

**SysMus23
Conference
Proceedings**



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Editorial

For this special issue of the WRoCAH Journal, we are very pleased to present the official conference proceedings of the 16th International Conference of Students of Systematic Musicology (SysMus23). The broad field of systematic musicology constitutes several subdisciplines within musicology and music science, exploring the foundations of music from numerous cross-disciplinary perspectives. We hope that this special issue can serve as an exceptional insight into the diverse range of research within the interdisciplinary field of systematic musicology.

This conference proceedings will present the abstracts of the accepted submissions to SysMus23, which were presented as paper presentations, poster presentations, and ‘blitz talks’ (short 5-minute presentations) at the University of Sheffield on 18th-20 October 2023. SysMus23 saw an exceptionally high submission rate, with abstracts spanning an eclectic array of topics within the related subject areas of systematic musicology. All conference abstracts are formatted in accordance with the American Psychology Association (APA) referencing style for this special issue, as this is the standard reference style for the discipline. Please note that this deviates from MHRA, which is typically used within standard WRoCAH Journal issues. With SysMus23 receiving substantial funding from WRoCAH through its student-led forum (SLF) scheme, the WRoCAH Journal stands as the ideal platform to illuminate the impactful research unveiled by postgraduate and early-career researchers during the conference.

James Cannon, Jonathan ‘Jaytee’ Tang, & Juliet Rudman
The WRoCAH Journal Editorial Team

About SysMus



With its inaugural conference taking place in 2008, for over a decade and a half, the student-led SysMus conference series has brought together postgraduate and early career researchers from across disciplines within the overarching field of systematic musicology. This includes music cognition, music perception, music psychology, music education, music therapy, music science, music theory and analysis, music and culture, music information retrieval, and the philosophy and sociology of music. This year the organising committee encouraged submissions from a broader range of disciplines that fit under the umbrella of 'systematic musicology', opening the call for submissions to include papers on the topic of music composition and performance. The conference is of particular importance to master's and doctoral level students, providing an optimal opportunity for students to network with global peers in their field. SysMus also offers the platform to engage with renowned international academics, who are invited to present keynote talks at the conference. SysMus takes place at different international venues and welcomes participants from all over the world. This year, it was hosted in collaboration with the Music Mind Machine (MMM) research group at the University of Sheffield, UK, as well as WRoCAH funded postgraduate researchers from the University of Leeds and the University of York.

About Music Mind Machine (MMM)



The Music Mind Machine (MMM) research centre, part of the Department of Music at the University of Sheffield, offers a platform for researchers and students to investigate musical experience from an interdisciplinary perspective. Research conducted at the centre is fundamental as well as applied, and the group combines theories and methods from music, psychology, social, and computational sciences to conduct research with real-world applications. The group organises regular events such as reading groups, seminars, and conferences, creating a space for researchers from around the world to promote their work, establish collaborations, and develop new skills.

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We would like to acknowledge and thank our peer reviewers for their time, dedication, and insightful comments. Their expertise, meticulous evaluation, and thoughtful feedback have greatly enriched the quality of the submissions. The peer reviewers include (in alphabetical order):

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The impact of COVID-19 pandemic on group music-making during the lockdown period: A survey study

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Background

In March 2020, when the UK government implemented restrictions on large gatherings and non-essential travel in response to the COVID-19 pandemic, amateur music groups across the nation were forced to abruptly cease rehearsals. The routine practice sessions and preparations for public performances were abandoned, leaving group members to cope with the abrupt discontinuation of a leisure pursuit that, for many, had been integral to their social interactions and overall well-being.

Aims

This study aimed to investigate the impact of the COVID-19 pandemic on social bonding, mental health and wellbeing in members of music groups during the lockdown, by addressing the following questions:

- What did members gain from participating in music groups before the lockdown?
- What strategies were used by members of music groups to maintain music engagements during the lockdown?
- What was the difference between the effect of music engagements on individuals compared with other recreational activities during the lockdown?
- What were members' fears and hopes regarding their music groups in the future?

Methods

This study opted for an online survey approach to accommodate a large and comprehensive collection of participants' perspectives while adhering to social distancing guidelines, ensuring both depth and breadth in the research. Data collection occurred during the UK lockdown and concluded in July 2020, when the potential for resuming group music activities was uncertain. Two hundred and thirty-five complete responses were analysed to investigate participants' wellbeing and the extent to which this was normally affected by their music group participation, and their hopes and fears for when rehearsals resume after social distancing measures are lifted.

Results

The study revealed that participants in music groups were motivated by psychological, musical, and social factors before the lockdown, with group music-making promoting mental health, positive moods, concentration, and self-improvement. During the lockdown, there was limited negative impact on general psychological wellbeing, but participants deeply missed in-person rehearsals and performances, resulting

in negative moods and a sense of loss. To maintain music engagement during lockdown, participants employed various strategies, including virtual rehearsals, which had positive social effects but also limitations. In the absence of group music-making, participants turned to other activities like exercise, recognising that while these had some mental health benefits, they couldn't replace the unique social and spiritual aspects of group music-making. Concerns about the future of music groups due to health and financial issues were prevalent, but there was a strong hope for their eventual return, with some participants viewing virtual music-making as a potential threat to the future of traditional music groups.

Conclusion

This research highlighted the positive influence of pre-lockdown group music-making on social bonds and mental well-being among music group members. The absence of these opportunities during the pandemic had adverse consequences for members and posed a threat to music groups' survival. While virtual rehearsals provided some relief, they couldn't fully replicate the in-person experience. The study emphasised the unique value of music as a deeply meaningful leisure activity that fosters community and personal satisfaction.

Despite challenges such as financial strain and declining membership, participants remained determined to resume rehearsals and performances. However, it's important to note that the research reflects early pandemic circumstances with uncertainty persisting as government guidance and regulations continue to evolve.

Exploring the motivations and impacts of musical participation in China's emerging cultural and tourism communities under creative placemaking: A case study of the Aranya community

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Background

Cultural tourism has become a crucial form of consumption for those seeking spiritual and cultural experiences (Smith & Richards, 2013). Nowadays, cultural tourism encompasses more than just traditional museums and historical sites. Cultural and tourism communities refer to groups of people with shared interests in the cultural attractions of a destination, making them a prime target for destination marketers (Buhalis, 2000). In China, cultural tourism has become a national strategy and emerging communities play a crucial role in its development (Chen, 2021). The Aranya Community in Hebei Province, China, is a prime example of a developing cultural tourism community that prioritizes the arts through the use of innovative placemaking strategies, fostering a vibrant cultural climate that supports the emergence of new musical styles and activities, such as various music festivals, community music activities, and music seasons (Wang, 2018). Aranya is known for its intense artistic community atmosphere, with homeowners forming art-loving groups that recognize diverse art forms, creating a strong sense of neighborhood.

Aims

This study aims to investigate the impact of community-organized music events on residents' personal growth and well-being in emerging cultural and tourism communities in China, specifically in the Aranya Community. The research will identify the motivations and experiences of Aranya residents who participate in community-organized music activities and assess the impact of these activities on their personal growth and well-being.

Additionally, the study will explore how these benefits influence continued participation.

Methods

A social constructivist perspective is appropriate for the research. Questionnaires and semi-structured interviews will be used to collect data on the factors influencing residents' participation in music activities. It will also explore the impact of community-designed music activities on residents' personal growth and well-being and investigate how these resulting benefits continue to stimulate residents to participate in music activities.

Contributions

The results of this study will contribute to the literature on the impact of music events on the personal growth and well-being of community residents, particularly in the Chinese context. This study will also add to the existing knowledge base on creative placemaking strategies that promote personal growth and well-being in China's emerging cultural and tourism communities.

References

- Buhalis, D. (2000). Marketing the competitive destination of the future. *Tourism Management*, 21(1), 97–116.
- Chen, S. P. (2021). Study on the construction of cultural tourism community in scene vision: A case study of Aranya Tourism community. *Journal of Central South University of Forestry & Technology (Social Sciences)*, 3, 102–110.
- Smith, M. K., & Richards, G. (2013). *The Routledge handbook of cultural tourism*. Routledge.
- Wang, Y. (2018). The exploration and practice of creative placemaking in Aranya. *Journal of Landscape Architecture*, 33(9), 20–27.

Deep generative models of raw audio for creative instrumental practice

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Introduction

Generative modelling of raw audio through deep learning (Dieleman, 2020) provides new means of creating audio samples and musical content radically divergent from traditional sampling methods in both process and output character. Its adoption by researchers and music practitioners though is currently limited and its applicability to creative musical practices under-explored. I present an ongoing enquiry into potential applications of two significant model architectures in this domain - WaveGAN (Donahue et al., 2018) and SampleRNN (Mehri, et al., 2017) - to my practice as an improvising saxophonist and composer.

Aims and Methods

I aim to address issues around best practices for creating datasets for training such models, and to develop processes and musical works that build on perceived potential applications of these models, taking into account each architecture's distinct behaviours (Dieleman, 2020). I do this through a practice-based research methodology consisting of the following steps:

- Dataset creation and pre-processing;
- Statistical modelling of these datasets using aforementioned deep learning architectures;
- Creative experimentation, development of software and creation of musical outputs.

Through this work I also aim to explore notions of risk-taking in an interdisciplinary, experimental creative music practice (Czernowin, 2017).

Results and Discussion

I contribute a showcase of the datasets, raw generated outputs and creative applications derived from deep learning modelling of instrumental practice sessions. Novel audio samples generated from the trained models will be auditioned and compared with their corresponding datasets, prompting discussion of their relationships and demonstrating their perceptual divergences from the dataset. Extracts from new musical and audiovisual works will be auditioned, demonstrating example applications of the generated outputs to instrumental practice, improvisation and composition.

My work generates assumptions around best practices for audio dataset creation and dataset-model compatibility, while motivating future work with alternative inputs to test these further. Through this work, I generate new tacit knowledge of applications of generative modelling of raw audio to instrumental practice, improvisation and composition. This knowledge will be of interest and utility to practice-based

researchers, musicians and sound artists curious about using AI within their own work. My reflections on specific notions of risk-taking as a driver of creativity (Czernowin, 2017) will also be of interest to these groups and to music psychology researchers.

References

- Czernowin, C. (2017). The art of risk taking: Experimentation, invention, and discovery. In K. Coussins (Ed.), *Experimental encounters in music and beyond* (pp. 31-38). Leuven University Press.
- Dieleman, S. (2020, March 24). Generating music in the waveform domain. <https://sander.ai/2020/03/24/audio-generation.html>
- Donahue, C., McAuley, J., & Puckette, M. (2018). *Adversarial audio synthesis*. arXiv. <https://doi.org/10.48550/arXiv.1802.04208>
- Mehri, S., Kumar, K., Gulrajani, I., Kumar, R., Jain, S., Sotelo, J., Sotelo, J., Courville, A., & Bengio, Y. (2017). *SampleRNN: An unconditional end-to-end neural audio generation model*. arXiv. <https://doi.org/10.48550/arXiv.1612.07837>

The Oohhs, Ahhhs and Eees of flavour: Exploring the effects of vocalising vowels on the flavour perception and pleasantness of the dining experience

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Background

Over the past decade, crossmodal correspondence research has grown exponentially and transformed our understanding and applications of music and sound (see Spence et al., 2021 for review). Relating to sound and taste, however, researchers have exclusively focused on elements of instrumental music (Crisinel et al., 2012; Gallace et al., 2011; Motoki et al., 2019, 2022; Ngo & Spence, 2011; Ngo et al., 2011; Pathak & Calvert, 2020; Pathak et al., 2020, 2021).

When discussing the reasoning behind sound-taste crossmodal correspondences, a prominent theory is embodiment - people's distinctive movements of the face and mouth when ingesting different tastes may be mimicked by specific speech sounds (Motoki et al., 2019). With the differences in facial activations and positioning between sung and spoken vowels (Konikoff Dental Associates, 2023; Hunt, 2022; O'Connor, 2022a, 2022b; Ophaug, 2017; Pope, n.d) - and sex potentially playing a role in vowel perception (Hope, 2023) - would these associations differ if the vowels are sung?

Aims

Given the paucity of research in vocal music, this research project explores the effects of sung vowel shapes on sound-flavour associations. It also aims to explore sex differences in vowel-taste perception and bridges crossmodal correspondence and sonic seasoning research by exploring the effects of sound-taste associations of sung vowels on the multisensory dining experience.

Method

This project consists of two phases: a survey followed by an experiment. One hundred and fifty-two participants completed a within-participant survey in which they listened to 10 vowel extracts – the five Italian vowels ([A], [E], [I], [O], [U]) sung by a male vocalist and female vocalist – and rated their sweetness, bitterness, saltiness, and sourness. A further 50 participants (15 males and 34 females) ranging between the ages of 18 and 56 completed a within-participant experiment, in which they blindly tasted the same rice cake sample under four background music conditions (sweet sound, salty sound, sour sound, and bitter sound) and rated the flavour perception, pleasantness perceptions and purchasing intentions.

Results

For the survey, results from multiple one-way Friedman ANOVAs indicated significant effects between the vowel-taste associations, demonstrating that [A] sung by a male is perceived as the saltiest, [A] sung by a female as the sweetest, [E] sung by a female as the sourest and [I] as the most bitter. The experiment displayed significant effects between the sound- taste perception, suggesting that the rice cake was perceived as significantly salty regardless of background music. The medians, however, show that the sweetness perception was highest when listening to the sweet sound, and the bitterness perception was highest when listening to the bitter sound. The salty sound matched the salty flavour best, and the sweet sound and rice cake consumed while listening to the sweet sound were perceived as the most pleasant.

Conclusions

This project explores the correlations of sung vowels and taste perception and transforms it into a practical multisensory experience. Valuable implications arose from this study for the food, advertising, and music industries, with additional opportunities to promote healthy eating and aid neurodiverse and disability communities.

References

- Crisinel, A. S., & Spence, C. (2012). The impact of pleasantness ratings on crossmodal associations between food samples and musical notes. *Food Quality and Preference*, 24(1), 136-140. <https://doi.org/10.1016/j.foodqual.2011.10.007>
- Crisinel, A. S., Jones, S., & Spence, C. (2012). 'The sweet taste of maluma': Crossmodal associations between tastes and words. *Chemosensory Perception*, 5(3-4), 266-273. <https://doi.org/10.1007/s12078-012-9133-9>
- Gallace, A., Boschin, E., & Spence, C. (2011). "On the taste of "Bouba" and "Kiki": An exploration of word-food associations in neurologically normal participants." *Cognitive Neuroscience*, 2, 34-46. <http://dx.doi.org/10.1080/17588928.2010.516820>
- Hunt, A. (2022, March 18). Watch your tongue: The secret to better singing *The Arena Media Brands, LLC*. <https://spinditty.com/learning/The-Importance-of-The-Tongue-in-Singing>
- Konikoff Dental Associates,. (2023). Understanding mouth anatomy: Tips for singers. Konikoff Dentistry Associates. <https://konikoffdental.com/understanding-mouth-anatomy-tips-for-singers>
- Motoki, K., Pathak, A., & Spence, C. (2022). Tasting prosody: Crossmodal correspondences between voice quality and basic tastes. *Food Quality and Preference*, 100, Article 104621. <https://doi.org/10.1016/j.foodqual.2022.104621>
- Motoki, K., Saito, K., Park., J., Velasco, C., Spence, C., & Sugira, M. (2019). Tasting names: Systematic investigations of taste-speech sound associations. *Food Quality and Preference*, 80, Article 103801. <https://doi.org/10.1016/j.foodqual.2019.103801>
- Ngo, M. K., Misra, R., & Spence, C. (2011). Assessing the shapes and speech sounds that people associate with chocolate samples varying in cocoa content. *Food Quality and Preference*, 22(6), 567-572. <https://doi.org/10.1016/j.foodqual.2011.03.009>
- O'Connor, K. (2022a). Vowels, vowel formants and vowel modification. *SingWise*. <https://www.singwise.com/articles/vowels-formants-modifications>
- O'Connor, K. (2022b). *Singing with an 'Open Throat': Vocal Tract Shaping*. *SingWise*. <https://www.singwise.com/articles/singing-with-an-open-throat-vocal-tract-shaping>
- Ophaug, W. (2017). The diminished vowel space in classical singing and the tug of war between "speech-true" and modified vowel qualities. *Journal of Singing* 73(3), 293-303.
- Pathak, A., & Calvert, G.A. (2020). Sounds sweet, sounds bitter: How the presence of certain sounds in a brand name can alter expectations about the product's taste. *Food Quality and Preference*, 83, Article 103918. <https://doi.org/10.1016/j.foodqual.2020.103918>

Pathak, A., & Calvert, G. A. (2021). Sooo sweet! Presence of long vowels in brand names lead to expectations of sweetness.

Behavioral Sciences 11(2), Article 12. <https://doi.org/10.3390/bs11020012>.

Pathak, A., Calvert, G. A., & Motoki, K. (2020). Long vowel sounds induce expectations of sweet tastes. *Food Quality and*

Preference, 86, Article 104033. <https://doi.org/10.1016/j.foodqual.2020.104033>

Pope, C. (n.d.). Matching vowels, modifying the vowel to find what is sometimes termed the narrow place. *Cathy Pope Singing and*

Voice Teacher. <https://www.cathypope.com/Vowels.htm>

Cognitive paleomusicology - An integrative framework for the study of the evolution of musicality and music

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Background

To date, a variety of scientific disciplines explore the evolution of music and musicality, i.e., the ability to perceive and produce music. These issues have been mainly discussed from an adaptationist (e.g., Mehr et al., 2021) or non-adaptationist perspective (e.g., Patel, 2008, 2010). Anyhow, a growing current trend is to investigate the evolution of music and musicality from the perspectives of gene-culture coevolution (Patel, 2018, 2021; Savage et al., 2021) and niche construction (van der Schyff & Schiavio, 2017; van der Schyff et al., 2022). However, theories on the origins of music and musicality remain numerous and controversial. Moreover, coevolutionary theories largely neglect biocultural interactions during individual development and a thorough consideration of material finds of prehistoric 'music culture' (e.g., prehistoric flutes), although they allow inferences of the development of music-related mental processes and components of musicality.

Aim

Our aim thus is to develop a conceptual framework for exploring the evolution of music and musicality, that offers an inclusive approach considering both biological and cultural factors, taking into account material finds that bear witness to prehistoric musical behavior and music.

Main Contribution

Here, we present *Cognitive Paleomusicology* (Bellmann et al., 2023), which provides an integrative conceptual research framework, exploring and reconstructing the evolution of human music and musicality from a decidedly biological-cultural perspective. Bridging the gap between biologically informed music research (e.g., Biomusicology), Cognitive Musicology, and culturally informed Music Archaeology, *Cognitive Paleomusicology* integrates methods and approaches from these fields, thereby giving socio-cultural as well as cognitive and neural developmental processes a central place in the study of the evolution of cognitive abilities during hominization, taking adaptive processes into account. To this end, *Cognitive Paleomusicology* integrates gene-culture coevolutionary and niche construction theories, and explicitly situates them within the framework of the Extended Evolutionary Synthesis (EES; Laland et al., 2014, 2015). In addition to variation and selection, the EES understands constructive developmental processes during ontogeny, including niche construction, and inclusive inheritance as causal evolutionary factors.

Implications

Further research on the biological-cultural co-evolution of musicality and music should consider the role of social learning of music for biology-culture interactions during ontogeny. Mental processes that can be inferred from existing music artifacts (e.g., the Geissenklösterle flute; Conard et al., 2008), such as combining discrete tones are based on biological, neuronal mechanisms and structures. The development of such structures, in turn, is impacted by the social learning of music (e.g., Barrett et al., 2013; Hannon & Trainor, 2007; Laland, et al., 2016). Thus, prehistoric music artifacts - in liaison with comparative research on the prehistoric and modern brain - are starting points for investigations into prehistoric biology-culture relationships within the framework of Cognitive Paleomusicology. In addition to other biological factors, ontogeny, cultural transmission, and active changes in the environment should be investigated as self-contained, causal, and integrated evolutionary factors. We propose an elaboration of *Cognitive Paleomusicology* against the background of the EES, opening a biological- adaptationist research framework that brings socio-cultural as well as ontogenetic factors into focus.

References

- Barrett, K. C., Ashley, R., Strait, D. L., & Kraus, N. (2013). Art and science: how musical training shapes the brain. *Frontiers in Psychology, 4*, 713. <https://doi.org/10.3389/FPSYG.2013.00713>
- Bellmann, O. T., Sachse, S. L., Asano, R., & Seifert, U. (2023). Kognitive Paläomusikologie. In H. Stubbe & R. Frenken (Eds.), *Paläopsychologie* (pp. 295-344). Pabst Science Publishers.
- Hannon, E. E., & Trainor, L. J. (2007). Music acquisition: effects of enculturation and formal training on development. *Trends in Cognitive Sciences, 11*(11), 466–472. <https://doi.org/10.1016/j.tics.2007.08.008>
- Laland, K., Uller, T., Feldman, M. W., Sterelny, K., Müller, G. B., Moczek, A., Jablonka, E., & Odling-Smee, J. (2015). The extended evolutionary synthesis: Its structure, assumptions and predictions. *Proceedings of the Royal Society B: Biological Sciences, 282*(1813). <https://doi.org/10.1098/rspb.2015.1019>
- Laland, K., Uller, T., Feldman, M., Sterelny, K., Müller, G. B., Moczek, A., Jablonka, E., Odling-Smee, J., Wray, G. A., Hoekstra, H. E., Futuyma, D. J., Lenski, R. E., Mackay, T. F. C., Schluter, D., & Strassmann, J. E. (2014). Does evolutionary theory need a rethink? *Nature, 514*(7521), 161–164. <https://doi.org/10.1038/514161a>
- Laland, K., Wilkins, C., & Clayton, N. (2016). The evolution of dance. *Current Biology, 26*(1), R5–R9. <https://doi.org/https://doi.org/10.1016/j.cub.2015.11.031>
- Mehr, S. A., Krasnow, M. M., Bryant, G. A., & Hagen, E. H. (2021). Origins of music in credible signaling. *Behavioral and Brain Sciences, 44*, Article e60. <https://doi.org/10.1017/S0140525X20000345>
- Patel, A. D. (2008). *Music, language, and the brain*. Oxford University Press.
- Patel, A. D. (2010). Music, biological evolution, and the brain. In M. Bailar (Ed.), *Emerging Disciplines* (pp. 91–144). Rice University Press.
- Patel, A. D. (2018). Music as a transformative technology of the mind: An update. In H. Honing (Ed.), *The origins of musicality* (pp. 113–126). MIT Press.
- Patel, A. D. (2021). *Musicality and gene-culture coevolution: ten concepts to guide productive exploration*. PsyArXiv. <https://doi.org/https://doi.org/10.31234/osf.io/qp6jx>
- Savage, P. E., Loui, P., Tarr, B., Schachner, A., Glowacki, L., Mithen, S., & Fitch, W. T. (2021). Music as a coevolved system for social bonding. *Behavioral and Brain Sciences, 44*, Article e59. <https://doi.org/10.1017/S0140525X20000333>
- van der Schyff, D., & Schiavio, A. (2017). Evolutionary musicology meets embodied cognition: Biocultural coevolution and the enactive origins of human musicality. *Frontiers in Neuroscience, 11*. <https://doi.org/10.3389/fnins.2017.00519>

van der Schyff, D., Schiavio, A., & Elliott, D. J. (2022). The evolution of the musical mind. In D. van der Schyff, A. Schiavio, & D. Elliott (Eds.), *Musical bodies, musical minds: Enactive cognitive science and the meaning of human musicality* (pp. 131-154). The MIT Press.

Verbal imagery as a catalyst for change in choral timbre: A quantitative study

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Background

Verbal imagery (i.e., figurative language, such as metaphor or simile) is a fundamental tool in musical practice. In particular, verbal images (e.g., bright/dark) are frequently used in musical training to denote and affect musical timbre. However, little systematic study has examined whether and how verbal imagery actually affects produced timbre, and whether such effects may be perceived by listeners.

Aims

This study investigated how verbal imagery affects sound timbre in choral performance, by quantitatively measuring its effects on sound attributes, and empirically examining whether listeners can match sounds with the images that triggered them. Such investigation produced insights on the use of figurative language in musical contexts, not only in describing musical sound, but as a tool shaping it. An empirical, quantitative examination of such an elusive phenomenon may, beyond its value for music cognition research, help formulate guidelines for the optimal use of verbal imagery in choral music-making.

Method

In two experiments, we investigated the effects of verbal imagery on the production (Exp1) and perception (Exp2) of sound timbre, examining whether verbal images may affect sung timbre in measurable ways and whether listeners can correctly perceive imagery/sound associations. In Exp1, 12 singers responded in a choral-like setting to six sound descriptors, comprising three contrasting pairs (bright vs. dark, flute-like vs. cello-like, head-produced vs. chest-produced) that were selected following a preliminary survey among choir conductors. We analyzed selected spectral attributes of the produced sounds (root mean square [RMS] levels, associated with loudness; spectral centroid, associated with sound “brightness”, and singer's formant cluster), comparing for each attribute the sounds elicited by opposite descriptors. In Exp2, participants ($n = 60$: 15 singers, 15 other musicians [mostly instrumentalists], 30 non-musicians) matched each recording from Exp1 with one of two descriptors – the “correct” descriptor, associated with that recording in Exp1, or its opposite. For each matching task, participants also rated their level of confidence.

Results

In Exp1, significant differences between all three descriptor pairs were found for RMS levels, suggesting that singers apply loudness in rendering diverse verbal images. For spectral centroid, the pair bright/dark elicited stronger and broader differences than the other two pairs, consistent with the association of that spectral attribute with sound brightness. In Exp2, accuracy (matching sound with the correct verbal imagery) was significantly higher than chance for all participants' groups and imagery types, excluding one imagery x group intersection. Both accuracy and confidence levels were highest for sounds elicited by brightness imagery (bright/dark). Singers were significantly more accurate than both other musicians and non-musicians. The latter two groups did not significantly differ in accuracy, though the “other musicians” group exhibited significantly higher confidence levels than non-musicians.

Conclusions

Results indicate that verbal imagery can indeed significantly affect vocal timbre (Exp1) and that listeners, both musicians and non-musicians, can identify intended associations between sound and imagery. Surprisingly, specific musical expertise (singing), rather than general musical training, enhanced such perception of image/sound relationships. Overall, our methodology, integrating production (performance) and perception research, may serve as a basis for comparative studies in other domains of music.

Prevalence of imagined social interaction is increased by concurrent task-irrelevant music

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Background

Evolutionary theories suggest that music's adaptive significance depends on its ability to generate social bonding (Savage et al., 2021). Undeniably, music has an important presence in many human cultures and contains fundamentally social elements (Cross, 2001). For instance, music-making is linked with prosocial outcomes, such as enhanced interpersonal bonding and establishing social dynamics (MacRitchie et al., 2018; Rabinowitch et al., 2013). However, not only music making, but also music listening may evoke thoughts of social interactions (Cabedo-Mas et al., 2021). Here, we explore whether this is the case, within the context of a mental imagery paradigm.

Aims

This study aims to test whether task-irrelevant background music can induce thoughts of social interaction in a mental imagery paradigm.

Methods

We analysed 700 free text responses collected from 100 participants in a previous study (Herff et al., 2021), in which participants imagined the continuation of a journey under music and silence conditions. Manual data coding, blind to the experimental condition, was conducted to compare the effects of music and silence on social interaction. Additionally, social interactions involving humans and non-humans and the use of first- and third-person language were annotated to determine whether it varied between music and silence conditions.

