SysMus24

# ABSTRACT BOOKLET

## SysMus ‘24

8.6.-10.6.

Jyväskylä, Finland

Picture: University of Jyväskylä

JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

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SysMus24

Abstract Booklet: SysMus'24

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# CHAIR'S WELCOME

Hello and welcome to SysMus '24!

I am so glad you could join us here in Jyväskylä (or online!) and am very excited to get to know each of you and your work. Jyväskylä is a long way from...well, anywhere. But after living here for a while, I feel that the journey was always worth the destination. I hope you feel the same way by the end of the conference.

Your hosts for SysMus this year are researchers from the Centre of Excellence in Music, Mind, Body and Brain at the Department of Music, Art and Culture Studies in the University of Jyväskylä. We most likely have the highest concentration of music science researchers in the world, conducting research on almost every topic in music science including music psychology, therapy, movement and neuroscience. Every visiting researcher will find something in their area of interest, which is why we are very eager to welcome you, showcase our work and foster collaborations.

SysMus has often branded itself as a great 'first' conference. It turns out, it's not just great for first-time presenters but an amazing learning experience for first-time organisers as well. For most of the members of the organising committee, this was our first time organising a conference, and watching this come together has been incredibly satisfying and fruitful. Thank you for your patience with us.

I would also like to take this opportunity to thank our supervisor Dr Joshua Silberstein-Bamford, whose leadership, enthusiasm, expertise as a previous host (and sense of humour) have shaped the conference into what it is today. Special thanks to Markku Pöyhonen, our Coordinator, who has patiently answered every (dumb) question and fixed every mistake we've made, and Prof. Petri Toiviainen, for his continuous support and guidance throughout this process. I would also like to thank our esteemed keynote speakers Prof Minna Huotilainen, Prof Tuomas Eerola and Prof Isabelle Peretz whose work has been instrumental to all of our work and has inspired many of us to choose this field of research and our sponsors for their financial/ in kind support.

I hope you have as great a time participating as we had organising SysMus '24 for you. Thank you!

Best
Nandhini
On behalf of the SysMus '24 Organizing Committtee

# SUPERVISOR'S WELCOME

Greetings,

It is my great delight to welcome you all to the 17th International Conference of Students of Systematic Musicology (SysMus24), here at the University of Jyväskylä, both physically in the Musica building and also in our online space on Gather Town.

SysMus conferences are always very special events. They are organised by students, for students. For many attendees, this may be their first experience of an academic conference. For most of our organising committee, this is certainly their first time organising one. For the past 17 years, the SysMus conference series has provided a valuable training ground for early-career researchers, and many former participants have gone on to do great work in the broad field of systematic musicology and related disciplines.

But what is systematic musicology? Leman and Schneider, in their 1997 book chapter *Origin and Nature of Cognitive and Systematic Musicology*, define it as "an interdisciplinary science, whose aim is to explore the foundations of music from different points of view, such as acoustics, physiology, psychology, anthropology, music theory, sociology, and aesthetics." More colloquial definitions may state that systematic musicology is everything that is not historical musicology, referring to a historic split in European musicology traditions. Some may also refer to it as *music science*, which has become a more popular term in recent years.

Whatever you call it, and whichever of the various aspects of systematic musicology you may practise, you are sure to find yourself at home here. The University of Jyväskylä has a strong tradition of studying music from interdisciplinary perspectives. Here at the Centre of Excellence in Music, Mind, Body and Brain, we use a range of quantitative and qualitative methods to study how and why people make music throughout their lives.

Looking at the programme, it seems we have a similarly diverse and interesting selection of presentations. You will also have the opportunity to enjoy Finland's long summer nights at some of our planned social events. I must commend Nandhini Natarajan, and the rest of the organising committee, for their tremendous work putting it all together. Organising a conference is a great challenge, but one they have risen to while still having a lot of fun along the way.

I hope you will find SysMus24 to be a valuable educational experience, but also a lot of fun as well. I look forward to meeting you all.

Tervetuloa Jyväskylään!

Joshua S. Bamford
Supervisor

# PROGRAMME SATURDAY 8.6.

| | |
|---|---|
| 10.00 | Opening |
| 10.45 | Coffee Break |
| 11.00 | Session 1 - Wellbeing (Chair: Abbigail Fleckenstein)<br>Julia Vigl<br>Hongjuan Zhu<br>Connor Kirts |
| 12.00 | Lunch |
| 13.15 | Keynote 1 – Minna Huotilainen: Music is a mystery to neuroscience |
| 14.15 | Coffee Break |
| 14.30 | Session 2.1 - Diversity (Chair: Katariina Henttonen)<br>Lou Barnell<br>Anni Kiikola<br>Flora Henderson |
| 14.30 | Session 2.2 - Data Processing (Chair: Rebecca Scarratt)<br>Oliver Tab Bellmann<br>Egil Ovesen<br>Matthias Jung |
| 15.30 | Poster Session<br>Menglan Lyu<br>Martina Kamenska<br>Jiayi Wang<br>Khashayar Shahriyari<br>Catherine Tan<br>Bruna Francisco Martins<br>Gabriela Sarmiento<br>Reinis Mauritis<br>Luiza Lucuța<br>Sara Lindstedt |
| 17.30 | Conference Dinner Cruise |

# PROGRAMME SUNDAY 9.6.

| | |
|---|---|
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| 12.15 | Lunch |
| 13.30 | Session 4.1 - Online (Chair: Joshua S. Bamford)<br>Ceren Ayyıldız<br>Poulami Kar<br>Laura Farré Rozada |
| 13.30 | Session 4.2 - Online (Chair: Jiayi Wang)<br>Bhavya Dixit & Kashish Janiani Tulsiyani<br>Menglan Lyu<br>Yue You |
| 14.30 | Coffee Break |
| 14.45 | Session 5.1 - Music and Movement (Chair: Riya Sidhu)<br>James Cannon<br>Riya Sidhu<br>Abbigail Fleckenstein |
| 14.45 | Session 5.2 - Therapy and Health (Chair: Rory Kirk)<br>Nandhini Natarajan<br>Jaana Ruotsalainen<br>Hannele Partanen |
| 15.45 | Workshop 1.1 - Peer Reviewing (Jan Stupacher) |
| 15.45 | Workshop 1.2 - Experience Sampling (Will Randall) |
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| | |
|---|---|
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| 11.15 | Session 6.2 - Music and Neuroscience (Chair: Nandhini Natarajan)<br>Victoria Norris<br>Luiza Lucuța |
| 12.00 | Lunch |
| 13.00 | Workshop 2.1 - Getting Published (Niels Chr. Hansen) |
| 13.00 | Workshop 2.2 - Muskari and Music Therapy |
| 13.00 | Workshop 2.3 - Motion Capture (Marc Thompson) |
| 14.15 | Coffee Break |
| 14.30 | Session 7.1 - Scoping Reviews (Chair: Gabriela Sarmiento)<br>Alicia Lucendo-Noriega<br>Heini Siltainsuu<br>Katariina Henttonen |
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| 17.00 | Panel Discussion - Mental health and the PhD (Facilitator: Heini Siltainsuu) |
| 18.00 | Closing session |

# Session 1 - Wellbeing

## The Role of Attachment Style in Music Mood Regulation

**Julia Vigl,** (University of Innsbruck, Department of Psychology); **Suvi Saarikallio,** (University of Jyväskylä, Finland)

Topic: Music and well-being

Presentation type: Live oral presentation

**Background: Music has a profound emotional impact on individuals and often serves as a tool for stress** reduction and self-regulatory processes (e.g., Kreutz & von Ossietzky, 2016). The effectiveness of using music for emotion regulation depends not only on the choice of music, but also on the regulatory strategy used, such as whether it involves cognitive reappraisal, emotional suppression, or emotional engagement (Carlson et al., 2015). Previous research suggests that attachment style, which primarily shapes beliefs about relationships, also influences general affective responses and emotion regulation. Anxiously attached individuals tend to focus on negative emotions and use emotion-focused strategies such as mental rumination, whereas avoidantly attached individuals tend to suppress emotions and seek less support (e.g., Mikulincer & Shaver, 2019). However, with regard to music, there is little research that has considered attachment style. Although one study has linked attachment style to song lyric preferences (Alaei et al., 2022), to the best of our knowledge, no research to date has examined the role of attachment style in the use of music for emotion regulation.

Aims: The present study aims to examine whether anxious and avoidant attachment styles are associated with different types, emotion regulation goals, and effectiveness of using music for emotion regulation. In addition, we will explore whether such associations are mediated by general tendencies in emotion regulation.

Methods: We will use a combined methodology that includes (1) questionnaires on attachment style, general and music-specific emotion regulation, and healthy/unhealthy music use, and (2) four specific interpersonal vignettes depicting events that may activate the attachment system, namely scenarios of conflict, rejection, partner's desire for closeness, or falling in love. The second method addresses the link between attachment styles and music choices in response to interpersonal events, exploring the regulatory purpose and specific music preferences. Data will be collected via an online survey distributed in Austria and Finland with a target of at least 200 participants.

Results: Data collection for the study is currently in progress and the results will be presented at the conference.

Conclusions: With our study, we hope to shed light on the impact of attachment style on music emotion regulation and the dynamics of healthy/unhealthy music consumption. In addition, we aim to assess whether the effectiveness of different music mood regulation strategies depends on the attachment style of the listener.

References: Alaei, R., Rule, N. O., & MacDonald, G. (2022). Individuals' favorite songs' lyrics reflect their attachment style. Personal Relationships, 29(4), 778–794. https://doi.org/10.1111/pere.12448. Carlson, E., Saarikallio, S., Toiviainen, P., Bogert, B., Kliuchko, M., & Brattico, E. (2015). Maladaptive and adaptive emotion regulation through music: A behavioral and neuroimaging study of males and females. Frontiers in Human Neuroscience, 9. https://doi.org/10.3389/fnhum.2015.00466. Kreutz, G., & von Ossietzky, C. (2016). The value of music for public health. In Oxford textbook of creative arts, health, and wellbeing: International perspectives on practice, policy and Research (pp. 211–219). Oxford University Press. Mikulincer, M., & Shaver, P. R. (2019). Attachment orientations and emotion regulation. Current Opinion in Psychology, 25, 6–10. https://doi.org/10.1016/j.copsyc.2018.02.006

Keywords: Music mood regulation, attachment style, emotion regulation, music use

# Cross-cultural perspective on the effect of music activity in maintaining psychological and subjective well-being

**Hongjuan Zhu** (Sheffield Hallam University, Sheffield, United Kingdom; The University of Sheffield, Sheffield, United Kingdom); **Amanda Krause,** (James Cook University, Townsville, Australia); **Shen Li,** (Henan University, Henan, China)

Topic: Music and well-being
Presentation type: Live oral presentation

**Background: Numerous studies on musical activity and well-being have demonstrated that participating in** music can improve multiple aspects of well-being across various populations. Music engagement improves subjective well-being in older adults (Perkins & Williamon, 2013), psychological well-being in individuals experiencing homelessness (Knapp & Silva, 2019), and boosts self-confidence, happiness, and relaxation among individuals with learning disabilities (Wilson & MacDonald, 2019). Krause, Davidson, and North (2018) developed a comprehensive measurement of musical activity and well-being, identifying five dimensions of well-being that can be experienced through music participation: mood and coping, esteem and worth, socialising, cognitive, and self-actualisation. However, a limitation of this study is the lack of cross-cultural evaluation, which may hinder a deeper understanding of the positive associations between music participation and perceived well-being across diverse cultural contexts.

Aims: The present study aims to conduct a cross-cultural examination of university students' well-being by investigating their engagement in musical activities across the UK, Australia, China, and Singapore. It seeks to address the following research questions: Do participants from the UK, Australia, China, and Singapore differ in their experiences of perceived well-being from music participation? Are there associations between types of musical activities and perceived well being resulting from music participation, controlling for the frequency of participation? If there is an association, does it vary among participants from the UK, Australia, China, and Singapore?

Methodology: The research employs self-report surveys in both English and Chinese, aimed at university students in the UK, Australia, China, and Singapore. It gathers demographic information and details on musical activity engagement, and using established scales to collect data on the five dimensions of well-being from music participation (Krause et al., 2018), and their musicianship (Chin, Coutinho, Scherer, & Rickard, 2018).To date, 266 valid responses have been collected: 85 from the UK, 54 from Australia, 109 from China, and 18 from Singapore. Out of these participants, 133 are currently pursuing a music-related degree.

Results: The GLM analysis revealed significant variations in perceived well-being from music participation across the UK, Australia, China, and Singapore. Multivariate tests indicated a significant effect of country (Pillai's Trace = 0.242, $F(15, 441) = 2.581$, $p = .001$, $\eta^2 = 0.081$). Post-hoc Tukey HSD tests identified significant differences in esteem and worth between China and the UK (MD = 0.7960, $p = .001$), a marginally significant difference in cognitive between Australia and China (MD = -0.6068, $p = .054$), and a significant difference in self-actualisation between China and the UK (MD = 0.6365, $p = .039$). However, mood & coping and socialising did not reach statistical significance. The types of musical activities are also not associated with perceived well-being. These preliminary findings may change due to issues related to power and sample size diversity.

Discussion and conclusion: The study highlights cultural nuances in perceived well-being among participants engaged in music activities in the UK, Australia, China, and Singapore. Significant differences in esteem and worth, cognitive, and self-actualisation emphasise the importance of cultural context in these perceptions. However, there were no significant differences in mood, coping, and socialising, indicating similarities despite cultural differences. Additionally, the types of musical activities do not associate with perceived well-being. The current research is in the data collection process and will explore a qualitative perspective to gain a deeper understanding of how cultural contexts influence individuals' well-being experiences through music engagement. The cross-cultural comparison will challenge the Western-centric nature of much existing knowledge of music and wellbeing, and present avenues for future research on the cultural specificity of emotional regulation and self-actualisation through music.

References Chin, T.-C., Coutinho, E., Scherer, K., & Rickard, N. (2018). MUSEBAQ: A Modular Tool for Music Research to Assess Musicianship, Musical Capacity, Music Preferences, and Motivations for Music Use. Music Perception: An Interdisciplinary Journal, 35, 376-399. doi:10.1525/mp.2018.35.3.376 Knapp, D. H., & Silva, C. (2019). The Shelter Band: Homelessness, social support and self-esteem in a community music partnership. International Journal of Community Music. Krause, A., Davidson, J., & North, A. (2018). Musical activity and well-being: A new quantitative measurement instrument. Music Perception, 35. doi:10.1525/MP/2018.35.4.454 Perkins, R., & Williamon, A. (2013). Learning to make music in older adulthood: A mixed methods exploration of impacts on wellbeing. Psychology of Music, 42(4), 550- 567. doi:10.1177/0305735613483668 Wilson, G. B., & MacDonald, R. (2019). The Social Impact of Musical Engagement for Young Adults With Learning Difficulties: A Qualitative Study. Front Psychol, 10.

Keywords: cross-cultural, music activity, well-being, university students

## Development of an assessment tool for the Episode Model of Emotional Experiences

**Connor Kirts,** (Durham University)

Topic: Music philosophy

Presentation type: Live oral presentation

**Background: Capturing emotional experiences has been a longstanding goal for researchers with several** models, from discrete to constructionist, being applied without consideration for their predictive implications. Recently, the Episode Model was developed to overcome some of these limitations and offer a holistic perspective which situates listener's self-regulation and prior emotional experience with the dynamic function the music has for the listener (Eerola, Kirts, & Saarikallio, in review). This research will focus on initial psychometric construction and the evaluation of the Episode Model.

Aim: The aim is to develop a self-report measure which identifies a type of emotional episode the participant is experiencing while listening to music at a certain point in time.

Methods: Based on psychometric construction principles (Boateng et al., 2018), several stages of development are required to build a robust tool. 1) Items are generated using existing literature in accordance with conceptual and operational definitions for the episodes. 2) Evaluation of content validity by a panel of experts who review and evaluate the relevance and representativeness of each item. 3) Items are pre-tested to assess aspects of face-validity and the extent to which items produce valid measurement. Step 1 is complete with steps 2 and 3 scheduled to finish before May.

Results: Due to steps 2 and 3 being in-progress, step 1 results are reported here. Based on 13 prior instruments and literature concerning the constructs, an initial pool of N = 281 items was identified. To fill conceptual gaps not accounted for by existing instruments, researcher constructed items (N = 244) were added. A total of 525 items have been identified and modified to fit a uniform style for appropriate response formats. Evaluation results from steps 2 and 3 will be assessed using content validity related indices and general agreement indices, and these steps will also substantially reduce the total item pool.

Discussion: The scope and usefulness of the developed tool and its construction principles will be discussed with the theoretical utility and practice uses in mind. The predictive ability of the models will also be raised.

