Editors' Introduction:
Connectivity and Diversity in Music Cognition

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ABSTRACT: Scholarly interest in the context of music listening and its influence on music cognition and connection is flourishing after decades of a predominantly individualistic approach. This article introduces a special issue that explores research on the theme of connectivity and diversity in music cognition research arising from the ICMPC16-ESCOM11 conference. The conference itself, held online during the later stages of the COVID-19 pandemic in 2021, transcended national borders, bringing together researchers and practitioners from multiple continents in a digital context. In this introduction, we set the scene for this topic as it related to the conference. The included papers are the outcome of workshops held as part of the conference. The first paper in the special issue explores the use of embodied consciousness as part of pedagogical strategies to help music performers connect with embodied memories that can support their understanding of the work they are performing. The second paper considers uses of music in the early stages of motherhood, including a comparison between the active choice to regularly sing or listen to music and its perceived effects for the mother and her infant. The papers and associated commentaries offer a window into the rich research theme of connectivity and diversity that is likely to be influential over the years to come.

CONNECTIVITY and diversity are two concepts that are receiving increased attention and prominence within music cognition research. Connectivity refers to the embeddedness of behaviour and cognition, highlighting the different ways in which musical experience is situated and shaped through interaction between individuals, instruments and environment. It also refers to neurological processes of interconnectivity between brain areas that in coordination enable music making and perception. Diversity is commonly used to refer to individual differences, as well as group differences and variety that develops as a consequence of diverse interaction histories between people and their varied environments. Increased interest in these themes is also part of a growing self-critical awareness on the part of researchers regarding inclusion, social justice and social action through research. This includes increased awareness of the historically narrow focus of research in music cognition on certain populations and music, and the ramifications of this for the conceptual foundations of the discipline.

Connectivity and diversity in music cognition was the theme of the online, joint meeting of two learned societies: the 16th International Conference on Music Perception and Cognition, and the 11th triennial conference of the European Society of the Cognitive Sciences of Music. The aim of the conference was to provide an interdisciplinary and intercultural platform for the dissemination of the most recent developments in music cognition research. To offer inclusivity to researchers, the conference was organised through the collaborative effort of multiple hubs that were distributed geographically: Australia, India, Azerbaijan, Lithuania, Poland, South Africa, Sheffield, Mexico and Colombia. The conference, and this special issue, highlight the relevance of this topic to music cognition research and its future. We also aimed to promote equality, diversity and inclusion through our conference and editorial processes and practices, including through researcher development activities. The authors of this Introduction contributed to the conference organisation and represent different research traditions and locations.

This special issue is one of the outcomes arising from the conference, containing two papers from authors who participated in the British Academy funded Writing Workshops and review commentaries on these papers. The aim of the issue is to offer that platform for discussion and development and link to the theme of connectivity and diversity where the opportunity arises. As a framing, we use this introduction to reflect on: how situatedness is relevant to musical behaviour and how such insights are necessary to understand differences in the ways music is performed and perceived across cultures; the need for methodological innovation to address current limitations in considerations of diversity and individual differences in music cognition research; identification of challenges, priority research topics and issues for music cognition research in specific geographical locations, highlighting how these priorities and challenges are both interlinked and diverse across locations. It also includes the practices of editorial work and publication processes in promoting connectedness and diversity of perspectives, an objective that aligns well with the vision of the journal.

PERSPECTIVES ON CONNECTIVITY AND DIVERSITY

Connectivity emphasises the relevance of situatedness to musical behaviour and to our understanding of music cognition. Ignoring such intrinsic connectedness, research methods and theoretical paradigms in music cognition have for a long-time emphasised a subject-object dualism. Take for example classical work on musical expression in performance (Kendall & Carterette, 1990; Gabrielsson & Juslin, 1996). From this perspective, a concept or intention is encoded into sounds, and these sounds are in turn decoded or deciphered by listeners. The sounds or music are the carrier of a disembodied message. However, as Leech-Wilkinson argued (2009), the origin and central manifestation of music is sound, not abstract concepts, whether performed or imagined. The medium is itself the main message. However a primary focus on sounds remains ignorant to the action and interaction by which such sounds arise. A problem with this perspective of music as sounds remains that it treats perceptual attributes as inherent in musical artefacts, and individual differences as wholly situated within the individual, rather than distributed between perceiver and artefact. In contrast ecological and embodied approaches aim to avoid this dualistic perspective (Clarke, 2005; Schiavio et al, 2014). If we take the perspective that music and actions are co-constitutive (Schiavio et al, 2017) then it forces new perspectives on perception and cognition. For example, Li and colleagues (2020, 2021) elucidate the multimodal co-intention that underlies production and perception of piano timbre, corroborating findings on the role of movement in perception of sounds such as duration in percussion performances (Schultz & Libscomb, 2007) and vocal articulations in musical timbres (Traube & Depalle, 2004). The first main article of this special issue by Alves & Nogueira addresses this topic of embodied consciousness and its implications for music pedagogy.

