SASMR 18

Symposium on Scientific Approaches in Sound and Movement Research

20 - 23 September 2018

Institute of Ethnomusicology
University of Music and Performing Arts Graz, Austria

Day 1 Thursday September 20

19:00 **Registration & Welcome Reception**

Kleiner Saal, Palais Meran

Music:
Sina Shaari, Oud | Daf
Massoud Shaari, Setār

Day 2 Friday September 21

09:00 - 10:30 **Keynote**

10:30 - 11:00 *Coffee Break*

11:00 - 12:00 **Session 1 | Music and Dance as Data**

12:00 - 13:30 *Lunch Break*

13:30 - 14:30 **Session 2 | Analyzing Dance**

14:30 - 15:00 *Coffee Break*

15:00 - 17:00 **Meeting I**

Informal Business Meeting
aims and purposes of the group

18:00 *Dinner | Evening Event*

Parks, Zinzendorfgasse
18:00 - 19:00
Jodeling Workshop with Daniel Fuchsberger

Keynote

Friday, 09:00-10:30

Chair: Stepputat, Kendra

Interpersonal Entrainment in Music Performance: a Cross-Cultural Perspective

The phenomenon of interpersonal entrainment, or synchronisation, in music performance has attracted increasing research interest over the last decade. Our current project, Interpersonal entrainment in music performance, addresses a number of key questions in this area, amongst them:

How does sensorimotor synchronisation relate to higher-level coordination processes in music performance?

How, if at all, do entrainment dynamics vary between musical traditions?

In what ways is musical entrainment mediated by cultural factors?

I will present some results of our cross-cultural comparative analysis of interpersonal entrainment, and then outline a new model of interpersonal musical entrainment that attempts to locate cultural influences on relevant psycho-physiological processes.

CLAYTON, Martin
Durham University (UK)

Martin Clayton is Professor in Ethnomusicology in Durham University. He studied at the School of Oriental and African Studies (SOAS) in London, where he obtained degrees in Music and Hindi (BA, 1988) and Ethnomusicology (PhD, 1993). His research interests include Hindustani (North Indian) classical music, rhythmic analysis, musical entrainment and embodiment, comparative musicology and early field recordings, British-Asian music and Western music in India. He previously worked at the Open University, and has taught a wide range of ethnomusicological courses at numerous other UK universities, besides contributing to OU teaching materials, and worked as Visiting Assistant Professor at the University of Chicago. He was a member of the Music sub-panel for the 2008 Research Assessment Exercise, and for the 2014 Research Excellence Framework. he is currently Director of Research in the Music Department.

Professor Clayton directs a major research project, ‚Interpersonal Entrainment in Music Performance', funded by the Arts and Humanities Research Council (AHRC, 2016-18), with co-investigators Tuomas Eerola (Durham), Antonio Camurri (Genoa) and Peter Keller (Sydney). he leads the Leverhulme Trust-funded project The Breath of Music: Investigating respiration in Indian music performance, and is also co-investigator on Laura Leante's AHRC-funded project ‚Khyal: Music and Imagination' in 2016. He previously directed the ‚Experience and meaning in music performance' research project: the co-authored book of the same name was published by OUP in October 2013.

Martin served for many years as committee member for the British Forum for Ethnomusicology (BFE) and the European Seminar in Ethnomusicology (ESEM), and serves on several editorial boards including the journals Music Analysis and Music Performance Research.

[Information from: https://www.dur.ac.uk/music/staff/?id=8693]

Session 1
Music and Dance as Data

Friday, 11:00-12:00

Chair: Phyfferoen, Dominik

From the archive to corpus studies: ethnographic recordings as rich data, technique as long tradition

PICARD, François
Sorbonne Université (France)

A simple study on a single piece (heard, played, recorded) sometimes leads to a treasure: Hornbostel has heard it a century before, and transcribed; or Charles Seeger invented a device to show the trace of the sound, together with the music notation, while listening to the record; or Gilbert Rouget searched desperately for a tool to synchronise drawing and sound.