Keywords: Psychometrics; Emotion; Affect; Emotional Experiences; Scale Development

# Session 2.1 - Diversity

## ‘Live Dreaming’: Exploring the reorientation of neurodivergent bodies and selves via creative music making and performance

**Lou Barnell,** (Royal Birmingham Conservatoire)

Topic: Composition

Presentation type: Live oral presentation

**Background: As a neurodivergent woman, I argue that I experience ‘triple alienation’. My feelings of** disorientation and sensory overload are exacerbated by the privileging of the eyes and ears in dominant narratives on music making, and in society at large (Cox 2011; Eidsheim, 2011). My research builds on a practice-based research methodology of ‘Live Dreaming’ to reorientate bodies in alienating environments. I draw from Schulze (2018) Serres, (2008) and IONE (2005) to articulate the ‘Live Dream’ as the embodied transdisciplinary osmosis of performance and dream where alienated bodies wayfind. I collapse the boundaries between musical performance, sensory and material exploration into a physical-dimensional ‘dream’ where the senses are unified to make sense of the here and now. ‘Live Dreaming’ situates itself within feminist materialist perspectives on power, voice and identity as entwined with materials, plants and critters. (Bennett 2010; Eidsheim, 2011; Haraway 2016). This practical and theoretical framework for ‘Live Dreaming’ uses what I call ‘Neuroqueer Radical Musicking’- a theoretical building block for ‘Live Dreaming’ based on an unfixed, embodied ecology of practices. It collides Walkers (2021) concept of ‘Neuroqueering’ practices, subversive acts and lived experiences with Harlow’s ‘Radical Musicking’ (2023). Harlow expands on Small’s original concept of ‘Musicking’ (2011) to include a material and non-human post-colonial ecology of musical practices. I explore embodied listening in performance via multisensory music-making, including Pauline Oliveros’s rich practical and theoretical framework ‘Deep Listening’(2010) which trains the body to appreciate all sounds.

Aims: This research aims to explore the question: “How might ‘Live Dreaming’ provide a practical tool for neurodivergent/female bodies to explore identities and reorientation through creative musical performance?” In doing so, it develops a body of compositional work that engages with embodied listening, practical experiments and theoretical literature through performances, installations and workshops. This research seeks to: 1. Investigate conceptual and abstract parallels between dreaming and performance. 2. Examine the potential for ‘Live Dreaming’ as a generative source of power for neurodivergent women and marginalised gender bodies to navigate alienating environments. 3. Create a practice-led toolkit for neurodivergent and marginalised bodies to reorientate and communicate themselves through creative musical performance. 4. Explore embodied listening, voice, software, and materials as a means of autonomous musical expression and to communicate synaesthetic experiences. The presentation will be accompanied by a short film of the author’s compositional practice. This serves to communicate the purpose of the abstract, practical methodology used to articulate the ‘Live Dream’.

Main Contribution: This research contributes to sector dialogue and practice around neurodivergent access to music-making. More broadly, it responds to the persistent under-theorisation of sonic arts and a need to broaden discourse on music as material, vibrational and embodied. I aim to offer ‘Neuroqueer Radical Musicking’ as an alternative to the dearth of creative tools for neurodivergent bodies to navigate alienating environments.

Implications: ‘Neuroqueer Radical Musicking’ and ‘Deep Listening’ are suggested as multisensory alternatives to listening that could provide an entry point into music-making for neurodivergent bodies, women and marginalised genders.

Keywords: Neurodivergent, Embodied, Multisensory, Feminist, Transdisciplinary

# Composing gender: Finnish songwriters' conceptions about gendered musical expression in western popular music

**Anni Kiikola,** (University of Jyväskylä)

Topic: Music theory and analysis
Presentation type: Live oral presentation

**Background: As a sociocultural phenomenon music is closely tied to the ideologies prevalent in its social and** cultural contexts, but as a rather powerful medium it also further mediates those ideologies. Gender has long been one of the cornerstones of western thought and as such has found its way into music as well, even having its own "musical syntax" along with things such as certain emotions in the 17th century heyday of stile rappresentativo. (McClary 2002, 35-37.) While the last few centuries have certainly brought about some changes, it could still be argued that conceptions of gender may be more closely related to contemporary music than we might assume; Tagg (2006, 174-178) has found that contemporary western listeners seem to be well versed in reading the gendered cues of music at least when paired with visual stimuli.

Aims: Combining elements of popular music studies, systematic musicology and gender studies in music, this interdisciplinary study aims to examine gendered interpretation of mainstream western popular music and especially the ways in which certain musical elements (e.g. timbre, key, tempo etc.) might be used to musically convey gender. One could argue that by reflecting our conceptions of gender, music not only reflects ideas of what gender is, but also what it should be. Therefore, exposing these kinds of gendered ideas to intentional scrutiny may be a vital aid in deconstructing systems of gender inequality. Thus, the aim of the study can be summarized as examining the gendered ideologies reflected in western popular music to facilitate the deconstruction of those ideologies in the larger context of western culture.

Methods: Four professional songwriters of western popular music were individually interviewed for the study employing a semi-structured qualitative interview design. In addition to their general conceptions and experiences about gender in relation to music, the songwriters were asked to discuss what kinds of music sound gendered (masculine, feminine etc.) to them and why, and to reflect on the ways specific musical elements could be used and varied to produce gendered-sounding pieces of music. After being transcribed the interview data was analyzed utilizing qualitative content analysis (Tuomi & Sarajärvi 2018, 122-124; Eskola & Suoranta 1998, 155-160).

Results: The study found that finnish songwriters seem to be as well versed in hearing gender as Tagg's (2006) participants were, whether they had previously given the subject much thought or not. Especially timbre, instrumentation and emotional expression were discovered to be influential factors in shaping the gendered interpretation of music, whereas the use of major vs. minor keys was not found to be of significance.

Conclusions: Based on the findings of this study, the "gendered syntax of music" could be said to rather closely follow the outlines set by the gendered dichotomies present in western culture. The study also implicates a need to question whether results gained by studying art music are fully generalizable to other types of musics as well.

SOURCES: Eskola, J. & Suoranta, J. (1998). Johdatus laadulliseen tutkimukseen. Jyväskylä: Vastapaino. McClary, S. (2002). "Feminine Endings: Music, Gender and Sexuality. University of Minnesota Press, 2002. Read 15.02.2024. Tagg, P. (2006). Music, moving images, semiotics, and the democratic right to know. In Brown, S. & Volgsten, U. (2006). Music and manipulation: On the social uses and social control of music. Berghahn Books. Tuomi, J., & Sarajärvi, A. (2018). Laadullinen tutkimus ja sisällönanalyysi (Uudistettu laitos). Vantaa: Kustannusosakeyhtiö Tammi.

Keywords: music analysis, songwriting, popular music, gender studies in music

# Dysmusia: Rethinking the case for music notation dyslexia: cultural and neuroscientific influences on approaches and findings

**Flora Henderson PhD,** (Independent Researcher)

Topic: Music education

Presentation type: Live oral presentation

**Music notation dyslexia, termed dysmusia, was first proposed by Gordon (2000) as an unexpected difficulty** in reading music notation despite musical ability. To date, dysmusia remains controversial and poorly investigated with few studies. Moreover, it has only been researched in relation to developmental dyslexia and with premises bound by the culturally specific medium of western staff notation. This research aims to rethink dysmusia as a distinct disorder that may overlap with other neurodevelopmental disorders such as dyspraxia (also known as Developmental Coordination Disorder) and ADHD, identify possible areas of difficulty and suggest investigative approaches that reduce cultural bias. Where music has been investigated in relation to dyslexia, it has usually been as a remediation for dyslexia problems, with rhythmic timing a particular focus, rather than looking at the skill of notation reading per se. The few studies investigating dysmusia have referenced phonological theories of dyslexia applied to staff notation. Findings have been mixed, indicating difficulties in reading pitch or in reading the visual combination of vertical (pitch) and horizontal (time) axes, with some researchers questioning the existence of dysmusia. Although the activities of sightreading notation are similar to reading verbal text, we don't decode notation information into a verbal sequence of referents because music is a motor-sound activity rather than a verbal activity. We translate notation information into an ordered sequence of motor-sound gestures for instrument or voice, segmenting and blending the gestures as we go. This information may combine rhythm with another dimension such as pitch in staff notation or motor gestures. Japanese music notation for the shakuhachi flute signifies fingering patterns and rhythm in a tablature system that uses referents from Japanese language syllabaries and characters. If difficulty is experienced in reading shakuhachi notation (but not in reading Japanese), the reading difficulty is not pitch. Possibilities are the visual-motor translation (rapid automization performing), the synthesis of two dimensions – rhythm and motor-gesture, the lack of systematic proportional spacing given to rhythmic sequences, slow processing, or the translation of rhythmic notation to motor-gesture timing. For a musician with motor gesture and/or attentional difficulties, such as those found in dyspraxia and ADHD, the rapid recognition, timing and ordering of motor gestures when reading music could be problematic. Framing notation as the representation of motor-sound gestures opens up the possibility of investigating reading difficulties from the perspective of motor skills. This could enable investigation into dysmusia in the dyspraxia and ADHD cohort who have been overlooked, and to new ways of conceptualising dysmusia. Results would help identify areas that could be targeted for remedial action, and reduce the psychological impact of unrecognised problems that may deter people from pursuing music they might otherwise enjoy and find beneficial.

Keywords: Dysmusia, music notation dyslexia, neurodevelopmental disorder

# Session 2.2 - Data Processing

## Dual Processing Streams in Musical Timbre Perception

**Oliver Tab Bellmann,** (Acoustics Research Institute, Austrian Academy of Sciences, Vienna); **Rie Asano,** (Max-Planck-Institute for Empirical Aesthetics, Frankfurt, Germany)

Topic: Music cognition / neuroscience

Presentation type: Live oral presentation

**Background: Timbre stands as a crucial component in music, serving diverse purposes such as conveying** emotions, enabling listeners to recognize and identify musical sounds, while also contributing to the structural organization of music (McAdams, 2013). Although the ventral auditory stream is acknowledged for its role in sound recognition, source identification, and emotional expression through timbre, the involvement of the dorsal auditory stream, typically linked to action recognition and structural organization in other musical domains, remains unknown (Alluri & Kadiri, 2019; Wei et al., 2022).

Aim: We investigate whether both ventral and dorsal auditory streams are involved in processing musical timbre.

Methods: We carried out an activation likelihood estimation (ALE) meta-analysis of 18 experiments from 17 neuroimaging studies on musical timbre perception to identify the brain regions that are consistently activated in those experiments.

Results: We found consistent activations in the bilateral transverse temporal gyri, the posterior superior temporal gyri and planum temporale, in the bilateral inferior parietal lobe, and in the right anterior insula and superior temporal gyrus.

Discussion and Conclusion: Our ALE meta-analysis revealed cortical regions associated with both dorsal and ventral auditory processing streams. We propose a dual-stream model for the cortical processing of musical timbre, involving an anteroventral stream along the superior temporal gyrus, anterior insula, and parts of the inferior frontal gyrus responsible for stimulus identity and categorical information processing. Additionally, a dorsal stream, comprising the posterior superior temporal gyrus, regions in the inferior parietal lobe, and parts of the inferior frontal gyrus, is implicated in timbre-based sensorimotor and sequence processing. Support for this model comes from previous neuroimaging and clinical studies (Wei et al., 2022; Alluri & Kadiri, 2019). Notably, the regions identified in our analysis show similarities to those involved in processing other fundamental aspects of music such as pitch and rhythm, suggesting potential shared neural bases for musical timbre and other musical domains.

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Keywords: Timbre, ALE meta-analysis, Dual-stream model, Music cognition, Cortical processing

# Noisy time series data of video and music perception in virtual reality (VR): Preprocessing of data, time series plots and analyses

**Egil Ovesen,** (University of Agder); **Rebecca Chamberlain,** (Goldsmiths, University of London); **Joerg Fingerhut,** (Humboldt University of Berlin); **Annahita Nezami,** (Earthscape VR); **Matthew Pelowski,** (University of Vienna)

Topic: Music perception

Presentation type: Live oral presentation

**Video and music perception happens over time. Recording time series data of various measures may provide** in insights into the stages of the perception of the stimuli, but our experience is that these data are noisy with huge and unexplained individual differences. Psychophysiological data are particularly noisy, or as Potter and Bolls (2012) put it: “monstrosities”. However, when the challenges of preprocessing the psychophysiological data are overcome, they can provide insights into emotional and mental processes that the participants may not be able or willing to share (Potter & Bolls, 2012).

The aim of this talk is to give examples of how continuous data, including psychophysiological data, can be preprocessed, illustrated and analysed to provide insights into the various stages of video and music perception.

We invited 70 participants to our lab where they watched a 25-minute-longvideo in virtual reality (VR). The video is based on the overview effect, which is the effect that astronauts have described when watching the Earth from outer space. Some of the reported aspects of the overview effects are a sense of awe, inter-connectedness of all life and responsibility for the environment (White, 2014). We hypothesised to see some of the same effects in our VR experiment. The music included binaural beats to enhance the feeling of connectedness (Barratt et al., 2022).

The participants were given online questionnaires to fill in three days before the experiment, immediately after and one or more week after. We recorded psychophysiological measures of electrodermal activity, pulse and respiration when the participants experienced the VR video, and the participants continuously rated their subjective experience of intensity using a joystick.

The questionnaire data from our experiment reveals that the participants experienced a stronger connectedness to nature and a better self-relation immediately after the experiencing the VR video as compared to the pre-questionnaires. The analyses we have conducted so far have not revealed any link between these changes and continuous data.

However, the continuous data provide insights into the participants perception of the video and music. The preprocessing, illustration and analyses of these data is the theme of this talk. One of the insights is that the experience of intensity can be predicted by the psychophysiological data, but with a significant lag. This may indicate that measurable physical emotions occur before the conscious experience of them. This corresponds to theories of emotions and feelings proposed by Antonio Damasio (2003). The time series plots identify the periods of the video the participants had measurable emotional arousal and what periods they reported as intense. This talk will have an extra emphasis on the perception of music. To do so, we will prepare timeline plots of the brightness, roughness and amplitude of the music (Peck, 2020) to explore whether these data can predict the physical reactions and the continuous self-ratings and if so, what the time lag between these measures are.

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Keywords: time series data, virtual reality, psychophysiology, awe, overview effect

# Performance Data Analysis for Community Music Experiments

**Matthias Jung,** (University of Agder)

Topic: Music perception

Presentation type: Live oral presentation

**Involving amateur musicians and musical novices from diverse backgrounds as practicioners in musical** events has been established as the term “Community Music” since the last decade or so (Higgins 2017). Those practices have been claimed to pacify societal tensions (Howell 2023) and appear in a broad variety of forms stemming from educational interventions to crowd work at concert events.

The work presented here approaches community music practice from the perspective of participatory composition (Xambo 2020) and aims to disclose perceptive tendencies and particpatory behaviour of audience members and musicians at performances of electronic music. During multiple concert experiments, we recorded continous data sets including audio, video, and MIDI data, and aggregated log data from the audience participants’ personal smartphones that were used for the interactive parts of the compositions. Additional data sets includes motion data recorded on ancles and wrists of the performers created with accelerometer wristband devices. Lastly, participants were asked to answer a self-report questionnaire after the concerts, which included both questions on the personal and musical backgrounds, as well as questions about the experience of the participatory parts of the concerts.

The talk discusses correlation and cluster analysis (Menardi 2011) as methods for understanding the connections and dependencies among those different data sets and presents some of the strategies to present those insights. Results include co-creative communication patters found in the interactive data sets of performing musicians and participating audience members, as well as a behavioural typology explaining the different clusters found in the log data of the smartphone use. Results from the qualitative data suggest insights of how both performers and audiences experience and interprete the community-driven concerts, and how the social dimensions of the performances were perceived by both groups. In conclusion, the studies propose that smartphone-based, participatory concerts can be valuable community music practices to enhance the agency of non-musicians during popular music performances.

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Keywords: Community Music, Participatory Composition, Performance Data Analysis

# Poster session

## The mediating effects of personality traits and cognitive styles on the relationship between cultural background and music emotion recognition

**Menglan Lyu,** (School of Arts and Creative Technologies, University of York, United Kingdom)**; Mimi O'Neill,** (School of Arts and Creative Technologies, University of York, United Kingdom)**; Hauke Egermann,** (Musikwissenschaftliches Institut, Universität zu Köln, Germany)

Topic: Music perception
Presentation type: Poster

**Background: Cross-cultural research on music emotion recognition has revealed both universality and** cultural specificity (Balkwill & Thompson, 1999). It has been suggested that cultural differences in emotion processing in music could be interpreted with consideration of individual differences (Juslin et al., 2016). However, there have been limited studies empirically investigating this.

Aims: This study aimed to explore whether and how individual differences in personality traits and cognitive styles mediate the effect of cultural background on the recognition of musically expressed emotions, and on the psychoacoustic features associated with music emotion recognition.

Methods: Data collected from 204 Chinese (36 males; 38 professional musicians) and 214 Westerners (89 males; 43 professional musicians), were analysed in this study. Participants were asked to listen to 18 previously tested Chinese and Western music stimuli, and rate the degree to which they thought the music expressed each of the five target emotions (happiness, sadness, peacefulness, anger, and fear), on continuous scales ranging from 1 to 5. Personality traits and cognitive styles were measured using the Big Five Inventory, the Analysis-Holism Scale, and the 10-item short forms of the Empathy Quotient and Systemising Quotient-Revised.

Results: The mediation analysis revealed the indirect effect of cultural background on the recognition of fear in Chinese music, and the recognition of happiness, sadness, and fear in Western music. Additionally, these observed indirect effects were all through Neuroticism. Both empathising and systemising did not mediate the influence of cultural background on emotion recognition sensitivity. Furthermore, the regression analysis for all types of cognitive styles only indicated a cultural difference in the empathising cognitive style, and the subsequent mediation analysis revealed the mediating effect of it on the influence of cultural background on the association between emotion recognition sensitivity and associated psychoacoustic features.

Conclusions: This study indicated the mediating effect of Neuroticism on the relationship between cultural background and the recognition of emotions in music. This could be attributed to the positive correlation between Neuroticism and Sensory Processing Sensitivity, which is a personality trait that describes sensitivity to environmental stimuli and is related to empathy. The previously hypothesised association between cultural differences in holistic-analytic cognitive styles and cultural differences in emotion recognition was not confirmed. However, cultural differences in associated psychoacoustic features were found to be related to cultural differences in the empathising cognitive style. These findings suggest the need to consider personality traits and cognitive styles for interpreting cultural differences in the recognition of emotions in music.

