# Comprehending Those Who Can't Relate

## Researchers seek the neurobiological roots of our social side

By TINA ADLER

From playgrounds to boardrooms to bars, one finds individuals who seem like loners, who are blind to others' needs, or who ruin their personal lives.

Psychologists often blame a person's difficulty in relating to others on upbringing or life experiences. Most researchers would agree that such factors do influence how one interacts with others.

But scientists also have begun investigating the underlying mechanisms of such behaviors — asking how neurobiology influences social competence, or the desire and ability to interact with others. For clues, they turn to brain-damaged or autistic individuals, whose conditions leave them socially detached and unable to interact normally with people.

An interest in bonding with others shows up in infants, researchers point out. Babies spend more time than many adults realize trying to engage in positive social interactions, notes Peter Szatmari of Chedoke-McMaster Hospital in Hamilton, Ontario. "Prosocial behaviors are very much more common in infancy and toddlerhood than they are in the later preschool years," he contends.

Infants empathize. They act distressed when another child gets upset. Within the first year of life, they play turn-taking games with their parents, demonstrating their ability to share. And infants participate in what Szatmari calls "joint attention" by pointing to things they want their parents to see.

In fact, the ability of infants to engage in social interactions suggests that prosocial behaviors are "hardwired — that is, they do have neural substrates and neural circuits and are under strong genetic control," he argues. Research examining brain function and the family history of people with severe social behavior deficits seems to confirm this view.

To understand the neurobiology of social competence, Antonio R. Damasio and his colleagues at the University of Iowa College of Medicine in Iowa City are examining how people make personal decisions, such as where to invest their money or whom to befriend. Szatmari, Damasio, and other researchers met March 16 in Washington, D.C., at a conference on social competence sponsored by the Learning Disabilities Association and the National Institutes of Health.

In a recent study, Damasio and his colleagues compared normal volunteers with patients who suffered brain damage in their frontal lobes as a result of strokes or tumors. The patients performed quite well — at genius level in some cases — on verbal and memory tasks. When the researchers asked them what they would do in hypothetical social situations, the patients responded as most people would, Damasio says.

But their answers differ completely "from how they act in real time and in real life," he explains. Since their injuries, the patients have made disastrous social and financial decisions. They also appear to be devoid of emotions, he says.

"So what you get is this very odd collapse of social [and] personal decision making on the one hand, collapse of the ability to express and feel emotion under certain circumstances, and otherwise an absolutely intact intellectual world," Damasio says.

In a study described in the April COGNITION, he and his coworkers gave four patients and eight normal volunteers play cash and asked them to decide which of a series of marked cards would win them the most money. When turned over, the cards either promised or required payments. The normal volunteers — but not the patients — quickly learned to avoid cards marked A or B, which proved risky because they either gave large rewards or requested huge sums.

Moreover, during the 4 seconds prior to choosing the high-risk cards, normal

### Art emerges from autism

Jessica Park, a successful, 35-year-old autistic artist from Williamstown, Mass., paints extremely detailed pictures, often of her current obsession. At one time it was stars. Security systems and refrigerators have also captured her artistic attention.

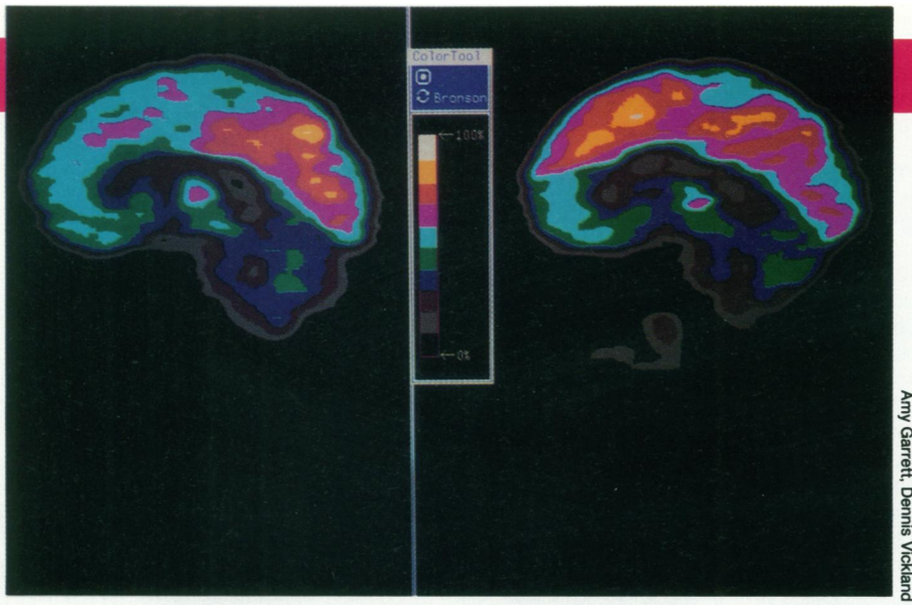
People, however, interest her little. As a child "she looked through you as if you were a pane of glass," explains her mother, Clara C. Park. "You can't say autistic children are withdrawn, because they were never there."

