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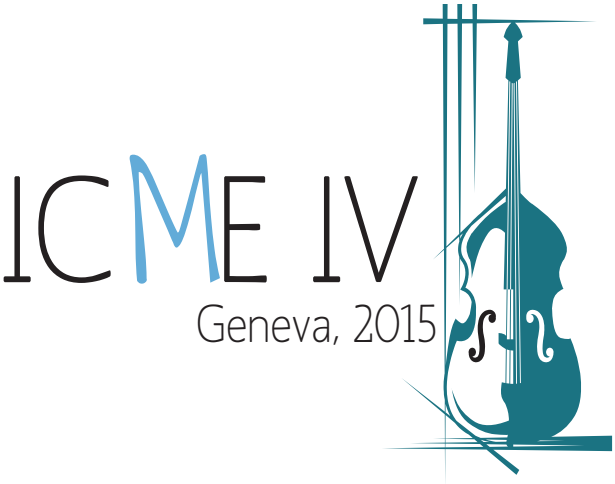
IV International Conference on Music and Emotion

Geneva, October 12-16, 2015

Book of abstracts

ICME IV
Geneva, 2015

The IV International Conference on Music and Emotion



Book of abstracts

University of Geneva

Geneva University of Music

Geneva, October 12-16, 2015

Welcome to ICME IV 2015 in Geneva!

Dear colleagues, dear friends,

We are extremely delighted to welcome the scientific community, the musicians and artists working on Music and Emotion in Geneva for the IV International Conference on Music and Emotion (ICME IV)!

The focus of this conference and related artistic events is the capacity of music to communicate and induce emotions in performers and listeners, and its widespread impact on human experience in everyday life.

The proposed program provides a multidisciplinary perspective on the field, including state-of the art approaches, the latest theoretical and empirical evidences, and future directions, potential applications will also be discussed. In addition, the conference will have as special focus research on the mechanisms by which the performing of and listening to music affects human experience at different levels: physiological, cerebral, behavioral, cognitive, aesthetic, and social. A better understanding of these mechanisms will open new perspectives for future scientific collaborations and promote new ways for experiencing cultural events.

This year ICME IV is organized jointly with the Musics & Sciences Festival 2015. We are looking forward to welcoming the artists who enthousiastically proposed several workshops and symposia on their works and related performances and concerts.

We are wishing you a fantastic and fruitful ICME IV in Geneva!

ICME IV Scientific and organizing committees

Scientific committee

Mme Kim Eliard, Department of Psychology and Educational Sciences and Swiss Center for Affective Sciences, UNIGE, Switzerland
Dr. Donald Glowinski, Department of Psychology and Educational Sciences and Swiss Center for Affective Sciences, UNIGE, Switzerland
Prof. Didier Grandjean, Department of Psychology and Educational Sciences and Swiss Center for Affective Sciences, UNIGE, Switzerland
Dr. Olivier Lartillot, Aalborg University, Denmark
Prof. Patrizia Lombardo, Department of Humanities, UNIGE, Switzerland
Prof. Ulrich Mosch, Department of Humanities, UNIGE, Switzerland
Prof. Marc-André Rappaz, Geneva University of Music, HEM, Switzerland
Prof. Patrik Vuilleumier, Department of Medecine, UNIGE, Switzerland

Organizing committee

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Prof. Didier Grandjean, Department of Psychology and Educational Sciences and Swiss Center for Affective Sciences - UNIGE
Prof. Marc-André Rappaz, Geneva University of Music, HEM, Switzerland

The scientific committee gratefully acknowledges the contribution of Dr Wiebke Trost and Dr Carolina Labbé as additinoal reviewers.

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Accounts of Emotional Reactions to Music: The Good, the Bad, and the Ugly

Juslin, Patrik N.

Uppsala University, Sweden

Emotional responses are often considered the driving force behind human engagement with music. In this talk, I will consider attempts to account for these reactions, which often appear mysterious to the general public. I begin by characterizing the emotions, their prevalence and nature. I then move on to review theoretical explanations of these emotions. First, I will look back at how the issue was initially investigated, and discuss some of the problems associated with the early attempts. Then, I will review current research on underlying mechanisms, with a particular focus on our recent studies at the Uppsala laboratory. Insights from this work will finally lead me to consider future directions. I will argue that, ultimately, progress in this area will require a statistical-ideographic approach, which means that listeners' responses are first modeled and understood at the individual level, before they are aggregated and summarized. I will illustrate this approach within the context of a specific psychological mechanism that has been previously neglected by music psychologists - aesthetic judgment. I will conclude that a multi-mechanism framework that includes aesthetic judgments is able to account for the wide variety of emotions that listeners experience during musical events.

Sweet musicke: Revisiting the musically beautiful

Scherer, Klaus R.

University of Geneva, Switzerland

In 1854 the influential music critic Eduard Hanslick wrote a pamphlet against the emphasis on emotion in musical romanticism, arguing instead for formal criteria for beauty in music. This position has been extremely influential over more than a century, up to the recent writings of the philosopher Peter Kivy. However, Hanslick did not deny that music can evoke emotions in the listener, he just did not want these to be used as defining or differentiating criteria. In this presentation, insisting on the important differentiation between utilitarian and aesthetic emotions, I attempt a synthesis between Hanslick's position on the inherent beauty of music and the frequent claim that music is "the language of emotions". In addition, I acknowledge that "aesthetic emotions" are not necessarily limited to reactions to something beautiful and pleasant. Instead, I propose a multi-component definition of musical emotions that includes criteria such as appraisal of beauty and ugliness (as part of an intrinsic un/pleasantness appraisal), a strong focus of attention (fascination and admiration), and a powerful impact on the organism, in the sense of "being moved". I will discuss different threads of empirical research to examine the utility of this theoretical framework, such as attempts to study the role of the appraisal of beauty in the visual and auditory modalities in analogy to sweetness in the gustatory modality. Furthermore, I will present a new Aesthetic Emotions Scale (AESTHEMOS) which we developed in collaboration with philosophers, literary scientists, and assessment experts.

Affect-Driven Music Consumption in the Mobile Streaming Age

Geoff Luck

University of Jyväskylä, Finland

Part of the attraction of listening to music likely stems from its affect-related qualities. We listen to music to comfort ourselves when we're sad and to lift us up in happier times. Music we find pleasurable activates our brain's reward circuits and evokes physiological indicators of emotional arousal. Listeners frequently report strong sensations in response to music, especially music they know well. In short, consuming music can be a highly moving experience. As such, one might assume that listening to music is a desired activity that people would seek out, especially given recent developments in digital streaming and mobile technologies that have rendered access to both recorded and live music effortless and ubiquitous. The aim here was to examine relationships between contemporary listening habits and a range of individual and affective factors, including music preferences, live music consumption, modes of listening, mobile OS affiliation, and demographics. Overall, it was found that people regard consumption of music as an extremely important aspect of their lives, listen to music for almost four hours per day (half of that time via a mobile device), and attend three major artist and four local artist concerts per year. Fans of Apple iOS attend more live concerts and regard both listening to music and music in general as significantly more important than their Google Android-driven counterparts. A host of other significant relationships between music preferences, demographic variables and affective aspects of music consumption were identified. Additional results will be presented at the conference.

The relative contributions of composition and visual and auditory performance cues to emotion perception

Thompson, Marc R.[1]; Vuoskoski, Jonna K.[2]; Clarke, Eric F.[2]

1: University of Jyväskylä, Finland; 2: University of Oxford, United Kingdom

Visual and auditory performance cues, as well as structural features of the music, can all communicate emotional information to observers. However, little is known about the relative contributions of these components to emotions perceived in music. In two experiments, we systematically varied the emotion conveyed by the structural features of the music, as well as the emotional expression communicated by the performer. In Experiment 1, a pianist performed four short pieces (sad, happy, scary, and tender-sounding) with four different expressive intentions: sad, happy, angry, and deadpan. The body movements of the pianist were tracked using optical motion capture. Subsequently, 31 participants rated the emotions that they perceived in the performances in audio-only, video-only, and audiovisual rating conditions. In order to investigate the possible influence of visual performance cues on emotion perception in the audiovisual rating condition, the four deadpan audio tracks were paired with motion capture animations representing the four different emotional expressions (of the same piece). A time-warping algorithm was applied to the motion capture animations so that the audio and video would appear synchronized. The ratings were analyzed using repeated-measures ANOVAs. In the audio-only condition, both the type of composition and the type of expression had a significant effect on participants' emotion ratings. In the video-only condition, participants accurately recognized the emotional expression conveyed by the performer. In the audiovisual condition, there was a significant effect of visual expressive cues on the ratings of perceived sadness. In Experiment 2, we replicate the experimental design using violin performances. The data collection for Experiment 2 is still in progress, and findings will be reported at the conference.

Human emotions track acoustic changes in environmental sounds

William Forde Thompson, Weiyi Ma

Macquarie University, Australia

Speech and music define us as humans, yet their evolutionary origins remain a mystery. Charles Darwin proposed that they originated from a common emotional signal system based on the imitation and modification of environmental sounds. This hypothesis is compatible with evidence suggesting that speech and music are processed by common mechanisms and share a common code for conveying emotional states. However, Darwin's suggestion that this code originates from the imitation of environmental sounds has never been examined. Here we report that changes in acoustic energy that are well known to interact with human emotions in speech and music also trigger systematic emotional responses when they occur in environmental sounds, including sounds of human actions, animal calls, machinery, or natural phenomena such as wind and rain. In Experiments 1 and 2, three acoustic attributes known to trigger emotional responses in speech and music – pitch height, intensity, and rate - were manipulated in 24 environmental sounds. Arousal and valence ratings of stimuli confirmed that emotions reliably track acoustic changes in environmental sounds. Increased pitch, intensity, and rate led to higher ratings of arousal and valence. In Experiment 3, participants compared the emotional expressions of two sequential faces. Manipulations of accompanying environmental sounds significantly influenced judgments of faces, illustrating implicit processing of emotional content in the sounds. The findings align with Darwin's hypothesis and indicate that changes in the acoustic environment are tracked by human emotions. We discuss our findings with respect to current theories of the link between emotion and music.

Emotion regulation in children with autism through music-based biofeedback

Bortz, Brennon Christopher; Bradburn, Isabel; Scarpa, Angela; Bell, Martha Ann; Swain, Deanna; Knapp, R. Benjamin

Virginia Polytechnic Institute and State University, United States of America

Children with autism spectrum disorders (ASDs) often struggle with impaired social interaction, repetitive and destructive behavior, and outbursts of emotion. While various means of aiding children in understanding and coping with these struggles exist, the aim of the Hear My Emotion project is to explore and develop means of helping children with ASDs effectively recognize and self-regulate emotion through automatic musical feedback. Through physiological sensing, arousal levels a child are monitored. When increasing levels of stress or frustration are detected, musical feedback is provided to the child through unobtrusive bone conduction headphones. Based on the massive database of physiological responses to music we have gathered through our worldwide Emotion in Motion project, three models of this musical feedback are being developed. In the first, music serves as a binary indicator to children of a stress. In the second, this indicator is coupled with a goal-based mechanism that signals effective self-regulation of this stressed state by the child. The third model--more than an indicator--presents continuous feedback to the child, assisting the child in self-regulation without requiring the child to actively attend to the music. This paper presents our analysis of the Emotion in Motion database that drives this work, our early and ongoing work in developing this system, our early results from work with typically developing children that will be used as we move to work with children with autism. Specifically, we present the results of several pilot studies exploring musical-emotional fluency and of detection of stressful affective states dynamic Bayesian networks.

Explicit and implicit processes in music and emotion

Franco, Fabia

Middlesex University

"Music is the shorthand of emotion" (Tolstoy, 1910): although music is considered a form of communication with limited semanticity, it remains a preferred human cultural activity that has the ability to alter mood, create connection and shape shared understanding between people[1]. In contemporary research, music is being studied within an integrated model of the human mind and behaviour. In this symposium, we will bring together new innovative research shedding light on different explicit and implicit processes underpinning vital associations between music, emotion and cognition. We aim to 1/ uncover hypotheses on how music occupies an influential role in human life through development and 2/ raise new questions in the debate on musical universality. The first paper (Bravo) will show how specific aspects of sensorial and tonal consonance and dissonance, integrated in a visual context, can influence our perception, interpretation and memory. A second paper (Van Puyvelde) will show how infant musical predispositions are involved in the creation of emotional and physiological parent-infant (co-)regulation and how consonance-dissonance within this early communication may lay the foundation for later emotional and physiological associative abilities. The third paper (Franco et al.) will specify how a listener's mood and music interact with one another in the creation of optimal cognitive performance and physiological self-regulation in 5- to 10-year-old children. Finally, the discussant (Cross) will elucidate key aspects of the papers' contributions to furthering our understanding of music and emotion.

The effect of musical dissonance on the emotional comprehension of visual information

Fernando Bravo

TU Dresden/University of Cambridge

Music is fundamentally a non-representational art form, distinguished from language by its lack of precise semanticity. However, when integrated into a visual context such as film, it can provide an underlying structure for the cinematic discourse. Its capabilities go beyond mirroring or providing a simple counterpoint to a meaning already portrayed by the visual images[1]. Experimental evidence highlighted that 1/ it can deeply influence the interpretation of film narrative, affecting not only perceptual judgments of, but also memory for, filmed events[2,3] and 2/combining music with visual information has been shown to consistently modulate activity in brain structures linked to emotion[4]. However, few studies carefully examined how specific structural characteristics of music may alter the emotional processing of visual information. Bravo's research aims to establish the manner in which alterations of the musical structure – tonal and sensory dissonance – may influence the emotional interpretation of visual scenarios. Ultimately, his work aims to build a scientific framework for designing interactive audiovisual environments to study the non-verbal mechanisms involved in complex emotional responses.

The function of infant musical predispositions in daily emotional and physiological parent-infant co-regulations

Martine Van Puyvelde

Vrije Universiteit Brussel /Royal Military Academy

It has been suggested that infants are endowed with musical predispositions[1] for tonal and rhythmic aspects that are foundational for music in different cultures. Recently, it has been observed that these specific predispositions are functional in daily parent-infant conversations structuring the timing[2] and prosody[3] of their early language. Moreover, it seems that in terms of music, processes of consonance and dissonance to which infants show sensitivity in linguistic/vocal exchanges, hold an important regulating function in interpersonal emotional[4] and physiological[5] exchanges across different cultures[6]. In this presentation, Van Puyvelde will show how musical predispositions are expressed through tonally synchronized mother-infant vocalizations and how this early musicality interacts with bodily expressions of interpersonal affect and physiological co-regulation. The examples originate from a series of mixed observation-experimental studies using acoustical pitch analyses (n=932 vocal samples), physiological regulation processes of heart rate variability (HRV based on heart rate and respiration) (n=40 dyads) and multimodal parent-infant synchrony observation (n=30 dyads).

Mood-matching music (not 'happy' music) improves cognitive performance and neuro-visceral integration in children

Fabia Franco[1], Joel S. Swaine[2], Martine Van Puyvelde[3]

1: Middlesex University, 2: University of Hull, 3: Vrije Universiteit Brussel / Royal Military Academy

We recently proposed a novel model to explain cognitive benefits associated with exposure to music[1] and provided a first empirical test suggesting that cognitive gains appear only with exposure to music whose perceived characteristics match a participant's mood[2]. We aim to corroborate this model and extend the range of measures by including both behavioural and physiological data over the lifespan. In this paper we report the first results of a sample involving children aged 6-10 years (n=45, 50% female). The experiment included a fixed within-subject design: 1/Baseline neutral video and cognitive test, 2/happy or sad mood induction (silent video), 3/ happy or sad music (mood matching or mismatching), 4/cognitive posttest, 5/other music (i.e., mismatching when first matching), 6/ cognitive posttest. Physiological self-regulation (respiratory sinus arrhythmia – RSA) was measured throughout the experiment. Mood-matching music enhanced cognitive performance, except in the sad condition when children were first exposed to mismatching music. Results on self-regulation supported the behavioural data, including failure to restore in the mismatching-matching exposure conditions.

How music and vocalizations impact on early behavioral and brain development in premature infants

Discussants: Didier Maurice Grandjean, Petra Susan Hüppi

University of Geneva

WHO prevalence numbers indicate that, every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation) and this number is rising. The important health consequences for preterm birth and perinatal care stretch from the neonatal period to childhood and adulthood, with its effects ranging from motor disabilities to difficulties in cognitive domains such as attention, memory, reading, mathematics, to reasoning and emotion regulation; the basis of these consequences laying in the alteration of early brain development. Ramon y Cajal 1899 in his studies on the making of the brain clearly stated: «The total arborisation of a neuron represents the graphic history of conflicts suffered during its developmental life». Understanding the effects of environment changes on early brain development and to define timing and mode of early interventions to enhance brain development will be a major task for maintaining and improving cognitive and non-cognitive skills in many high risk populations. In this symposium we will address how music and human vocalizations are processed during early life development in healthy newborns and preterm infants and how such musical and voice exposure are able to modulate early neural development and to modify infant behaviors. In order to design developmental care interventions, it is important to understand how activity and environmental stimuli shape the developing brain. This symposium will address new findings on activity induced plasticity resulting in structural and functional modulation of the developing brain. Prof. Petra S. Hüppi will describe the brain developmental consequences of preterm birth from infancy to childhood and illustrate brain structural alterations linked to socio-emotional development. Lara Lordier will address how music, as an early intervention, impacts on brain development using functional MRI. Alexandra Adam-Darque will describe how early vocal exposure influence neuronal networks involved in voice processing using fMRI and EEG. Manuela Filippa will present how mother voice exposures, i.e. maternal infant-directed vocal communication, modulate and is modulated by preterm infant behaviors during online interactions. The composer and musician Andreas Vollenweider will discuss his long and fruitful experience with music in different social and clinical contexts.

Invited: Andreas Vollenweider: In his presentation Andreas Vollenweider focusses on music's contribution in the development of the emotional consciousness and its effect on psychological and physical health. He will share interesting personal stories, which will provide an extended view on music's capacity as a means of communication for complex content. He will also discuss his long and fruitful experience with music in different social as well as clinical contexts. Andreas Vollenweider, born 1953 into a musical family in Zurich, is a musician through and through, pioneer, discoverer. Vollenweider is among the world's most successful instrumentalists ever, and his music is one of a kind. His trademark, the electro-acoustic harp he devised himself and ceaselessly fine-tunes, makes him incomparable. It's difficult to categorise him; on the American Billboard charts he has been represented simultaneously in the lists of the best rock/pop, jazz and classical albums! He has sold over 15 million albums worldwide, received several Grammy nominations and is still the only Swiss to have been granted the music industry's highest award. - www.vollenweider.com

Brain development in premature infants

Petra Susan Hüppi

University of Geneva

In order to understand how the brain grows to master complex cognitive functions is a fascinating task of developmental neuroscience. Every step in brain development contains major micro and macro structural changes that lead to functional competence from the fetus to the newborn to the child and into adulthood. Non-invasive neuroimaging has allowed researchers in recent years to start to assess these important structural changes during brain development. The three major structural characteristics of the developing human brain are dynamic changes in cortical lamination, the cortical folds with the complex surface structure tightly linked to functional specificity and the underlying connectivity that provides the basis for functional networks. Over the last two decades these advanced neuroimaging tools have allowed to illustrate specific alterations in structural brain development of preterm infants affecting the prefrontal and limbic cortico-basal ganglia-thalamo-cortical loops providing a link for their executive and socio-emotional dysfunction later in childhood, with recent data showing a marked effect on the development of the amygdala.

Music and early brain development in the newborn

Lara Lordier

University of Geneva

Development of neural networks in the perinatal period is highly dependent on the intrinsic and extrinsic multisensory activity driving maturation of neuronal circuits. Stress induced by the Neonatal Intensive Care Unit (NICU) contributes to the developmental disorders observed in preterm infants. Neural and functional consequences of (extreme) prematurity warrant for consistent NICU care enhancement. While noise in neonatal intensive care units has a detrimental effect, music, as a multisensory exposure, has been related to positive consequences for premature babies on various physiological and behavioral settings. Furthermore, listening to music is a complex process for the brain, since it triggers a sequel of cognitive and emotional components with distinct neural substrates. We assessed music processing in newborns, and impact of music exposure on brain development using functional MRI and resting state fMRI in full-term and preterm at term equivalent age infants. Preterm infants listened everyday to music especially created by a renowned musician and composer Andreas Vollenweider (http://www.vollenweider.net), adapted to their high fragility and to their behavioral state. Our results indicate that preterm infants can benefit from early ex-utero experience, leading to an enhanced functional brain development.

Early sensory experience on voice perception in newborns

Alexandra Darque

University of Geneva

Hearing is already functional during the last months of pregnancy and shortly after birth, full-term neonates demonstrate a preference for their mother's voice. After very premature birth, the immature brain is exposed to various auditory stimulations and the question remains open if preterm babies benefit of these early sensory experiences. The aim of this electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) study is to investigate the neural pathways involved in voice perception in full-term babies and preterm infants tested at term equivalent age (TEA). Functional MRI and high-density EEG were performed on newborns while listening to their mother's voice and the voice of an unknown woman. Both event-related potentials and fMRI results show that the two groups of infants process differently the mother's and stranger's voices, but with a less pronounced difference in preterm infants. Exposure to voices as experienced by preterm infants explain this attenuation, thus early ex-utero experiences may influence the maturation of neuronal networks involved in voice processing.

Maternal infant-directed speech is modulated by preterm infant behaviour

Manuela Filippa

University of Geneva

Mother's voice is known to be a key element for bonding and survival in humans. Preterm birth represents a sudden interruption of the bonding process that begins in the perinatal period. In their first weeks of life, preterm infants are deprived of developmentally appropriate stimuli, including the mother's voice and, conversely, are exposed to an unpredictable auditory environment. In case of premature birth, the bidirectionality of mother-infant vocal communication can be compromised. Aim. The current study explores the effects of preterm infant's positive behavior (open eyes and smile) on the acoustical features of mother's voice. Methods. Participants were twenty mothers who were asked to speak and to sing to their medically stable infants placed in incubators (34.8±4.5 WGA). 85 audio sequences of maternal speech and singing synchronous with an infant positive behavioral display are compared to random selections in absence of infant behavioral display. Results. Mothers of preterm infants are sensitive to infant's positive behavioral displays during infant-directed vocal communication, maternal voice modulates according to these positive displays and that this modulation is evidenced in maternal voice's pitch and energy. Conclusions. In preterm dyads, maternal voice modulates by acoustical signals which are conformed to the musical features of IDS. The bidirectional nature of human communication is discussed.

Sanguineus and Melancholicus

Florence Malgoire[1], Donald Glowinski[2]

1: Geneva University of Music, 2: University of Geneva, Switzerland

This one-hour workshop with world-class baroque violinist Florence Malgoire will aim at discussing the scientific and artistic projects that are currently led with the University of Geneva and the Haute Ecole de Musique. Specifically, recent results on brain and behavioural analysis of the musicians' performance expressivity will be reviewed. The use of new technologies, such as motion capture and virtual immersive environment to investigate the musician practice and stress resilience during public performance will also be discussed.

Building up musical character using modeling as a practice strategy

Stefanie Freitas, Cristina Capparelli Gerling

Universidade Federal do Rio Grande do Sul, Brazil

As part of a larger research project, we present the results of an empirical investigation on the manipulation of temporal parameters aiming at defining the character of a musical work. In addition to tempo markings, composers may also request specific emotional states also known as character for their works. Schumann's pieces found on Davidsbündler, Phantasiestücke and Kreisleriana collections show the mark Innig (Intimate). Likewise, Brazilian composer Camargo Guarnieri (1907-1993) wrote a short piece Ponteio 46 and marked Íntimo (Intimate). This work was used to investigate how nine pianists of diverse levels of expertise manipulate temporal parameters to define Íntimo in their performances. This work is part of a major collection of piano pieces found in twentieth-century Brazilian repertoire. Guarnieri's directions for tempo and character are given in Portuguese language. In this sample, the participants were asked to imitate two contrasting commercially available recordings of the selected piece and to use modeling as a deliberate practice strategy. Modeling is a learning process in which students imitate interpretations (models), absorb or deny elements and turn them into individual and creative ideas. The preparation of this excerpt was monitored during eight weeks. Data collection was based on five semi-structured interviews and five recorded performances (MIDI format, recorded in Yamaha Disklavier DKC-800). We based data analysis on the content of interviews and measurement of time with aid of software Sonic Visualiser. As predicted in the initial hypothesis, modeling contributed to increase expressive intentions articulated in order to establish the requested character for the work.

