

Editor's Note: Introduction to Special Issue on Music and Embodied Cognition

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THIS special issue offers a unique contribution to contemporary research on embodied approaches to music perception and related phenomenon. While the role of the body has been acknowledged in a variety of disciplinary contexts, particularly in the domain of music performance, the "4E" movement in cognitive science – i.e. the interrelated paradigms that study cognitive processes as embodied, embedded, enactive, and extended phenomena - has advanced knowledge in previously underexplored areas. Critically analyzing the benefits and limits of embodied approaches to the perception of music and related artistic practices is a crucial step to expand the conceptual and empirical foundations of the 4E movement, as well as address related concerns of musicologists and music scholars.

The double issue comprises five target articles and nine commentaries. The target articles derive from a call for papers to presenters from the conference *Embodied Music Cognition (EMuCog): An Interdisciplinary Approach*, held at the University of Edinburgh, 22-23 July 2013. The organizing committee, which included Kevin Ryan, Eric Barnhill, Alessio Bucci, Joe Dewhurst, Krzysztof Dolęga, Lauren Hadley, and Dave Ward, steered the conference towards conceptualization and testing of embodied cognition in the context of music. The guiding principle was thus primarily about the possibility of conceiving a distinct field of embodied music cognition. In addition, the conference offered a space for interdisciplinary discussion and debate on specific questions within the framework of embodiment. Funding for the event was generously provided by the Scots Philosophical Association and the University of Edinburgh Philosophy Department.

The topics in this issue are necessarily wide-ranging, therefore any division is intended as a guide for the reader rather than reflecting a rigid categorization of content or focus. Moreover, the conversations raised within and about the target articles contain different understandings of how an embodied account could, or should, operate, and reflects the status of embodied cognitive sciences as a developing field.

The target articles can be grouped into three main categories: frameworks, applications, and compositions. The first category includes "The role of embodiment in the perception of music" by Marc Leman and Pieter-Jan Maes and "Mental Representations in Musical Processing and their Role in Action-Perception Loops" by Rebecca Schafer. Leman and Maes offer a survey of recent empirical research from their laboratory in Ghent University, as well as offering a broader theoretical backdrop to situate it in the embodiment literature. The commentaries provided by Andrew Geeves and John Sutton, and by Andrea Schiavio, critically focus on several tensions between the 4E approach espoused and more "disembodied" elements found in the target article, such as the role of affect, representation in explanations of music perception, and a suggestion that it should place a more central role on action and enaction for music perception through participatory sense-making. Schafer's article introduces converging evidence for the link between action and perception in a predictive coding account with a focus on musical imagery and the role mental models play in this process. The commentators, while all highly supportive of the predictive coding frame and acknowledging its potential benefits, suggest further features that should be included in the account by drawing on areas such as anthropology and developmental studies (Paulo Andrade & Joydeep Bhattacharya) or joint musical action and related considerations about specific hypotheses that the predictive coding framework could uniquely offer (John Michael & Thomas Wolf).

The two target articles in the applications category are "The Context-Dependency of the Experience of Auditory Succession and Prospects for Embodying Philosophical Models of Temporal Experience" by Maria Kon and "Music and Cognitive Extension" by Luke Kersten. Kon's article explores how a philosophical debate about experiences of succession versus successions of experience, along with the philosophical models of time they entail, could be augmented and supported by empirical work in embodied music cognition. The importance of context-sensitivity and the work of Rolf Inge Godøy are utilized to exemplify how such an approach may look. The commentary by Godøy introduces further elaborations on the relevant empirical work for the task. Michelle Phillip's commentary suggests

additional empirical work as well and, while supporting conversations between philosophers and psychologists, posits that a potential role for philosophical models would be providing experimental hypotheses for future testing. Kersten's article compares and contrasts two different E paradigms – extended and enactive – and argues in favor of an extended mind approach. He also includes a comparison and contrast between his view of extended mind and Joel Kruger's account. In the commentaries, Jakub Matyja analyzes conceptual terms and tools potentially underexplored in the target article. Along a similar line, Joel Kruger provides additional context to understand the differences between the two proposed extended mind accounts and argues that Kersten has overlooked the role of affect in music cognition.

The composition category consists of J. Harry Whalley, Panagiotis Mavrod and Peter Furniss "Clasp Together: Composing for mind and machine". The focus piece from the article, which was originally composed by Whalley, is particularly relevant for embodied music perception since it, first, offers a case study for grounding embodied music cognition and, second, provides a unique perspective to explore how agency, control and interaction relate within new musical technologies, shifts in composing techniques, and different theoretical movements for how we understand music perception. The commentary by Miguel Ortiz, Mick Grierson and Atau Tanaka contextualizes this individual piece within a broader history of music neuroscience, human-computer interactions, and Brain Computer Musical Interfaces. They also explore some pros and cons such technologies have in relation to the target article.

I am very grateful to Nikki Dibben and Renee Timmers for their support, guidance, and patience through the editorial process, along with offering me the opportunity to bring together this collection of papers. I also wish to thank Daniel Shanahan for his help in gathering commentaries. Finally many thanks to all the authors and commentators for their time and thoughtful engagement, without which this project would never have started, let alone made it to its conclusion.