Abstract Submitted
for the CUWIP21 Meeting of
The American Physical Society

Development of control in brain networks over temporal and spatial scales using graph models LINDSAY SMITH, HARANG JU, DANIELLE BASSETT, University of Pennsylvania — Regions of the human brain vary in their capacity to control whole brain activity, in large part due to their location in the underlying structural network of interconnections crisscrossing the cortex. Recent work suggests that this capacity for control differs across spatial and temporal scales of the brains dynamics and can be formally probed using the Laplacian eigenspectrum of the brains structural network. Yet how such spatiotemporal control might differ from one human to another, potentially supporting and explaining differences in cognitive function, remains unclear. Here, we address this question by measuring several summary statistics of spatiotemporal control from human brain network architecture, as reflected in diffusion tensor imaging data acquired from 882 youth between the ages of 8 years and 22 years. We found that distinct features of network topology are correlated with a regions capacity to enact distinct control strategies, and we investigate these relationships as a function of discrete timescales, from markedly slow modes of dynamics to relatively swift modes of dynamics. Our results provide insight into how local variation in connectivity gives rise to distinct processes of global control as a function of timescales over modes of activity.

Lindsay Smith
University of Pennsylvania

Date submitted: 04 Jan 2021

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