Embodied Music Cognition and Mediation Technology

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Introduction

Modern digital media tend to handle music as encoded physical energy, while the human way of dealing with music is based on beliefs, intentions, interpretations, experiences, evaluations, and significations. How can this gap be closed? What kind of mediation is needed to bridge the gap? And how can engineers, psychologists, brain scientists, and musicologists contribute to this? What would be a good approach in handling these questions?

This book offers a framework for dealing with the above questions. It is based on a hypothesis about the nature of musical communication, which is supposed to be rooted in a particular relationship between musical experience (mind) and sound energy (matter). In this mind/matter relationship, the human body can be seen as a biologically designed mediator that transfers physical energy up to a level of action-oriented meanings, to a mental level in which experiences, values, and intentions form the basic components of music signification. The reverse process is also possible: that the human body transfers an idea, or mental representation, into a material or energetic form. This two-way mediation process is largely constrained by body movements, which are assumed to play a central role in all musical activities. The embodied music cognition approach assumes that the (musical) mind results from this embodied interaction with music. The approach can be considered an extension of, or perhaps an alternative to, the classical (disembodied) music cognition approach.

The first chapter introduces the main theme of the book by considering the practice of musical signification. This practice is fundamentally based on musical experience, but it also involves music description, in particular when these experiences are communicated. I argue in favor of a musical signification practice that is based on action, action measurement,

and action-based descriptors of music. This approach holds the promise that the natural mediator for music (which is the human body) can be extended with (artificial) mediation technologies so that mental activity can cross the traditional boundaries into environments (digital or virtual) that cannot otherwise be accessed by the natural mediator. The rest of the book can be seen as an unfolding and an application of this idea. Broadly speaking, the theory of embodied music cognition is developed in chapters 3–5, and the applications are discussed in chapters 6–7.

The second chapter gives a historical and philosophical overview of the major music research paradigms that are important as background for this book. Starting from Greek philosophy, attention is focused on the difference between disembodied and embodied approaches to music, and on the role of empirical approaches and technology in modern music research.

In the third chapter, I start constructing the framework by looking at the relationship between a human subject and its environment. This chapter introduces a dynamic ecological model for understanding how subjects can realize the transformation from physical energy to cultural abstractions, and vice versa. The next chapter goes deeper into the central mechanism of embodied cognition: the coupling of action and perception. It investigates how music can be understood as having an action-based and goal-directed character. The fifth chapter explores the idea that action-based understanding of music may be stratified, involving different degrees of corporeal engagement from synchronization to attuning and to empathy, and from observation to imitation and to emotional engagement.

In chapters 6 and 7, the feasibility of the embodied music cognition approach is studied in two core areas of modern music mediation research: interaction with musical instruments (how to build mediation tools that allow flexible and spontaneous expression of artistic ideas), and music search and retrieval (how to build mediation tools that allow search for and retrieval of music in a database or digital music library). The enormous reservoir of musical information on the Internet, for example, calls for flexible access based on the connection between human communication, and machine search-and-retrieval technology. Can we find a way of searching for music on the Internet which does justice to human perception, human cognition, motor interaction, and emotive involvement with music? Can we find a way of interacting with machines

so that artistic expression can be fully integrated with contemporary technologies? What tools should be developed in order to achieve these goals, and what are the human ways of acting in these contexts? In these two domains, I show how an embodied music cognition approach, based on corporeal articulations and semantic descriptions, can contribute to the development of a mediation technology.