Thanks to people in electroacoustic studies (François Delalande, Pierre Couprie) or in performance studies, such tools are today available to every one.

The present paper will present current research-and-teaching practice, associating new tools with ancient representations of music and sound. We will stress the interest — somehow opposite to the evidence that ethnomusicology is the way "the people" listen to sound — towards listening to sound as musical, to music as sound.

Strict adherence to audible sound will be respected.

Virtual Gamelan Graz: Disclosing Implicit Musical Knowledge

GRUPE, Gerd
University of Music and Performing Arts Graz (Austria)

The project aimed at investigating ways of unveiling tacit knowledge on musical concepts and current performance practice of classical Central Javanese gamelan music (karawitan) with the help of listening experiments. The two main areas to be studied were first, the way in which a given composition is actually transformed into a live performance (garap); second, the evaluation of the specific tuning of individual gamelan sets (embat). Computer-generated audio examples were prepared which incorporated existing explicit musical knowledge about karawitan performance practice so that an evaluation by Javanese experts could reveal shortcomings due to tacit assumptions disregarded in our virtual renditions. Concerning embat published measurements of various traditional gamelan sets were used to calculate and retune some 1360 digital samples of sound generators.

Audio examples of traditional compositions taken from both tuning systems (sléndro and pélog) and their respective modes (pathet) were presented to three renowned senior musicians for evaluation. By adopting an analysis-by-synthesis approach which incorporated only explicit and mainly generic principles of performance practice while largely omitting tacit assumptions or specific knowledge pertaining to individual pieces, it could be demonstrated that other factors beyond "correct notes" need to be considered. This underscores the necessity to approach the "rules" of karawitan performance in a much broader way than merely refining "structural" paradigms on the level of a musical grammar. Regarding the assessment of various tunings listening to different ones in direct comparison proved to be conducive to an in-depth verbal discourse on matters which might otherwise remain rather vague or abstract.

Thus, listening experiments with local experts in which musical parameters can be controlled individually have proven to be a useful tool in investigating how actual performance practices are shaped by implicit norms even in a tradition accompanied by a local music theory.

Session 2
Analyzing Dance

Friday, 13:30-14:30

Chair: Alisch, Stefanie

A sciency look at dancing the Romanian way

GREEN, Nick
Independent Researcher (UK)

This paper is from the perspective of a physicist (and engineer) actively involved in the participatory dance scene, but also a contributor to dance scholarship in the chorological and anthropological perspectives. Many participants of recreational folk dance in Balkan dancing styles have a scientific background, and so tend to rationalise what we do and what we see from the concepts of processes and mechanics. So I am asking what might be examined using technology and a scientific mind. The analysis of movement capture could lead to a quantitative understanding of the process of dancing in areas that are generally overlooked or only described in the more established paradigms of observation or notation analysis. Based on a comparison of my particular experience of two dance cultures – western classical dance training and participation in Romanian traditional dance – I will discuss a number of aspects of moving that could be analysed through a technological approach. Such knowledge may give a clearer path to learning to dance in different cultural "ways" rather than by a controlled imitation. Pertinent points I intend to discuss include: The musicality, the need for a "musical ear", and how to use syncopation and delay ("dulce" – sweetness). Is the "count" or the key point of the move related to acceleration or position? How does this relate to the rhythmic pulse? Is the individual dancer in control of their body, or compliant to neighbours? Is the dancer controlling gravity or is gravity part of the dance rhythm? Are ideas of a supporting leg and stepping to move the centre of mass always valid? When mannerisms and gestures (movements with meaning) are used to personalise (improvise) in an otherwise very structured dance, are these dynamics finely connected to the music as delays, pauses, and sharper accelerations?