Results

Bayesian Mixed Effects models revealed strong evidence for greater social interaction in music ($M = 0.36$, $SE = 0.02$) relative to silent ($M = 0.17$, $SE = 0.04$) imagination conditions ($\beta = 1.47$, $EE\beta = 0.34$, $\text{Odds}(\beta > 0) > 9999^*$). No strong evidence of music ($M = 0.22$, $SE = 0.04$) versus silent ($M = 0.09$, $SE = 0.03$) conditions ($\beta = 0.46$, $EE\beta = 0.69$, $\text{Odds}(\beta > 0) = 2.97$) was found when social interaction was broken down into human and non-human social interactions. There was also no strong evidence between first- and third-person language use between the music ($M = 1.33$, $SE = 0.7$) and silence ($M = 1.30$, $SE = 0.7$) conditions, ($\beta = 0.46$, $EE\beta = 0.69$, $\text{Odds}(\beta > 0) = 2.97$).

Discussion

This study supports the hypothesis that music can evoke imagery related to social interaction more intensely than silence. It seems, not only does music boost social interactions between individuals (Hove & Risen, 2009), it also enhances social thought within an individual. Future research is needed to explore how different visual stimuli or additional situational prompts (e.g., verbal instruction) may interact with music to influence the content and nature of imagined social interactions. Moreover, further research is required to establish precisely whether imagined social interactions provide the same, or at least some, of the positive effects that real social interactions provide (Krach et al., 2010; Ybarra et al., 2011).

References

- Cabedo-Mas, A., Arriaga-Sanz, C., & Moliner-Miravet, L. (2021). Uses and perceptions of music in times of COVID-19: A Spanish population survey. *Frontiers in Psychology, 11*, Article 606180. <https://doi.org/10.3389/fpsyg.2020.606180>
- Cross, I. (2001). Music, cognition, culture, and evolution. *Annals of the New York Academy of Sciences, 930*(1), 28-42. <https://doi.org/10.1111/j.1749-6632.2001.tb05723.x>
- Herff, S. A., Cecchetti, G., Taruffi, L., & Déguernel, K. (2021). Music influences vividness and content of imagined journeys in a directed visual imagery task. *Scientific Reports, 11*(15990). <https://doi.org/10.1038/s41598-021-95260-8>
- Hove, M. J., & Risen, J. L. (2009). It's all in the timing: Interpersonal synchrony increases affiliation. *Social Cognition, 27*(6), 949-960. <https://doi.org/10.1521/soco.2009.27.6.949>
- Krach, S., Paulus, F., Boddien, M., & Kircher, Ti. (2010). The rewarding nature of social interactions. *Frontiers in Behavioral Neuroscience, 4*. <https://doi.org/10.3389/fnbeh.2010.00022>
- MacRitchie, J., Herff, S. A., Procopio, A., & Keller, P. E. (2018). Negotiating between individual and joint goals in ensemble musical performance. *Quarterly Journal of Experimental Psychology, 71*(7), 1535-1551. <https://doi.org/10.1080/17470218.2017.1339098>
- Rabinowitch, T.-C., Cross, I., & Burnard, P. (2013). Long-term musical group interaction has a positive influence on empathy in children. *Psychology of Music, 41*(4), 484-498. <https://doi.org/10.1177/0305735612440609>
- Savage, P. E., Loui, P., Tarr, B., Schachner, A., Glowacki, L., Mithen, S., & Fitch, W. T. (2021). Music as a coevolved system for social bonding. *Behavioral and Brain Sciences, 44*, Article E59. <https://doi.org/10.1017/S0140525X20000333>
- Ybarra, O., Winkielman, P., Yeh, I., Burnstein, E., & Kavanagh, L. (2011). Friends (and sometimes enemies) with cognitive benefits: What types of social interactions boost executive functioning? *Social Psychological and Personality Science, 2*(3), 253-261. <https://doi.org/10.1177/1948550610386808>

How EDM moves us: Embodiment, emotion and social bonding on the dancefloor

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Background

Interdisciplinary literature on subjective experiences of EDM attendance reveal strong emotional experiences and social connection as inherent aspects of EDM culture (Cannon & Greasley, 2021). EDM is characterised by rhythmic properties that promote sensorimotor entrainment to a metrical beat, which has been shown to facilitate interpersonal synchronisation among a group of dancers (Solberg & Jensenius, 2019). Interpersonal synchronisation has been found to be positively associated with group social bonding across experimental studies (Tarr et al., 2016). EDM is also characterised by structural features, such as the break routine, that bring about intense affective experiences and distributed embodied pleasure responses on the dancefloor (Witek, 2017). Strong affective responses to music may be conveyed through body movements and the resultant emotional contagion among dancers, in turn, may lead to a powerful collective emotional experience. These communal experiences may increase feelings of closeness with others, characterised as “kama muta” (Fiske et al., 2019). As such, the embodied corporeal and affective experiences afforded by EDM, when co-experienced, may contribute to social bonding within a group. Despite the potential of shared emotional experiences and interpersonal synchrony to foster social bonding, the extent to which affective experiences and synchronised movement behaviour are related in an EDM context and the degree to which these experiences contribute to social bonding amongst dancers has yet to be systematically examined.

Aims:

The current study is exploratory and is underpinned by the following key research aims:

1. Examine the nature of affective experiences afforded by attendance at an EDM event.
2. Understand to what extent participants entrain to the music and interpersonally synchronise.
3. Explore the relationship between movement and affective experiences on the dancefloor.
4. Analyse the relationship between social bonding and movement/affective experiences.

Methods:

A volunteer sample of participants will dance to a pre-recorded EDM playlist in a mock-up club environment (approx. 30 mins) in which they will be video recorded to gather behavioural and contextual data. Participants will wear Empatica E4 wristbands in order to measure movement (via the accelerometer). Affective experiences will be measured using the self-report KAMMUS-2 (kama muta)

scale and a 7-item scale measuring distributed embodied pleasure developed for the purposes of this study (derived primarily from existing theoretical work). Social bonding will be measured using a self-report social bonding index consisting of the inclusion with self in other scale (IOS) and items relating to perceived likeability, connectedness and similarity in personality of other participants.

Participants will complete these measures following the dance session.

Results

This study is an early work in progress and there are no results to report at this stage. In brief, relationships between the degree to which participants are interpersonally synchronised with the group and the extent to which they experience strong affective experiences, and whether these are related to social bonding will be examined using correlational analysis. The extent to which the strength of these relationships are moderated by perceived emotional synchrony and emotional contagion (as expected) will also be analysed.

Conclusion

The potential for EDM to engender strong emotional experiences and foster interpersonal synchrony necessitates empirical investigation into how these experiences may contribute to social bonding in an ecologically valid EDM setting. The present study has begun to address this through planned examinations of embodied and affective experiences with EDM in a mock-up club environment, with plans to conduct a follow-up study in a real-world nightclub.

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.
- Fiske, A. P., Seibt, B., & Schubert, T. (2019). The sudden devotion emotion: Kama muta and the cultural practices whose function is to evoke it. *Emotion Review*, 11(1), 74-86.
- Solberg, R. T., & Jensenius, A. R. (2019). Group behaviour and interpersonal synchronisation to electronic dance music. *Musicae Scientiae*, 23(1), 111-134.
- 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.

Inducing self-related emotion evaluation by modulating the speaking voice during brain imaging

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Background

The non-verbal emotional tone of our voice plays a ubiquitous role in human interactions. As listeners, we respond to emotional sounds of other people's voices immediately. Yet, recent evidence suggests that we may also listen to the emotional sound of our own voice to make inferences about how we feel (Aucouturier et al., 2016; Goupil et al., 2021). These experiments use a novel paradigm that covertly applies programmable audio effects in order to "color" the perceived feedback from one's own voice with an emotional tone that was not intended by its producer (Rachman et al., 2018).

Aims

This project aimed to implement this novel approach for fMRI in order to characterize the brain mechanisms by which the acoustic self-perception of non-verbal emotional cues in the own speaking voice may interact with our concurrent emotional state.

Methods

Thirty-eight participants (22 females, median age 24.5, MAD = 3,86) read neutral situational scenarios from a first-person perspective in a one-hour fMRI scan session and rated valence and arousal to evaluate how they would feel in the corresponding scenario. During reading, programmable audio filters are covertly applied to make the perceived feedback from the own voice either sound happier (positive fundamental frequency shift [+50%], a peak notch filter to simulate the impact of smiling [frequency = 2880Hz, gain = 3,00, Q = 0,74]) or sadder (negative fundamental frequency shift [-50%] and a high-shelf filter to attenuate higher frequencies [frequency = 8000Hz, gain = 0,25, Q = 1]). The experiment was organized into two blocks of 30 minutes, each containing 16 trials. Both blocks contained vocal feedback manipulations in the happy, sad, and neutral presets. The order of the presets and number of scenarios in each preset were as follows: block 1) happy = 6, sad = 5, neutral = 5; and block 2) neutral = 6, sad = 5, happy = 5. Analyses involved contrasting both the happy and sad effect ratings and the fMRI data with those of the unfiltered voice feedback to detect mood changes and their underlying brain activations.

Results

The “sad” audio filter yielded more negative valence ratings of the scenarios and the “happy” filter had more positive valence ratings relative to no audio filter. Preliminary fMRI analyses contrasting happy vs sad showed increased brain activation related to sound perception and emotional prosody (BA41,22, 47), emotional and social behavior (temporal pole), self-processing (posterior cingulate), and emotional control (frontal pole). The inverse contrast (sad vs happy) showed increased activation in visual and vocal motor areas.

Conclusion

Here we demonstrate that covert vocal feedback manipulations are feasible in an MRI setting and that these effects can be replicated in the Danish language. Our results support the theory of self-perception, which states that we unconsciously observe our own behavior to make inferences about our emotional state (Bem, 1972). In line with the theory of constructed emotion (Barrett, 2017), self-voice perception may influence core affect and thus one’s emotional experience.

Preliminary neuroimaging results suggest that the brain implements emotional changes through interactions between the monitoring and recognition of non-verbal emotional expressions during speech production and their corresponding self-related socio-emotional cognitions (Ardila et al., 2014; Koechlin, 2011). These findings support the role of the self in acoustic-emotional processes.

References

- Ardila, A., Bernal, B., & Rosselli, M. (2014). The elusive role of the left temporal pole (BA38) in language: a preliminary meta-analytic connectivity study. *International Journal of Brain Science*, 2014. Article 946039. <https://doi.org/10.1155/2014/946039>
- Aucouturier, J. J., Johansson, P., Hall, L., Segnini, R., Mercadié, L., & Watanabe, K. (2016). Covert digital manipulation of vocal emotion alter speakers’ emotional states in a congruent direction. *Proceedings of the National Academy of Sciences*, 113(4), 948-953. <https://doi.org/10.1073/pnas.1506552113>
- Barrett, L. F. (2017). The theory of constructed emotion: an active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience*, 12(1), 1-23. <https://doi.org/10.1093/scan/nsw154>
- Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 6, pp. 1–62). Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60024-6](https://doi.org/10.1016/S0065-2601(08)60024-6)
- Brewer, J. A., Garrison, K. A., & Whitfield-Gabrieli, S. (2013). What about the “self” is processed in the posterior cingulate cortex?. *Frontiers in Human Neuroscience*, 7, 647. <https://doi.org/10.3389/fnhum.2013.00647>
- Goupil, L., Johansson, P., Hall, L., & Aucouturier, J. J. (2021). Vocal signals only impact speakers’ own emotions when they are self-attributed. *Consciousness and Cognition*, 88, Article 103072. <https://doi.org/10.1016/j.concog.2020.103072>
- Koechlin, E. (2011). Frontal pole function: what is specifically human?. *Trends in Cognitive Sciences*, 15(6). <https://doi.org/10.1016/j.tics.2011.04.005>
- Rachman, L., Liuni, M., Arias, P., Lind, A., Johansson, P., Hall, L., Richardson, D., Watanabe, K., Dubal, S. & Aucouturier, J. J. (2018). DAVID: An open-source platform for real-time transformation of infra-segmental emotional cues in running speech. *Behavior Research Methods*, 50(1), 323-343. <https://doi.org/10.3758/s13428-017-0873-y>

The association between musical instrument practice and cognitive control in older adults

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Background

A growing body of literature suggests that practicing a musical instrument is a convenient and affordable way to improve cognitive health in older age, especially the executive functions. This is an encouraging perspective as the world population is aging, and cognitive decline among older adults is becoming prevalent. Cross-sectional and longitudinal studies on this topic provide encouraging results, however they follow different theoretical frameworks when explaining the possible neural mechanisms behind the effect of music training on cognition. Additionally, they provide insufficient discussion about the components inside the practice of a musical instrument such as memorization, sight-reading, and bi-manual coordination. This gap in the literature to some extent hinders the possibility to compare previous studies and design future studies accordingly. In this paper, we aim to address this issue by providing a comprehensive overview of the theoretical frameworks used in previous literature.

Aims

The aims of this study are: (1) To review the literature on the effect of musical instrument training on the executive functions and list their theoretical framework. Two types of information will be collected: the cognitive and neural mechanisms behind the putative effect on executive functions, and the components of musical instrument training involved; (2) To organize the literature based on this information in a unified theoretical framework.

Main Contribution

Three main categories of mechanisms have been identified as being responsible for the effect of musical instrument training on executive functions. The first category is related to the direct cognitive load and multi-modal stimulus on the executive functions. Presumably, music performance would work on the mind in a similar fashion as aerobics does with our body, putting heavy demands on brain areas related to the executive functions, and responsible for functional connectivity of multiple systems that are not as intensively activated in daily activities. The second type of mechanism assumes that music may improve the executive functions indirectly through stimulation of associated abilities like language or motor control. The third type of mechanism is related to emotions, mood enhancement and social engagement. For example, music training may activate brain structures involved in reward and pleasure, thereby

reducing stress and improving mood. This process would reestablish chemical homeostasis in the brain, affecting the brain's network related to executive functions.

Implications

A clear understanding of the possible mechanisms that underlie the positive effects of the practice of a musical instrument on cognition can guide the design of future longitudinal studies. These studies should not only focus on whether musical instrument training affects executive functions but also on who benefits the most, and which components are responsible for these effects.

Practice-based research into new methods of working with timbre

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Background

Timbre is a fundamental multidimensional aspect of music, increasingly controllable through technological advances enabling precise frequency analysis and manipulation. Since pitches typically derive from timbres (Milne et al., 2016), electronic timbre manipulations provide opportunities to control perceptual attributes of pitch relationships. Spectral music uses pitch tunings additively as a basis for timbre construction (Teodorescu-Giocanea, 2003). Conversely, I use electronic timbre control to modify intervals/chords in a subtractive way based on perceptual attributes.

Objectives

My compositions and upcoming online survey will evaluate these processes with listeners. I anticipate that musically untrained participants will often perceive modified dissonant intervals as being more consonant and stable - perhaps comparable to unmodified consonant intervals - while tonal relations will change less for musically trained participants due to pitch recognitional practice-based projects that break down boundaries between timbre and pitch in music based on perceptual links. Towards this, I aim to develop efficient tools for manipulating spectra based on desired perceptual outcomes. These could evolve into unique techniques for composers, producers and sound designers, combining pitch and timbre into a pliable composite. Individual note timbre controls benefit this approach, requiring adaptive electronics. With such techniques, inefficiencies emerge that would benefit from automation (Bernardes et al., 2014).

Methodology

Compositions facilitated by prior research and tool outcomes inform subsequent analysis and praxis. First, I am manipulating auditory roughness, a measurable timbral property that significantly contributes to dissonance perception (Farbood & Price, 2017). Using Max/MSP software with `zsa.descriptors` and CNMAT “roughness” externals, I analyse audio to eliminate close frequency proximities that induce acoustic beating (roughness). Through perceptually informed analysis, compositions, and audio surveys, I can test the salience of these modulations. I evaluate their effectiveness by dividing roughness measurements from processed and unprocessed piano intervals; both compared synchronously with rolled-off frequencies over 2Khz to prevent transients from influencing measurements. Subsequently, I take a running average of the divided roughness values to find the average proportion of roughness removal.

Results

Initial experiments led to a working Max MSP tool for automatically detecting and eliminating roughness. It targets and removes frequencies from clashing pairs, with selectable patterns: left partials, right partials, alternating, or reverse alternating. This prototype effectively reduces the average measured roughness in most signals, especially when the filter configuration is frozen instead of continuously updating. Work is needed to interpolate dynamically-updating filters, preventing abrupt changes.

Samples controlled for overall amplitude, all using Pianoteq 7 default settings. Filters frozen. Reduction percentages, averaged across 5,000 samples for each of four patterns (20,000 samples averaged per interval), were as follows:

- Minor second F3-F#3: 75.71% • Tritone E4-Bb4: 70.84%
- Tritone C3-F#3: 60.8%
- Perfect fifth Eb3-Bb3: 98.44%

Discussion

My compositions and upcoming online survey will evaluate these methods with listeners. I anticipate that musically-untrained participants will often perceive modified dissonant intervals as being more consonant and stable - perhaps comparable to unmodified consonant intervals - while tonal relations will change less for musically-trained participants due to pitch recognition. Previous similar surveys found perception differences to be dependent on musical training (Arthurs et al., 2017).

With further refinements, tools using similar techniques could develop into new accessible audio plugins with varied applications as creative tools. Adapting my tool as an effect plugin would require further consideration due to challenges with changing spectra in auditory roughness models (Vassilakis, 2005). Eventually, it could be an efficient option for composers exploring the area between pitch and timbre.

References

- Arthurs, Y., Beeston, A. V., & Timmers, R. (2017). Perception of isolated chords: Examining frequency of occurrence, instrumental timbre, acoustic descriptors and musical training. *Psychology of Music, 46*(5), 662–681. <https://doi.org/10.1177/0305735617720834>
- Bernardes, G., Davies, M. E. P., Guedes, C., & Pennycook, B. (2014). Considering roughness to describe and generate vertical musical structure in content-based algorithmic-assisted audio composition. In *Proceedings of the Joint International Computer Music and Sound and Music Computing Conference* (pp. 318–324). Athens, Greece.
- Farbood, M., & Price, K. (2017). The contribution of timbre attributes to musical tension. *The Journal of the Acoustical Society of America, 141*(1), 419–427. <https://doi.org/10.1121/1.4973568>
- Krumhansl, C. L., & Iverson, P. (1992). Perceptual interactions between musical pitch and timbre. *Journal of Experimental Psychology: Human Perception and Performance, 18*(3). <https://doi.org/10.1037/0096-1523.18.3.739>
- Milne, A. J., Laney, R., & Sharp, D. B. (2016). Testing a spectral model of tonal affinity with microtonal melodies and inharmonic spectra. *Musicae Scientiae, 20*(4), 465–494. <https://doi.org/10.1177/1029864915622682>
- Teodorescu-Ciocanea, L. (2003). Timbre versus spectralism. *Contemporary Music Review, 22*(1-2), 87-104. <https://doi.org/10.1080/0749446032000134751>

Vassilakis, P. (2005). Auditory roughness as a means of musical expression. In R. A. Kendall & R. W. H. Savage (Eds.), *Selected reports in Ethnomusicology: Perspectives in systematic musicology* (pp. 119–124). Los Angeles, CA: Department of Ethnomusicology, University of California.

How do people categorise music? An exploratory study on genre use in popular music categorisation

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Background

Throughout the history of art and music, the concept of genre has played a fundamental role in categorizing and defining creative works. Various theoretical frameworks have been proposed to explain the nature of genres, ranging from classical categorization (Aristotle, n.d.), to the more nuanced prototype theory (Deliège, 1996, 2001; Pollard-Gott, 1983; Rosch, 1978). Nevertheless, the classification of music genres remains a subject of ongoing scholarly debate (Holt, 2007; Johnson, 2018).

Within the realm of academic discourse, music genre labels have been used for various purposes from exploring personality differences based on music genre preferences to exploring people's musical identities (Greasley et al., 2013; Rentfrow et al., 2009, 2011; Rentfrow & Gosling, 2003, 2006). In the contemporary landscape of popular music, genre labels have become increasingly elusive, prompting a critical inquiry: 'Are genres (still) universally defined?'

Aims

The present research aimed to understand the underlying principles of music categorisation. Focusing on four prominent music genres (jazz, pop, rock, and hip-hop), it explores whether genres are the primary framework for categorizing unfamiliar music and investigates the universality of genre definitions. It also examines alternative music categorization strategies and factors influencing how people categorize music.

Methodology

This study employed a free sorting task, presenting participants with 40 music excerpts (ten per genre) to group based on perceived similarities. Participants detailed their categorization strategies, and questionnaires assessed music preferences (STOMP-R; Rentfrow & Gosling, 2003) and musical sophistication (GMSI; Müllensiefen et al., 2014).

Data analysis included correlation tests, network analysis (Scott, 2017), and thematic analysis (Braun & Clarke, 2006) for qualitative data. Among the 38 participants, 22 were female, 12 were male, with a mean age of 32 years.

Results

The results indicate that majority of participants favoured genres, when asked to identify their preferred strategy(ies) for music categorization. However, inconsistencies emerged in genre understanding, with

some excerpts consistently grouped together regardless of genre labels. These findings would suggest that while genre remains the preferred method of organizing music, the definitions of genres vary among individuals.

Conclusions

In summary, this exploratory study establishes a foundational basis for future research in genre recognition and similarity perception. Large-scale replication studies are necessary to confirm the generalizability of these findings across different genres and cultural contexts. These results underscore the importance of adopting a more nuanced approach to the utilization of genre labels in music perception and preference research, with the aim of improving the accuracy and relevance of such studies.

References

- Aristotle. (n.d.). *Poetics* (A. Kenny, Ed.). University Press.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Deliège, I. (1996). Cue abstraction as a component of categorisation processes in music listening. *Psychology of Music, 24*(2), 131–156. <https://doi.org/10.1177/0305735696242007>
- Deliège, I. (2001). Prototype effects in music listening: An empirical approach to the notion of imprint. *Music Perception, 18*(3), 371–407. <https://doi.org/10.1525/mp.2001.18.3.371>
- Greasley, A., Lamont, A., & Sloboda, J. (2013). Exploring musical preferences: An in-depth qualitative study of adults' liking for music in their personal collections. *Qualitative Research in Psychology, 10*(4), 402–427. <https://doi.org/10.1080/14780887.2011.647259>
- Holt, F. (2007). *Genre in Popular Music*. University of Chicago Press. <http://ebookcentral.proquest.com/lib/durham/detail.action?docID=686254>
- Johnson, T. (2018). *Analyzing Genre in Post-Millennial Popular Music*. Dissertations, Theses, and Capstone Projects. https://academicworks.cuny.edu/gc_etds/2884
- Müllensiefen, D., Gingras, B., Musil, J., & Stewart, L. (2014). The musicality of non-musicians: An index for assessing musical sophistication in the general population. *PLOS ONE, 9*(2), e89642. <https://doi.org/10.1371/journal.pone.0089642>
- Pollard-Gott, L. (1983). Emergence of thematic concepts in repeated listening to music. *Cognitive Psychology, 15*(1), 66–94. [https://doi.org/10.1016/0010-0285\(83\)90004-X](https://doi.org/10.1016/0010-0285(83)90004-X)
- Rentfrow, P. J., & Gosling, S. D. (2003). The do re mi's of everyday life: The structure and personality correlates of music preferences. *Journal of Personality and Social Psychology, 84*(6), 1236.
- Rentfrow, P. J., & Gosling, S. D. (2006). Message in a ballad: The role of music preferences in interpersonal perception. *Psychological Science, 17*(3), 236–242. <https://doi.org/10.1111/j.1467-9280.2006.01691.x>
- Rentfrow, P. J., Goldberg, L. R., & Levitin, D. J. (2011). The structure of musical preferences: A five-factor model. *Journal of Personality and Social Psychology, 100*(6), 1139–1157. <https://doi.org/10.1037/a0022406>
- Rentfrow, P. J., McDonald, J. A., & Oldmeadow, J. A. (2009). You are what you listen to: Young people's stereotypes about music fans. *Group Processes & Intergroup Relations, 12*(3), 329–344. <https://doi.org/10.1177/1368430209102845>
- Rosch, E. (1978). Principles of Categorisation. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and categorization* (pp. viii, 328). Lawrence Erlbaum.
- Scott, J. (2017). *Social Network Analysis*. SAGE Publications Ltd. <https://doi.org/10.4135/9781529716597>

Aural diversity in live music venues: A qualitative enquiry into auditory experiences of autistic individuals

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Background & Aims

An increase in awareness of prevalent neurodivergent traits, some of which are associated with Autism Spectrum Conditions (ASC) and Attention Deficit Hyperactivity Disorder (ADHD), has encouraged more conversations around aural diversity and its requirements. Aural diversity encompasses symptomatic conditions such as tinnitus, hearing impairments and other diverse hearing experience types (DHET) that are rarely met in traditional societal spaces. This is due to the lack of knowledge and awareness from those who identify with the typical hearing experience type (THET) towards those who have DHET; there is often ignorance, lack of technological knowledge among venue owners, as well as the societal challenges of being in a minority group where the needs of the majority are prioritised.

Substantial research conducted in music and wellbeing already evidences the benefits of music listening for the general public, whether in venues or personal private spaces.

However, symptoms that relate to conditions such as autistic burnout can prevent relaxation and enjoyment towards event attendance due to sensory avoidance and the additional strain of masking during societal gatherings. Technological innovations to support this have been present in particular venues across the UK since 2015 (e.g. The Lowry in Greater Manchester and Riverside Studios in London) and assist those who require them.

Unfortunately, limited research has been conducted into the technology and autistic individuals' opinions on these systems. By filling part of that gap, this study shows the importance of making the entertainment arts accessible for all, no matter how they experience the world from an aural perspective.

Method

Through semi-structured interviews, six participants were asked a series of questions centred around elements of their venue experiences including sound sensitivities, travelling to and from the venue, and whether the current technological system that is used in some venues across the country could work for them with other aspects of the live music experience still in place. Thematic analysis was then applied to collate themes that are perceived as 'common' to the neurodiverse audience member as well as some meaningful themes that came from development of responses from participants.

Results

The findings emerging from this study revealed four overarching themes (1) Sensitivity, (2) Emotion, (3) Venue Experiences, and (4) Materials and Accessibility. Thirteen themes were categorised into these overarching themes which captured each participant's journey through music in live venues. These ranged from separation of emotion to crowd sensitivity.

Implications

Through similarities and differences in participant responses between themes, this study explores the lived experiences of a sample of autistic individuals when attending live music venues. Results coincide with various studies on emotional and physiological attributes when listening to music as well as the combination of symptoms that can characterise autistic burnout. More research is needed to understand the experiences of autistic individuals in live music settings and whether the industry needs to do more to promote aural inclusivity within audience engagement for concert and event attendance throughout the UK.

The role of music in the civil rights movement and how music changed the society

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Introduction

This research indicates how music helped change society, focusing on the Civil Rights Movement (CRM) in the States. CRM is the social movement to establish the civil rights of the African American from 1954 to 1968. History.com Editors (2009) shows African Americans had suffered discrimination since the beginning of the slave trade in 1619 and the National Association for the Advancement of Colored People (NAACP, n.d)) has stated at least 3,446 African Americans had been lynched in the States during 1882 to 1968. CRM indeed began as a response to racial inequality and discrimination against African Americans, seeking to address and rectify these injustices through various non-violent protests, legislative changes, and activism with great leading of Martin Luther King Jr.

Methods

The aim of this research is to reveal the relationship between music and social change, particularly within the CRM, by using literatures and artist interviews. Protest folk songs have played a significant role in social justice struggles. According to Lenart (2005), the Albany campaign, the first mass grassroots movement for racial desegregation of whole local communities in 1961 to 1962, marked the initial use of music as a protest song in social movements, and activists used “We shall overcome” (Seeger, 1948) as a powerful protest anthem during the movement. Additionally, Denisoff (1966) has stated that King Jr stated the protest songs including “We shall overcome” (Seeger, 1948) emphasized unity and solidarity between protesters, and helped them march together. Therefore, folk protest music had been used as a binder to connect all races who participated in the movement.