Evidence for the multidimensional nature of hedonic value in the perception of Romantic piano music

Manuela Marin, Michaela Wandl, Helmut Leder

University of Vienna, Austria

Berlyne (1971) posited an inverted-U relationship between hedonic value and complexity in arts appreciation, but converging evidence for his theory is still missing. Recent evidence suggests that neglecting the multidimensional nature of complexity may explain the diverging results. Here, we propose that definitions of hedonic value are also manifold and comprise concepts such as liking, beauty and pleasantness, which, besides the definition of complexity, may determine the nature of the relationship between hedonic value and complexity. In fact, we recently demonstrated that the relationship between hedonic value and complexity varies according to the definition of hedonic value in response to visual art. Depending on the definition of hedonic value, the relationship with complexity was either linear or not present. Here, we further examined whether hedonic value is a uni- or multidimensional concept in the perception of another art form, namely music. Stimuli, which comprised 92 affective Romantic piano music excerpts varying in arousal and pleasantness, were presented for 15 s to 64 female non-musicians. Ratings of hedonic value (either pleasantness, beauty, or liking), arousal, complexity and familiarity were collected on 7-point scales. Participants' mood prior to the experiment, age and musical sophistication were similar across conditions. When controlling for familiarity with the musical excerpts, we observed strong correlations between arousal and complexity (all rs ~ .80). Curve-fitting analysis showed that the association with complexity was significantly negative for pleasantness (rs = -.40), positive but not significant for liking (rs =.16), and not present for beauty (rs = -.09). Across conditions, the measures of hedonic value were moderately correlated (all rs ~.70) and those of complexity highly correlated (all rs ~.90). These findings partly replicate those previously obtained for visual art and suggest that aesthetic theories need to account for the multidimensionality of hedonic value.

Nikimun from Chisasibi: An emotional relationship with the land through songs

Roxane Campeau

Université de Montréal, Canada

Sound and Sentiment has provided the first cognitive analysis of songs (Molino 1984): for Kaluli people, musicking is representing the environment at the same time that it is shaping their way to perceive that environment. With this work, Steven Feld revealed the basis of a new paradigm, now handled by ecomusicology. Beyond the culturalist/naturalist debate, ecomusicology is studying both how music creates worldviews by inducing emotions and how those emotional processes are constitutives of the affective qualities of a particular soundscape (Schafer 1977; Feld 1982, éd. 2012; Kelman 2015). Along that line, I present a succinct literature review from neurosciences, human geography and ecomusicology that leads to the following: music can represent the land by eliciting emotions and memories. Both are necessary to create a sense of place which in turn creates a territory to remember. I provide a discourse analysis from three recent fieldworks within the Cree Nation of Chisasibi, Eeyou Istchee, to describe how singers from Chisasibi relate to the land by singing songs (nikimun). Therefore I suggest that emotions associated with land experience are the foundation of songs at the same time that songs' emotional content represents the affective qualities of the land. As an elder from Chisasibi said : « To hear a song makes you go back to the land [...] People loved being on the land, that was their life, and from that they started to create songs about the land, songs from the heart ».

The relative role of embodied simulation and semantic associations in emotional contagion with music

Julian Cespedes Guevara, Nicola Dibben

University of Sheffield, United Kingdom

Recent theories of musical emotional contagion have proposed that listeners become "infected" with the emotion they perceive in music either by implicitly mirroring the melody of the piece; or the movements that performers make when playing. This experiment aimed to test these competing hypotheses. Participants listened to three instrumental pieces (expressing sadness/tenderness, fear/anger, and joy, correspondingly) and were randomly assigned to 4 listening conditions: Group 1 engaged in vocal simulation (i.e. humming along with the music), Group 2 engaged in motor simulation (i.e. pretending to play the instruments of the piece), Group 3 engaged in a distracting motor and vocal task; and Group 4 listened to the music remaining silent and still. The participants' affective state was measured with verbal self-reports, and with an indirect perceptual technique in which participants watched faces that changed from different expressions, and were asked to detect the offset of the initial expression. A short interview was also carried out to explore the participants' semantic associations and visual imagery. It was predicted that participants in both simulation groups (1 and 2) would experience more intense perceived and induced emotions than participants in groups 3 and 4; and that participants who evoked more emotional associations would experience more intense emotions, independently of their listening condition. Results indicate that even though the participants in the motor simulation group experienced slightly more intense emotions than the participants in the other groups, these differences are not large enough to become statistically significant. And in the case of the fear/anger piece, semantic and autobiographical associations significantly predicted stronger and more negative perceived and induced emotions. These results suggest that the even though motor embodied simulation may facilitate emotional contagion with music, the activation of semantic associations may play a more central role in this phenomenon.

Differential Activation of Mechanisms Underlying the Induction of Emotions in Music Listeners Suffering from Depression

Laura Stavroula Sakka

Uppsala University, Sweden

Music has the potential to elicit emotions in listeners, and recent research shows that these emotions are mediated by a number of underlying psychological mechanisms, such as contagion and memories. Depression has been associated with negative biases in cognitive processes (e.g., memory, attention). The aim of this study was to explore whether such cognitive biases also influence the activation of mechanisms during music listening in depressed people. Depressed and healthy-control individuals participated in a music listening experiment, which featured musical stimuli that targeted specific mechanisms (i.e., brain stem reflex, contagion, and episodic memory). After each piece, listeners rated scales measuring the BRECVEMA mechanisms and their felt emotions. Participants also completed a survey assessing emotion regulation with music, and filled out psychometric tests of depression (BDI) and anxiety (BAI). Depressed people showed differences in emotional reactions to music compared to healthy controls, and these could be explained by a differential activation of the mechanisms. Differences between depressed and controls were also found in the emotion regulation strategies reported. These results suggest that cognitive biases are evident in the activation of mechanisms during music listening and influence the way depressed people experience music. Knowledge of this kind may be of potential use for music-therapeutic interventions against depression, where focus lies on the underlying mechanisms mediating the induction of musical emotions.

Daily pleasures: The role of pleasure types in determining the emotional engagement of daily art experiences

Johanna Maksimainen, Suvi Saarikallio

Dept. of Music, University of Jyvaskyla, Finland

Theories of art and aesthetics embrace the relevance of subjective interpretations, however, the impact of music listening, pictures, and broader audiovisual environments on the emotional experience has repeatedly been studied by focusing on the stimulus properties. This study aims to advance the subject-driven approach into the research of everyday art-induced emotions through a detailed exploration of the related motivational basis, in particular, how the subjective pleasure orientations and emotional orientations relate to each other. Data was collected through an online questionnaire (N= 109), designed for measuring emotions and conceptions that the respondents relate to a musical piece or a visual object they consider specifically significant in their daily life. Participants' pleasure orientations relating to the chosen object were assessed through 12 items, representative of Tiger's model of four pleasure types. Emotional orientations were assessed through 53 emotion terms. Exploratory factor analysis indicated a four-factor model for the pleasure orientations and a 12-factor model for the emotional orientations. Regression analyses were calculated to predict the 4 emergent pleasure orientation factors by the 12 emotional orientation factors. Specific relations between the emotional and pleasure orientation factors were observed, showing that different types of pleasure (socio, psycho, physio, ideo) in daily art engagement are characterized by particular emotional contents. The study provides novel perspectives for understanding the underlying structures directing individuals' emotional engagement to everyday objects.

Training musicians : aesthetic dimension of art works as a tool to develop the emotion complex

René Rickenmann, Luis De la Calle

University of Geneva, Switzerland

In the field of studies about relationships between music and emotions, the models have been proposed are usually based in an 'internalist' conception of the emotional impact of music in which usually the musical works causes emotional effects on the listener. From a 'situated cognition' perspective, more recent versions of this models take a more contextual approach through cultural variables like 'musical expectancy' and 'aesthetic emotions' (Hargreaves, North & Schubert, 2013). Despite the fact that some researchers adopt those ecological approaches, the relationships are usually conceived in terms of interactions between two entities that develop independently. On the contrary, theories based in a historic-cultural paradigm (Vygotski 1925/2005) takes a more dialectic analysis of the relationships between the social context and cultural works, in one hand, and the subject developpement of his emotional complex, on the other hand. On this paradigm, the development of emotions are conceived as a triadic system in which interact three instances: the teacher as mediator of the interactions between the learner and the cultural object. In this perspective we mobilize the russian concept of «perezhivanie», meaning «lived emotional experience», as a professionnal tool to develop those artistic skills. This concept used by Stanislavski in drama training (1949) can be useful to understand this « teacher/music work/learner » system, when the music teacher mediation can influence learner knowledge and skills about music as a cultural emotions device. According to the Vygotski's approach of art psychology (1925/2005), we define the artworks as «social techniques of emotions».In this paper we present a study of an Andean training music performers about autochtone instrument playing of this traditional music. In those workshops the trainer introduces «didactic situations of perezhivanie» in order to enrich the emotional meanings of this music for the music performer first and then for his future listeners. Thereby we contribute to the discussion about Gabrielsson & Juslin's research question relating to « try to determine the extent to which musicians and listeners have a common [cultural] expressive code » (1996, p. 70).

Personality factor sensation seeking and the experience of music: Heart rate effects during rhythmical alterations

Andreas Altorfer[1], Christian Mikutta[2], Anina Tereh[1], Simon Schwab[1], Werner Strik[1]

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The concept of „Sensation Seeking" quantifies a personality construct that is focussed on thrilling experiences in life. This theoretical position is based on a psychophysiological mechanism that connects a baseline in arousal with stimulus-dependent changes. In connection with music, it is assumed that certain interpretations have the power to produce different forms of arousal in „high sensation seekers" (HSS) compared to „low sensation seekers" (LSS). 40 subjects were screened using the Arnett Inventory of Sensation Seeking (AISS-D). In an experimental situation two versions of Beethoven's „Elise" were presented after a baseline measure of 2 minutes. One interpretation was built with a music synthesizer in regular pulse transformed to a Steinway piano sound. The other interpretation was played by Siang Wong; it can be characterized by rhythmical variations to increase tension in relevant harmonic parts. Heart variables (heart rate - HR- and heart rate variability - HRV) were recorded and analysed. Groups of „high" and „low" sensations seekers were built (using Median split). Connections between rhythmical variations and heart rate were evaluated using ANOVAs, Pearson correlations, and wavelet-based „Semblance" analysis (Mikutta et al. 2013). Using common statistical methods, interpretations with rhythmical variations and regular pulse are not associated with stimulus-dependent changes in HR and HRV. However high sensation seekers showed a general dominance in sympathicus activity compared to low sensation seekers. Using the highly sensitive semblance analysis, it can be shown in a comparison of both sensation seeker groups, that low sensation seekers only present stimulus-dependent correlations between rhythmic structure and HR changes (correlations between .5 and .9), whereas high sensation seekers displayed no physiological reaction i.e. are not sensible for variations in musical pulse.

Analyzing mystic ecstasy : how music participates in the emergence of emotion in Sufi rituals ?

Amélie Pavard

Labex Gream, France; Université Lyon 2, France

If the concept of mystic audition in Sufi esotericism was widely exposed (During 1988 ; Regula Qureshi, 2006), the nature of emotion felt by religious adherents, and the way it emerges continues to feed the debates. In Sufi rituals, followers try to reach to a superior spiritual state by listening to mystic songs and dancing (Rouget, 2004 ; During, 1994 ; Barsalou et al., 2005). In this context, ecstasy emergence is conditioned by an emotional sharing between singers and believers. Dance movements are generally explained as a "catharsis" and consequent to ecstasy (During, 1994), or as a way to remember ritual songs in order to feel the emotional religious text (Beaudoin and De Lavergne, 2008). However, a field study in Damascus highlights that movements due to music start immediately at the beginning of the ritual. A survey was conducted with uninitiated French subjects who had to learn individually Sufi poems with/without what they thought to be sports movements but were Sufi movements. It appears that free recall was significantly lower for subjects who learned poems with movements than without movement. In addition, movements tend to produce significantly more self-reported feelings, and could enable the integration of embodied emotions. Then, an acoustic study of emotion expressed by singers (Scherer, 1984, 1989) showed that the introduction of followers' movements would intensify singers' emotions in an emotional contagion way (vowels length or fundamental frequency changes…). These results are consistent with the hypothesis that movements due to music are fully involved in trance process.

Timbre and texture as perceptual-emotional aspects of musical hearing

Mario Baroni, Roberto Caterina, Fabio Regazzi

University of Bologna, Italy

Although timbre and texture aspects have often been studied in the field of acoustic research for the musical process a relatively few studies have been done in the perceptual-emotional domain. The study we are going to present integrate these different domains. It is based on Laborintus II by Berio, particularly on a fragment of a short episode called "canzonetta" where the "colour" of death is reproduced by singing voices and instruments. We recorded separately 8 small groups of homogeneous instruments and voices in a performance of this chamber piece in order to obtain a global result that we could mechanically modify by subtracting one or more of such recorded groups. We prepared four different excerpts: one with the original version and three with modified versions by subtracting some recorded groups . 50 participants (25 experts, 25 non experts) were invited to fill in semantic differential bipolar Likert scales made of 12 adjectives -6 of them concerning perceptual aspects of sound and 6 related to emotional responses - in relation to the excerpts previously described. Spectrograms of different versions were analyzed using sonic visualizer program and software. Expert participants were musicians and music analysts used to modern classical music repertoire. Non experts were university students with no musical experience. The aim of our study was to explore which timbre and texture effects depicted better the color of death and evoked its sweet affective power. Non experts results are undifferentiated while expert results are consistent with our theoretical assumptions as indicate different adjectives couples for each fragment representing experimental variations. Where voices and their instrumental doubling have been subtracted experts judge music as more transparent and serene; where percussive effects are eliminated as softer and where echo effects are no present as more alarming.

Daily pleasures: The role of pleasure types in determining the emotional engagement of daily art experiences

Johanna Maksimainen, Suvi Saarikallio

Dept. of Music, University of Jyvaskyla, Finland

Theories of art and aesthetics embrace the relevance of subjective interpretations, however, the impact of music listening, pictures, and broader audiovisual environments on the emotional experience has repeatedly been studied by focusing on the stimulus properties. This study aims to advance the subject-driven approach into the research of everyday art-induced emotions through a detailed exploration of the related motivational basis, in particular, how the subjective pleasure orientations and emotional orientations relate to each other. Data was collected through an online questionnaire (N= 109), designed for measuring emotions and conceptions that the respondents relate to a musical piece or a visual object they consider specifically significant in their daily life. Participants' pleasure orientations relating to the chosen object were assessed through 12 items, representative of Tiger's model of four pleasure types. Emotional orientations were assessed through 53 emotion terms. Exploratory factor analysis indicated a four-factor model for the pleasure orientations and a 12-factor model for the emotional orientations. Regression analyses were calculated to predict the 4 emergent pleasure orientation factors by the 12 emotional orientation factors. Specific relations between the emotional and pleasure orientation factors were observed, showing that different types of pleasure (socio, psycho, physio, ideo) in daily art engagement are characterized by particular emotional contents. The study provides novel perspectives for understanding the underlying structures directing individuals' emotional engagement to everyday objects.

Emotional problems of musically gifted students from parents' perspective

Malgorzata Sierszenska-Leraczyk

I.J. Paderewski Academy of Music, University of Music, Poland

The author of the presentation is both a psychologist and a musician. She is a lecturer at Academy of Music (University of Music) in Poznan (Poland) where she is heads the Laboratory of Psychology of Music. She has also worked as a teacher and a psychologist in specialist music schools of Poznan for over 35 years. Family environment plays a great role in a child's professional development, thus it has been undertaken to check how music education is perceived and evaluated by parents whose children attend music schools. The results - presenting in the poster - are based on 31 questionnaires filled in by parents of children attending secondary specialist music schools in 5 Polish cities. 15 parents had one child in the school; 16 more than one, and the survey comprised 54 students. The children attended school in a wide time span, i.e. from 1984 to 2014. The survey especially focused on advantages and disadvantages of secondary music schools as seen from parent's perspective. The most common advantages included: i.e.: learning time management when having a lot of duties and activities; learning discipline, work planning, and self-development; ability to identify and solve problems; shaping self-discipline. Summing up parent' opinions, I should notice that difficulties and disadvantages of attending specialist music school are mostly connected with life in general or the intensity of studying. They do not undermine the way music schools operate, but rather show the family's engagement in the child development. The advantages regard music education. What is interesting is the fact that the added value of intensive music education is noticed and appreciated by parents. Finally, comments and comparisons of comprehensive and music schools also tend to present positive aspects of receiving musical education.

Emotional connotations of musical timbre of isolated instrument sounds through the perspective of affective speech: Behavioural and ERP Evidence

Xiaoluan Liu, Yi Xu, Jyrki Tuomainen

University College London, United Kingdom

In this study we aimed to explore emotional connotations of musical timbre of isolated instrument sounds through the perspective of affective speech using behavioural and ERP experiments. The behavioural experiment aimed to compare the timbre (i.e., voice quality) of affective speech and the timbre of isolated instrument sounds categorized by listeners into three emotions: anger, happiness and sadness. The results showed that there were no significant differences between affective speech and musical instruments in terms of the timbral acoustic features in each category of the emotions. Two ERP experiments were conducted using the stimuli from the behavioural experiment to study the neural processing of affective speech and instrument sounds. The first one tested the ERP patterns (the P200 and LPC) of affective speech and instrument sounds separately. The results showed that overall, speech had significantly higher P200 and LPC amplitude than isolated instrument sounds, which is probably due to the brain processing advantage of human voice. Nevertheless, similarities also exist: in both speech and instrument conditions, anger was higher than happiness and sadness in the P200 and LPC amplitude; sadness was higher than happiness in the LPC amplitude. The second ERP experiment used a priming paradigm, with isolated instrument sounds as primes and affective speech as targets. The results showed that emotionally incongruent instrument-speech pairs triggered larger N400 than emotionally congruent pairs. Taken together, this study provides further evidence for emotional connotations of musical timbre of isolated instrument sounds through their acoustic and ERP similarities with affective speech.

Music for anxiety? A critical review of music listening effects on anxiety in non-clinical samples

Yulia Panteleeva, Grazia Ceschi, Donald Glowinski, Guillaume Fürst, Didier Grandjean

University of Geneva, Switzerland

The healing power of music has been recognised since ancient times. Despite this interest, the empirical evidences and the possible theoretical mechanisms underlying music effects on affective states remain controversial. Recent research efforts have been made to better understand music impact in various clinical settings including anxiety. Unfortunately, the neglect of mechanisms explanation coupled with a high variety in experimental methods has prevented scholars from drawing clear conclusions. The aim of the current study is to review state-of-the-art empirical studies on the effect on anxiety of music listening in healthy individuals. For each study, theoretical background, methods, and potential for interventions are considered. Eligibility criteria based on Cochrane guidelines for Randomized Controlled Trials (RCT) allowed the selection of a significant subset of 32 studies out of 5151 articles. This review confirms that music listening tends to decrease anxiety in healthy individuals, with the greatest effect on psychophysiological measures. With some exceptions, the available body of literature is far from reaching methodological golden standards. Moreover, very few publications rely on a strong cognitive model from which specific hypothesis may be derived (e.g., model of autobiographical memory and appraisal theory). As a whole, the effect of music listening on anxiety has to be considered with caution from both an empirical and a theoretical validation perspective. In accordance with Juslin (2013), a theory-driven approach and more stringent empirical protocols are expected to reach cutting edge conclusions. Implications of these findings for psychological interventions and new research protocols are discussed.

Perception of musical and vocal emotions processed through cochlear implants

Alexandre Lehmann[1,2,3], Sebastien Paquette[2,3], Duha Ahmed[1,2], Isabelle Peretz[2,3]

1: McGill University, Canada; 2: International Laboratory for Brain, Music and Sound Research & Centre for Research on Brain, Language and Music, Canada; 3: University of Montreal, Canada

Cochlear implants restore the sense of hearing in the deaf, but several acoustic features crucial for perceiving auditory emotions are severely degraded. Therefore implantees are impaired at perceiving emotions, with negative consequences on social development, communication and quality of life. Previous studies documenting this deficit have used complex stimuli and did not compare emotions in the musical and vocal domain directly. Many confounding variables make these domains hard to compare: factors such as semantics, length, harmony and context are likely to recruit different neural networks. Here we sought to directly compare emotional perception of music and voice. We used validated auditory emotional stimuli explicitly designed to control for confounding variables, and to be comparable across domains. Both musical and vocal excerpts consisted in short affect bursts depicting basic emotions (happiness, sadness, fear) and neutrality, which are minimally conventionalized, relatively universal and fundamental to spontaneous human communication. Participants were asked to rate these stimuli, processed through a cochlear implant simulation, along emotional scales, as well as on arousal and valence scales. Emotional perception of both music and voice was impaired through cochlear implants, with emotional perception accuracy being more impaired for music than for voice; participants were able to recognize happy and neutral stimuli above chance. We discuss the implications of our results regarding the impact of auditory deprivation on emotional processing, as well as clinical implications, such as the choice of emotion-relevant features to be included in device processors and the design of targeted rehabilitation programs.

The impact of expertise and emotion recognition accuracy in music performance evaluation

Elena Cañadas[1], Marianne Schmid Mast[1], Donald Glowinski[2], Marc-André Rappaz[3], Didier Grandjean[2]

1: University of Lausanne, Switzerland; 2: University of Geneva, Switzerland

Interpersonal accuracy describes the ability of a person to accurately assess others' states and traits, such as their emotions, intentions, and personality (Hall & Bernieri, 2001). A key component of interpersonal accuracy is the ability to correctly recognize the emotions of others through their nonverbal expression. This study investigates the role of interpersonal accuracy, specifically emotion recognition accuracy, in the context of music experience. Music, as well as vocal expression, represents a form of communication through nonverbal behavior. Specifically, musicians are able to express emotions through their interpretations for the listeners. We hypothesized that music experts may have better emotion recognition abilities and are therefore more accurate in evaluating music performances. We asked a total of 80 participants to fill in an online survey on Qualtrics. First, we evaluated their music expertise with a self-report questionnaire. We then measured their ability to accurately recongnize emotions in others with the GERT. Then, participants were presented with 12 short auditions in which 4 differents musicians play the same piece in a "metronomic", "concert like", and "emphatic" performance style. Participants evaluated the performances, that is expressivity and pleasentness of the piece and indicated to what extend they would select each candidate for a future concert. Results show a positive link between music expertise and emotion recognition accuracy. Performance evaluation seems to be influenced solely by the level of music expertise (positively) and not by emotion recognition accuracy.

Effects of Music-linked Autobiographical Memories, on Emotion. A Study with Patients diagnosed with Dementia.

