Talk Abstract:

Human association cortex is populated by a series of large-scale networks. In terms of organization, the multiple networks form an orderly progression that radiates outwards from sensory-motor networks to transmodal association networks that underlie advanced forms of human cognition. In-depth analysis within individuals reveals anatomical details including that functionally distinct networks are intertwined throughout multiple zones of association cortex, raising questions about how they evolved and how they differentiate during development. Interestingly, it was recently discovered that monkeys, including the genetically accessible marmoset, possess association networks that recapitulate many of the human features. These parallels provide an opportunity to connect experiments in animal models of large-scale circuits to work and clinical interventions in the human. What is further revealing is that the networks that populate the transmodal zones of association cortex, within the regions estimated to be preferentially expanded in hominid evolution, possess three distinct spatially juxtaposed networks in the human for (1) language, (2) making social inferences, and (3) remembering. All share a common organizational motif with the same general pattern of distributed connectivity but they occupy spatially adjacent regions of cortex and can be functionally dissociated from one another. A parsimonious idea is that the same general circuit motif, arising at least 50 million years ago in primates, has expanded and specialized into multiple similarly organized, differentially specialized distributed networks that populate the expanded zones of human association cortex in support of the human niche’s cognitive toolkit.