Results

The research revealed that race is not necessarily a barrier to civil rights protest. As a matter of fact, White folk artists promoted the movement with King Jr and singable folk protest music, “We shall overcome” (Seeger, 1948), especially, had been used as a protest tool. Furthermore, protesters tried to achieve the movement with boycotts during the early CRM, which is the 1955 Montgomery Bus Boycott, though music changed the way of protest from the Albany campaign. Therefore, music has become an essential tool when people of various races engage in protest movements. This contribution of music to the campaign highlights its significance in the field of Sociomusicology.

Discussion

Historically, artists protest discrimination with music, though it might be difficult to determine which songs are most influential to society and people. Compared with CRM, the value of music to social issues could be determined through social media in the 21st century. For instance, Rina Sawayama has protested Asian racism, micro aggression, especially, in “STFU!” (2020). As Sawayama (2019) said “*I wanted to play with stereotypes in the video, how Asian women aren't often allowed to express anger or rage, or be dominant*” in Lasoye's interview, the video starts from microaggression she experienced. Additionally, she revealed a comment from a man who expressed embarrassment about having engaged in microaggression in Goto's interview in 2020. All of the findings suggest that music has a strong power of changing society.

References

- Alexander, J. (2022, January 15). MLK and the songs of the Civil Rights Movement. *The tablet*. <https://thetablet.org/mlk-and-the-songs-of-the-civil-rights-movement/>
- Denisoff, R. S. (1966). Songs of persuasion: A sociological analysis of urban propaganda songs. *The Journal of American Folklore*, 79(314), 581–589. <https://doi.org/10.2307/538223>
- Goto, M. (2020). “Rina Sawayama: “Japanese women don't get angry,” a stereotype that has been overturned”. *She is*. <https://sheishere.jp/interview/202004-rinasawayama/2/>
- History.com Editors. (2009, October 14). Black History Milestones: Timeline. *History*. <https://www.history.com/topics/black-history/black-history-milestones>
- Lasoye, M. (2019, November 23). ‘STFU!’: Rina Sawayama talks raging against microaggressions. *gal-dem*. <https://gal-dem.com/rina-sawayama-interview-stfu-2019/>
- Lenart, N. (2005). The Albany movement and the origin of freedom songs. *The Gettysburg Historical Journal*, Article 4 .
- NAACP. (n.d.). History of lynching in America. *NAACP*. <https://naacp.org/find-resources/history-explained/history-lynching-america>
- Rina Sawayama. (2020). *Rina Sawayama - STFU!* [Video]. YouTube. <https://www.youtube.com/watch?v=XojM2D3F-Dc>

Using narrative interviewing to explore lived experiences of disability within Western Music Cultures

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Background

Music and disability studies is a growing research area which explores representations of disability in musical works, and accommodations for musicians in therapy and education (Lubet, 2011). Despite general public awareness of prolific musicians with impairments (e.g., Beethoven, Glennie) and autobiographical accounts (Martin, 2020), limited research actively seeks to explore the lived experiences of musicians with physical impairments. Additionally, research has suggested that musical identity is influenced by a range of personal and environmental factors, but has not explored the contribution of disability.

Aims

This presentation will outline the value of using narrative interviewing to understand the lived experiences of disabled musicians, drawing upon two interviews I have conducted across two studies. In these interviews, asking participants to share their experiences openly enabled the exploration of their multiple identities and discussion of how they interact with one another due to their disability experience.

Method

Narrative interviewing is a form of storytelling (Lawler & Mattingly, 2000) and through the stories participants share, we can learn about their life, who they are, and why they relate to the world as they do. Two physically disabled musicians shared their experiences through online interviews, reflecting on the lows and highs of musical involvement, the challenges and joys they have faced, and how their experiences have impacted their current musicianship.

Results

Both of the participants enjoyed sharing their experiences and appreciated the opportunity to do this. It was clear that although both participants saw their musical involvement as a fundamental part of their identity, this could not be isolated from the other identities they held. For instance, as a disabled woman within an orchestral section of able-bodied men, one participant experienced societal barriers and injustice. Similarly, as a young disabled musician, the other participant felt this made him an 'easy target'. These themes were able to be explored naturally through narrative interviewing.

Conclusion

Sharing stories is a powerful form of communication and can be invaluable for research. In the two interviews presented, the question of disability and musical identity arose from employing narrative interviewing, demonstrating how it is a valuable technique for exploring and understanding lived experience. Future research can consider this further and continue to explore the impact of disability on lived experience and musical identity.

References

- Lubet, A. (2011). *Music, disability, and society*. Temple University Press.
- Lawlor, M. & Mattingly, C. (2000). Learning from stories: Narrative interviewing in cross-cultural research. *Scandinavian Journal of Occupational Therapy*, 7(1), 4–14. <https://doi.org/10.1080/110381200443571>
- Martin, M. (2020, July 24). Crippling musicianship: reflections on compulsory non-disability in classical music and the orchestra. *The Sociological Review*. <https://thesociologicalreview.org/magazine/july-2020/music-and-sound/crippingmusicianship-reflections-on-compulsory-non-disability-in-classical-music-and-the-orchestra>

Evolution analysis of ear training applications use by musicology students

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Background

Ear training is an essential skill for musicians (Andrianopoulou, 2019; Karpinski, 1990) and mobile applications are increasingly being used to support and enhance this skill (Chen, 2015; Liu et al., 2021; Ouyang, 2022). However, the integration of these applications into formal higher education remains limited in many countries (Buonviri & Paney, 2020; Demirtaş, 2021; Terrien, 2018; Ventura, 2021). To explore the use and integration of ear training applications, we conducted two surveys in 2021 and 2023 at Sorbonne University, France's largest musicology student population.

Aims

This study analyzes the evolution of the use of ear training applications among musicology students. It considers opinions about their perceived effectiveness and the factors influencing their adoption. We also explore the benefits and drawbacks of integrating ear training applications into music education curricula.

Methods

Data were collected through two surveys sent by email to bachelor and master's students in 2021 and 2023 (125 and 110 students accordingly). Comparisons were made on the use of technology, attitudes towards the tools, and the participants' previous knowledge in music theory/ear training. Both groups were equivalent in age, years of musical practice, and university level at the time of the survey.

Results

The survey revealed an increased awareness and use of ear training applications over the two years. Almost all students (98%) reported learning difficulties despite most of them having studied music theory for over five years. Perception, memory, and concentration were the biggest causes of learning difficulties. By 2023, 73% of students were aware of ear training applications; the number of application users grew by 9%, and the percentage of long-term application users increased in comparison to 2021. The preferred applications (Perfect Ear, Complete Ear Trainer, MyEarTraining, and Ear Master Pro) contain powerful gamification features, the possibility to use the microphone to answer, and several ways to interact with the musical elements. However, most do not offer contextualized exercises, and the sound quality and diversity are limited. Student's perceived motivation and progress due to application use increased. The

preferred feature by students is the convenience of being able to study anywhere at any time. On the contrary, students are dissatisfied with the sound quality and pedagogical paths in existing applications.

Conclusions

Most musicology students lack confidence in their listening skills and feel the need to supplement their learning with ear training applications. However, the current applications available do not align with the academic contents, which hinders their effectiveness (Karpinski, 2000). Integrating ear training applications as an alternative method to develop aural skills can benefit struggling students. The applications can be tailored to the specific needs of the students, and aligned with the teachers' pedagogical approach and program's content (Crawford, 2017). Additionally, the applications could offer metacognitive strategies to help improve executive functions (Slevc et al., 2016). The integration of ear training applications into music education curricula can lead to a more inclusive education system that allows for different types of creative outcomes and provides students with more opportunities for success. Further research is needed to identify the most effective ways to integrate these applications into formal music education and to improve their usability and effectiveness in supporting student learning.

References

- Andrianopoulou, M. (2019). *Aural education: Reconceptualising ear training in higher music learning*. Routledge.
- Buonviri, N. O., & Paney, A. S. (2020). Technology use in high school aural skills instruction. *International Journal of Music Education*, 38(3), 431–440. <https://doi.org/10.1177/0255761420909917>
- Chen, C. W. J. (2015). Mobile learning: Using application Auralbook to learn aural skills. *International Journal of Music Education*, 33(2), Article 2. <https://doi.org/10.1177/0255761414533308>
- Crawford, R. (2017). Rethinking teaching and learning pedagogy for education in the twenty-first century: Blended learning in music education. *Music Education Research*, 19(2), 195–213. <https://doi.org/10.1080/14613808.2016.1202223>
- Demirtaş, E. (2021). The effect of the Covid-19 Process on the attitudes of music students towards e-learning (pp. 247–258).
- Karpinski, G. (1990). A model for music perception and its implication in melodic dictation. *Journal of Music Theory Pedagogy*, 4(1). <https://digitalcollections.lipscomb.edu/jmtp/vol4/iss1/10>
- Karpinski, G. (2000). Lessons from the past: Music theory pedagogy and the future. *Music Theory Online*, 6(3), Article 3. <https://www.mtosmt.org/issues/mto.00.6.3/mto.00.6.3.karpinski.html>
- Liu, C., Hwang, G.-J., Tu, Y., Yin, Y., & Wang, Y. (2021). Research advancement and foci of mobile technology-supported music education: A systematic review and social network analysis on 2008-2019 academic publications. *Interactive Learning Environments*, 0(0), 1-20. <https://doi.org/10.1080/10494820.2021.1974890>
- Ouyang, M. (2022). Employing mobile learning in music education. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-022-11353-5>
- Slevc, L. R., Davey, N. S., Buschkuhl, M., & Jaeggi, S. M. (2016). Tuning the mind: Exploring the connections between musical ability and executive functions. *Cognition*, 152, 199-211. <https://doi.org/10.1016/j.cognition.2016.03.017>
- Terrien, P. (2018). Chapitre 1. L'utilisation des nouvelles technologies dans l'enseignement de l'éducation musicale au collège. In *L'intégration du numérique dans l'enseignement. Apprentissage musical, instrumental et vocal*. L'Harmattan. <https://hal-amu.archives-ouvertes.fr/hal-02262525>
- Ventura, M. D. (2021). From the music learning process to its effective design. *International Journal of Emerging Technologies in Learning (IJET)*, 16(21), Article 21. <https://doi.org/10.3991/ijet.v16i21.24273>

A driving beat with a captivating melody on top – the relationship between groove and catchiness in polyphonic popular music

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Background

In western popular music, we often find compositions in which a salient melody or riff is put over a steady driving background. Such music conveys an infectious feeling of groove while providing a memorable and catchy part to sing along to. This groove and catchiness are two central characteristics of popular music and, allegedly, goals for composers and musicians. Whether these characteristics are connected or interact remains unclear. In music psychology, the experience of groove is commonly defined as pleasurable urge to move to music (Janata et al., 2012), while catchiness is less clearly defined, but usually related to memorability (Van Balen, 2016). Most studies on these two phenomena focus on the perspective of music listeners and on quantitative methods. In a recent study (Bechtold et al., 2023), we instead investigated the perspective of music creators using a qualitative approach. The present work focuses on a specific aspect of this study: the interaction of groove and catchiness in polyphonic music.

Aims

Our aim was to understand how groove and catchiness interact in polyphonic music, informed by the experiential, practical and artistic knowledge of music creators.

Methods

We conducted stimuli-guided semi-structured expert interviews with five professional popular music musicians. The analysis followed guidelines for theory-generating interviews by Bogner et al. (2014), with some adaptations where necessary. Due to the low number of participants, we regard these results as preliminary. We base our results on one hand on the expert's assessments and explanations of the popular music stimuli, and on the other hand on the many strategies the experts employ when they strive to promote groove and catchiness in their musical practice.

Results

We found that to promote groove or catchiness, music creators often reported strategies for both. There were three different forms of interaction between them in polyphonic music. First, groove and catchiness can mutually support each other but remain separable, which is common when high groove patterns and high catchiness patterns are combined. Second, when combining patterns that are groovy and catchy at the same time, the sensations of groove and catchiness in the music can fuse to a single experience. Third,

questioning an exclusively positive relationship, the two can be deliberately independent when either groove or catchiness are not present at all.

Conclusions

We investigated how music creators go about promoting groove and catchiness and how they relate these two phenomena in their practice. Our approach demonstrated why and how they employ specific musical strategies for these purposes. We found that groove and catchiness can interact and that a positive relationship between them is common, but not universal. In the next step, we will examine the interaction between groove and catchiness in a listening experiment.

References

- Bechtold, T. A., Kilchenmann, L., Curry, B., & Witek, M. A. G. (2023). Understanding the relationship between catchiness and groove: A qualitative study with popular music creators. *Music Perception, 40*(5), 353-372. doi: <https://doi.org/10.1525/mp.2023.40.5.353>
- Bogner, A., Littig, B., & Menz, W. (2014). *Interviews mit Experten. Eine praxisorientierte Einführung*. Springer VS.
- Janata, P., Tomic, S. T., & Haberman, J. M. (2012). Sensorimotor coupling in music and the psychology of the groove. *Journal of Experimental Psychology, 141*(1), 54–75. <https://doi.org/10.1037/a0024208>
- Van Balen, J. M. H. (2016). *Audio description and corpus analysis of popular music*. Utrecht University.

Modelling coordination strategies in improvised musical performances by skilled jazz groups

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Background

Jazz is a highly interactive form of music-making. The quality of performances in this genre depend not only on the improvisational virtuosity of the musicians in an ensemble, but also their ability to interact and coordinate their actions successfully with each other (Hagberg, 2017). Ethnographic research has provided some insight into the strategies that proficient improvisers claim to use when coordinating joint action (e.g., Berliner, 1994; Monson, 1996). However, musicians' own self-reported perspectives on their interactions with others are rarely unbiased (Schober & Spiro, 2014) and require support from large-scale modelling and objective analysis of real performances.

Aims

In this paper we aim to establish the different strategies used for coordinating group musical improvisations in jazz. Using data gathered from real musical performances, we first build computational models to identify the different strategies used to coordinate group improvisation in groups of pianists, bassists, and drummers. We then compare the relative optimization of these strategies via statistical analysis of parameters extracted from the models and through computer simulations.

Methods

In a controlled experiment, five duos of jazz pianists and drummers improvised together over a simulated internet network, with latency and jitter parametrically and orthogonally varied between 0 and 180 milliseconds to produce thirteen conditions (see [supplementary video recording](#)). Separately, in a corpus study, source separation and automatic onset detection algorithms were applied to over five hundred commercial jazz recordings made between the 1950s and the present day by pianists, bassists, and drummers. Timing data (onsets) were extracted from all performances and used to generate linear causal models of rhythmic coupling and phase correction between the performers (Jacoby et al., 2021). Further objective measures of performance success (tempo slope, timing irregularity, ensemble asynchrony) were also derived from this timing data.

Results

Our modelling uncovered two distinct coordination strategies used by improvising groups. In the experiment, two of our five duos predominantly adopted a 'democratic' approach, where each performer

coupled equally to the other. This strategy minimised asynchrony but caused performances to slow down, as musicians matched their performance to each other's delays. Three duos adopted a 'leadership' approach where coupling was asymmetric, with one performer adapting to their partner significantly less than their partner adapted to them. This strategy did not suffer from performance slow-down, but came at the expense of greater asynchrony. Both democratic and leadership coordination strategies were also demonstrated in the corpus study, albeit without the widespread changes in tempo or synchrony induced by the presence of the simulated network in the experiment.

Conclusion

Group jazz improvisation is a form of joint action in which coordination is achieved through interactive alignment between participants across a number of levels, including the sharing of musical knowledge and performance goals (Doffman, 2014). Our work highlights the range and optimality of the different strategies used by advanced groups to distribute timing adaptation and error correction during improvisation. Developing these skills forms a key aspect of musical training in this style, and as such our work has numerous further implications for jazz pedagogy.

References

- Berliner, P. (1994). *Thinking in jazz: The infinite art of improvisation*. University of Chicago Press.
- Doffman, M. (2014). Temporality, awareness, and the feeling of entrainment in jazz performance. In M. Clayton, B. Dueck, & L. Leante (Eds.), *Experience and Meaning in Music Performance* (pp. 62–85). Oxford University Press.
- Hagberg, G. L. (2017). The ensemble as plural subject. In E. F. Clarke & M. Doffman (Eds.), *Distributed Creativity: Collaboration and Improvisation in Contemporary Music* (pp. 300–313). Oxford University Press.
<https://doi.org/10.1093/oso/9780199355914.003.0025>
- Jacoby, N., Polak, R., & London, J. (2021). Extreme precision in rhythmic interaction is enabled by role-optimized sensorimotor coupling: Analysis and modelling of West African drum ensemble music. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 376(1835), Article 20200331. <https://doi.org/10.1098/rstb.2020.0331>
- Monson, I. T. (1996). *Saying something: Jazz improvisation and interaction*. University of Chicago Press.
- Schober, M. F., & Spiro, N. (2014). Jazz improvisers' shared understanding: A case study. *Frontiers in Psychology*, 5.
<https://doi.org/10.3389/fpsyg.2014.00808>

Paul's Granny music: Topics, Topical fields, and parody in Paul McCartney's music hall-inspired beatles songs (1967–1968)

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Background

Out of the four Beatles, bassist and songwriter Paul McCartney is most strongly linked to the band's musical references to the music hall tradition. However, McCartney's use of music hall characteristics varies in both their extent and the sharpness of their satire. What might a listener make of this seeming contradiction: using the same methods of reference to create differing meanings? To examine this question, I draw on musical topic theory (Echard, 2017; Hatten, 1994) and theories of musical parody and satire (Everett, 2004; Sheinberg, 2000).

Aims

I argue that McCartney deploys stylistic conventions of the music hall to explore multiple kinds of parody. After "Penny Lane," McCartney wrote four more songs deeply inspired by the music hall. "Your Mother Should Know" (1967) and "Martha My Dear" (1968) treat music hall references as topics, fleeting musical references that do not color the entire song. The songs also function as satirical parodies: they present two stylistic layers, one of which is exaggerated or distorted. For example, the piano and brass instruments in "Martha My Dear" are confined to specific song sections, with little to no overlap with rock-based sections. Such a demarcation draws attention to the music hall-esque characteristics and makes them feel very out of place.

Meanwhile, "When I'm Sixty-Four" (1967) and "Honey Pie" (1968) present the music hall as a topical field – a set of musical references that rules a song's soundscape – and are non-satirical parodies. They present two stylistic layers, but without exaggerating or distorting either. In "When I'm Sixty-Four," for instance, the rock instruments (electric guitar, bass, drums) blend with music hall-associated instruments rather than being clearly marked. The two stylistic layers, rock and music hall, are presented without exaggerating or distorting either.

To determine the nature of the parody in the song, I examine the extent of music hall characteristics, lyrics, and whether recontextualization of the music hall generates oppositions in meaning ("ethos;" Everett, 2004). This project thus proposes a possible interpretation behind McCartney's music hall references.

Main Contributions

This paper contributes to existing literature on topic theory in two ways. First, I explore the role(s) that parody plays in musical meaning through a topical lens. Second, topical readings of rock music are a rapidly growing area of interest; this research engages with that conversation by suggesting the Beatles' music as a fruitful area of analysis. The paper also contributes to existing literature on the Beatles and psychedelic rock by emphasizing musical meanings and how they develop, with topic theory as the analytical method.

Implications

McCartney's music hall-inspired songs are remarkably consistent in the connections they draw between type of reference (topic vs. topical field) and type of parody (satirical vs. non-satirical). The songs also draw a clear connection between levels of markedness and what meaning we are meant to take from a stylistic reference. This project may open up a promising area of inquiry into the meaning(s) of later rock music that draws on aspects of the music hall.

References

- Echard, W. (2017). *Psychedelic popular music: A history through musical topic theory*. Indiana University Press.
<https://doi.org/10.2307/j.ctt1zxxzgx>
- Everett, Y. U. (2004). Parody with an ironic edge: Dramatic works by Kurt Weill, Peter Maxwell Davies, and Louis Andriessen. *Music Theory Online*, 10(4).
- Hatten, R. (1994). *Musical meaning in Beethoven: Markedness, correlation, and interpretation*. Indiana University Press.
- Sheinberg, E. (2000). *Irony, satire, parody and the Grotesque in the music of Shostakovich: A theory of musical incongruities* (1st ed.). Routledge.

Max Weber's theory of rationality in indeterminate music: Rational features in John Cage's *Solo for Piano*

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Introduction

Die rationalen und soziologischen Grundlagen der Musik (1921, [Eng.] *The Rational and Social Foundations of Music*, 1958) is the posthumous publication of a German sociologist Max Weber (1864–1920). He applied the theory of rationality to Western art music and suggested the rational elements of Western art music is its arithmetical structure, theoretical basis, notational system, and the relationships between virtuosos, mass market, musical instruments, religions, and other societal elements (Weber, 1958), while irrational elements of Western music is about its asymmetrical structure, melodiousness, and intuitiveness. Weber's rationality has been criticised and assessed by many scholars (Darmon, 2015; Fend, 2010; Kalberg, 1980; Konoval, 2020; Levine, 1981; Mackinnon, 2001; Malhotra, 1979; Segady, 1993; Turley, 2001; Wierzbicki, 2010). Undoubtedly, these researchers have built a solid foundation for us to extend rationality further. Thus, this research extends rationality to Cage's indeterminate music, *Solo for Piano* (1957–58), to investigate applicability of this theory.

Methods

Weber draws from causality of the societal circumstances, subjective meaning, and value-oriented actions to propose the theory of rationality (Kalberg, 2008). This theory suggests that rational actions demonstrate individuals' actions appropriate to the beliefs and ends (Benn & Mortimore, 2015), while irrational actions represent the contradictions between impulsive desires and logics (Kalberg, 1980). I firstly conclude three rational features: (i) method/being methodical, (ii) function/functional, and (iii) interaction/being interactive. I then analyse eighty-four notations of *Solo for Piano* and apply these features to my analyses, and finally obtain the result suggesting applicability of this theory in Cage's indeterminate music.

Results

The application of theory of rationality to *Solo for Piano* shows three features in the relationships between compositional materials, functions of materials, types of freedom, and performing approaches. Irrationality represents the uses of paper imperfections and indeterminacy within the composition. Rationality represents Cage's graphic compositional system, including the intentional indeterminacy and the arrangement of elements. Rationalisation demonstrates the transformation of paper imperfections' nature from chance to semi-indeterminate.

Discussion

The theory of rationality has been developed as the music was no longer focused on harmonic structure and emotional expressions. Thus, I suggest, through Cage's interpretation of Zen Buddhism and his composing techniques, the theory of rationality will show its applicability. Cage interpreted Zen Buddhism as three ideas - freedom (Silverman, 2010), unimpededness, and interpenetration (Revill, 2014) - to show the 'chaos' of life (Cage, 2011), to limit the power of a composer, and to offer more freedom to performers. In terms of these purposes, he invented a graphic compositional system (Pritchett, 1993), in which he applied chance-driven materials, placed solid note heads on them, and then overlaid the note heads with a single staff that turned them into notes (Holzaepfel, 2011). This process shows: (i) rationalisation, turning chance paper imperfections into semi-determinate compositional materials, (ii) Cage's composition, constructing compositional elements in a methodical, structural, and interactive way, and (iii) intertwined relationships between rationality and irrationality. Cagean indeterminacy delivers his philosophical value and purpose, as well as allows freedom and unpredictability within performers' realisations.

References

- Benn, S. I., & Mortimore, G. W. (2015). Can ends be rational? The methodological implications. In S. I. Benn & G. W. Mortimore (Eds.), *Rationality and the social sciences: Contributions to the philosophy and methodology of the social sciences* (pp. 268–295). Routledge.
- Cage, J. (2011). *Silence: Lectures and writings* (19. pr). Wesleyan University Press.
- Darmon, I. (2015). Weber on music: Approaching music as a dynamic domain of action and experience. *Cultural Sociology*, 9(1), 20–37. <https://doi.org/10.1177/1749975513511789>
- Fend, M. (2010). Witnessing a 'process of rationalisation'? A review-essay of Max Weber's study on music. *Max Weber Studies*, 101–120.
- Holzaepfel, J. (2011). Cage and Tudor. In D. Nicholls (Ed.), *The Cambridge companion to John Cage*. Cambridge University Press.
- Kalberg, S. (1980). Max Weber's types of rationality: Cornerstones for the analysis of rationalization processes in history. *The American Journal of Sociology*, 85(5), 1145–1179. <https://doi.org/10.1086/227128>
- Kalberg, S. (2008). Max Weber. In G. Ritzer (Ed.), *The Blackwell Companion to Major Classical Social Theorists* (pp. 132–192). Blackwell Publishing Ltd. <https://doi.org/10.1002/9780470999899.ch6>
- Konoval, B. (2020). Max Weber and the sociology of music. In E. Hanke, L. Scaff, & S. Whimster (Eds.), *The Oxford Handbook of Max Weber* (pp. 463–486). Oxford University Press.
- Levine, D. N. (1981). Rationality and freedom: Weber and beyond. *Sociological Inquiry*, 51(1), 5–25. <https://doi.org/10.1111/j.1475-682X.1981.tb01021.x>
- Mackinnon, M. H. (2001). Max Weber's disenchantment: Lineages of Kant and Channing. *Journal of Classical Sociology*, 1(3), 329–351. <https://doi.org/10.1177/14687950122232576>
- Malhotra, V. A. (1979). Weber's concept of rationalization and the electronic revolution in western classical music. *Qualitative Sociology*, 1(3), 100–120. <https://doi.org/10.1007/BF02429896>
- Pritchett, J. (1993). *The music of John Cage*. Cambridge University Press.
- Revill, D. (2014). *The roaring silence: John Cage: a life* (2nd ed.). Arcade Publishing.
- Segady, T. W. (1993). Consequences of the increasing rationality of music: A reassessment of Weberian rationalization. *Sociological Spectrum*, 13(4), 451–463. <https://doi.org/10.1080/02732173.1993.9982044>
- Silverman, K. (2010). *Begin again: A biography of John Cage* (1st ed.). Alfred A. Knopf.

Turley, A. C. (2001). Max Weber and the Sociology of Music. *Sociological Forum*, 633–653.

Weber, M. (1958). *The Rational and social foundations of music* Southern Illinois University Press.

Wierzbicki, J. (2010). Max Weber and musicology: Dancing on shaky foundations. *The Musical Quarterly*, 93(2), 262–296.

<https://doi.org/10.1093/musqtl/gdq004>

The effects of “feeling moved” and “groove” on standstill

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Background

Music makes us move, even when we try to stand still. The standstill paradigm has been used in previous research to show that even when participants try to stand still, music makes us move more than silence and certain musical genres and features evoke more involuntary motions than others.

Aims

We aimed to examine involuntary musical motion in response to drum patterns (isochronous vs. on-off polyrhythm vs. 3 against 4 polyrhythm vs. random syncopation) and music selected to vary in groove and familiarity. We hypothesized that drum patterns with polyrhythms and music with high groove and familiarity would make people exhibit more micromotion. We also aimed to explore whether music that makes us feel emotionally “moved” (i.e., “touched”) actually makes us move. Finally, we explored the social dynamics of group listening by examining whether task success or group entrainment led to greater social connectedness.