Danai Theodosopoulou[1], Guy Peryer[1], Heather Edwards[2], Simon Horton[1], Anne Killett[1]

1: University of East Anglia; Faculty of Medicine, School of Health Sciences; 2: Norfolk and Suffolk NHS Foundation Trust

Personally significant music may help people with dementia to connect with the environment, supporting engagement, and sharing memories. Research so far has focused on the effects of music-evoked autobiographical memory (Janata et al. 2007) and on the impact of music listening on neuroplasticity and symptoms of neurodegenerative diseases (Särkämo et al. 2014). 'Music Mirrors' is an intervention in which a trained carer or volunteer interviews a person with dementia to understand emotionally significant events from their life history and document music or sounds that are linked to these. This study will explore the impact of Music-linked Autobiographical Memory Retrieval (experimental group), on emotions, engagement, and communication and compare it with Autobiographical Memory Retrieval through Reminiscence (control group). Forty dyads of patients in the early stages of dementia, accompanied by their caregivers will be recruited from day care centres and day clinics within the UK. Twenty dyads will be randomly assigned to each group. Neuropsychological assessment of cognition and emotion will be performed at baseline, 4 months and 9 months, post-intervention. Additionally, qualitative interviews will be held pre and post- intervention. The analysis of those qualitative and quantitative data aims to clarify the effect of personalized music on the expression of the emotions in the experimental group (Särkämo & Soto 2012), and if that effect reveals any differences between the two groups regarding the vividness of autobiographical memories and the richness of autobiographical retrieval. This poster will show how key literature and theoretical perspectives are informing the research design choices in capturing links between shared experiences of personally significant music and emotional experiences.

Stage fright and physical condition of wieniawski international violin competition participants

Malgorzata Sierszenska-Leraczyk, Wiktoria Pawelec

I.J. Paderewski Academy of Music, University of Music, Poland

The autors are interested in the physical and psychological condition of instrumental musicians, especially violinists. Wiktoria Pawelec, M.A., Department of Biomechanics at University School of Physical Education in Poznan, specializes at violinists' motion system problems and overload. Małgorzata Sierszenska-Leraczyk, Ph.D., both a psychologist and a musician, is a lecturer at Music Academy in Poznan, and directs the Laboratory of Psychology of Music. The methods of survey were: The Questionnaire of Family Environment for Musicians; Interview; Questionnaire - evaluation of stage fright; The Questionnaire for Research of Motion System's Disorders and Overuse Syndrome by Professional Violinists. The group of survey: participants (n=90) of International Henryk Wieniawski Violin Competition (2001, 2005, 2011). The Henryk Wieniawski International Violin Competition in Poznan is preceded by rigorous preliminaries, thus the very fact of participating in the competition is considered as an achievement. The competitors constitute a group of individuals whose high quality of music attainment is unquestionable and proved by previous achievements, such as prizes at various performance competitions, studying at prestigious music academies, and tuition with acknowledged violin teachers. Musical performance anxiety is a serious problem that affect many musicians of all ages. The participants evaluated their stage fright befor the first stage of Wieniawski Competition from 60% to 90% (in the scale: 0 = I feel relaxed to 100 = I feel paralysed by fright). Participants of the XIV Wieniawski Competition in 2011 took part in a survey dealing with the physical condition of young musicians. The survey inquired about the intensity of practising, tiredness after work and breaks in violin playing and also about work-related musculosceletal disorders. There were 23 young outstanding violinists from 11 countries. Their average age was 22.83 years, with standard deviation SD=2.76. The youngest violonist was 18 years old, the oldest 28; 15 of them were female and 8 male; 17.3% of them were left-handed.Almost all the surveyed participants, except 3 persons, work 7 days a week. The average number of hours spent weekly on practising amounts to 30.22 hours. Intensive work, its spatial character, prolonged musculartensions and great speed lead to overuse of motionsystem among musicians.

Lateralized modulation of amygdala connectivity by valence during continuous music listening

Petri Toiviainen[1], Vinoo Alluri[1,2,3], Elvira Brattico[4]

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The amygdala has been found to be activated during listening to music with both positive and negative valence. While increased connectivity has been observed between the left amygdala and the auditory cortex during listening to music with positive emotions (Koelsch et al. 2013), dynamics of amygdala connectivity during continuous listening have not been studied. The aim of the study was to find out how functional connectivity between the amygdalae and other brain areas is modulated by perceived valence during continuous listening to music, and in particular, whether there are any lateralization effects in the modulation patterns. Brain responses of eighteen participants were recorded using functional magnetic resonance imaging (fMRI) during continuous listening of three musical pieces of different genres. Subsequently, the participants continuously rated the perceived valence of the stimuli. Psychophysiological interaction (PPI) analyses were carried out to find out how dynamically rated valence modulated functional connectivity between each amygdala and the rest of the brain. Overall, positive valence was found to increase connectivity from the left amygdala more than from the right, and vice versa. In particular, negative valence increased connectivity from the right amygdala to orbitofrontal areas, left middle temporal gyrus, primary motor cortex, and anterior cingulate gyrus, whereas negative valence increased connectivity from the left amygdala mainly to motor areas of cerebellum. The results provide novel evidence suggesting lateralization in the connectivity of amygdalae in the auditory modality as a function of dynamically changing valence.

Music Therapy in the Nursing Homes of Ticino (CH)

Carlo Alberto Boni

Helvetic Music Institute, Bellinzona (CH), Italy

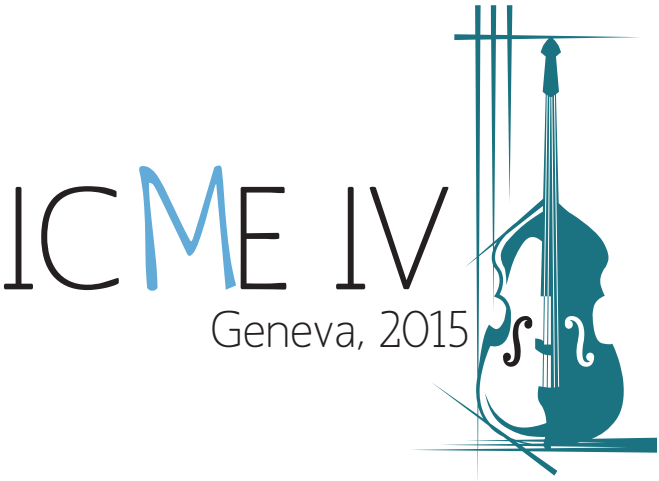
Memories of soundscapes, experiences and people are linked to the life of every person. Music therapy allows elderly people to rediscover their own musical past, stimulating emotions and memories but also reasoning. The residents of nursing homes usually have a reduced autonomy with regard to their motor difficulties, psychiatric disorders and cognitive impairments. Furthermore, they frequently manifest a reduced social behavior, often in connection with depression, anxiety and low self-esteem. The objective of music therapy is to improve the quality of life, targeting: bradykinesia, dyskinesia, posture, gait, breathing, tone of the voice, prosody, mood, social attitude, attention, expressivity, cognitive status, wandering, short and long term memory. The Music Therapy Project with the Elderly People's Cantonal Office of Ticino (CH) started in 2011 and is now at its fifth edition, involving 30 nursing homes and 10 music therapists. The approach adopted is based on the Phenomenological-relational Methodology, developed and practiced for over 30 years by Prof. Paolo Cattaneo. Music therapists use all the components of the musical language (rhythm/melody/harmony) thus eliciting the psychocorporal, emotional and cognitive engagement. Weekly settings are held with heterogeneous groups of 3-10 people. The effects of music therapy are primarily visible on cognitive reactivity, memory, mood, facial and gestural kinesics, on average with an increase of over 10% in the first six months. The results are evaluated through a semi-objective observational form, developed by the Helvetic Music Institute and more recently also through the Resident Assessment Instrument for Nursing Homes (RAI-NH). The poster will illustrate the results of the project and the beneficial effects of music therapy in nursing homes.

«Sanguineus and Melancholicus» concert

Dominos ensemble:

Florence Malgoire

Amandine Solano, Alix Verziar, Carole Parere



Musical listening as an analogical performance

Emmanuel Sander

University of Paris 8, France

The mere title of Meyer's (1956) seminal book, "Emotion and Meaning in Music" puts on stage meaning and emotion as two major issues in musical cognition. Meaning emerges from concepts and each concept in our mind owes its existence to a succession of analogies made unconsciously over years. Analogies initially give birth to a concept and continue to enrich it over the course of our lifetime. Furthermore, at every moment of our lives, our concepts are selectively triggered by analogies that our brain makes without letup, in an effort to make sense of the new and unknown in terms of the old and known (Hofstadter & Sander, 2013). This human ability to make analogies that lies at the root of all our concepts seems especially relevant in musical cognition. We will notably present Nichol's (2012) contribution, "Musicat", a computer model that simulates the process of listening in a human fashion manner through an analogy mechanism. Musicat displays supposedly internal cognitive structures that form as the melody progresses in time, taking the form of groups of notes and analogies between group structures. It models listening as a dynamic and creative analogical performance from which emotion is a component.

Musical Minds: Musical practice driven behavioral and cerebral brain plasticity

Clara E. James[1,2], Mathias S. Oechslin[3]

1: University of Applied Sciences and Arts Western Switzerland (HES-SO), School of Health Sciences, Switzerland (Professor); 2: Faculty of Psychology and Educational Sciences, University of Geneva, Switzerland (Privat-Docent); 3: International Normal Aging and Plasticity Imaging Center (INAPIC), University of Zurich, Zurich, Switzerland

Any complex action we undertake often, intensively and over extended periods of time, will shape our behavior and brain progressively. However, it is difficult to determine the respective influences of nature and nurture. The continuum of expertise levels, and also the fact that virtually all human cognitive functions are involved in musical activities, promotes musical conduct to a privileged model for research on experience driven behavioral and cerebral changes. Musical instrumental training can induce functional and structural brain plasticity and boost general cognitive and perceptual-motor function, explained by the widely distributed brain areas involved in music performance that underpin many other cognitive and perceptual-motor skills. James and collaborators investigated brain adaptations in correlation with changes of behavior in 60 age, sex, age of training onset and intelligence matched young adults with 3 distinct levels of musical proficiency. A multimodal neuroimaging approach was applied, collecting electro-encephalographic (EEG), as well as functional and structural magnetic resonance imaging (MRI) and diffusion tensor imaging (MR-DTI) data, in order to gather wide-ranging temporal and spatial information about brain function and structure. During functional brain imagery, a comprehensive set of 120 specifically composed string quartets covering all minor and major tonalities with different degrees of congruity at closure were appraised by the participants. They also completed a supplementary battery of cognitive assessments relating to the main task. The cardinal result of the study resided in gradual cerebral and cognitive changes with degree of musical training, showing that musical practice at least partially drives plasticity, and not only predisposition and development.

Emotions, musical theatre and piano music. The case of Chopin's Nocturne op. 27 n. 1

Luca Marconi

Pescara Conservatory, Italy

My paper will exemplify how I use analysis in order to find the relationship between a musical piece, emotions and metaphors. As regards emotions, I will consider the emotional expressivity of the analyzed piece; as regards metaphors, I will use the concepts of "metaphorical projections", "cross-domain mappings", "source domain" and "target domain" theorized by George Lakoff and Mark Johnson and applied to music by Lawrence Zbikowski, Michael Spitzer and Francesco Spampinato; I will then relate them to the concept of "hearing as" developed by Roger Scruton and with the concept of "isomorphism" proposed by Matthew Park Custer. Besides, I will apply to the music some concepts borrowed from Umberto Eco's theories on the interpretation of narrative texts. Thanks to these concepts, my analysis of Chopin's Nocturne op. 27 n. 1 will search for its features which make us find an isomorphism between listening to that piece and living another experience, ascribable to another conceptual domain Each time I find this kind of isomorphism, I will formulate two hypotheses: 1. the model listener of this piece is invited to hear it as something that is not its sound; 2. the isomorphism found invites the model listener to project metaphorically the conceptual domain considered (which functions as a source domain) for mapping the experience of listening to this piece (which functions as a target domain). Thus, I will consider the emotional expressivity which can be inferred by these processes of "hearing as" and "cross-domain mapping".

Nonlinearities and the sound of arousal in music

Gregory Bryant[1], Daniel Blumstein[2], Vinicio Zanon Santon[2]

1: UCLA Department of Communication Studies; 2: UCLA Department of Ecology and Evolutionary Biology

Many animals produce and respond to harsh nonlinear sounds when alarmed, possibly because acoustic production systems are rapidly aroused and/or overblown in stressful, dangerous situations. Humans produce nonlinearities in music, achieved through overdriving amplifiers, digital modeling devices, and the incorporation of various non-instrumental materials into sound making. We examined how nonlinearities in music affect listeners' emotional responses. Subjects were presented with music without noise, or versions of the music that had noise or abrupt frequency shifts experimentally added. Arousal and valence judgments were affected by the addition of simulated nonlinearities including noise and rapid pitch shifts. In a second experiment with the addition of benign video, valence (but not arousal) judgments changed with the addition of noise or frequency shifts. Thus, the presence of a video image suppressed the ability of simulated nonlinearities to modify arousal. We have also explored whether these acoustic attributes directly affect facial electromyographic (EMG) activity. Noise-manipulated music significantly increased corrugator supercilii activity compared to control and pitch-up conditions, and there were no differences between noise and pitch-down conditions. The addition of video eliminated any effect of the acoustic manipulations on facial EMG measurements, but judges rated distorted music as more negative than pitch-up or control compositions. Taken together, our results demonstrate that nonlinearities in music affect listeners' ratings of arousal and valence somewhat independently of their physiological responses, and possibly reflect an adaptive sensitivity in humans to noisy features in communicative sounds that have been widely incorporated into music through cultural evolutionary processes.

Music does not only communicate intrapersonal emotions, but also interpersonal attitudes

Jean-Julien Aucouturier[1], Clément Canonne[2]

1: IRCAM STMS UMR9912, Paris, France; 2: Université de Bourgogne, Dijon, France

Our capacity to express emotional content in music, and how it relates to linguistic prosody, has been the subject of impassioned psychology and neuroscience research in the past two decades. While the musical expression of basic emotions is now understood to rely much on the same acoustical characteristics as speech prosody, the picture is less clear when music is considered a medium not only for basic emotions, but also for social attitudes. The present study aims to test the capacity of musical communication to encode, and be decoded as, a series of 5 attitudes (DOM:domineering, INS:insolent, DIS:disdainful, CON:conciliatory, CAR:caring), selected from the literature to differ along both the affiliatory (e.g., INS < CAR) and control (e.g. DIS < DOM) dimensions of social behaviours: being domineering, insolent, disdainful, caring or conciliatory. We recorded a series of 100 improvised duets, in which one musician was tasked to express one attitude and the other to recognize it. First, we found that the encoded attitudes could be reliably decoded from musical interactions, both by the participants of the interactions (hit rate H=64%) and by external listeners (H=54.3%). Second, we show that this capacity to decode social intents from music did not merely rely on features communicated by the encoder's channel (amounting to only H=34%), but also for a large part on temporal and harmonic coordination cues between both musicians. Together, these results show that musical interactions can be used as a means to directly communicate social attitudes so far believed to be germane to verbal interactions, and that this capacity is neither entirely mediated by the emotions expressed by the encoder nor a simple exaptation from language. In evolutionary terms, this suggests that a lot more social communication would have been possible with music as the sole pre-linguistic «technology» than previously believed and opens avenues for vastly more diversified views on music processing that the intra-personal, performer-to-listener view of musical expression that has dominated the recent literature.

The Conductor's gaze. Eyes, emotion expression, and their musical functions

Isabella Poggi, Sofia Albanese

Università Roma Tre, Italy

Research in Sign Language and body communication attributed various functions to gaze: syntactic and expressive (Emmorey, 2005; Ekman, 1979), turn-taking and backchannel (Jokinen, 2004), pointing, iconic communication of physical and metaphorical properties, sentence performatives, metadiscursive functions (Poggi, 2007). Gaze is also relevant in the Conductor's communication, a multimodal and multifunctional behavior in which gestures, face, posture, gaze, in both concert and rehearsal, provide information about the sound to produce: who should sing or play, when, what semantic content to express by words and music, what melody, rhythm, tempo, timbre, intensity, expression, musical structure to produce, and how. In our work, two independent coders analyzed the gaze behavior of several orchestra conductors, during rehearsal and concert, through an annotation scheme that describes each gaze as to its communicative parameters (eye direction, eyebrows movements, eyelids aperture…), attributes it a meaning (e.g., give the start, blame, express anger, ask for a "piano"), and classifies it as to its musical function (provide indication on intensity, rhythm, frequency, expressiveness) and the exploited semiotic device (codified, directly, or indirectly iconic). Results show that the meanings of gaze are shared across Conductors (e.g., both raised eyebrows always convey or accompany a request of singing/playing "piano"; raising part of an eyebrow indicates higher tunes). Emotion expression by gaze may be conducive to singers'/players' technical movement (a frown expressing anger calls for a "forte"), express the Conductor's emotion about present performance (ecstatic shut eyes convey enjoyment), induce the emotions to be impressed to music (inner parts of eyebrows raised, displaying sadness, ask for a sad sound). Yet gaze also conveys mental states (close eyes = concentration) and solicits the technical movement (frown of effort = sforzato; raised eyebrows of circumspection = play softly), while gaze direction requests attention to warn, monitor performance, or give the start.

Judgment of musical emotions after cochlear implantation in adults with progressive deafness

Emmanuèle Ambert-Dahan[1,2], Anne-Lise Giraud[3], Olivier Sterkers[1], Séverine Samson[2,4]

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While cochlear implantation is rather successful in restoring speech comprehension in quiet environments (Nimmons et al., 2008), other auditory tasks, such as music perception, can remain challenging for implant users. Here, we tested how patients who had received a cochlear implant (CI) after post-lingual progressive deafness perceive emotions in music. Thirteen adult CI recipients with good verbal comprehension (dissyllabic words ≥70%) and 13 normal hearing participants matched for age, gender, and education listened to 40 short musical excerpts that selectively expressed fear, happiness, sadness, and peacefulness (Vieillard et al., 2008). The participants were asked to rate (on a 0–100 scale) how much the musical stimuli expressed these four cardinal emotions, and to judge their emotional valence (unpleasant–pleasant) and arousal (relaxing–stimulating). Although CI users performed above chance level, their emotional judgments (mean correctness scores) were generally impaired for happy, scary, and sad, but not for peaceful excerpts. Limitations of CI transmission that produce impairments in pitch, timbre, and melody perception (i.e., Gfeller et al., 2002a, 2008; McDermott, 2004) can specifically affect the recognition of happy, scary, and sad music by CI users. Yet, as pitch discrimination remains fairly good when stimuli are far apart in the spectral domain (Looi et al., 2004; McDermott, 2004), CI users may retain the ability to distinguish emotions in music, such as telling apart happiness from peacefulness or sadness. CI users also demonstrated deficits in perceiving arousal of musical excerpts, whereas rating of valence remained unaffected. The relatively spared abilities of CI listeners to judge emotional valence, as compared to arousal, and to recognize peacefulness in musical excerpts confirm previous observations indicating that CI users can use temporal acoustic cues to process music (Kong et al., 2004). We therefore propose that the larger improvement in processing temporal (rhythm and metric) than spectral (pitch and timbre) cues that follows cochlear implantation (Cooper et al., 2008) contributes to regain the processing of musical emotions.

A comparison of undergraduates music listening habits in everyday life and while studying

Eduardo Coutinho[1,2], Adele Lisser[1]

1: Department of Music, University of Liverpool, United Kingdom; 2: Department of Computing, Imperial College London, United Kingdom

In this paper, we report an investigation of the music listening habits of a population of undergraduates in everyday life and while studying. In particular, we compare their preferences for different music genres in each situation, as well as the role of individual factors and traits in such judgments. Rating scales and free answer questionnaires were administered to 92 students of the University of Liverpool (UK). The questionnaires aimed at exploring (a) whether or not students listen to music while studying; (b) which music genres do students prefer listening to while studying and in everyday life; (c) the perceive effects of music on studying at both cognitive and affective levels; and (d) the mediating role of gender, personality traits and musicianship. Statistical analysis revealed various important results. First, students listen significantly more to classical music while studying than in free time, and listen significantly less to all other genres studied (except folk and soundtracks). Second, compared to male students, female undergraduates listen significantly less to Jazz and Blues music, irrespective of the situation (studying or not). Third, clear differences were found between the music preferences of listeners with different personality traits: extraverts listen to Folk and Jazz music less often than introverts; conscientiuous students listen more often to Blues, Pop, and Soundtracks, and less to Electronic and Religious music; and students high in openness to new experiences listen more to Jazz and less to Religious music). Fourth, further quantitative and qualitative analyses reveal the some of the reasons why students listen to music while studying, and the musical and affective characteristics of the music that is preferred. Finally, we discuss the implications of these findings in terms of positive and negative effects on studying skills.

Emotional Responses to Music, Trait Empathy and the Uses of Music in Early Adulthood

Angela Schorr

Siegen University, Germany

The AIMS scale ("absorption in music"; Sandstrom & Russo, 2013) is the starting point for this study. As psychological research on music listening is mainly focused on emotional responses to/emotional benefits of music, researchers recently made use of this new scale (e.g., Hogue, Crimmins & Kahn, 2015). But what does it measure? What does it predict? How is it related to everyday uses of music and to musical training? Originally, the authors intended to create a validated research measure of individual differences in emotional responses to music. They took the Tellegen Absorption Scale (TAS) as a template, which is known for its hidden multidimensionality, but widely used in research on hypnotisability. We interviewed N=147 individuals age 18 to 30 (M=23;2; 53,7% female, 46,3 male; 85% had a higher school certificate) by applying the AIMS scale and a standardized version of the IRI empathy test. Additionally, we collected data on the interviewees' everyday uses of music. Results: The dimensionality problems of the TAS transferred to the AIMS scale. In our statistical analyses we used the 34-items original version of the scale, but also a 19-items version shortened according to classical test theory. Music listeners, amateur musicians and (semi-)professional musicians don't differ as regards to the intensity of music listening. But multiple regressions show that absorption in music together with empathy dimensions predict music listening behavior of music listeners and amateur musicians, but not of (semi-)professional musicians! Further inspections of the data confirm that the AIMS scale might be useful as a trait measure (reality absorption, fantasy absorption) to explore and predict the everyday uses of music of music listeners and amateur musicians only. The AIMS19 has to be validated with a new sample.

Emotion in the Singing Voice: Convergent approaches from phonetics, psychology, and computer sciences

Chair(s): Johan Sundberg, Klaus R. Scherer

Discussant(s): Bernardino Fantini (Unige)

While there is now an extensive literature on the expression of emotion in the voice and the accuracy of auditory recognition by listeners, the expression of emotion in singing and the ability of listeners to correctly decode specific emotions of the singer from his/her vocal production has rarely been studies empirically. The contributors in this symposium present different types of studies with a new corpus of emotional singing, the Geneva Corpus of Emotional Singing (GeCESi). The design and recording of the corpus will be described and first results on the acoustical parameters extracted for the different expressed emotions reported, together with data on recognition success by naïve listeners. Novel in depth spectral analyses using advanced phonetic methods are described, providing important insights into the link between physiological voice changes and the resulting acoustic parameters. In addition, a machine learning approach to automatic classification of sung emotions, using a dimensional approach, is described, allowing to evaluate the importance of specific parameters. Finally, the issue of context effects in listening to emotional singing in ecologically valid settings is raised, permitting to evaluate the role of the affective involvement of the singer.

Singing emotions: Encoding patterns and decoding accuracy for a new corpus of emotion portrayals by professional opera singers

Klaus R. Scherer

University of Geneva, Switzerland

In order to compare the vocal expression of emotion in speech and singing, we created a corpus of emotion portrayals, the Geneva Emotional Singing Corpus (GEMOSI), constituted by 8 professional opera singers (2 sopranos, 2 mezzo sopranos, 1 countertenor, 2 tenors, 1 baritone/bass) who sang a scale and a meaningless phrase expressing 10 different emotions. This contribution will describe the design and recording of the corpus and present the first set of data on the pattern of acoustic parameters which characterize the different emotions expressed by the singers, highlighting individual differences. These data are discussed in relation to the accuracy of emotion recognition by lay listeners for the different renderings. These results will be discussed with respect to prior theoretical predictions by the Component Process Model of emotion and will be compared with empirical data on emotion expression in speech.

