

Network Modeling of Neural Systems and Disorders

Neuroimaging methods have tremendous potential for explaining the function and structure of the healthy human brain as well as the pathophysiology of neuropsychiatric disorders. The most sophisticated approaches to interpreting neuroimaging data utilize neural network models. Network modeling conceptualizes the brain as a complex, modularly organized information processing system, composed of a large number semiindependent networks. Network models reveal a high degree of modularity in the resting brain which dynamically shifts during task performance. Network modeling characterizes disorders by alterations in “traffic” (covariance patterns) in specific networks, and can detect treatment-induced network normalizations including correlations with behavioral symptoms. The same non-invasive imaging and analysis techniques can be applied to animal models, providing an extraordinary opportunity for translational research.