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Keywords: Mediators, personality traits, cognitive styles, cultural background, music emotion recognition

# Exploring Rachmaninoff's Compositional Thinking: Bells and Bell-Ringing as the Main Feature of His Musical Language

**Martina Kamenska,** (Institute of Musicology SAS)

Topic: Music theory and analysis

Presentation type: Poster

**Background: The phonic characteristics of bells represent the most distinctive aspect of art in cultures with** an Orthodox bell-ringing tradition. The specific sound environment that is a part of everyday life in Orthodox towns and villages has been a creative inspiration for many artists. In Sergei Vasilievich Rachmaninoff's musical language, bells occupy a special place. For him, they evolved from an inspirational source into a defining feature of his unique style, shaping his compositional thinking to the greatest extent.

Aims: The main aim of this paper is introducing this specific phenomenon while pointing out its significance within the context of the composer's work. This study will delve into specific examples of the various compositional uses of bells in Rachmaninoff's music, outline their contexts, and present which components of the musical structure were most influenced by bell-ringing.

Methods: Structural-sound comparative analysis was the main way to identify a direct correspondence between the Orthodox bell-ringing tradition and the compositions that Rachmaninoff himself acknowledged as being influenced by bells. Subsequently, we compared the musical structure of these consciously bell-influenced compositions with works exhibiting subconscious latent bell-like qualities. In Rachmaninoff's music, the line between conscious and subconscious use of bells is very thin.

Results: On the basis of research and musical analysis of Rachmaninoff's work, we can conclude that bell-ringing as a dominating sonic specificity has manifested itself in his compositional style in an exceptionally strong way and on various levels. Firstly, it can be an integral part of the core concept of a composition, where the imitation of bells is used consciously and purposefully (e.g., "The Easter" Op. 5, or "The Bells" Op. 35). Secondly, bell-ringing is often (albeit subconsciously) woven into the compositional structure, influencing the individual components of the music (such as Preludes and Etudes-Tableaux, among others). The presence of bells in Rachmaninoff's music contributes to its acoustic qualities, creating a distinctive sonic foundation for the composition, while also carrying symbolic connotations and representing a kind of sounding image. The phonic aspect of bell-ringing has permeated the structure of the musical material, the conception of the work, and has become an important constructive principle.

Conclusions: Since existing studies point to the presence of bells in Sergei Rachmaninoff's work only partially, our aim was to bridge this gap in the musicological literature and offer a more comprehensive understanding of the bell phenomenon within the composer's musical style. The findings from this study may inspire research into other characteristic features of Rachmaninoff's musical language, as well as the use of bells in the work of other composers.

Keywords: Bells, bell-ringing, compositional thinking, musical language, Sergei Rachmaninoff

# Exploring the lived experience of flautists' performance-related health and wellbeing

**Jiayi Wang,** (IOE, UCL's Faculty of Education and Society); **Professor Graham Welch,** (IOE, UCL's Faculty of Education and Society)

Topic: Music and well-being
Presentation type: Poster

**The study has investigated the lived experience of flautists, focusing on their perspectives and experiences** of performance-related physical discomfort, injury and related mental health challenges that they encounter for practice and performance. The aims of the research have been to provide flautists with an opportunity to reflect on any physical or psychological performance issues in their own words, and to understand the subjective meaning of these experiences for the participant flautists.

A qualitative approach was used for gathering data. All the fieldwork was undertaken during or immediately after the Covid-19 pandemic. Consequently, the participating flautists were deliberately selected using professional networks on the basis of the combined characteristics of their personal backgrounds and their experience, and being able to participate remotely.

There have been two data collection phases. Phase 1 was a specially designed pre-interview questionnaire drawing on appropriate literature. Phase 2 was built on the pre-interview questionnaire responses and was designed as semi-structured interviews, undertaken on Zoom, and included a 'River of Flute-playing Experience' activity during the interview. The 'Rivers of Experience' method is an autobiographical research tool. Participants were asked to write down their experiences and challenges at various key points along their drawing of a meandering river. The combined data analyses drew on thematic analysis.

The eight participants reported a personal history of performance-related health and wellbeing challenges that they had faced at some point in their lives. The findings reveal that flautists encounter health-related challenges associated with their practice and performances, and the data suggest that they each require (i) an understanding of likely performance-related health challenges and (ii) supportive resources to assist them in managing these challenges. The research also highlights the importance for flute teachers of having practical knowledge of injury prevention in order for the knowledge to be a key component of their teaching.

Keywords: health and wellbeing, flautists, lived experience

# Event cognition: exploring structures and meta-structures in contemporary music

**Khashayar Shahriyari,** (Washington University in St. Louis)

Topic: Music philosophy

Presentation type: Poster

**Background: Music ontology studies have often portrayed music as an ephemeral art form lacking objective** existence, with scores serving merely as approximations of actual music. This perspective would lead us to regard music as a series of related events rather than as a static object. For this reason, the term "musical event" is widely used by researchers working in music perception and music cognition. However, these scholars often approach musical events in terms of sonic occurrences that unfold in abstraction rather than in an ecological/spatiotemporal context that develops in real time. This approach, while customary for traditional music analysis, falls short for the analysis of certain forms of contemporary music where fixed notation is absent.

Aims: Drawing from empirical research in cognitive psychology, this study builds on Radvansky and Zacks' (2014) theory of Event Cognition by proposing a framework for music analysis and aesthetic understanding within a spatiotemporal context. This framework aims to bridge the gap between sonic relationships written on scores (musical structure) and the perceived experiences that emerge in an ecological context (musical meta-structures).

Main Contribution: While Joseph Jakubowski (2019) has explored Event Cognition theory in the analysis of spectral music, this study expands upon his work by encompassing a broader spectrum of musical genres and concepts. Through this interdisciplinary approach, this study demonstrates the potential of Event Cognition theory to account for both the sonic and ecological dimensions of music.

Implications: This research proposes new avenues for music ontology and epistemology, primarily for analyzing contemporary, experimental, and non-notated musical forms. Ultimately, this study suggests a new framework for the conceptualization of music, considering not only traditional notions of music analysis rooted in sonic structures but also the ecological grounds for music understanding.

Keywords: Event cognition, contemporary music, music ontology, music analysis

## The role of individual differences in the use of music for mood regulation

**Catherine Tan,** (University of Cambridge); **Peter M. C. Harrison,** (University of Cambridge)

Topic: Music and well-being
Presentation type: Poster

**Background: As we navigate daily life, our emotions can be modulated either positively or negatively by the** situations we attend and respond to. The ability to regulate our emotions (i.e., to sustain or change their duration, intensity, and occurrence) is a skill that supports our overall psychological well-being and integration in society (Brackett, 2019; Gross; 1998). Music listening is an activity which has been observed to facilitate emotion regulation across all ages (DeNora, 1999; Sloboda, 2004; Cirelli et al., 2020; Vincenzi et al., 2022); however, selecting the wrong music to listen to may result in maladaptive regulation practices (Garrido and Schubert, 2015). To predict the emotive outcomes of music listening requires an understanding of the complex interplay between differences in listeners, listening contexts and the music itself (Carvalho et al., 2022; Eerola et al., 2016; Garrido and Schubert, 2015). Given the technological advancements in music recommendation algorithms and playlist generators, machine learning is an apparent candidate for supporting this process.

Aims: In this study, we are exploring how music recommendation technologies can be optimized to enhance mood regulation and well-being through learning patterns between music listener's individual differences, their use of music for mood regulation and the music they listen to. We aim to answer the following research questions: 1. How do music listeners' individual differences in musical engagement, empathy and wellbeing predict the music they listen to for mood regulation? 2. What types of music are good at facilitating particular music mood regulation strategies? 3. How can music recommendation algorithms support well-being?

Methods: Participants will be invited to complete an online questionnaire to support the research objective. The test battery will collect information on participant demographics and music recommendations. In addition, it will collect information on participants' history of using music for mood regulation (through the Brief Music Mood Regulation Scale by Saarikallio, 2012), musical sophistication (using the Brief GOLD-MSI by Lin et al., 2021), musical reward (using the Barcelona Music Reward Questionnaire by Mas-Herrero et al., 2013), empathy (using the Interpersonal Reactivity Index by Davis, 1980), and well-being (using the 18-item Psychological Wellbeing Scale by Ryff & Keyes, 1995).

Results: The data will be analyzed to identify possible relationships between listeners' individual differences and the music they choose to listen to for mood regulation. These interpretations will then be used to train an algorithm to make music recommendations that facilitate a music mood regulation strategy (Saarikallio & Erkkila, 2007) that is tailored to the listener, taking into consideration their individual backgrounds.

Conclusion: The results of this research will further the theoretical underpinnings and methodologies used to study the phenomenon of music mood regulation. Furthermore, this research will advance music technologies as an accessible tool for improving the well-being of communities.

Keywords: emotion regulation, music, recommendation algorithms

## Singing, health and wellbeing

**Bruna Francisco Martins,** (University of Leeds); **Dana Clemmensen,** (University of York); **Emily Cooper,** (The University of Sheffield)

Topic: Music and well-being

Presentation type: Poster

**Background: The Singing in Balance network comprises a group of researchers and organisations based in** the UK looking at the effects of choir participation on wellbeing and health. This poster presents the current state of the project, which is in its primary phase, and shares a literature review of the impacts of singing in a group. Research has found that singing, both individually and in a group, can have various benefits on one's physical health, mental health, and wellbeing. Regarding physical health, many studies have focused on health conditions such as cancer, chronic pain, and Parkinson's in which the results found improved breathing, posture, and muscle tension with singing interventions. Emerging studies also identify singing benefits to individuals struggling with mental health issues such as anxiety, depression, PTSD, and dementia. These studies indicate that singing may improve self-regulation, sense of purpose, and personal expression. Finally, there is a significant body of studies that identify singing's impact on psychological, emotional, and social well-being. Singing can improve life satisfaction, self-efficacy, and positive emotions and in group settings it can provide a sense of belonging, self-identity, group identity, and cohesion as well as facilitate the 'ice breaker' effect.

Aims: The present review aims to provide an insightful overview of the knowledge available in this field and publicize it as well as spotlight the network and projects the researchers are involved in regarding the topic of singing for health and wellbeing.

Main contribution: The poster will summarize current knowledge regarding the impact of group singing on wellbeing, physical health, and mental health. These groups include professional and non-professional choirs/singing groups such as religious groups, therapy interventions, leisure, and more. By expanding the search words to group singing (instead of just 'choirs'), it provides an opportunity to review the varied outcomes in the myriad of contexts group singing can be facilitated in. Considering the results of the current literature regarding these impacts will promote holistic analysis of group singing and thus, aid our further understanding of the functions of singing and group musicking on health and wellbeing. Finally, by spotlighting this innovative network we promote and invite collaboration between new and experienced researchers, Ph.D. students and organisations that study and work in group singing for health and wellbeing. Hopefully, the knowledge produced by this collaboration will help to better inform current practices and promote further discussion around this topic.

Implications: We hope that the insights presented will be especially useful in the health sector. As this research is interdisciplinary, the results may inform future practices and technologies for new and existing group singing interventions.

Keywords: group singing, health, wellbeing

## How does music training affect the effect of synchrony on social bonding?

**Gabriela Sarmiento-Cabrera,** (University of Jyväskylä); **Patti Nijhuis,** (University of Jyväskylä); **Joshua Silberstein-Bamford,** (University of Jyväskylä)

Topic: Music sociology
Presentation type: Poster

**Social bonding is foundational to society and the need for bonding is a key factor in how humans interact** with others. Synchrony has been found to enhance bonding, as has music. Listening to music, dancing to it, and playing it with other people seems to have a positive effect in the formation of social bonds. However, the effect previous musical training can have on how synchrony enhances social bonding has been seldom researched.

In this study we aim to determine if previous musical training and experience influences synchronization's effect on social bonding. For this, 30 pairs of participants will complete the Inclusion of Other in the Self Scale as well as other measurements for social bonding before and after doing several randomized repetitions of the mirror game in different leading conditions (leading, following, and joint). We hypothesize that the effect musical training has is positive, enhancing synchronization's effect on social bonding. Data collection is ongoing, but preliminary results will be presented.

The implications of this study will be discussed, along with the need for further research into how personal context may influence the synchrony-bonding effect.

Keywords: Musical training, social bonding, synchrony

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## The development of singing skills in school children and its correlation with life satisfaction

**Reinis Maurītis,** (Jazeps Vitols Latvian Academy of Music); **Daniel Müllensiefen,** (Goldsmiths, University of London); **Tatjana Voitova,** (Jazeps Vitols Latvian Academy of Music); **Valdis Bernhofs,** (Jazeps Vitols Latvian Academy of Music)

Topic: Music and well-being
Presentation type: Poster

**Aim: The aim of this study is to explore the relationship between life satisfaction and musical skills and** activities, specifically the development of singing skills in children and adolescents. We expect to find a positive correlation between satisfaction with life and individual singing skills. In addition, we expect to find a positive relationship between the satisfaction with life and the increase of singing abilities over repeated measurements taken over the course of several months. Also we predict that musical listening ability has a positive correlation with life satisfaction and singing skills.

Methods: There is no specific musical intervention used in this study, because in this study participants are active boys choir singers who learn choir singing in a general education school during a regular learning process. From a large sample of same age and same socio demographic background school children two groups will be formed. One group, the choir singers group, would receive the choir singing class. Another would be the control group, equal to the singers group however with no singing in a choir. The project is designed as a longitudinal study following the boys' choir's daily learning process, choir rehearsals and other activities. For data collection the LongGold test battery was adapted and translated into Latvian. Data will be collected from the experiment groups with 30 participants of age from 8 to 13 (grade 2 to 7) in each. The adapted test battery includes assessments on musical perception skills (i.e. Mistuning Perception Test, Beat Perception Test, Melody Discrimination Test), life satisfaction, and other self–report questionnaires, including Basic demographics, Concurrent Musical Activities, Theory of Musicality, Musical Home Environment, the Goldsmiths Musical Sophistication Index. The focus of the satisfaction with life scale (SWLS) is to evaluate a respondent's level of satisfaction with their life overall. A 5-item test that assesses a person's overall life satisfaction based on cognitive judgments rather than focusing on positive or negative emotions (Diener, Emmons, 1985). For the assessing the dynamics of singing skill development an online test will be used (Singing Ability Assessment, SAA, Silas, Müllensiefen, Kopiez, 2023). The test comprises three main tasks: (1) reproducing a single long note; (2) reproducing a folk song phrase; (3) listening and singing an arrhythmic melody. The SAA has been adapted considering the choir boys' choir age and ability levels.

Results: Results of the study will provide evidence to whether the development of singing skills is correlated with satisfaction with life, whether changes over time in either of these constructs will be followed by changes in the other construct at a later time point. Data collection is planned to start from March 2024, and since this is longitudinal study, the next data collection is planned in autumn 2024. A compilation of the first wave of data is planned until the end of May 2024. This will provide sufficient time to analyze the data and present preliminary results at the SysMus conference.

Keywords: Life satisfaction, singing, choir, musicality

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## Investigating the relationship between Audio Features and Lyrics across Taylor Swift's Pen Playlists

**Luiza Lucuța,** (The MARCS Institute for Brain, Behaviour and Development, Sydney, Australia)**; Ceren Ayyildiz,** (The MARCS Institute for Brain, Behaviour and Development, Sydney, Australia)

Topic: Music and culture

Presentation type: Poster

**Background: In Western Popular music, the lyrics of a song often align with its audio features. Taylor Swift** is a musical artist whose success has been closely associated with her songwriting. Swift has recently revealed her self-described categorisation of songwriting styles using imaginary pens, each reflecting a different type of emotion. These categories are 'Glitter Gel Pen' (happy, energetic songs), 'Fountain Pen' (modern personal stories), and 'Quill Pen' (antiquated, old fashioned). However, there have been no empirical attempts to validate this classification, further referred to here as 'Pen Theory'.

Aims: The aim of this project is to assess whether Swift's own categorisation can be validated through distinguishable differences in audio features and lyrics between songs pertaining to different playlists. It also aims to investigate the relationship between audio features and lyrics across the Pen Playlists, as well as across Swift's broader discography. 3.

Methods: Audio features were extracted from the standard version of Taylor Swift's ten studio albums (Taylor's Version where available) through Spotify's API. Principal Component Analyses (PCA) were conducted for dimensionality reduction purposes. 'Energy', 'Loudness', 'Acousticness' and 'Liveness' emerged as a single component which was labelled "Intensity', while 'Danceability' and 'Valance' were found to be independent. Therefore, the three audio features included in the analyses were 'Danceability', 'Intensity' and 'Valence'. For lyrics, Latent Dirichlet Allocation (LDA) was used for semantic topic modelling. Bayesian statistical models were used to analyse whether the Pen Theory classification can predict audio features, lyrical topics, and the relationship between them. A similar statistical approach was used to analyse the relationship between audio features and lyrics across Swift's entire discography.

Results: Statistical analyses of the audio features within the Pen classification revealed Glitter Gel Pen songs to be distinguishable from Fountain Pen and Quill Pen Songs. Specifically, they were found to be higher in 'Danceability', 'Intensity' and 'Valence'. In terms of lyrics, five semantic topics were identified using LDA: ‘Dance and Friendship’, ‘Love and Struggle’, ‘Seasons of Emotions', ‘Memories of Moments’ and 'Time'. However, no clear relationship between assigned topics and Pen playlists could be observed, as the five topics were present within songs across all three Pen types. Bayesian linear mixed effects models revealed insufficient evidence to support the relationship between LDA topics and audio features across the Pen Playlists, indicating that topics stay consistent despite variability within the audio features. Similarly, insufficient evidence was found to support the relationship between the audio features and lyrics in the context of Swift's entire discography. Bayesian pairwise analyses of audio features across the entire discography highlighted notable variability between albums.