Emotional coloring in singing: An in-depth spectral analysis of a tenor's voice

Glaucia L. Salomao, Johan Sundberg

KTH Stockholm, Sweden

Emotional expressivity is an essential component in singing, posing the question how singers create such expressivity within the metrical and melodic framework. Previous investigations have focused on aspects such as tempo, intensity, aperiodicity, pauses, and formants. Here we report a case study, in which we examine long-term-average spectrum (LTAS) characteristics and glottal voice source parameters in examples sung by a professional tenor, who sung examples on the vowel /a/ and on a nonsense text in eleven emotional colorings. Deviations from the values in Neutral performances were analysed with respect to long-term-average spectrum and glottal voice source properties, obtained by inverse filtering. In addition, we used five singing samples as observations and computed a repeated measures ANOVA over the eleven emotions. Strongly significant emotion effects were observed for all LTAS parameters, which also were highly correlated, thus showing consistent findings. Sadness had the steepest spectral slope and Anger and Contempt the flattest. Sadness and Anger were diametrically different with respect to voice source parameters. The differences between Sadness and Tender on the one hand and Anger and Arousal on the other suggest subglottal pressure differences. Glottal adduction seemed high in Anger and Arousal and low in Sadness and Tenderness.

Automatic recognition of emotional dimensions in singing

Florian Eyben[1], Eduardo Coutinho[2]

1: AUDeering, Germany; 2: University of Liverpool, UK

In this contribution we evaluate the feasibility of automatic recognition of emotion portrayals in singing, and the importance of devising a comprehensive set of relevant acoustic parameters. Computational experiments and validation are performed on the Geneva Corpus of Emotional Singing (GeCESi). The emotional states are mapped to ternary arousal and valence labels for simplified interpretation of the results. A small set of relevant acoustic features derived from our previous research on the same data and a large scale, state-of-the-art feature set commonly used for the recognition of paralinguistic phenomena (the baseline feature set of the Interspeech 2013 Computational Paralinguistics ChallengE; ComParE) were used. A feature relevance analysis with respect to classification accuracy and correlation of features with the targets is conducted and discussed. The results show that the automatic classification performance for arousal is similar for both feature sets, while the ComParE set is superior for valence. It is further shown that applying a novel intra singer feature ranking criteria to select robust features improves the generalisation of the automated classification to new singers even further.

Music Emotion Recognition: Machine Learning and Cognitive Modelling

Chair(s): Eduardo Coutinho (Imperial College London), Björn W. Schuller (Imperial College London)

Discussant(s): Mark Sandler (Queen Mary University of London), Marcus Pearce (Queen Mary University of London)

After a century of manifold developments in psychological research on the emotional power of music, during the last decade, research on how music pieces are associated with the communication and induction of affective states (emotions and moods) has increasingly become a central topic in the Computer Sciences. The computational analysis of music has allowed to develop models that estimate the emotional impact of music, not only with the goal of finding news ways for indexing and recommending music from personal or shared libraries, but also for understanding how music creates emotion, and especially the links between music structure and emotional responses. Work in this area has been divided in two main trends: data driven (machine learning) approaches, and cognitive modeling. Given the promising developments in both areas, a much-needed advancement is to explore the intersections of both areas towards a better understating of the link between music structure and emotion and the creation of more powerful and reliable music emotions recognition systems. The purpose of this symposium is to create a common space for the display of current research trends on both these areas, including recent practices and latest developments, the quality and relevance of current models and techniques, present and future challenges, and potential applications of these new promising technologies (e.g., healthcare, mood regulation).

Predicting musical emotions from low-level acoustic and physiological measurements

Eduardo Coutinho

Imperial College London, UK

The focus of this talk is to evaluate the automatic estimation of the intensity and valence of perceived emotions in music and speech using acoustic/psychoacoustic descriptors and information about the physiological states induced in the listeners. In a behavioural study collected time-continuous ratings of emotions perceived in full music pieces and long speech excerpts, using a computer interface which modelled emotion on two dimensions (arousal and valence). Additionally, we measured several physiological parameters (respiration, heart rate, skin conductance, skin temperature, and blood pressure) while listening to each stimulus. Regression experiments with Recurrent Neural Networks were then conducted to model multiple relationhips between self-reported emotions, physiological activity and psychoacoustic features. Results show that psychoacoustic features alone are generally better predictors of arousal and valence compared to physiological indicators. Furthermore, most physiological indicators analyzed can be predicted with good accuracy from acoustic/psychoacoustic features. Taken together the results suggest that music and speech signals can trigger physiological activity related to emotional processing.

Experiments in Affective Music Computing

Mark Sandler

Queen Mary University of London, UK

This talk will review work at Queen Mary University of London relating music and emotion, from an engineering perspective and in an Affective Computing context. We will describe experiments in large scale collection browsing, wherein we built mood models from non-commercial production music that is professionally tagged, and applied them to an untagged, commercial music collection. We then describe a more creative study, called Mood Conductor, that enables an audience to interact directly with live performers by relaying their mood via a smartphone app. Most recently, these two themes have been combined as Mood Player, where, in real-time, multiple participants interact to drive the mood of a sequence of songs played from a personal collection. In its most recent incarnation, Mood Player includes biometric signals from users to drive the music selection process. The talk will include demos where possible, and will summarise the directions of our future work in this area.

"Emotion in Music" task at MediaEval: lesson learned

Mohammad Soleymani[1], Anna Aljanaki[2], Yi-Hsuan Yang[3]

1: Swiss Center for Affective Sciences; 2: Universiteit Utrecht; 3: Academia Sinica

Users choose songs and create playlists based on their emotional content depending on the context and their personal preference. Therefore, automatic understanding of emotions expressed in music benefits music recommendation systems. In this talk, I report on developing a benchmark for dynamic emotion recognition in music from its acoustic content. We developed a benchmark for the "emotion in music" task at MediaEval multimedia benchmarking campaign devoted to the human-centered multimedia information retrieval. In contrast to the MIREX mood challenge, we targeted affective dimensions and dynamic emotion detection considering the temporally dynamic nature of music. We created a large dataset through a carefully designed crowdsourcing campaign. We then report on best practices for automatic music emotion recognition (MER) and analyze the most successful approaches both in terms of the utilized or designed acoustic features and machine learning methods. Three years of this MER challenge taught us that the temporal emotional changes might occur on very different timescales from several seconds to several minutes, which is why longer training samples and emotional segmentation could be beneficial for a dynamic MER system.

Expectation, Emotion and Aesthetics in Musical Listening

Marcus Pearce

Queen Mary University of London

Eduard Hanslick (1854) identified the importance of unconscious expectations in the aesthetic experience of music. Unexpected musical events introduce a sense of tension and suspense while expected events generate pleasurable feelings of resolution. Some 100 years later, Leonard B. Meyer (1957) suggested that expectations are built upon learned cognitive representations of musical styles instantiated as probability systems in the minds of composers, performers and listeners. Until recently, there has been surprisingly little scientific work to corroborate these hypotheses. I will present a dynamic information-theoretic model of auditory expectation (Pearce, 2005) that learns through musical experience and generates probabilistic predictions about forthcoming events (e.g., the pitch or onset time of the next note), given the current context. In empirical experiments with listeners, ratings of unexpectedness and uncertainty, and electrophysiological responses to expected and unexpected notes, show a close correspondence with the predictions of the model, measured in terms of information content and entropy (Pearce, 2005; Pearce et al., 2010; Omigie et al., 2012, 2013). Furthermore, behavioural and physiological emotional responses to live musical performances have been shown to vary systematically with the probabilistic expectations of the model (Egermann et al., 2013).

GeKiPe, an interactive tool of gesture capture

Chair(s): Donald Glowinski

University of Geneva

Philippe Spiesser

Geneva University of Music

GeKiPe (Geste Kinect & Percussion) is a research-creation project which aims to explore the control of virtual instruments by analysing a percussionist's specific gestures. The project studies the interaction between the different ways of capturing movements: a kinect v.2 camera and arduino accelerometre captors which are placed on each of the performer's hands to detect his movements. This multimedia tool using both images and sound, sculpted in real time, will generate the creation of a new repertoire of works, combining the input of composers, performers and visual designers.GeKiPe is supported by the Haute École Supérieure de Suisse Occidentale and is developed at the Haute École de Musique de Genève in partnership with the IRCAM Centre Pompidou de Paris and the association FlashBack66.

A Neurocognitive Exploration of Uncertainty during Emotion Recognition in Controlled Sound

Fernando Bravo

TU Dresden, Germany; University of Cambridge, UK

Previous neuroimaging studies have shown heightened weight on sensory evidence under higher levels of predictive uncertainty. The signal enhancement theory proposes that attention improves the quality of the stimulus representation, and therefore reduces uncertainty, by increasing the gain of the sensory signal. The present study was aimed at investigating attentional enhancement of sensory signals for ambiguous music-evoked emotions, utilising strictly controlled auditory information. The experiment required participants to categorize sound stimuli of three distinct levels of consonance/dissonance (in terms of interval content) within an emotion recognition paradigm. Separate behavioural and neuroscientific (fMRI) experiments were conducted. Behavioural results revealed that the intermediate dissonance condition (minor thirds) was the most ambiguous and cognitively demanding category (slowest reaction times), compared with the consonance condition (perfect fourths, fifths and octaves) and the strong dissonance condition (minor/major seconds and tritones). The neuroscientific experiment demonstrated a heightened weight on sensory evidence whilst participants were evaluating intermediate dissonances, which was reflected in an increased neural response in the right Heschl gyrus (primary auditory cortex). The results support previous studies that have observed enhanced precision of sensory evidence whilst participants attempted to represent and respond to higher degrees of uncertainty, and converge with evidence showing preferential processing of complex spectral information in the right primary auditory cortex. These findings are discussed with respect to recent Bayesian models of perception, which have proposed that attention may heighten the weight of information coming from sensory channels to stimulate learning about unknown predictive relationships.

The role of acoustical features in the identification of lullabies across musical cultures

Camille Guillemin[1], Andrew Bremner[2], Manuela M. Marin[3], Bruno Gingras[4]

1: Centre de Recherche en Neurosciences de Lyon, France; 2: Goldsmiths, University of London, UK; 3: University of Vienna, Austria; 4: University of Innsbruck, Austria

Lullabies exist in every culture and display common musical characteristics. We investigated whether Western children and adults could reliably distinguish between lullabies and non-lullabies from either a Western (German) or a non-Western (Chinese) musical culture. We also sought to identify the acoustical features that might predict the participants' categorizations. Forty short (10 s) musical excerpts from Chinese and German lullabies and non-lullaby songs, all without lyrics, were selected by native members of each culture. Half of the non-lullaby songs were classified as "low-arousal" and half as "high-arousal". Twenty-eight children (4 to 5 years of age) and 26 adults from a Western cultural background (primarily British) were exposed to all 40 excerpts, and categorized each as either a lullaby (defined as music that would help a baby, or a teddy bear in the case of the children, fall asleep), or a non-lullaby. Participants' performance was assessed using both logistic regression and the discriminability index d'. Acoustical features were analyzed with the MIRtoolbox in MATLAB. Although both adults and children were able to differentiate lullabies from non-lullabies, adults discriminated between low-arousal songs and "true" lullabies better than children. Whereas low-arousal Chinese songs and Chinese lullabies were equally likely to be categorized as lullabies, low-arousal German songs were clearly distinguished from German lullabies. A linear regression model showed that, for children and adults, the variance in lullaby responses rates was significantly predicted by acoustical features such as spectral flux and spectral entropy, which have been previously found to reliably predict subjective music-induced arousal.

The role of source tracking in response to musical artworks

William Forde Thompson, Nicolas Bullot

Macquarie University, Australia

Research has identified multiple mechanisms that lead to an emotional experience of music. However, most music experiences include awareness that artworks are produced with specific intentions in unique historical, social, and cultural contexts. First, we review Bullot and Rebers (2013) psychohistorical framework for understanding art appreciation, and describe its application to music appreciation. The framework suggests that experiences of music arise not only from musical structure and personal associations; but also from a cognitive process of inferring causal, autobiographical, and contextual information related to the source of that music. Second, we summarize research by Thompson and others showing that, given the opportunity, listeners attend closely to facial expressions and body movements of performers. By contributing to an accumulation of knowledge about the source of musical artworks, this facial and bodily information influences perceptual and episodic representations of music, affecting all levels of aesthetic experience. We argue that listeners actively seek out and incorporate source knowledge into their experiences of music, and we describe a tripartite model in which aesthetic and emotional responses to music arise from three classes of mental representations: perceptual, personal, and source representations. Whereas past research has been largely restricted to perceptual and personal representations of music, the tripartite model predicts that musical artworks also engage a set of previously unexplored cognitive processes that bring to mind contextual details associated with the source of the music. We discuss whether musical tension or disfluency might provide a bridge between the perception of music and mechanisms of source tracking.

The Emotional Impact of Music in Children with Disabilities - Cerebral Palsy

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This interdisciplinary research project on Music Therapy for cerebral palsy and autistic children brings into confluence both the arts and neuroscience. We used two sample populations from the Spastic Centre in Penang. One is of severe spasticity, which limited our intervention to mainly music listening and basic rhythmic exercises. The impact of this intervention is emotional feel good response ranging from curiosity to calmness and agitated reactions. The second population of nine subjects, five are dipelagic, one tripelagic with the rest having acceptable ambulatory functions. All the subjects are within the choronological age of 7 to 12 years and cognitive age of 4 to 4.11 years (Wechsler Abbreviated Scale of Intelligence Tests). It employs mainly traditional percussive musical instruments to gauge their physical and emotional response expressed through playing skills, memory, self-confidence, as well as verbal and non-verbal communicational abilities. The method employed is participatory involvement teaching the children to play the percussive melodic instruments, namely the Bonang (knobbed gongs), Gambang Kayu (Wooden xylophone), and Saron (bronze-keyed xylophone) as well as Canang (a pair of small knobbed gongs), Kesi (a pair of small finger cymbals) and Gongs. We have found that administering this non-invasive music therapy has given the children a stable emotional state and euphoric feeling during the playing sessions. Such positive emotional states enable the children to develop and enhance their memory, generate self-confidence and a sense of achievement besides increasing their communicative abilities by way of individual and ensemble playing. It creates a better quality of life. In conclusion, music can generate varying degrees of emotional response according to the degree of disability—vocal, physical and cognitive impairment. But all respond positively to this non-invasive music intervention.

Corroborative Changes in Skin Conductance Orienting Activity as Predictor of Higher Emotional Regulation in Soccer Players

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Purpose of the present study was to extrapolate intricate relationships between autonomic indices of emotionality in predicting changes in transient as well as dispositional emotionality. Initially two hundred seven young-adult male competitive soccer players, (residents of Kota Bharu city, Malaysia) volunteered as participants, and out of them on the basis of projective analyses of emotionality (employing Rorschach Ink-Blot Test), one-hundred twenty-nine players having higher indices of emotional resilience; lower constriction and suspiciousness were selected as participants of this experiment. All of them were subjected to evaluation of inner psychobiological status (decomposed indices of phasic skin conductance (Sc) activity – viz. orienting latency; recovery time; rise time) while they were subjected to listening musical tunes (Indian Classical Raga and Motzart's sonata KV 381 - KV. 123a) which were introduced to them in counter-balanced way. Results however revealed significant impact of differential music sessions (interchangeably presented) on differential aspects of Sc indices in predicting differential aspects of inner core emotionality. Multiple linear regression analyses were done to identify differential possibilities of direct, inverse, moderating and supportive relationships between decomposition indices of autonomic orienting activity (viz. latency; amplitude and recovery time) related to cognitive-affective and affective-motivational aspects of sports behaviour. Analyses of autonomic activation and arousal modulation and various indices habituation paradigm indices were found as significant predictors of changes in dispositional emotional constellation observed in the players. Orienting latency was observed as the most significant contributor in predicting changes in emotional hardiness as well as flexibility.

An approach of EEG music generation based on random, pentatonic scales for composition and music therapy

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Human's brain activity could be displayed objectively on EEG (electroencephalograph) devices. So how to compose via BCI (Brain-Computer Interface) devices is a valuable research. However, there is no precisely corresponding relationship be found yet between brain wave and emotion. So it became to a problem that the music derived from EEG should truly reflect the user's emotion. Unlike many existing EEG music works, we neither use the EEG source data as the material of music directly, nor assume it as the conditions to match the rules for composition. In this paper, we proposed an approach which adopt random, pentatonic scales as fundamental music phrases and then adapt it with modulation which directed by user's mental status. The fundamental phrase was consisted of sine waves and the standard pitch was set to 432HZ which contributed to user's meditation. Various audio processes were provided to modulate the fundamental music phrases. The user's mental status was detected by a portable, single-electrode BCI device with a Neurosky TGAM chip inside which could provide not only EEG power spectrum but user's attention and relaxation levels. Depends on user's mental status, every note outputted could have a dramatic difference (especially on the harmonics). Then we have a virtuous cycle: User changed sound by medications, and the changing sound contributed user's medications. We have already finished some experiments on the people with/without music background. In the questionnaires followed, the most of users denoted that the music outputted has a strong connection with their mood and feeling.

Relaxation effects of a combined music therapy and heart rate variability biofeedback intervention: A randomized controlled trial

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Recent evidence shows that both music therapy (MT) and heart rate variability (HRV) biofeedback (BF) interventions may be effective in treating stress-related symptoms and promote relaxation. However, no study has yet explored the potential of integrating the working mechanisms into a combined approach using live auditory feedback. Therefore, the objective of the present study was to evaluate the psychophysiological effects of a combined MT/HRV BF intervention. A total of 60 apparently healthy adults were randomized to either the experimental group (EG) or the control group (CG), where participants listened to prerecorded relaxation music. Both groups completed a stress test prior to the 15-minute interventions. Heart rate (HR) and HRV were extracted for the following 5-minute segments: Resting pre-task (T1), stress test (T2), intervention (T3), resting post-intervention (T4). Self-ratings of relaxation, general well-being, acute pain intensity and mindfulness were assessed before T1, after T2, and after T4. Significant time × group interaction effects were found for well-being ($p = .028$), RMSSD ($p < .001$) and logLF ($p < .001$), indicative of increased parasympathetic outflow and a decreased respiration rate (RESP) in the EG. In both groups, subjective ratings of well-being and relaxation significantly decreased at the end of the stress task and increased after the interventions. In conclusion, the combination of relaxant aspects of MT and HRV BF seems to be a well-received, easy to understand and effective way to induce relaxation and well-being in apparently healthy adults. Future research should explore the potential of this combined approach for clinical MT settings.

Emotion recognition from brief excerpts of speech and music: A gating study

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How much acoustic information do listeners require to recognize emotions in speech and music? In two studies, the auditory gating paradigm was adopted to study the time-course of emotion recognition for a wide range of expressions (anger, fear, happiness, interest, lust, relief, sadness, serenity, tenderness, and neutral). In Study 1, semantically neutral utterances recorded by four professional actors were segmented into 11 gates and presented in a successive blocked format. Listeners reported the emotion they thought the actor was trying to express in a forced choice-task. In Study 2, the same experimental design was used with music expressions performed by three professional musicians (cello, viola, and violin). Results showed that listeners performed better than chance when stimulus duration was ≤ 250 ms for all speech-expressions (except relief) and for music-expressions of anger, fear, happiness, sadness, and tenderness. Calculation of the identification point (i.e., the point in time where listeners were correct and no longer changed their mind on what emotion they thought was expressed) showed that the average identification point ranged between 0.3-1.0 s for speech expressions of anger, sadness, happiness and neutral; between 1.0-1.5 for fear, interest, lust, tenderness and serenity; and 1.8 s for relief. The average identification point for music expressions ranged between 0.9-1.1 s for anger, happiness and fear; between 1.4-1.7 for sadness, interest and tenderness; and 2 s for neutral and serenity. The two studies show that very brief speech and musical stimuli include enough acoustic information to allow listeners to recognize emotional expressions (in particular for anger, fear, happiness, and sadness), although some expressions (e.g., interest, serenity, neutral) are recognized from shorter stimuli in speech vs. music.

Vagally mediated heart rate variability (HRV) and self-ratings of relaxation during live monochord music in apparently healthy students

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Music therapy interventions have increasingly been considered an effective and low-cost treatment for stress-related symptoms. A growing number of studies investigated psychophysiological effects of music, however, results are inconsistent and little is understood about the underlying mechanisms. The present study examined the trajectories of the psychophysiological response of apparently healthy participants during a music therapy relaxation intervention. 70 participants were assigned to single sessions of receptive live music therapy or a verbal relaxation exercise. Self-ratings of relaxation and well-being were assessed before and after the intervention via visual analogue scales and the Relaxation Inventory (RI). Beat-to-beat intervals were continuously recorded throughout the 25-minutes sessions (5 minutes rest, 15 minutes intervention, 5 minutes rest) using a Polar RS800CX portable device. Statistical analysis (RM-ANOVA) focused on HRV parameters indicative of parasympathetic cardiovascular outflow. We found significant quadratic time effects in meanRR, the high frequency spectrum, and self-ratings of relaxation for both groups. Marginally significant group*time interaction effects were observed for the cognitive tension subscale of the RI. Time effects in HRV measures and relaxation self-ratings were found both during the music therapy session and a verbal exercise with marginal group*time interaction effects. Consistent with previous literature, effect sizes for time*group interaction were small for physiological data. Working factors including relaxation, mindfulness, and acoustic stimulation in the control group may contribute to the lack of significant interactions. Music might be effective in the treatment of stress-related symptoms. Further investigation is needed to examine this hypothesis.

Why listening to your favourite music increases loneliness

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From qualitative research we know, that music is sometimes described as an understanding friend (Laiho, 2002), but how sound waves can provide comfort and understanding is still unclear. The social surrogate hypothesis proposes, that the comforting effects of objects stem from affective associations with relationships. Comfort food (Troisi & Gabriel, 2011) and favoured tv programs (Derrick et al., 2009) have been shown to provide the experience of belonging and therefore alleviate loneliness. Can music confer similar benefits? There is evidence for the opposite relationship: intensified loneliness among individuals with few social contacts and increased music use (Davis & Kraus, 1989). To test the effect of music listening on loneliness, a between-subject design with two factors was implemented: (i) The need to belong, which comprised three conditions of autobiographical recall (personal distress, impersonal distress, and control), and (ii) an imagery task with preferred and casual music conditions. The results of 75 participants suggest, that the two distress conditions led to elevated levels of loneliness in comparison with the control condition, and those in the preferred music condition exhibited significantly higher levels of loneliness than those in the casual music condition. Music was not able to act as social surrogate. Instead, participants in the distress conditions chose to imagine mood-congruent situations and music, which in turn amplified their loneliness. This is in line with previous findings, that report an association between listening to music in order to reduce loneliness with lower quality of life and more somatic symptoms (Thoma et al., 2012).

The emotional intensity in the performance and learning of a piece of contemporary music. A study of cases.

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Universidad Pública de Navarra, Spain

Despite the importance of the role of emotion in music, most of the analysis has mainly focused on the listener-emotional response, being scarce the researches dedicated to the performer. Besides, the characteristics of contemporary music can involve more difficult to generate positive emotions. Some authors have even denied their ability to move. These could be some of the reasons why the presence of contemporary music both in the concert rooms as in the curricula is so reduced. The goal of our study is to analyze the emotional response of fourteen students from brass-wind instruments during learning on a piece of atonal music for solo instrument. For this purpose we asked students point in the score those fragments they feel stronger emotionally and we interviewed both at the beginning and at the end of the study of the work. We have found parallelisms in musical characteristics of the passages considered with greater emotional charge : Moments in which contrasts of dynamics and registers are produced and passages characterised by having long values or by special effects such as the glissando. Interviews reveal that the emotion experienced by students is more cooler and, therefore, more intellectual, and less physiological. Yet they recognize that the study involves a familiarity and an understanding, wich contribute to increase the emotional intensity.This work is part of the Research National Project I+D (2008-2011, code EDU-2008-03401) "Audition, cognition and emotion in the atonal music performance by high level music students", funded by the Ministry of Science and Innovation of Spain.