Historically, psychological research has been notoriously individualistic and universalising. Aiming to uncover universal, biologically-grounded mechanisms, this has led to a focus on the individual within a culture, rather than as enculturated. Hence 'culture' and 'individual differences' are often operationalised as add-ons to theories and experimental designs rather than influencing the very conceptualisation of the topic. A certain principle is seen as underlying perception, even though variation at the individual or group level may arise in the application of these principles. For example, trait empathy may play a role in the appreciation of sad music (Eerola et al., 2016; Taruffi et al., 2021), musical training enhances neural responses to violations in a tonal context (e.g. Pagès-Portabella et al., 2021), or there is a within-group advantage in interpreting cues for emotional communication (Laukka & Elfenbein, 2021). The concepts of active sense-making, active listening and predictive coding reverse this perspective and the agentic subject operating in and interacting with an environment takes center stage. Such shifts in perspective have been important in

formulating new models of music cognition and emotion, emphasising the active construction of meaning, which is culture, individual and context dependent (Cespedes-Guevara & Eerola, 2018; Koelsch et al., 2019; Krueger, 2014). An interactive perspective is also key in the investigation of uses and functions of music in everyday life. Musical affordances are not static and a given, rather they develop and depend on the person interacting with music. The second main article of this special issue by Vazquez-Diaz explores such contextual shifts in functions of music when mothers use music in their everyday lives in the close presence of their newborn baby.

Apart from the way we approach and theorise music cognition, centralising connectivity and diversity has implications for the methodologies that are used in music cognition research. Jacoby et al. (2020) have already forcefully argued for the need to diversify who is participating in research, counteracting heavy biases in the representativeness of research findings, which as the Covid pandemic illustrated can have life-threatening consequences if samples are dominated by WEIRD populations. However, such changes do not just concern the recruitment sample. Again, research paradigms and theoretical frameworks will need to be adjusted and become more contextually sensitive. A prime example of this might be traditions of cross-cultural research which take a construct from one culture and test it in another without much adaptation. For example, Ekman's facial expression research and equivalent music-emotion research have been criticised for assuming the primacy of certain emotion constructs, rather than actually exploring what concepts may be relevant in a certain context first. Similarly, response modes and tasks are known to bias results, as has been clear for some time in research on standardized IQ tests. Whilst ethnographic research offers context-sensitive approaches, traditional approaches generally divide who is having and developing the knowledge (the researcher) from who is offering input and sharing their knowledge (the informants). There are ways of addressing these imbalances with a rise in the development of co-design and participatory research methods and practices (Hield et al., 2024). Involving stakeholders at the design stages and feeding back to disseminate knowledge as well as enable impact are ways to make research better aligned with the questions, issues and concerns of a broader and more diverse population (e.g. MacRitchie et al., 2023). The studies in this special issue did not explicitly employ co-design. Nevertheless, the questions addressed did arise from and as such align with professional experience of the researchers as music practitioners (in education and music for parents and infants).

A promising way to address imbalances in power dynamics of knowledge is via the establishment of research networks around specific topics or to research a particular question, which may include academic and non-academic collaborators, leading to multi-authored papers or collaborative knowledge sharing events. The now well established uses of hybrid and fully virtual meeting and collaboration formats enable collaboration irrespective of geographical and national borders. As mentioned, the ICMPC16-ESCOM11 conference exemplified some of the concrete actions that can be used to mitigate frequently encountered inequalities of access and barriers to participation and thereby facilitate inclusive and diverse participation, including online and hybrid formats and negotiation of time-zones in conference programme scheduling (Savage et al., 2023; see also Parncutt et al. (2024) for a vision on global hybrid meetings). Collaborative research across multiple sites is rapidly becoming a central practice of psychological research, testing replicability of results whilst also enabling larger test samples (e.g. Jacoby et al., 2024; Mehr et al., 2019). Such practices are not yet sensitive to potential meaningful variations across sites, but with adjusted models of cognition that include active sense-making may become so. A promising direction for research here is to combine quantitative and qualitative approaches to allow for relationships to be modeled as well as for differences in concepts and approaches to emerge.

