Perspective-Tracking Brain Response Could Help Identify Children with Autism

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Using brain imaging to examine neural activity associated with our ability to distinguish the self from others may offer scientists a relatively accurate tool to identify children with autism spectrum disorder.

Although further research and evaluation will be needed before the imaging strategy can be used as a standard part of clinical assessment, preliminary findings published in *Clinical Psychological Science* indicate that it has diagnostic potential.

 “Our brains have a perspective-tracking response that monitors, for example, whether it’s your turn or my turn,” lead researcher Read Montague, professor at Virginia Tech Carilion Research Institute, said in a statement. “This response is removed from our emotional input, so it makes a great quantitative marker.” he said. “We can use it to measure differences between people with and without autism spectrum disorder.”

In previous brain imaging research using functional MRI (fMRI), Montague and colleagues found relatively increased levels of activity in an area of the brain called the middle cingulate cortex when it was the participant’s turn in to play in a turn-taking game. The researchers hypothesized that this brain area may contribute to our ability to distinguish between the self and others and more recent findings seem to confirm this, showing similarly increased activity in the middle cingulate cortex when participants are presented with images of the self in comparison to images of other people.

Intriguingly, a 2008 study in which participants had to imagine themselves executing various physical actions indicated that activity in the middle cingulate cortex in participants with autism spectrum disorder was associated with severity of their symptoms — a relatively lower response correlated with more severe symptoms.

Based on these findings, Montague and colleagues hypothesized that activity in the middle cingulate cortex might serve as a biomarker of self-perspective that could be used as a clinical tool.

To test this hypothesis, the researchers had children lie in an fMRI scanner and showed them 15 images of themselves and 15 images of a child matched for age and gender. The images were displayed for 4 seconds each and they were presented in a random order.

The children in the control group, who had no clinical diagnoses, showed a relatively high level of activity in the middle cingulate cortex when viewing their own pictures. In contrast, children with autism spectrum disorder showed a relatively diminished response.

Importantly, Montague’s team could detect this difference in individuals using only a single stimulus image.

“We went from a slow, average depiction of brain activity in a cognitive challenge to a quick test that is

significantly easier for children to do than spend hours under observation," Montague said. "The single-stimulus functional MRI could also open the door to developing MRI-based applications for screening of other cognitive disorders."

Lu, J., Kishida, K., De Asis-Cruz, J., Lohrenz, T., Treadwell-Deering, D., Beauchamp, M., & Montague, P. (2015). Single-stimulus functional MRI produces a neural individual difference Measure for Autism Spectrum Disorder. *Clinical Psychological Science.* DOI: 10.1177/2167702614562042