Lab-music: between emotional value and stimulus control

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A key reason people engage with music in daily life is its emotional impact. But music as object of research often has to meet practical criteria aside from emotional engagement and aesthetic pleasure. Limited complexity and duration of presentation are however likely to impact the emotional experience as musical meaning unfolds over time. What is the smallest unit of music still containing emotionally meaningful information? This question will be addressed using an affective priming paradigm testing the emotional priming strength of different kinds of musical stimuli on word targets. It was hypothesised that the processing of target-words would be affected if the music prime conveys emotionally meaningful information. First single elements of musical structure – consonant and dissonant chords – have been used as primes. Dissonant chords primed words but consonant chords failed to do so, as in Sollberger et al. (2003). This indicates that they did not convey sufficient emotional information to impact the emotional processing of the following word. To test whether this lack of emotional meaning can be explained by the very reduced musical structure, the experiment was repeated with unfamiliar pre-validated short musical excerpts that convey different emotions (happiness, sadness, relaxation and fear). This study provides information about characteristics of musical stimuli which are required in order to convey meaningful emotional information. It provides further evidence that emotion in language and music is processed using related cognitive systems and generalizes this finding to a new language (English).

Objectively assessed musical ability and empathy: An analysis based on two multicomponential measures

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Empathy plays a crucial role in successful human communication, for example by facilitating the perception and interpretation of other persons' intentions and emotional states (Davis, 1983). Although musicians have been shown to have an advantage in the decoding of emotion from speech prosody (Lima & Castro, 2011), little is known about associations between empathy and musical ability more generally. Here we examined whether objectively assessed musical ability would be positively correlated with empathy. The constructs were measured via a brief form of the Profile of Music Perception Skills (PROMS, Law & Zentner, 2012) and the Interpersonal Reactivity Index (Davis, 1983) in a German speaking sample of N=80 (45 females, mean age: 24.6, SD: 6.53). Musical ability was sizeably correlated with general empathy, $r = .27$, $p < .02$. This relationship help up after controlling for age, gender, and the big five personality traits ($ß = .32$, $p < .01$). Among musical skills, melody, tuning, and rhythm were particularly strong predictors of empathy, in particular of fantasy and compassion. The highest association was between proficiency in the perception of just tuning and compassion ($r = .29$). The relationship between empathy and musical ability calls for a closer examination of the mechanisms underlying this association.

Subcortical network hub differences in musicians and non-musicians during continuous listening to music

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The amygdala, striatum and hypothalamus have been established as hubs for processing joy in non-musicians during continuous listening to music. While there has been increasing evidence concerning the differences in music encoding and processing as a result of musical training, it has not yet been established how these emotional hubs vary as a result thereof. We aimed at investigating differences in subcortical hubs between musicians and non-musicians during continuous listening to music. Brain responses of eighteen musicians and non-musicians were recorded using functional magnetic resonance imaging (fMRI) during continuous listening to three 8 minute-long musical pieces belonging to different genres without voice or lyrics. Eigenvector Centrality Mapping (ECM) was carried out on subcortical structures to identify the central hubs for both groups. In accordance with previous literature, non-musicians revealed greater centrality in left-hemispheric regions including the amygdala, hippocampus, and striatal areas including putamen and pallidum, in addition to the mediodorsal thalamus extending to the ventral anterior parts. On the other hand, the musicians revealed greater centrality in the brain stem, particularly in the vicinity of the ventrolateral pons, red nucleus and locus coeruleus. Furthermore, the right hemispheric hippocampus, putamen and dorsolateral thalamus also displayed greater centrality for the musicians. These results provide novel evidence highlighting the importance of the brain stem in musicians while decoding music. The implications will be discussed.

Professional pathways of musicians through analyses of the market supply (ensured by musicians) and demand (consumer behaviour). Case study. Verbier Academy 2014

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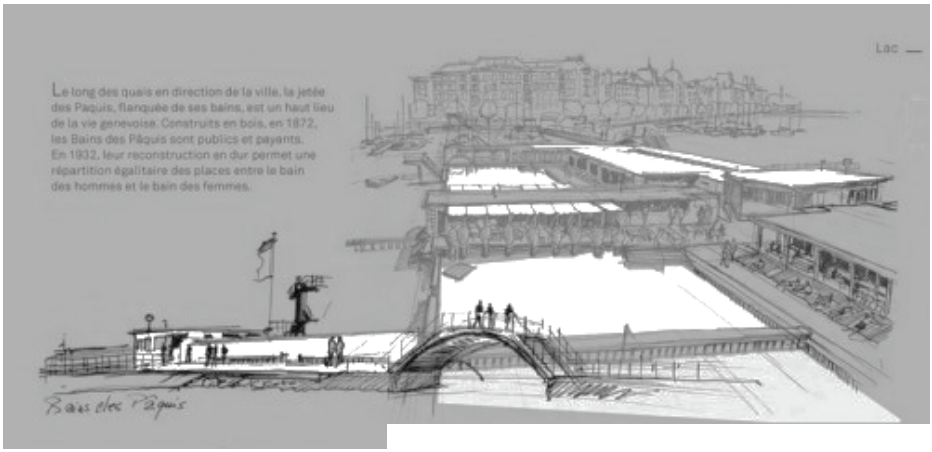
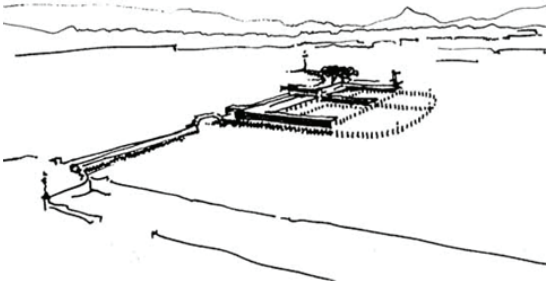
Background: The research strategy is the case study of the Academy Verbier Classic Festival 2014. Aims: The research aim is to analyse professional pathways of musicians through analyses of the market supply (ensured by musicians) and demand (consumer behaviour). Methods: In the literature review, the secondary research characterizes the market supply and demand in terms of classic music offer in Switzerland. Moreover, the data from Swiss Federal Statistics Office provides the amateur profile of classic music. The in-depth analyses of ticket price politics for classic concerts are conducted. Finally, such topics as musicians' motivations, working conditions, challenges, objectives, everyday life are described and synthesised. The methodology for this prospective, non-experimental study is based on semi-structured approach. The method chosen for primary data collection is descriptive survey. Semi-structured comprehensive interviews are held with sixteen musicians from Verbier Academy. Conceptual validity is respected as the study is held according to methodology framework used for sociology studies. Reliability is close to 90%. Results: Each interview is retranscripted and summed up horizontally in a table. Afterwards, vertical analyses follow. Finally, the main themes identified in table cross-sectional analyses are compared to literature review outcomes. Conclusions: The market demand in Switzerland is closely linked to cultural and social background, education level and willingness to provide intellectual effort for attending classic concerts. The market supply is characterised by musicians' instability and career inequalities. Therefore, in the world of classic music, innovation is vital, so that to raise consumers' interest as well as musicians' career opportunities.

Social Event

Fondue aux Bains des Pâquis!





Towards a nomological network of musical, emotional, and cognitive abilities

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The current keynote looks at interrelationships between musical and other human abilities as a key area for future research on music and the mind. Connections between musical and other abilities have been difficult to study in the past due to the paucity and the limitations of instruments to assess musical ability. Thus, our first task consisted in creating a new objective test capable of diagnosing individual differences in musical abilities regardless of individuals' level of musical training or proficiency. The work resulted in the Profile of Music Perception Skills (PROMS), which measures perceptual musical skills across multiple domains: tonal (melody, pitch), qualitative (timbre, tuning), temporal (rhythm, rhythm-to-melody, beat, tempo), and dynamic (loudness). A key insight resulting from research on the PROMS is that non-musicians can be very musical – a phenomenon that led us to coin the term musical sleeper. The implication is that musical ability is only imperfectly captured by musicianship status (i.e., being a musician vs. non-musician). A second advantage of the PROMS is that it provides information on specific music perception skills. Thus, any link between musical ability and a nonmusical ability–from language processing to empathy–can be understood in more detail than has been possible in the past. Capitalizing on this strength, my collaborators and I have begun to examine associations between musical ability, emotion recognition ability, empathy, general cognitive ability, as well as other enduring individual dispositions (e.g. creative temperament, personality). The resulting pattern of interrelationships, parts of which will be highlighted during the address, offer preliminary insights into the place of musical ability within a broader network of human abilities. This knowledge should serve our understanding of the role of musical ability in psychological development as well as further our understanding of the function of music as a human universal.

Social Communication Through Musical Ensemble Performance

Peter Keller

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Musical ensemble performance is a social art form that entails the communication of expressive and affective intentions through the interpersonal coordination of sounds and body movements. The effectiveness of communication is constrained by the quality of ensemble cohesion, which depends on the ability of co-performers to coordinate their actions with simultaneous precision and flexibility. I will present results of research aimed at elucidating the psychological and neurophysiological mechanisms that enable such coordination. This work has revealed how interpersonal coordination is influenced by individual differences in sensory-motor and cognitive skills that enable an individual to anticipate, attend, and adapt to others' actions in real time, as well as by and social-psychological factors (including aspects of personality, such as empathy) that affect these 'ensemble' skills. More broadly, if it is assumed that music is a microcosm of social interaction in general, then these findings on the interaction between ensemble skills and personality may be seen to advance our understanding of basic principles of affective communication.

Visual and orchestral components of musical affect in dramatic scenes

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Links between music and emotion in dramatic art works (film, opera or other theatrical forms) have long been recognized as integral to a work's success. A key question concerns how the auditory and visual components in dramatic works correspond and interact in the elicitation of affect. We aim to identify and isolate the components of dramatic music that are able to clearly represent basic emotional categories using empirical methods to isolate and measure auditory and visual interactions. By separating visual and audio components, we are able to control for, coordinate and compare their individual contributions. Using stimuli from opera and film noir, we collected a rich set of data (N=120) that will make it possible for us to segment and annotate musical scores with collated affect descriptors for subsequent score analysis. Custom software was developed that enables participants successively to record real-time emotional intensity, to create event segmentations and to apply overlapping, multi-level affect labels to stimuli in audio, visual and audiovisual conditions. Our findings suggest that intensity profiles across conditions are similar, but that the auditory component is rated stronger than the video or audiovisual components. Descriptor data show congruency in responses based on six basic emotion categories, and suggest that the auditory component elicits a wider array of affective responses, while the video and audiovisual conditions elicit more streamlined responses. These data will enable a new type of score analysis based entirely on emotional intensity and emotion category, with applications in music perception, music theory, composition and musicology.

Motor expertise differences in emotional expressivity processing

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The primary objective of our study is to reveal how expressive information in movement, a key feature of emotional communication, is decoded using spatial and dynamic properties of biological movements and how motor expertise acquired during musical training can enhance this decoding capacity. Wöllner and collaborators showed that this capacity is critical for ensuring robust coordination and time alignment in a music ensemble (Wöllner et al. 2010). Aglioti revealed that expert skills in anticipating others' intention are based on the detection of a minimal set of movement features and postural details (Aglioti et al. 2008). Driven by the results obtained in two pilot experiments (n=34), we developed an original experimental design including eye-tracking, behavioral and a fMRI study. Twenty six participants (F=82%, mean age 24±12 years, musicians=52%) watched point-light display movies based on the collected motion capture of a violinist in a string quartet indicating forte and piano entries to the other performers. In a random half of the trials only the preparation part of the musician's gesture was shown, in the other half the full sequence was shown. A control condition was inserted consisting in a non-anthropomorphic display of the performance where the dynamic of each body marker was maintained but where relative distances between body limbs were scrambled. After each trial, participants had to report whether they thought the performance was forte or piano. Preliminary results showed that a fine-tuned motor expertise developed through extensive instrumental practice may dramatically increase performance.

Foreign Language Learning: When Prosody Precedes Lexical Meaning

Branka Zei Pollermann

Vox Institute, Switzerland

Speech prosody (rhythm, intonation, duration) constitutes the suprasegmental framework of both speech production and speech perception. On the production side, it determines the phonetic realisations of phoneme durations, stress patterns, syntagmatic grouping of morphemes (dependency relations), discourse types (statements, requests) and emotional meanings. On the perception side, prosody disambiguates the speech signal by facilitating the segmentation of an acoustic continuum into meaningful linguistic units. The structural features of music also include a suprasegmental level (melody, tempo, harmony) and a segmental level (individual sounds). While rhythm – be it in speech or music- is an acoustic phenomenon, its perception involves the listeners' motor reactions. The learning of rhythm and intonation is thus independent of the utterance's lexical meaning. Cognitive and neurological mechanisms that subserve the acquisition of prosody and phonology will be presented within the framework of Piaget's genetic epistemology and Liberman's motor theory of speech perception. Now, in spite of substantial evidence that prosody organises both speech production and speech perception, foreign language teaching methods often neglect it. To demonstrate how the acquisition of prosody can and should precede the learning of lexical meanings, we elaborated a foreign language teaching methodology which includes (1) the conversion of spoken dialogues into vocal hums and musical instruments, (2) visualisation and gestural imitation of melodic contours, (3) variations of emotional tones of dialogues (sound morphing). Our method confirms that the acquisition of musical aspects of speech is independent of lexical meanings and that audio-motor training enhances speech perception and phonological processing of spoken language.

Emotive Ambient - Atmospheres in Instrumental and Film Music

Steffen Alexander Schmidt

Zurich Art School, Switzerland

The term «atmosphere» (orig. german: Atmosphären) was prominently introduced by Gernot Böhme in 1995 as a new aesthetic concept. It succeeded a huge career in the fields of design and architecture in recent years. Surprisingly, it was not discussed in music theory, although the term «atmosphere» as «ambient» was introduced by musician and producer Brian Eno in 1975 (Toop 1997). The paper will discuss basic aspects of Böhme's theory concerning emtional relations to atmosphere in music. Musical examples from different stylistic eras and time periods are analyzed and discussed: Beethoven, 3rd Symphony, 2nd movement; Wagner, Siegdfriedidyll, from Siegfried; Bartok, Nignt's Music, 4th movement «Im Freien»; Brian Eno, LUX 1. Various examples from film music (Baddalamenti, Morricone). The thesis of the paper suggests a new theoretical approach towards an «emotive narration» of western art and ambient music, by introducing temporal dimensions and modes of description into Böhme's concept of atmosphere. In his discussion on the concept of music as an art of time (Dahlhaus), Böhme argues against it and prefers to establish music as an art of space. The complete missing of a temporal concept marks a lack in Böhme's theory. Relating to Bergson's concept of «temps durée» the author will describe the temporal shift from atmospheric to an emotional perception of music. Both modes of perception are essentiell for the understanding of music, elaborating the existing aesthetic concept of music as «uncertainty» (Sloboda 2000). The analysis is carried by a methodology between categories of philosphy, film theory (V. Sobchak, H.J. Wulff 2012) and music theory. Its aim is to optimize the dialogue between the disciplines for future inter- and transdisciplinary research.

What Emotions Teach us about Music. The Challenge of Musical Emotions for Cognitivism

Federico Lauria

University of Geneva, Switzerland

Music can elicit affective states by the means of the emotion expressed by music. For instance, a requiem might express sadness and induce a similar state in us. How are we to understand this affective mirroring? This talk approaches this issue with the help of cognitive views of emotions, from a philosophical, psychological and neuroscientific perspective. According to cognitivism, emotions are evaluations or cognitive appraisals. In feeling sadness about the death of a person, one represents the death as being a loss. Musical emotions challenge this view: in feeling sadness in response to music expressive of sadness, one is neither sad about the music nor does one assess that something sad happened. Whereas most scholars reject cognitivism on this basis, this talk aims at defending cognitivism. In a nutshell, the claim is that music presents us with values (e.g. the sad). Music can be literally or metaphorically sad (it is like a sad event). Feeling sadness in response to it is no longer mysterious: one appraises the music as being literally or metaphorically sad. In the first part, I present the challenge to cognitivism. I criticise then the main philosophical solutions that have been proposed – the appeal to being moved, moods, and imagined objects. In the last part, I argue that the idea of presentation of value can rebut the challenge. Far from being threatened by musical emotions, cognitivism teaches us that music presents us with values, with the diversity values afford.

Structure of emotions in memorable experiences of sad music

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Several studies have recently explored how sad music is able to generate pleasurable, sadness-related experiences (Taruffi & Koelsch, 2015; Van Den Tol & Edwards, 2015), although the exact nature of these experiences is still opaque. To expand the initial findings, two large surveys were carried out, using a convenience sample (n=1747), and a representative sample (n=445). Participants were asked to recall a memorable experience related to self-identified sad music, and to answer 26 statements about reasons for engaging with it, 15 psychological and physical reactions, 10 mechanisms involved, and 36 emotions induced by these episodes. First, we carried out an Exploratory Factor Analysis (EFA) using the larger sample, and then a Confirmatory Factor Analysis (CFA) using the representative sample. The structure of emotions associated with memorable experiences of sad music could be compressed into 3 factors, labelled as «Grief», «Sweet Sorrow», and «Being Moved». This solution was stable across background variables, and was corroborated by CFA using the representative sample. Similar analysis strategy yielded the main reasons for engaging with sad music, which were "to reminisce", "to belong", and "to regulate emotions". The most important mechanisms were related to "memories", "beauty", "emotions expressed", and "visual imagery". The results challenge the notion that sadness associated with music is a uniform emotional experience. The experiences associated with sad music also involve decidedly negative experiences (e.g., grief and anger), which underline the need to focus on a range of emotional reactions when investigating responses to sad music.

Why sad people listen to sad music: music as a tool for meaningful reappraisal

Florian Cova

University of Geneva, Switzerland

It has been observed repeatedly, both in everyday life and in psychological studies, that people tend to be more attracted to sad music when they are themselves sad. From an emotional regulation point of view, this is surprising, since we would expect sad people to preferentially listen to happy music in order to counterbalance for negative affect. A widespread account is then that sad people listen to sad music because it resonates with their own mood, which is pleasurable. In this talk, I will present an alternative hypothesis based on previous philosophical and psychological works on the emotion of «being moved»: a pleasurable emotion that resembles sadness due to the presence of tears, and the elicitation of which can be facilitated by sadness. According to this hypothesis, people listen to sad music to reappraise the sad events in their lives in a more positive and meaningful light, thus transforming sadness in a more positive emotion. Compared to the resonance hypothesis, this hypothesis makes a certain number of predictions. The first is that sad people will not tend to listen to any kind of sad music, but only to moving sad music. The second is that sadness will only prompt people to listen to sad music when the sadness-eliciting event is construed as meaningful (e.g. a death in the family, the end of a romantic relationship), but not when the event is perceived as mundane and meaningless (e.g. losing one's wallet). I will present preliminary data suggesting that sad people indeed have a preference for moving music, rather than purely sad music.

Constructed emotions: the role of aesthetic emotions in music learning processes

Chair(s): René Rickenmann, Isabelle Mili

Discussant(s): Isabelle Mili, Catherine Grivet-Bonzon

University of Geneva, Switzerland

In the last chapter of his Psychology of Art (2005/1925), Vygotsky postulates that the art works are «social technologies of emotions». In this approach the art works are not only an object that sets the emotional experiences of the human being: art works are also devices that produce and transform the emotions human complex, through build aesthetic experiences. In the field of performing arts (music, dance, theater, ..), the study of training practices can approach this dimension of artistic works as an emotional device : the analysis of the didactic strategies of music teachers highlights expert knowledge about musician's performance : musicians work to communicate aesthetic feelings and «touch» their audience. From a joint research on music teacher's training practices (funded by the Switzerland SNF and doctoral works in our research team), this symposium brings together a range of researches that highlight the different types of expert knowledge of the musical performers.. These studies show that aesthetic emotions related to artistic works and practices are historically and culturally constructed. In their spoken presentation, Gael Thivolle and Stefan Bodea, analyze a first level of the aesthetic relation to the musical work which is that of learning the sensitive links to the musician and his instrument, according to technical and interpretive parameters of the music work to play. In their spoken presentation, René Rickenmann and Luis de la Calle, analyze a second level of the aesthetic relation to the music instrument and the musical work which is that of «perezhivanie» (Stanislavski, 1949) as a professional tool. This term, meaning «lived emotional experience», is used by art performers for building the aesthetic links to ethnic music works, where their performance is far from the original ecologic contexts and cultural uses. Finally, in their spoken presentation, Isabel Balmori Martin and Stefan Bodea, analyze the teacher's uses of metaphors to learn the expressive uses of the voice which is the privileged way for the singer to embody and mobilize the dimension of Interpretation of the music work aimed at reaching the aesthetic emotion of an audience.All these researches took place in different areas : Lugano, Lausanne or Geneva, in Switzerland, but also abroad. That's the reason why we submit a symposium: the geographic and cultural aspects of these different researches are quite significant!

Operating emotions in individual harp's learning knowledge improvement

Stefan Bodea, Gaël Thivolle

University of Geneva

Instructional situation: In this case, we're following an in-training harp teacher giving an improvisation task to her pupil. She's giving her some images of emotional states, expected characterizing the musical realization. Problem: We'll try to understand how, through a guided action and the use of emotions, the development of musical knowledge becomes a sociocultural tool (Vygotski). Through this observation, we mean to analyze the first level of the aesthetical relation to the musical work, as a sensitive relationship between the musician and his/her instrument, according to technical and interpretative parameters of the work. Research questions: Our research focuses on the didactic function of emotions in the development of knowledge; As semantic understanding of music (Wolff, 2015: 154 and passim.), which cognitive capacity have been assigned in teacher's intention of making it culturally and musically shareable (cf. Brossard, 2001, Sensevy & Quilio, 2002) and efficient for the pupil? Our text will follow the didactical situation through a synopsis, our didactic & psychological references and a process of clinical analysis, bringing forward Lev Vygotski's concept of perezhivanie which states that "new emotions are added in the subject's mind and have the capacity to extend his/her sensory range"(..). We're interested in understanding how to mediate such access.

Emotion & movement: learning in music, a didactic approach

Isabel Balmori-Martin, Stefan Bodea

University of Geneva

We will approach emotion from its etymological origin, we will consider emotion from its Latin meaning: motio (movement) during a performance situation done by the artist. In a "classical" singing context, it appears that the breathing action, sound emission, text pronunciation or the use of moves to convey the singer's attitude are linked to the transmission of aesthetic emotions which involve integrating complex actions that are culturally constructed and historically located. As part of our research framework we conducted quantitative and qualitative analyses of the music teacher's professionalization in initial traingin. To capture theses developing professional actions (request 100019-156730) , we filmed singing courses given by future singing teachers from the Conservatory of Lugano. Our analysis begins with a short excerpt featuring a young student teacher teaching a beginner. Through this excerpt we understand how the young "teacher" uses metaphor as a combination of a vocal example and instructional moves to stimulate learners' corporal awareness which are largely invisible and ephemeral but upon which the teacher has no direct influence. This may be expressed for example as the coordination of movements to support breathing which constitutes part of the interpretative dimension of texts and singing music.

Training musicians : aesthetic dimension of art works as a tool to develop the emotion complex

René Rickenmann, Luis De la Calle

University of Geneva, Switzerland

In the field of performing arts the authors analyse the training of andean music by ethnological perspective. The study of training situations in an ethnomusicology perspective concern the dimension of artistic works as an emotional device : the analysis of the didactic strategies of music teachers highlights expert knowledge about musicians performance work to communicate aesthetic feelings and how they appeal their audience Analyse the aesthetic relation between the music instrument and the musical work which is that of «perezhivanie» (Stanislavski, 1949) as a professional tool. This term, meaning «lived emotional experience», is used by art performers for building the aesthetic links to ethnic music works, where their performance is far away from the original ecologic contexts and cultural uses.