Conclusions: The current project is the first empirical attempt at investigating Taylor Swift's Pen Theory. This was carried out through a data-driven framework for musical analysis that simultaneously accounted for audio features, lyrics, and the relationship between them. While the current study only focused on Taylor Swift's music, this research methodology can be applied to the work of other musical artists.

Keywords: Musical feature analysis, Spotify API, Topic Modelling, Bayesian Statistics, Taylor Swift

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## Music activities in the home environment to support bonding between parent and child

**Sara Lindstedt,** (Master's Degree student in Musicology, University of Jyväskylä)

Topic: Music and well-being

Presentation type: Poster

**The children's relationships with their caregivers are indisputably important. Acknowledging parental stress** and its negative effect on children's upbringing, this thesis questions whether a joint musical activity between parent and child could help the parent understand the child's experiences more clearly and support their bonding.

Aim: In this qualitative master’s thesis, the goal was to bring light to the music activity experiences of parents (N9) with their small children (ages 1,5-4-years) in their home environment. In the interviews, the parents describe their experiences with music activities, especially related to empathy and stress. The thesis research question is: How do music activities in the home environment support parental bonding? Based on previous research, it was hypothesized that parents would experience the musical activities as supporting lower stress and higher empathy toward their child (Greenberg, Rentfrow & Baron-Cohen, 2015; Groarke & Hogan, 2019).

Methods: Participants took part in a two-week music activity assignment. The focus was on parenting, stress, and empathy. At the end of the first interview, participants were instructed to do 10- 15 minutes of daily shared music activities that the family felt comfortable with when they felt more suitable. After two weeks, participants took part in a second semi-structured interview. An inductive, data-driven approach was adopted in this study. In this phenomenological perspective research, the data for the analysis was the interview material from before-and-after music activity interviews. Parents were asked to reflect on what thoughts and emotions the music activities evoked and whether they noticed a difference in their own or their child's behavior and emotions.

Results & conclusions: The results show that music use can change once one becomes a parent. Parents' past music relationship (close-distant) and their roles as stay-at-home parents or working parents also seem to have an effect. Results show that parents found five stress reduction strategies during the music activity assignment. Parents were able to be more self-aware and found that music activities supported their emotion regulation. Parents also noticed improvement in their and their children's focus. Music activities offered fun and interesting activities to the parent-child duo and gave parents motivation to commit to it. Parents noticed that empathizing with their children was easier during music activities than in typical playtimes. Parents' positive experiences designing and sharing music activities with their children supported their confidence. In conclusion, when looking at the results, the elements of music activities can lead to positive parenting behavior that supports bonding between parent and child. Home-based music activities can help parents reduce stress, be more mindful, and show positive parenting behavior that strengthens parent-child bonding and well-being.

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Keywords: music activities, music and parenting, affective regulation, empathy, parenting stress, parent-child bonding, music in a home environment

# Session 3 - Emotion

## Sound and sense: A longitudinal web-based investigation of children's subjective responses to music

**Caroline Owen,** (University of York); **Andrea Schiavio,** (University of York)

Topic: Music perception

Presentation type: Live oral presentation

**Background: Our research is situated in the context of limited empirical investigation into young children's** lived experiences with music. Of note is Herbert and Dibben's (2018) focus on the responses of older children and adolescents (ages 10-18) and earlier interest in children's musical or aesthetic awareness and their ability to recognize basic emotions (such as happiness, sadness and fear) purportedly expressed by music. In a preliminary interview study, Owen and colleagues (under review) found that children as young as five years described music-induced experiences including visceral sensations, imagined narratives and scenarios, revealing a similar variety of responses to those reported by adults (e.g., McAuley et al., 2021).

Aims: The present study aims to reveal insight into how subjective responses to music evolve developmentally by examining verbal responses that emerge spontaneously in children aged between five and eleven years.

Methods: The longitudinal study is a series of web-based listening experiments presented to participants biannually for three years. Participants are invited to help a fictional alien cartoon character learn about what music means to Earthlings by giving free descriptions of experiences induced by seven musical extracts, each experiment featuring different musical genres. Participants are asked 1) How does this music make you feel? and 2) Does this music make you think of or imagine anything? Recruitment has been carried out via email and social media channels.

Results: Preliminary results from a qualitative analysis indicate strong similarities between what music makes children feel and what it makes them imagine, although whether they distinguish clearly between what they feel, imagine or perceive is not always clear-cut and appears not to be age-dependent. This lends support to the theory that there is a complex spectrum of experience from perception to feeling (e.g., Gabrielsson, 2002).

Conclusions: Insight into young children's lived experiences with music contributes a new perspective to the growing body of research interested in the bio-cultural evolution of musicality – the human capacity for engaging with and appreciating music (e.g., Tomlinson, 2015). A greater understanding of how music-induced feelings emerge developmentally may also be of value in the fields of music therapy and education.

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Keywords: Subjective responses to music, children, narrative, visual imagery, evolution of musicality

## The new roles of music listening in young people's everyday lives in Finland

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Topic: Music and well-being
Presentation type: Live Oral Presentation

**Background: Young people today live in a world that is full of uncertainty and crises that have affected their** everyday lives (Kivijärvi, 2022). In addition, music listening culture today is rapidly changing, and for example the social media service TikTok has already influenced the processes of music listening (Radovanovic, 2022). To fully understand the role of music in young people's lives, there is a need for more scientific and music psychological research regarding the ways youngs engage with music and how their engagement is related to their experiences of social and cultural participation.

Aim: To provide new knowledge of young people's self-perceived gratifications of music listening, and how everyday music listening can influence wellbeing in youth.

Methods: Finnish adolescents and young adults (15–25 years) (n=64) were recruited to participate through different channels in social media, contacts established with youth centers and schools, and leaflets. Each participant was interviewed twice. The first interview focused on the participants' musical history and everyday experiences with music. After this, the participants recorded videos and /or took photos related to their uses and experiences of music in their daily lives. After a one-week period of this data collection, a deeper interview focusing on these participants' musical uses and experiences was conducted. In this paper, the focus will be on the interview–material and its thematical analysis.

Expected results: This study presents new and uprising themes concerning young people's music listening culture and their relationship to music in general.

Conclusion: Young people's music listening culture is continuously changing (e.g. Radovanović, 2022). The results presented here will contribute to the discussion of the current role of music in their everyday lives.

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Keywords: music in youth, music listening, music in everyday life, music and well-being

# Relationship between psychosocial factors and musical listening abilities within adolescents with intensive music training in Latvia: results of the first testing wave

**Tatjana Voitova,** (Jazeps Vitols Latvian Academy Of Music)

Topic: Music education
Presentation type: Live oral presentation

**Background: The professional music education system in Latvia is unique, it has deep roots and time-proven** traditions. Active engagement with music is considered to have a significant impact on personal, social, and intellectual development of young people (Asztalos & Csapó, 2017). Psychosocial skills (e.g., growth mindset, emotional intelligence) have been found to be closely linked to musical abilities and academic performance in adolescence (Müllensiefen et al., 2015). However, it is yet unclear to what extent psychosocial factors interact with aspects of musicality.

Aim: This study aims to determine the relationship between psychosocial factors and musical listening abilities within adolescents with intensive music training in Latvia.

Methods: The ongoing study is designed as a longitudinal study following the pupils with intensive music training during the years of adolescence. It does not involve any specific musical intervention, but two types of schools with a markedly different curriculum have been recruited: general secondary schools and schools with a special curriculum of intensive music training. Each participant will take part in (at least) three rounds of testing spaced about six months apart. In the first testing wave there were 191 participants (range 11-18, M=13.9, SD=1.75). For data collection, the LongGold test battery was adapted and translated into Latvian (www.longgold.org). The online test battery comprises tests on various music perception abilities, cognitive tasks, and self-report questionnaires on several psychosocial variables as well as on demographics and musical background.

Results: An evidence-based quantitative model of the interaction between psychosocial variables and musical development in adolescents with intensive music training will be provided. An initial cross-sectional analysis indicates significant positive associations among musical listening variables and musical training ($p < .001$), working memory ($p < .001$), age ($p<.001$) as well as various psychosocial variables, i.e., Children's grit scale ($p < .001$), Children's hope scale ($p<.01$), and Strengths and difficulties ($p<.01$).

Conclusion: The interpretation of data obtained in the study will allow for a comprehensive view of the interplay between psychosocial and musical development within adolescents with intensive music training in Latvia. Insights from this study will allow teachers and parents to understand how psychosocial abilities co-develop in parallel with musical abilities and how positive growth trajectories can be stimulated.

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Keywords: musicality, music training, adolescents, psychosocial factors

# Session 4.1 - Online

## Enhancing Vividness of Mental Imagery through Expressive Isochronous Drumming

**Ceren Ayyildiz** (MARCS Institute for Brain, Behaviour and Development, Western Sydney University); **Andrew J. Milne** (MARCS Institute for Brain, Behaviour and Development, Western Sydney University); **Muireann Irish** (Brain & Mind Centre, & School of Psychology , The University of Sydney); **Steffen A. Herff** (MARCS Institute for Brain, Behaviour and Development, Western Sydney University)

Topic: Music perception

Presentation type: Virtual oral presentation

**Background: Recent research highlights music's capacity to shape vividness – the clarity and detail with** which mental imagery is experienced (Herff et al., 2022, 2021; Marks, 2023). Vividness of mental imagery plays a key role in many cognitive behavioural therapies (Morina et al., 2013). Ritual music, generally characterised by an emphasis on timbre and rhythm in humanities literature, is often intended to conjure vivid imagery (Iyer, 2002). Here, this music played by humans exhibits subtle, expressive variations in timbre, loudness, and timing, differing from mechanical, non-expressive playing which is played by a computer employing consistent timbre and perfectly synchronised onsets. Empirically, it has been observed that different inter-beat and inter-onset rhythmic patterns may alter perceptual experiences (Cano & Beveridge, 2019). However, an empirical exploration of whether micro-expressions, both within and across different instruments, truly influence the vividness of mental imagery has not been conducted yet.

Aims: The aim of the study is to explore whether notable timbral differences across instruments and subtle differences within expressive versus non-expressive playing influence the vividness of mental imagery.

Methods: One hundred participants engaged in a directed mental imagery paradigm, where they imagined a hike towards a mountain while listening to silence or resynthesised versions of a repetitive drumming stimulus from Harner (1990). In seven trials, listeners were presented with three different drums in expressive (through changes in tempo, strike velocity, and drum-hit location) and non-expressive versions, as well as a silence condition. Then, participants were asked to rate their vividness of the imagined content.

Results: Bayesian mixed effects models revealed strong evidence that music enhances vividness of imagery compared to silence. This held for all three drums separately. Furthermore, expressive playing increased vividness compared to non-expressive playing and silence, but there was no difference in vividness between non-expressive playing and silence.

Conclusions: This study demonstrates that music augments imagery vividness in line with previous research (Herff et al., 2021), as well as presents further insights into how timbre and isochronous rhythmic drumming influence this phenomenon. Moreover, our findings indicate that subtle expressive timbral variations within repetitive isochronous rhythmic drums affect imagery vividness more than large-scale timbral differences. Overall, the nuanced interplay of expressive timbral characteristics in music, especially repetitive isochronous drumming, may be pivotal in intensifying the vividness of mental imagery. This effect is particularly relevant for therapeutic techniques that rely on imaginal exposure to diminish responses to anxiety-inducing situations (Mota et al., 2015).

Keywords: Music perception, mental imagery, timbre, rhythm

# Tonal and temporal features explain the normative variations in music perception: Evidence from Eastern instrument players and nonmusicians

**Poulami Kar,** (Center of Behavioural and Cognitive Sciences, University of Allahabad); **Bhoomika R Kar,** (University of Allahabad)

Topic: Music cognition/ neuroscience

Presentation type: Virtual oral presentation

**Background: Music Perception Skills include the ability to detect modulations in tonal and temporal features** namely melody, timbre, tempo, rhythm, pitch, tuning, etc. Not much is understood about how these features contribute to perception of music when people listen to audio clips.

Aims: We examined how nonmusicians and trained musicians rely on these features to perceive music. We also examined how these spectral and temporal features cluster in construction of Music Perception.

Methods: PROMS-S [Law & Zentner, 2012] was employed with subtests for Melody, Tuning, Rhythm, Embedded rhythm, Tempo, Timbre, Accent, and Pitch. Data was collected from 74 participants: 37 musically trained (3-5 years) and 37 nonmusicians. We used a Shapiro-Wilk Test to examine the normality of the eight perceptual features. Principal Component Analysis (PCA) was performed due to the multicollinearity between the eight perceptual features. We also performed a factor analysis to investigate how the features cluster for musicians and nonmusicians. Finally, Pearson's Correlation Analysis was performed to examine the association between music perception and its perceptual features comparing Musicians and Nonmusicians.

Results: Shapiro-Wilk Test showed that across all participants, except for timbre and pitch, all features were normally distributed. Among nonmusicians, all the features were normally distributed, while among musicians, timbre showed ceiling effect. Musicians showed better performance on subtests of melody, tuning, tempo, timbre, and pitch. The sample consisted of 90% eastern (Indian) instrument (Tabla/Sitar/Sarod/Harmonium/Veena) players, most of whom were also vocalists. PCA was performed due to the multicollinearity between the eight perceptual features. PCA [Mackiewicz & Ratajczak, 1993; Jolliffe & Cadima, 2016], performed separately for nonmusicians and musicians, showed that for nonmusicians, maximum information about music perception was obtained from tempo whereas for musicians many features participated significantly in constructing the Principal Component. Factor Analysis showed melody being unique for musicians while tempo is unique for nonmusicians. Uniqueness here define the amount of information that is explained by one variable and not the others.

Conclusions: From our results we can conclude that training showed a significant effect on performance in the subtests of melody, tuning, tempo, timbre, and pitch. The Principal Component of nonmusicians being heavily constructed through tempo suggests that nonmusicians have easier access to tempo which has been suggested to have an universally lower threshold across people in previous studies [Drake & Botte, 1993; Peretz et al. 2009]. For musicians we see greater cohesion across the tonal and temporal features in construction of Principal Component suggesting that training may help in sharpening the understanding of perceptual features of music. The factor analysis confirms that nonmusicians may use tempo as it is an easily accessible feature, and training may allow Musicians to avail features of tonal domain, such as melody. This refers to the idea of Music Perception being a top-down process for musicians while a bottom-up approach for nonmusicians [Kondoh et al. 2021]. We also find through correlation analysis that while listening to an audio clip, musicians depend more on how a musical piece is constructed in sequence through melody, whereas Nonmusicians depend more on how the music progresses in time through embedded rhythm.

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Keywords: music perception, tempo, timbre, PCA

## Simplifying the Analysis, Learning and Memorization of Post-Tonal Piano Music: Main Findings of Testing Conceptual Simplification with Recruited Practitioners

**Laura Farré Rozada,** (Royal Birmingham Conservatoire, Birmingham City University)

Topic: Music information retrieval

Presentation type: Virtual oral presentation

**Background: There is a gap in music performance, education and psychology in terms of memorization** training for post-tonal piano music. Despite the repertoire spanning over 100 years, pedagogues and professionals still lack effective tools for developing this skill (Soares, 2015). Existing research on this domain is mostly focused on observing practitioners' behaviors during practice, to understand how these prepare for a memorized performance of a selected repertoire (Chaffin et al., 2010; Fonte, 2020). However, the resulting Performance Cue Theory that emerges from these studies does not provide a systematic method to assist learning, but instead, explains performers' behaviors to fulfil the given task (Chaffin et al., 2002; Farré Rozada, 2023). Furthermore, other important aspects of memorization, such as the role of sleep for memory consolidation; influential parameters of performance practice, such as the abilities of perfect pitch and sight reading; or the role of emotions have rarely been examined or simply omitted.

Aims: This spoken presentation focuses on the results of testing, extending and formalizing a new method for analysis, learning and memorization of post-tonal piano music, named Conceptual Simplification (Farré Rozada, 2023). This presents a novel implementation to musical memorization of group theory, number theory and geometry; and of paradigms used to optimize algorithm design. Therefore, it builds on mathematics and computer science to improve human memory and musical performance. However, as demonstrated, Conceptual Simplification does not require any previous scientific training to be successfully implemented and works for different learning styles and types of complexity.

Method: Conceptual Simplification is tested through a series of studies with practitioners, who range from conservatoire piano students to international performers, including observation and analysis of the author's own performing practice. The repertoire featured involves existing post-tonal and commissioned works.

Results: From testing the parameters of perfect pitch, synesthesia, sight-reading, emotions, sleep, mental practice, complexity and expertise; the most influential parameters for memorization identified are perfect pitch, sight-reading, sleep and complexity. Additionally, a formal definition for complexity is formulated. Similarly, after testing different practice and performance strategies, the most effective strategies for memorization identified are simplifying strategies and conceptual encoding strategies, included in Conceptual Simplification. Finally, it is also revealed the positive role of mental practice for coping with performance anxiety and self-sabotage

Conclusions: Although the scope of these studies was limited to testing Conceptual Simplification for post-tonal piano music, this method could be adapted to other instrumentalists, singers and conductors; and musical genres. More ambitious applications might involve non-musical domains, since Conceptual Simplification essentially scaffolds complexity, proceeding in a non-linear manner and avoiding time-consuming procedures. The method also presents enough flexibility for other practitioners to incorporate additional strategies, adapting it to their needs accordingly. Finally, Conceptual Simplification also indicates promising additional benefits. Concretely, in preventing performance anxiety through greater confidence and reducing the potential for injuries that usually result from repeated practice. Conceptual Simplification's systematic approach toward engaging conceptual memory and reasoning leads to more confident memorized performances, while needing less repetition during practice.

