

# Brain alterations support categorical and dimensional features of the neurobiology of autism

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A study in *Biological Psychiatry* provides a new understanding of brain alterations in children with autism spectrum disorder (ASD) that may help researchers and clinicians better define the disorder.

Many people think of an illness as something you have or you don't. But this concept gets tricky with an illness such as ASD, which is defined based on behaviors that can differ in type and severity from person to person. Patients with ASD tend to be diagnosed into specific subgroups, based on a categorical model of the disorder. But research supports a dimensional model, where symptoms occur along a spectrum that likely expand beyond those categorical definitions.

In the study, a team of researchers, led by senior author Wei Gao, Director of neuroimaging research at Cedars-Sinai in Los Angeles, used brain imaging to determine if the neurobiology of ASD fits a categorical model or a dimensional model of the disorder. First author Dr. Amanda Elton, a postdoctoral researcher at UNC Chapel Hill where the research was conducted, and colleagues analyzed [functional magnetic resonance](#) imaging data from 90 boys with ASD and 95 typically developing boys. They looked at relationships between behavior, diagnosis, and functional connectivity of four large-scale brain networks related to ASD.

The researchers found that variations in functional connectivity were associated with a spectrum of behavioral symptoms in all of the children,

regardless of whether they were diagnosed with ASD. This indicates a dimensional nature of the disorder, where ASD impairments are associated with alterations in brain regions that govern typical behaviors. However, they also found that some brain regions differed in their strength of [functional connectivity](#) between boys with ASD and typically developing boys, supporting a categorical nature of the disorder.

"In contrast with considerations that categorical and dimensional models of [autism spectrum disorder](#) are in competition, this study revealed evidence of both models in the brain," said Gao, supporting a complementary nature of the two models instead of a dichotomy.

"Moving forward, a better conceptualization of ASD, and potentially other [brain disorders](#) too, might benefit from embracing a hybrid model incorporating both categorical and dimensional mechanisms," said Gao.

Dr. John Krystal, Editor of *Biological Psychiatry*, also thinks that the impact of the study extends beyond autism, with implications for the debate on the nature of psychiatric diagnosis, which contrasts the categorical model, exemplified by the American Psychiatric Association's Diagnostic and Statistical Manual (DSM), and dimensional model, illustrated by the US National Institute of Mental Health Research Domain Criteria (RDoC).

"There are an increasing number of examples where patient groups are distinguished from the general population by both dimensional and categorical features. This may suggest that the diagnostic process, in the future, will need to integrate perspectives from both DSM and RDoC," said Krystal.

**More information:** Amanda Elton et al. Neural Connectivity Evidence for a Categorical-Dimensional Hybrid Model of Autism Spectrum Disorder, *Biological Psychiatry* (2016). [DOI:](#)

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