The Puzzle of Music's Aesthetics

Ulrich Mosch, Patrizia Lombardo

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Music is not a unified object: it varies in space and time. In the Western world music has undergone major historical changes since medieval times culminating with the 20th Century avant-garde in a dismissal of expressivity by a quest of abstraction. How can we deal with emotions if expressivity in a traditional understanding is banned? To discuss this question we have chosen works by the Hungarian composer György Ligeti. He wrote in the 1960s several pieces (for example Atmosphères for big orchestra, 1961, and Lux aeterna for 16 part mixed choir, 1966) based on continuous slow timbral transformation avoiding any recognizable pitch and rhythmical structure. Can we talk about emotional value of this kind of musical pieces? Can emotional effects, beyond pleasantness and unpleasantness, be measured? Or does the hidden aesthetic of this kind of music reconfigure the conditions of our aesthetic experience? If the emotional expressivity is banned from much contemporary music, it might come back in a puzzling way when used in film. Musical scores are an integral part of filmmaking and not simply as accompaniment or ornament but as essential elements of the editing of film. The soundtrack is synchronized with the images of the motion pictures either reinforcing or contrasting their semantic value. Stanley Kubrick has used elements of the above mentioned musical compositions by Ligeti in order to add an expressive dimension to the images. Nevertheless this expressivity does not correspond to fundamental or definite emotions –sadness, joy, etc.- but to an emotional atmosphere demanding more than the immediate perception of the audience. Kubrick's restored musical expressivity requires a cognitive effort of our ears and eyes.

MIRtoolbox and the MiningSuite: Computational analysis of sound and music

Olivier Lartillot

Aalborg University, Denmark

This workshop offers a broad overview of a set of computational tools for the analysis of sound and music: MIRtoolbox and MiningSuite. They are very easy to use, even for users without any background in computer science or signal processing. They are developed as Matlab toolboxes, available for free and not requiring any prior knowledge in Matlab. With MIRtoolbox, audio recordings of sound or music can be analysed, while MiningSuite can be used also for the analysis of encoded scores and MIDI files. Various types of analyses can be performed from audio: basic representations (waveform, spectrum, dynamics, envelope, etc.), timbral descriptions (brightness, roughness, MFCC, etc.), tonal and metrical analysis, structural descriptions. A large set of statistical descriptions of the analyses can be performed as well. A brief tour of the operators is accompanied with concrete examples and concise explanations of the different concepts. A user-friendly syntax allows the design of elaborate processes without having to care about technical details. Recent improvements are presented. The new MiningSuite combines both audio and symbolic representations of music. Like in MIDItoolbox, general statistical descriptions of scores can be computed, as well as more advanced musical analysis based on models from the literature. MiningSuite also features new innovative technologies for structural analysis: local grouping, ornamentation reduction, pattern analysis, etc. MIRtoolbox was initially designed in the context of a research project (BrainTuning FP6-2004-NEST-PATH-028570, coordinated by Mari Tervaniemi) studying among other the interrelationships between music and emotion. Through an articulation between audio descriptions of music and the collection of listeners' emotional appreciations, it is possible to construct models predicting the emotions associated to a piece of music based on the analysis of the audio and musical content.

Vocal Functionality – An Emotional Agent

Morten Schuldt-Jensen

Musikhochschule Freiburg, Germany

The maluma-takete experiments of Wolfgang Köhler and more recent, modified repetitions show, that the human brain attaches abstract meanings to shapes and sounds in a consistent way. This applies not only to language but holds good for music as well and can be used as a vehicle for emotion, if this perceptual predisposition is understood and mapped musically correct by the composers. As human beings we are especially conditioned to receive emotional messages by means of the human voice, not least in combination with text, and thus choral composers with the necessary vocal expertise – and the technical compositional skills to use it – have very powerful communicative tools at their disposal, compensating much for the choral medium's relative lack of colour diversity in comparison with that of an orchestra. The sources of variation and vehicles of emotion comprise tessitura characteristics, vocal registration, compression of the voice, air amount, primary and background vowel quality and colour, resonating cavity control, etc. It is the task of any singer and conductor to recognize these subtle but crucial compositional features in order to identify the intentions of the composer and eventually convey the emotional connotation of the work in addition to the semantic information of the score. By analysing sounding and visual examples – e.g. Schubert: Am Feierabend (D.795,5), Brahms: Warum (op. 74,1) and Bach: Jesu, meine Freude (BWV 227) - the presentation will show, how the emotional contents and even an intended confessional direction of a piece can be changed by ignoring – or just deviating from – the above mentioned idiomatic vocal music features as subtly prescribed by the composers. Based on a survey of basic vocal technique some probable theoretical music-emotion implications of different composing and interpretation procedures will be discussed.

Differential Biofeedback Interventions in Moderating Inhibited Performance in Soccer

Soumendra Saha, Srilekha Saha, Faria Sultana, Maruf Ahmed, Foujia Huda, Nurfarrah Ezatty Binti Mohd Zahir

Universiti Sains Malaysia, Malaysia

Performance excellence in soccer significantly depends on mental toughness or more specifically the aspect of cognitive-emotional flexibility of the player. Indices of projective evaluations can reveal hidden emotional crises and internal conflicts, psychobiological evaluations can substantiate with the inner emotionality revealed to provide etiological information related to performance hindrances in soccer. Present study was carried out following CONSORT 2010 guidelines to compare the effectiveness of skin conductance (Sc) biofeedback intervention training in combination with differential introduction of music therapy in regulation of sudomotor nerve activity (SNA) and of electromyography (EMG) biofeedback in regulation of peak torque and maximal voluntary contraction (MVC) in modification of performance catastrophe in soccer. Fifty-two high-performing soccer players of Malaysia were assessed with autonomic measures (SNA and Sc amplitude); projective evaluation of emotionality and muscle potentiality. Thereafter they were categorised into four groups, with one no-intervention control group (Gr. A, N = 13); Gr. B (N = 13, received only habituation paradigm Sc biofeedback training); Gr. C (N = 13, received Sc biofeedback training accompanied by self-selected musical tunes of their choice) and Gr. D {(N = 13, received Sc biofeedback training accompanied by Motzart's sonata KV 381 (KV. 123a)}, for six weeks following the pre-fixed protocol (15 min.s /day for 2 days/ week). Post-intervention analyses revealed faster autonomic recovery followed by Sc biofeedback combined with Motzart's sonata, while no such observable impact of Sc biofeedback training alone was evident. Benefits of Motzart's sonata on SNA and regulation of peak torque was revealed.

Musical Expression in the Choral Classroom

Andrea Maas

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Music educators, students and philosophers argue that expression is a critical component to musical experiences. Musicians have the opportunity to "move" an audience, to "communicate a story, an emotion" (Brenner & Strand, 2013, p.11) but often disagree about the role it should play and how to elicit this from students. The aim of the present study is to explore with choral directors and singers the ways in which musical expression is manifested in the choral classroom. A qualitative, constructivist, grounded-theory approach was employed using open ended, semi-structured, stimulated recall interviews (SRI) as the central data collection tool. The main empirical findings include descriptions of, criteria for and approaches to musical expression in the choral classroom. Musical expression is described as a vehicle for expressing emotions and ideas as well as a tool for understanding our own and others emotions. Common identifiers between teachers and students include the ways in which attention and energy are employed in the use of breath, phrasing, facial expressions, body movements and physical and emotional surroundings. Musical expression may also manifest itself through memories and in the interpretation of musical elements such as dynamics, tempo and articulations. Asking questions, reflecting on personal experiences, building awareness and allowing students to come to conclusions on their own, may all be integral components in the development of musical expression. Finally, the choral classroom must be a space where teachers and students share vulnerability and skills, build trust, encourage risk-taking, and participate in open dialogue and collaborative decision-making. Specific pedagogical strategies and environmental conditions are suggested to elicit these aesthetically rooted, emotionally expressive, musical experiences. Implications for the fields of music education, teacher education,aesthetics, neurology and psychology will be discussed.

Historical changes in the emotions and free associations evoked by piano music: Schubert, Wagner, Liszt, Schoenberg

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We are developing a new method for analyzing the evolution of musical language in the historical trajectory connecting Schubert, Wagner, late Liszt and early Schoenberg. That trajectory is characterized by the stepwise emergence of extended or chromatic tonality, free chromaticism, and atonality. Bisesi et. al. (2014) explored structural continuities, transitions and breaks along this historical course in a psychological, computer-based approach to music analysis whose ideas and methods are borrowed from four disciplines: music history (Baroni, 2003; Bent, 1996; Cook & Pople, 2004), music theory (pitch-class set analysis: Forte, 1973; Rahn, 1980; neo-Riemannian models: Cohn, 1998; 2012; transformational theories: Lewin, 1987; Rings, 2011), psychoacoustics (a model of musical chord-roots: Parncutt, 1988, 1993), and cognitive psychology (key profiles: Krumhansl & Kessler, 1982; Temperley, 2006). Are these changes in musical structure accompanied by consistent changes in the immanent emotions (i.e. emotions which are latent in the score) and free associations (or abstract images) that are evoked by the music? Musicians and non-musicians are asked to describe emotions that they experience when listening to a selection of representative piano pieces (or piano transcriptions) belonging to the proposed trajectory, by (i) choosing and rating words from a list of emotions derived from the Geneva Emotion Music Scale (Zentner & Scherer, 2008) and from the Izard's Differential Emotions Scale (Izard, 1990; Ouss et al., 1990), and (ii) indicating additional words for emotions and free associations on their choice. Preliminary results are consistent with the hypotheses that to identify uncertain or ambiguous tonality and/or atonality, as well as to describe unfamiliar contexts for consonance/dissonance, categorical models of emotions look more appropriate than dimensional models. Decreasing tonal centricity and/or increasing degree of dissonance within and between the works of each composer are associated with higher ratings in feelings like tension, anxiety, fear, uncertainty, and associations like dark, gloomy, insecurity, sense of death.

Background music influences the evaluation of moving emotional facial expressions

Anne Weisgerber

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In our daily lives, emotions are often influenced by music either voluntarily (e.g., MP3 player) or not (e.g., music in shopping centres). Several studies investigated how music, as an auditory input, influences the evaluation of emotional words and faces. However, these researchers usually used emotional words and static emotional face expressions (EFE) as stimuli but our facial expressions are not static but change in valence and intensity. In the present experiment, different emotional music samples (happy and sad music) were presented as a musical background for moving EFE presented as targets. The goal of this study was to investigate if music may help people to refine emotion identification in a more ecological setting. Participants were exposed to three conditions (congruent, baseline and incongruent music-EFE combinations) with 108 videos of facial expression morphing (neutral to 100% of emotion and vice versa). They were asked to press the space bar when they thought that the facial emotion expression was at 50% of the expressed emotion. We observed that participants were significantly closer to the 50% threshold in the congruent condition (59%) versus 70% in the incongruent condition. We also found that, in the congruent music condition, participants were more accurate to 50% of the emotion expression when it appeared from neutral to emotion (54%) than when the emotion expression disappeared (61%). In conclusion, this study showed that congruent music helps to enhance precision in emotion identification but interferes in emotion disengagement in moving facial expression.

Music as a language of the emotions: multi-disciplinary findings and a developmental hypothesis

Constant Bonard

University of Geneva, Switzerland

How can abstract patterns of sound communicate actual affects? In the first part of my presentation, I shall expose the following answer «musical communication uses mechanisms traditionally ascribed to language» from the perspective of different disciplines: philosophy (Rousseau, 1781; Meyer, 1956), musicology (Cooke, 1956; Nattiez, 1975), cognitive psychology (Juslin, 2003; Cross, 2004), neuroscience (Patel, 2003; Koelsch, 2004), cognitive archeology (Mithen, 2005), and linguistics (Lerdhal and Jackendoff, 1986; Katz and Pesetsky, 2011). I shall argue that, beside the often noted links between expressive prosody and melody, one can give accounts of musical expression in terms of musical syntax, semantics, and pragmatics. I shall thus defend the claim that music is a (quasi-)language of the emotions by presenting multi-disciplinary findings supporting it. In the second part of my presentation, I shall explore theorically a specific result this claim may yield, which could be of some importance for music aesthetics: If musical expression is based on (quasi-)linguistic properties, and since a critical period of acquisition seems to be crucial to the mastering of a language, then we could explain why, in many cases, we are more at ease (on both a productive and a receptive level) with musical cultures we have grown with, rather than ones we have long been exposed to while adults. There would also be a critical period of acquisition for musical syntax. For instance, since I have never been acquainted with Carnatic music in my youth, I may never be able to understand certain expressive qualities of its rāgas, because it possesses a syntax different (Vijayakrishnan, 2007) to that of the music I know. A proposal for future empirical research will be presented.

The goals, strategies, and mechanisms of adolescents' musical relaxation

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Recent research has begun to uncover the psychological mechanisms that underlie the affective impact of music. Nonetheless, current literature is fragmented across a variety of related concepts, such as emotion regulation strategies and emotion induction mechanisms and not specifying the relevance of these in the differing everyday situations. Knowledge on the particular affective processes and their interactions should be better rooted also in contextual aspects and engagement motivations such as relaxation or social interaction. This study focused on the interplay of affective goals, regulation strategies, induction mechanisms, and resulting affective states in the particular context of adolescents' musical relaxation. Fifty-five adolescents (42 girls, 13 boys), aged 15, participated in the study. Participants engaged in a relaxation task of listening to self-selected relaxation music for 20 minutes and filled in a questionnaire targeting the abovementioned affect-related concepts and attended features of the music. Participants completed the study once in a laboratory and once at home. Open-ended descriptions were analyzed using summative, directed, content analysis for identifying typical patterns of usage and interactions between the related concepts. Goals, in addition to relaxation, included positive moods and energizing. Somewhat in line, the resulting states, in addition to relaxation, included positive and novel emotions, revigoration, and disappearance of negative emotions. The most common regulation strategy was active positive distraction and the most typical induction mechanisms were emotional contagion, episodic memory, and visual imagery. The descriptions typically consisted of interplay of different musical features. Patterns in the relationships between the concepts were observed. The study clarifies the role of music in the specific engagement context of relaxation and provides novel, broader, understanding of the interplay of particular affective processes.

Musical emotion variation detection from acoustic content - lessons learned from developing MediaEval «Emotion in Music» benchmark

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Musical emotion variation detection (MEVD) algorithms predict emotions expressed in music from its acoustic content by tracking emotional changes along the duration of a musical excerpt on a certain temporal resolution, e.g., 2 Hz. In this talk, we summarize the lessons learned from organizing an MEVD benchmark at MediaEval multimedia benchmarking initiative (http://www.multimediaeval.org) over three years. One of the main challenges lies in collecting the ground truth for MEVD. Since 2013, we collected a dataset of temporally varying annotations for more than 1700 musical excerpts (Soleymani et al. 2013, Aljanaki et al. 2014). We describe the strategies used to improve the quality of this data with instruction and experiment design. The inter-annotator agreement achieved with the state-of-the-art annotation strategy is still rather low with Cronbach's alpha of 0.24 for valence and 0.31 for arousal. We identified a number of challenges in music annotation for MEVD. First, the size of the musical excerpts typically chosen by researchers (less than a minute) is too small. Second, giving ratings on an absolute scale is problematic to humans, especially in real time. Third, the task necessitates tracking and responding to music continuously (with unspecified granularity) which leads to obtaining annotations on different structural levels (individual notes, phrases, sections). We will also briefly present our evaluation strategy and the best performing automatic methods. We believe that this benchmark will serve as a milestone in advancing MEVD with a goal of building automatic models and mining features relevant to model emotion perception in music.

Development of an Intuitive Listener-focused Interface for Assessing Reasons for Listening

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An essential element in modelling the emotional outcomes of personal music listening is the accurate assessment of the various reasons for listening. While previous research has identified a broad range of listening motives and functions of music, it has not yet produced a means for listeners to intuitively report their combination of reasons for engaging with music. The current project aimed to develop an intuitive and listener-focused interface for reporting the set of reasons for any given listening episode. This was achieved by bringing together complementary research approaches, including qualitative analysis of interviews, and experience sampling. This process resulted in a mobile interface presenting nine reason categories, each branching off to a selection of primary reasons for listening, determined by listener mood and context. The interface was developed primarily for use in MuPsych, a mobile application which utilises experience sampling methodology for the ecologically valid and real-time assessment of personal music listening. This interface will have a direct application in curation for music streaming, in which music can be selected to match the listener, their context, and their specific reasons for listening. Personalised curation of music will allow listeners to reach desired affective states, and help maintain emotional health and well-being.

Development and pilot evaluation of a music therapy treatment manual for depressive adolescents

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Depression is among the most prevalent mental illnesses in adolescents. Recent research found evidence supporting the hypothesis of depression mainly being a disorder of emotion regulation, involving severe mood disturbances. Listening to music and associated activities are of major importance in adolescents' identity formation, mood regulation, and peer group building processes. Moreover, neuroimaging studies found strong associations between neural networks involved in music processing and those responsible for emotion regulation. However, despite positive experience of a growing number of music therapists working with depressive adolescents, there is a severe lack of scientifically sound studies and formalized treatment guidelines. Therefore, the aim of the present pilot study is to finalize a treatment manual and to evaluate suitable methods for a subsequent randomized controlled trial. The pilot study utilizes a simple pre-post-follow-up-design and will start recruitment in October 2015. The primary outcome is depression (CDRS-R, BDI-II), secondary outcomes encompass emotion regulation (Feel-KJ), quality of life (KIDSCREEN) and stress (heart rate variability, hair cortiscol). Clients aged between 13 and 17 with a depression diagnosis are eligible to participate in a manualized music therapy treatment lasting for twelve weekly single sessions. Interventions of the manual will mainly focus on improvement of emotion regulation, realization/recognition of own emotions and the expression of feelings. Expected outcomes are a feasible and methodologically robust design for a phase-II clinical trial and the final version of a music therapy treatment manual for depressive adolescents.

Music therapy devoted to neuropsychological rehabilitation

Maryse Bétrisey, Anne Bellmann Thiran

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There is now an emergent litterature documenting the usefulness of music therapy in the field of cognitive neurorehabilitation (Magee WL. & O'Kelly J. 2015, Sihvonen AJ. et al., 2014, François C. et al. 2015). We have been developing such a practice at the CRR-Sion since 1999. From that experience, we describe and formalise in this poster the strengths and advantages of music therapy, which acts as a good complement to classical neuropsychological rehabilitation. Music therapy offers a different access door (emotion, non verbal auditory modality), specific means, less dependant on left hemispheric language functions (singing, musical instruments, monocorde bed), and a different approach, more playful, less school-like and performance oriented, taking advantage of some automatic-voluntary dissociations. Field of application are diverse: among others, we can cite aphasic patients. Patient RP suffers from motor transcortical aphasia, we take advantage of the automatic-volontary dissociation which allows her to sing songs and fade out progressive the external aids piano accompaniment, than only piano chord in introduction, than alone- ; RP regains pleasure and selfconfidence and the Melodic Intonation Therapy cant than be introduced by her speech therapist. With hemineglect patients, we will in particular use musical intruments such as balafon (for example, the patient must reproduce a musical sequence, the tonal position acting as an acoustic cue for spatial exploration -low registre to the left-. Other examples of application are provided in the poster.

Emotions in the opera house: A field study of responses to four opera productions

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Swiss Center for Affective Sciences, Switzerland

Scherer and Zentner (2001) have suggested a Route model for the mechanisms involved in the elicitation of emotion via music of different genres, outlining different factors likely to explain the type and intensity of emotional states triggered by music. However, these theoretical suggestions have rarely been investigated empirically. We invited four groups of participants to attend the dress rehearsal of selected operas. The general design of these studies has been to assess the participants' emotional experience during the performance, as well as various factors that might influence this experience. We manipulated prior information about the opera by dividing the groups of participants into subgroups receiving a 30-minute introduction to either the plot of the opera and the staging by the director, or to the musical structure as intended by the composer. Preliminary results showed no effect of type of introduction on the emotions attributed to the different parts of the operas. However, we found significant differences between the different parts (scenes or acts), suggesting that the emotional value attributed to each piece was independent from the background factors investigated. We also found differences between the emotions reported to be felt by the listeners and those that they perceived in the performance, indicating that emotions supposedly expressed by the piece and the performers were not necessarily congruent with felt emotions. Lastly, we found no effect of mood on affect during the operas, suggesting again that the emotions elicited by the pieces were not influenced by the listener's subjective states.

Assumed roles and processes in Improvisation

Tyreek Antoine Jackson

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Improvisation in music involves a host of processes throughout the body and mind – from inward-thinking neurocognitive processes, to ouward-thinking communicative processes, and performative processes to physically produce the music. Throughout the course of an improvisation, improvisers will shift from process to process and combine processes together; sometimes turning inward and building material bit by bit, like a composer; sometimes reacting and responding to feedback from their environment, like a listener; or sometimes relying more on muscle memory and a rehearsed vocabulary, like a performer. A central question to understanding the improvisational process is how and when these shifts between processes take place. In the first study, a jazz trio was asked to improvise over the jazz standard "Giant Steps" for 2 choruses. To see if tempo had an influence on the improvisation, improvisations were done at 100, 180, and 260 bpm. The improvisations were analyzed and phrases were categorized as Improviser as Composer (IAC) or Improviser as Performer (IAP) phrases. To see if improvisers were listening inward, an average number of beats between phrases (ASL) was compared with the average number of beats between phrases (APL). Results indicated the largest number of IAP phrases and the smallest APL to ASL ratio occurred at 100bpm, whereas the opposite was true at 260bpm. Results from the first study have prompted the second experiment; which will involve 10 keyboard players improvising over Giant Steps under the same conditions.

Rating Emotions in a Cross-modal Context: How Music and Images are Felt and Perceived

Landon Shaffer-Liggett Peck

The University of Sheffield, United Kingdom

What is the difference between perceived and felt emotions in music when presented with congruent an incongruent emotional images? The objective assessment of expressed emotion may differ drastically from subjectively felt emotions due to one's personality, aesthetic taste, and other individual differences. This study examined the differences in perceived and felt emotion ratings in a cross-modal context and provided compelling evidence for a combinatorial emotional rating between musical and visual emotional pairings. Nine cross-modal (music/images) conditions were presented in an experiment where thirty-three participants evaluated the felt and perceived emotional content of each condition. Emotionally evocative images were selected from the International Affective Picture System (IAPS) database, and emotionally corresponding film music was chosen from previous studies. Participants were presented with happy, neutral, and sad music and images. Each participant was asked to record the valence of their emotional responses on a scale from 1-7, 1 corresponding to "very sad" and 7 "very happy." Results showed a stepwise trend in perceived and felt emotions suggesting that both music and images were independently effective at emotional manipulation. Perceived emotion ratings were more pronounced spanning a larger breadth of emotional scale, while felt emotions were rated more neutrally. It was found that there was a larger variance in response for perceived emotions than those of felt emotions. Incongruent conditions (happy music with sad images or sad music with happy images) resulted in neutral emotional ratings; however, results suggested that images may be more important in the perception of emotion, and music may drive the felt emotion response. Further studies should be conducted to explore this finding and examine the relationship between incongruent emotional conditions and the perception and feeling of emotion.

