

Structural and functional clusters of complex brain networks – a network of networks

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Abstract

Recent research has revealed a rich and complicated network topology in the cortical connectivity of mammalian brains. A challenging task is to understand the implications of such network structures on the functional organization of the brain activities. This is studied here basing on dynamical complex networks. We investigate synchronization dynamics on the cortico-cortical network of the cat by modelling each node (cortical area) of the network with a sub-network of interacting excitable neurons. We find that this network of networks displays clustered synchronization behaviour and the dynamical clusters coincide with the topological community structures observed in the anatomical network. This kind of mesoscopic modelling seems to be a promising approach for understanding brain dynamics. Our results provide insights into the relationship between the global organization and the functional specialization of the brain cortex.