„My step is more tango than yours!“ - A Choreomusicological Analysis of Tango Argentino Walking

STEPPUTAT, Kendra & DICK, Christopher
University of Music and Performing Arts Graz (Austria)

In current international tango argentino practice, there is not one homogenous tango dance style or movement norm. Several styles co-exist, some of them are labeled (e.g. milonguero, nuevo, salon), others exist in niches only. Tango teachers use this variety to position themselves in the market, discussions among dancers about the ‚best‘ style - for instance subjective qualities as originality, comfort, elegance, intimacy etc. - are ongoing and trigger tango sub-scenes as well as market opportunities. But are the differences really that essential, or are they more constructed perception of the same basic tango movement repertoire? To answer this question, we used motion capture data that we collected in the course of the project „Tango-danceability of Music in European Perspective“. The data was collected during three sessions in the lab, each with a professional and widely influential tango argentino couple dancing in a different style. For the sake of comparability, we chose to focus on the analysis of tango walking. Movement analysis of tango steps is the basis for our approach here, yet tango argentino is an artform danced to music, and the sound should not be ignored. We therefore chose a choreomusicological approach in relating the movements to the tango sounds, to capture tango walking in its sound-movement-interconnection.

We argue, that exploring tango styles on an in-depth level, from a choreomusicological perspective and supported by quantitative motion and sound analysis (such as biomechanical analysis and music information retrieval) can help to understand actual differences or commonalities in style, aside tango scene inherent controversies. It is here that our research can provide useful information for ‚culturally relevant‘ questions, raised and discussed by tango scene members themselves.

Day 3 Saturday September 22

09:00 - 10:30 **Session 3 | Regional Models: India**

10:30 - 11:00 *Coffee Break*

11:00 - 13:00 **Meeting II**

Informal Business Meeting
further organization and proceedings publication

13:00 - 14:30 *Lunch Break*

14:30 - 15:30 **Session 4 | Cognition - Body - Timbre**

15:30 - 16:00 *Coffee Break*

16:00 - 17:30 **Session 5 | Rhythm - Meter - Timing**

17:30 *Formal Closing | Farewell*

Session 3
Regional Models: India

Saturday, 09:00-10:30

Chair: Henderson, Flora

Gesture in South Indian vocal lessons: mappings between music and movement in a pedagogic context

PEARSON, Lara
Max Planck Institute for Empirical Aesthetics (Germany)

During Karnatak vocal lessons in South India, teachers often gesture spontaneously while demonstrating musical phrases to their students, producing continuous streams of melody and hand movement. In this paper I present findings from my research on gestural practices in contemporary Karnatak pedagogy, focussing on the question of what musical features are indexed by teachers' hand gestures. In addition, I draw on existing literature on cross-modal perception to consider the cross-domain mappings between music and movement that lie behind such gestural indexing.

An interdisciplinary approach was employed, combining ethnomusicological methods (participant observation and interviews) with techniques from empirical musicology (audio feature extraction, video motion-tracking, and correlation between the two sets of data). Analysis of interviews with over thirty Karnatak musicians revealed a number of musical features that are commonly believed to be indexed by teachers' gestures, including svaras (scale degrees), gamakas (ornaments), bhāva (the mood of the raga), and the teacher's performance style. Quantitative analysis of audio and motion data from three lessons by different teachers showed a positive overall correlation between musical pitch and hand position. Qualitative analysis provided insight into the gestural style of each teacher, and showed that other musical features are also sometimes indexed, including emphasis, changes in loudness and timbre, and the borders of sub-phrases.

In interviews, teachers and students expressed the opinion that gestures play a role in helping students understand musical phrases. Karnatak music is replete with subtle, context-dependent ornaments that are un-notated and difficult for novices to grasp. Therefore, any assistance in conveying such musical details would support the pedagogic process. The combined results of my research suggest that teachers' gestures often index musical features in ways that are based on established cross-domain mappings, and that both teachers and students believe that such gestures convey musical and pedagogic information.

Effort in gestural interactions with imaginary objects in Hindustani dhrupad vocal improvisation

PASCHALIDOU, Stella & CLAYTON, Martin & EEROLA, Tuomas
TEI of Crete (Greece)

In Hindustani vocal improvisation singers often appear to engage with melodic ideas by manipulating imaginary objects with their hands while singing, such as through stretching, pulling, pushing and other effortful interactions, during which they seem to act as if they are encountering an increased resistance upon their hands. Here we seek to gain a deeper understanding of the role of effort during MIIOs (Manual Interactions with Imaginary Objects) in the dhrupad performance practice by examining whether, how and to what extent effort and gesture types appear associated with the voice in a consistent way.

