Critical dynamics on a large human Open Connectome network

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Extended numerical simulations of threshold models have been performed on a human brain network with N = 836 733 connected nodes available from the Open Connectome Project [1]. While in the case of simple threshold models a sharp discontinuous phase transition without any critical dynamics arises, variable threshold models exhibit extended power-law scaling regions. This is attributed to fact that Griffiths effects, stemming from the topological or interaction heterogeneity of the network, can become relevant if the input sensitivity of nodes is equalized. Effects of link directness, as well as the consequence of inhibitory connections is studied. Nonuniversal power-law avalanche size and time distributions have been found with exponents agreeing with the values obtained in electrode experiments of the human brain [2].

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[1] M.T. Gastner and G. Ódor, Sci. Rep. **5**, 14451 (2015).

[2] G. Ódor PRE **94**, 062411 (2016).