Evaluating Autism Connectivity Abnormalities through Functional Fingerprinting

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The field of clinical neuroimaging has extensive literature devoted to determining Autistic brain functional connectivity differences with resting state functional magnetic resonance imaging (rs-fMRI) methods. Despite the history of research, biomarkers for Autism are still unknown due to the lack of convergence in the literature. In order to account for the lack of convergence, for in-scanner head motion related artifacts, and for the heterogeneity of the Autistic condition, a meta-analytic procedure was applied to determine whether rs-fMRI functional connectivity abnormalities in Autistic brains were valid. The procedure is the first clinical neuroimaging application of functional fingerprinting methods, which aim to characterize brain regions based on tasks activating them. Connectivity abnormalities were determined through a dual-regression independent component analysis of anonymous Autism Brain Imaging Data Exchange subject data. Using BrainMap's database of thousands of task-based neuroimaging studies for functional fingerprinting, the abnormally connected regions were evaluated by creating behavioral domain profiles of abnormally connected regions. Hyperconnected regions in adult Autistic males were found to have significantly increased involvement in behavioral domains implicated by their diagnosis: social, executive, and speech functioning. The findings are the first in the field to be validated by meta-analytic methods, relating abnormal connectivity functional biases to diagnostic criteria. The new process of functional fingerprinting applied to clinical neuroimaging results will not only promote more accurate biomarkers for Autism, but also facilitate more accurate neuroimaging biomarkers for any neurological disorder with diagnostic criteria.

Awards Won:
American Psychological Association: Third Award of $500