How does the autistic brain 'see' human faces?

Studies show that many autistic individuals have difficulty recognizing faces, and new research by Yale researchers indicates that the autistic brain processes faces as though they were objects.

Robert Schultz and colleagues used functional magnetic resonance imaging (fMRI) to study face perception in 14 high-functioning individuals with autism or Asperger syndrome (AS), an autistic-spectrum disorder. The researchers compared autistic and AS subjects' responses to those of two groups of matched controls.

"Individuals with autism spectrum disorders demonstrate a pattern of brain activity during face discrimination that is consistent with feature-based strategies that are more typical of nonface object perception," the researchers report. The autistic and AS subjects showed reduced activation in the fusiform gyrus, the area of the cerebral cortex that appears to "encode" human faces so that they can be recognized. In contrast, they showed increased activation in an adjacent brain region that processes objects.

"Of the things that the developing child routinely encounters, the human face is probably the most frequent and important," Schultz says. "The ability to recognize and remember people by their face is critical for all types of interpersonal relationships. The face conveys many important types of information, including a person's age, sex and emotional state. Decoding this information is critical to successful functioning within a group. It is precisely these things that are so difficult for these patients."

The researchers note that it is not possible to know whether an innate lack of interest in faces leads to altered processing, or whether the altered processing is one cause of autism. Earlier research at Yale and Brown Universities, however, indicates that facial processing is a learned process. In this research, Isabel Gauthier and Michael Tarr found that subjects trained to be expert at recognizing novel shapes (called "greebles") showed similar activity in the fusiform gyrus whether they looked at greebles or faces. "Novice" greeble viewers, in contrast, did not show this type of fusiform gyrus activity. This suggests that humans develop skill in processing faces, rather than being born with this ability.

Schultz agrees that the face-processing deficit in autistic individuals may result from an absence of learning experiences. "This may be a result of a lifelong disinterest in people, and a failure to develop normal expertise for faces," he says. If so, he speculates, direct intervention with very young autistic children, whose brains are still developing, could help these children learn to process faces more normally.

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"Abnormal ventral temporal cortical activity during face discrimination among individuals with autism and Asperger syndrome," R. T. Schultz, I. Gauthier, A. Klin, R. K. Fulbright, A. W. Anderson, F. Volkmar, P. Skudlarski, C. Lacadie, D. J. Cohen, and J. C. Gore, *Archives of General Psychiatry*, Vol. 57, No. 4, April 2000, pp. 331-340. Address: Robert Schultz, Child Study Center, Yale University, Box 207900, New Haven, CT 06520-7900.

—and—

"People with autism and Asperger syndrome process faces as objects, Yale study of brain abnormalities finds," Yale University press release, April 17, 2000.

—and—

"Brain region used in face recognition is active in new object recognition," Brown University press release, June 22, 1999.

Developmentally disabled often crime victims

While crime rates are dropping across America, developmentally disabled individuals are at high (and possibly increasing) risk of being crime victims, according to law professor Joan Petersilia.

Reviewing the research literature, Petersilia concludes, "Studies from the U.S., Canada, Australia, and Great Britain consistently confirm high rates of violence and abuse in the lives of persons with disabilities," with one analysis indicating that developmentally disabled people are four to ten times as likely to be crime victims than are non-disabled people. "One recent study," she notes, "found that more than 70 percent of women with developmental disabilities are sexually assaulted in their lifetime." In addition, she says, people with developmental disabilities are at high risk of being victimized repeatedly.

Petersilia theorizes that "deinstitutionalization may have adversely affected some people with disabilities, throwing many into poverty and unsafe community settings where they become easy targets for criminal predators." She notes, however, that rates of violence also are high in institutional settings. People with developmental disabilities are particularly vulnerable, she says, because they desire acceptance, are dependent on others for food, shelter, and care, and often lack the resources, awareness, or verbal ability to report abuse.

"Many aspects of our service delivery system also place persons with disabilities at risk," Petersilia says. "For example, one study found that 44 percent of all offenders against people with disabilities made initial contact

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Newborns and autism

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guish between autistic and retarded children.

Nelson et al. say their findings suggest that autism may stem from a combination of genetic defects and exposure to environmental insults occurring either prenatally or early in infancy. However, they stress the need for additional studies to confirm their results.

David Pisani and Ellen Powell of the March of Dimes comment, "The implications [of this study] are phenomenal: If we can identify babies at risk for these conditions at birth, we may be able to jump-start interventions." They note, however, "We don't know whether the high levels of these proteins could cause autism and mental retardation, or whether the high levels are a sign of something else going wrong."

Editor's note: The children included in this study were born in the early 1980s, before widespread use of the MMR vaccine and before the huge increases in autism began. This study thus sheds no light on the possible role of the MMR vaccine as a cause of the increase.

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"Neuropeptides and neurotrophins in neonatal blood of children with autism, mental retardation, or cerebral palsy," Karin B. Nelson, J. K. Grether, James M. Dambrosia, Lisa A. Croen, Ben F. Dickens, Robin L. Hansen, and Terry M. Phillips, presentation at the San Diego meeting of the American Academy of Neurology, May 3, 2000. Address: Karin B. Nelson, National Institute of Neurological Disorders and Stroke, NIH, Bethesda, MD 20892.

ATEC available

In ARRI 13/4, we announced the availability of the Autism Treatment Evaluation Checklist (ATEC), a one-page, easy-to-complete scale specifically designed to evaluate changes in autistic children and adults treated with any biomedical or educational intervention. The ATEC is available at no cost from our website (www.autism.com/atec), or by mail from ARI. Scoring is also free. Responses may be entered at the website for instant scoring (four scales plus total) or by mailing or faxing forms to ARI.

We have recently computed split-half internal-consistency reliability coefficients for the ATEC. The reliabilities (N=662) range from .84 to .94—very high.

For a copy of the ATEC and more information, visit the ARI website or send an SASE to ARI.