Biomedical/Education Update:

Intensive behavior mod outperforms eclectic teaching techniques

Intensive behavior modification is more effective than "eclectic" treatments for autistic preschoolers, according to a recent report.

Jane Howard and colleagues evaluated three groups of young autistic children:

—Twenty-nine children receiving intensive behavioral intervention in a one-on-one instructional setting, for 25 to 40 hours per week.

—Sixteen children receiving intensive "eclectic" intervention consisting of a combination of teaching methods provided for 30 hours per week, with a ratio of one teacher to one or two children.

—Sixteen children in non-intensive early intervention programs, educated in small groups for 15 hours per week.

Before intervention began, and approximately 14 months afterward, the researchers administered standardized tests of cognitive, language and adaptive skills. Howard et al. say that while the three groups were comparable at the beginning of the study, the children receiving intensive behavioral therapy had significantly higher scores in every area except motor skills. No differences were seen between the intensive and non-intensive eclectic groups.

The researchers say, "These findings are consistent with other research showing that intensive behavior analytic intervention is considerably more efficacious than 'eclectic' intervention."

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"A comparison of intensive behavior analytic and eclectic treatments for young children with autism," J. S. Howard, C. R. Sparkman, H. G. Cohen, G. Green, and H. Stanislaw, *Research in Developmental Disabilities*, Vol. 26, No. 4, July-August 2005, 359-83. Address: Jane S. Howard, California State University, Stanislaus, Psychology Department, 801 W. Monte Vista Avenue, Turlock, CA 95382.

Does "mirror neuron" impairment underlie autistic social deficits?

Impaired function of brain cells called mirror neurons—dubbed "monkey see, monkey do" neurons by scientists—may underlie many of the problems of autism, according to new research.

Mirror neurons have been studied directly in monkeys. These cells fire both when a monkey performs an action itself, and when it observes another living being performing the same action. Although mirror neurons cannot be studied directly in people, electroencephalograph (EEG) recordings can be used to analyze the functioning of these cells.

Lindsay Oberman and colleagues used EEGs to analyze mirror neuron functioning in 10 high-functioning autistic males and 10 control subjects matched for age and gender. The researchers looked for suppression of "mu rhythm," a brainwave pattern that is blocked when the brain is doing, seeing, or imagining action. Thus, mu wave suppression reflects activity of the mirror neurons.

The researchers asked subjects to move their own hands, and to watch videos showing another person's moving hand or (as controls) bouncing balls or "white noise." Non-autistic subjects exhibited mu wave suppression both when they themselves moved, and when they viewed another person moving. In contrast, mu wave suppression occurred in autistic subjects only in response to their own actions.

"These findings provide evidence that individuals with autism have a dysfunctional mirror neuron system, which may contribute to many of their impairments—especially those that involve comprehending and responding appropriately to others' behavior," Oberman says. Moreover, the researchers note, "The additional lack of any significant correlation between age and mu wave suppression also suggests that this dysfunction is not something that improves over the livespan."

The researchers say their findings may aid researchers in identifying autism at a very early age in at-risk siblings of autistic children, allowing for earlier treatment. Moreover, study co-author Jaime Pineda says, "We can learn to increase or decrease the strength of the mu signal at will." Thus, Pineda says, it may be possible to use biofeedback therapy to improve the imitation skills of autistic individuals.

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"EEG evidence for mirror neuron dysfunction in autism spectrum disorders," Lindsay M. Oberman, Edward M. Hubbard, Joseph P. McCleery, Eric L. Altschuler, Vilayanur S. Ramachandran, and Jaime A. Pineda, *Cognitive Brain Research*, 2005, in press. Address: Lindsay M. Oberman, 9500 Gilman Drive, La Jolla, CA 92093-0109, lshenk@psy.ucsd.edu.

—and—

"Autism linked to mirror neuron dysfunction," press release, UC San Diego, March 29, 2005.

Autistic individuals see faces as threatening

Autistic children perceive even neutral faces as threatening, according to a recent MRI study—a likely explanation, the study's authors say, for these children's poor eye contact. The study also casts doubt on previous research suggesting that autism involves defects of the fusiform region of the brain, which is key to facial recognition.

In two separate investigations, Kim Dalton and colleagues performed magnetic resonance imaging (MRI) scans on 27 autistic children while the subjects performed facial discrimination tasks. They also tracked the subjects' eye movements during the tasks. The results were compared to those of normally developing children.

The researchers found that the amygdala, an area of the brain that is activated by threatening situations, is abnormally active in autistic individuals when they gaze directly at a non-threatening face. "Imagine walking through the world and interpreting every face that looks at you as a threat, even the face of your own mother," says study co-author Richard Davidson.

Dalton et al. also found that autistic children had difficulty identifying facial expressions and differentiating between familiar and unfamiliar faces. Earlier research suggested a link between autistic individuals' poor face recognition skills and abnormalities of the fusiform region. However, Dalton et al.'s study indicates that this region is under-active in autistic children simply because it receives less input, due to these children's tendency to avert their gaze (for related research supporting this theory, see ARRI 18/3). Their results, they say, show that the fusiform region is "fundamentally normal."

The researchers say their findings could lead to new methods of teaching children to perceive faces correctly—for instance, having autistic children view people who are not gazing directly at them. In addition, they say, if the amygdala is overactive in infancy in autistic children, the finding could lead to early identification of the disorder.

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"Gaze fixation and the neural circuitry of face processing in autism," K.M. Dalton, B. M. Nacewicz, T. Johnstone, H. S. Schaefer, M. A. Gernsbacher, H. H. Goldsmith, A. L. Alexander, and R. J. Davidson, *Nature Neuroscience*, Vol. 8, No. 4, April 2005, 519-26. Address: kmdalton@wisc.edu.

—and—

"Eye contact triggers threat signals in autistic children's brains," news release, University of Wisconsin Madison, March 7, 2005.