Finally, we would like to briefly address the aspect of geographical and linguistic diversity and connectivity. English as a lingua franca for research has its clear benefits but negative effects of this English privilege need to be actively countered. The same is true for the flourishing of research depending on financial resources, geographic location and the clustering or relative sparsity of expertise. These are very obvious points to make, but important to repeat as they need continued attention. Increasing diversity of perspectives will enhance the quality of research and should help foster a dynamic environment where scholarship progresses through meaningful tension and discussion. Such diversity includes the theoretical and methodological approaches taken to a research topic. They also include the identification of challenges, priority research topics and issues for music cognition research, which may depend on specific geographical locations. For example, the government vision for research and innovation in the United Kingdom is for it to tackle major challenges and increase the nation's productivity and prosperity. This is reflected in strategic funding themes which value the societal benefit of research (research 'impact' and 'knowledge exchange'), and collaborations between researchers with external stakeholders such as businesses, and third sector

organisations. Impacts of this steer felt locally include: increased attention within music research to applied areas such as creative arts and health; a devaluing of SHAPE subjects in public discourse and valuing of STEM subjects which makes itself apparent in uncritical valorisation of 'science' of music in media reporting, and increased student interest in 'science' of music (e.g. neuroscience); reduced funding to music provision in state school education, and reduced funding to national music organisations, both of which tend also to be art music. At the same time there is a shift to investment in creative industries rather than 'arts' which presents a different context and framing for music cognition research and one to which it is not currently well aligned.

A co-edited volume between researchers from the Western Balkans and Western Europe on psychology of music (Bogunovic et al., 2024) has highlighted other areas of priority in music cognition research in the Western Balkans. A contextually informed objective of this research has been to promote skill development, wellbeing and artistic outcomes of talent-based music education. This has led to in-depth research on talent-development, musicianship skills, musical aesthetics and interactions between personal, contextual and musical factors for music appreciation. The rigour in this specialised area of research is a clear strength regionally, but also internationally.

This brings us to the closing point of this section which is the impact of funding and through that of policy on research practices and agendas. Whilst we may be subject to these pressures and agendas, we can also play a role in shaping them through advocacy and setting our standards of co-production, collaborative networks and co-authorship.

IMPROVING CONNECTIVITY AND DIVERSITY THROUGH RESEARCHER DEVELOPMENT

As noted above, researchers and musics from the Global South and low to middle income countries (LMICs) are under-represented in the discipline of music cognition. Funded by a Writing Workshops Award from the British Academy, we worked with international partners to identify research development needs for early career researchers. We embedded these activities as part of the ICMPC16-ESCOM11 Conference in order to increase the visibility of and access to these development activities. The conference comprised 798 delegates from 43 countries, across four time-zone clusters. The Writing Workshops totalled 16-hours across the conference program with flexible attendance and virtual networking across the nine hubs [2].

The Writing Workshops award provided sessions on developing and drafting funding applications, writing for peer review academic journals, and networking and dissemination skills. Some of these sessions were bespoke to early career researchers (ECRs) from LMICs, others were open to anyone to attend. Nine self-nominated early career researchers from LMICs were each mentored by a more senior academic to help draft a peer review journal article (there were 5 female LMIC ECRs, and 5 female mentors). Mentees were from Brazil, India (x3), Malaysia, Mexico (x2), People's Republic of China, South Africa; mentors were from Australia, Canada, Colombia, Germany, Norway, Switzerland, UK, USA. We are proud to have made a small step in supporting the career development of the ECRs, whilst the conference as a whole contributed to diversifying knowledge production and improving equity in music cognition as a discipline.

Researcher Development Activities

Researcher development activities were co-designed with hub leaders with a view to addressing self-identified needs and to avoid adoption of a deficit model. Chosen activities included academic writing, publishing advice, research funding and academic careers.

