

Brain networks: why, what, how - and how not?

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Human brain function relies on connectivity between brain areas, which makes a *complex network*, or a system of nodes connected by links, to appear as a natural model for the brain [1]. *Network neuroscience* [2,3] that applies mathematical and statistical tools of *network science* to study the brain has indeed opened new insights on human brain function in health and disease. However, finding an optimal network model of brain function requires facing several challenges, ranging from technical issues related to network construction to more fundamental questions of interpreting the outcomes of network analysis [4].

In this talk, I will demonstrate how to construct networks at different temporal and spatial scales from multimodal functional neuroimaging data and how to analyze them to understand human brain function. I will warn against common methodological drawbacks of functional brain network construction, including problems in node definition [5,6,7] and ignoring the time dependency of the networks [8,9], and offer example solutions to tackle these issues. Further, I will discuss the potential and limitations of the network model of human brain function in a broader philosophical context and draw attention to a fundamental but often ignored question: to what extent is the human brain really a network?

References

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