Jessica Park talks about her obsessions, "but she can't share or respond to any mood of yours," her mother explains. But with much effort, the artist can learn what others like, as she revealed one day after baking cookies with her mother.

"She said proudly she didn't put cinnamon in the cookies because she knows I don't like cinnamon," Clara Park says. — *T. Adler*

TGL Photoworks

*Perry House at Williams College in Williamstown, Mass., by Jessica Park, an autistic artist. She often includes in her paintings parts of constellations.*




Amy Garrett, Dennis Vickland

***A** positron emission tomography (PET) scan of the brain of a normal individual (left) reveals a cooler anterior singulate (shown in blue at top left) compared to the very active anterior singulate (pink and yellow area) of a socially withdrawn person (right).*

volunteers perspired more than they did before turning over the other cards. The patients showed no such anxiety about their risky decisions.

The study suggests that while normal people use logic to analyze risks before making decisions, their brains also give them an automatic emotional warning signal that the patients' brains fail to produce, Damasio says

The patients "run purely on cognition . . . and if you are going to run your personal and social life on logic alone, it's not going to work," he warns.

Researchers have located many parts of the brain that influence social interaction, including the amygdala. Frank Wood of the Bowman Gray School of Medicine in Winston-Salem, N.C., said at the conference that he has recently uncovered additional brain areas that "tell the more interesting story."

He examined positron emission tomography scans of 50 volunteers, including six socially withdrawn people, while they performed a simple letter identification task. The scans show how extensively different regions of the brain metabolize glucose, an indicator of brain activity.

In the socially withdrawn participants, the thalamus, the brain's primary sensory processor, metabolized less glucose than it did in the other volunteers. And the anterior singulate, which regulates emotion and focuses attention, appeared to have an "astonishingly high" glucose metabolism rate. The amygdala, in contrast, was less active. The three findings together suggest that the withdrawn volunteers were riveted on the task and ignored stimuli, such as the researchers, near them.

"We thought withdrawn people . . . focus on too narrow a range of the environment, and this seems to confirm it," Wood says.

Autism reveals to scientists what happens when the underpinnings of social behavior become seriously unglued. Some autistic people appear to have no interest in social interaction and do not talk. Others want to communicate but have trouble doing so. They form meaningless sentences or may insist on talking endlessly about one topic.

The cause of autism still mystifies scientists, but they have uncovered some clues. Autistic children tend to have an impaired neurological functioning that explains their disease or a family history of emotional disorders, but not both, Robert DeLong of Duke University Medical Center in Durham, N.C., reports in two studies to be published in a forthcoming DEVELOPMENTAL MEDICINE AND CHILD NEUROLOGY.

Autistic children with a family history of emotional disorders but no neurological problems often have symptoms of bipolar disease, which involves manic and depressive episodes, DeLong says. The bipolar disease "seems to cause the autism," he suggests.

DeLong and his colleagues reached these conclusions by performing complex neurological assessments and reviewing the psychiatric family histories of 40 children with autism, Asperger's syndrome, or pervasive developmental disorder, all considered autistic spectrum disorders.

Prior to this study, no one had "showed a widespread connection" between autism and bipolar disorder or major depression, DeLong says.

Researchers are also pinpointing which brain processes function poorly in autistic individuals and disrupt their communication skills. Autistic teenagers perform poorly on tests of working memory, according to Bruce F. Pennington of the University of Denver, who described two of his recent studies at the conference. Working memory stores information needed to complete an ongoing or an up-and-coming task. It allows people to plan what they want to do or say next, and it plays a critical role in all social interactions, he notes.

Impaired working memory also makes it difficult for autistic individuals to imitate other people's gestures or movements, which is an important way children learn, Pennington says. "When you imitate someone, you have to remember what they did, plus you need to use that as a plan for what you'll do," he explains. For example, if an autistic child wants to imitate his sister sticking her tongue out, he might have difficulty keeping in mind where his tongue is.

Researchers say they are just beginning to understand the mechanics of humans' social side. What most people take for granted — being concerned for others, enjoying friends, learning from peers — scientists view as complex, often mysterious abilities.

The demands that imitation places on individuals reflect the requirements of social interaction in general. "Even though we [imitate] so effortlessly, it's quite a big task," Pennington says. □

Waterhouse

***C**hildren often learn by imitating each other, which autistic children may have difficulty doing.*