

Autism Spectrum Disorder and “Mind-Blindness”

47-2

How does autism spectrum disorder affect development?

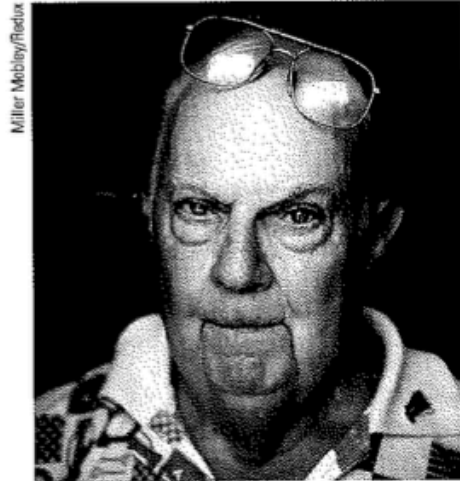
Diagnoses of **autism spectrum disorder (ASD)**, a disorder marked by social deficiencies and repetitive behaviors, have been increasing, according to recent estimates. Once believed to affect 1 in 2500 children, ASD now affects 1 in 110 American children and about 1 in 100 in Britain (CDC, 2009; Lillienfeld & Arkowitz, 2007; NAS, 2011). The increase in ASD diagnoses has been offset by a decrease in the number of children considered “cognitively disabled” or “learning disabled,” which suggests a relabeling of children’s disorders (Gernsbacher et al., 2005; Grinker, 2007; Shattuck, 2006). A massive \$6.7 billion National Children’s Study now under way aims to enroll 100,000 pregnant women in 105 countries and to follow their babies until they turn 21—partly in hopes of explaining the rising rates of ASD, as well as premature births, childhood obesity, and asthma (Belluck, 2010; Murphy, 2008).

The underlying source of ASD’s symptoms seems to be poor communication among brain regions that normally work together to let us take another’s viewpoint. This effect appears to result from ASD-related genes interacting with the environment (State & Šestan, 2012). People with ASD are therefore said to have an *impaired theory of mind* (Rajendran & Mitchell, 2007; Senju et al., 2009). They have difficulty inferring others’ thoughts and feelings. They do not appreciate that playmates and parents might view things differently. Mind reading that most of us find intuitive (*Is that face conveying a smirk or a sneer?*) is difficult for those with ASD. Most children learn that another child’s pouting mouth signals sadness, and that twinkling eyes mean happiness or mischief. A child with ASD fails to understand these signals (Frith & Frith, 2001).



Autism spectrum disorder This speech-language pathologist is helping a boy with ASD learn to form sounds and words. ASD is marked by deficient social communication and difficulty grasping others’ states of mind.

autism spectrum disorder (ASD) a disorder that appears in childhood and is marked by significant deficiencies in communication and social interaction, and by rigidly fixated interests and repetitive behaviors.



“Autism” case number 1 In 1943, Donald Gray Triplett, an “odd” child with unusual gifts and social deficits, was the first person to receive the diagnosis of a previously unreported condition, which psychiatrist Leo Kanner termed “autism.” (After a 2013 change in the diagnosis manual, his condition is now called autism spectrum disorder.) In 2010, at age 77, Triplett was still living in his family home and Mississippi town, where he often played golf (Dorvan & Zucker, 2010).

In hopes of a cure, desperate parents have sometimes subjected children to dubious therapies (Shute, 2010).

ASD (formerly referred to as “autism”) has differing levels of severity. “High-functioning” individuals generally have normal intelligence, and they often have an exceptional skill or talent in a specific area. But they lack social and communication skills, and they tend to become distracted by minor and unimportant stimuli (Remington et al., 2009). Those at the spectrum’s lower end are unable to use language at all.

ASD afflicts four boys for every girl. Psychologist Simon Baron-Cohen believes this hints at one way to understand this disorder. He has argued that ASD represents an “extreme male brain” (2008, 2009). Although there is some overlap between the sexes, he believes that boys are better “systemizers.” They tend to understand things according to rules or laws, for example, as in mathematical and mechanical systems. Children exposed to high levels of the male sex hormone *testosterone* in the womb may develop more masculine and autistic traits (Auyeung et al., 2009).

In contrast, girls are naturally predisposed to be “empathizers,” Baron-Cohen contends. They are better at reading facial

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expressions and gestures, though less so if given testosterone (van Honk et al., 2011).

Biological factors, including genetic influences and abnormal brain development, contribute to ASD (State & Šestan, 2012). Childhood MMR vaccinations do not (Demichelli et al., 2012). Based on a fraudulent 1998 study—"the most damaging medical hoax of the last 100 years" (Flaherty, 2011)—some parents were misled into thinking that the childhood MMR vaccine increased risk of ASD. The unfortunate result was a drop in vaccination rates and an increase in cases of measles and mumps. Some unvaccinated children suffered long-term harm or even death.

