

**OPINION**

# Playing by the rules

BY DEBORAH RUDACILLE

26 JULY 2011





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Playing an online game that involves tossing a ball back and forth by pressing a button seems like

a fun, relaxing activity. But a new study, published this month in *Developmental Cognitive Neuroscience*, shows that it can also reveal significant differences in the way that the brains of children with autism process **social exclusion and rule-breaking**.

The same team last year identified specific **brain signatures** that are seen in both children with autism and their unaffected siblings, but not in healthy controls.

In the new study, the researchers scanned the brains of 13 children with autism and 16 typical controls as they played two online games, **Cyberball** and Cybershape. In both games, children tossed a virtual ball back and forth for five minutes with what they thought were other children logged into the game online.

In fact, they were interacting with a computer program that either left them out of the game part of the time (Cyberball) or violated the rules of the game (Cybershape). These violations were sometimes in their favor and sometimes not.

Immediately after playing each game — and while still in the scanner — the children filled out a ten-item questionnaire that assessed how they felt about being left out or observing their fellow players (i.e. the computer) violating the rules of the game.

Typical children and the children with autism felt equally distressed about being left out of the play in Cyberball. However, the children with autism were significantly more distressed by the Cybershape rule violations.

The children's brain regions showed even more salient differences: In all, ten regions were activated differently between the two groups. Nine of these showed more activation in the typical children in response to social exclusion.

Only the precuneus, a brain region believed to be key to self-consciousness and self-awareness, showed greater activation in children with autism when they were excluded.

The precuneus also plays a central role in the **default mode network**, active when individuals' brains are at rest. This may indicate a degree of disengagement on the part of the children with autism during social interactions, the researchers say.

Another brain region, the insula, tucked deep inside the brain, was both under-activated during social exclusion and over-activated during rule violation in the children with autism compared with the controls. The insula is an emotional hotspot, lighting up on scans when people experience intense emotions such as disgust, rage or emotional pain.

Many participants in the game (both children with autism and controls) suspected that they were playing with a computer, the researchers admit, which might lessen the sting of social exclusion.

But the outrage that the children with autism felt when the computer broke the rules was not diminished. Like other studies of **moral reasoning**, this one shows that no matter how trivial the context, for people with autism, rules are never meant to be broken.