A mixed sequential methodological approach was used, combining qualitative and quantitative methods based on original material that was recorded in domestic spaces in India. This consists of interviews, audio-visual material and motion capture data of vocal ālāp improvisations by different dhrupad singers of the same music lineage. In the qualitative part of the study, we applied thematic analysis to interview material in order to identify action-based metaphors, which were then used in video analysis, where we relied on third-person observations in order to identify, label and classify the audio-visual material in terms of MIIO types and perceived effort. In the quantitative part of the study, we used the cross-validated annotations as response values of linear models that were fit to measured movement and sound features, in order to estimate effort levels and classify gestures as interactions with elastic or rigid objects.

Findings indicate that despite the flexibility in the way a Dhrupad vocalist might use his hands while singing, there is ample evidence of non-arbitrariness in the association between melody and exerted effort as well as types of imaginary interaction. This may reflect various association strategies based on the organization of melodic context, the mechanical strain of vocalization, the ālāp macro-structure organization and shared cross-modal morphologies.

Computational tools to assist teaching of alien music traditions: The Musical Bridges project

CARO REPETTO, Rafael & SERRA, Xavier
Music Technology Group, Universitat Pompeu Fabra, Barcelona (Spain)

The development of information and communication technologies has granted worldwide access to music digital traces (Serra 2017) of music traditions that are alien to the listener, but not necessarily to pathways for their comprehension and appreciation. On the other hand, courses on "world musics" are increasingly common in official curricula. These circumstances have fostered the publication of related educational materials. Most of these publications—such as World Sound Matters by Stock (1996) or the Global Music Series edited by Wade and Campbell (2003–2012), among many others—consist on textual explanations illustrated by audio recordings. This guided listening poses two important challenges to the learner, such us the difficulty of "hearing" the explanations on the audio, especially when confronted to an alien sonic world, and the limited number of music examples covered, whose detailed analysis and comprehension might not guarantee, or might even have an overfitting effect for, understanding and appreciating "real life" performances.

We argue that the discipline of Music Information Retrieval (MIR) offers opportunities to address the aforementioned challenges. MIR technologies can be used to develop tools for visualizing musical features, thus complementing "attentive listening" with visual cues, and for interacting with such features, which encourages "engaged listening" (as defined by Campbell 2004). Furthermore, these tools can be automatically implemented on large corpora of audio recordings, thus widening the music samples to which the learner is exposed. In this paper we introduce Musical Bridges, a just launched project which aims at developing such tools for assisting learning of alien music traditions. It draws on the corpora and technologies developed in the CompMusic project for Hindustani, Carnatic, Turkish makam, Arab-Andalusian and jingju music. We present the goals and methodology of the project, discuss its opportunities and challenges, and present the first prototypes for supporting Hindustani and jingju music teaching.

Session 4
Cognition - Body - Timbre

Saturday, 14:30-15:30

Chair: Polak, Rainer

The many colours of timbre: using amplitudes and spectrographs to investigate development of timbral gestures in Japanese shakuhachi music

HENDERSON, Flora
Independent researcher (UK)

Can note onset amplitude patterns serve as indicators of timbral development in the traditional repertoire of the Japanese shakuhachi flute?

In many East Asian music traditions, like the shakuhachi, timbre has a high status, denoted by types in organology, repertoire structure and expression, and instrumental techniques. In traditional solo unmetered shakuhachi repertoire, associated with Zen Buddhism, acoustic development of a single tone or phrase is paramount. Techniques from the large timbral compass are commonly employed at note onset and throughout phrasal development, alongside techniques like microtonality.

