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The Science-Music Borderlands

Reckoning with the Past and Imagining the Future

Edited by: Elizabeth H. Margulis, Psyche Loui, Deirdre Loughridge

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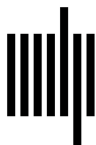
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II Beyond Music as a Window into the Mind

Volume Editors

Cognitive science aims to understand the workings of the mind. Following efforts at the beginning of the twentieth century to establish psychology as “a purely objective experimental branch of natural science” (Watson, 1913), a period dominated by behaviorism ensued, during which psychologists studied measurable behavior responses to external stimuli while “blackboxing” interior states. With the cognitive revolution in the 1950s onward, cognitive scientists reclaimed mental life as a valid object of study. According to the historian of science Hunter Crowther-Heyck (1999), the idea that the brain is a computer was instrumental to the cognitive revolution, enabling a scientific theory of the mind that linked cognition with behavior, mind with body, and knowledge with action through the construction of mental models informed by notions of feedback loops and hierarchical organization. Associated with this central framework was a focus on information processing and computational models that constituted the mind as an object of scientific study.

It is within this context that contemporary music cognition took shape. During the 1980s and 1990s, research focused on cognitive representations of the syntactic formations that constitute musical structure, adopting the framework of Chomskyan linguistics. Multiple models were constructed that aimed to explain how listeners derived syntactic representations from sequences of pitches over time (Lerdahl & Jackendoff, 1983; Narmour, 1990). Emotional, affiliative responses to music were understood to be choreographed by the way musical patterns played with this syntax, building expectations and then thwarting them for expressive effect.

Advances in neuroimaging during the early 2000s brought a new emphasis on mapping the brain regions that respond to various aspects of music, contributing to the notion that music can reveal how the mind works. This idea was well suited to the heart-to-heart, soul-to-soul, mind-to-mind listening paradigms of Western art music, which envisioned musical listening as a solitary, stationary, contemplative activity and musical creativity as emanating from a composer’s soul or disembodied mind. As

musicologists and ethnomusicologists drew attention to bodily dimensions of music making and experience, however, the narrowness of such a disembodied conception of music became increasingly apparent (Holsinger, 2001; Le Guin, 2006; Becker 2004). At the same time, cognitive scientists and philosophers have offered alternatives to the mind-body dualism on which the passive-listening paradigm and its scientific implementations relied (Varela, Thompson, & Rosch, 2016; Noë, 2004).

De Souza and Witek's contributions to this volume (chapters 6 and 7, respectively) center on the increased explanatory power of a turn toward embodied cognition, in which the body is understood not as an arbitrary vessel in which the mind-soul is housed but as deeply co-constitutive of the mind itself. Listening as an embodied cultural practice is a central interest among musicologists, ethnomusicologists, and sound researchers, and engagement between these fields has the potential to offer new framings for research questions and empirical methods. Kassabian's 2013 analysis of background music, for example, emphasizes that it is not generally heard with high levels of focused attention and produces a kind of distributed subjectivity that makes analysis at the level of the individual insufficient. Robinson's 2020 work on listening, positionality, and intersubjectivity implies that studies need to account for variables that go beyond which set of notes is present in the stimuli. Clarke's 2005 work on perceptual ecology demonstrates that musical environments, instruments, and practices scaffold and shape musical thinking in ways that make analysis purely at the unit of the brain less illuminative.

To further complicate the picture provided by neuroimaging studies that reveal the parts of the brain engaged in particular music-related tasks, studies of degeneracy and redundant neuronal systems suggest that the brain enables cognition in more than one way (Price & Friston, 2002); the brain can and often does find multiple ways to accomplish the same task. Similarly, other researchers argue that examining brain and behavioral responses to isolated stimuli may never provide sufficient meaningful insight into real-world cognition (Lindquist et al., 2012; Siegel et al., 2018), a challenge that Faber and McIntosh (chapter 12) take up with the tools of complex systems research, and that Williams and Sachs (chapter 11) address by using more naturalistic stimuli and experimental contexts.

Cognitive processes do not operate in isolation from the surrounding world. There is an iterative relationship between environments and cognitive processes, both at the timescale of evolution (as discussed in Tomlinson's chapter 2) and at the level of the individual (as described in De Souza's chapter 6). How can research frameworks in music cognition take this into account? Drawing from his work on the social contexts of Sri Lankan drumming, Sykes's chapter 9 suggests that reconceptualizing the science

of music as a “science of sound-as-relations will generate a perspective on the universal that presumes its radical diversity.” Kragness, Hannon, and Cirelli’s chapter 8 explores the way infant-environment interactions shape the development of musical behaviors. It is not simply a case of the mind’s independent constraints meeting the circumstances of an environment, reactions to which reveal the structure of those constraints. Rather, interactions between the baby and the environment influence musical development in ways that are not reducible to either the mind or the environment considered as independent factors.

Taken together, these chapters suggest that empirical work on music should start from a broader understanding of what the mind encompasses and pursue a wider set of goals. In particular, the field might consider how research in music cognition can connect to artistic practice and to goals related to health and well-being. There’s exciting potential here for another conception of science that complements the modern paradigm of experimentation as hypothesis testing, with experiments oriented toward interaction and emergence, where the ability to produce results may exceed the ability to explain them (Pickering, 2010, 2016). Other chapters explore some of these possibilities. Miranda (chapter 10) focuses on the way technologies developed for neuroscience can be harnessed to generate new compositional worlds. Leslie (chapter 13) examines how thinking about artistic creation as a kind of experiment in cognition can yield new insights and practices.

Throughout this section and this volume runs a thread about the importance of the historical perspective to scientific practices. Sean Silver points out the iterative nature of discovery in cognitive science, where

a set of tools for thinking offers a model for thinking, which suggests in turn new refinements to the tools, which prompt new twists to the model, and so on. . . . The standard cognitive model is about the present moment, interested in how we think *right now*. . . . Historicity is, however, built into cognition understood in its ecological sense; elements of any thinking ecology evolve with reference to other elements in the ecology . . . the relationships between elements of the system (between us and our objects, objects and their caretakers) bear historical baggage. (2015, pp. 272, 273)

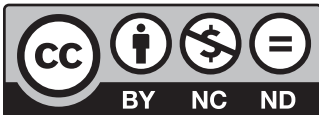
When scientists engage deeply with this history, in sustained communication with musicologists and historians, it can result in work that revolutionizes both fields, as vividly demonstrated by Raz’s exploration in chapter 5 of how notions of sonic vibration shaped early theories of neural transmission and the subsequent development of modern neuroscience.

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