Methods

One hundred and fifty-eight participants were recruited to compete against each other to stand as still as possible. Participants’ motion was measured using a single motion capture marker fixed to their head and they were recorded in groups of 3-15 at a time. Quantity of motion was calculated as the sum of the difference between consecutive samples in all 3 dimensions (speed). Cross-recurrence quantification analysis was used to calculate synchrony and temporally distributed coordination between pairs of participants in each group. Participants filled a survey before the experiment where they reported their demographics, genre preferences, musical behaviors, musician status, and alertness. After the session, participants reported their standstill strategies, feelings of self and group success, engagement, energy, musical liking and familiarity, distraction from other participants, connectedness, and trait empathy. The stimuli consisted of 4 drum patterns (“drums”) and 5 excerpts from real music (“music”). They were alternated with silence and they were presented in random order over loudspeakers.

Results

Analysis is ongoing but preliminary analyses employed nonparametric paired samples Wilcoxon signed rank tests to examine the differences between average quantity of motion in the excerpts. These results suggest that sound excerpts evoked more motion than silence ($W = 4579, p = .002$), music excerpts

evoked more motion than drum excerpts ($W = 4988, p = .018$), and there was greater temporally distributed coordination between participants during silence than music ($W = 48001, p = < .001$). There were no differences in micromotion attributable to manipulations of groove and familiarity, or “feeling moved”. There were no significant correlations between quantity of motion in the excerpts and the questionnaire items. However, there were significant correlations between questionnaire responses. There were positive correlations between success of self and success of the group, feeling engaged and energized by the music, feeling engaged and liking the music, liking the music and being familiar with it, and a negative correlation between success of self and feeling distracted by the other participants.

Conclusion

This research contributes to the field of embodied music cognition by demonstrating the inextricable connection between music and motion, and the social nature of group experiences, even in sonic silence.

Development and validation of self-regulated learning in music practice (SRL-MP) scale

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Background

To practise effectively, musicians must engage in self-regulated learning (SRL) by managing their thoughts, behaviours, and feelings. Zimmerman's (2000) three-phase cyclical model of SRL is a valuable tool that has allowed researchers to understand expert practice. According to this model, musicians regulate their practice in a continuous cycle of three phases: forethought, where musicians set goals and plan their course of action; performance, where musicians focus their attention and use strategies to achieve their goals; and self-reflection, where musicians evaluate their progress.

There are several scales that measure SRL in music practice (Araujo, 2015; Miksza, 2012) but only the Self-Regulated Learning Questionnaire (SRLQ; Hatfield et al., 2017) was based on this three-phase cyclical model. However, the SRLQ contains several issues, such as low internal consistency for some subscales and the inclusion of items that address performance rather than practice, even though they are two distinct tasks. To our knowledge, there is no existing scale with good psychometric properties that measures SRL in music practice from the lens of the three-phase cyclical model.

Aims

The aim of this study was to develop and validate a new questionnaire that measures SRL in the context of music practice. We specifically aimed to develop a questionnaire that is based on Zimmerman's (2000) three-phase cyclical model and considers the contextual and dynamic nature of SRL.

Methods

An initial pool of items was generated by selecting items from existing scales and adapting SRL scales from other domains (e.g., sport) to music practice. Five researchers with experience in the field of SRL and music practice evaluated the items for appropriateness and readability. Items were revised based on their feedback, then piloted on three musicians. The final pool consisted of 79 items across seven subscales (planning, self-efficacy, task strategies, self-monitoring, concentration, self-evaluation, self-reaction).

This pool was then administered to 290 musicians. Eligible participants were those who played a musical instrument or sang, were aged 18 years or over, and practised at least three times per week on average.

Results

The responses were split into two groups, Sample A and Sample B. A series of exploratory structural equation modelling (ESEM) was carried out on Sample A to reduce the item set. The final model consisted of 27 items over 5 subscales. ESEM of this model on sample B demonstrated a good fit ($\chi^2(226) = 354.744, p < .001$; CFI = 0.938; TLI = 0.904; RMSEA = 0.063, 90% CI [0.047, 0.077]; SRMR = 0.035). Internal consistency was acceptable for both the global scale ($\alpha = .90$) and each subscale (.84 < $\alpha < .87$).

Conclusion

Musicians must self-regulate their learning in a continuous cycle of planning, execution, and reflection during practice. The SRL-MP scale could be a useful tool to measure this cyclical process in musicians' practice sessions. Our future work will assess construct validity of the scale by comparing scores across known groups and examining correlation with related constructs such as self-efficacy.

References

- Araújo, M. V. (2016). Measuring self-regulated practice behaviours in highly skilled musicians. *Psychology of Music, 44*(2), 278–292. <https://doi.org/10.1177/0305735614567554>
- Hatfield, J. L., Halvari, H., & Lemyre, P.-N. (2017). Instrumental practice in the contemporary music academy: A three-phase cycle of Self-Regulated Learning in music students. *Musicae Scientiae, 21*(3), 316–337. <https://doi.org/10.1177/1029864916658342>
- Miksza, P. (2012). The Development of a measure of self-regulated practice behavior for beginning and intermediate instrumental music students. *Journal of Research in Music Education, 59*(4), 321–338. <https://doi.org/10.1177/0022429411414717>
- Passarotto, E., Preckel, F., Schneider, M., & Müllensiefen, D. (2022). Deliberate practice in music: Development and psychometric validation of a standardized measurement instrument. *Psychology of Music, 030573562110651*. <https://doi.org/10.1177/03057356211065172>
- Ritchie, L., & Williamon, A. (2011). Measuring distinct types of musical self-efficacy. *Psychology of Music, 39*(3), 328–344. <https://doi.org/10.1177/0305735610374895>
- Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Academic Press. <https://doi.org/10.1016/B978-012109890-2/50031-7>

Learning to “PractiseWell”: Observing piano students’ practice to explore the effects of an online intervention

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Background

To practise effectively, musicians must engage in self-regulated learning (SRL) and use skills such as goal setting, strategic planning, time management, and self-evaluation (McPherson et al., 2016). As these skills are often not taught explicitly in instrumental lessons (Koopman et al., 2007), it is essential to explore ways to foster music students’ practice skills. Practice interventions provide critical learning opportunities for students to develop autonomy in their practice. “PractiseWell” is a 9-week online intervention designed to equip conservatoire piano students with skills and strategies for effective practice and performance preparation. Our previous work (Suzuki & Mitchell, 2023) demonstrated good acceptability for PractiseWell. The next step is to investigate its effects on students’ practice.

Aims

The aim of this study was to pilot PractiseWell and examine changes in students’ practice sessions before and after the intervention.

Methods

Eight conservatoire piano students completed PractiseWell. Before and after the intervention, participants took part in a practice-performance task. This task consisted of sight-reading an unseen piece, practising it for 40 minutes, then performing it for a recording. The practice session was video recorded for analysis. Participants took part in structured interviews before and after the task following microanalytic procedures (Miksza et al., 2018) to elucidate their thought processes. Participants also rated clarity of goals, confidence, productivity, focus, and satisfaction with the final performance on a scale of 1- 10.

Interviews were audio recorded and transcribed verbatim. The practice videos were coded for behaviours and strategies using Behavioural Observation Research Interactive Software (BORIS; Friard & Gamba, 2016). In these analyses, we looked for markers of SRL and expert practice such as focus on specific musical goals (Chaffin et al., 2002; Zimmerman, 2008), pausing during practice (Palese & Duke, 2022; Suzuki & Mitchell, 2022), and high self- efficacy (Zimmerman et al., 2017).

Results

We found several positive changes in participants' practice. At post-test, participants worked more on musical goals, paused more during practice, and reduced aimless playing. Six participants reported higher

clarity of goals, while all participants reported increased productivity. Four participants reported higher confidence at post-test compared to pre-test. Interestingly, participants who did not report increased confidence consistently had low confidence scores at both pre-test and post-test. There were no discernible trends in self-reported levels of concentration or performance success. Substantial individual differences in improvement were observed among participants. In particular, one participant with initially very low SRL levels displayed minimal change.

Conclusion

This study demonstrated positive effects of PractiseWell on participants' practice. Our results also suggest that self-paced online interventions may not be suitable for students with very low self-regulation, as benefitting from them requires the ability to work independently. However, more studies are needed to investigate this further. Our future work will focus on conducting large-scale trials to evaluate the efficacy of PractiseWell.

References

- Chaffin, R., Imreh, G., & Crawford, M. (2002). *Practicing perfection: Memory and piano performance*. Lawrence Erlbaum Associates.
- Friard, O., & Gamba, M. (2016). BORIS: A free, versatile open-source event-logging software for video/audio coding and live observations. *Methods in Ecology and Evolution*, 7(11), 1325–1330. <https://doi.org/10.1111/2041-210X.12584>
- Koopman, C., Smit, N., de Vugt, A., Deneer, P., & den Ouden, J. (2007). Focus on practice-relationships between lessons on the primary instrument and individual practice in conservatoire education. *Music Education Research*, 9(3), 373–397. <https://doi.org/10.1080/14613800701587738>
- McPherson, G. E., Evans, P., Kupers, E., & Renwick, J. (2016). Applying self-determination and self-regulation theories for optimizing music performance. In A. Mornell, *Art in motion III, performing under pressure* (pp. 131–148). Peter Lang Publishing.
- Miksza, P., Blackwell, J., & Roseth, N. E. (2018). Self-regulated music practice: Microanalysis as a data collection technique and inspiration for pedagogical intervention. *Journal of Research in Music Education*, 66(3), 295–319. <https://doi.org/10.1177/0022429418788557>
- Palese, R. S., & Duke, R. A. (2022). Thinking time in music practice. *Update: Applications of Research in Music Education*, 41(1), 34–44. <https://doi.org/10.1177/87551233211056632>
- Suzuki, A., & Mitchell, H. F. (2022). What makes practice perfect? How tertiary piano students self-regulate play and non-play strategies for performance success. *Psychology of Music*, 50(2), 611–630. <https://doi.org/10.1177/03057356211010927>
- Suzuki, A., & Mitchell, H. F. (2023, August 17-20). *How to "PractiseWell"? Piloting an online intervention for effective piano practice* [Conference presentation]. International Symposium on Performance Science, Warsaw, Poland.
- Zimmerman, B. J. (2008). Goal setting: A key proactive source of academic self-regulation. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 267–295). Lawrence Erlbaum Associates Publishers.
- Zimmerman, B. J., Schunk, D. H., & DiBenedetto, M. K. (2017). The role of self-efficacy and related beliefs in self-regulation of learning and performance. In *Handbook of competence and motivation: Theory and application* (2nd ed.; pp. 313–333). The Guilford Press.

Un-beat-able: Aging musicians' experience of their temporal capacities

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Background

Research on changes in temporal capacities in adulthood is sparse. Existing studies mostly investigate isolated tasks, capturing losses in biological potential such as higher duration discrimination thresholds (Gordon-Salant & Fitzgibbons, 1999) and more tapping variability (Pollock et al., 2023). In contrast to this deficient picture of aging, many musicians remain active and successful up to a high age (Gembris & Heye, 2014; Manturzevska, 1990). This discrepancy might result from the prevalent psychophysical approach to studying aging which ignores the cultural resource component of lifespan development, including experience, training and familiarity (Baltes et al., 1999). Furthermore, strategies to adapt to age-related losses, such as goal *selection*, *optimisation* of existing goal-directed means, and *compensatory* acquisition of new means (SOC; Baltes et al., 1999) remain disregarded. Without considering culture and adaptation, it is unclear what impact biological aging has on music making outside of the lab. The literature thus fails to explain how older musicians experience their lifespan rhythmic development and manage to retain their refined musical timing capacities (Brodsky, 2011).

Aims

The present study investigates older musicians' subjective experience of aging and their temporal capacities in music making, to provide a holistic and realistic perspective on the lifespan development of tempo, timing, and rhythm. It addresses the following questions: Which positive and negative changes do older musicians perceive in their temporal capacities? Do they apply SOC-strategies to adapt to these changes?

Methods

Qualitative interviews were conducted with classical orchestra and chamber musicians from the UK. Six female and four male participants were interviewed. The participants' age ranged from 51 to 69 years ($M = 60.7$, $SD = 6.41$). They had an average of 50.2 years of musical activity ($SD = 10.57$, range: 33-64), and four identified themselves as (semi-)professional. Common themes across the interviews were identified using thematic analysis.

Results

The musicians demonstrate a steady confidence in their temporal capacities. Practice- and experience-driven improvement is more prominent than age-related decline. With more seniority, the musicians take on more leadership, which can lead to higher expectations and increasing fear of making timing-related mistakes. Strategies of selective optimisation with compensation are used to adapt not only to age-related losses, but to general temporal challenges such as complex rhythmic patterns and fast speed. The findings are interpreted and discussed in the framework of lifespan psychology theories. Limitations arise from the sample of young-old, healthy ‘best agers’.

Conclusions

Aging musicians’ experience of their temporal capacities comprises gains, losses and stability, with positive changes being more prevalent. This finding highlights the dominant role of cultural resources for aging musicians, generally enabling them to counteract biological losses. Additionally, the findings suggest that adaptive strategies might be useful for musicians of any age. Older musicians’ knowledge how to best employ these strategies therefore is a valuable resource for younger colleagues. Overall, the findings challenge ageism in the music industry and in research. Future studies should develop holistic tasks to experimentally test the developmental trajectories and interactions of biology and culture in musical timing capacities.

References

- Baltes, P. B., Staudinger, U. M., & Lindenberger, U. (1999). Lifespan psychology: Theory and application to intellectual functioning. *Annual Review of Psychology*, 50(1), 471–507. <https://doi.org/10.1146/annurev.psych.50.1.471>
- Brodsky, W. (2011). Rationale behind investigating positive aging among symphony orchestra musicians. *Musicae Scientiae*, 15(1), 3–15. <https://doi.org/10.1177/1029864910393425>
- Gembris, H., & Heye, A. (2014). Growing older in a symphony orchestra: The development of the age-related self-concept and the self-estimated performance of professional musicians in a lifespan perspective. *Musicae Scientiae*, 18(4), 371–391. <https://doi.org/10.1177/1029864914548912>
- Gordon-Salant, S., & Fitzgibbons, P. J. (1999). Profile of auditory temporal processing in older listeners. *Journal of Speech, Language, and Hearing Research*, 42(2), 300–311. <https://doi.org/10.1044/jslhr.4202.300>
- Manturzewska, M. (1990). A biographical study of the life-span development of professional musicians. *Psychology of Music*, 18, 112-139. <https://doi.org/10.1177/0305735690182002>
- Pollok, B., Hagedorn, A., Krause, V., & Kotz, S. A. (2023). Age interferes with sensorimotor timing and error correction in the supra-second range. *Frontiers in Aging Neuroscience*, 14, 1048610. <https://doi.org/10.3389/fnagi.2022.1048610>

Rats detect temporal changes rather than melodic ones

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Background

Meter is one of the fundamental components of rhythm. A metrical structure is perceived when some of the events are felt as more prominent than the others. Meter can be physically evoked by changes in the events (beats) composing a sequence, but it can also be induced by the listener over sequences of regular events. Surprisingly, there is no reliable evidence of meter perception in non-human animals.

Aims

Our aim is to explore the extent to which the basis for meter perception can be found in non-human animals that do not use complex vocalisations, such as the rat. We also want to understand the mechanisms involved in the perception of the meter and how temporal regularity is linked to it.

Method

Forty naive rats were familiarised with auditory rhythmic sequences that evoke a specific metrical structure. They were individually placed in isolated response boxes with a speaker, a nose-poking detector and a pellet feeder. The animals were trained to poke the nose into the feeder to receive food reward. Once they learned this association, we ran 30 familiarisation sessions plus the test sessions. During familiarisation, the rats were rewarded with food when poking their nose after stimuli presentation. In test sessions, the animals were presented with 24 familiarisation sequences and 16 test sequences (8 familiar sequences and 8 novel, unfamiliar sequences). Total number of responses (nose-poking) to familiar and to novel test sequences was analysed. Importantly, neither familiar test nor novel test sequences were rewarded. Each experiment lasted 2 months approximately. The animals were caged in pairs in a quiet environment.

In the first experiment, we familiarised rats with hearing rhythmic sequences with a duple or triple metrical structure. During test sessions, they had to discriminate between sequences with different metrical structures (e.g., duple vs. triple meter). In the second experiment, rats were familiarised with rhythmic sequences containing long and short tones. Test tasks were focused on the discrimination of rhythmic sequences with different rhythmic groupings, different time interval ratios, and different meters. We used the same rats for both experiments.

Results

In Experiment 1, we observed that the animals did not discriminate between duple or triple meter sequences and isotonic sequences, nor did they discriminate between duple and triple meter sequences.

Conversely, they were able to discriminate between isochronous, metrical sequences and non-isochronous sequences. Thus, rats probably focused on the temporal structure of the stimuli while disregarding melodic changes. In Experiment 2, the results showed that they can discriminate between familiar sequences and novel sequences with a different rhythmic grouping. Also, they were able to discriminate between familiar sequences and novel sequences with a different time interval ratio.

Conclusions

Together, the results from the 2 experiments suggest that rats, a mammal that does not use complex vocalisations, can detect differences between rhythmic sequences if changes are present on a temporal level rather than a melodic or tonal level.

Allowing musicians to “flourish”: How can we equip musicians with performance science knowledge using social media?

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Background

Recent years have witnessed significant advancements in performance science research, offering musicians valuable insights into achieving peak performance, maintaining physical and mental wellbeing, and flourishing into successful musicians (McPherson, 2022).

However, this knowledge predominantly resides within academic circles, often eluding musicians who stand to benefit from it.

Our project “Flourish” aims to bridge this research-practice gap by enhancing the accessibility of research findings. Social media is one potential avenue to achieve this: its prevalent use can provide an effective way to communicate messages, while its multimedia format provides scope for content to be delivered in engaging ways. While the use of social media for knowledge dissemination has gained traction in fields like medicine (Chan et al., 2020) and music pedagogy (Lei et al., 2021), its application to convey performance science research remains unexplored.

Aims

This study investigated musicians' social media usage patterns and existing knowledge of performance science. It constituted the initial phase of our project, and findings will inform the social media content to be created and delivered by our project in the future.

Methods

We conducted a questionnaire study, completed by 143 musicians from the UK and USA, representing a diverse spectrum of musical expertise. The questionnaire consisted of Likert- scale, multiple choice, and short-text questions about social media use and knowledge of performance science research. Quantitative data was analysed using R while qualitative responses were subjected to thematic analysis (Braun & Clarke, 2006).

Results

There were notable differences in usage of social media platforms across age groups, but Instagram, Facebook, and YouTube emerged as the most widely used platforms. Instagram was especially popular, particularly for musicians aged 18-24. However, when queried about the platform participants would turn

to for new information, YouTube predominated, suggesting that musicians may not perceive Instagram as a primary source of learning.

Thematic analysis of textual data suggested that individuals consider performance science to primarily be the application of the scientific method to understanding the nature of performance. Their key motivation for engaging with the field was improving performance quality or efficiency.

Likert-scale questions revealed that participants generally possessed limited understanding of performance science research and found it somewhat inaccessible. Undergraduate and postgraduate music students aged 18-24 especially perceived this area of research as being inaccessible. Moreover, professional musicians considered performance science highly relevant to their musical practice in contrast to undergraduate students.

In the context of various performance science research topics, participants exhibited generally low levels of understanding yet high enthusiasm for expanding their knowledge. Topics of particular interest included career management, mental wellbeing, and effective practice.

Conclusion

In the coming months, our project aims to begin creating digital content to provide evidence-based information to musicians. This will be informed by the findings of the current study, as well as the existing literature on research translation using social media (e.g., Lu et al., 2021). Furthermore, we hope that our work will serve as an inspiration for fellow researchers to communicate their findings to musicians in similarly accessible and captivating ways.

References

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Chan, T. M., Dzara, K., Dimeo, S. P., Bhalerao, A., & Maggio, L. A. (2020). Social media in knowledge translation and education for physicians and trainees: A scoping review. *Perspectives on Medical Education, 9*(1), 20–30. <https://doi.org/10.1007/s40037-019-00542-7>
- Lei, S. Y., Chiu, D. K. W., Lung, M. M., & Chan, C. T. (2021). Exploring the aids of social media for musical instrument education. *International Journal of Music Education, 39*(2), 187–201. <https://doi.org/10.1177/0255761420986217>
- Lu, D., Ruan, B., Lee, M., Yilmaz, Y., & Chan, T. M. (2021). Good practices in harnessing social media for scholarly discourse, knowledge translation, and education. *Perspectives on Medical Education, 10*(1), 23–32. <https://doi.org/10.1007/s40037-020-00613-0>
- McPherson, G. (Ed.). (2022). *The Oxford handbook of music performance (Vol. 2)*. Oxford University Press.

Love songs and serenades: A theoretical review of music in romantic relationships

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Background

In the *Descent of Man*, Darwin (1871) first articulates the hypothesis that musicality may have been selected for sexually. In addition, popular musicians are frequently portrayed as sex icons, seemingly supporting the notion that musicality may be attractive (Marin & Rathgeber, 2022), and love songs feature in most human cultures (Mehr et al., 2018).

Despite this, the scientific literature on the evolutionary functions of music has focused primarily on social bonding (Savage et al., 2021) and credible signalling (Mehr et al., 2021) theories, and there are limited examples of high quality research to test a sexual selection function.

Aims

In this theoretical review, we aim to reconcile these apparent multiple functions of music, highlighting the ways in which music may be used in the formation and maintenance of romantic/sexual relationships, while drawing upon theories of love and relationship stages from social psychology.

Main contribution

We propose that there may be two distinct types of music making for these different functions: music for attraction, which would be virtuosic in nature to display physical and cognitive fitness to potential mates; and music for connection, which would facilitate synchrony between partners and likely engage the same reward mechanisms seen in the general synchrony-bonding effect, enhancing perceived interpersonal intimacy as a facet of love. These functions may also map onto the behaviours of non-human animals, such as birdsong (Rose et al., 2022) and duetting in non-human primates (Raimondi et al., 2023). Furthermore, we consider the additional function of shared musical knowledge or music preferences as a display of similarity (Figueredo et al., 2006), which may be important in attracting mates, as well as maintaining a relationship through shared interests. We make an initial attempt to map different functions of music to the facets of love in the triangle model (Sternberg, 1986), while recognising that the relative importance of these functions may change based on the relationship stage (Knapp, 1978). The possible role of individual differences in personality, attachment style, and love languages are also discussed.

Implications

Through this discussion, we produce testable hypotheses of the use of music in romantic relationships in contemporary society. This creates a roadmap for future research which may rigorously test whether there is a role for sexual selection in the evolution of musicality, or whether music in romantic relationships is just a special case within the general social bonding theory.

References

- Darwin, C. (1871). *The descent of man, and selection in relation to sex*. John Murray.
- Figueredo, A. J., Sefcek, J. A., & Jones, D. N. (2006). The ideal romantic partner personality. *Personality and Individual Differences*, 41(3), 431-441. <https://doi.org/10.1016/j.paid.2006.02.004>
- Knapp, M. L. (1978). *Social intercourse: From greeting to goodbye*. Allyn & Bacon.
- Marin, M. M. & Rathgeber, I. (2022). Darwin's sexual selection hypothesis revisited: musicality increases sexual attraction in both sexes. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.971988>
- Mehr, S. A., Krasnow, M. M., Bryant, G. A. & Hagen, E. H. (2021). Origins of music in credible signalling. *Behavioural and Brain Sciences*, 44. <https://doi.org/10.1017/S0140525X20000345>
- Mehr, S. A., Singh, M., York, H., Glowacki, L. & Krasnow, M. M. (2018). Form and function in human song. *Current Biology*, 28(3). <https://doi.org/10.1016/j.cub.2017.12.042>
- Raimondi, T., Di Panfilo, G., Pasquali, M., Zarantonello, M., Favaro, L., Savini, T., Gamba, M. & Ravignani, A. (2023). Isochrony and rhythmic interaction in ape duetting. *Proceedings of the Royal Society B*, 290, 20222244. <https://doi.org/10.1098/rspb.2022.2244>
- Rose, E. M., Prior, N. H. & Ball, G. F. (2021). The singing question: re-conceptualising birdsong. *Biological Reviews*, 97(1), 326-342. <https://doi.org/10.1111/brv.12800>
- Savage, P. E., Loui, P., Tarr, B., Schachner, A., Glowacki, L., Mithen, S. & Fitch, W. T. (2021). Music as a coevolved system for social bonding. *Behavioural and Brain Sciences*, 44. <https://doi.org/10.1017/S0140525X20000333>
- Sternberg, R. J. (1986). A triangular theory of love. *Psychological review*, 93(2), 119. <https://psycnet.apa.org/doi/10.1037/0033-295X.93.2.119>

Learning long isochronous and non-isochronous rhythmic cycles from North Indian classical music

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Background

Rhythm is a fundamental aspect of music that provides it with groove, maintains temporal structure, and resonates across cultures. Isochronous (IS) meters are organized with reference to a regular beat, which is subdivided into equal parts and combined into measures comprising equal numbers of beats. On the other hand, non-isochronous (NI) meters are characterized by uneven distances between beats, as observed in the long-short-short (3+2+2) or short-short-long (2+2+3) patterns (London, 2012). NI are more prominently observed in some cultures (like Turkish, Bulgarian, and Indian).

Previous studies have consistently noted that IS rhythms are easier to recognize than NI rhythms. However, these investigations have not explored the influence of slower and cyclic rhythms, such as the "long-form rhythms" (Clayton, 2020) present in North-Indian Classical Music (NICM). Rhythmic cycles in NICM, known as tal, utilize IS and NI patterns, which have longer and uneven cyclic divisions, not utilized by previous studies.

Moreover, cultural familiarity has been found to affect the recognition of NI rhythms, irrespective of musical training (Hannon et al., 2012). Interestingly, musicians have demonstrated superior NI recognition compared to non-musicians (Yates et al., 2017). However, previous studies have not considered the impact of explicit (instruction-based) active learning on the perception of IS and NI.

Aims

The study aims to:

- Investigate the recognition and perception of long and cyclic-IS and shorter-NI rhythms within NICM, which have been previously understudied.
- Assess the effects of short-term explicit active learning on rhythm perception among musicians and non-musicians unfamiliar with Indian music.

Methods

Data was collected online using Qualtrics, with participants recruited through convenience sampling. Forty-seven participants (mean age 26 years, $SD= 4.7$) completed the study in over 4-minutes. Musical expertise was assessed using a six-item self-report questionnaire (Zhang & Schubert, 2019).

The stimuli consist of 2 original rhythms/stimuli and 5 test rhythms/stimuli (for each original rhythm). The original rhythms are the 16-beat IS TeenTal (4+4+4+4) and 7-beat NI RupakTal (3+2+2)

from NICM. The test rhythms are: 1. Natural (unaltered original rhythm); 2. Basic (simplified original rhythm); 3. Complex (an idiosyncratic version of original rhythm); 4. Structurally Preserved (SP) Alteration (addition of a half-note to the original rhythm, such that the number of beats remains the same); 5. Structurally disrupted (SD) Alteration (addition of a quarter note, such that the total number of beats is increased by 1). All stimuli were created by the experimenter in Pro Tools (2019.6.0) using MIDI extensions for Tabla samples in Kontakt (5.8.1) Factory Library.

The study consisted of three parts: 1. Baseline, followed by 2. Training, and 3. Testing. Baseline and training involved participants rating each test rhythm in comparison to the original rhythm on a 7-point scale from 'Extremely Similar' to 'Not at all Similar.' Training included explicit instructional videos for the two original rhythms, with participants assigned to either the IS (Teen Tal) or NI (Rupak Tal) group.

Results and Discussion

After excluding participants of Indian ethnicity, 30 participants (11 musicians, 19 non-musicians) were selected for further analysis. Participants differentiated between the original rhythm and the SD rhythm in both Baseline and Testing parts of the study. Musicians showed an improvement in recognizing NI after the short-term learning; however contrary to Hannon et al. (2012), neither musicians nor non-musicians had an improved recognition for long-IS.

