Neurobiology of Pitch Encoding from Brainstem to Auditory Cortex

Pitch is an essential perceptual attribute in the processing of language and music. There is strong evidence for hierarchical processing of pitch starting in subcortical structures. Therefore, pitch provides an excellent window for studying experience-dependent effects on both cortical and brainstem components of a well-coordinated, hierarchical network. This seminar focuses primarily on crosslanguage (Mandarin vs English) electrophysiological studies of linguistically-relevant pitch contours in the brainstem and auditory cortex. We propose a theoretical framework that includes local, feedback and feedforward components to account for experience-dependent enhanced representations of pitch at brainstem and cortical stages of processing. Neural representations are transformed at each biological level of abstraction. The brainstem, provides pitch representations with fine-grained, spectrotemporal information. In contrast, the cortical representation is coarser. Pitch representations reflect primarily a series of distinct, transient temporal neural events marking only certain temporal attributes of the pitch contour. We conclude that long-term language experience shapes adaptive, hierarchical pitch processing. See also ‘hkpu gandour seminar handout’ for broad outline of lecture.