ACADEMIC WRITING

Academic writing session. This session was for ECRs who were starting to write journal articles for academic publication and was an opportunity to learn more about writing style and structuring of academic publications.

One-to-one mentoring for publication. This was open to academics from LMICs who wanted to produce a journal article for publication. This mentoring scheme started prior to the conference and paired each participant with a more experienced academic mentor to help the mentee produce an academic journal article in music cognition for publication.

PUBLISHING ADVICE

'Getting published' advice session with book publishers. In this session publishers from traditional and open access publishing companies talked about routes to and processes of publishing an academic monograph.

'**Meet-the-editors' journal publishing advice session**. This session offered the opportunity to meet editors from some of the fields' most-read academic journals and learn about the journal publishing process.

RESEARCH FUNDING

Research funding webinar(s) provided by British Academy. Participants heard from the British Academy about their priorities, evaluation criteria and processes to help applicants develop their research project ideas into fundable applications.

Research funding ideas-pitch. This session was an opportunity for Early Career Researchers to discuss with peers ideas for a research project for which they wanted to apply for external funding. This session was for ECRs who were developing a research funding application and required preparation of a 5 minute presentation about their idea for synchronous online discussion in a small group of other presenters. The session was chaired and break-out groups were chaired, by people with experience in research funding capture.

ACADEMIC CAREERS

Applying for an academic job. This session shared insight into academic job application processes in different national contexts.

REFLECTIONS ON THE RESEARCHER DEVELOPMENT ACTIVITIES

There were distinct advantages to embedding the Writing Workshop activities as part of the conference: it meant there was greater visibility to ECRs across our partner networks than might otherwise have been the case, and it was able to facilitate equity and partnership building by exploiting opportunities that this conference offered. This is one model of how one might go about decolonising music cognition research and improving inclusivity and diversity. Our conference report, which helps shape subsequent conference design, sets out this ambition (ICMPC, 2021).

The mentoring scheme worked well in most cases and benefitted both mentors and mentees, according to their feedback, as intended. In future iterations it would be preferable to run the mentoring over a longer period to enable time for the mentoring relationship to develop and so that mentees receive some generic training before working in detail with the mentor. In our programme these two kinds of activity were compressed within the same three-month timespan which proved too short a timespan in some cases. This is reflected in the relatively low take-up of the opportunity to publish: two of the nine participants completed the whole of the submission and review process.

The different activities afforded a variety of opportunities for LMIC ECRs and other researchers to interact. First, the conference format provided participants in the Writing Workshop project an opportunity to hear from and interact with scholars from non-LMIC countries. The remote format, multi-hub structure enabled this to be one of the largest conferences ever held for these organisations, and therefore offered access to hundreds of delegates. We facilitated community and interaction within this large group using themed panels, workshops with discussion and associated break out groups, and one-to-one mentoring. Second, the workshops within the conference were held with large cohorts of ECRs across both LMICs and non-LMICs, in order to facilitate inclusion and diversity. These brought together non-LMIC established researchers together with ECRs from LMICs and elsewhere. Smaller break-out sessions allowed for interactions tightly focused on the needs of LMIC ECRs. Third, the mentoring on journal article development enabled nine ECRs from LMIC countries to engage in a more personalised way with other scholars. Based on qualitative feedback collected from participants after the intervention, the self-identified benefits of this for LMIC researchers were:
- Broader and deepened scholarly networks in music cognition within the nine countries involved;
- Increased awareness of research funding opportunities including cross-nation opportunities;
- Enhanced skills in developing and writing research funding applications amongst ECRs;

- Increased awareness of procedures and expectations of academic journals and book publishers including peer review and editing processes;
- Increased skills in writing up research for publication in academic outlets, including international peer review journals, edited volumes and monographs;
- Publication in a peer reviewed academic journal (for the two ECRs who chose to do this).

There are numerous benefits for researchers from other countries:
- Increased access to the research produced by scholars from LMICs by inclusion of their work in journals;
- Increased participation of researchers from ODA countries in music cognition international networks and leadership;
- Like many other disciplines, music cognition research has been shaped by the perspectives and white racial frame of those in the 'Global North'. Inclusion of the Writing Workshop within the primary conference for this discipline draws awareness to this frame and will, if continued, improve research excellence overall.

