

NEWS

Size of infant's amygdala predicts language ability

BY VIRGINIA HUGHES

21 NOVEMBER 2008

A child's language ability correlates with the volume of his or her amygdala – the small, deep brain region that is strongly associated with emotion processing – according to an unpublished five-year longitudinal study presented Wednesday afternoon at the **Society for Neuroscience meeting**.

Analyzing brain imaging data collected from 24 infants at 6 months of age, researchers at Rutgers University found that the larger the volume of the right amygdala, the lower the babies score on language tests given at 2, 3, and 4 years of age. The researchers found the inverse to be true of the left amygdala, but not to statistical significance.

Based on these results and previous studies, the researchers speculate that during early development, neuronal connections are strengthened between the amygdala and known language processing centers in the brain. Because children with autism have impaired social interaction, these connections may be disrupted, the researchers say.

“We're seeing this effect in really young babies,” says lead investigator **April Benasich**, director of the university's Infancy Studies Laboratory. “We don't know for sure, but it might be that in autism, this modulation is not the way that it should be because of the lack of interaction that you have in autistic kids.”

Several imaging studies of people with autism have compared amygdala size and language ability. A 2000 report found that adults with Asperger syndrome – an autism spectrum disorder characterized by high language abilities – have **larger left amygdala volumes than low-functioning adults** with autism.

In 2006, another study found that children with autism who have **larger right amygdalas at ages 3 to 4 have more impaired communication** by the time they are 6 years old, and conversely, that children with autism who have larger left amygdalas at age 3 or 4 have better communication

abilities by the time they are 6.

These studies indicated that the amygdala might play a role in the language impairments that are characteristic of people with autism. But Benasich's study suggests that the amygdala also plays a role in the language acquisition of children without autism.

Joint attention:

Joe Piven, an autism researcher at the University of North Carolina at Chapel Hill, is looking at the possible link between amygdala volume and joint attention ? the process of sharing observation of the same object or event as another person. "Joint attention and language have a long history of being closely related," he says.

Piven's team is scanning the brains of children with autism to test whether larger amygdalas at a younger age are associated with better joint attention later in childhood.

Piven declined to reveal the results because they are unpublished, but taken with the preliminary results from the Rutgers study, he says, "there does seem to be some connection, some important relationship" between the amygdala and attention or language. "This is exactly the kind of research we should be doing because it's longitudinal and looking at a very early period, where we think a lot of the action is in development," he adds.

Performing brain scans of young infants is not easy. In the Rutgers study, rather than sedate the babies, the researchers **scanned the children during natural sleep**.

Weeks before the scanning, the researchers gave the parents of the babies a CD that mixed lullabies with noises recorded from magnetic resonance imaging (MRI), which the parents played every night to habituate the babies to the noise during sleep.

On the night of the scan, the babies fall asleep in their own cribs and blankets in the lab. Then the researchers carefully moved the sleeping babies to a pillow-fitted MRI machine ? and hope that the infants don't wake up during the 25-minute scan. Even with these precautions, the infants do wake up about half the time. "You can be there working for two hours and then get no scan," says **Silvia Ortiz-Mantilla**, a postdoctoral fellow in Benasich's lab who carried out the experiments.

The team is planning to test the language abilities of the children again at later ages. They're also scanning more infants as young as three months, to determine just how early the amygdala's influence might arise.

For all reports from the Society for Neuroscience annual meeting, **[click here](#)**.

