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## The Neuropsychology of Autistic Spectrum Disorders

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This special issue represents the work from several of the leading autism research groups in the United States. The studies include behavioral, neuropsychological, and neuroimaging investigations of preschoolers, school-age children, adolescents, and adults with an autistic spectrum disorder diagnosis. The *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision; American Psychiatric Association, 2000) includes autistic disorder, Asperger's disorder, and pervasive developmental disorder—not otherwise specified (PDD–NOS) under the umbrella term “pervasive developmental disorders” (ASD), but many researchers and clinicians now prefer the term “autistic spectrum disorders.” Under this term, autism is seen as part of a spectrum of disorders that have significant social deficits and the presence of repetitive behaviors and restricted interests in common (Lord & Bailey, 2002; Tanguay, 2004; Wing, 1996).

Structural brain imaging studies have revealed neuroanatomical abnormalities in a wide variety of brain regions in children and adults with autism including the corpus callosum, cerebellar vermal lobules VI–VII, amygdala and hippocampus (for review, see Akshoomoff, Pierce, & Courchesne, 2002). Recent studies (Akshoomoff et al., 2004; Courchesne et al., 2001; Sparks et al., 2002) have demonstrated that brain volume is abnormally large in 2- to 4-year-olds who are later confirmed to have a diagnosis of autistic disorder or PDD–NOS. Infant head circumference measurements from children diagnosed with autism or PDD–NOS suggest that the process of early brain overgrowth begins to occur by

the end of the 1st year of life (Courchesne, Carper, & Akshoomoff, 2003). This profile of early, pervasive abnormalities in brain development helps to explain the difficulties these children have in the development of early social and communication skills. It is not yet clear if there are distinctive differences in the underlying pathology between autistic disorder, PDD-NOS, and Asperger's disorder. It does appear likely that the degree of structural brain abnormality varies with autism severity and level of cognitive impairment (Akshoomoff et al., 2004; Lotspeich et al., 2004). Differences in the timing and nature of brain development abnormalities may also account for these behavioral distinctions.

In the article by Luyster and her 18 co-authors (Luyster et al., this issue), they present the results from a study that included 351 children recruited from 13 geographical sites to investigate the issue of social regression in autism. Children with word loss in the 2nd year of life were significantly more likely to also exhibit a loss of social skills. Development before the loss and progress by age 3 was also carefully examined using reliable parent interview methods. The striking and perplexing issue of regression appears to be most consistent with a diagnosis of ASD yet only a factor for a subset of these children. As Luyster et al. suggest, perhaps future genetic and neurobiological studies will shed some light on possible biological differences between those children with ASD who show this pattern of early loss of skills and those who do not.

Specific aspects of executive functioning, such as the ability to abstract rules, shift attention, learn from feedback, and maintain a focus on multiple aspects of information in decision making, have been found to be deficient in ASD. For those children who develop good functional language and academic skills, these common executive functioning deficits typically preclude them from achieving their full potential, particularly with regard to social and independent living skills. Three articles in this special issue (O'Shea, Fein, Cillessen, Klin, & Schultz, this issue; Joseph, McGrath, & Tager-Flusberg, this issue; Kleinhans, Akshoomoff, & Delis, this issue) examine executive functioning to further explore these issues and to determine how they may also explain specific aspects of memory processing and language in ASD.

Researchers have been very interested in face-processing skills in individuals with ASD. Young children with ASD exhibit significantly abnormal eye contact and face processing skills. From a developmental perspective, early deficits in processing faces or limited social motivation lead to less experience processing faces, leading to greater face processing and social difficulties over time. In the article by Dawson, Webb, and McPartland (this issue), the cognitive/perceptual and motivation/affective hypotheses of face-processing impairments in autism are examined. These researchers take a unique perspective on this topic within the context of electrophysiological research with infants and young children, both typically developing and those with ASD. From their experienced perspective, the authors blend together a lucid description of electrophysiological techniques, the normal

developmental literature, and the autism literature and artfully build an argument for the social motivation hypothesis in autism.

Although electrophysiological studies have provided years of useful information about brain function, many readers may be more familiar with the more recent functional magnetic resonance imaging (fMRI) technique. Haist, Adamo, Westerfield, Courchesne, and Townsend (this issue) build on previous investigations of spatial attention deficits in autism (including their own electrophysiological studies) using a unique spatial attention paradigm and the exquisite spatial resolution of fMRI. Using the behavioral and brain activation results, they conclude that adolescents and adults with ASD have a profound deficit in automatic spatial attention and deficient voluntary spatial attention abilities.

This collection of articles represents only a preview of things to come. All of these experienced talented researchers continue to conduct exciting new research studies, taking advantage of major advances in clinical science, cognitive neuroscience, developmental psychology, and developmental neurobiology to act as a bridge between a complex developmental syndrome and the search for answers regarding the underlying causes and treatments for the future.

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