Conclusion

The current study makes an important observation about previously ignored longer rhythms prominent in some cultures like NICM. The recognition of IS is challenging when the rhythmic cycle is longer. However, the study requires more participants and a familiar group of participants to make better conclusions.

References

- Clayton, M. (2020). *Time in Indian music: Rhythm, metre, and form in North Indian rag performance*. Oxford University Press.
- Hannon, E. E., Vanden Bosch der Nederlanden, C. M., & Tichko, P. (2012). Effects of perceptual experience on children's and adults' perception of unfamiliar rhythms. *Annals of the New York Academy of Sciences*, 1252(1), 92–99. <https://doi.org/10.1111/j.1749-6632.2012.06466.x>
- London, J. (2012). *Hearing in time: Psychological aspects of musical meter*. Oxford University Press.
- Yates, C. M., Justus, T., Atalay, N. B., Mert, N., & Trehub, S. E. (2017). Effects of musical training and culture on meter perception. *Psychology of Music*, 45(2), 231–245. <https://doi.org/10.1177/0305735616657407>
- Zhang, J. D., & Schubert, E. (2019). A single item measure for identifying musician and nonmusician categories based on measures of musical sophistication. *Music Perception: An Interdisciplinary Journal*, 36(5), 457–467. <https://doi.org/10.1525/mp.2019.36.5.457>

Introductory music of the Skywalker Saga characters: Gender and character type in Music Information Retrieval analysis

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Background

The influence of entertainment is not one-dimensional: entertainment does not only portray, but also constructs reality. This influence is not always explicit. The way music affects our perception of other stimuli can be similarly invisible. Music is shown to influence an audience member's perception of the events of a multimedia piece, but the audience member is not always conscious of this effect, attributing their view to other aspects of the film (Bullerjahn & Güldering, 1994; Thompson et al. 1994). Providing narrative cues is understood to be among the functions of film music (see Gorbman, 1987; Herget, 2021). Information on how this hidden power might influence us is critical to our media literacy.

Aims

To add to this body of knowledge, the research questions for this work were as follows: What differences are there in the musical features of the introductory music of characters of Star Wars films by gender? What differences are there in the musical features of the introductory music of characters of Star Wars films by the character's status as protagonist or antagonist?

Methods

To answer these questions, values for 10 features of 30 excerpts of music from the soundtracks were extracted via the Music Information Retrieval toolbox for Matlab. The excerpts were 10-20 seconds in length, and linked to a human main character by identifying their co-occurrence with the visual introduction of the character or by a track or theme being named after the character. Characters included were male or female protagonists or male antagonists. One way ANOVA was performed, supplemented by the non-parametric Kruskal-Wallis test as needed, to see whether the mean and standard deviation values of those features differed between excerpts associated with male and female characters, and excerpts associated with protagonists and antagonists.

Results

The results indicate that excerpts associated with female characters had lower global energy and roughness (i.e., loudness and dissonance) than excerpts associated with male characters. The variance of these features within a track was lower in excerpts associated with female characters. This effect persisted also when the excerpts of antagonists were excluded from analysis. Additionally, in the condition of all

excerpts included, there was less variance in pitch within an excerpt in excerpts associated with female characters. Regarding character type, the variance of pitches within a track was found to be lower in excerpts associated with protagonists than antagonists, when all excerpts were included. When analysing only excerpts associated with male protagonists and antagonists, no such difference was found.

Conclusion

Utilising computer assisted analysis methods, the differences in music linked to characters of different identities can be discussed in precise terms. MIR analysis of music can provide a way to describe the music to facilitate the multidisciplinary study of the interplay of music and other aspects of a multimedia piece beyond the character identity, such as storytelling, visual aspects like costuming, dialogue, sound effects, and music. Many avenues for future research are recognised based on this work.

References

- Bullerjahn, C. & Gldenring, M. (1994). An empirical investigation of effects of film music using qualitative content analysis. *Psychomusicology: A Journal of Research in Music Cognition*, 13(1-2), 99-118. <https://doi.org/10.1037/h0094100>
- Gorbman, C. (1987). *Unheard melodies: Narrative film music*. Indiana University Press.
- Herget, A. K. (2021). On music's potential to convey meaning in film: A systematic review of empirical evidence. *Psychology of Music*, 49(1), 21-49. <https://doi.org/10.1177/0305735619835019>
- Thompson, W. F., Russo, F. A., & Sinclair, D. (1994). Effects of underscoring on the perception of closure in filmed events. *Psychomusicology: A Journal of Research in Music Cognition*, 13(1-2), 9-27. <https://doi.org/10.1037/h0094103>

Shared time, shared flow, and shared physiology in Javanese gamelan

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Background

The experience of shared flow refers to the optimal balance between challenge and skill for a given task, resulting from interpersonal action in a group situation. The performance of Javanese gamelan is an ideal setting to investigate shared flow, due to the requirement that all instruments work harmoniously, allowing for shared flow and its native equivalent, *ngeli*. Previous study into shared flow and physiological synchrony found both positive and negative associations in the contexts of traditional and improvised playing respectively (Gibbs et al., 2023). This suggested fundamentally different experiences of flow depending on the degree of individualism or togetherness that the performance required. However, shared flow was assessed via a pre-validated measure that did not seem to account for these differences. One prominent component of flow is time transformation, and most questionnaires seem to only investigate this on a general level, rather than determining whether it is specifically experienced as a slowing down or speeding up of time. This study employs the methods of my previous study together with a novel approach to measure shared flow, by combining self-reports with a measure of perceived subjective time.

Aims

The aims of this study fall under two broader themes. The first, by employing measures of interpersonal closeness, shared flow, shared time perception, and measures of physiological synchrony, aimed to unravel the ways in which group flow relates to levels of conscious and subconscious togetherness. The second aimed to further disentangle the time-related aspects of shared flow, by testing whether there is a relationship between measures of subjective time distortion and shared flow, and exploring participants' phenomenological insights on this.

Methods

Four pre-established gamelan groups of varying expertise across the UK and Ireland performed in three conditions: (1) a traditional piece of gamelan music from notation, (2) from memory, and (3) a group improvisation. Physiological parameters of skin conductance and heart rate were recorded, which were subsequently analysed via inter-subject correlation across musically meaningful windows (Pérez et al., 2021). After each condition, participants completed self-report measures of shared flow and a self-report

measure of time perception. At the end of each experiment, focus group interviews were conducted and follow-up surveys were sent out, in which participants were asked to reflect on their time estimations.

Results

Although analysis is still underway, this presentation will discuss some preliminary insights into how relationships between shared flow, shared time, and shared physiology depend on performance conditions and expertise. Some examination will also be made as to whether players have a shared sense of time that can be related to shared flow.

Conclusion

This study is the first, to my knowledge, to assess the possibility of a shared perception of time in music performance. Very little work has been done to assess the potential of shared physiological parameters and shared time perception underlying shared flow. Furthermore, by adopting a mixed-methods approach, quantitative evidence can be paired with phenomenological insights, contributing to the discourse surrounding what shared flow experiences in music performance settings involve both consciously and subconsciously.

References

- Gibbs, H. J., Czepiel, A., & Egermann, H. (2023). Physiological synchrony and shared flow state in Javanese gamelan: Positively associated while improvising, but not for traditional performance. *Frontiers in Psychology, 14*. <https://doi.org/10/gsqp22>
- Pérez, P., Madsen, J., Banellis, L., Türker, B., Raimondo, F., Perlberg, V., Valente, M., Niérat, M.-C., Puybasset, L., Naccache, L., Similowski, T., Cruse, D., Parra, L. C., & Sitt, J. D. (2021). Conscious processing of narrative stimuli synchronizes heart rate between individuals. *Cell Reports, 36*(11), Article 109692. <https://doi.org/10.1016/j.celrep.2021.109692>

Putting musical feelings into words: Children's verbal descriptions of music-evoked responses

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Background

Empirical research devoted to exploring the variety and diversity of children's subjective responses to music is relatively scant compared to the wealth of studies examining their ability to discriminate emotions said to be *expressed* by music (see Trehub et al., 2010 for a review). Learning about how children experience music subjectively might contribute to the growing body of research interested in the evolution of musicality - why humans produce music in the way they do, and why it has such ubiquitous appeal and carries meaning for many people.

Aims

As part of a longitudinal inquiry into children's music-evoked experiences, the present study is part of a project to develop an age-appropriate method for capturing children's self-reported responses to music.

Methods

We recruited 26 participants aged between five and eleven years to give free descriptions of their music-evoked experiences and to test the suitability of a categorical measurement scale. We adapted six terms from pre-validated scales used with adults (*happy, relaxed, powerful, sad, tense* and *longing for something in the past*). We tested children's understanding of our adapted terms using short stories and asked them to describe and rate feelings induced by six musical extracts taken from pre-validated examples.

Results

Most children chose the target category for the stories, suggesting they had understood the adapted terms, although in their free descriptions they used *scared* more frequently than *tense* and *wanting to/wishing they could go back* in the context of *longing*. Children were able to use the categorical scale to select terms that best described their music-induced experiences. Their free responses revealed additional musical feelings including *excited, proud, heroic, brave, and triumphant*, as well as 35 reports of music-evoked visual imagery and imagined narrative. Through thematic analysis, we found that the free responses could be grouped into 13 conceptual categories, many of which map onto categories which feature in pre-validated scales used with adult listeners.

Conclusions

For an age-adaptive response format, a categorical scale with a small number of terms may be accessible to all participants. However, a free-response option allowing children to use their own vocabulary might elicit more nuanced data that can inform us about their emotional granularity (Barrett, 2017), as well as more detail about their music-evoked experiences. Further testing is needed to determine an optimally appropriate response format for young listeners.

References

- Barrett, L. F. (2017). *How emotions are made: The secret life of the brain*. Pan Macmillan.
- Trehub, S. E., Hannon, E. E., & Schachner, A. (2010). Perspectives on music and affect in the early years. In P. N. Juslin, & J. A. Sloboda (Eds.), *Handbook of Music and Emotion – Theory, Research, Applications*. Oxford University Press.

Variation in the production of musical motifs as an interactional resource in music therapy: A conversation analysis

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Background

Music therapy is an established intervention regularly offered to children with disabilities (British Association for Music Therapy [BAMT], 2023). It is common for both the child and music therapist to be engaged in active and spontaneous music making during interactions in a music therapy session. However, there is limited observational research examining how children with disabilities and music therapists work together to manage interactions during music making, or how both participants use music as an interactional resource within an interaction.

Aims

This paper explores how music can be used as an interactional resource to establish cooperative and coordinated interactions between participants, and sustain interactions through creating new opportunities for participants to respond within a music therapy interaction.

Methods

This paper uses Conversation Analysis (CA) to analyse interactions in a music therapy case study. CA has been proven to be a relevant method to analyse interactions with neurodivergent participants (Antaki & Wilkinson, 2013; Schegloff, 2003; Williams et al., 2016). Data was drawn from a video recording of the start of a music therapy session lasting 2 minutes and 34 seconds. The participants in the interaction are a boy with disabilities and a music therapist engaged in a naturally occurring interaction within a therapeutic context. The interaction was multi-modal involving music, words, movements, expressions, and gaze. Episodes for analysis were selected because they were considered significant moments in either establishing or sustaining the interaction. The interaction was transcribed using the Jefferson transcription method (Sidnell & Stivers, 2013) which was adapted to include musical notation within the transcript. The transcript was analysed to establish key features of interactional sequences between the participants.

Results

The preliminary analysis demonstrates that the production of musical motifs can play a central role in establishing cooperative and coordinated interactions in music therapy. A participant produced musical motifs in order to invite a response from their interaction partner which, when understood as an invitation, encouraged the interaction partner to respond in return. Variation in the production of musical

motifs was shown to be essential in enabling the participants to sustain the interaction. Two key reasons for variation were identified. Firstly, a participant varied musical motifs in response to their interaction partner through the addition of glissandi or by adjusting the tempo of a musical motif. Secondly, a participant created new opportunities for their interaction partner to respond through varying the order of motifs, extending motifs through rhythmic development, or introducing contrasting musical motifs. The analysis also illustrates how physical and visible conduct supported the use of musical motifs within multi-modal interactions.

Conclusion

Areas of similarity in methods participants use to create new opportunities for their interaction partners to respond were identified between verbal interactions and interactions in music therapy. These areas would benefit from further research. CA enables the contributions of both participants to be considered equally, and to be viewed from a resource-oriented perspective rather than deficit focus. The potential for CA to support resource focused research is an area for further exploration in music therapy research with people with disabilities.

References

- Antaki, C., & Wilkinson, R. (2013). Conversation analysis and the study of atypical populations. In J. Sidnell, & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 533-550). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781118325001.ch26>
- Schegloff, E. A. (2003). Conversation analysis and communication disorders. In C. Goodwin (Ed.), *Conversation and brain damage* (pp. 21-55). Oxford University Press.
- Sidnell, J., & Stivers, T. (2013). Introduction. In J. Sidnell, & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 1-9). Wiley-Blackwell.
- Williams, V., Jepson, M., Ponting, L., & Ford, K. (2016). Inclusive conversation analysis with disabled people. In M. O'Reilly, & J. N. Lester (Eds.), *The palgrave handbook of adult mental health* (pp. 82-100). Palgrave Macmillan. https://doi.org/10.1057/9781137496850_5
- British Association for Music Therapy, BAMT (2023, April 19). What is music therapy. <https://www.bamt.org/music-therapy/what-is-music-therapy>

Emotional response to music-color stimuli

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Background

Music and color are stimuli known for evoking emotions. Research by Palmer et al. (2013) revealed an emotional link between these stimuli, showing that people often associate music that evokes a particular emotion with colors that elicit similar emotions.

Aims

Given the emotional link between music and color, this study aimed to explore emotional responses to combined music-color stimuli that induce positive (joy) and negative (sad) emotions, in both congruent (same emotion) and incongruent (different emotion) situations.

Method

To determine positive and negative colors, a study was conducted with 32 Mexican participants (19 females; $M = 21.4$ years, $SD = 3.3$), utilizing 37 colors from the Berkeley Color Project, adapted by Valdés-Alemán et al. (2022), along with two control images emotionally validated as positive and negative. Each color was displayed for 15 seconds in random order, and participants evaluated them using three bipolar continuous scales: Valence, Arousal, and Pleasure. The scores per stimulus for the three scales were averaged (VAP index), characterizing joyful and pleasurable colors with positive indexes, and sad and unpleasant colors with negative ones.

A second study involved 33 Mexican participants (20 females; $M = 20.3$ years, $SD = 2.4$). Joyful and sad music, previously evaluated emotionally (Valdés-Alemán et al., 2022), were assessed alongside the joyful and sad colors selected from the first study. The stimuli were evaluated individually (music or color-only) and in combination (congruent or incongruent in emotion), using four bipolar continuous scales: Valence, Arousal, Pleasure, and Predominance. The last scale applied only to the combined conditions, inquiring about the stimulus (music or color) that predominantly conveyed the reported emotion. The VAP index was also calculated.

Results

In the first study, the colors with the highest and lowest VAP index were selected. After comparing VAP index scores between these colors and controls, considering stimulus type (color and control) and emotion (positive and negative), significant differences were found only in emotion ($p < .001$), indicating that positive and negative colors were as emotionally contrasting as the control stimuli.

The second study's results showed a significant main effect in emotion ($p < .001$) when comparing VAP index scores for both joyful and sad stimuli (music and colors) presented individually, confirming an emotional distinction between them. However, a significant main effect in stimulus type (color and music; $p = .004$) revealed that both types of stimuli conveyed emotions differently. VAP index scores for the stimuli presented together differed significantly ($p < .001$) among all conditions, except between congruent and incongruent stimuli when music shared the same emotion. The Predominance scale showed no significant differences, with all scores being negative (towards music), indicating that, within the combined stimuli conditions, music predominantly conveyed the reported emotion.

Conclusions

While music and color could individually evoke opposite emotions (joy and sadness), when combined, music played a more substantial role in conveying emotions. Even in cases of incongruent stimuli, music's emotion predominated over the color's emotion. Furthermore, music was more emotionally engaging than color when assessed individually, potentially elucidating this phenomenon.

References

- Palmer, S. E., Schloss, K. B., Xu, Z., & Prado-León, L. R. (2013). Music-color associations are mediated by emotion. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(22), 8836–8841. <https://doi.org/10.1073/pnas.1212562110>
- Valdés-Alemán, P., Zamudio-Gurrola, A., & Téllez-Alanís, B. (2022). The emotional link between color and music: What happens with atonal music? *Psychomusicology: Music, Mind, and Brain*, *32*(1–2), 46–57. <https://doi.org/10.1037/pmu0000288>

Presenting a new method for video analyses to evaluate different forms of musical engagement for people with Parkinson's disease

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Introduction

Parkinson's disease (PD) is a neurodegenerative condition that, because of the loss of dopaminergic neurons in the brain, results in motor (e.g., tremor, freezing) and non-motor symptoms (e.g., anxiety, apathy). In addition to pharmacological and surgical treatments, arts-based health interventions such as dancing and singing have been shown to positively impact both motor- and non-motor symptoms for people with Parkinson's (PwP; Devlin et al., 2019). Combining approaches using music and movement could therefore improve quality of life for PwP (Barnish & Barran, 2020).

Methods

As part of a patient and public involvement consultation process to co-create a new music and movement-based intervention, workshops were conducted with PwP in the UK and Switzerland. The workshops included different types of musical engagements such as moving to music, listening to music, and making music, and were video recorded.

Video recordings can supply vital information not only about verbal expressions but also about non-verbal behaviours due to their multidimensionality. But as the symptoms of PD sometimes make communication difficult (not only verbally but also with facial expressions and gestures), we developed a new method for video analysis to capture the different levels of engagement (i.e., verbal response, gestures, facial expressions, and posture) in music and movement-based group activities.

The workshop recordings were used to develop a new systematic method for video analyses, combining the matrices for documenting consensus and paralinguistic information of the Micro-interlocutor Analysis for focus groups by Onwuegbuzie et al. (2009) and qualitative content analysis by Kuckartz (2019). The method enables multiple coders to systematically document verbal and non-verbal expressions using the symbols outlined in [Table 1](#). Each symbol has a value between -1 and 1 to generate an objective measure of the level of engagement of each participant. New symbols can be added if required. Verbal responses that are relevant to the research question can also be coded based on the instructions defined by the researchers a priori and used to inductively formulate qualitative categories of the content.

Results

In the present study, we found that listening to meaningful music, moving to music, and making music using percussion instruments had an immediate positive effect on the movements and mood of PwP. However, musical tasks and instruments need to be chosen carefully to prevent sensory overload. Furthermore, common motifs for engagement in musical group activities (i.e., symptom relief, energy, altruism, socializing, curiosity) as well as reluctance to participate (i.e., apprehension, logistics, complexity, negative valence) have been explored.

Discussion

The new method for video analysis provides a standardized and systematic approach to evaluating musical group activities and health intervention for PwP by directly reflecting people's motivation to participate. Further research is needed to better understand the psychological mechanisms underlying adherence to health intervention, particularly in relation to non-motor symptoms such as apathy, which is characterized by a lack of motivation or initiative.

References

- Barnish, M. S., & Barran, S. M. (2020). A systematic review of active group-based dance, singing, music therapy and theatrical interventions for quality of life, functional communication, speech, motor function and cognitive status in people with Parkinson's disease. *BMC Neurology*, *20*(1), 1-15.
- Devlin, K., Alshaikh, J. T., & Pantelyat, A. (2019). Music therapy and music-based interventions for movement disorders. *Current Neurology and Neuroscience Reports*, *19*, 1- 13.
- Kuckartz, U. (2019). Qualitative content analysis: from Kracauer's beginnings to today's challenges. *Forum Q. Soc. Res.*, *20*, 3. <https://doi.org/10.17169/fqs-20.3.3370>
- Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*, *8*(3), 1–21. <https://doi.org/10.1177/160940690900800301>

Synchronising to salsa rhythms: The effects of music and dance training

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Background

Beat perception and production are fundamental for dancing to and playing music. Musicians and dancers learn to perceive the beat and align movements with it. However, this movement takes different forms in the two disciplines. Musicians make discrete, effector-specific movements to produce music, while dancers make whole-body movements, usually in the presence of music, to produce dance. Moreover, in music the focus is on sound production, whereas in dance the focus is on movement production.

The challenges posed by beat perception and production vary in different musical styles. In Salsa, beat perception can be particularly difficult due to unusual rhythmic structures at its core. Salsa music is highly cross-cultural, with roots in musical traditions ranging from Africa to the Caribbean, Europe, and the Americas. Moreover, there is a large amount of popular music inspired by the genre. Most people therefore have some familiarity with Salsa music, whether or not they dance Salsa.

Aims

In this study, we will assess beat perception and beat production abilities when listening to naturalistic stimuli based on Salsa music. We will include groups enabling control for skills in extracting beat information from the music and synchronising whole-body movements to music.

Methods

The groups will include: (1) beginner Salsa dancers; (2) experienced Salsa dancers; (3) experienced dancers of other dance styles; (4) musicians; and (5) controls who are neither dancers nor musicians.

Participants will tap their preferred tempo, tap to a metronome, and undertake the Harvard Beat Assessment Test. This will allow us to control for preferred tempo, and ensure that participants have normal sensorimotor synchronisation abilities.

Participants will tap the beat of naturalistic stimuli based on Salsa music. These will vary in tempo (164 bpm, 192 bpm, and 220 bpm) and amount of information about the beat, in three different instrumental combinations: (1) clave and bass; (2) clave, bass, and cáscara; and (3) clave, bass, cáscara, and maracas.

Results

Tap times will be converted to radians, standardising results across tempi. Variability and accuracy of tap times will be analysed using circular statistics, with all data points (arbitrarily) assigned a radius of 1. Mean vector length denotes inverse variability of tapping, i.e., the less variable the tapping, the closer the mean vector length is to 1. Mean vector angle denotes inverse accuracy of tapping, i.e., the less accurate the tapping the larger the absolute value of the angle.

Linear mixed-effect models will be employed to compare performance between: (1) groups, (2) tempi; and (3) amounts of information about the beat. The groups will be coded according to experience in dancing, Salsa dancing, music perception, and music production. This will be used to build a hierarchical model, which will be compared to a random model in order to determine which factors best describe any differences between groups.

Discussion

In this study, we hope to elucidate differences in beat perception and beat production abilities, arising from intensive training in music or dance, when listening to naturalistic stimuli based on Salsa music.

The rhythms of tradition: Understanding Ḍhol Sāgar and drumming knowledge in Garhwal, North India

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Background

The Garhwal Himalayan range in India is referred to as Dev Bhūmi (Land of the Gods) as it is home to several devī-devtās (local deities), sages, and rishis. In Garhwal, traditional music practices and deity possession rituals are deeply intertwined and are integral to community life and spiritual ceremonies. The possession ritual involves a spirit or deity temporarily taking over a person's body, often accompanied by music and drumming rhythmic instruments, known as Ḍhol-damauñ.

Aims

This paper seeks to understand the link between music and possession in the context of divine embodiment experienced by musicians and the oracles of different deities in ritual worship where ritual drumming of Ḍhol-damauñ plays a significant role.

Methods

The study adopts a multidisciplinary methodology that integrates techniques from various domains such as psychology, ethnomusicology, and religious studies to examine the repertoire of drumming and the musicians, their personal involvement in playing, and the significance of drumming in the occurrence of possession experiences among oracles.

To explore this, ethnographic fieldwork was carried out in Garhwal Himalaya for thirteen months, along with psychological immersion, case studies, life histories, and semi-structured interviews. The participants were selected based on their knowledge and experience in the region's traditional music practices and deity possession rituals.

Results

The results of the study reveal a close relationship between drumming and spirit possession in Garhwal. The participants reported that the rhythm and vibration of the drums have a powerful effect on the mind and body, helping to facilitate the possession experience. The drumming also serves as a form of communication between the possessing spirit and the participants, as well as between the participants and the audience. The results suggest that drumming serves not only as a musical expression but also as a means of accessing the spiritual realm and experiencing possession.

Conclusions

This study sheds light on the importance of ritual drumming in shaping the religious and cultural identity of the Garhwal Himalayan communities. The paper contributes to the wider academic discourse on the relationship between religion, music, and deity possession.

References

- Alter, A. (2009). The significance of tantric sects for drum practice in the central Himalayas. *Yearbook for Traditional Music*, 41, 187-198. <https://www.jstor.org/stable/25735484>
- Alter, A. (2016). *Dancing with Devtās: Drums, power and possession in the music of Garhwal, North India*. Routledge.
- Alter, A. (2020). Drumming and dancing in Mahābhārata performances of the Himalayas: Possession as transitional states. *Yearbook for Traditional Music*, 52, 169-185.
- Chandola, A. (1977). *Folk drumming in the Himalayas: Linguistic approach to music*. AMS Press.
- Fiol, S. (2017). *Recasting folk in the Himalayas: Indian music, media, and social mobility*. University of Illinois Press.
- Friedman, R. L. (2000). *The healing power of the drum: A psychotherapist explores the healing power of rhythm*. White Cliffs Publications.
- Jassal, A. S. (2017). Making god present: Place-making and ritual healing in North India. *International Journal of Hindu Studies*, 21, 141-164. <https://doi:10.1007/s11407-017-9208-y>
- Sax, W. (1991). *Mountain goddess: Gender and politics in a central Himalayan pilgrimage*. Oxford University Press.
- Sax, W. (2002). *Dancing the self: Personhood and performance in the Paṇḍav Līlā of Garhwal*. Oxford University Press.

Defining playability in musical performance: Cognitive factors and implications for automated song difficulty estimation

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Background

Web-based music services such as Ultimate Guitar and Chordify have made learning to play the guitar more accessible, alongside traditional musical instruction methods via music schools or private teachers (Rodriguez & Marone, 2021). These companies have simplified the learning process by offering community-proposed chord transcriptions or automatically extracting chord progressions from audio recordings of songs presented in a user-friendly format. Currently, Ultimate Guitar and Chordify have 40.1 million and 8 million users respectively (UG Community, 2023; GROC, 2023). Amateur guitarists use these resources for informal self-practice, which is demonstrated to boost motivation more than formal teaching (Reynolds & Chiu, 2013). However, the abundance of online chord data on these platforms can be overwhelming for amateur learners seeking suitable pieces to enhance their expertise, as the sheer volume of information can make it difficult for them to sift through and identify appropriate pieces that match their skill level and personal preference.

Aims

This study aims to develop a definition and operationalization of playability specifically for guitarists through a literature review. We seek to aid the creation of a more precise, automated, and interpretable approach to support learners in selecting appropriate pieces based on their skill level and personal preferences. A successful outcome would involve identifying factors contributing to playability, allowing for a fine-grained and automated system to predict a song's difficulty level. This system would enable learners to select suitable pieces that align with their abilities and tastes.

Main contribution

We define playability as the level of musical proficiency required to perform a musical song on a specific instrument. While it is a crucial aspect of musical analysis and performance, it is a complex and challenging concept to measure or quantify due to its interplay between the musical song and the individual's competence. The playability of musical songs can be influenced by various factors, such as the complexity of the musical structure (Boon, 1990), the instrument of choice (Magnusson et al., 2021), and the musical context in which it is played (Chirico et al., 2015; Huron & Berc, 2009). Individual musical competence for a particular song requires developing physical and cognitive skills (Zatorre et al., 2007)

and is influenced by personality (Swaminathan & Schellenberg, 2018). These skills are essential for achieving musical proficiency and require ongoing development and refinement (Brown et al., 2015).