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Keywords: analysis, learning, memorisation, method, post-tonal piano music.

# Session 4.2 - Online

## Establishing a Stimulus Set of Happy and Sad Bollywood Soundtracks for Emotion Research

**Bhavya Dixit,** (Department of Psychology, Ashoka University, India);
**Kashish Janiani,** (Department of Psychology, Ashoka University, India);
**Swathi Swaminathan,** (Department of Psychology, Ashoka University)

Topic: Music perception

Presentation type: Virtual oral presentation

**Background: In the last two decades, researchers have developed several stimulus sets for studying emotion** processes using Western forms of music, typically with participants from Western parts of the world. There continues to be a scientific need for developing and validating non-Western stimulus sets to expand music and emotion research.

Aims: One widely-used stimulus set contains excerpts of Hollywood soundtracks (Vuoskoski et al., 2012). The primary aim of the present study was to develop a non-Western equivalent using excerpts of Bollywood soundtracks that receive consistent emotion ratings from a sample of Indian participants. Another aim was to study the consistency of Indian listeners' emotion ratings to the Hollywood soundtrack excerpts from the Vuoskoski et al. (2012) stimulus set.

Methods: We selected 16 Bollywood soundtrack excerpts that were 35-45s long. 8 of these were selected from 'happy' scenes and 8 from 'sad' scenes in Bollywood movies, with 4 vocal and 4 instrumental pieces in each category. Through an online listening study, we collected 154 urban, English-speaking Indian listeners' perceived and felt emotion ratings to the selected Bollywood soundtrack excerpts, and the 4 happy and 4 sad Hollywood soundtrack excerpts from Vuoskoski et al. (2012). Participants were randomly assigned to rate excerpts along discrete emotions (Happiness, Sadness, Peace, Fear, Anger) or dimensional components of emotion (Valence, Energy-Arousal) on 7-point unipolar and bipolar Likert scales, respectively.

Results:We calculated Cronbach's alpha on emotion ratings to examine consistency across raters. Generally, participants were highly consistent in their ratings (alphas > .97) across happy or sad songs from the Bollywood or Hollywood databases, and across felt and perceived discrete and dimensional emotions. Felt emotion ratings were strongly and positively correlated with perceived emotion ratings. Moreover, all pieces elicited ratings that matched with the correct target emotions at above-chance levels.

Conclusions: Both Bollywood and Hollywood stimulus sets used in this study produced consistent and valid ratings across a sample of urban Indian listeners. This suggests that the Bollywood stimulus set could be used to study emotion processing in Indian and comparative contexts. Additionally, the present study validates the Hollywood stimuli for use in non-Western contexts.

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Keywords: music, emotion, diversity, research methods

# Exploring the in-group advantage in emotion recognition in culturally-familiar music and the moderating influences of individual differences

**Menglan Lyu,** (School of Arts and Creative Technologies, University of York, York, United Kingdom)**; Mimi O'Neill,** (School of Arts and Creative Technologies, University of York, York, United Kingdom)**; Hauke Egermann,** (Musikwissenschaftliches Institut, Universität zu Köln, Köln, Germany)

Topic: Music perception

Presentation type: Virtual oral presentation

**Background: Previous studies have demonstrated an in-group advantage for listeners in recognising** emotions expressed in music when the music aligns with their cultural background (Balkwill & Thompson, 1999). However, recent evidence highlights an emotion-specific advantage for different cultures instead of an overall in-group advantage. Previous studies on music and emotion have suggested the influence of individual differences on the recognition of emotions in music. However, these factors are often not adequately considered in the investigation of this issue in a cross-cultural context, despite suggestions that cultural differences need to be interpreted with consideration of individual differences.

Aims: The first aim of this study was to investigate whether the previously found emotion-specific advantage for different cultures can be replicated. This study also aimed to explore moderating factors in the relationship between cultural background and music emotion recognition, including gender, musical expertise, current mood, familiarity and preference for specific musical stimuli, and general preferences for musical genres.

Methods: Data collected from 246 Chinese and 225 Westerners, were analysed. Participants were asked to listen to 18 previously tested Chinese and Western music stimuli, and rate the degree to which they thought the music expressed each of the five target emotions (happiness, sadness, peacefulness, anger, and fear), and their familiarity and preference for the music stimuli, on continuous scales ranging from 1 to 5. Participants also completed the International Positive and Negative Affect Schedule Short Form, and the Short Test of Music Preferences.

Results: Mixed ANOVA showed a cultural advantage for the Western participants in the recognition of fear in both Chinese and Western music, partially aligning with previous findings. Additionally, there was no gender difference, but there was an evident advantage for professional musicians compared to non- and amateur musicians. Correlation analysis showed that familiarity and preference were both associated with the recognition of musically expressed emotions. Further moderation analysis also indicated the moderating effects of negative affect and preferences for musical genres on emotion recognition sensitivity.

Conclusions: Similar to the previous study, an overall in-group advantage was not established but a cultural advantage for the Western listeners in the recognition of fear was observed. The moderating effects of the tested factors on the recognition of musically expressed emotions highlight the importance of considering individual differences in cross-cultural studies on music emotion recognition.

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Keywords: Moderators, cultural background, music emotion recognition

# Testing theories of cross-cultural communication of emotion in music performance: Cultural-familiarity, language-variation, and stereotyping

**Yue You,** (The University of Sheffield); **Renee Timmers,** (The University of Sheffield)

Topic: Performance
Presentation type: Virtual oral presentation

**Background: To understand cross-cultural communication of emotion in music, three theories have been** proposed: 1) Cultural distance and dialect (Laukka & Elfenbein, 2020); 2) Linguistic influences (Quinto et al., 2013); and 3) Stereotype theory (Susino & Schubert, 2019). The first proposes that listeners have an advantage perceiving emotion in culturally familiar or similar music, due to shared psychoacoustic cues. The second proposes that language-based differences influence the use of cues in emotion expression and recognition. The third predicts that stereotype views a listener may hold bias the perception of emotions in less familiar music.

Aim: The aim of this research is to investigate and compare the influence of these three sources of variation on communication in music performances. To do so, this paper formulates main predictions and methods to investigate these influences of cultural familiarity, language and stereotype views.

Methods: Three empirical cross-cultural research studies are proposed to investigate predictions from the three theories. The studies plan to compare performers and listeners from China and the UK, including participants with varying degrees of exposure to another culture. Research studies will collect quantitative data, complemented by open-ended questions to obtain qualitative insights. Study 1: This study tests Theory 1. Violinists from China and the UK will be asked to play simple folk music composed in pentatonic scale with six emotions (sad, angry, fear, joy, calmness and love). These performances will be presented in audio format to listeners who are asked to identify the emotion expressed. Emotion recognition accuracy will be measured, predicting an in-group emotion recognition advantage. Study 2: This study investigates Theory 2 and will examine the cues used to express emotion in violin performance. It will analyse the data collected in Study 1. These include emotion, speech and other cues not directly related to performers' emotional expression. Acoustic properties of the performances will be extracted using Matlab MIRToolbox. The relationships between these cues and the perception and expression of emotion will be analysed. The relevance of linguistic cues such as nPVI will be tested. Study 3: This study examines Theory 3 to explore how visual and performer information (e.g., race, gender) can bias emotion perception through stereotype activation. Identical to Study 1, except that the performances will be presented to listeners in the audio & visual format. The results of Study 3 will be compared to Study 1 (i.e., audio-only format) to examine the influence of communication channels on emotion perception. Analysis will include the influence of different communication channels and how demographic details may bias and influence the perception of emotions conveyed in performances.

Results: As this study is still in the design stage, the presentation will focus on introducing research background and methods. Each theory offers one main prediction: The first predicts better communication among those sharing a cultural background. The second predicts that language characteristics influence cues informing production and perception of emotion.The third predicts a stronger cultural effect if visual or biographical information is included due to cultural stereotyping.

Conclusion: This study systematically investigates different sources of variation in expressive communication between performers and listeners from different cultural and linguistic backgrounds. This will enhance understanding of successful cross-cultural communication and generate insight into where potential barriers may occur and how these could be overcome. This has relevance for music education, including employing variation purposefully for creative purposes.

Keywords: Cross-culture, Emotional communication, Music Performance, Language and music, Stereotype

# Session 5.1 - Music and Movement

## How EDM Moves Us: Preliminary data from a mock-up club study

**James Cannon,** (University of Leeds); **Alinka Greasley,** (University of Leeds); **Alice O'Grady,** (University of Leeds)

Topic: Music cognition / neuroscience
Presentation type: Live oral presentation

**Background: Research into lived experiences of electronic dance music (EDM) participation show EDM events** foster connectedness with others (Cannon & Greasley, 2021). However, there is a lack of empirical research into the facets of EDM events that underpin this. EDM is characterised by rhythmic properties that promote sensorimotor entrainment to the beat. This has been shown to facilitate interpersonal synchronisation, which is positively related with social bonding (Tarr et al. 2016). Entrainment to the repetitive beat facilitates continuous, embodied pleasure and conveying pleasure through movement may lead to a powerful collective emotional experience via emotional contagion (Witek, 2017). Despite the potential for affective and interpersonal synchrony to foster connectedness, the extent to which affective experiences and synchronised movement are related in an EDM context and the degree to which these experiences contribute to social bonding have yet to be systematically examined.

Aim(s): This pilot study aimed to 1. Explore affective experiences afforded by attendance at an EDM event 2. Investigate relationships between movement and affective experiences on the dancefloor 3. Investigate relationships between social bonding and movement/affective experiences

Methods: Participants (n = 5) danced to a pre-recorded DJ set in a mock-up club environment (a dark performance studio with dynamic lighting and music) on a university campus for 30 minutes while fitted with an Empatica E4 wrist-worn accelerometer measuring movement on 3-axis. Participants completed a social bonding survey before and after the dance session measuring connectedness, likeability, similarity in personality and closeness with group. The post-session survey also included measures of affective experiences, including 'distributed embodied pleasure' and emotional contagion, and other extraneous factors.

Results: Preliminary analysis at the descriptive level shows participants experienced distributed, embodied pleasure during the event. Participants overall social bonding scores increased from pre-event (M = 12.40, SD = 2.70) to post-event (M = 15.40, SD = 3.29). Fourier transformations applied to participants' pre-processed accelerometer signals revealed a dominant movement frequency, aligning closely with the average beats per minute (BPM) of the DJ set, indicating participants' synchronisation with the rhythmic tempo throughout the dance session. Calculation of entrainment values that represent that degree to which participants were entrained at the half-time, normal time and double-time tempo are underway. Subsequent correlational analysis between these values and scores on affective experiences and social bonding scales is expected to show a positive relationship between degree of entrainment/interpersonal synchrony and pleasure/social bonding.

Conclusions: This preliminary research has potential to provide new insights into how EDM events facilitate social bonding through shared embodied and affective experiences. Initial results indicate EDM events may facilitate connectedness through shared affective experiences. Analysis to determine the extent to which entrainment and interpersonal synchrony contributes to affective experience and bonding is ongoing. Follow-up studies using a larger sample size are planned and aim to further uncover the links between movement, emotion, and social bonding. This data may be utilised by the nightlife industry, unveiling the processes underlying lived experiences of EDM participation that bear significant value for culture, communities, and well-being (Cannon & Theodore, 2022).

References: Cannon, J. W., & Greasley, A. E. (2021). Exploring Relationships Between Electronic Dance Music Event Participation and Well-being. Music & Science, 4(1), 1-17. Cannon, J. & Theodore, T. (2022). Dance Music's Impact on Communities and Culture. https://www.doi.org/10.13140/RG.2.2.12386.61126. Tarr, B., Launay, J., & Dunbar, R. I. (2016). Silent disco: dancing in synchrony leads to elevated pain thresholds and social closeness. Evolution and Human Behavior, 37(5), 343-349. Witek, M. A. (2017). Filling in: Syncopation, pleasure and distributed embodiment in groove. Music Analysis, 36(1), 138-160.

Keywords: Entrainment, Electronic Dance Music, Social Bonding, Emotion, Synchrony

## Individual differences in groove: empathy, music experience, and dance experience

**Riya Sidhu,** (Western University)

Topic: Music perception

Presentation type: Live oral presentation

**Background: Empathy, the sharing and understanding of another's emotions, has been associated with music** evoked emotions and greater interpersonal synchrony, and empathy may also be related to moving along with music. Participants higher in empathy are faster than low empathy participants at entraining their movements to music and report higher pleasure when doing so (Bamford & Davidson, 2019). Further, empathy predicts spontaneous movement to music (Zelechwoska et al., 2020), and, as the desire to move to music is an important constituent of groove, one may expect empathy to be associated with groove.

Aims: The current study investigated how the experience of groove was affected by individual differences, specifically trait empathy, music training, and dance training. We also examined groove experience for different movement types (tap, move, and dance), to examine interactions between the type of movement that was rated and individual background.

Methods: Participants (n = 184) completed listened online to 40 music clips and rated them on desire to tap, desire to move, desire to dance, liking, and familiarity. Participants also completed the Toronto Empathy Questionnaire (TEQ), the Interpersonal Reactivity Index (IRI), the Barcelona Music Reward Questionnaire (BMRQ), the Gold-Musical Sophistication Index (Gold-MSI), and the Gold-Dance Sophistication Index (Gold-DSI). Individual difference scores and ratings were used as predictors of the tap, move, and dance ratings.

Results: A principal component analysis was completed first to reduce the number of predictors, yielding 4 orthogonal factors. Factor 1 consisted of high weights on empathy scores (IRI empathic concern and perspective taking subscales, TEQ score, and the BMRQ musical reward subscale). Factor 2 primarily consisted of dance experience (Gold-DSI general score, Gold-DSI dance training subscale, and BMRQ sensory-motor subscale). Factor 3 primarily consisted of music experience (Gold-MSI general score, Gold-MSI training subscale, and the BMRQ social reward subscale). Lastly, factor 4 consisted of liking and familiarity ratings and the IRI personal distress subscale). Linear regressions were conducted with the 4 factors as predictors for the three groove movement ratings. For all three movement ratings, empathy was not a significant predictor. For desire to move and desire to dance ratings, dance experience was a significant predictor, while for desire to tap ratings, music experience was a significant predictor. Factor 4 was also a significant predictor for all three rating types.

Conclusions: The current study found no evidence for an association between empathy and perceived groove. Music and dance experience both predicted groove ratings, but for different types of movements. Future groove studies should consider the type of movement that is rated as different patterns of results may arise based on the movement asked about.

Keywords: groove, movement, music training, dance training

## Being Musically Moved

**Abbigail Fleckenstein,** (University of Olso; RITMO Centre); **Jonna Vuoskoski,** (University of Oslo; RITMO Centre); **Suvi Saarikallio,** (University of Jyväskylä)

Topic: Music sociology

Presentation type: Live oral presentation

**Background: Ongoing empirical evaluation of the feeling of 'being moved' has laid the foundation for** understanding the elicitors of being moved, its emotional and physiological correlates, and potential prosocial action tendencies associated with the experience (Cova & Deonna, 2014; Hänninen & Koski-Jännes, 2023; Kuehnast et al., 2014; Menninghaus et al., 2015, Schindler et al., 2022). Among the various elicitors, music and the experience of artistic beauty have been identified as triggering the emotion (Hänninen & Koski-Jännes, 2023; Menninghaus et al., 2015). 'Being moved' may be conceptualized according to moral, communal, and/or value related standards and may differ in their subsequent behavioral responses, or action tendencies according to these standards (Landmann, et al., 2019). For example, if experienced as a moral or communal emotion, being moved may motivate individuals to engage in prosocial other-focused action intentions. Alternatively, if experienced as a value emotion, being moved may motivate individuals to engage in positive self-focused action intentions (Landmann, et al., 2019). The conceptualization of 'being moved' in these ways is interesting particularly concerning artistic beauty as an elicitor of the emotion. Often understood as a value (Gotshalk, 1935), beauty ratings of musical excerpts have been shown in previous studies (Vuoskoski & Eerola, 2017; Vuoskoski et al., 2022) to be positively correlated with quantitative ratings of being moved. While empirical evaluation of moving musical experiences has received increased attention (see Hanser et al., 2022; Swarbrick & Vuoskoski, 2023; Vuoskoski & Eerola, 2017; Vuoskoski et al., 2022) a qualitative evaluation of the experiences eliciting this emotion has yet to be conducted. As a result, it is not yet known how listeners subjectively conceive of moving experiences evoked by music, how this experience relates to aesthetic values such as beauty, or whether these experiences could be better conceptualized as moral, communal or value emotions.

Aims: This project aims to qualify musical experiences considered to be moving or beautiful by identifying the music/musical events eliciting the experience, emotional correlates experienced, and potential action tendencies resulting from these experiences.

Methods: The project implements a mixed methods approach. Data collection is ongoing consisting of an online questionnaire (target n= 220) collecting open-ended responses of music listening experiences considered to be moving or beautiful, and scale-rating responses adapted from AESTHEMOS (Schindler et al., 2017) and KAMMUS Two (Zickfeld et al., 2018) questionnaires to gain additional information about the emotional correlates as well as the action tendencies associated with these experiences.

Expected Results: Open-ended responses will be analyzed using template analysis, a type of thematic analysis. It is anticipated that affective ratings of music considered to be moving will be correlated with both positive and negative valenced emotions (Schindler et al., 2022).

