Technische Universität München

ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

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Auditory-Vestibulomotor Temporal Processing and Cross-modal Plasticity for Musical Rhythm in the Early Blind

Abstract: The auditory dorsal stream (ADS) is a cortical brain network responsible for sensorimotor spatio-temporal processing. However, despite the important role of vestibular input when the head or body is moving through space, as well as the strong coupling between the vestibular and visual systems, very little is known about how vestibular information is integrated with auditory-motor inputs in the ADS, nor is it known to what extent this integration is affected by early visual deprivation. Using functional magnetic resonance imaging and motion capture technology we show that the ADS includes an extension to parietoinsular vestibular cortex (PIVC) and to subcortical regions including basal ganglia and vestibular cerebellum. This circuit is engaged after sensorimotor synchronization training, during beat recognition, and is preserved in the early blind. The strength of activation of PIVC in the early blind correlates with a measure of lifetime physical spatial activity, suggesting that experience with vestibular stimulation via physical spatial activities might compensate for any negative effects of early blindness, and thus reinforcing the beneficial effects of mobility training. Finally, rhythmic entrainment provides an effective tool for studying auditory-vestibulomotor integration and music appreciation, and for developing music-based interventions for early blind individuals.

Biography: Jessica Phillips-Silver, PhD, is a researcher in the Department of Neuroscience at Georgetown University Medical Center and served as adjunct professor in the Faculty of Music, where she developed

Georgetown's first course on Music and the Brain. Jessica's research examines how 'feeling the beat' in music is a multisensory experience from infancy through adulthood, and she documented the first case of the musical disorder 'beat deafness'. She currently studies the musical processing and cortical plasticity in blindness with Prof. Josef Rauschecker at Georgetown. She is also interested in the development of musical rhythm and executive functions in Deaf and hearing children, and music and dance as a model of temporal prediction and cooperation in humans.

The Talk is hosted by Prof. Gordon Cheng (Institute For Cognitive Systems)

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All talks in the MSNE Invited Speaker Series are open to students, staff, and members of the public. Attendance is free.

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