Implications

The implications of this study are significant for guitar instruction and accessibility. An automated system that accurately predicts a song's difficulty level could enhance learning by allowing learners to choose suitable pieces that match their skill level and personal taste. This system would be especially beneficial for individuals who cannot afford traditional music lessons or have limited access to guitar instructors. Additionally, learning and playing music from a repertoire that one enjoys can bring personal satisfaction and enjoyment.

Ultimately, the findings of this study could lead to improved teaching methods and more effective learning strategies, benefiting learners of all skill and experience levels.

Figure 1: Physical and cognitive criteria for evaluating the playability of songs on the guitar position during guitar performance. Note that repetitiveness reflects both cognitive and physical factors and that attentive listening to auditory feedback is necessary for developing and refining performative gestures.

References

- Boon, J. P., Noullez, A., & Mommen, C. (1990). Complex dynamics and musical structure. *Journal of New Music Research*, 19(1), 3-14. <https://doi.org/10.1080/09298219008570553>.
- Brown, R. M., Zatorre, R. J., & Penhune, V. B. (2015). Expert music performance: cognitive, neural, and developmental bases. *Progress in brain research*, 217, 57-86. <https://doi.org/10.1016/bs.pbr.2014.11.021>.
- Chirico, A., Serino, S., Cipresso, P., Gaggioli, A., & Riva, G. (2015). When music “flows”. State and trait in musical performance, composition and listening: A systematic review. *Frontiers in Psychology*, 6, 906. <https://doi.org/10.3389/fpsyg.2015.00906>.
- GROC (2023, January 20). *Chordify: Het Groningse Paradedpaardje van de it- en muziekindustrie heeft al Acht Miljoen Gebruikers.* 'GROC - Groninger Ondernemers Courant. Retrieved April 5, 2023, from <https://www.groningerondernemerscourant.nl/nieuws/chordify-het-groningse-paradepaard-van-de-it-en-muziekindustrie-heeft-al-acht-miljoen-gebruikers>
- Huron, D. & Berec, J. (2009). Characterizing idiomatic organization in music: A theory and case study of musical affordances. *Empirical Musicology Review*. 4. <https://doi.org/10.18061/1811/44531>.
- Magnusson, T. (2021). The migration of musical instruments: On the socio-technological conditions of musical evolution. *Journal of New Music Research*, 50(2), 175-183. <https://doi.org/10.1080/09298215.2021.1907420>.
- Reynolds, R., & Chiu, M. M. (2013). Formal and informal context factors as contributors to student engagement in a guided discovery-based program of game design learning. *Learning, Media and Technology*, 38(4), 429-462. <https://doi.org/10.1080/17439884.2013.779585>.
- Rodriguez, R. C., & Marone, V. (2021). Guitar learning, pedagogy, and technology: A historical outline. *Social Sciences and Education Research Review*, 8(2), 9-27. <https://doi.org/10.5281/zenodo.5784696>.
- Swaminathan, S., & Schellenberg, E. G. (2018). Music training, cognitive abilities, and personality predict musical competence. *Scientific reports*, 8(1), 9223. <https://doi.org/10.1038/s41598-018-27571-2>.
- UG Community @ Ultimate-Guitar.com. (2023, May 1). Ultimate Guitar. Retrieved May 1, 2023, from <https://www.ultimate-guitar.com/forum/>.

Zatorre, R., Chen, J. & Penhune, V. When the brain plays music: auditory–motor interactions in music perception and production. *Nat Rev Neurosci*, 8, 547–558 (2007). <https://doi.org/10.1038/nrn2152>.

Music listening and aphasia recovery: Examining the usability of a purpose built mobile music listening application

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Background

Aphasia affects up to one third of people post-stroke, affecting receptive and expressive language. Research indicates potential language recovery benefits of daily music listening for people with aphasia. The engagement with music listening in post-stroke aphasia care and recovery, however, is severely limited by available, usable mobile music listening technology. Usable music listening technology specifically tailored to meet the needs of people with aphasia is required.

Aims

To examine the usability of a mobile music listening application designed specifically for people with post-stroke aphasia.

Methods

Participants with chronic post-stroke aphasia used a purpose-built mobile music listening application for two weeks. Prior to use, technology confidence and use, aphasia severity, self-efficacy, and music engagement rating scales and questionnaires were completed.

Following use, the System Usability Scale (SUS) was completed.

Results

Nineteen people with post-stroke aphasia living in the community completed the study. Overall, the application was rated with a high system usability rating. Technology confidence was positively associated with overall system usability.

Conclusion

Music listening may provide positive language recovery benefits for people with post-stroke aphasia. A mobile music listening application that is tailored to meet the needs of people with post-stroke aphasia provides the vehicle for engagement with music listening and is a critical and clinically relevant approach to aphasia recovery post-stroke.

Music and episodic memory: What's under the hood?

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Background

Unlike words, music is very difficult to remember after only being heard once (Halpern & O'Connor, 2000). One possible explanation is an episodic memory failure arising from interference, the inability to learn new information due to interference with information previously learned. Additional contextual information is known to enhance memory distinctiveness which decreases interference, potentially impacting musical memory.

Alternatively, poor music memory could be due to a binding issue at encoding or the phonological loop not being sufficiently activated.

Aims

This three-part investigation explored factors known to impact memory in non-musical domains to better understand musical memory: interference, binding of composite informational pieces, and working memory.

Method

The first study investigated the role of additional contextual information, utilising a between-subjects design, manipulating interference level (high, low) by changing the number of timbres participants heard in musical tracks (1 vs 4). Tracks were novel, tonal music lasting 7-12 seconds. Participants first completed an incidental encoding task, consisting of rating the speed of two presentations of 8 target tracks, then completed a distractor task, and finally completed implicit and explicit memory recognition tasks, which consisted of rating 16 tracks (8 target, 8 distractor, randomly ordered) for pleasantness and confidence in whether the track had been previously heard.

The second study investigated the extent to which binding track melody and timbre information plays a role in musical memory performance, utilising an identical design to the first study with an additional melody/timbre match test which asked participants' confidence about whether tracks were in the same instrument as originally heard.

The third study investigated whether phonological loop activity via deliberate internal rehearsal impacts memory for music. We again replicated the first study, but with an additional presentation via prompted internal rehearsal ("play it back in your head") to facilitate comparison of this study (with rehearsal) against the first study (without).

Results

In the first study, an independent t-test found no significant difference in memory rates between proactive interference groups, suggesting mitigating interference did not impact musical memory.

The second study replicated this result and additionally demonstrated that participants were significantly above chance at identifying track timbre and melody alignment to the track's original presentations. However, there was no correlation between participants who accurately matched melody/timbre information and track remembrance rates, suggesting poor music memory was not due to a binding failure.

An independent samples t-test in the final study showed deliberate rehearsal did result in significantly better memory performance, and analysis further demonstrated significantly better signal/noise detection. Additionally, even with better overall performance, memory performance was not impacted by enhanced contextual information, suggesting the previous studies' results were not due to a floor effect.

Discussion

Ultimately, manipulating interference level did not significantly impact memory for music, and while participants did accurately bind melody and timbre information, this also did not impact music memory. However, deliberate rehearsal significantly improved memory for music, suggesting musical imagery plays a role in musical memory. Interesting further directions could include the link between musical imagery and musical memory or replicating the findings with non-tonal music.

References:

Halpern, A. R., & O'Connor, M. G. (2000). Implicit memory for music in Alzheimer's disease. *Neuropsychology, 14*(3), 391–397.
<https://doi.org/10.1037/0894-4105.14.3.391>

Music listening and stress reduction: Visual imagery as an underlying mechanism?

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Background

Much research has shown that music is able to modulate emotional state and mood (Rickard, 2004). Increasingly, music is also being explored as a technique for reducing feelings of stress and anxiety (Baltazar et al., 2019) based on evidence that certain music features such as slow tempo and rhythmic simplicity are perceived as relaxing (Tan et al., 2012).

However, it is possible that music may offer stress reduction and relaxation in more indirect ways: Panteleeva et al. (2018) propose that complex cognitive mechanisms like spontaneous autobiographical memories and mental imagery may play a role in this regard. Visual imagery (VI) has been proposed as a mechanism by which emotions are induced by music (Juslin, 2013), the content of which has the ability to soothe (Küssner & Eerola, 2019). It is possible that VI could also be employed as a relaxation strategy during moments of stress (Baltazar & Västfjäll, 2020).

Aims

Using a probe-caught methodology (Taruffi et al., 2017), we examined the potential role of music-induced VI in explaining any observed reductions in negative affect following a stress induction task. Our aims were three-fold: (1) compare electrophysiological correlates of music-induced spontaneous and deliberate VI; (2) replicate findings of music's ability to reduce feelings and physiological correlates of stress; and (3) test the hypothesis that VI is a strategy for using music to relax.

Methods

Thirty participants underwent three counterbalanced conditions while a 32-channel electroencephalogram (EEG), skin conductance response (SCR), and heart rate (HR) were recorded. In each block, stress was first induced using the Mannheim Multicomponent Stress Test (Reinhardt et al., 2012), simultaneously employing emotional, cognitive, auditory, and motivational stressors. Following this, participants listened with eyes closed to either an ambient, techno, or a podcast track. Throughout listening, participants were sent timed dichotomous thought-probes every 30-50 seconds asking whether VI was experienced (Yes/No) and, if yes, whether it was spontaneous or deliberate. Listeners also rated their affect before, during, and after listening.

Results

Linear mixed models showed an effect of stress task on subjective and objective (EEG and SCR) measures of stress – increases in stress-signature levels post-stress induction compared to pre-stress. Further, while the listening conditions showed similar levels of stress reduction by post-listening, results showed that the ambient track had an advantage in reducing subjective stress.

To test whether VI is associated with stress reduction, we examined how drops in stress signatures were related to the amount of VI using a correlation analysis in the first instance. There was a strong significant correlation between VI and reductions in subjective stress ratings and SCR. Next steps include running mediation analyses to assess the extent of VI's role in music-induced stress reduction.

Conclusion

The findings suggest that there is some link between VI and stress reduction. Interestingly, this finding is in line with ideas from Panteleva et al. (2018) who suggest that the perceived benefits of music may be driven not just by the relaxation potential of the listening track's acoustic and structural features, but also by the sorts of cognitive processes (here, VI) that music may encourage.

References

- Baltazar, M., & Västfjäll, D. (2020). Songs Perceived as Relaxing: Musical Features, Lyrics, and Contributing Mechanisms. *PAM-IE 2019: Proceedings of the First International Conference: Psychology and Music – Interdisciplinary Encounters*, 115–124.
- Baltazar, M., Västfjäll, D., Asutay, E., Koppel, L., & Saarikallio, S. (2019). Is it me or the music? Stress reduction and the role of regulation strategies and music. *Music & Science*, 2, 205920431984416. <https://doi.org/10.1177/2059204319844161>
- Juslin, P. N. (2013). From everyday emotions to aesthetic emotions: Towards a unified theory of musical emotions. *Physics of Life Reviews*, 10(3), 235–266. <https://doi.org/10.1016/j.plrev.2013.05.008>
- Küssner, M. B., & Eerola, T. (2019). The content and functions of vivid and soothing visual imagery during music listening: Findings from a survey study. *Psychomusicology: Music, Mind, and Brain*, 29(2–3), 90–99. <https://doi.org/10.1037/pmu0000238>
- Panteleva, Y., Ceschi, G., Glowinski, D., Courvoisier, D. S., & Grandjean, D. (2018). Music for anxiety? Meta-analysis of anxiety reduction in non-clinical samples. *Psychology of Music*, 46(4), 473–487. <https://doi.org/10.1177/0305735617712424>
- Reinhardt, T., Schmahl, C., Wüst, S., & Bohus, M. (2012). Salivary cortisol, heart rate, electrodermal activity and subjective stress responses to the Mannheim Multicomponent Stress Test (MMST). *Psychiatry Research*, 198(1), 106–111. <https://doi.org/10.1016/j.psychres.2011.12.009>
- Rickard, N. S. (2004). Intense emotional responses to music: A test of the physiological arousal hypothesis. *Psychology of Music*, 32(4), 371–388. <https://doi.org/10.1177/0305735604046096>
- Tan, X., Yowler, C. J., Super, D. M., & Fratianne, R. B. (2012). The Interplay of Preference, Familiarity and Psychophysical Properties in Defining Relaxation Music. *Journal of Music Therapy*, 49(2), 150–179. <https://doi.org/10.1093/jmt/49.2.150>
- Taruffi, L., Pehrs, C., Skouras, S., & Koelsch, S. (2017). Effects of sad and happy music on mind-wandering and the default mode network. *Scientific Reports*, 7(1), 14396. <https://doi.org/10.1038/s41598-017-14849-0>

A probe-caught neurophysiological investigation of visual imagery during extended listening

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Background

Research has demonstrated a high incidence of visual mental imagery (VMI) in response to music (Hashim et al., under review) and there is growing evidence that this can take many forms (Küssner & Eerola, 2019). However, there is a concern that current experimental paradigms tend to encourage deliberate VMI by virtue of repeatedly asking participants to explicitly report on their experience of VMI.

Regularly probing responses during extended listening tasks is an effective way of capturing nuances in listeners' experiences over time (Polychroni et al., 2022). Here, we used a so-called probe-caught methodology in order to better capture differing experiences of VMI. Specifically, adopting terminology from research into attentional modes of mind-wandering (MW; i.e., intentional/"tuning-out" and unintentional/"zoning-out"), the current study investigated whether spontaneous and deliberate VMI have dissociable neural substrates.

Aims

The aims were three-fold: (1) examine the rate of occurrence of VMI as a function of music's familiarity and relaxation potential; (2) replicate past findings of links between music-induced VMI and occipital alpha suppression; and (3) compare electrophysiological correlates of music-induced spontaneous and deliberate VMI.

Methods

Thirty participants, recruited through the university credit scheme and word-of-mouth, underwent four 20-min music listening conditions each comprising three music genres (EDM, classical, and jazz) - non-familiar tracks with high and low relaxation potential and self-selected familiar tracks with (self-judged) high and low relaxation potential - with eyes closed, while a 32-channel EEG was recorded. Participants were sent timed dichotomous thought-probes every 30-50 seconds throughout listening asking whether VMI was experienced (*Yes/No*) and, if *yes*, whether it was *Spontaneous* or *Deliberate*. Linear mixed models exploring differences in VMI incidences across the listening conditions were run, and cluster permutation analyses (CPA) were used to identify differences in spectral power between probe responses in delta [2-3 Hz], theta [4-7 Hz], alpha [8-13 Hz], and gamma [30-45 Hz] oscillatory bands ten seconds before probe presentation.

Results

Models showed that the greatest prevalence of VMI was observed for music tracks which were both high in relaxation potential and familiarity, compared to non-relaxing and unfamiliar tracks (Aim 1). CPA between *Yes/No* probes identified a significant negative cluster in midline fronto-central and right parieto-occipital channels, whereby VMI led to more alpha suppression than no VMI. (Aim 2). CPA between *Spontaneous/Deliberate* probes also revealed a significant negative cluster primarily occupying left parieto-occipital and occipital sites, whereby spontaneous VMI led to more alpha suppression than deliberate (Aim 3).

Conclusion

Our findings are in line with MW literature proposing that spontaneous MW is the most often manifestation experienced (Seli et al., 2016), and demonstrate the relevance of trying to capture and contrast spontaneous and deliberate forms of VMI during music listening.

Initial visualisations of EEG results also point towards similarities with previous results (Fachner et al., 2019) which found greater involvement of the visual cortex during VMI. In our study, this was more clearly reflected in relation to spontaneous VMI. Our study and future variations of it have great potential to extend understanding of both VMI and the affordances of music listening.

References

- Fachner, J. C., Maidhof, C., Grocke, D., Nygaard Pedersen, I., Trondalen, G., Tucek, G., & Bonde, L. O. (2019). “Telling me not to worry...” Hyperscanning and neural dynamics of emotion processing during guided imagery and music. *Frontiers in Psychology*, 10(1561). <https://doi.org/10.3389/fpsyg.2019.01561>
- Hashim, S., Stewart, L., Küssner, M. B., & Omigie, D. (under review). *Music listening evokes story-like visual imagery with both idiosyncratic and shared content.*
- Küssner, M. B., & Eerola, T. (2019). The content and functions of vivid and soothing visual imagery during music listening: Findings from a survey study. *Psychomusicology: Music, Mind, and Brain*, 29(2–3), 90–99. <https://doi.org/10.1037/pmu0000238>
- Polychroni, N., Herrojo Ruiz, M., & Terhune, D. B. (2022). Introspection confidence predicts EEG decoding of self-generated thoughts and meta-awareness. *Human Brain Mapping*, 43(7), 2311–2327. <https://doi.org/10.1002/hbm.25789>
- Seli, P., Risko, E. F., & Smilek, D. (2016). On the necessity of distinguishing between unintentional and intentional mind wandering. *Psychological Science*, 27(5), 685–691. <https://doi.org/10.1177/0956797616634068>

A musical game of memory: Formalization of memory-based listening experiments

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Background

Memory for music has been a longstanding research topic in both cognitive science and systematic musicology (Snyder, 2000). It is still unclear which features of music make it memorable and how changes in these features influence its recognizability (Halpern & Müllensiefen, 2008; Janssen et al., 2017). Most of the research in memory for music focuses on pitch and rhythm, and happens in strictly controlled experimental environments.

However, recent research suggests that more complex features such as timbre play an important role as well. To account for the complexity of both musical features and their effect on memory, more ecologically valid data is needed. One possible solution for this is to introduce games into research designs (Honing, 2021). Games are intrinsically motivating and unfold in less controlled environments, allowing the collection of large amounts of data. One example of this is an audio version of the children's matching pairs game, or *Memory*. In combination with signal processing techniques, it allows us to characterize which parts of an audio signal are memorable. While the game itself is appealing because of its simplicity, the data analysis needed to model gameplay is complex. We present a formalization for the matching pairs game to analyze and model what factors might affect memory for music.

Aims

Existing formalizations of *Memory* (Foerster & Wattenhofer, 2013; Zwick & Paterson, 1993) rely on the assumptions that players need perfect memory and will adopt a logically optimal strategy to solve the game. In reality, humans make mistakes and we use this characteristic to investigate how different music features affect memory and strategy. Our goal is to develop a formal account of the game by providing a game state descriptor and an overview of the game progression. We will use this formalization to model latent variables related to musical memory.

Main Contribution

We introduce the state progression variables n (number of pairs), k (number of observed cards), and p (number of observed matched pairs). A single state is now described as the tuple (n, k, p) and changes in the current game state are reflected by changes in this tuple. Based on this descriptor, we generate the accessibility relations between different states as allowed changes to each of its variables. The start state is

described as $(n,0,0)$ and the final state is $(0,0,0)$. This allows us to model actions that the player takes in the game as a progression from start to final state through a Markov-chain inspired space.

Implications

Our new formalization provides a psychologically valid model for modeling empirical data as it does not require unrealistic assumptions of human performance. The model allows us to track the process of the game as paths that players take through the state space. We plan to map these paths to the cognitive processes related to music perception and memory. Specifically, the differences between paths allow us to model which musical features people attend to and if less timbral information make it more difficult to remember and recognize known musical pieces.

References

- Foerster, K.-T., & Wattenhofer, R. (2013). *The solitaire memory game (tech. rep.)*. ETH Zurich.
- Halpern, A. R., & Müllensiefen, D. (2008). Effects of timbre and tempo change on memory for music. *Quarterly Journal of Experimental Psychology*, *61*(9), 1371–1384.
- Honing, H. (2021). Lured into listening. *Zeitschrift für Psychologie*, *229*(6), 266–268.
- Janssen, B., Burgoyne, J. A., & Honing, H. (2017). Predicting variation of folk songs: A corpus analysis study on the memorability of melodies. *Frontiers in psychology*, *8*, 621.
- Snyder, B. (2000). *Music and memory: An introduction*. MIT press.
- Zwick, U., & Paterson, M. S. (1993). The memory game. *Theoretical computer science*, *110*(1), 169–196.

Singing in the brain: An ALE meta-analytic review

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Background

Singing is one of the oldest forms of musicality and is ubiquitous worldwide. It likely evolved to strengthen social bonding by enhancing communication and emotional expression. The broad range of singing expertise, from non-musicians to highly trained singers, and the absence of physical instruments make it an ideal subject for investigating sensory-motor control. Singing involves a range of brain mechanisms, including movement production, auditory perception, somatosensory feedback, and activation of the limbic system, making it an excellent model for studying sensory-motor control.

Aim

To gain a comprehensive understanding of the neural control of singing, we conducted a systematic review and meta-analysis of singing related neuroimaging studies including singing production, perception, and imagery.

Methods

Fifty-four studies were included in the qualitative synthesis. From these, 43 studies with 1,540 participants were included in the quantitative synthesis by means of coordinate-based meta-analyses using the activation likelihood estimation (ALE) method. Pre-registered contrast analyses (PROSPERO CRD42022320300) were performed to examine the effects of expertise and singing articulation. Additionally, meta-analytic connectivity modelling (MACM) was conducted to functionally characterize our results into behavioural domains and experimental paradigms.

Results

The results confirm that singing production involves a network of brain regions that mediate auditory-motor integration, including basal ganglia and cerebellar areas, which are known to play a crucial role in motor control and learning, as well as networks processing emotional and somatosensory information. This is consistent with the notion that singing is a complex motor skill that requires precise coordination between sensory and motor systems. The findings also show that singing perception involves brain areas associated with auditory, attention, and language but also motor processing. Finally, the results of the singing imagery analysis suggest that imagining singing involves the activation of brain regions that are also involved in actual singing, further supporting the idea that mental imagery can enhance motor learning and performance. Subgroup analyses suggest that expertise and articulation have distinct effects

on brain activation during singing production. Singers show more sensory auditory integration, motor planning, and performance monitoring compared to non-singers. Articulated singing, compared to non-articulated singing, results in increased activation in areas involved in somatosensory processing, control of phonation and articulatory movements, and precise timing.

Conclusion

This study is the first meta-analysis of the neuroimaging of singing and provides an overview of the neural control of singing. Our findings may have implications for training and rehabilitation programs for singers and individuals with speech disorders.

Jazz improvisation unravelled. *Collecting fingerprints from distinct playing stages*

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Background

In certain musical genres, such as in some non-Western styles and particularly in jazz, skilled improvisers have the ability to spontaneously generate new arrangements of melodic, rhythmic, and harmonic patterns, resulting in novel and emotionally gratifying music sequences ‘on the spot’. Despite the prevalence of this practice, the distinct musical features that mark the various stages of a jazz performance remain puzzling.

Aim & Methods

To address this gap, we conducted a study in which we analysed MIDI data obtained from 16 expert jazz pianists during memory-based playing (*byHeart*), as well as two distinct modes of improvisation: free (*iFreely*) and melody-based improvisation (*iMelody*). To explore differences in the musical signatures between the conditions, we have developed an innovative framework combining MATLAB and Python scripts to characterise musical features such as the total number of played notes, pitch-class distribution, interval size distribution, entropy, and pitch predictability.

Results

Our findings reveal significant differences in the metric structure – specifically number of played notes – and pitch predictability and entropy when comparing *iFreely* with *iMelody* and *byHeart*, thereby illuminating the distinct phases of jazz playing.

Conclusion

These results support the potential of jazz improvisation as a versatile and dynamic form of domain-specific creativity, composed of well-defined phases, each possessing a unique fingerprint that converge to produce novel pieces with high aesthetic value.

Depicting shadows and bird calls: Comparing different composers' approaches to word painting through original SATB settings of the same texts

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Background

Word painting is evident across a large corpus of vocal music from the Renaissance to the present day. Composers apply compositional devices and techniques to illustrate intentional word painting that can be melodic, harmonic, rhythmic, or symbolic in nature - albeit, in most cases, a combination of these elements. This project aimed to explore and 'test' the possibilities and limitations of word painting within an SATB choir context. Four composers participated in the study, setting two contrasting haikus for SATB unaccompanied choir. The texts were specifically written for the purpose of being set to music and contain rich opportunities for word painting within a short space of just seventeen syllables for each haiku.

Project Aims

- Musically analyse participants' compositions to identify and understand contrasting and shared compositional approaches to word painting.
- Compare participants' compositions with my own existing versions of the same text to consolidate findings within my thesis and for use in future research presentations and publications.
- Facilitate workshops to rehearse and record participants' compositions.

Methods

I aimed to achieve a range of compositional approaches to word painting from participants of varying educational stages and genders. The participants who took part in the project are all early-career composers from undergraduate to post-PhD study. They had five weeks to set the haikus in an SATB format and were allowed to include divisi, up to two voices per vocal part. The compositions were required to meet a maximum of four minutes for both haikus combined. I asked participants to document their compositional approaches to word painting through a 150-word commentary matched to each corresponding line of the haikus, which I used to create a synthesis matrix. A framework was developed to identify and analyse instances of word painting within the haikus. The aim was to pinpoint significant moments of word painting by examining how the poetic salient features of the texts correlated with compositional devices. In Haiku 1, the salient features were *cold*, *shadow falls*, *whisper*, and *fire*. In Haiku 2, the features were *radiant*, *playful*, *calls*, and *silver*. The compositional devices examined were melodic

development, harmonic emphasis, rhythm, and dynamics.

Key Findings

The analysis of participants' compositions showed a greater extent of shared, rather than contrasting compositional approaches to word painting. This was especially apparent in correlation to salient features depicting vivid imagery and particularly suggestive language, such as *fire*, *shadow*, *playful*, and *calls*.

Furthermore, the analysis also showed that participants' compositional approaches to word painting aligned with my own, supporting the hypothesis that the nature of particular salient features of the haikus attracts shared interpretations and compositional responses. The workshop sessions provided an opportunity to bring participants' compositions to fruition in an engaging context.

Re-realising opera performance for chamber ensemble

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Abstract

Chamber arrangements of large-scale works have been gaining popularity in the last decade with professional groups, educational institutions, and amateur opera societies, especially as they reduce costs and allow for performances in small venues. Their use also increased as they allowed for social distancing during the Covid-19 pandemic. However, many arrangements are often poorly executed and scores include indications pencilled in haphazardly, resulting in time being wasted before and during rehearsals. Therefore, this thesis suggests alternative approaches and explores how we can re-realise opera performance by using chamber arrangements. It will explore the methods which may be used in producing these arrangements, illustrated by my own arrangements and performances (I also conduct the performances) of two operas, a 65-minute version of Puccini's *La Bohème* that was performed in November 2021 and Lehár's *The Merry Widow* that was performed in April 2023.

There is little literature on how a chamber arrangement of an opera might be made with reduced forces and reduced duration. Hence, in order to construct a framework for my own arrangement, I proposed a list of ten factors to consider when producing an opera arrangement. I also documented my process of arranging the two operas with regards to the ten factors. Finally, I designed a questionnaire that would be able to capture useful data from the audience, singers, and instrumentalists involved in the performances. By undertaking this research, I found out that the ten

factors were comprehensive in making sure that all aspects of producing an opera arrangement was considered. They consider the entire journey from the initial genesis of a project regarding its purpose and vision, which leads onto the arranging process, and finally towards the performance, after which, feedback is obtained. There is much that arrangers may learn from the research presented in this thesis such as the methods in which I employed: the use of current timbre research to analyse an original score through the listening process and translating that into my own arrangement.

Make or break: Undergraduate students' mental well-being and one-on-one music lessons

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Background

In university-level music institutions, students have the opportunity to take one-on-one lessons. These lessons foster individualized relationships between students and instructors, as well as a unique teaching and learning environment and power dynamic. However, there is concern surrounding these educational structures and how they affect students' mental well-being. Previous research has shown that various academic and socio-cultural variables impact students' mental well-being, and that musicians may suffer from the expectations and traditions inherent in "conservatory culture" (Celik & Sari, 2022; Persson, 2000). Furthermore, learning was hindered when students' values and expectations conflicted with the teacher or the institution, and improvement occurs by changing the culture of learning (Rakena et al., 2016).

