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# Predictive Power and Validity of Connectome Predictive Modeling: A Replication and Extension

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## ABSTRACT

Neuroimaging, particularly functional magnetic resonance imaging (fMRI), is a rapidly growing research area and has applications ranging from disease classification to understanding neural development. With new advancements in imaging technology, researchers must employ new techniques to accommodate the influx of high resolution data sets. Here, we replicate a new technique: connectome-based predictive modeling (CPM), which constructs a linear predictive model of brain connectivity and behavior. CPM's advantages over classic machine learning techniques include its relative ease of implementation and transparency compared to "black box" opaqueness and complexity. Is this method efficient, powerful, and reliable in the prediction of behavioral measures from the Human Connectome Project's resting state fMRI data? Our replication of connectome-based predictive modeling yielded a correlation of approximately r = 0.8 between actual and predicted behavioral measures. However, when the model is given randomly shuffled pairs of subjects and behavior as input data, the prediction succeeds regardless. Applications of various cleaning techniques proved ineffective; further investigation into the legitimacy of connectome-based predictive modeling must be conducted.

## KEYWORDS

fMRI, Machine Learning, Functional Connectivity, CPM, Behavioral Measures