**Neuroscience in Music Research: Critical Challenges and Contributions**

Neuroscientific accounts of music-theoretical topics are increasingly prominent. It is important to critically examine the challenges and contributions of incorporating neuroscience into music studies. Such examination allows for more meaningful integration, and leads to better designed experiments that are appropriately sensitive to the historical and cultural situatedness of the topics they investigate. Here I discuss three contributions and three challenges. The contributions are mechanistic explanations (which identify entities and activities that carry out musical behaviors), comparison (which can unite or distinguish between apparently different or similar behavioral capacities), and consilience (the ability to transfer knowledge across domains of inquiry). The challenges are the problem of defining behavior (musical behaviors are under-defined, complicating the attribution of neural data), reverse inference (a logical fallacy complicating the association between neurophysiology and a musical task), and problems from issues with the cognitive ontology (i.e., the set of fundamental cognitive capacities). Following this theoretical discussion, I apply the six ideas to recent work on improvisation and syntax (including my own), analyzing the work’s value and pitfalls. A final emergent theme from this critical analysis is that music neuroscience makes its best contributions when synthesizing work from other areas of music studies.