Music and Cognition: What cognitive science can learn from music cognition

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Like language, music is a uniquely human capacity that arguably played a central role in the origins of human cognition. The ways in which music can illuminate fundamental issues in cognition have been underexamined or even dismissed. This symposium considers cognition in music, especially as related to language, as enlarging our overall understanding of cognition, contributing to cognitive science conceptually and methodologically, and showing the advantages of taking music as a strong partner in studying human cognitive functioning in all its facets.

Richard Ashley

Music is widely assumed to have some kind of communicative function, but of what—structure, emotion, life-events? Pragmatic theorists from Grice onward have proposed that all communication uses the same principles but this claim has only rarely been examined in depth. This talk builds on pragmatic theories and shows how music can be understood as deeply related to, and yet differentiated from, linguistic modes of communication, especially those dealing with face-to-face, interactive communication. Evolutionary implications are addressed from this position.

Henkjan Honing

While the most common way of evaluating a computational model is by showing a good fit with the empirical data, recently the literature on theory testing and model selection criticizes the assumption that this is actually strong evidence for a model. This presentation will outline the role of 'surprise' in the computational modeling of music cognition. For a model to be surprising, all predicted outcomes should be a small fraction of the possible outcomes. The resulting methods will be demonstrated using on existing real world models of music cognition currently being developed in the context of the European EmCAP project on music cognition.

Edward Large

Nonlinear resonance is ubiquitous in nature, and is relevant to understanding music. Human motor rhythms behave as coupled nonlinear oscillators, and human neural rhythms resonate with the rhythms of music. The cochlea operates according to the principles of nonlinear resonance, and nonlinear resonance is a plausible neural mechanism for pitch perception in humans. A recent theory of tonality models tonal percepts as resonance relationships in a dynamic neural field. I suggest that nonlinear resonance may provide a universal "grammar" for music, and ask 1) What constraints does nonlinear resonance put on music? 2) How could a particular musical "languages" be learned?

Caroline Palmer & Sean Hutchins

Musicians add variation to the pitch and rhythmic categories we call music; we consider whether these manipulations constitute a "musical prosody": an abstract, rule-governed level of representation distinct from individualistic forms of musical expression and shared by listeners. Possible functions of musical prosody are: segmenting a continuous acoustic stream into its component units, highlighting items of relative importance, coordination among producers, and attributing emotional states to producers. Several rule-governed models of musical prosody have been proposed that take notated compositional scores as input and yield prosodic manipulations as output. Prosody may aid perceptual learning, and provide low-level cues to aid segmentation and learning of hierarchical relationships.

Erin Hannon

Most adults have a working knowledge of basic musical structures in their culture, as well as knowledge of their native language. The developmental trajectory of musical knowledge acquisition can shed light on how we learn about complex structures generally and how learning changes developmentally. I consider whether young infants can perceive temporal structures in music (rhythm and meter), how such perceptual abilities are modified by culture-specific experiences at different ages, and whether basic biases constrain perception and learning even in young, un-enculturated infants. Such research may broaden our understanding of rhythm perception in both music and speech, and general learning processes during development.