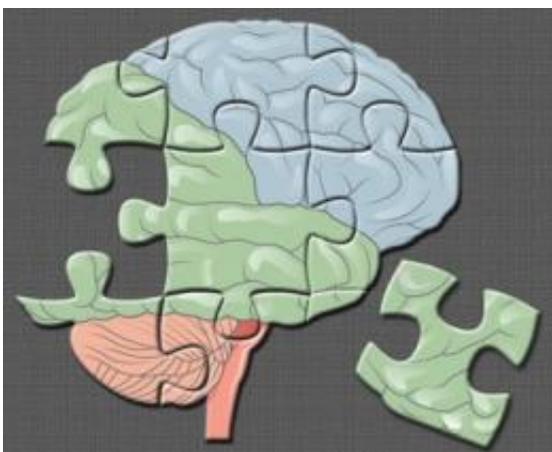


# Neuroscientists find evidence that autistic patients have trouble understanding others' intentions

January 31 2011, by Anne Trafton

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Graphic: Christine Daniloff

(PhysOrg.com) -- A study from MIT neuroscientists reveals that high-functioning autistic adults appear to have trouble using theory of mind to make moral judgments in certain situations.

Specifically, the researchers found that autistic adults were more likely than non-autistic subjects to blame someone for accidentally causing harm to another person. This shows that their judgments rely more on the outcome of the incident than on an understanding of the person's intentions, says Liane Young, an MIT postdoctoral associate and one of the lead authors of the study, which appears in the Jan. 31 online edition

of the [Proceedings of the National Academy of Sciences](#).

For example, in one scenario, "Janet" and a friend are kayaking in a part of ocean with many [jellyfish](#). The friend asks Janet if she should go for a swim. Janet has just read that the jellyfish in the area are harmless, and tells her friend to go for a swim. The friend is stung by a jellyfish and dies.

In this scenario, the researchers found that people with [autism](#) are more likely than non-autistic people to blame Janet for her friend's death, even though she believed the jellyfish were harmless.

Young notes that such scenarios tend to elicit a broad range of responses even among non-autistic people. "There's no normative truth as to whether accidents should be forgiven. The pattern with autistic patients is that they are at one end of the spectrum," she says. Young's co-lead author on the paper is former MIT postdoctoral associate Joseph Moran, now at Harvard.

Most children develop theory-of-mind ability around age 4 or 5, which can be demonstrated experimentally with "false-belief" tests. In the classic example, a child is shown two dolls, "Sally" and "Anne." The experimenter puts on a skit in which Sally puts a marble in a basket and then leaves the scene. While Sally is away, Anne moves the marble from the basket to a box. The experimenter asks the child where Sally will look for the marble when she returns. Giving the correct answer — that Sally will look in the basket — requires an understanding that others have beliefs that may differ from our own knowledge of the world, and from reality.

Previous studies have shown that autistic children develop this ability later than non-autistic children, if ever, depending on the severity of the autism, says MIT Professor John Gabrieli, senior author of the study.

"High-functioning" autistic people — for example, those with a milder form of [autism](#) such as Asperger's syndrome, often develop compensatory mechanisms to deal with their difficulties in understanding other people's thoughts. The details of these mechanisms are unknown, says Young, but they allow autistic people to function in society and to pass simple experimental tests such as determining whether someone has committed a societal "faux pas."

However, the scenarios used in the new MIT study were constructed in a way that there is no easy way to compensate for impaired theory of mind. The researchers tested 13 autistic adults and 13 non-autistic adults on about 50 scenarios similar to the jellyfish example.

In a 2010 study, Young used the same hypothetical scenarios to test the [moral judgments](#) of a group of patients with damage to the ventromedial prefrontal cortex (VMPC), a part of the prefrontal cortex (where planning, decision-making and other complex cognitive tasks occur).

Those patients understand other people's intentions, but they lack the emotional outrage that usually occurs in cases where someone tries (but fails) to harm someone else. For example, they would more easily forgive someone who offers mushrooms he believes to be poisonous to an acquaintance, if the mushrooms turn out to be harmless.

"While autistic individuals are unable to process mental state information and understand that individuals can have innocent intentions, the issue with VMPC patients is that they could understand information but did not respond emotionally to that information," says Young.

Putting these two pieces together could help neuroscientists come up with a more thorough picture of how the brain constructs morality. Previous studies by MIT assistant professor Rebecca Saxe (also an

author of the new PNAS paper) have shown that theory of mind appears to be seated in a brain region called the right temporoparietal junction (TPJ). In ongoing studies, the researchers are studying whether autistic patients have irregular activity in the right TPJ while performing the moral judgment tasks used in the PNAS study.

**More information:** "Impaired theory of mind for moral judgment in high-functioning autism," by Joseph M. Moran, Liane L. Young, Rebecca Saxe, Su Mei Lee, Daniel O'Young, Penelope L. Mavros, and John D. Gabrieli. *Proceedings of the National Academy of Sciences*, 31, January, 2011.

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