Twin and sibling studies provide some evidence for biology's influence. If one identical twin is diagnosed with ASD, the chances are 50 to 70 percent that the co-twin will be as well (Lichtenstein et al., 2010; Sebat et al., 2007). A younger sibling of a child with ASD also is at a heightened risk (Sutcliffe, 2008). Random genetic mutations in sperm-producing cells may also play a role. As men age, these mutations become more frequent, which may help explain why an over-40 man has a much higher risk of fathering a child with ASD than does a man under 30 (Reichenberg et al., 2007). Researchers are now sleuthing ASD's telltale signs in the brain's synaptic and gray matter (Crawley, 2007; Ecker et al., 2010; Garber, 2007).

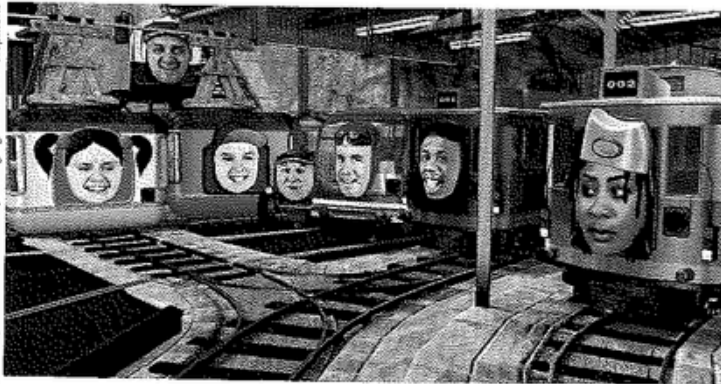
Biology's role in ASD also appears in brain-function studies. People without ASD often yawn after seeing others yawn. And as they view and imitate another's smiling or frowning, they feel something of what the other is feeling. Not so among those with ASD, who are less imitative and show much less activity in brain areas involved in mirroring others' actions (Dapretto et al., 2006; Perra et al., 2008; Senju et al., 2007). When people with ASD watch another person's hand move-

ments, for example, their brain displays less than normal mirroring activity (Oberman & Ramachandran, 2007; Théoret et al., 2005). Scientists are continuing to explore and vigorously debate the idea that the brains of people with ASD have "broken mirrors" (Gallese et al., 2011).

Seeking to "systemize empathy," Baron-Cohen and his Cambridge University colleagues (2007; Golan et al., 2010) collaborated with Britain's National Autistic Society and a film production company. Knowing that television shows with vehicles have been popular among kids with ASD, they created animations that grafted emotion-conveying faces onto toy tram, train, and tractor characters in a pretend boy's bedroom (FIGURE 47.8). After the boy leaves for school, the characters come to life and have experiences that lead them to display various emotions (which I predict you would enjoy viewing at www.thetransporters.com). The children were surprisingly able to generalize what they had learned to a new, real context. By the intervention's end, their previously deficient ability to recognize emotions on real faces now equaled that of children without ASD.

Figure 47.8

Transported into a world of emotion (a) A research team at Cambridge University's Autism Research Centre introduced children with ASD to emotions experienced and displayed by toy vehicles. (b) After 4 weeks of viewing animations, the children displayed a markedly increased ability to recognize emotions not only in the toy faces but also in humans.

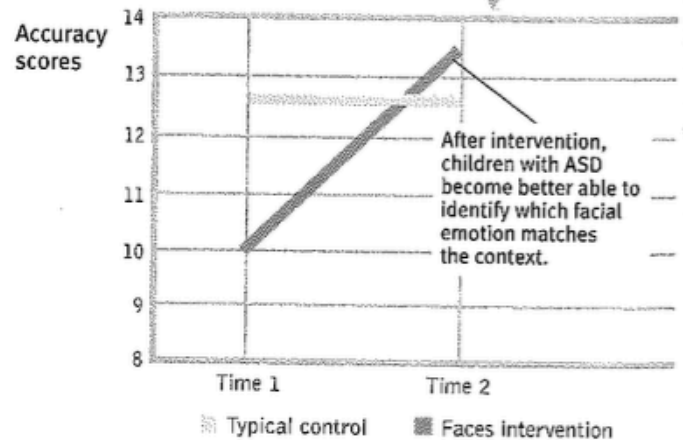


(a) Emotion-conveying faces were grafted onto toy trains.



"The neighbor's dog has bitten people before. He is barking at Louise."

Point to the face that shows how Louise is feeling.



After intervention, children with ASD become better able to identify which facial emotion matches the context.

(b) Children matched the correct face with the story and photo. (The graph above shows data from two trials.)