Conclusions: Findings from this project seek to contribute to ongoing empirical evaluation of the experience of being moved by deepening understanding of its emotional correlates and action tendencies in musical contexts. Future directions for similar research on the topic will also be discussed.

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Keywords: Music Listening; Being Moved; Beauty

# Session 5.2 - Therapy and Health

## Face the Music: Piloting a Study on Clinical Improvisation

**Nandhini Natarajan,** (Centre of Excellence in Music, Mind, Body, & Brain, University of Jyvaskylä); **Iballa Burunat-Perez,** (Centre of Excellence in Music, Mind, Body, & Brain, University of Jyvaskylä); **Esa Ala-Ruona,** (Centre of Excellence in Music, Mind, Body, & Brain, University of Jyvaskylä)

Topic: Music therapy

Presentation type: Live oral presentation

**Background: The neuroscientific mechanisms of musical improvisations have often been studied in the** context of creativity (for reviews: Loui, 2018; Beaty, 2015). Prior studies employing EEG have found increased spectral power in the alpha, beta, and theta frequency bands, primarily localized in various regions of the frontal cortex, the superior temporal gyrus, inferior parietal lobule, and temporal-parietal junction, during improvisational music compared to playing scales (Sasaki et al., 2019). Differences in the activities of these bands may indicate a unique neural state during improvisation. Additionally, classification of emotional states using EEG data has been shown to be possible (Pousson et al., 2021; Hsu et al., 2017). Many music therapy modalities and music based interventions also use improvisation to improve the health and well being of clinical and non-clinical populations (Diaz- Abrahan et al., 2019; Albornoz, 2011; Pothoulaki et al., 2012; Erkkilä et al., 2011; Geretsegger et al., 2012). Improvisation forms a core component of many models of psychodynamic music therapy which utilise the client's expression through music or words and the therapist's response either musically, through mirroring, matching, accompanying or frameworking, or without music, respectively (Kim, 2016). Despite the existing use of EEG to study music-evoked emotions during passive music listening, it is important to highlight that there is a notable gap in the literature regarding the examination of emotional changes resulting from improvisation or active music-making. Consequently, the underlying brain mechanisms responsible for the positive therapeutic effects of improvisation remain unclear.

Aim: To examine how musical improvisation, compared to non-improvisational playing (sight reading) affects the emotional state and brain activities of musicians and non-musicians.

Methods: 2 pilot participants (musicians) played 6 five minute alternating trials of the two conditions (improvisation and sight reading) on a keyboard. The improvisation was based on the prompts: "play how you feel" or "express yourself through music" and sight-reading was done using Figurenotes: http://www.figurenotes.com/ which is based on a colour matching system, enabling non-musicians to 'sight read'.

Results: No significant differences in the valence and arousal ratings were found between the two task conditions in both participants.

Discussion: More data needs to be collected to understand the differences in emotional states between the two conditions. Additionally, constructs apart from valence and arousal, that could potentially be more therapeutically relevant, could be considered as an outcome to measure the differences in emotional states.

References Loui, P. (2018). Rapid and flexible creativity in musical improvisation: review and a model. Annals of the New York Academy of Sciences, 1423(1), 138-145. Beaty, R. E. (2015). The neuroscience of musical improvisation. Neuroscience & Biobehavioral Reviews, 51, 108-117. Pousson, J. E., Voicikas, A., Bernhofs, V., Pipinis, E., Burmistrova, L., Lin, Y. P., & Griškova-Bulanova, I. (2021). Spectral characteristics of eeg during active emotional musical performance. Sensors, 21(22), 7466. Ghodousi, M., Pousson, J. E., Voicikas, A., Bernhofs, V., Pipinis, E., Tarailis, P., Burmistrova, L., Lin, Y., & Griškova-Bulanova, I. (2022). EEG Connectivity during Active Emotional Musical Performance. Sensors, 22(11), 4064.



Keywords: improvisation, active music making, integrative improvisational music therapy

# A Case Study of Music Therapy Rehabilitation Process of a Young Intellectually Disabled Man with Fear of Falling

**Jaana Ruotsalainen,** (University of Jyväskylä, Department of music, art and culture)

Topic: Music therapy

Presentation type: Live oral presentation

**Background: Fear of falling (FoF) has been studied in the elderly and patients with neurological disorders,** but previous case studies have not included younger participants with intellectual disabilities (ID). The current case study reports the effective use of music to reduce anxiety, improved functional ability of an young adult male with ID who could no longer walk unassisted due to severe FoF. In traditional physiotherapy, he did not achieve his goal to take two unassisted steps. However, when music therapy techniques were included within physiotherapy sessions conducted by the first author, the patient was able to take 82 unassisted steps by the 5th session, and up to 197 unassisted steps by the 9th session.

Aims: 1) To recognize essential factors contributing to the therapy. 2) To observe in the videos patient's behaviour relating to the therapeutic elements (rhythm, singing etc.). 3) To discuss the role of music in the patient's rehabilitation.

Method: The study includes qualitative and quantitative analysis of data from the therapy sessions. The qualitative part of the report is based on the notes, observations and self-reflections of each session written by the therapist. The videoclips of tasks were described and analyzed as quantitative data. The author defined her variables to measure in the rehabilitation process, the modified annotation protocol and tools for analysis of therapeutic interactions developed by Spiro and Himberg (2016).

Results: The key factors were the positive atmosphere supporting the patient's courage and the mutual trust between the therapist and the patient. The patient was encouraged with verbal and bodily expressions of the therapist. 1) The patient appeared to appreciate the therapist's attitude, in giving him cognitive information as for an adult, rather than talking down to him as a person with ID 2) The patient seemed to forget anxiety while concentrating on acting with the ball, not needing any music. The videos showed that the use of items, like a ball, beanbag, or tambourine related to low nervous reactions and high time moving without support. Additionally, low nervous reactions (between 0.6% – 10%) related to high verbal guidance (over 48% of the time). 3) The preferred songs provided motivation to move and therapist's singing gave him the safe background for training.

Conclusions: The concept of emotional self-regulation by calming effect of singing, rhythmic reciting combined in motor performing and increased cognitive knowledge of functions of own body, provided a theoretical framework and a point of comparison for the empirically constructed understanding.

References: Spiro, N., & Himberg, T. (2016). Analysing change in music therapy interactions of children with communication difficulties. Philosophical Transactions of the Royal Society B: Biological Sciences, 371(1693), 20150374.

Keywords: music, multi-disciplinary therapy, anxiety for moving, ID person, self-competence, body awareness, singing, reciting

# Primary prevention of physical diseases through music-based health communication: Towards wider utilization of music – An integrative review

**Hannele Partanen,** (University of Jyväskylä)

Topic: Music and well-being

Presentation type: Live oral presentation

**Background: Health is an important value and one creator of wellbeing for both the individual and society.** Health promotion is not solely responsible of health care and therefore it is important to research what kind of approaches and meanings music can offer. This research approached prevenAve health promotion from a primary prevenAve level, focusing on action before physical diseases occur. Previous studies have shown that songs can be an effective health communication strategy (Cournoyer Lemaire, 2020, p. 479; Sheffield & Irons, 2021, p. 288). However, this perspective has been almost completely ignored in music-wellbeing research, especially in the Nordic countries.

Aims: The aim was to produce knowledge about primary preventive musical health promotion and its development so that it can be used in the future when planning different methods to promote the health of the population. Three research questions were: 1) What is currently known about the using music in health communication for the primary prevention of physical health and wellbeing? 2) By what mechanisms could musical emotion influence health choices and behavior? 3) What kind of musical health communication could be useful in thinking about preventive health choices made by Nordic adults?

Methods: An integrative review was conducted. An electronic databases search was conducted for the years from 2008-2024. Data was collected from the Music Periodicals Database (ProQuest), Scopus, PsycINFO, PubMed (Medline), and FINNA – databases in two separate searches (February 2024 and April 2024). The data was supplemented by a manual search. The search terms were formed based on test searches. The search was carried out systematically based on pretermitted inclusion and exclusion criteria. The quality of the included studies was evaluated.

Implications: Results: 24 studies of the 779 search results met inclusion criteria. The phenomenon of music-based primary prevention of physical diseases came out versatile and extensive. Music is used in different ways for different target groups and communication is carried out by a wide variety of agents. Study results also suggest that many different emotions arise and are present in music-based health communication. However, little is still known about how emotions work in these interventions. This study also identified several learning points from the world that can be utilized when planning, implementing, and evaluating an intervention in, for example, the Nordic countries.

Conclusion: Findings support that music is a valuable resource in the primary prevention of physical diseases. This study suggests, that when music is used in health communication intervention, music should be considered at every stage of the intervention. Numerous research targets are emerging from the phenomenon, and it is important to bring the research into the Nordic context. This study also showed that in musicology, the concept of primary prevention fits well to describe a situation where a disease is prevented before it occurs. Relevance to clinical practice: Research results can be used when planning different methods to promote the health of the population.

This master's thesis will be published in summer 2024.

References: Cournoyer Lemaire, E. (2020). Extraordinary times call for extraordinary measures: The use of music to communicate public health recommendations against the spread of COVID-19. Canadian Journal of Public Health, 111(4), 477–479. https://doi.org/10.17269/s41997- 020-00379-2. Sheffield, D., & Irons, J. Y. (2021). Songs for health education and promotion: A systematic review with recommendations. Public Health, 198, 280–289. https://doi.org/10.1016/j.puhe.2021.07.020



Keywords: music, promoting wellbeing, prevention, health communication, emotions

# Session 6.1 - Musicking

## “They may struggle like me!”: A qualitative exploration of participants’ social perceptions during experiments involving musical interactions with virtual partners

**Persefoni Tzanaki,** (University of Sheffield)

Topic: Music sociology

Presentation type: Live oral presentation

**Background: Interpersonal synchrony, the coordination of movements among individuals, has garnered** significant attention for its positive impact on social cohesion (Rabinowitch, 2023). While efforts have been made to understand the mechanisms underlying these effects, the role of individuals' social perceptions in the experience of bonding following synchronous musical interactions remains unexplored. To address this gap, our study adopted a mixed-methods approach, engaging participants in lab-based musical interactions with virtual partners and qualitatively exploring their thought processes during the study via interviews. This presentation primarily focuses on the qualitative aspects of the study.

Aims: The interviews aimed to identify mental states that participants attributed to their virtual partners during their musical interactions and explore how these attributions influenced the social bonding effects of synchrony.

Methods: Eighty adult participants (54 identifying as female) completed two online tasks in random order. In Task 1, participants tapped along with the beat of background music while listening to tapping sequences from ostensible participants. For Task 2, individuals watched videos of two stick figures walking to music while being instructed to imagine themselves as one of the figures and the other figure as an unknown partner (Stupacher et al., 2022). Unbeknown to participants, the tapping sequences in Task 1 and the “other”-figure’s walking in Task 2 were manipulated to exhibit four synchrony conditions: a) synchronous and in-phase with the beat of the music; b) synchronous, anti-phase; c) jittered in-phase; and d) jittered anti-phase. Following the tasks, participants completed a 10-minute interview, describing their thoughts on the study and their feelings toward their virtual partners.

Results: A thematic analysis revealed four themes: 1) Less pronounced asynchrony fostered compassion, being perceived as partners making an effort to synchronise. Conversely, significant deviations amplified social disconnection. 2) The type of task influenced differently the perception of synchrony and its social bonding. Tapping with a partner led to more rigid social perceptions when they were not synchronised, whereas the stick-figure task allowed for more walking behaviours to be perceived as synchronous. 3) Participants attributed mental states to their partners as a way to justify their asynchronous behaviour. This process facilitated bonding even when synchrony was not achieved. 4) Insufficient information about partners' backgrounds and personalities, or the absence of physical presence, presented challenges to the social bonding experience for some participants.

Conclusion: To our knowledge, this is the first study adopting a mixed-methods approach to explore the bonding effects of synchrony. The themes provided important insights into the role of participants’ cognitive processes and conceptualisations in lab-based experiments. The findings suggest that the synchrony-bonding link is not solely stimulus-driven. Instead, a combination of bottom-up (here, partner’s temporal behaviour) and top-down processes, including mental attributions affected by individual characteristics and the type of engagement in musical interactions, influence the social outcomes of synchrony. In conclusion, the study advocates for integrating mixed-methods approaches in future research endeavours to gain a more comprehensive understanding of synchrony and its social role in musical contexts.

Keywords: interpersonal synchrony, social bonding, social perceptions, mixed-methods

# Integrating Voluntary Musical Imagery in Music Practice: A Review

**Chen Meng,** (Centre of Excellence in Music, Mind, Body and Brain, University of Jyväskylä, Jyväskylä, Finland; Art College, Shandong University of Science and Technology, Qingdao, China); **Geoff Luck,** (Centre of Excellence in Music, Mind, Body and Brain, University of Jyväskylä, Jyväskylä, Finland)

Topic: Music education

Presentation type: Live oral presentation

**Background: Practice has been identified as a crucial facilitator for musicians to achieve performance** excellence (Ericsson, 1996). Within the rich literature on improving performance levels, scholars have revealed the significance of incorporating musical imagery strategies into one's practice regimen (Clark et al., 2014). Despite the recognized potential of applying voluntary musical imagery (VMI) in enhancing musical learning and performance, research questions of what voluntary musical imagery is, why it might support musicianship enhancement, and how it can be applied effectively have largely been fragmented in the field.

Aims: The aims of this review are threefold. First, we enrich the interpretation of VMI in the context of music practice. Second, we summarize findings on how deliberate use of musical imagery parallels physical practice through the lens of neural functional equivalence. Third, we synthesize work on the application of VMI in enhancing musical learning from both theoretical and practical perspectives.

Main Contribution: The main contribution of this paper lies in its holistic synthesis of literature regarding the multimodal aspects of voluntary musical imagery in music practice research. We reinterpreted VMI, which is not merely a mental rehearsal of music but an embodied phenomenon where imagery and bodily processes are deeply interconnected. This view is supported by the evidence of neural equivalence, showing overlapping and correlated brain activity during the imagination, perception, and physical execution of music (Zatorre et al., 1996). Furthermore, the empirical studies of applying VMI in deliberate practice, self-regulated learning (SRL), and mental practice have demonstrated its utility in enhancing musical practice both mentally and physically (Brown & Palmer, 2013).

Implications: By synthesizing existing research on the phenomenal description, neural mechanisms, and practical applications of voluntary musical imagery in music practice, our review highlighted the crucial implications of VMI for researchers, performers, and music educators. Additionally, we discovered significant gaps in the exploration of VMI and encouraged further research within three critical areas: explore the impact of embodied experiences on VMI formation, investigate the optimal imagery content and ratio combination to establish a personalized intervention protocol for more effective musical pedagogy, and advance the measurement from a physiological perspective.

Reference: Brown, R. M., & Palmer, C. (2013). Auditory and motor imagery modulate learning in m usic performance. Frontiers in Human Neuroscience, 7. https://doi.org/10.3389/fnhum.2 013.00320. Clark, T., Lisboa, T., & Williamon, A. (2014). An investigation into musicians' thoughts a nd perceptions during performance. Research Studies in Music Education, 36 (1), 19– 37. https://doi.org/10.1177/1321103X14523531. Ericsson, K. A. (Ed.). (1996). The Road To Excellence. Psychology Press. https://doi.org/1 0.4324/9781315805948. Zatorre, R. J., Halpern, A. R., Perry, D. W., Meyer, E., & Evans, A. C. (1996). Hearing i n the Mind's Ear: A PET Investigation of Musical Imagery and Perception. Journal o f Cognitive Neuroscience, 8(1), 29–46. https://doi.org/10.1162/jocn.1996.8.1.29

Keywords: musical imagery, voluntary musical imagery, music practice

# Session 6.2 - Music and Neuroscience

## Measuring the brain response to music and speech using EEG: A pilot study

**Victoria Norris,** (School of Biomedical Engineering, Faculty of Engineering, The University of Sydney, Australia); **Alistair McEwan,** (School of Biomedical Engineering, Faculty of Engineering, The University of Sydney, Australia); **Petra Karlsson,** (Cerebral Palsy Alliance, The Children's Hospital at Westmead Clinical School, Faculty of Medicine and Health, The University of Sydney, Australia.); **Leanne Togher,** ( Sydney School of Health Sciences, Faculty of Medicine and Health, The University of Sydney)

Topic: Music cognition/ neuroscience

Presentation type: Live Oral Presentation

**Background: Across the different stages of our lives, from infancy [1], [2], [3], [4], [5] to senior years [6],** engagement with music has been shown to have a beneficial effect on mental well-being and overall quality of life. Understanding more about how the brain responds to auditory stimuli such as music and speech may inform treatments involving music therapy for patients. Electroencephalography (EEG) is a measure of electrical brain activity over time which typically involves extensive preparation of electrodes and wires [7], and can be costly to use in research. The development of commercially available wireless EEG headsets has made EEG experiments more accessible [8], [9], [10], [11]. Though these headsets have lesser signal quality than clinical research-grade EEG, if the utility and limitations can be defined, then it may be a suitable technology to be used in research. Wireless dry EEG also has potential to be used conjunctively with interventions involving music and speech as a feedback measurement for the effectiveness of the therapy. This pilot study sought to determine whether accurate responses to music and speech sounds could be measured with wireless EEG.

Aims: 1) Measure the brain response to a music stimulus with variation in rhythm using EEG. 2) Investigate EEG activity for a speech stimulus. 3) Compare research-grade clinical EEG to wireless EEG technology for measuring these responses.

