A Neural Model of Perceiving Rhythmic Structure Perception

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Neural population rhythms (oscillations) are cyclical fluctuations of baseline neuronal activity that can be observed in neocortical and thalamic regions of the brain. Auditory rhythmic stimulation can entrain auditory cortical rhythms and broadly distributed motor rhythms. Auditory-motor entrainment is thought to underlie pulse and meter perception in music and enable coordination of rhythmic movements with musical rhythms. Auditory-motor coupling is thought to be reciprocal and plastic. I will describe a recent dynamical model of cortical synchronization to complex rhythms using gradient frequency neural networks. The model successfully predicts neural synchronization and synchronized tapping to “missing pulse” rhythms.

Bio:
Ed Large directs the Music Dynamics Laboratory at the University of Connecticut, where he is Professor of Psychological Sciences and Professor of Physics. His research areas include music psychology, auditory neuroscience and nonlinear dynamical systems. He uses theoretical modeling in conjunction with experimental techniques to understand how the rhythmic and tonal structures of music interact with the dynamics of the brain and body. He currently serves as President of the Society for Music Perception and Cognition and he is the Founder of Oscilloscape, a software startup based in the Hartford, Connecticut area. His current projects include studies of driven oscillator networks, rhythm perception-action in humans and nonhuman animals, perception of pitch and tonality, auditory pattern recognition and learning, and emotional communication in music.