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Title: From connectome to function: connectivity features underlying neuronal population dynamics in the nematode *C. elegans*

The wiring architecture of neuronal networks is assumed to be a strong determinant of their dynamical computations. An ongoing effort in neuroscience is therefore to generate comprehensive synapse-resolution connectomes alongside brain-wide activity maps. However, the structure-function relationship, i.e. how the anatomical connectome and neuronal dynamics relate to each other on a global scale remains unsolved. To address this, we systematically compared graph features in the *C. elegans* connectome with correlations in nervous system wide neuronal dynamics obtained from whole brain Ca^{2+}-imaging. We found that connectivity motifs and input similarities can predict functional relationships between neurons. Surprisingly, quantities such as connection strength and amount of common inputs do not improve these predictions, suggesting that the network's topology is sufficient. We demonstrate that hub neurons in the connectome are key to these relevant graph features. Consistently, inhibition of multiple hub neurons specifically disrupts brain-wide correlations. Thus, we propose that a set of hub neurons and non-local connectivity features provide an anatomical substrate for coordinated global brain dynamics.