Vocal learning and flexible rhythm pattern perception are linked: evidence from songbirds

Oct. 26th (Tuesday): 4-5pm ET

Prof. Aniruddh Patel

The perception of rhythmic patterns in auditory sequences is important for many species, ranging from crickets and birds to humans. Humans can recognize the cadence of a friend's voice or the rhythm of a familiar song across a wide range of tempi. This shows that our perception of temporal patterns relies strongly on the relative timing of events rather than on specific absolute durations. This tendency is foundational to speech and music perception, but to what extent is it shared by other species? Growing evidence suggests that human rhythm perception relies on auditory–motor interactions even in the absence of movement. Given that vocal learning species have evolved neural adaptations for auditory-motor processing and communicate using acoustic sequences that are often rhythmically patterned, we hypothesize that such species are advantaged for flexible auditory rhythm pattern perception. Consistent with this hypothesis, we show that a vocal learning songbird robustly recognizes a basic rhythmic pattern (isochrony) independent of rate, far outperforming vocal non-learning rats tested in analogous prior research. Our findings pave the way for neurobiological studies to identify how the brain represents and perceives the temporal structure of auditory sequences.

Aniruddh (Ani) Patel is a Professor of Psychology at Tufts University, where he studies the cognitive, neural, and evolutionary foundations of musicality. He received his PhD in Organismic and Evolutionary Biology from Harvard University, and then worked for 15 years at The Neurosciences Institute in San Diego, CA, where he was a Senior Fellow before joining Tufts. His areas of emphasis include music-language relations (the topic of his 2008 book, *Music, Language, and the Brain*, Oxford Univ. Press) rhythmic processing, and cross-species studies of music cognition. A wide variety of methods are used in this research, including brain imaging, behavioral experiments, theoretical analyses, acoustic research, and comparative studies with nonhuman animals. Dr. Patel has served as President for the Society for Music Perception and Cognition and is a Fellow in the Brain, Mind, and Consciousness program in the Canadian Institute for Advanced Research (CIFAR).

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