Music rehearsals and well-being

Eva Matlschweiger, Sabrina Sattmann, Richard Parncutt

University of Graz, Austria

Several studies have reported positive effects of (choral)singing on well-being (e.g. Beck et al., 2000), mostly by comparison to a listening condition. There is, however, a lack of literature addressing the comparison of choral singing with other active music-making conditions. This study compares the effect of choral singing, playing in a brass band, playing in a theater group, and passive music listening on well-being. Participants were three choirs (n=57, 44 female, mean age 59.7), two brass bands (n=54, 20 female, mean age 34.1), three theater groups (n=34, 21 female, mean age 32.1) and a group of concert-goers (n=37, 27 female, mean age 46.4). Participants completed the Positive Negative Affect Schedule, the Perceived Stress Questionnaire (PSQ) and the State-Trait-Anxiety-Inventory before and after a 1.5-hour rehearsal (concert). They then answered a series of open questions in writing (e.g. importance of singing/playing; satisfaction with performance) after the session. Interviews were conducted with 3-5 participants per condition. Results show a significant decrease of negative affect between pre- and post-measurements for all conditions. A significant decrease in PSQ ratings was found for the choir, theater and concert conditions. State anxiety significantly decreased in the choir, theater and concert conditions and significantly increased in the brass band condition. Choral singing (as shown in previous studies), playing in a theater group and listening to music was found to have a positive effect on well-being. Qualitative data is currently being analyzed; findings may explain the lack of positive effect in the brass band condition.

Musical structure and chills in self-selected popular and classical music

Sabrina Elisabeth Sattmann, Richard Parncutt

University of Graz, Austria

The aim of this study was to investigate the musical structures that are associated with chills (positively experienced goose bumps or shivers down the spine) while listening to music. As previous studies have focused on classical music and partly on professional musicians (e.g. Sloboda, 1991), this study considered the perception of mainly popular music by amateur musicians and non-musicians. Interviews were conducted with 20 participants (12 female). Each was asked to bring three chill-eliciting pieces of their own choice. During the interview, the tracks were played and participants indicated the chill-inducing passages verbally. Additionally, they explained why they liked the pieces, special features of the identified passages, and what emotions were evoked. Additionally, participants were also asked about any memories or associations to the music, whether they attended to the lyrics, and how important these were for them. More than half of the tracks were popular, in a major key, and in four-four time, which seems to contradict Panksepp (1995) who suggested that sad and melancholy music is especially chill eliciting. Analysis of the 60 pieces suggested that chill-inducing passages are associated with changes in instrumentation, dynamics, melodic/thematic and harmonic content, as well as melodic peaks and delays of musical progressions. This replicates previous findings that chills are often evoked by musical changes (Grewe et al., 2007). Our data suggest that melodic peaks, delays of expected events, and changes of instrumentation are emotionally more important than previously assumed.

Micro-timing deviations modulate groove and pleasure in electronic dance music

Pauline Tranchant[1,2], Alexandre Lehmann[1,2,3]

1: Centre for Research on Brain, Language and Music & International Laboratory for Brain, Music and Sound Research; 2: Université de Montréal, Canada; 3: McGill University, Canada

« Groove is that aspect of music that induces a pleasant sense of wanting to move along » (Janata et al, 2012). This phenomenon is of central interest for the study of how people engage in musical and dancing behaviors. Little is known on the characteristics of a musical rhythm that are important to convey groove. Medium degrees of syncopation yielded higher groove ratings of funk drum breaks (Witek et al. 2014); whereas non-constant systematic micro-timing deviations - typical of jazz, funk, and samba - decreased groove ratings of short rhythms (Davies et al. 2013). In electronic dance music (EDM), « swing » is believed to play an essential role in creating the sense of groove (Butler 2006, Danielsen 2010). In popular genres such as house or techno, it consists of constant deviations in the duration and timing of every second 8th or 16th note. Here we investigated the effect of systematic micro-timing deviations on groove and pleasantness ratings of 16 bar-long, realistic EDM excerpts. Ratings of groove and pleasantness were compared between different swing conditions, as well as against conditions designed to control for polyphony and regularity. Groove ratings positively correlated with pleasantness. Swing amount negatively modulated groove, while higher regularity and polyphony positively modulated groove. We will discuss these empirical findings in relation to groove research and genre-specific production guidelines. We suggest future studies that involve music producers, dancing, and neuro-imaging modalities

How does music evoke emotions in the brain?

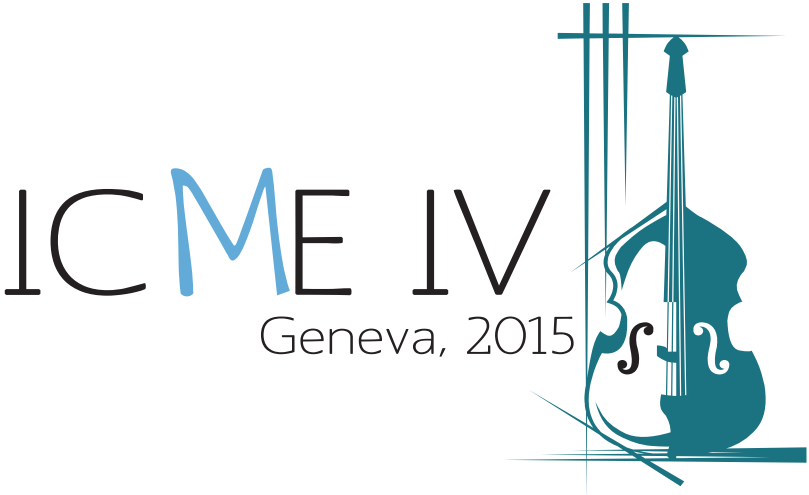
Piano: Satoko Matsumoto, Violin: , Stefan Koelsch, Violin: Julia Alexa Kraft, Viola: Chie Peters, Cello: Tilman Kanitz

Freie Universität Berlin, Germany

Lecture-Concert, Johannes Brahms, Piano quintet f-minor Op. 34

Everybody knows the experience that music evokes emotions. But / how/ does music evoke emotions in us? How does music itself evoke emotions (even without reference, e.g., to emotional memories, or without mimicking emotional expressions)? Do music-evoked emotions actually involve those brain structures that are crucially involved in 'real' emotions? This lecture-concert will deal with these questions and present latest findings from music psychology and the neuroscience of music in a way that they can also be understood by non-experts. The lecture-concert will also guide through the principles underlying the evocation of emotions with music, and illustrate these principles with live examples from the f-minor piano quintet by Johannes Brahms.

Following the talk, the entire piano quintet will be performed.



Body emotion perception, out of self experience and music

Béatrice de Gelder

Maastricht University, Netherlands

The body is a powerful means of social and emotional communication. The information conveyed by the body seems to merge effortlessly with that provided by the face, the voice and the surrounding context. In this talk, I will explore how what we know so far about emotional body perception may be relevant for understanding the experience of dance and music. For this purpose compare conscious and nonconscious body experience with a self and an out of self mode of perception.

Music and the Simulation of Emotions

Lawrence Zbikowski

University of Chicago, United States of America

In this paper I build on recent work on the simulation of emotions to develop an account of how musical organization shapes emotional responses. According to the model developed by Paula Niedenthal and her colleagues, emotional responses to social signals such as smiles activate psychological and physical processes that are similar to those that underlie the signal. The result is an embodied simulation of an emotional response. Such simulations may result in overt emotional displays (responding to a smile with a smile) but they may also be associated with more complex behaviors (such as those involved with responding to a feigned smile, or one used to assert dominance). Key to the shaping of such complex behavior is conceptual knowledge. Through a close reading of the Andante from J.S. Bach's Second Sonata for Unaccompanied Violin, I illustrate how conceptual knowledge activated by sequences of musical sound can inform emotional responses. I further suggest how this approach can address problems associated with the study of emotional responses to music, and how it could be developed in experimental contexts.

Rhythmic entrainment – a musical emotion induction mechanism

Wiebke Trost

University of Geneva, Switzerland

There are many ways in which music can induce emotions in the listener. Among other psychological principles, one emotion induction mechanism that has only recently been acknowledged as such is rhythmic entrainment. Rhythmic entrainment stands for the notion that musical rhythms engenders adaptation and synchronization processes of bodily rhythms in the listener, and that these processes are responsible for the elicitation of an emotion which may eventually generate a subjective emotional experience. In this talk I will argue how music induces emotions through rhythmic entrainment. Theoretical and empirical arguments will be presented, which suggest that rhythmic entrainment works as a general principle. It will be proposed that rhythmic entrainment can affect the listener in particular on four different levels, the perceptual, the autonomic physiological, the motor and the social level. For each level the corresponding phenomena and underlying brain processes will be presented. Moreover, different induction mechanisms arouse different kinds of affects. It will be discussed which type of emotions rhythmic entrainment induces. Finally, it will be put forward how rhythmic entrainment can be applied in rehabilitation settings.

A qualitative approach to the psychological mechanisms underlying musical emotions: Understanding Nostalgia and Sadness in Fado music

Gonçalo Teixeira Barradas

Uppsala University, Sweden

Recent research has provided an explanation of how underlying mechanisms mediate the induction of emotions in listeners. However, because some cultures are more frequently exposed to certain musical features and atmospheres, it can be expected that these trigger specific mechanisms and emotions that serve functions in a partly culture-specific manner. The aim of this study was to explore how the various mechanisms included in the BRECVEMA framework mediate the emotions evoked by fado, an urban Portuguese folk music, in its natural context. In-depth interviews with fado listeners were recorded, transcribed, translated, content analyzed and coded into categories. A qualitative approach allowed us to examine how interactions between places, music and listeners contributed to the activation of specific mechanisms, emotions evoked, and consequences for people's subjective wellbeing. Results suggested that fado music induced mostly nostalgia and sadness. These were mainly mediated by episodic memory, emotional contagion and aesthetic judgment. Nostalgia enhanced participants' subjective wellbeing in the sense of community strength and reflection on their own past, while sadness was mainly regulated by cathartic experiences like crying. Furthermore, nostalgia was associated mostly with negative memories, regarded as important for personal growth and avoidance of past mistakes, while sadness was associated with the melodic aspects of fado, contributing mostly to mood matching, emotion regulation and wellbeing. The most salient contributing features of the music involved the sound of the guitars, the lyrics, and the singer's performance, while the proximity between listeners and performers and the atmosphere were the most salient aspects regarding the place. Although the mechanisms underlying musical emotions may not differ cross-culturally, the exposure to certain musical features and places may influence their prevalence. We conclude that more qualitative research is needed to understand the specificities of musical emotions cross-culturally.

Musically Induced ASMR: an amalgamated experience

Juri Kobayashi, Suvi Saarikallio

University of Jyväskylä, Finland

Musically induced ASMR is an Autonomous Sensory Meridian Response triggered by music. The term ASMR is best known on the internet by communities who report experiencing this phenomenon. It is most simply understood as an experience like musical chills, however can be triggered by nearly any form of stimuli. The current study employed grounded theory methodology, a meticulous and established qualitative research method for developing theory that serves to explain salient characteristics of a particular phenomenon, to theorize the nature and significance of musically induced ASMR and ASMR in general. Based on the data collected, the study confirmed the existence of musically induced ASMR and demonstrated this concept's analogous psychological, physiological, and emotional characteristics with musical chills through comparison with prior research. The study established the term musically induced ASMR to describe a phenomenon, for which previous studies have struggled to assign competent descriptive terminology such as, chills, thrills or frisson. As a core characteristic of the phenomenon, it was found that ASMR stimulates a sense of self-awareness, which initiates other psychological, physical and emotional responses.

Improved Methods for Measuring Synchronous Sympathy

Teresa Marrin Nakra

The College of New Jersey, United States of America

A study published in the journal Music Perception in December 2014 [2] compared the emotional intensities of a conductor and audience during an orchestra concert, using heart rate (HR) and slider box data. Researchers found that the conductor's HR variations aligned temporally with structural patterns in the score and the audience's average emotional intensity measurement. One study limitation involved the inseparability of three sources of HR variability: emotional intensity, cognitive load, and physical effort. (The HR signal is a complex measure that reflects interactions between physical, emotional, and cognitive experiences; emotional intensity contributions are caused by signals from the autonomic nervous system.) In order to quantify and decouple the various contributions to HR variation, researchers attempted to estimate physical effort over short time window; they acknowledged that more research was needed to distinguish and estimate the relative contributions of the different factors toward HR variations. This project aims to transcend this limitation by simultaneously measuring HR, movement (acceleration), and electrodermal activity (EDA) on the same sensing device, namely the Empatica E4 wristband. This presentation will describe improvements to the data collection system and methods, along with planned deployments of the new system with conductors in professional concert situations. The goal of this research is to tease out some of the underlying mechanisms of emotional responses to music between conductors, musicians, and audiences. We will primarily assume that listening to and performing music elicits clear physiological responses that correlate to emotions (i.e., "emotional induction" or the "emotivist" position), but will also consider the six additional mechanisms proposed by Juslin and Västfjäll (2008) [1]. Methods and results from preliminary studies will be presented.

Emotion perception, expression and regulation in music therapy

Thomas Wosch

University of Applied Sciences Würzburg-Schweinfurt, Germany

Emotion perception, anxiety, emotion regulation and emotional transitions are some issues of music and emotion in music therapy treatment of psyche disorders and other diseases. Different psyche disorders include different disorders in emotion perception, expression and regulation. From these arise indications and contraindications of different methods of music therapy in different disorders. The paper will discuss indication and contraindications of three methods of music therapy from the point of view of emotion. These methods are Regulative Music Therapy (RMT), the Bonny Method of Guided Imagery and Music (BMGIM) and Improvisational Psychodynamic Music Therapy (IPMT). The research methods are randomized controlled trials (RCT), clinical outcome studies (ebm-2), EEG, microanalyses and MIR-based Music Therapy Toolbox-analysis. Results are e.g. indication of RMT in eating disorders and borderline disorder based in highest significance in clinical outcome study (compared with other psychotherapy methods, p=0,01) and indication of IPMT in affective disorders based in RCT (compared with standard care) and EEG-measurements pre and post treatment of 20 sessions of music therapy (with changes in fronto-temporal activity, i.e., significant absolute power increases at left fronto-temporal alpha). These results inform music and emotion from the perspectives of psyche disorders and music therapy. Results extent the discrete model of musical emotions to the items of intermusical relationship and of emotional transitions. Results also contribute to perception of musical anxiety in two ways: the way of hyper arousal in perception-desensitization-regulation and the way of hypo arousal in relaxation-altered consciousness-regulation. This informs also models of individualized emotion perception in music.

Music, Emotion, and Metaphor

Alessia Pannese[1,2,3], Marc-André Rappaz[4], Didier Grandjean[1,2]

1: Swiss Centre for Affective Sciences (CISA), University of Geneva, Switzerland; 2: Neuroscience of Emotion and Affective Dynamics (NEAD), University of Geneva, Switzerland; 3: Department of Fundamental Neurosciences, University of Geneva, Switzerland; 4: University of Music (HEM), Geneva, Switzerland

Music is often described in terms of emotion. This linguistic link is paralleled by empirical evidence showing that engaging with music is frequently associated with subjective reports of emotion experience, and with objectively measurable responses at the behavioural (e.g. change in facial expressions, psychomotor responses, and action tendencies), physiological (e.g. change in hormonal secretion, cardiac and respiratory frequency, skin temperature and conductance), and neural level (e.g. activity within hippocampus, amygdala, insula, orbitofrontal cortex, and other brain regions known to be involved in emotional responses). Based on these observations, it has been held that human interest in music is ultimately rooted in music's ability to induce emotions. This view, however, is not unanimous. Some accounts reject the possibility that music may induce 'real' emotions. Evidence in this direction comes from the so-called 'paradox of negative emotion', whereby music described in terms of negative emotions (e.g. sadness, grief, despair) may nevertheless be judged as enjoyable. The discrepancy between (negative) affective descriptors and (positive) affective experience suggests that music might move the listener through indirect mechanisms that do not always coincide with the emotions linguistically attributed to it. Here we will discuss the role of metaphor as a potential mediator in this mechanism. Drawing on musicological, philosophical, and neuroscientific literature, we will explore the theoretical and empirical implications of a possible model of music experience in which metaphor acts as the hinge between language, emotion, and aesthetic response.

The role of aesthetic utility in economic money-sharing experiments

Christopher Hemmens

University of Geneva, Switzerland

Simple money-sharing games have long been used in economics to study participants' utility preferences in areas like altruism and inequality aversion. However, we regularly see behaviour that appears to be irrational or contradictory to standard game theoretic assumptions. Based on data from existing money-sharing games, I hypothesise that, on average, people show a preference for ratios that, in music, would be considered concordant. For example, if someone were asked to split $10 between themselves and someone else, they would be more likely to choose a split of $8:$2 or $6:$4, which correspond to chords that are traditionally harmonious by Western musical standards, rather than $7:$3, which is not. I refer to this preference as aesthetic utility. I conduct an experiment to find which musical ratios are most appealing and then run alternative-specific conditional logit models on existing money-sharing data to see if the most favoured ratios are selected for over alternatives. When the number of choices is small, I use dummy variables to identify certain options as being aesthetically pleasing and compare these models to a basic altruistic utility model using log-likelihood ratio tests. There is little to no evidence that aesthetic utility has an effect here. When the number of choices is large, I also include a dummy variable to identify options that have a single significant figure - what I term 'integer options'. This is a common heuristic by which agents limit their available choices. I find that aesthetic utility increases the chance that a particular option will be chosen when the number of available choices is large. The impact is small but significant. In the context of cognitive science, this result reinforces the notion that humans make decisions by using simplifying heuristics and this study contributes the idea that ratio-aesthetic is one of these heuristics.

Affective Intentionality of Musical Feelings

Christoph Seibert

Max Planck Institute for Empirical Aesthetics, Germany

Cognitivist approaches have been the leading paradigm within the psychological and philosophical investigation of emotions. From this perspective, simply said, emotions have been conceptualized as cognitive appraisals having an intentional content with feelings as a non-intentional by-product. However, within the last 15 years, based on phenomenological as well as analytical considerations, the idea has been brought forth that emotions should not be reduced to their cognitive intentionality but that feelings own an intentionality sui generis which has been described as affective intentionality. According to this concept, being simultaneously self-directed and outwardly directed, feelings own an intentional double-structure—we feel ourselves in a certain way towards something. Following this conception, I propose a framework for the differentiation of various musical feelings according to their intentional structure addressing a desideratum in the current discussion on musical emotions. The exploration of the intensity of the self-directedness and the specificity of the world-directedness unfolds a two-dimensional space for the differentiation of dynamic phenomenal affective states in relation to music. In addition, in the case of being directed to the world in a specific way, feelings might be discriminated due to the way the world-directedness is achieved and regarding their actual intentional content. Derived from the analysis of widely discussed philosophical explanations and psychological mechanisms for music's potential to arouse emotions with reference to their underlying intentional structure, I propose a taxonomy comprising affective states that exhibit a strong self-directedness as for example actual musical feelings (being specifically world-directed) or musical background feelings (being non-specifically world-directed) as well as those being only marginally directed to the self as the affective state while merely perceiving emotional expression. Finally, discussing the possibility to integrate this conception into empirical approaches, I will argue that this might fruitfully complement established tools for the assessment of musical feelings.

Methods and tools for the empirical assessment of Musical Emotions

Chair(s): Eduardo Coutinho

University of Liverpool

Discussant(s): Marcel Zentner[1], Nikki S. Rickard[2]

1: University of Innsbruck; 2: Monash University

The study of emotion induction through music places major challenges to empirical research in different disciplines. One central reason is the fact that the emotions experienced by listeners are influenced by a variety of parameters related to listener traits and states, musicians' performance, and listening and cultural contexts. Another, is that the nature and specificity of musically induced emotions is still not well understood, and there is empirical evidence that the listening to music is likely to generate more frequently and more consistently a different subset of emotions than those commonly experienced in other contexts of everyday life. Therefore, a comprehensive empirical investigation of emotional experiences during exposure to music must consider a wide range of variables in addition to the music itself if investigators are to achieve a broader understanding of the emotional power of music. The purpose of this symposium is to bring together and display current research trends on the development of freely available instruments for the quantification of listener- and context-related factors with an impact on musically induced emotions, as well as music-specific taxonomies and strategies for quantifying musical emotions.

New approaches to assess emotions elicited by music: Qualia and Dynamics

Ursula Beermann[1], Stéphanie Trznadel[2], Klaus R. Scherer[2]

1: University of Innsbruck, Department of Psychology; 2: Swiss Center for Affective Sciences, University of Geneva

We present two new approaches to the assessment of musical emotions. The first approach aims onqualia that accompany musical emotions. Using the Music Qualia Inventory (MQI) we asked participants to rate qualia of the five emotion components feelings (e.g., Moved-Indifferent), bodily reactions (e.g., Slow breathing-Rapid breathing), expression (e.g., Mouth closed-Jaw drop), behavioral impulses (To make piece stop-To make piece go on), and music evaluations (e.g., Beautiful-Unattractive). In a first validation of the instrument, listeners of a Dutch classical radio station filled in the MQI right after listening to three classical music excerpts. Results show differences in the qualia profiles depending on the musical piece. The second approach assesses emotions dynamically, i.e., emotions are reported while listening to a musical piece, rather than retrospectively. Using the 14 emotions listed in the Geneva Music-Induced Affect Checklist (GEMIAC), we asked participants to enter the exact time point next to the respective emotion whenever they feel it while watching or listening to a musical performance. Analyses of data generated during an experimental concert with a well-known string quartet are ongoing and will focus on differences in the emergence of emotions depending on the respective movement or section of a piece.

GEneva Music-Induced Affect Checklist (GEMIAC)

Eduardo Coutinho[1], Klaus R. Scherer[2]

1: University of Liverpool; 2: Swiss Center for Affective Sciences

The study of music-induced emotions would benefit from standardized instruments to consistently evaluate the nature of affective reactions to music. In this talk, we describe a new checklist - GEneva Music-Induced Affect Checklist (GEMIAC) - for rapid assessment of music-induced affect, designed to extend and complement the Geneva Emotional Music Scale. The new checklist contains a selection of affect and emotion categories that are consistently found in the literature to belong to the most frequently mentioned types of emotional reactions to music, based on an empirical investigation of the semantic structure of the relevant terms. Two versions of the checklist for assessing the intensity and frequency of affective responses to music are proposed.

The MUSEBAQ: A comprehensive and modular instrument for assessing musical engagement

Nikki S. Rickard[1], TanChyuan Chin[1], Eduardo Coutinho[2], Klaus R. Scherer[3]

1: Monash University; 2: University of Liverpool; 3: Swiss Center for Affective Sciences

Engagement with music is complex, influenced by numerous listener-related factors. We report here on the development of a modular instrument which assesses a diverse set of music engagement constructs. The MUSEBAQ can be administered in full, or by module as relevant for specific purposes. Evidence was obtained from over 3000 adults (aged 18-87) for its structure, validity and reliability. Module 1 (Musicianship) provides a brief assessment of formal and informal music knowledge and practice. Module 2 (Musical Capacity) measures emotional music sensitivity (α=.90), listening sophistication (α=.76), indifference to music (α=.59), music memory and imagery (α =.81) and personal commitment to music (α=.80). Module 3 (Music Preferences) classifies preferences into six broad genres - rock or metal, classical, pop or easy listening, jazz, blues, country or folk, rap or hip/hop, dance or electronica. Online administration uses adaptive reasoning to selectively expand sub-genres, while minimizing time demands. Module 4 (Reasons for Music Use) assesses seven motivations for using music; musical transcendence (α=.90), emotion regulation (α=.94), social, music identity and expression (α=.90), background (α=.80), attention regulation (α=.69), and physical (α=.71). The comprehensiveness, yet flexibility, of the MUSEBAQ makes it an ideal questionnaire to use in research requiring a robust measure of music engagement

The ecological measurement of everyday music listening: MuPsych and the mobile experience sampling method (m-ESM)

William M. Randall, Nikki S. Rickard

Monash University

The measurement of everyday music use remains a challenge for researchers, with many available methodologies limited by intrusiveness or lack of ecological validity. The Experience Sampling Method (ESM) addresses such limitations by assessing current subjective experience at various times throughout participants' everyday functioning. The mobile ESM (m-ESM) was developed to observe everyday listening episodes, while maintaining a natural and familiar listening experience for participants. Specifically, it was designed to collect real-time listening data with minimal retrospective bias, and increased ecological validity. To achieve this, a mobile app named MuPsych was created, utilising mobile-device technology, which allows for the combination of experience sampling with a personal music player. Testing of the MuPsych app revealed vast improvements on previous ESM approaches, in terms of increased ecological validity, and decreased response times and recall bias. Furthermore, modelling of the MuPsych data on personal music listening revealed that emotional responses to music are determined largely by contextual factors. This implies that studies which fail to consider, or deliberately control for context variables, are limited in the conclusions they can draw in regards to the emotional outcomes of music. The m-ESM provides a reliable and ecologically valid tool with which the results of these alternate approaches can can be linked to the everyday experience, to provide a more holistic understanding of music listening.