Methods: We recorded EEG during baseline rest state, and listening to three auditory stimuli (metronome, music and speech) for 12 healthy adult participants, using a wireless EEG (Emotiv EPOC+ headset) and a research-grade EEG (Electro-cap with g.tec USBamp.research). There were seven participants for each system (two participants had recordings done from both systems). The EEG power spectraldensity (PSD) was analysed to investigate differences in brain activity related to listening to metronome, music and speech stimuli compared to baseline rest state. PSD amplitude at the musical beat frequency (6Hz, corresponding to musical bpm of 360), alpha power, and ratios alpha/theta and alpha/gamma were extracted. Friedman Chi square test and Wilcoxon signed rank test was performed to find difference in PSD measures between the conditions (rest, metronome, music, speech). Mann Whitney U test was performed to find difference in PSD measures between the EEG systems. It was expected that the music stimulus would produce an auditory steady-state response (ASSR) at the musical beat frequency, visible as a peak in the power spectral density, as in [12], while the other conditions of rest, metronome and speech would not produce this response.

Results: There was no distinguishable ASSR to the music chosen for this study visible in the PSD, compared with silence, listening to speech or a metronome stimulus. Statistical tests revealed a significant difference in the alpha power between music compared to rest, and speech compared to rest. Statistical testing also revealed significant differences between the EEG systems.

Conclusions: These unexpected results highlight a need for further investigation using different musical stimuli for recording the ASSR and more robust EEG methods to compare wireless and research-grade systems.

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Keywords: EEG, Music, Brain, Speech

## EEG Investigation of Content and Timing Predictions in Music and Speech: A Novel Methodological Approach

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Topic: Music cognition/ neuroscience

Presentation type: Live oral presentation

**Background: Prediction is a fundamental aspect of cognition that allows for anticipation of the content** ("what" will occur) and timing ("when" will it occur) of upcoming events. However, it is unclear how the brain generates and integrates these predictions, and whether these processes operate similarly across domains.

Aims: The current project aims to develop a stimulus set that is well matched across music and speech, enabling a within-participant investigation of interactions between timing and content predictions in both domains. These stimuli will be used in experiments that combine EEG recordings with behavioural ratings and computational predictability estimates.

Methods: Experimental stimuli consist of melodies and sentences matched in note/word count that were designed to generate strong predictions for the final note/word. Content and timing manipulations were performed identically and in parallel across music and speech to facilitate cross-domain comparisons. Content in melodies and sentences was altered such that the ending note or word was either predictable or unpredictable based on the preceding context. The stimuli were designed so that an identical word/note would be either predictable or unpredictable depending on the context, ensuring comparable acoustic input for EEG analysis. The predictability of final notes and words was validated through computational models (IDyOM for melodies, GPT-2 for sentences). Timing was manipulated to be predictable or unpredictable on a global level. The presentation rate of notes/words was modified through the compression (70% faster) or lengthening (30% slower) of the acoustic signal in the unpredictable condition and remained unaltered in the predictable condition. Simultaneously manipulating both dimensions (content, timing) will provide insights into the effect of timing predictions on content predictions in music and speech.

Behaviourally, participants will be asked to rate how well the final note/word completed the melody/sentence. Musicians and non-musicians will be recruited to investigate effects of training-related neuroplasticity on music prediction, as well as potential transfer effects to speech prediction.

Results: Data collection will commence shortly, with preliminary data to be presented at the conference. It is expected that manipulations of content (incongruent final note/word) will elicit prediction error-related ERPs (ERAN for melodies, N400 for sentences), which will be reduced when timing is unpredictable, reflecting an interaction between content and timing predictions. It is also expected that brain responses will correlate with behavioural ratings and computational estimates, with notes/words classified as more unpredictable by the models eliciting lower behavioural ratings of completion, and stronger prediction error ERPs. It is of particular interest to investigate whether the interaction between content and timing predictions operates differently within music and speech, and how it might be influenced by musical training and working memory capacity.

Conclusions: Results will shed light on the complex interaction of content and timing predictions across music and speech domains, with implications for music training and rehabilitation. This study also contributes a highly controlled stimulus set that can be used for further investigations comparing music and speech.

Keywords: prediction, music, language, neuroscience, planned study

# Session 7.1 - Scoping Reviews

## How to conduct a scoping review? Methods of a music education scoping review

**Alicia Lucendo-Noriega,** (University of Jyväskylä & Centre of Excellence in Music, Mind, Body and Brain); **Joshua S. Bamford,** (University of Jyväskylä & Centre of Excellence in Music, Mind, Body and Brain)

Topic: Music education

Presentation type: Live oral presentation

**Background: Scoping reviews are becoming more common in research. It is an interesting approach to** synthesize the previous literature especially in those cases where the scope is broad, and the evidence heterogeneous. The current presentation aims at describing the process for a systematic scoping review, through the example of one conducted on the topic of music education and social-emotional learning.

Aims: The review presented here aimed at clarifying how the various musical program characteristics might influence SEL development. The analysis focused on the elements and characteristics of the interventions of previous music interventions targeting social-emotional development and on the operationalization of such skills.

Main Contribution: The current presentation details each stage of the review, to present the different software and methodological approaches used in the process. The review protocol is also presented to discuss the benefits and challenges encountered to comply with open science principles. The initial stage involved defining the search key words and query strings, for which a concept analysis and several databases were consulted. Once the sources of evidence were retrieved, duplicates were removed before the double-blinded title and abstract screening. The next steps involved full text screening and data extraction, detailing the tools and approaches followed in this section. As for the synthesis, the main learnings in the extraction, visualization and presentation of results are discussed.

Implications: While a scoping review can provide a thorough overview of a topic, it can also be a time and resource consuming process. Through the exemplification of one scoping review in the topic of music education, this presentation not only hopes to show the diversity of software and resources available, but also provide a safe discussion forum for sharing good practices and potential collaboration roads.

Keywords: Scoping review, methods, music education, social-emotional

# Music for wellbeing in rehabilitation and supporting old people's quality of life: a scoping review

**Heini Siltainsuu,** (Centre of Excellence in Music, Mind, Body and Brain, University of Jyväskylä); **Henna-Riikka Peltola,** (Centre of Excellence in Music, Mind, Body and Brain, University of Jyväskylä)

Topic: Music and well-being

Presentation type: Live oral presentation

**Background: According to a growing amount of multidisciplinary research literature, music may have an** effect on our wellbeing on many levels and dimensions (MacDonald, Kreutz & Mitchell, 2012). Due to the worldwide phenomenon of aging population it is important to shed light to the processes through which music may support the wellbeing of older individuals in particular.

Aims: The aim of this review was to gather and synthesize recent multidisciplinary results of studies investigating music's abilities to affect the wellbeing of older adults.

Methods: A scoping review method adapted from the Arksey and O'Malley's (2005) five-stage framework was used, starting with a search conducted in ProQuest, Scopus, PubMed, JSTOR, EBSCOhost and Web of Science databases. Peer-reviewed research articles in English, conducted between January 2010 and December 2022, and with a research interest in how music may affect the wellbeing of older adults were extracted. Following the inclusion criteria, the initial result of 995 eligible search results was condensed into the final sample of 138 research articles (44 quantitative, 52 qualitative, 20 mixed methods and 22 reviews; published in 90 journals), which were further analyzed.

Results: Through the analysis, five main mechanisms, through which music may support wellbeing in this age group, were identified. These were i) cognitive and physical rehabilitation through clinical interventions, ii) social engagement in musical group activities, iii) individual's engagement with music for emotional support and subjective wellbeing, iv) use of music for supporting the wellbeing of formal or informal caregivers, and v) enhancing accessibility and age-related adaptation within musical activities. Also, we identified a considerable degree of inconsistency in methodological and theoretical approaches used in researching this rather undefined topic and population in all its diversity.

Conclusions: According to this sample of multidisciplinary studies, music seems to benefit older adults and their objective, subjective and social wellbeing through several mechanisms. Some of these mechanisms require specific understanding of the needs of aging individuals. Methodological, conceptual and theoretical inconsistency may complicate the accumulation of scientific knowledge on this topic. Further research is necessary to fully understand the large scope of music-related wellbeing benefits among older individuals.

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Keywords: music, wellbeing, older adults

## Music-evoked and music-induced fear: a scoping literature review

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Topic: Music cognition / neuroscience

Presentation type: Live oral presentation

**Background: Music-evoked and music-induced emotions have been studied a great deal in recent decades. In** the last few years, music and emotion research has also focused more on emotions that have been regarded as negative ones, such as sadness and disgust (see e.g.: Peltola, 2017; Peltola & Vuoskoski, 2022). However, music-evoked fear has not been studied a great deal so far. For instance, fear has typically been included only as part of basic or categorical emotion palettes, but not investigated specifically. Research on the specific emotion of fear is very scarce. Nevertheless, it has been stated that music serves a great part of building the atmosphere of fear in for example horror movies (Yeung, 2016; Halfyard, 2016, s. 115-116). Thus, the field needs more research.

Aims: This scoping review investigates how music-induced and music-evoked fear has been studied in the last 20 years. The aim of the study is to find out: 1) how music-evoked or music-induced fear or fear expressed by music has been studied in the last 20 years; 2) in which fields and with which methods; 3) what kind of results have been obtained, and whether they are coherent; and 4) how these studies define scary or fearful music. The timeframe of the scope is from Jan 1st, 2004, to Jan 1st, 2024, and the review focuses on empirical, peer-reviewed articles.

Main contribution: The relevance of this study lies in gaining better understanding of music-evoked and music-induced fear, and forming a broad understanding on how the phenomenon has been studied. The goal is also to address research gaps. It serves as a new opening to the broader field of music and emotion research and as a necessary addition to the understanding of negative emotions in music.

Implications: The information this scoping review serves as a guide for future empirical research, for instance, where are the gaps in research; and what kind of issues, from which perspectives and with which methods the topic should be studied in the future. The information may also be applied in practice, for instance, in music education, emotion education and music therapy.

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Keywords: music and emotion, fear, scary music, fearful music, scoping review

# Session 7.2 - Popular Culture

## Music in contextualising ideological discourse in mainstream film: case Captain America

**Saana Sutinen,** (Linnaeus University)

Topic: Music and culture

Presentation type: Live oral presentation

**Background: The ideological, political, and cultural ideas and ideals are effectively communicated in** mainstream entertainment, not only explicitly political content. Hollywood, with its global influence, has a long history of participating in this kind of cultural export (see e.g. Alford 2009). This can be conceptualised as wielding cultural soft power in service of U.S. interests (see e.g. Laderman 2018). Several mechanisms through which music might participate in these processes have been found. Among them are music's "emotionalising" function in film (see e.g. Gorbman 1987; Cohen 2001), influencing identification to film characters (Hoeckner et al. 2011), identification being a mechanism for narrative persuasion (Graaf et al. 2012) and film music as a narrative cue (Gorbman 1987; Herget 2021), contributing to the narrative. The Marvel superhero character Captain America , the most visibly patriotic member of the Avengers as well as a member of the U.S. military, has been seen as the embodiment of the idea of U.S. exceptionalism, legitimizing the use of U.S. military force (Gruenewald 2018) and depicting it as a global force for good (Griffin 2018), connected to contemporary U.S. politics (Stevens 2015). In the aforementioned ways, the music of the 21st century Captain America films factors into these portrayals.

Aims: A part of an ongoing PhD work, this presentation explores the conceptualisations and theoretical viewpoints from which the topics of ideology in western entertainment media and more specifically U.S. mainstream film and the influence of music in film have previously been approached. This work examines how the music in film participates in contextualizing and forming the depictions of ideology via the example of the aforementioned themes in the 21st century Captain America films.

Main Contribution: As the topics of narrative persuasion, identification, effects of music in film and the political-cultural functions of mainstream fiction film (and entertainment more broadly) are spread across many different fields and non-related studies, their systematic evaluation becomes necessary to understand the power that film music has in shaping the beliefs and attitudes of the audience. This work relates of the role of music research within the wider topic of the impact of entertainment on beliefs and attitudes and lays a theoretical foundation for future interdisciplinary work.

Implications: Producing knowledge on the mechanisms of influence in mainstream film contributes to our cultural media literacy at a time when the global political-cultural climate is increasingly unstable. In this context, the world-wide distribution and popularity of the Marvel franchise and the massive and complex cultural impact that follows highlight the importance of the academic study of media products of the Marvel franchise.

Keywords: film music, superheroes, cultural export, propaganda, media literacy

## Motivations for using music for sleep and their link with musical characteristics: insights from YouTube comments

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Topic: Music and well-being

Presentation type: Live oral presentation

**Background: Research on lullabies, sleep and relaxation music indicate that sleep music should be soft, calm**, and with small pitch and dynamic changes. However, in recent survey studies, participants reported listening to known pop songs and in a big data analysis of tracks from Spotify sleep playlists, many tracks were loud, energetic, and popular songs, indicating that a wide variety of musical characteristics are present in music for sleep. There are various reasons why one may use music to help themselves sleep, such as to improve mood, to form a ritual, to distract oneself or to relax. It is possible that different motivations may influence music selection and that some motivations are linked with certain musical characteristics.

Aims and Methods: Here, we used a text-mining approach with the online streaming service YouTube to understand better the motivations behind choosing a specific track for sleep. We analysed the comments from single-tracks and sleep-compilation tracks for sleep.

Results: We found that both included sleep-related terms, regardless of musical characteristics. However, there were significantly more sleep terms for sedative than excitative tracks. There were no differences between energy levels for other motivations. The control radio hits compilations had significantly less comments relating to sleep and relaxation than sleep-compilations. These sleep-compilation tracks were then looked at further in terms of tempo, instrumentation, presence of a steady beat and other musical characteristics. Finally, we explored how the comment section of sleep-compilation tracks has a stronger atmosphere where the focus is on others compared to control top hits compilation tracks, indicating the presence of a sleep-support community on YouTube.

Conclusions: This study confirms that many different tracks are used for sleep, regardless of their musical content and points to motivations as a potential avenue of future research which would influence the way music is selected for music interventions related to sleep.

Keywords: sleep, music, YouTube

# Measuring Horror Music's Efficiency In Inducing Anxiety In A Video Game

**Santeri Salmirinne,** (University of Jyväskylä); **Enja Heikkilä,** (University of Jyväskylä)

Topic: Music cognition / neuroscience

Presentation type: Live oral presentation

**Background: Anxious and suspenseful musical elements are aplenty in horror video games, and a lot has** been done in studying the ways this kind of music is made, and how it presents itself in-game. In video game studies fear and anxiety inducing elements are seen as key emotional elements in the horror genre. Most related studies focus on music's ability to reduce anxiety in various situations. Despite this, there have been a bunch of studies trying the opposite as well. Fear is, for example, a typical emotion featured in the study of musical emotions (e.g., Gosselin et al., 2007; Krumhansl, 1997) and music has also been found to be effective in generating and amplifying suspense (Cohen, 2001), as well as anxiety and stress (Thayer & Levenson, 1983) in the context of films. Video games also bring a noteworthy dimension into play through interaction and immersion. Highly immersive virtual reality games and applications have been widely studied in a therapy setting to simulate real-life scenarios.

Aims: Horror game music's effectiveness in inducing fear and anxiety has gone largely untested. Music has a significant impact on a player's actions and the intensity of the emotional experience (e.g., Calleja, 2011; Jørgensen, 2017), and models to analyse player behaviour have been developed in the study of human-computer interaction (e.g., Schertler et al., 2019). Methods of analysis specifically intended for reviewing video game music are still sparse (Medina-Gray, 2019), and this study is a great opportunity to compare the efficiency of different data types.The questions we aim to answer are: Q1: How well do anxious musical elements and sound design induce anxiety in a video game context? Q2: How experiencing different levels of video game anxiety affects player behaviour? Q3: How well different types of data work in detecting and measuring anxious responses in a video game?

Methods: We've formulated a mixed methods study to test our research questions. We will do this by having players play a specifically designed video game with horror music as the sole variable. We will measure and compare physiological reactions (HRV, GSR) with player movement data from the game, and also conduct interviews for subjective appraisals of the experience.

Results and Conclusions: We are currently recruiting participants for the study, and we are expecting to have results before June 2024. Combining interdisciplinary measures in video game research brings in new possibilities for the surrounding fields of study as well. The immersiveness and the natural placement of music in games can bring in new viewpoints for researchers of musical emotions in the debate between "real emotions" and "artistic/musical emotions". Tools in analysing player movement data can potentially be used by game developers to understand their players better, even at scale. The application of music therapy elements as well as any knowledge of how, for example, the experience of anxiety works in such games could be very useful in developing better applications and games in the future.

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Keywords: video game music, ludomusicology, cognition, anxiety, fear

# Session 8.1 - Online

## Investigating the Impact of Synchrony, Music, and Touch on Prosocial Behaviour in Children: A Video Paradigm Study

**Gabriella Vizzutti,** (University of Birmingham); **Maria Witek,** (University of Birmingham)

Topic: Music and well-being

Presentation type: Virtual oral presentation

**Background: Social interactions, such as interpersonal touch and synchronised music-making, have been** shown to promote prosocial behaviour, crucial for children's social development. Music inherently fosters positive social development, while interpersonal touch similarly influences prosocial behaviours (Buren et al., 2021; Cascio et al., 2019; Cirelli, 2018; Jakubiak & Feeney, 2017)

Aims: This study aims to investigate whether music and synchrony can positively influence prosocial outcomes as effectively as interpersonal touch. Using a video paradigm, we examined how synchrony, touch, and music influence prosocial ratings in children, aiming to collect data supporting the premise that synchronised music-making can serve as a viable substitute for interpersonal touch in situations where touch is prohibited.

