Nonlinear Statistical Dependence Outperforms Linear Dependence in Bayesian Inferences about the Neural Networks Underlying Simulated fMRI Data

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Presentation Abstract Summary Cognitive tasks engage multiple brain regions. Information is transformed from region to region giving rise to statistical dependence between the observed responses. Most current fMRI analysis methods (e.g. functional connectivity) investigate univariate and linear dependence. However, the dependence between regions is likely multivariate and nonlinear. Recent work shows that multivariate measures of dependence outperform univariate measures, and that nonlinear measures outperform linear measures. In this conference article, we used a Bayesian approach to test whether nonlinear measures of dependence 1) can select between alternative neural network models of the underlying computations and 2) they are assigned a greater probability under the correct model than linear measures of dependence in a case in which the ground truth is known.

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