Synthesizing speech-like emotional expression onto music and speech signals

Chair(s): Jean-Julien Aucouturier (CNRS)

Presenter(s): Marco Liuni (CNRS), Laura Rachman (CNRS), Pablo Arias (CNRS)

The workshop is a one-hour hands-on session in which participants will learn to use a new, free software tool able to synthesize markers of speech-like emotional expression, incl. pitch inflections, vibrato, and spectral envelope manipulations, onto any pre-existing music, speech or audio stimuli. Tested on speech, the effects are reliably recognized as emotional; they can produce emotions of varying controllable intensities; and they are not typically detected as artificially produced. In addition, they run in less than 15 milliseconds, allowing the tool to modify emotional expression on the fly in social situations, naturally and surreptitiously. In this workshop, participants will learn to use the software, and practice applying the effects both speech and music stimuli. Applied to speech, the effects will allow to systematically control for the nature and intensity of the expressive cues in e.g. imaging stimuli. Applied to musical signals, these effects will allow to test for the cognitive mechanisms involved in decoding speech-like emotional cues in music, and whether these differ from those involved in emotional speech. Participants will leave the workshop with a running copy of the software on their laptop, and - we hope - with a few experimental ideas to try back home.

The Emotion in Motion Framework for Distributed Music and Emotion Studies

Chair(s): Brennon Christopher Bortz

Virginia Polytechnic Institute and State University

Presenter(s): Brennon Christopher Bortz[1], Javier Jaimovich[2], R. Benjamin Knapp[1]

1: Virginia Polytechnic Institute and State University; 2: Universidad de Chile

Emotion in Motion began as a massive-scale study with the aim of compiling a database of human physiological and self-reported emotional responses while listening to music in naturalistic settings. To date, this database includes data from nearly 20,000 subjects gathered in six locations across three continents. In the last year, Emotion in Motion has been rebuilt to become both this massive database as well as a flexible, extensible software framework for the design and execution of studies involving emotion, physiological signals, and a variety of digital media. With the help of Emotion in Motion, researchers can both add to the Emotion in Motion database or design their own studies or even multimedia interactions. In addition, the substantial Emotion in Motion database is being made available to the academic community for their own use in analysis. This workshop comprises three parts. First, we provide an overview of the study and analysis to date. Second, we introduce the participants to the process of using software framework in their own work. Finally, we instruct the participants in how to use the existing dataset in their own work by means of a tutorial introduction on the tools used to access, query, and augment the Emotion in Motion database.

Computer-aided orchestration tools and their contribution to composition and teaching methods. Researches and experiments at HEM Geneva

Chair(s): Eric Daubresse

Presenters: Eric Daubresse, Marc Garcia Vitoria

Geneva University of Music

Although orchestration is an essential domain of the music, it generally remains an empirical knowledge, hard to share and difficult to be formalized, Therefore, unlike other musical categories, it is not surprising that it has been left out of the field of computer-aided musical research and composition. Nevertheless, it has been a research topic of some interest only for less than one decade; HEM Geneva take part in this research for the last 4 years, surrounded with expert partners in Canada (McGill) and France (Ircam). During this research time, computer-aided orchestration environments (orchis and pleione) have been developed in order to provide interfaces for exploring the space of instrument timbre mixtures and finding timbre combinations which matches with both sound target and set of user-specified perceptual requirements. During this workshop, we will present the main goals of this project, an overview of the state of the art, a brief demonstration of the tools, then we will focus on the works and results obtained by the students and composers at Hem Geneva, as well as the pedagogical and creative changes instigated by these technologies.

Eye-movement measurements as index of being absorbed by music

Elke B Lange[1], Fabian Zweck[1], Petra Sinn[2]

1: Max-Planck-Institute for Empirical Aesthetics, Germany; 2: University of Potsdam, Germany

Experiencing music can be accompanied by the state of being absorbed by the music, a state in which individuals allow the music to draw them into an intense listening experience. In an exploratory study we tackle the question, whether being absorbed by music might be related to eye movement control and pupil size. Microsaccades, which are miniature movements of the eyes during fixational movements, are related to attentional processing and cognitive load, pupil dilation to cognitive load and emotional arousal. Hence, they might be good candidates to index musical processing. We presented musical excerpts to listeners with the instruction to fixate a visual fixation point during intense music listening. As control, periods of silence were included. Eye movements and pupil dilation were recorded. Musical excerpts were selected from a broad range of styles, e.g. Techno, Metal, Folk, Classical Music. Each excerpt was rated for felt absorption, arousal, valence, preference and familiarity. Mean microsaccade rate decreased with increased absorption, liking and when felt valence was more positive, but there was no effect of arousal. Pupil size increased with increased arousal and liking and when felt valence was more positive, but there was no effect of absorption. Whereas pupil data did not relate to felt absorption, microsaccade rate decoded increased involvement into the music. When being not absorbed, some acoustic features, e.g. energy, roughness and novelty, correlated with microsaccade rate. Results demonstrate that microsaccade rates and pupil dilation index musical processing differentially, capturing on the one hand the same (e.g., valence) but also different (e.g., arousal versus absorption) components of the listening experience.

Intelligent Emotion-based Music Generation for Dance

Chih-Fang Huang[1], Wei-Po Nien[2], Yin-Chun Lo[2], Bo-Yuan Liu[3]

1: Kainan University, Taiwan, Republic of China; 2: National Chiao Tung University, Taiwan, Republic of China; 3: Shanghai Normal University Music College

This paper mainly presents a technological system for emotion-based music using algorithmic composition with human physical movement. Based on a qualitative and quantitative analysis of physical movement and its emotion factors, the basic motivational elements are analyzed through the use of a two-dimension emotion diagram. The corresponding musical elements determine the emotional features of the final composition of music by using conventional auto-composition logic. The qualitative and quantitative aspects of the physical movement are based on Laban movement analysis (LMA). This analysis describes human actions by using several basic physical movement aspects, and then quantifies actions according to related research on physical movement. According to the results of several studies, the basic emotion factors of arousal and valence can be observed by quantifying movement factors. An emotional prototype is the most critical parameter in emotional music composition. Through the casually computer-automated composition function, emotional music was produced using the standard composing theories of pitch class and Markov chain. The practical system of the program is based on the Max-MSP and JAVA. Physical movement was recorded using Kinect and the data was run in the program. Using the movement aspects of LMA, the emotion parallel system, and the auto-composition system, music could be produced immediately. Through the experiment and questionnaire, the relationship between human emotion and physical movement was determined, the possibility of connecting human emotion and physical movement was proved, and emotional music was produced.

La musique vocale à la conquête de l'espace!

Nicolas Farine, direction; Grand Choeur de la HEM – Genève

L'architecture du Biotech présente des similitudes avec les grandes cathédrales gothiques: l'espace créé une acoustique qui empêche le concert dans sa forme traditionnelle, mais offre de superbes opportunités expressives. G. Gabrieli fut l'un des premiers compositeurs à relever ce défi avec génie lorsque qu'il exerçait à la Basilique St-Marc de Venise dès 1580.

Oeuvres Giovanni Gabrieli (1557 – 1612)

Ecuatorial

Pierre Bleuse, direction; Orchestre et ensemble de percussion de la HEM – Genève

Précurseur de toute l'avant-garde du 20ème siècle, le compositeur français Edgar Varèse fut le premier à affirmer que la musique se fait avec des sons et non avec des notes. Il fait de la percussion un protagoniste central et expérimente les premiers instruments électroniques. Intégrales et Ecuatorial rendent compte de ses travaux historiques et si originaux.

Œuvres: Edgar Varèse (1883 – 1965), Intègrales Ecuatorial

Brain correlates of music-evoked emotions

Stefan Koelsch

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During the past decade, numerous studies investigated neural correlates of emotions with music. These studies do not only provide insights into emotional effects of music, but also into human emotions and their brain correlates in general. Functional neuroimaging studies on music and emotion show that music can modulate activity in brain structures that are known to be crucially involved in emotion, such as the amygdala, nucleus accumbens, hypothalamus, hippocampus, insula, cingulate cortex and orbitofrontal cortex. The potential of music to modulate activity in these structures has important implications for both emotion theory and therapeutic applications.

Exploring emotional responses to sad-sounding music

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Listeners and researchers alike disagree on whether listening to sad music actually makes one feel sad. Although it has been established that there are notable individual differences in the enjoyment of sad music, surprisingly little is known about the range of emotions experienced. Thus, the present study aimed to investigate what kinds of emotions are experienced in response to nominally sad music, and to explore the underlying structure of those experiences. In Experiment 1, 241 Finnish participants listened to a 3-minute excerpt of sad music in an online experiment, and described their felt emotions using 16 adjective scales. Principal Component Analysis revealed 3 components that explained 61% of the variance in all 16 scales. These components were labeled as "Sad and moved", "Enjoyable relaxation", and "Unpleasant arousal". In Experiment 2, 307 participants from different countries listened (online) to five 2-minute excerpts of sad music representing different genres and varying nuances of sadness. They rated their felt emotions using 7 adjective scales that were derived from the 3-factor structure obtained in Experiment 1. Confirmatory Factor Analysis was used to test the 3-factor solution as well as alternative 2-factor and 3-factor solutions. The best fit was provided by a 3-factor solution that was a close match to that obtained in Experiment 1, with sadness ("sad" & "melancholic") representing a factor independent of the positive, aesthetic ("in awe", "moved" & "peaceful") and negative ("anxious" & "powerless") constructs. In both experiments, the scale "melancholic" received the highest mean ratings, followed by "peaceful" and "moved".

Does sad music just press our empathy button?

Richard Parncutt

University of Graz, Austria

What motivates people to engage with sad music? How can music displaying sadness evoke positive emotion (Gabrielsson, 2002)? If attraction to sad music is universal (Balkwill et al., 2004), we expect an evolutionary explanation - not a cognitive-cultural one (such as Aristotle's catharsis, or allowing negative emotions without negative consequences, Kivy, 1990). Listeners are attracted to music that evokes basic emotions (happiness, anger, fear, surprise, tenderness) due in part to evolutionary drives based on individual survival and reproduction; e.g. angry/fearful music presses our danger/attention button. Attraction to sad music may be driven by dispositional empathy (Vuoskoski & Eerola, Escom, 2015), which promotes group survival. Diverse evidence supports the partial innateness of empathetic responses. Altruistic responses to others' distress (directed altruism) may be as old as mammals and birds (De Waal, 2008); separation distress has a universal neural foundation (Panksepp et al., 1997). Human empathy is automatic and emotional (Singer et al., 2004). Pain is associated with specific facial expressions (A. C. D. C. Williams, 2002), and spontaneous facial mimicry is largely automatic (Sonnby-Borgström, 2002). A role for empathy in music perception is consistent with the dominance of social emotions ("playful joy, sadness, maternal care, sexual lust, territorial/dominance imperatives") over non-social, self-preservative emotions ("anger and fear") in the origin of music (Panksepp, 2009). Specifically, sad music may represent a virtual sad person (Watt & Ash, 1998; Parncutt & Kessler, 2006), which activates an automatic proximal mechanism (Preston & De Waal, 2002, abstract). That can explain why sad music is linked to personality traits openness to experience and empathy (Vuoskoski et al., 2012; Vuoskoski & Eerola, 2012); prolactin (Huron, 2011); and even minor keys (Parncutt, 2014). If music originated in mother-infant bonding (Parncutt, 2009), empathy can explain associations between sad music and nostalgia, peacefulness, and wonder (Vuoskoski et al., 2012).

Rhythmic entrainment as an emotion induction mechanism

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Entrainment, the process through which physical systems with regular outputs become synchronized as they interact with one another (Clayton, Sager, & Will, 2005), is often proposed as a potential emotion induction mechanism in music listening (Juslin, 2013; Scherer & Coutinho, 2013). However, entrainment processes are likely involved at more than one level, such as the perceptual, motor, autonomic physiological, or subjective for example (Trost & Vuilleumier, 2013). We sought to test some of these levels in a series of behavioral and psychophysiological studies, which began by assessing whether it was possible to reliably report one's subjective experience of feeling entrained by the music resulting in the Musical Entrainment Questionnaire (MEQ; Labbé & Grandjean, 2014). This measure, found to be composed of a Motor Entrainment (ME) factor consisting of items related to feeling like moving, and a Visceral Entrainment (VE) factor consisting of items related to sensing one's internal rhythms changing, were then used as predictors of felt emotions in a series of follow-up studies aimed at testing the links between subjective entrainment, other levels of entrainment, and specific musical emotions through the use of the Geneva Emotional Music Scale dimensions (GEMS; Zentner, Grandjean, & Scherer, 2008). Finally, the impact of other variables such as the pleasantness of the music or the orchestration (e.g. solo vs. ensemble) on entrainment were also explored. We found the combination of both MEQ factors to be powerful predictors of largely positive emotional dimensions, and to be related to certain physiological measures of entrainment as well.

Music reconstruction of music from direct cortical recordings in humans

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Music is a universal aspect of human behavior. We addressed how music is represented in the human brain by recording electrocorticographic signals (ECoG) from 28 patients with intracranial electrodes covering left and right auditory cortices. A decoding model based on sound spectral features and high gamma filtered cortical surface potentials was able to reconstruct music that was identifiable by listeners when the ECoG data was transformed into sound waveforms. The perceptual fidelity of the sound reconstructions increased with increasing electrode spatial density and frequency tuning sampling. The left as well as the right superior temporal gyrus showed the highest fidelity in reconstructing the music. These results reveal that the spectro-temporal sound representation of music can be decoded using neural signals acquired directly from the human cortex.

Emotional associations in the art of piano playing

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The pianist's technique can be considered one of the manifestations of general human expressiveness – externalizing of feelings and emotions through the sphere of expressive movements. This is a process of adequate incarnation during performance of the experienced by the Artist feelings and moods, encoded in a musical composition. It is difficult to separate in the structure of the pianist's movements the «purely performing» movements (those directly responsible for the sound reproduction) from the expressive elements constituting the outer plastique of the pianist. Accordingly, formation of this artistic «emotionally determined» technique must also lay through emotion. The associative method involving emotional memory at all levels is quite efficient when working on the performing technique, especially with subtle and vivid music of impressionists. For example, when working on Debussy's pieces (who is often called «the poet of water»), important are metaphors and associative representations associated with the water element: they don't only enrich the musical emotion, but can be also used as an effective means of developing of good practices and motor experiences needed for an adequate transmission of images in real musical sound. Useful are comparisons with sensations during the swimming: slamming, angularity, muscle stiffness are contraindicated, the body must adapt to the aquatic environment, to merge with it, like a fish. These associative kinesthetic sensations help students to find the right piano sensations, the freedom of the whole performing apparatus - from the body to the fingertips; softness, flexibility, coordination, unity and interrelatedness of all movements. Some examples will be analyzed by demonstrating the effectiveness of bodily kinesthetic associations for the emotional experience of music. Theoretical study of the problem is result of synthesis of empirical data obtained from the author's long-term experience of teaching piano in university.This material is original and hasn't been published before.

How to target the emotional effects in musical performance

Morten Schuldt-Jensen

Musikhochschule Freiburg, Germany, Switzerland

For composers and musical practitioners it is equally crucial to know and recognize the agents of musical meaning and emotion and to have the technical skill to deliberately elicit the desired effect. Every interpretation of a classical composition implies a search for a content alongside with an analysis of the emotional state and development, all of which has to be expressed later by means of a few performative categories (tempo, dynamics, phrasing, articulation, timbre). Although we are still scholarly searching for the right theoretical understanding of ”musical meaning and emotion”, musicians and conductors on a daily basis navigate in and chose among a host of optional parameters in order to target the emotional impact of their interpretations. This presentation aims to explain and exemplify these options based on recent findings within the fields of musical perception and semiotics. It also encompasses a number of performance practical insights from a conductor’s point of view, and in the attempt to constitute a variety of aspects of the anatomy of musical emotion, excerpts from highly contrasting recordings of e.g. the Requiems of Mozart and Brahms will be used to show, how e.g. the choice of soloists, possible disregard of biographical and - apparently less important - score information (within the above mentioned categories) as well as ignorance of period performance conventions can dramatically change the intended emotional and theological meaning of the composition and thus eventually its artistic effect and religious function.

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Présentation et table ronde autour de l'improvisation vocale

Jean-Yves Haymoz et les membres de l'ensemble

Didier Grandjean

Centre Interfacultaire en Sciences Affectives, UNIGE

LE CHANT SUR LE LIVRE

La production vocale est un phénomène impliqué dans de nombreux comportements de l'humain comprenant non seulement le langage et les onomatopées mais également le chant. Les mécanismes psychologiques, corporels et cérébraux de productions vocales ayant des connotations émotionnelles ont été étudiés dans différentes disciplines permettant de mieux comprendre les mécanismes en jeu dans de tels comportements. Comment dans la polyphonie les chanteurs réalisent-ils une performance ensemble ? Lors de l'improvisation chantée des polyphonies, comment se passent les échanges entre chanteurs ? Cette présentation et table ronde abordera ces questions en mettant en commun les points de vues artistique et scientifique, pour mieux comprendre la production vocale et les phénomènes émotionnels qui y sont liés.

Polyphonies improvisées

par l'ensemble LE CHANT SUR LE LIVRE

Emmanuel Bonnardot, Pierre Funck, Jean-Yves Haymoz, Barnabé Janin et Raphaël Picazos

L'improvisation polyphonique demande aux chanteurs de trouver des mélodies qui respectent un style. Comment deviner, sentir à l'avance ce que vont faire les autres ? Tel est l'enjeu de recherches à la fois historiques, pratiques et musicales. Dans ce concert commenté, l'ensemble LE CHANT SUR LE LIVRE chantera en improvisant divers genres de musique du Moyen âge et de la Renaissance, en expliquant les contraintes que ces styles imposent.

Musics & Sciences Festival

Ateliers interactifs et performances auront lieu toute la journée du samedi dans l'espace du grand forum du Campus Biotech. Le public, de tous âges, pourra ainsi flâner d'une manifestation à une autre et discuter avec musiciens et chercheurs.

En plus des atelier et performances, les visiteurs pourront rencontrer les chercheurs sur différents stands. Des présentations et discussions sur les phénomènes psychologiques et cérébraux impliqués dans les émotions ressenties lors de la pratique et de l'écoute musicale: Comment le cerveau traite-t-il les informations musicales? Comment la musique peut-elle induire de fortes émotions? Comment étudier le geste musical et ses liens avec l'expressivité émotionnelle? Comment le cerveau produit-il des enchainements moteurs permettant une performance musicale expressive?

La Machine infernale

Jean-Marc Aeschimann et Sylvie Morgenegg

Etudiants du département musique et mouvement de la HEM – Genève

Prestation musicale et scénique autour de quatre pianos, avec violon, violoncelle et saxophone. Vingt-cinq danseurs et musiciens laissent leur imagination vagabonder autour d'un curieux engin. A partir d'une pièce de Bach, le mouvement, l'énergie et les sons déferlent dans un fourmillement d'idées, de contrastes et de rebondissements.

Body Percussion

Elèves de l'Institut Jaques-Dalcroze

Elèves du Conservatoire populaire de musique, danse et théâtre

Des élèves, enfants, adolescents, étudiants, sur les galeries, au rez- de-chaussée, frappant des rythmes à l'unisson, en contrepoint, faisant des onomatopées, des mouvements et déplacements simples, en alternance avec les «danseuses» du CPMDT, évoluant sur plusieurs niveaux, sur les sons de quatre pianos et une batterie, situés au pied des passerelles.

Musique et rire

Nicolas Bolens, responsable du département composition et théorie de la HEM – Genève

Comment la musique peut-elle nous faire rire? Quels sont les ingrédients de l'humour dans la musique elle-même? Au travers d'enregistrements et de vidéos, le public éprouvera les effets comiques d'un Spike Jones lorsqu'il « massacre les classiques » ou d'un Bartók lorsqu'il interrompt un contrepoint énergique et dense par une mélodie anormalement naïve et simple.

Etre chanteur

Marcin Habela, responsable du département vocal de la HEM – Genève

Découvrir d'une manière ludique que chanter est une activité à la portée de tous, liée à un savoir-faire précis et à une conscience corporelle accrue, tel sera l'objectif de cet atelier. Reconnaitre en soi ce qui résonne, ce qui souffle, ce qui vibre et comment il est possible d'influencer tous ces paramètres afin de constituer un geste vocal en quête d'un son.

Les Neurones Musiciens

Découvrir son activité cérebrale à l'écoute de la musique

Hélène Conrad

Dr Donald Glowinski

Centre Interfacultaire en Sciences Affectives, UNIGE

Quelle différence votre cerveau fait-il entre Mozart et les Beatles ? trip/hop, le métal ou le rock vous laissent-ils vraiment indifférent ? Etes-vous sûr de vous ennuyer en écoutant de la musique classique? Grâce à un casque EEG il est possible de « capter » les émotions que l'on ressent lorsqu'on mange, qu'on respire un parfum ou qu'on écoute de la musique. Dans cet atelier les participants pourront ainsi visualiser les effets de la musique sur le cerveau.

Etre chef d'orchestre

Elena Schwarz, chef d'orchestre

Cet atelier vise à donner au public une expérience du rôle du chef d'orchestre face aux musiciens. Des exercices d'improvisation, inspirés de la technique du «soundpainting», permettront au public de comprendre et expérimenter le lien entre geste et son. Ensuite des œuvres classiques seront jouées par l'ensemble qui suivra les aspirants chefs d'orchestre.

GeKipe « Geste, Kinect et Percussion »

Grégoire Lorieux, Alexander Vert, Thomas Köppel et Philippe Spiesser, percussion

«Geste, Kinect et Percussion» étudie le rapport entre la force physique réelle du percussionniste et la qualité du son virtuel en rapport musical avec ce geste. Plusieurs caméras permettront de reconnaître le geste et de le qualifier de manière très fine - vitesse, fluidité - afin de le mettre en correspondance par un logiciel pour les modéliser en instruments virtuels.


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MAGMA

Daniel Haefliger et les membres du Swiss Chamber Orchestra

Au tournant du siècle, l'idée de créer un ensemble de chambre rassemblant les meilleurs interprètes suisses autour d'un projet musical à l'échelle du pays est devenue réalité. Sous la direction artistique de Daniel Haefliger (Genève), Jürg Dähler (Zurich) et Felix Renggli (Bâle), l'ensemble des Swiss Chamber Soloists a été fondé en 1999. Grâce à des propositions de programmes innovantes et à des interprétations de premier ordre, les Swiss Chamber Soloists sont devenus un acteur culturel incontournable de la scène musicale suisse.

Ilja Gringolts (violon); Miguel da Silva (alto); Daniel Haefliger (violoncelle); Gilles Vonsattel (piano)

DMITRI CHOSTAKOVITCH 1906-1975

Trio pour piano et cordes no 1 en do mineur op. 8 (1923) 12'

VALERY ARZOUMANOV *1944

Conte d'automne

Scherzo pour piano et cordes sur un thème de Mahler (2014), création mondiale 2014

GUSTAV MAHLER 1860-1911 / ALFRED SCHNITTKE 1934-1998

Quatuor pour piano et cordes en la mineur

DMITRI CHOSTAKOVITCH 1906-1975

Trio pour piano et cordes no 2 en mi mineur op. 67 (1944) 28'

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