THE PAPERS IN THIS ISSUE

The papers and commentaries in this Special Issue were drawn from the conference by a combination of open call and targeted invitation to ensure a diverse and inclusive authorship.

The paper by Alves and Nogueira explores the pedagogical practices of three clarinet teachers, identifying strategies that they use to evoke embodied memories in their students that can support their understanding of the work they are performing. Performance pedagogy is a topic that remains of great relevance to music cognition researchers and education practitioners: what pedagogical competencies are needed to teach performance techniques?

Alves and Nogueira present a framework of pedagogical competency which draws on a variety of previous studies (Duke & Simmons, 2006; Ball et al., 2008; Forrester, 2015), as well as introspection and protocol analysis (Ericsson, 2006), Damasio's theory of consciousness (1999, 2010) and more. The authors' method employed semi-structured interviews with the teacher and student participants and used a joint analysis protocol to extract domains of competency. As a result of this work, Alves and Nogueira identified a new competency field which they termed "embodiment consciousness in music performance". This competency implies the systematic didactic use of metaphor to access performers' sensorimotor, motor, and affective memories.

The three responses to this paper further contextualise and expand upon the idea of embodied consciousness. Erin Heisel ("Interdisciplinary and Relational Approaches to Embodiment Conscious Music Performance Pedagogy") situates Alves and Nogueira's "embodied consciousness" as an important contribution to discussions of kinesthetic awareness (LeBorgne & Rosenberg, 2021; Friedlander, 2018; Brown, 1996). In her commentary, Heisel explores two extensions for context around their work: the interdisciplinary nature of music performance pedagogy and the dialectical nature of pedagogy that includes student-teacher relationships. J. Harry Whalley ("Metaphor in Music Pedagogy and Its Connection to Embodiment Consciousness") expands upon the metaphor concept, which is addressed in the article. He argues that attempts to comprehend a metaphor can only be made within the confines of a shared cultural community or reference group, and that music may cut across cultures acting as a bridge between culturally relevant metaphors. In her commentary on Alves and Nogueira's article ("Commentary on 'Embodiment Consciousness in Music Performance Pedagogy' by Alves and Nogueira"), Laura Bishop proposes a potential approach that is informed by embodied teaching strategies. She makes some recommendations for empirical testing and expresses methodological considerations that include involving expert and non-expert teachers in the experiments to compare their competencies and results, shifting the focus away from teachers' behaviour and toward teacher-student interactions.

The paper by Vazquez-Diaz de Leon presents the results from two studies that focused on the effect of mother's self-selected use of music on maternal bonding; these were based on the importance of mother's well-being and the role of music on supporting the transition into motherhood and behavioral patterns during mother–infant interactions. In particular, the research first investigates mother's spontaneous uses of music. This is followed by a comparison of the choice to listen regularly to music or to sing regularly in the presence of their infant across the span of multiple days. Vazquez-Diaz de Leon argues that both listening to and singing music can reduce parental stress and improve mother-infant interactions, enhancing maternal

attachment. The reciprocal feedback model explains how mothers' and infants' musical responses affect each other, with music serving as a tool for mood regulation and emotional communication. The study concludes that self-selected uses of music positively impacts mothers' well-being and interaction quality, suggesting its potential benefits for maternal bonding.

The two commentaries on this paper both pick up on the exploratory character of Vazquez-Diaz de Leon's work and call for further research into the cultural and individual contexts of mothers' musical interactions with their infants. McClean's commentary picks up on Vazquez-Diaz de Leon's findings regarding how music enhances mother-infant bonding and highlights the need for further research into how maternal engagement with music might be impacted by cultural and social contexts. Ilari also calls for research into how musical practices are influenced by their cultural and individual contexts. Both imply the need for a deeper understanding of how these factors shape motherhood and infant development through music, informed by an understanding of diverse social-cultural context.

This issue presents windows into the theme of connectivity and diversity in music cognition, contributing to the research effort to understand the power of music to connect, and the power of music to be enacted and conceived differently depending on the context, cultural background and needs and preferences of individuals and groups. The aim of the conference was to promote such balanced considerations through defining the research theme, and this special issue is one means which supports that broader aim.

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NOTES

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[2] The full program within which the Writing Workshop activities sat (including titles, authors, abstracts and links to video presentations) is available at the ICMPC16-ESCOM11 website: https://icmpc2021.sites.sheffield.ac.uk/conference-program

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