

Large-scale cortical networks for motor and cognitive motor functions in the primate brain.

Abstract: Cortical functions result from the conjoint function of different, reciprocally connected areas working together as large-scale functionally specialized networks. In the macaque brain, architectonic, connectional, and functional data have provided evidence for functionally specialized large-scale cortical networks involving temporal, parietal, and frontal areas. These networks appear to play a primary role in controlling different aspects of motor and cognitive motor functions, such as hand action organization and recognition, or oculomotor behavior and gaze processing. In addition, there is also evidence for subcortical nodes of these networks that can provide a further transfer of cortico-cortical information possibly conferring flexibility or specific timing to cortical computations.

Based on comparative considerations it is possible to identify human homologs of the macaque large-scale cortical networks, sharing phylogenetically older neural mechanisms, which could have been exploited and differentiated, in the evolution of the human lineage, resulting in the emergence of human-specific higher-order cognitive functions.