Aims

Conducted amongst undergraduate students, this pilot study provides deeper understanding of students' experiences with one-on-one lessons and the master-apprentice relationship in relation to their mental well-being and sociodemographic characteristics. It also serves to amplify student voices to create positive change in the teaching and learning environment.

Methods

Qualitative data were collected using an anonymous online survey in December 2022. The survey consisted of 17 questions regarding students' demographic information, experiences in one-on-one music lessons, perceptions of impact on mental well-being, experiences learning at the institution in general, and changes in the teaching methods students feel would improve their mental well-being. The study sample was purposefully selected with the goal of collecting responses from a wide range of students, representative of the undergraduate population. Eleven survey responses were collected.

Results

Three main themes emerged: (1) the overall impact of lessons on students' mental well-being, including specific aspects impacting students; (2) the role of identity; and (3) extended aspects of the learning culture impacting students. First, preliminary results indicated that most students' mental well-being is impacted to some extent by one-on-one lessons, with the most common response being that students are

“very impacted” by lessons. 63% of respondents indicated that lessons have a “positive” impact on their mental well-being, but for 57% of them, this occurred only after changing teachers. Second, many respondents described how their gender and race/ethnicity interacts with their learning and their well-being. Third, students recurrently mentioned repertoire, high workload, negative environment, and program of study as influential factors within the institutional culture impacting their mental well-being.

Conclusion

The results of this pilot study corroborate the existing literature. The themes revealed from analysis of the survey responses deepen our understanding of how one-on-one music lessons relate to students’ mental well-being. As one respondent stated, “private teachers have the potential to uplift students, but they have equal potential to crush their spirit,” demonstrating that lessons can have considerable impact on students’ mental well-being, positive or negative. This study holds significance for music students, applied teachers, administrators, and institutional policy, and contributes to the need for further research to better understand students’ mental well-being and pedagogical methods in music institutions. Collaborating with students and listening to students’ voices is the first step towards positive change and creating a learning culture that is welcoming for all.

References

- Celik, S., & Sari, A. S. (2022). Examining of conservatory students' mental well-being levels aspects of various variables. *Asian Journal of Education and Training*, 8(1), 1-7. <https://doi.org/10.20448/edu.v8i1.3653>
- Hodkinson, P., Biesta, G., & James, D. (2007). Understanding learning cultures. *Educational Review*, 59(4), 415–427. <http://dx.doi.org/10.1080/00131910701619316>
- Persson, R. S. (2000). Survival of the fittest or the most talented?: Deconstructing the myth of the musical maestro. *Journal of Secondary Gifted Education*, 12(1), 25–38. <https://doi.org/10.4219/jsge-2000-638>
- Rakena, T. O., Airini, & Brown, D. (2016). Success for all: Eroding the culture of power in the one-to-one teaching and learning context. *International Journal of Music Education*, 34(3), 285-298. <https://doi.org/10.1177/0255761415590365>

Maybe it's because I'm a lesbian: An archival investigation on jam today, the sisterhood of spit, spoilsports, and the Women's Liberation Movement

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Introduction

The spectacle of the 'all-female' band is one that elicits thoughts of female empowerment, political activism, and the rejection of heteronormative femininity. Of course there are many complexities in the current wave of feminism, the discourse surrounding gender identity, and the accessibility of musicianship that differentiate between now and previous waves of feminism. Yet the opening statement still rings true for all female-only bands of any decade. The bands examined in this study include three all-female, UK-based bands - Jam Today, the Sisterhood of Spit, and the Spoilsports - and analyses their perspectives and engagement with second-wave feminist ideology and lesbianism. Focusing on these bands provided many interesting details on their experiences with second-wave feminism, sexuality, and musicianship, and may contextualise the current wave of feminism and its relationship with women, music, sexuality, and gender.

Aims

The aim of this research was to analyse the relationships between the bands and their members, gain further insights about the experience of being a musician during the Women's Liberation Movement (WLM), and add to existing research regarding this topic.

Method

This study examines archival material from the University of Leeds Brotherton Library Special Collections Archive, 'Feminist Archive North', and the website Women's Liberation Music Archive. This included interviews, newspaper articles, and lyric sheets. The data collected for this research is analysed using 3 different models: Framing Analysis (Goffman, 1974; Kitzinger, 2007), Cognitive-Affective Alliances (Wolfe & Haefner, 1996), and a model to understand Women's Experiences in Jazz (Wehr, 2016). The data coding used a method outlined by Glen H. Elder et al. (1993) and additionally used inspiration from Thematic Analysis (Braun & Clarke, 2006).

Results & Conclusion

Social Justice, femininity, and community were found to be the most prominent factors in the bands' experiences and engagement with the WLM and all-female bands, which was influenced by the members' musical and homosexual identities. The similarities between the bands' experiences included dealing with

homophobia and sexism, having goals of creating spaces for women, and recognising the cultural significance of the ‘all-female band.’ The main difference was how they portrayed their gender in which the Sisterhood of Spit played on expectations of femininity, potentially as a form of satire or reclamation, while Jam Today and SpoilSports explicitly rejected these expectations. These findings indicate that there are many ways an individual or group may choose to express their femininity despite having similar backgrounds, goals, and experiences, and that these differences can, and did, create tensions between the members of the WLM. Recognising these tensions may aid in understanding current tensions within the fourth wave of feminism regarding gender identity. Furthermore, new material that had yet to be documented was revealed in the study, specifically lyric sheets from Jam Today, thus making this study another accessible resource for further examination of these bands and/or the WLM.

Dark hearts and laughing fire: How is Wagnerian duality exposed in apocalypse now?

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Background

“We use Wagner. It scares the shit out of the sl*pes. My boys love it.” Thus remarks Colonel Kilgore, in Francis Ford Coppola’s *Apocalypse Now* (1979), broadcasting Richard Wagner’s *Ride of the Valkyries* (1856) as his division unleashes destruction upon a Vietnamese village. The use of Wagner’s music invokes the grim legacy of Wagnerism.

What confounds this are themes that resonate with aspects of Wagnerism. *Apocalypse Now* is a condemnation not only of man’s primal evil, but equally of an imperialist America severed from its human origin.

Aims

This paper interrogates the music and ideology of Richard Wagner through its presence in *Apocalypse Now*. It examines the contrasting presentations of Wagnerism in the film and asks what this reveals about the duality of Wagnerism.

Methodology

This is a musicological study with a focus on historiography as well as thematic and textual analysis of film and music. Both research subjects are examined through the application of a socialist theoretical framework combined with Carl Emil Schorske’s approach to irrationality and mass movements in the European fin de siecle. The framework of Schorske’s analysis is applied to synthesise an approach which elucidates an understanding of the contradictions of Wagnerian ideology.

Main Contribution

Although the horrors of individual barbarity are key targets of Coppola’s contempt, *Apocalypse Now* equally expresses disgust at the consumption of human life in the name of progress. Kilgore and Kurtz are both moral aberrations, but it is only the latter Willard is sent to punish. The former is endorsed by a state that trains “young men to drop fire on people, but... won't allow them to write “f*ck” on their airplanes”.

There is a harmony between these themes and those espoused in Wagner’s *Der Ring Des Nibelungen* (1876). *Der Ring* attacks the moral emptiness of capitalist society and its pretence of rationalist progress.

The gods of the saga exemplify moral corruption, their authority founded upon a violation of nature in the restless harmonic world of the Rhine that opens *Das Rheingold* (1869).

In *Siegfried* (1876), the god's authority is splintered by the instinctive human being. The problem that arises is that having annihilated order, the world that takes its place may well be no better. Siegfried embodies the ideal of the instinctive, irrational human being, yet this doesn't stop him being fundamentally cruel.

Siegfried betrays the danger of Wagnerian ideology. Wagnerism precipitated Volkish mass movements and racial persecution. Wagner's music underscores *Apocalypse Now* because his ideology, woven into that music, enabled the arrogance and incapacity for introspection required for the characters of the film to enact the horrors they inflict.

Conclusion

This study reveals an intoxicating amorality that sits at the heart of Wagnerism. That Wagnerian ideals are both satirised and invoked in *Apocalypse Now*, speaks of an ideological construction that offers remedies fundamentally vulnerable to the worst aspects of human nature. In its commitment to unreason, Wagner's ideology empowers people to strike down suffocating order, but in doing so unleashes a more vital horror.

An empirically validated set of metrically ambiguous rhythms

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Background

Musical rhythm is perceived in the context of a nested hierarchy of periodicities known as metre. Metre allows time units to be grouped into beats, and musical events that coincide with beat onsets are more predictable and perceived as more stable by listeners. One common approach to studying beat and metre perception involves the use of polyrhythms. Polyrhythms consist of two simultaneous isochronous pulse trains with rates that can be expressed as a coprime integer ratio (e.g., 3:4). Either pulse train can be perceived as the beat, which results in metrical ambiguity. However, there is evidence that listeners are strongly biased towards perceiving whichever pulse train contains binary subdivision groupings as the dominant beat. Essentially, although polyrhythms in principle permit metrical ambiguity, they do not necessarily display it empirically.

Aims

Here we attempted to address this issue by surveying a complete metrical space for ambiguous rhythms. Our goal was to identify a set of rhythms which exhibit metrical ambiguity, then validate that they remain ambiguous under closer scrutiny.

Methods

We asked listeners to tap the beat of every possible rhythm that could be constructed on a 12-unit grid, presented at two different tempos. We identified different forms of ambiguity: two groups of listeners disagreeing on how to interpret the same rhythm or an individual's interpretation changing over repeated listenings. For a second study, we identified pools of rhythms that were either highly ambiguous or highly unambiguous. We presented these two rhythm types at a broader range of tempos and rotations, both to validate their initial classification as (un)ambiguous and to determine the optimal conditions for ambiguity to arise.

Results

In the first experiment, we identified a set of promising candidate ambiguous rhythms, each of which we paired with unambiguous rhythms. Overall, responses were heavily biased towards 2- or 4-unit beat interpretations, even for polyrhythms. In the second validation experiment, ambiguity scores were again significantly higher for the ambiguous group of rhythms than their unambiguous counterparts.

Conclusion

We provide a validated pool of maximally ambiguous rhythms that we propose may serve as a powerful tool in a broad range of experiments on beat/metre perception. We also give recommendations on subsets of rhythms to use for specific purposes.

Transcending silence: The experiences of trans* singers in choirs

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Background

Experiences with gender identity vary across time, place, and culture, as does the language to describe them. The term trans* is increasingly used in written contexts to include any individual who's assigned gender at birth does not match their gender identity. This can be a binary (man or woman) or non-binary (man and woman, neither, fluid, etc.) gender identity. Due to its recognition of diversity, the term trans* is used throughout this abstract.

Trans* individuals are likely to experience social exclusion, limited access to healthcare, difficulties with legal protection and recognition, and in some cases risks to personal safety. Consequentially, well-being difficulties are common.

Findings of studies on group singing indicate that choir participation can positively impact mental and physical well-being, promote social inclusion, and aid the building of communities, whilst being cost-effective. However results of inquiries so far suggest that these spaces are often challenging to access for trans* singers, with barriers including enforced gendering in sections and uniforms, lack of awareness from fellow singers and musical directors, and deliberate discrimination. Aside from choirs addressing these barriers, a private and individualised approach may also be critical for effectively coaching trans* singers in choir settings.

Research on the experiences of trans* singers in Western settings, especially in choirs, is recent. Consequentially, there is little prior knowledge. Studies tend to have small sample sizes, are primarily carried out by cisgender researchers, and methods are designed around a limited understanding of this demographic.

Past studies predominantly take a qualitative approach with common methods being semi-structured interviews and observations of singing teachers/choir conductors. Research mostly focuses on identifying the barriers to participation, though more recent work is starting to explore musical vocality through medical transition and inclusive pedagogy.

Aim

Through this poster presentation, I aim to provide an overview of the findings so far on the experiences and inclusion of trans* people in choirs, common methodological approaches, their limitations and implications for further research.

Main Contribution

For this poster presentation, a systematic literature review was carried out. The sources included in the review are studies that investigate the experiences of trans* singers in choirs in the format of case studies, systematic reviews and observations from vocal professionals. Findings were synthesized and are outlined in the poster. A critical review of common methods is provided as well as how my masters dissertation builds on this and what new insights this research provides.

Implications

The research gaps and limitations in this area mean there are few scientifically informed resources available for musical directors and choir participants on supporting trans* singers in choirs. As a result, it is currently difficult to bring about positive change in these environments, causing this highly disadvantaged demographic to stay largely segregated from group-singing spaces. However, considering the research so far, it is possible to address this by considering previous findings and methodological limitations, including trans* voices more directly in research, supporting further research, and using results to produce more practical resources for music practitioners.

Non-instrument song 'Syair Akaed Saeket' as a media for Islamic Da'wah in Indonesia

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Background

The spread of Islam in Java, Indonesia is closely related to art and culture, one of which is the use of music and songs as media. Through culture, Islam was more quickly accepted by society at that time. One of the well-known media in spreading Islam is *Syair (song) Akaed Saeket* which was written in early 1900 by K.H.R. Syamsul Arifin and K.H.R. As'ad Syamsul Arifin at the Salafiyah Syafi'iyah Islamic Boarding School, Sukorejo, East Java, Indonesia. This song contains the teachings of monotheism and faith for Muslims. This song contains 20 obligatory attributes for Allah, 20 muhal attributes for Allah, 1 jaiz attribute for Allah, 4 obligatory attributes for the Apostles, 4 muhal attributes for the Apostles, and 1 jaiz attribute for the Apostles. This song becomes a medium of Islamic da'wah by singing it without music before the time for the Maghrib prayer (6 pm). This song is interesting to study because until now, this song still exists among the people.

Aims

The purpose of this study is to describe the development of the *Syair (song) Akaed Saeket* which is still being sung today without instruments. In addition, this study also aims to explain the contents of the song.

Methods

This study used a descriptive qualitative method. Researchers will interpret the existence of social phenomena which are then translated through language or text. Data collection was carried out by studying literature on *Syair (song) Akaed Saeket*. In terms of analysis techniques, this study uses a combination of content analysis and data reduction techniques.

Results

The results of this study are:

1. The influence of Javanese culture, especially Madura is very strong, so this song was written using the Madurese language to adapt to the culture in that region
2. This song consists of verses so that when it is sung without instruments, this verse has a tone
3. The spread of this song is done after the Maghrib prayer or what is often referred to as 'praise-pujian' so it still exists to this day.

4. This song is used as a medium of Islamic da'wah because it contains 20 obligatory attributes for Allah, 20 muhal attributes for Allah, 1 jaiz attribute for Allah, 4 obligatory attributes for the Apostles, 4 muhal attributes for the Apostles, and 1 jaiz attribute for the Apostles.

Conclusions

Music and culture become one of the preaching media that is often used in Islamic preaching. Through *Syair (song) Akaed Saeket*, the introduction of Islam becomes easy to accept because it uses the regional language and adapts to the local culture. Although it has been more than a century, this song still exists and is sung every day after the Maghrib prayer. Its dense content, but conveyed with the media of non-instrument songs. makes this song remembered and sung by the public.

Sound in spatial dimension: Difference between Turkish and other language speakers

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Introduction

Pitch is known to have both vertical and horizontal spatial visual representations but with more pronounced vertical property (Mudd, 1963). Previous research has shown correlations between pitch description, sound localization, and spatial properties in various languages (Lidji et al., 2007; Rusconi et al., 2006). One study found mappings between vocabulary, pitch, and spatial properties in Turkish, Farsi, and Zapotec (Shayan et al., 2011). Another study using a matching task found that pitch is associated with spatial height in Dutch, whereas thickness is associated with pitch in Turkish (Dolscheid et al., 2020). Our study aims to further study these mappings by using a reaction-time-based test to see if the findings can be generalized to other tasks in the Turkish-speaking population

Methods

In the pre-trial phase of our study, we introduced auditory stimuli in the form of sine waves at 220 Hz and 659 Hz. Participants were tasked with describing the pitch of these tones in their respective native languages. We used this step to establish a linguistic background for later pitch description comparisons for cross-linguistic analysis.

We developed a reaction-time test consisting of 2 trials. For both trials, participants were asked to press the corresponding arrow key for the position of the visual stimulus as soon as the object appeared.

In Trial I, we conducted 120 trials where participants were presented with tones at 220 Hz and 659 Hz and a visual stimulus with only one thickness level. These tones were played before presenting the visual stimuli. The pitch was generated using a sine wave generator and participants' reaction times were recorded via key presses, providing valuable data for our analysis.

In Trial II, we expanded our study with 128 trials, introducing additional positional variations: up, down, left, and right. Unlike Trial I, we introduced two thickness levels for the tones. Again, we used a sine wave generator to produce auditory stimuli in 220 Hz and 659 Hz, and participants' reaction times were collected through key presses.

Results

Our preliminary analysis showed that there are no differences in reaction time between thickness and position conditions for Turkish speakers. We also found no significant result when we looked for the interaction when all the three variables (thickness, positions, and pitch) were present.

Discussion

Several crucial elements might have influenced our study. Our Turkish-speaking individuals' English skills and bilingualism may have brought confounding variables into our findings, underscoring the need of accounting for language proficiency in a second language in future studies. While the reaction-time test revealed insights, it may oversimplify cognitive processes, suggesting that additional testing should be investigated to see if the previously reported findings are present in other environments. These discrepancies might also be ascribed to inadequate thickness-to-pitch mapping in our tasks, stressing the significance of accurate experimental designs one more time. Despite its shortcomings, our study contributes to clarifying the importance of language in cross-modal research, suggesting additional research in multilingual studies.

References

- Dolscheid, S., Çelik, S., Erkan, H., Küntay, A., & Majid, A. (2020). Space-pitch associations differ in their susceptibility to language. *Cognition*, 196. <https://doi.org/10.1016/j.cognition.2019.104073>
- Lidji, P., Kolinsky, R., Lochy, A., & Morais, J. (2007). Spatial associations for musical stimuli: A piano in the head? *Journal of Experimental Psychology: Human Perception and Performance*, 33(5), 1189–1207. <https://doi.org/10.1037/0096-1523.33.5.1189>
- Mudd, S. A. (1963). Spatial stereotypes of four dimensions of pure tone. *Journal of Experimental Psychology*, 66(4), 347–352. <https://doi.org/10.1037/H0040045>
- Rusconi, E., Kwan, B., Giordano, B. L., Umiltà, C., & Butterworth, B. (2006). Spatial representation of pitch height: The SMARC effect. *Cognition*, 99(2), 113–129. <https://doi.org/10.1016/j.cognition.2005.01.004>
- Shayan, S., Ozturk, O., & Sicoli, M. A. (2011). The thickness of pitch: Crossmodal metaphors in Farsi, Turkish, and Zapotec. *Senses and Society*, 6(1), 96–105. <https://doi.org/10.2752/174589311X12893982233911>

Effects of group singing on mental health in children aged 7 - 18: A systematic review

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Background

Many compelling studies examine the effects of group singing on mental health in adults. Several studies show promising positive results of group singing within clinical settings, such as reduced stress levels, increased psychological well-being, and feelings of connectedness. These positive effects must be examined in other age categories, such as children under 18. As societies continue to de-stigmatise conversations around mental health, especially in young children, it is important to examine potential interventions, such as group singing, early to understand their effects.

Aim

This systematic review examines the effects of group singing on the mental health of children aged 7 - 18. The review examines the physiological, psychological, and emotional impact, and looks for potential effect commonalities between studies resulting from group singing. Finally, the review addresses the question of whether group singing has a positive effect on mental health in children.

Data sources

To conduct the review, Google Scholar, the Cochrane Library, the Imperial College Library database, and the University of Toronto Libraries database were searched. No date restrictions were placed in the search to maximise the number of results. Only studies that used group singing interventions were included. Studies whose participants were outside the age category were excluded. The search was conducted in English and Russian due to the researcher's language fluency.

Results

Four studies were included in the review. In these studies, group singing has been shown to decrease cortisol levels, increase health-related quality of life (HRQQL), increase psychological well-being scores, and increase quality of life scores. The findings of these studies suggest three effect areas of group singing on children's mental health: physiological, psychological, and emotional.

Limitations of these studies must be considered, particularly the variety of scales and tests used in each study and the difference in intervention settings (in-person and virtual).

Conclusions

The evidence from these studies supports the positive effects of group singing for children. However, there is a lack of research on the impact of group singing in this age category. Future studies need to build on the documented psychological, physiological, and emotional variables to provide deeper insights into each variable and establish greater validity of the observed effects.

Investigating relationships between visual imagery, emotion of the music and emotions felt during performance

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Background

Visual imagery in music performance is defined as images that musicians voluntarily or involuntarily see in their mind's eye whilst performing or practising music. Research has indicated that performers may experience different forms of visual imagery during practice and performance (Day & Thompson, 2019; Küssner & Eerola, 2019), and that they use forms of imagery to prepare for performance and improve performance quality (Clark et al., 2012; Wöllner & Williamon, 2007). Furthermore, a close connection between visual imagery and emotion has been demonstrated (Balteş & Miu, 2014; Day & Thompson, 2019;). However, there is a gap of understanding about the precise relationship between music, perceived and felt emotions, including negative ones, and visual imagery.

Aim

This study aimed to investigate the relationship between visual imagery, emotion of the music perceived and felt during music performance, and related practices from the performer's perspective. The central questions are how music performers perceive and use visual imagery in their music performance, how this relates to emotions perceived and experienced, and how the use of visual imagery may influence their performance in turn.

Method

A survey method was adopted to investigate the research question. So far, 57 participants answered the questions about experienced visual imagery, including type, frequency, intensity, and changes in visual imagery as participants' emotion or contexts change, and the effects of visual imagery on participants' performance.

Result

Among the 57 participants, 20 reported they experienced visual imagery most of the time when practising alone, which is more frequent than when they perform with others. Regarding types of visual imagery, 22.4% indicated experiencing landscapes, which was most frequently experienced, followed by situations. The majority of participants reported "always" or "most of the time" for changes in visual imagery when emotions or the type of music changes, but only "sometimes" or "never" for changes in visual imagery in response to performance anxiety and place/time. Moreover, only a small proportion of participants

indicated “never” for visual imagery to change with emotion (5.2%), which indicates a strong connection between visual imagery and emotional expression.

Conclusion

We conclude that music performers most often experience vivid visual imagery when performing alone, and tend to use concrete visual imagery such as landscapes and situations. Furthermore, visual imagery often changes as the emotion of the music changes, indicating a close relationship between both of them. However, it is unclear if the use of visual imagery can help support music performance, which requires further investigation.

References

- Balteş, F. R., & Miu, A. C. (2014). Emotions during live music performance: Links with individual differences in empathy, visual imagery, and mood. *Psychomusicology: Music, Mind, and Brain*, 24(1), 58–65. <https://doi.org/10.1037/pmu0000030>
- Clark, T., Williamon, A., & Aksentijevic, A. (2012). Musical imagery and imagination: The function, measurement, and application of imagery skills for performance. In D. Hargreaves, D. Miell, & R. MacDonald (Eds.) *Musical imaginations: Multidisciplinary perspectives on creativity, performance, and perception* (pp. 351–365). Oxford University Press.
- Day, R. A., & Thompson, W. F. (2019). Measuring the onset of experiences of emotion and imagery in response to music. *Psychomusicology: Music, Mind, and Brain*, 29(2-3), 75–89. <https://doi.org/10.1037/pmu0000220>
- Küssner, M. B., & Eerola, T. (2019). The content and functions of vivid and soothing visual imagery during music listening: Findings from a survey study. *Psychomusicology: Music, Mind, and Brain*, 29(2-3), 90–99. <https://doi.org/10.1037/pmu0000238>
- Wöllner, C., & Williamon, A. (2007). An exploratory study of the role of performance feedback and musical imagery in piano playing. *Research Studies in Music Education*, 29(1), 39-54. <https://doi.org/10.1177/1321103X07087567>

Dynamic hybridisation: Methods of integration of electroacoustic and popular music

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Background

In recent years, electroacoustic composers have become increasingly interested in the creative techniques, materials, and processes commonly employed by other traditions of music, including popular music. Conversely, popular music practitioners have been incorporating technologies used in electroacoustic music into the creation and performance of their works since the 1960s. It could also be argued that, with current technological developments and their wide availability, it has become increasingly difficult to differentiate between pieces of electroacoustic music and, particularly, popular music (Emmerson & Smalley, 2001). This trend brings attention to the questions of genre definitions, the blurring lines that divide genres in the modern practice of music, and the creation of hybrid genres.

The concept of hybridisation has gained prominence amongst practitioners and researchers alike (Bentall, 2016), but there is still a vast terrain to explore regarding the methods employed in creating hybrid works. Although some attempts have been made towards establishing methods for integrating genres (Friar, 2017; Mayal, 2016), there is still a lack of acknowledgement of the interaction amongst the diverse music parameters involved in the hybridisation process and of the misguided assumption that music can be objective in every scenario.

Considering all this, this research will consider and propose a series of compositional methods for the creation of hybrid works nestled under a broad approach that shall be termed dynamic hybridisation.

Aims

To determine and analyse the central features/elements of electroacoustic and popular forms of music that might be subjected to some form of hybridisation.

To review current research on hybridisation and to propose a bespoke set of methods for merging electroacoustic and popular music named dynamic hybridisation.

Method

The method of dynamic hybridisation acknowledges the intrinsic and intricate relationship amongst the different music parameters involved in the integration of genres, the variability and flexibility that composers show when they approach the creation of a work, and the subjectivity surrounding genre categorisation. Since this compositional project is a practice-led research, a portfolio of compositions will

be created in order to test the method and to contrast the result with other relevant pieces from the appropriate repertoire.

Main Contribution

By establishing dynamic hybridisation as a compositional method, it is expected that other practitioners will acknowledge and make use of it in their practice.

References

- Bentall, R. (2016). Methodologies for Genre Hybridisation. *Organised Sound*, 21(2), 117–126. <https://doi.org/10.1017/S1355771816000042>
- Emmerson, S., & Smalley, D. (2001). Electro-acoustic music. *Grove Music Online*, 1. <https://doi.org/10.1093/gmo/9781561592630.article.08695>
- Friar, S. (2017). *Hybrid Music in Theory and Practice* (Doctoral Thesis, Princeton University). DataSpace at Princeton University. <http://arks.princeton.edu/ark:/88435/dsp01nc580q265>
- Mayall, J. (2016). Cross-genre hybridity in composition: A systematic method. *Organised Sound*, 21(1). <https://doi.org/10.1017/S1355771815000357>

“Jack, I Swear”: Intersections of masculinity and sexuality in Charles Wuorinen’s *Brokeback Mountain*

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Background

In his 2014 operatic adaptation of *Brokeback Mountain*, Charles Wuorinen uses his music and Annie Proulx’s libretto (expanded from her original short story of the same name) to enhance the depth of the two main characters, Ennis del Mar and Jack Twist, and their shared experience, in contrast with Proulx’s story and the 2005 film directed by Ang Lee. Despite the growing amount of queer musicological research within the past few decades (e.g., Brett & Wood, 2006; Hubbs, 2004; Rogers, 2022;), virtually no scholarship has engaged with the opera’s themes. One of these themes involves the multifaceted conflict of two repressed gay men coming to terms with their sexuality and love for one another within their place in the 1960s–1980s American West. What, if anything, does this opera contribute to the story already told?