Methods: In an adaptive version of Jan Stupacher's 2017 study, forty children aged 7-12 participated in a within-subject design study. Participants watched videos depicting two stick figures walking side-by-side, rating the likeability of one figure, their own well-being, and describing the relationship between the figures. Ratings were based on an adapted version of the Inclusion of Other in Self (IOS) scale under eight conditions varying in acoustic (music, metronome), synchrony (asynchrony, synchrony), and touch (no touch, touch). (Aron et al., 1992; Stupacher et al., 2017).

Results: Statistical analyses revealed that synchrony, touch, and music all increased prosocial responses. Bayesian analyses indicated that touch had a stronger overall effect on IOS than synchrony and music, while synchrony had a stronger effect on well-being and likeability. Post-hoc comparisons found comparable IOS ratings when figures were synchronously walking without touch compared to asynchronously walking with touch. Similarly, IOS results were similar when figures were walking in synchrony to a metronome as when they were walking asynchronously to music. The average IOS ratings consistently showed higher values when comparing conditions where figures walked in synchrony to music without touch, to conditions where figures were out of sync to a metronome with touch.

Conclusion: These findings suggest that synchrony and music may be as effective as touch in promoting prosociality in children. Given the scarcity of interpersonal touch in the digital age and the aftermath of the COVID-19 pandemic, attention should be given to alternative forms of social interaction, such as synchronic music-making, which may offer similar benefits for social cohesion when touch is not possible.

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Keywords: Prosocial Behaviour, Children, Music, Touch, Synchrony

# Tap to your own rhythm: Examining rhythmic regularity in Speech to Song Transformation

**Lalit Mohan,** (International Institute of Information Technology, Hyderabad); **Vinoo Alluri,** (International Institute of Information Technology, Hyderabad)

Topic: Music perception

Presentation type: Virtual oral presentation

**In the illusory transformation of speech-to-song, repeated speech phrases can perceptually turn into song-**like utterances. Two competing theories have emerged surrounding the phenomenon. From the perspective of speech studies, repeated presentation of speech leads to lexical satiation, that is, loss of semantic meaning, subsequently leading to the emergence of the illusion because of temporal segmentation wherein syllables form the fundamental units of rhythm. On the other hand, in light of mechanisms involved in music processing, the illusion is suggested to emerge because of pitch salience tied to stable tonal targets. This is observed more in repeated stimuli with an isochronous rhythm than with variable timing. However, studies indicate the illusion's perceptual strength is linked to individual differences in musical aptitude, specifically in processing metrical structures. Recent work on tapping into linguistic rhythm on acoustically matched stimuli suggests individuals can have subjective interpretations of rhythmic regularity in speech and song. This study also defines rhythmic regularity as the ease of tapping to a speech or song and observed that participants could differentiate and rate songs as more rhythmically regular than speech.

This prompts us to examine how likely is the speech-to-song transformation (illusion strength) when individuals impose a metrical structure on repeated speech through tapping. First, we study the phenomenon with and without a tapping task. Second, differences in tapping styles between the participants can give us insights into rhythmic cues (i.e., inter-vocalic, syllabic or stress duration) picked up by individuals. Third, employing controlled stimuli with complex and simple metrical structures can highlight individual differences, especially in the context of musical expertise. These experiments will help us investigate the relationship between specific acoustic cues, perceived rhythm, and individual differences in speech-to song experience.

Keywords: music, language, rhythm, perception

# Perception of long isochronous and non-isochronous rhythmic patterns from North Indian Classical Music: The impact of cultural familiarity, musical expertise, and short-term learning

**Nashra Ahmad,** (Durham University)**, Tuomas Eerola,** (Durham University) **Martin Clayton,** (Durham University)

Topic: Music perception

Presentation type: Virtual oral presentation

**Background: Musical rhythms vary across cultures, featuring distinct characteristics. Non-isochronous metres** (NI), more prevalent in some cultures, involve combinations of long and short beats or groups of beats. NI metres are recognised better by those with greater cultural familiarity, and short-term exposure doesn't alter recognition measured through similarity ratings in unfamiliar adults (Hannon et al., 2012). Musicians are better at recognising Isochronous meters(IS) and NI compared to non-musicians (Yates, 2017). However, these differences between IS and NI have been studied in fast tempo and short patterns, not the slower and longer patterns prevalent in North Indian Classical Music (NICM), which this study targets.

Aims: 1. Examine differences in similarity-perception of long-IS and shorter-NI metres among participants familiar and unfamiliar with the culture. 2. Evaluate the impact of musical-expertise on the perception of these metres. 3. Assess effect of short-term explicit active learning in similarity-perception of these metres among unfamiliar participants.

Methods: Participants (n=140) included 76 Indians (32 musicians, 44 non-musicians) and 64 non-Indians (34 musicians, 30 non-musicians). Stimuli consist of 2-Original rhythms/stimuli and 5-Test rhythms (for each original rhythm). Original rhythms are: 16-beat IS TeenTal (4+4+4+4) and 7-beat NI RupakTal (3+2+2) from NICM. Test rhythms are: Unaltered Original, simplified 'Basic', idiosyncratic 'Complex', altered such that it is 'Structurally-Preserved', and, altered such that it is 'Structurally-Disrupted'. Experiment consisted of baseline, training, and testing parts. Baseline and testing parts involved participants rating similarity of each test rhythm to original rhythm. Training included explicit-instructional videos for original rhythms.

Preliminary results: Familiar-participants(Indians) perceived the similarity of pattern for both shorter-NI and longer-IS better than unfamiliar-participants(non-Indians). Unlike previous studies, similarity-perception of shorter-NI was better than longer-IS by unfamiliar-participants. Indian-musicians (Familiar) performed best on rating the similarity of NI among all groups and performed slightly better for IS than Indian-non-musicians. Western-musicians rated NI more accurately than non-musicians, however there was no difference for long-IS. Hence, we suggest that the number of beats affects similarity perception of meters. After short-term learning, unfamiliar participants had an improvement in their similarity ratings in shorter-NI.

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Keywords: Rhythm Perception, North Indian Classical Rhythms, Short Term Explicit Learning, Cultural Familiarity

# Session 8.2 - Online

## Redividing the Octave for Expanded Tonal Spaces: Preliminary Practical Explorations of Formalised Approaches to Microtonal Composition

**Edward Clijsen,** (De Montfort University)

Topic: Composition

Presentation type: Virtual oral presentation

**Background: This research investigates innovative compositional applications of microtonal musical** techniques to locate new expressive dimensions in music. Tuning systems beyond the standard twelve-tone frame, such as 24, 31 or 96 tones per octave, provide composers with increased resources for musical colour, texture, harmony and expressive nuance (Chalmers 1993; Partch 1974; Wolf 2003). For the composer the consequent vast increase in data demands advanced organisational strategies, and new or adapted musical instruments. Lerdahl (2019) stresses the value in blending systematic and intuitive approaches to composition, yet despite attempts to systematise microtonality (Jones 2013) we continue to lack codified methods for dealing with microtonal tuning constructs as holistic entities, beyond microtonal 'inflections' of what are otherwise twelve-note contexts. Recent demonstrations show that strictly formalised techniques of musical organisation offer potential solutions to the conceptualisation and handling of microtonal tunings but lack connections to intuitive pathways to employ them in composition.

Aims: This research will devise formalised generative systems through which the subtleties and complexities of microtonal tuning systems can be effectively handled and explored in composition to discover, compare and develop the expanded harmonic and melodic principles they afford. This presentation will discuss recent investigations into a formalised approach to microtonality and aims to share the expanded expressive capabilities that microtonality affords the composer, as well as highlight methods through which microtonal composition is facilitated.

Methods: Employing a practice-based action research model, underpinned by critical theoretical investigation, this study will commence with a comprehensive literature review leading into analytical case studies of selected microtonal works (e.g. Brook, Ives, Johnston, Wyschnegradsky) and formalised compositional approaches: serial or set-based methods (e.g. Babbitt, Schat, Schoenberg) and generative systems (e.g. Nørgård, Xenakis). Extending from this, innovative compositional approaches to microtonal tunings will be devised and tested by systematically hybridising and synthesising selected formalised/generative procedures – constructing musical material and supporting innovative approaches to form through distinctive new harmonic and melodic principles. Discussion will draw from a portfolio of original compositions and practical experiments (études) as well as analyses of principal compositions from the repertoire. This presentation will primarily draw from recent practical experiments and compositions for the '24-TET' Kingma System Alto Flute in collaboration with Carla Rees (Professor of Low Flutes and Contemporary Flute at the Royal Academy of Music in London).

Results/Impact: As a development of the microtonal repertoire and theory, this research has capacity to deliver impact through discovery of innovative compositional resources and techniques that promote applications of enriched sonority and colour in a wide range of applied musical settings (e.g. film, sound design, gaming). Chahin (2017) demonstrates that microtonal techniques can have cross-cultural significance, facilitating hybrid forms in new expressions of global culture through merging disparate musical practices – an explorative avenue that could extend beyond this immediate project.

References: Chahin, R. (2017) Towards a Spectral Microtonal Composition: A Bridge Between Arabic and Western Music. Mainz: Schott Campus. Chalmers, J.H. (1993) Divisions of the Tetrachord. Polansky, L. and Scholz, C. (eds.) Hanover, NH: Frog Peak Music. Jones, J.B. (2013) Microtonalis: A Systematic Approach to Microtonal Composition. D.M.A Thesis, Cornell University. Lerdahl, F. (2019) Composition and Cognition: Reflections on Contemporary Music and the Musical Mind. California: University of California Press. Partch, H. (1974) Genesis of a Music. Second Edition. Massachusetts: Da Capo Press. Sethares, W.A. (2005) Tuning, Timbre, Spectrum, Scale. Second Edition. New York: Springer. Wolf, D.J. (2003) 'Alternative Tunings, Alternative Tonalities', Contemporary Music Review, 22(1-2): 3-14.

Keywords: Microtonality, Formalism, Systematic, Composition, Expression

## Interpretative Organ-isms: Quantitative Analyses of a New Dataset of Organ

**Katelyn Emerson,** (Centre of Music and Science, University of Cambridge); **Peter M. C. Harrison,** (Centre of Music and Science, University of Cambridge)

Topic: Performance

Presentation type: Virtual oral presentation

**Background: To perform a piece of classical music, a player must translate the composer's written work into** sound. The process of turning the musical score into an aural product is enabled by the player's manipulation of 'expressive' parameters (e.g. timing, volume, pitch, timbre, etc.). This produces a unique artistic 'interpretation'. In this project, we study interpretations in classical organ performances. The organ is particularly interesting for such study as it limits performers' expressive parameters: timing is the sole variable that organists can continuously manipulate.

Aims: We present three quantitative analyses of a new dataset of organ performance note onset timings, manually transcribed from historic recordings, to show how each methodology can yield insights into the interpretative decisions of these early 20th-century performers.

Methods: We test how the Pairwise Variability Index (nPVI), originally developed for comparison of linguistic rhythm, can group performers' musical timing at a particular composed note duration by their linguistic background. We subsequently expand the focus to the bar level, examining the average performed durations of within-bar beat durations grouped by players and pieces in turn. Finally, we use k-means clustering of these within-bar durational beat patterns to identify timing patterns universally employed at particular points in the same piece, as well as determine strategies that diverge from the group tendency.

Results: The nPVI calculation offers highly different results depending on the particular piece and composed note durations measured. Averaged within-bar beat durational hierarchies over the complete dataset reveal an expected inclination towards extending beats 1 and 3 in 4/4 time. Closer examination shows this can be skewed by particular tendencies within individual pieces. K-means clustering enables identification of several typical within-bar beat durational strategies, which can then be placed back onto the tempo maps for closer analysis and score comparison. Traditional strategies that often appear in the literature were found, such as phrase-final lengthening or stretching of particularly interesting chords, as well as exceptions to these trends.

Conclusions: The summary qualities of nPVI reinforces the findings of previous research that it is highly dependent upon the input, both the composed note duration and the given piece. Likewise, averaged within-bar beat durations show interesting similarities between the overall durational trends of particular pieces, but appear skewed by the number and styles of the pieces over which they are averaged. K-means clustering, which has not previously been applied to within-piece music performance analysis, emerges as a powerful tool that enables a combination of analytical summary and detail. It facilitates confirmation of previous research in temporal phrase strategies while also suggesting some higher level interpretative considerations that appear to group players.

This research advances the state of knowledge in music performance analysis and also demonstrates how contextual features of performers and the instruments they play can increase understanding in quantitative analyses such as this one. We additionally describe an ongoing data collection of multimodal performance data from organists playing the same repertoire on different organs that will enable expansion of this research.

Keywords: expressive performance, empirical music analysis, organ, duration

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## A quantitative multimodal approach to picking techniques on a nylon guitar: methods and preliminary results

**Augusto Cesar Pereira Armondes,** (Federal University of Minas Gerais, Brazil)

Topic: Music technology

Presentation type: Virtual oral presentation

**Background / Aims: Acquiring musical instrumental skills is a complex process involving systematized and** tacit knowledge. High-skilled musicians share some technical and musical characteristics besides presenting idiosyncratic ones (REPP, 1992). A quantitative approach can highlight some of these features, especially in an almost uncharted area as guitar picking techniques. In the present study, we focused on three with widespread use: strumming, sweep, and alternated picking.

Methods: We collected data from three kinds of sensors to investigate how musicians apply them on a nylon classical guitar. Hexaphonic pickups permit obtaining the audio signal of individual strings and extracting some features, such as onset time and amplitude (dBFS). Two force-sensor resistors (FSR) fixed on both sides of a guitar pick measure the force exerted by the fingers. An inertial measure unit (IMU) placed in the hand's back allows the analysis of gestural characteristics. A video recording at 240 fps also helps observe additional features. Software Max 8 displays in real time information delivered by all sensors and records them in separated buffers/files. For each take we get a 6-channel audio file and three text files, containing data from motion, force and a symbolic musical transcription (FREIRE, ARMONDES, SILVA, 2021). Three experienced musicians played the following excerpts (with muted notes) at 60 and 100 bpm: a strummed groove, two sweeping arpeggios (in 5 and 6 strings), and 4 types of alternated picking (with 4, 3, 2, and 1 note per string). The record starts with a pedal pressing, and the musician has a count-in of 4 beats.

Results: As expected, the results showed common features for all performances, as well as personal characteristics from each musician. The observed features were: repositioning of the right hand when playing from low to high strings (and vice-versa), spatial direction of the attacks, changes in the forces applied to the pick, regularity on rhythm and dynamics.

Conclusions: With this preliminary study, we have discovered that the combination of data from different sources can be useful for studying the chosen picking techniques, with a portable and non-invasive setup. Although the small sampling does not permit any generalization, we could observe similarities and differences among the musicians, and different strategies for playing in different tempos. With this it is possible to question a widely spread strategy of practicing technical exercises from lent to rapid since the gestures employed in each case are not the same. Visual feedback can help to perform in slow motion gestures similar to those employed in the fast passages.

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Keywords: Guitar Picking, Technique, Musical Performance

## Visual Cues and Topics in the Soundtrack Album of the Squid Game Series

**Eunah Lee,** (University of Oregon)

Topic: Music theory and analysis

Presentation type: Virtual oral presentation

**The relationship between the visual components of a film and the film score has often been described as one** of music being subservient to picture, for example Gorbman’s concept of “inaudibility” (Gorbman 1987, Neumeyer and Buhler 2015, and Buhler 2019). But what about situations in which music is primary, such as listening to a film’s or series’ soundtrack album after having watched the film or series? My paper will consider how remembering the visual cues in the Netflix TV series Squid Game after having watched the film shapes the way one hears the soundtrack album. I raise the important question of how visuals in the film can contribute to interpreting musical meanings, in tandem with the musical characteristics of the soundtracks. As galant schemata can acquire the role of musical signs when they are associated with topics through repetition and invoke meanings (Sánchez-Kisielewska 2020 and Mirka 2023), I argue that remembering the film can function as a visual sign (together with music) to invoke meanings in soundtracks. In this paper, I analyze Squid Game and its soundtrack album to demonstrate how the visual cues in Squid Game contribute to musical topics in its soundtrack album and create certain musical meanings, to allow the listener to comprehend the musical narrative in soundtracks.

I begin by providing six topics with “essential characteristics” (Frymoyer 2017) in Squid Game’s soundtrack album, shown in Example 1: “childhood,” “death,” “identity,” “unfolding,” “tension,” and “trauma.” I identify the musical meanings under each topic by comparing musical characteristics of corresponding soundtracks and selected scenes where the musical clips with the topic are played in Squid Game.

Example 2 uses “Let’s Go Out Tonight,” to illustrate the interaction of remembered visual cues and topics and their influence on comprehending the soundtrack’s narrative. The soundtrack album (Example 2a) generates a narrative where a musical sign associated with identity, hope, and anti-violence asks to be remembered by repetition but is forgotten by an unresolved cadence. The original theme in the TV series had maintained the repetition and unresolved cadence but changed some musical characteristics (listed in Examples 2b and 2c). These slightly changed characteristics (e.g. omitted measures and change of note values), had strengthened the signification of uncertainty of hope, and the accompanying scene confirmed this. The uncertainty of hope was resolved in the series (Example 2d) by bringing back the same theme in different keys and associating it with a different title, “I Remember My Name.” The key elevated from E major to F major and ended with a conclusive cadence. The associated scene confirmed this by portraying a character’s sacrifice and remembrance of his name (as opposed to his number).

Through my investigation of this and other soundtracks in the album, I hope to more clearly describe the process of a listener comprehending a film’s soundtrack after having seen the film. This study will add a previously-unexplored perspective to the discourse on the relationship between sound and image in film.



Keywords: Squid Game, film and music, topic theory, schema, visual memory

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