

OPINION

Thought test hints at neural signature for autism

BY SARAH DEWEERDT

6 JANUARY 2015

Autism is diagnosed strictly on the basis of behavior, usually relying on a subjective and time-consuming assessment. Many researchers have instead been **searching for biomarkers**, both to speed up the process and to provide a more objective diagnostic measure.

A study published 2 December in *PLoS ONE* contributes to this effort by identifying patterns of brain activity that can accurately **distinguish people with autism from controls** 97 percent of the time. But the study also reveals the contradictions — and even dangers — involved in this ostensibly objective approach.

The researchers scanned the brains of 17 adults with high-functioning autism and 17 controls, who were asked to think about eight different ‘social’ verbs, such as hug, insult and adore, inside the scanner. In some instances, the participants were supposed to think about performing these actions and in others, to think about being the recipient.

These thoughts light up the brains of people with autism differently than they do control brains. When the controls think about social verbs, they show activation in a part of the cerebral cortex called the precuneus, which is associated with representations of the self. People with autism show little activation in this area when they think about the same verbs.

Thought experiments:

The researchers offer a plausible explanation for this: The controls imagine themselves as part of the story when they think about social actions, whereas people with autism think about these concepts more abstractly, as if they were outside observers. The pattern is so consistent that a

computer algorithm was able to correctly classify 33 of the 34 participants as having autism or not, based on their imaging results.

Previous studies have shown **altered patterns of brain activity** in autism, but this one is unusual in that it shows differences in how people think about the kinds of social actions that are at the heart of the disorder.

The study also found that the participants with autism think similarly to one another. That is, the computer algorithm can tell which of the eight verbs a person with autism is thinking about based on patterns of brain activity in other people with autism who are considering the same word.

This consistency is especially striking given the heterogeneity of autism, the researchers say. However, the study participants with autism — all high-functioning adults — represent only a small slice of the spectrum, so perhaps this uniformity isn't so surprising.

The results offer a fascinating window into how people with autism experience the world. But the notion that they herald a potential diagnostic test for the disorder — an idea **excitedly reported** in the **popular press** and suggested by the researchers themselves — is much more problematic.

A true diagnostic biomarker would have to **distinguish people with autism from those with other disorders**, and from their unaffected parents and siblings, who often share some autism-like traits, **including patterns of brain activity**. It's not clear whether the 'thought test' meets this challenge, as the researchers excluded people who have a family history of autism from their control group.

The approach would also be difficult in children or in people with cognitive impairment because it requires individuals to think about complex concepts. The participants even wrote down their ideas about each verb — whether the action is intentional, how another person might react to it, and so on — so that they could think about the words the same way each time during the scan.

Even with this preparation, the researchers had to throw out some data from both the autism group and controls because people's minds wandered during the scan. In other words, hard as it is not to think of a pink elephant, it's harder still to think about what a hug means.

More broadly, I would argue that we shouldn't label people as having a disorder or medical condition based solely on the style of their thoughts. The fact that some people think differently from the norm — including in ways typical of autism — enriches humanity as a whole.