Recent advances in acoustics and cognition have identified note onset as key in determining instrumental timbral parameters (Grey 1977, McAdams 2004, Giordano and McAdams 2005, Halmrast et al 2010). These approaches can be adapted to other musical contexts like shakuhachi traditional repertoire. The gestural force producing these acoustic parameters is represented in amplitude, with frequency distribution in a spectrograph. These parameters are observable in solo unmetered music such as traditional shakuhachi repertoire in which timbre plays a key role.

Koku is a core work in traditional shakuhachi repertoire, here performed by Yokoyama Katsuya (1997). The work is structured through a series of phrases based around a tone centre. Each phrase employs timbral gestures in its note onset and development and these gestures change in type, quantity and dissemination as the work progresses, contributing to the work's momentum. Using the spectrographic analysis programme Sonic Visualiser (QMUL), I will measure amplitude dissemination in the first second of note onset in each phrase and will compare these measurements across all phrases to consider how far the measurements indicate the musical development of timbral gestures within a phrase and within the overall trajectory of the work. If successful, this approach could provide another avenue for timbral analysis in other music traditions.

A transformative power of music-making on spatial processing: Musical body and evolution of human cognition

CHEONG, Yong Jeon
Ohio State University (USA)

Music makes our everyday experience special. McAllester (1971) considered this transformative power as one of the most important universals in music. Nettl (2000) noted that music can lead to fundamental changes in human consciousness. Although how music transforms our experience remains unclear, tracing the evolutionary history of music may give us some hints on the way music contributes to human cognition.

In the past decades, the origin of music regained its popularity in many disciplines. An evolutionary biologist, Fitch (2006) argued that co-evolution of vocal and instrumental music is a human-specific trait because other animals produce sound either vocally or non-vocally. Morley (2013) argued that the instrumental music-making and the instrument production contribute to the development of human cognition. De Souza (2017) pointed out that vocalization is grounded in the body alone whereas non-vocal music involves an interaction between body and instruments. These arguments support Patel (2010)'s theory of music as a transformative technology of the mind.

I focus on the experience of space pertaining to body in music-making, specifically on the difference in spatial experience between vocal and instrumental music-making. I examine ‚body space' and ‚space adjacent to body (peripersonal space)'. ‚Body space' is associated with proprioception and touch while ‚peripersonal space' is characterized by multisensory perception and sensorimotor coupling. I propose that use of musical instruments revolutionizes human spatial experience by integrating different spaces. Vocal music involves only ‚body space' whilst instrumental music-making requires interaction between ‚body space' and ‚peripersonal space'.

Although vocal and instrumental music making has co-evolved only in humans, instrumental music shows clearly the transformative power of music on our spatial experience. This study may improve our understanding of how each music contributes to the development of human cognition in its own way from the evolutionary perspective.

Session 5
Rhythm - Meter - Timing

Saturday, 16:00-17:30

Chair: Picard, François

Rhythmic tolerance of triple metre mazurka as a precondition for the compatibility of music practices? Towards a comparative study of mazurka music and dance in the Atlantic realm

ALISCH, Stefanie
Humboldt Universität zu Berlin (Germany)

The term mazurka encompasses dance, song, instrumental form, and rhythm. Mazurka serves an umbrella for different folk dances with a ternary pulse from different regions of Poland. During the 19th century the mazurka became an early form of globalised dance music which was practiced across Europe but also in Japan, the Seychelles, the US, Brazil, Jamaica, La Reúnion, Martinique, or Cape Verde.

A mazurka ensemble in Poland might comprise fiddlers, drummers, vocalists, or accordion players who play to an audience of dancing couples. Musicians perform the ternary mazurka pulse in such a way that they render it with differing bar lengths and inter-onset-intervals. Mats Johansson (2010) elaborates on the concept of „Rhythmic Tolerance" in ternary pulse Swedish and Norwegian folk music genres that are geographically and stylistically close to the Polish mazurka.

In this paper I discuss theoretical and methodological questions around early research into mazurka in a comparative perspective. The paper is based on the hypothesis that the rhythmic tolerance of European mazurka might have engendered entrainment and thus compatibility with less malleable time-line based dance music from West Africa in the Atlantic realm. I sharpen this wide geographic scope by examining mazurkas of Cape Verde and Martinique, islands states on both sides of the Atlantic where the mazurka was nativised in the wake of European colonisation.