Aims

Through the portrayal of the main characters and the social issues at play, Wuorinen elevates the complexity of the characters to new heights, covering territory not previously explored in other mediums. I engage with queer-theoretical scholarship—including queer musicology (Peraino & Cusick, 2013) and music theory (Lee, 2020)—and analyze a sample of scenes from the score and the available recording from the Teatro Real de Madrid. The main topics of queer scholarship with which I engage involve masculinity (Keller & Jones, 2008; Maus, 1993), pacifism/violence (Brett, 2006a; Mass, 2006), and essentialism (Brett, 2006b). In so doing, I show that by obfuscating the characters’ sense of masculinity, the opera adds a complex dimension to their story, enhancing what was previously accomplished in the film and short story.

Main Contribution

Through a handful of examples, I show how the portrayal of these characters through staging and music challenges the fundamental masculinity of Ennis and Jack. Masculinity serves as a societal and personal framework for the *Brokeback* cowboys, constraining them in numerous ways. It dictates their self-expression as well as their character development. Furthermore, their expression through music and acting contributes to a more extensive understanding that the characters are sexually, romantically, and personally frustrated and unfulfilled. The critical element in Wuorinen’s portrayal of the characters involves depicting them as sensitive poets through song, which de-emphasizes their toughness. This

adaptation shows different versions of Ennis and Jack, versions more noticeably torn than before. Each character's sense of himself deconstructs as his manliness is challenged.

Furthermore, the opera adaptation intensifies the ongoing essentialist conflict that each character has with himself; they both have trouble reconciling their split lives between home and Brokeback Mountain.

Implications

Wuorinen's expansion of *Brokeback Mountain* to opera illustrates how a single story can be effectively adapted to fit various mediums and provides new angles to tell the same story time and again. This research and analysis will ultimately show the opera's effect on the story and the larger conversation surrounding depictions of queerness and queer relationships in opera, especially in non-canonic works.

References

- Brett, P. (2006a). *Music and sexuality in Britten: Selected essays* (1st ed.). University of California Press.
- Brett, P. (2006b). Musicality, essentialism and the closet. In P. Brett, E. Wood & G. C. Thomas (Eds.), *Queering the pitch: The new Gay and Lesbian musicology* (2nd ed., pp. 9-26). Routledge.
- Brett, P. & Wood, E. (2006). Lesbian and Gay music. In P. Brett, E. Wood & G. C. Thomas (Eds.), *Queering the pitch: The new Gay and Lesbian musicology* (2nd ed.). Routledge.
- Hubbs, N. (2004). *The queer composition of America's sound: Gay modernists, American music, and national identity*. (1st ed.). University of California Press.
- Keller, J. R., & Jones, A. G. (2008). Brokeback mountain: masculinity and manhood. *Studies in Popular Culture*, 30(2), 21-36.
- Lee, G. (2020). Queer music theory. *Music Theory Spectrum*, 42(1), 143-153.
- Mass, L. D. (2006). A conversation with Ned Rorem. In P. Brett, E. Wood & G. C. Thomas (Eds.), *Queering the pitch: The new Gay and Lesbian musicology* (2nd ed., pp. 85-111). Routledge.
- Maus, F. E. (1993). Masculine discourse in music theory. *Perspectives of New Music*, 264-293.
- Peraino, J. & Cusick, S. G. (2013). Music and sexuality. *Journal of the American Musicological Society*, 66(3), 825-872.
<https://doi.org/10.1525/jams.2013.66.3.825>
- Rogers, B. (2022). The queer pleasures of musicals. In F. E. Maus & S. Whitely (Eds.), *The Oxford Handbook of Music and Queerness* (pp. 63–80). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199793525.013.48>

The understanding musical agency project (UMAP)

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Background

Music therapy (MT) has repeatedly been shown to benefit patients with a wide variety of neurological disorders (Sihvonen et al., 2017). The proposed mechanism of action is a facilitation of functional and structural neural reorganisation (Altenmüller & Furuya, 2017; Koelsch, 2009; Stegemöller, 2014). However, the literature frequently groups music listening and music making together, making it difficult to differentiate between active music therapy (AMT) interventions (such as playing an instrument) and passive music therapy (PMT) interventions (such as listening to music). We propose that one of the barriers towards investigating AMT interventions is a challenge related to quantifying the degree of musical engagement by the patients or musical agency (Fritz et al., 2020). In the Understanding Musical Agency Project (UMAP), we sought to overcome this challenge. We present a tool for measuring musical agency across a range of populations likely to undergo some form of AMT intervention.

Adapting Existing Tools: The Sense of Agency (SoA) questionnaire (Tapal et al., 2017) was adapted to address musical agency rather than general agency. The questionnaire was evaluated by a panel of musicologists and professional musicians. Suggestions were implemented and the result was the Sense Of Musical Agency (SOMA) questionnaire.

Initial Testing with Musicians: The questionnaire was administered to 11 musicians across 8 sessions. The SOMA questionnaire showcased high internal consistency (Cronbach's alpha = .92), a high completion rate (100%), and high test-retest reliability.

Clinical Application: The SOMA questionnaire was then administered to 6 stroke patients at the university hospital in Leipzig. The questionnaire had a 0% completion rate. Patients report suggested problems with abstract language, complicated vocabulary, and long sentences in the questionnaire.

Redevelopment of the questionnaire: The SOMA questionnaire was redeveloped to address patients' concerns. The revised version was streamlined to eight items rooted in principles from musicology with simpler questions. Fifty-four schoolchildren were assigned to a group of either group musical agency or sham musical agency. The new questionnaire manifested a moderate internal consistency (Cronbach's alpha = .78), but indicated significant levels of musical agency in both conditions. Post-experimental interviews suggested that this corresponded to the children feeling rather unsure of whether they were in

control of the music due to being in a group agency design. The questionnaire therefore captured illusory agency, probably due to the ambiguous group control setup.

Testing with elderly participants: We further administered the questionnaire to 32 healthy elderly individuals in an experiment employing two conditions: musical agency and sham condition. Here, participants reported significantly varied levels of musical agency between conditions ($p < .001$) and the questionnaire maintained high internal consistency (Chronbach's alpha = .81).

In conclusion, we have developed a fast, valid, and reliable questionnaire to measure musical agency. We observed that this was capable of capturing variations of feeling in control of the music through illusory musical agency, which seems to readily occur in ambiguous experimental settings. Such a tool is invaluable for gauging musical agency within AMT settings. By offering reliable measurements, the SOMA questionnaire can guide therapeutic practice and facilitate robust evaluation of AMT in future scientific investigations.

References

- Altenmüller, E., & Furuya, S. (2017). Apollos gift and curse: Making music as a model for adaptive and maladaptive plasticity. *E-Neuroforum*, 23(2), 57–75. <https://doi.org/10.1515/nf-2016-A054>
- Fritz, T. H., Montgomery, M. A., Busch, E., Schneider, L., & Villringer, A. (2020). Increasing divergent thinking capabilities with music-feedback exercise. *Frontiers in Psychology*, 11, Article 578979. <https://doi.org/10.3389/fpsyg.2020.578979>
- Koelsch, S. (2009). A neuroscientific perspective on music therapy. *Annals of the New York Academy of Sciences*, 1169(1), 374–384. <https://doi.org/10.1111/j.1749-6632.2009.04592.x>
- Sihvonen, A. J., Särkämö, T., Leo, V., Tervaniemi, M., Altenmüller, E., & Soinila, S. (2017). Music-based interventions in neurological rehabilitation. *The Lancet Neurology*, 16(8), 648–660. [https://doi.org/10.1016/S1474-4422\(17\)30168-0](https://doi.org/10.1016/S1474-4422(17)30168-0)
- Stegemöller, E. L. (2014). Exploring a neuroplasticity model of music therapy. *Journal of Music Therapy*, 51(3), 211–227. <https://doi.org/10.1093/jmt/thu023>
- Tapal, A., Oren, E., Dar, R., & Eitam, B. (2017). The sense of agency scale: A measure of consciously perceived control over one's mind, body, and the immediate environment. *Frontiers in Psychology*, 8, 1552. <https://doi.org/10.3389/fpsyg.2017.01552>

“Somos la resistencia, no?”: Palimpsest and metaphor in Money Heist and “Bella Ciao”

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Background

The Italian folk song “Bella Ciao” has been a musical icon for resistance and freedom, gaining popularity in recent years due to its repeated use in the hit Netflix series *Money Heist* (2017–21). Why did Jesús Colmenar, a writer for the series, choose a partisan war song as an anthem meant to represent a group of outlaws? More importantly, how does the song’s use in the context of the show lead viewers to understand the seemingly-paradoxical relationship between bank robbery and resistance?

Aims

In this paper, I argue that *Money Heist* uses “Bella Ciao” not only to embody resistance, unity, and freedom, but also to take on additional meanings while adding depth to, and humanizing, its anti-heroes. I examine the different instrumentations, moods, timbres, and scenic settings of the song within the show to highlight how they affect viewers’ perception of the characters and plot. Layered meanings and interpretations are created that become more complex with each viewing.

Methods

Drawing from Claudia Gorbman’s (1987) theory of music in film and Berthold Hoeckner’s (2019) conception of film-music semiotics, I discuss double projection, affective attachment, and palimpsest in “Bella Ciao’s” appearances in the series, examining how the scenes interact to manipulate viewers’ emotions. Through contextual aural analysis of the three instances the song is used in the series, I explore how different “Bella Ciao” instrumentations, moods, timbres, and accompaniments affect viewers’ perception of the characters and plot, creating an experiential palimpsest that becomes more complex with each viewing. I also draw the connection between the palimpsest created between the song in the show and instances of its recent use as an anthem in various activist movements and protests.

Results

By this final instance of “Bella Ciao,” viewers are quite familiar with the song and can identify its function as the anthem for the show. While each use of the song is unique due to their instrumentation, voicing, and context within the show, all three instances end with two key elements. In each instance, the melody ends with an ascending melodic minor scale with the words “per la liberta” (for the freedom), while the characters raise their fists, or glasses of wine, in the air. This fist in the air, coupled with the Italian

resistance song helps signify the metaphor for “resistance” and unity within the show; but the power of the music helps reinforce the connection between viewers and characters.

Conclusions

With the nuanced layer of palimpsest between Bella Ciao’s alleged ties to the partisan movement, as well as the inter and intra-medial palimpsest of each instance in the show, the writers use the song to help portray their narrative of “resistance” despite the evident paradox between the song and the show’s anti-hero storyline.

A longitudinal study on the relationship between the development of musicality and psycho-social factors in adolescents with and without intensive music training in Latvia

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Background

Psycho-social skills (e.g., growth mindset, emotional intelligence) have been found to be closely linked to musical abilities as well as academic performance in adolescence (Müllensiefen et al., 2015). However, it is unclear to what degree the growth of musical abilities is influenced by psycho-social skills above and beyond the cognitive abilities of adolescents. A comprehensive observational study that tracks musical development over time can provide an answer to this gap in the research literature.

Aim

To determine the role of psycho-social variables for musical development in a sample of adolescents with a wide range of musical training backgrounds in Latvia.

Methods

The study does not involve any specific musical intervention. It is designed as a longitudinal study following the pupils during the years of the most important and sensitive period of adolescence. During the period of data collection, the psycho-social and cognitive development of adolescent participants will be tracked by assessing the same pupils in the same schools in every testing session. Since we are aiming for a wide range of musical backgrounds (from no musical training to professional musical training), two types of schools will be recruited for research – general schools and schools with a special curriculum of intensive music training. In total, it is expected that 250 pupils (range 11-20 years) from 4 schools will take part in the research. As it is a longitudinal study, each participant will take part in three rounds of testing spaced about six months apart (18 months in total).

For data collection, the LongGold test battery was adapted and translated into Latvian (www.longgold.org). Data will be collected in the schools filling out the online test battery which comprises tests on music perception abilities (e.g., beat perception, melody discrimination, rhythm ability, mistuning perception), cognitive tasks (working memory test), self-report questionnaires on psycho-social variables (Children's Hope Scale, Children's Grit Scale, Strengths and Difficulties, School Engagement Measure, Theory of Intelligence, Theory of Musicality) as well as on demographics and musical and other activities (Goldsmiths Musical Sophistication Index, Musical Home Environment, Concurrent Musical Activities).

Results

Results of the study will provide an evidence-based quantitative model of the effect of psycho-social variables on musical development in adolescence. We expect to have Theory of Intelligence, Children's Hope and Grit Scale as well as working memory capacity to have a positive effect on the development of musical abilities and the time that children receive musical training. In contrast, we expect a negative effect from low school engagement and psychological difficulties.

Conclusion

The interpretation of data obtained in the study will allow for a comprehensive view of the interplay between psycho-social and musical development during adolescence in Latvia. This, in turn, will allow teachers, parents, psychologists, and others involved with adolescents to understand whether and how cognitive and psychosocial abilities develop in parallel with musical abilities.

References

Müllensiefen, D., Harrison, P., Caprini, F., & Fancourt, A. (2015). Investigating the importance of self-theories of intelligence and musicality for students' academic and musical achievement. *Frontiers in Psychology*, 6, 1702. <https://doi.org/10.3389/fpsyg.2015.01702//>

Exposing analysis as practice: Problematising the embodied musickal through the epistemic turn

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Background

An increasingly interconnected, globalized world illuminates the rich spectrum of local musical practices, aesthetics, philosophies, and modes of musicological inquiry. However, this new, global perspective of musicking presents a dilemma for musical analysis: to what extent does a focus on local ontologies preclude cross-cultural theorizing, and in what ways are universalist analytical perspectives impoverished by glossing over essential local practices and perspectives?

Aims

This paper offers a new ground from which to traverse the global and local in musicking, reassembling the analytical enterprise through an epistemological turn. It is argued that a radically-embodied view of musicking provides a universal groundwork from which to negotiate across the local and global, emic and etic, through a relational analytics of musickal sociality. While musicologists have offered new frameworks for analytical approaches rooted in local musical practices, such frameworks remain mired in ontology. For example, the tripartition framework of Molino (1975) and analytical categories of Nattiez (1990) do not afford an escape from ontological minutiae. Their concern with ways-of-being as opposed to relational processes limits analysis from meaningfully navigating between the global and local. This paper argues that truly global, pluralistic analytical ambitions require a more expansive conception and representation of analysis itself, a redefining (or ‘un-defining’) of analysis and theory. Eschewing new analytical frameworks, this paper offers an ‘expositional’ reconceptualization of ‘analysis-as-practice,’ adapted from the field of artistic research (Schwab, 2019), in order to affect a turn from the ontological to the epistemic.

Main Contribution

A universal view of musicking as kinesthetically embodied has emerged from empirical research over the past few decades. Additionally, ethnographic studies trace how metaphors of motion and gestural enaction are inextricable from sonic realization in cultures of musicking (Brinner, 1995; Fatone, 2010; Feld, 1982; Rahaim, 2012). It has been proposed that radically-embodied ‘deep gesture’ may act as the fundamental dynamic process (Zbikowski, 2017) from which local grammars, practices, and cultures of musicking are ecologically constructed (Harlow, 2018, 2022). This paper argues that these matters of fact compel a radical shift of the axes of the musickal global and local within analysis, analogous to the shift

toward the terrestrial demanded by the climate crisis within the political as proposed by Bruno Latour (2018). A radically-embodied view of musicking provides a stable ‘terrestrial’ ground across which relational modes of inquiry (Born, 2010) can interrogate musical globalities among localities.

Implications

Such a reorienting of the axes of the musickal global and local, traversing the two through the ground of radically-embodied gesture and relational epistemologies, demands a fundamental reconsideration of ‘analysis’ as process and multiplicity through which musicking is problematized. Such a shift in the analytical enterprise ‘from ontological to epistemological concerns’ (Schwab, 2019, 38) can be most effectively captured through Schwab’s ‘expositional’ approach, one in which inquiry is exposed and problematized rather than theorized. An expositional approach to analysis-as-practice grounded in the matters of fact of embodied gesture affords new and thick articulation of the global-in-the-local and local-in-the-global across the musickal.

References

- Born, G. (2010). On Tardean relations: Temporality and ethnography. In M. Candea (Ed.), *The Social after Gabriel Tarde, Debates and Assessments*. (pp. 230-247). Routledge. <https://doi.org/10.4324/9780203876312>
- Brinner, B. (1995). *Knowing music, making music: Javanese gamelan and the theory of musical competence and interaction*. University of Chicago Press.
- Fatone, G. (2010). You’ll break your heart trying to play it like you sing it: Intermodal imagery and the transmission of Scottish classical bagpiping. *Ethnomusicology*, 54(3), 395-424. <https://doi.org/10.5406/ethnomusicology.54.3.0395>
- Feld, S. (1981). ‘Flow like a waterfall’: The metaphors of Kaluli musical theory. *Yearbook for Traditional Music*, 13, 22-47. <https://doi.org/10.2307/768356>
- Harlow, R. (2018). Ecologies of practice in musical performance. *MUSICultures*, 45(1-2), 215-237.
- Harlow, R. (2022). Inertial discourse in the sociality of gesture: Prolegomenon to a Sono-kinesthetic ethnography. *67th Annual Meeting of the Society for Ethnomusicology*. 10-13.
- Latour, B. (2018). *Down to earth: Politics in the new climatic regime*. Polity Press, Cambridge
- Molino, J., Underwood, J. A., & Ayrey, C. (1990). Musical fact and the semiology of music. *Music Analysis*, 9(2), 105–156. <https://doi.org/10.2307/854225>
- Nattiez, J.-J. (1990). *Music and discourse: Toward a semiology of music*. Princeton University Press.
- Rahaim, M. (2012). *Musicking bodies: Gesture and voice in hindustani music*. Wesleyan University Press.
- Schwab, M. (2019). Expositonality. In P. de Assis & L. D’Errico (Eds), *Artistic Research: Charting a Field in Expansion*. (pp. 27-45). Rowman & Littlefield International.
- Zbikowski, L. (2017). *Foundations of musical grammar*. Oxford University Press. <https://doi.org/10.1093/oso/9780190653637.001.0001>

Residents' perspective on music interventions for people with dementia in care homes

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Introduction

Currently, more than 55 million people are living with dementia worldwide (World Health Organization, 2021). As dementia mainly affects older adults and is one of the major causes of disability and care dependence among this age group, the development and implementation of treatment measures is highly relevant, especially in care homes.

Numerous publications suggest that music has potential to improve the quality of life in these vulnerable groups (Clements-Cortés, 2015; Blankevoort et al., 2010; Fusar-Poli et al., 2017; Hsu et al., 2015). Therefore, some nursing homes already provide music interventions for elderly people with dementia, but to date less is known about how the participants experience the services offered. Hence, this study targets participants in the Music Interventions for Dementia and Depression in Elderly Care Project (MIDDEL) and focuses on the views of older adults who either participated in the recreational choir singing or group music therapy interventions (Gold et al., 2019).

Aims

This study aims to investigate the perception of older adults with dementia symptoms regarding their participation in music interventions offered by the MIDDEL-project. Their perspective is of particular importance in order to determine any barriers that impede participation in music interventions like recreational choir singing and music therapy. Hence, music-related services can be adapted more precisely to the needs of elderly people with dementia who live in nursing homes. Moreover, both the leaders of the music interventions and the caregivers might be able to facilitate the participation of more residents in the future.

Methods

Eight semi-structured interviews with older adults who were diagnosed with dementia were performed. They participated in recreational choir singing or group music therapy, and were recruited from different care homes in Oldenburg (Germany) and areas nearby. The samples consist of females who are aged between 81 and 94 years. They were all responsive and basically able to communicate their thoughts despite their dementia. The interviews were audio-recorded and transcribed. Further, the data material was analysed using a qualitative content analysis (Kuckarzt, 2014) and the software MAXQDA.

Results

The residents like the music interventions as they are perceived as entertaining and a good distraction from daily routine. The participants like songs that they are able to remember which is why they mostly prefer to sing folksongs and German Schlager. Furthermore, they favour active participation of other residents. As the behavioural symptoms of dementia lead to decreased participation or restless behaviour of some residents, a request for different groups adapted to the abilities and needs of the individual residents was expressed.

Discussion

People with dementia participating in the study enjoyed the music interventions and willingly participated in them. Nevertheless, their opinions were very individual, which shows that the needs and expectations of the residents must be taken into account in order to optimize the music interventions and to ensure a higher number of participants in the future.

References

- Blankevoort, C. G., van Heuvelen, M. J., Boersma, F., Luning, H., de Jong, J., & Scherder, E. J. (2010). Review of effects of physical activity on strength, balance, mobility and ADL performance in elderly subjects with dementia. *Dementia and Geriatric Cognitive Disorders*, 30, 392-402.
- Clements-Cortés A (2015). Clinical effects of choral singing for older adults. *Music and Medicine*, 7, 7–12.
- Fusar-Poli, L., Bieleninik, L., Brondino, N., et al. (2017) The effect of music therapy on cognitive functions in patients with dementia: a systematic review and meta-analysis. *Aging Mental Health*, 1–10.
- Gold, C., Eickholt, J., Assmus, J., Stige, B., Wake, J. D., Baker, F. A., Tamplin, J., Clark, I., Lee, Y. C., Jacobsen, S. L., Ridder, H. M. O., Kreutz, G., Muthesius, D., Wosch, T., Ceccato, E., Raglio, A., Ruggeri, M., Vink, A., Zuidema, S., Odell-Miller, H., Orrell, M., Schneider, J., Kubiak, C., Romeo, R., & Geretsegger, M. (2019). Music interventions for dementia and depression in elderly care (MIDDEL): Protocol and statistical analysis plan for a multinational cluster-randomised trial. *BMJ Open*, 9, e023436.
- Hsu, M. H., Flowerdew, R., Parker, M., et al. (2015). Individual music therapy for managing neuropsychiatric symptoms for people with dementia and their carers: A cluster randomised controlled feasibility study. *BMC Geriatrics*, 15, 84.
- Kuckartz, U. (2014). *Qualitative text analysis: A guide to methods, practice and using software*. SAGE.
- World Health Organization (WHO). *Global status report on the public health response to dementia 2021* [internet]. Geneva: WHO, 2021.

The highs and lows of music: Subjective and neurophysiological responses during a live concert experience

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Background

People's strongest musical experiences are most often at live concerts (Lamont, 2011). The development of new technologies and facilities are beginning to allow more extensive research into the effects of music engagement in more naturalistic settings. Recent research has begun to investigate the neurophysiological correlates of audience members at live concerts (e.g., Chabin et al., 2022; Czepiel et al., 2021), however questions still remain over the relationships between the social, emotional, and musical experiences in these settings.

Aims

In this study, we examine the effects of a highly expressive classical piano performance on subjective and neurophysiological responses of audience members at a live concert.

Methods

A live performance was held at the McMaster University LIVELab featuring a high-level, professional pianist from the Canadian Chopin Society. They performed for 40 minutes on a Yamaha Disklavier piano to a sold-out audience, including works from Scarlatti, Schuman, Prokofiev, and Chopin.

Electroencephalography (EEG), heart rate (HR), and galvanic skin response (GSR) were measured from 20 participants simultaneously during the event. Subjective ratings of enjoyment, emotional intensity, familiarity, and connectedness with the audience and with the performer were completed after each piece. Additionally, audio and MIDI recordings were taken from the Yamaha Disklavier. In an ongoing online follow up study, participants listened back to audio recordings of the performance and continuously rated their felt valence and arousal. Performers were also asked to indicate sections of the performance that were particularly emotionally expressive.

Analysis

Analysis is ongoing. As a first step, we will investigate changes in EEG alpha power during highly expressive moments in the performance, as indicated by the performers and continuous ratings. Future investigations will consider how auditory features compare to subjective ratings in predicting neurophysiological synchronisation between audience members (Chabin et al., 2022; Czepiel et al., 2021),

probing distinctions between auditory and emotional processing (Wollman et al., 2020), as well as engagement and enjoyment of musical experiences (Kaneshiro et al., 2020).

Implications

Understanding how music affects enjoyment and emotion requires examination of the neural, physiological, and psychological factors driving music perception. Past work has largely consisted of studies in artificial contexts (lab, online surveys), using short musical excerpts, typically 30-60s, or even shorter simplified stimuli (e.g., only rhythm or pitch sequences). While this has helped us to understand the building blocks of music perception, it does not capture the reality or power of many musical experiences, particularly those that take place in social situations such as at live concerts. The present study takes steps to address these issues by exploring an audience's felt experience in a live concert.

References

- Chabin, T., Gabriel, D., Comte, A., & Pazart, L. (2022). Audience interbrain synchrony during live music is shaped by both the number of people sharing pleasure and the strength of this pleasure. *Frontiers in Human Neuroscience*, 16. <https://doi.org/10.3389/fnhum.2022.855778>
- Czepiel, A., Fink, L. K., Fink, L. T., Wald-Fuhrmann, M., Tröndle, M., & Merrill, J. (2021). Synchrony in the periphery: Inter-subject correlation of physiological responses during live music concerts. *Scientific Reports*, 11(1), Article 1. <https://doi.org/10.1038/s41598-021-00492-3>
- Kaneshiro, B., Nguyen, D. T., Norcia, A. M., Dmochowski, J. P., & Berger, J. (2020). Natural music evokes correlated EEG responses reflecting temporal structure and beat. *NeuroImage*, 214, Article 116559. <https://doi.org/10.1016/j.neuroimage.2020.116559>
- Lamont, A. (2011). University students' strong experiences of music: Pleasure, engagement, and meaning. *Musicae Scientiae*, 15(2), 229–249. <https://doi.org/10.1177/1029864911403368>
- Wollman, I., Arias, P., Aucouturier, J.-J., & Morillon, B. (2020). Neural entrainment to music is sensitive to melodic spectral complexity. *Journal of Neurophysiology*, 123(3), 1063–1071. <https://doi.org/10.1152/jn.00758.2018>

Increased empathic abilities associated with group music performance

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Background

Musical practice is an activity extended around the world. There is a wide range of factors that encourage people to play music from professional development to entertainment and joy. Regardless of the underlying intentions to engage in musical performance, it has been described as having different benefits associated with musical practice. Although almost all research has focused on cognitive benefits of musical training it has been pointed out that group music performance could be associated with improvements in emotional abilities and prosocial behaviours such as trust and cooperation (Anshel & Kipper, 1988; Kirschner & Tomasello, 2010). However, evidence is scarce and mainly limited to children in educational contexts.

Aims

Our main aim was to explore whether group music experience could be linked to improved empathic abilities in adults.

Method

Ninety-one participants (40 with group music experience and 51 without it), from 18 to 45 years ($M = 21$, $SD = 5.75$, 48,4% women) completed the Interpersonal Reactivity Index (IRI, Davis, 1980) which reported measures of Perspective Taking (PT), Fantasy (FS), Empathic Concern (EC) and Personal Discomfort (PD). Participants also completed a questionnaire regarding academic level, formal or informal music experience, and preferred music style.

All the participants completed the information online and the personal consent.

Results

Independent samples T-Student were carried out. The results revealed the participants with group music experience outperform those non-experienced in perspective-taking ($t = -2.745$, $p = 0.007$, $d = 0.47$) and empathic concern ($t = -2.436$, $p = 0.016$, $d = 0.773$). No other significant results were found. We did not find differences among group music performance participants regarding the nature (formal or informal) of their experience.

Conclusion

Our findings suggest that playing music in a group could be beneficial in terms of prosocial behaviour by improving the ability to take perspective on others' situations and increasing the capacity for empathic concern towards others. As group music performance involves communication skills and shared goals it is possible that continued experience may improve empathic abilities that may be transferred to non-musical contexts. Importantly, the lack of differences between formal and informal musicians points out that making music in group may report general prosocial enhancements. These findings have important implications for both educational practices, in terms of the potential benefits of music to socioemotional development, and for promoting psychological well-being and prosocial behaviours in the general population.