Through audio and video recordings I introduce early-phase research into mazurka. Following Justin London's (2004) theory of metre I discuss flexible bar lengths and swing ratios in order to compare mazurka performances in different geographic settings, working towards modelling rhythmic tolerance with methods of Music Information Retrieval.

The Intensity Factor in the Traditional Idiom of Music Making in Dagbon. Expressive Components in the Dance Mode of Drumming

PHYFFEROEN, Dominik & STROEKEN, Koenraad & LEMAN, Marc
University of Ghent (Belgium)

The music and dance culture that we are presenting belongs to the heritage of Dagbon, a complex and well organized agricultural society in Northern Ghana. In that society, music and dance are in symbioses with social, religious and traditional political structures of each Dagomba community, which is linked to clans and families. In this study we present results of an analysis of the traditional idiom of music making in Dagbon.

The first part of the paper we define the key expressive elements of music making in Dagbon such as the "intensity factor" and the „Aferian hemiola style". Instantiations of these elements are: The call and responds style of singing, the improvisational character of the music-dance, the existence of homeostasis states and rhythmical transition zones, the phenomenon of a 'movable one' that interlocks with the common 'elementary pulsation' that forms part of the architecture of the music-dance, the superposition of simple rhythmical patterns that interlocks with each other, simultaneously double elementary puls-lines, distinctive costumes, make-up, and objects related to the occasion of the ritual performance e.g. amulets and regalia, the sacrifice of animals, giving of coins to the dancers and musicians, trance and narrowed consciousness.

In the second part of the paper we present results of analyses of the polyrhythm in the dance mode of drumming, to illustrate how the "Aferian hemiola " and the "intensity factor" get instantiated in complex polyrhythmic drum patterns performed by traditional lunsi-ensemble.

We made computer analyses of audiovisual field recordings in combination with video analyses and made transcriptions and annotations in western score notation.

Finally we discusses how the traditional idiom of music making interacts with the urban idiom of music making, in the "Hiplife Zone" an urban popular music style found in Ghana and in Tamale, and show key elements of embodied music interaction.

Empirical evidence for the theory of swing-based meter in Malian dance-drumming

POLAK, Rainer
Max Planck Institute for Empirical Aesthetics (Germany)

The talk opens with a timing analysis of a drum trio recording from Bamako, showing that despite considerable rhythmic complexities, all ensemble parts exhibit an amazing degree of fidelity to a basic ostinato whose two durations per beat relate by approximately 57:43 (≈4:3). I then will survey a series of empirical studies which examine the performance and perception of uneven, "swung" beat subdivisions in drum ensemble music from Mali. Four audio-corpora were recorded with mobile multi-track studios and studied both with traditional music analysis and with computational methods. Hypothesis-driven perceptual experiments (discrimination testing, preference rating, sensorimotor synchronization) were run in Mali, Bulgaria, and Germany. These studies are ethnographically informed, largely collaborative, and interdisciplinary. My own background is in social anthropology and African studies; my collaborators specialize in music theory, music cognition, and computational musicology.

The theoretical mainstream in ethnomusicology as well as in music theory and and psychology assumes categorical rhythm perception and metric pulse to rest on the human tendency to recognize and anticipate iso-periodicities in rhythmic patterns. This would suggest that uneven beat subdivisions represent expressive performance timing deviations from some underlying isochronous reference framework. By contrast, our research supports the ethnography-based alternative hypothesis that certain mathematically complex "swing timing ratios" constitute metric references structures in Malian performance practices and listenings, but not so in other music-cultural contexts.

Claims on cultural diversity in ethnomusicology typically concern styles and meanings of performance practices. African musicologists have rejected and deconstructed as exotist othering some ethnomusicological "inventions" of cultural difference between "African" and "Western" musical contexts with respect to the basic mechanisms of music perception and cognition. Based on a combination of ethnographic fieldwork and scientific methods, we here propose that basic structures of perception *can* vary across cultural groups.

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