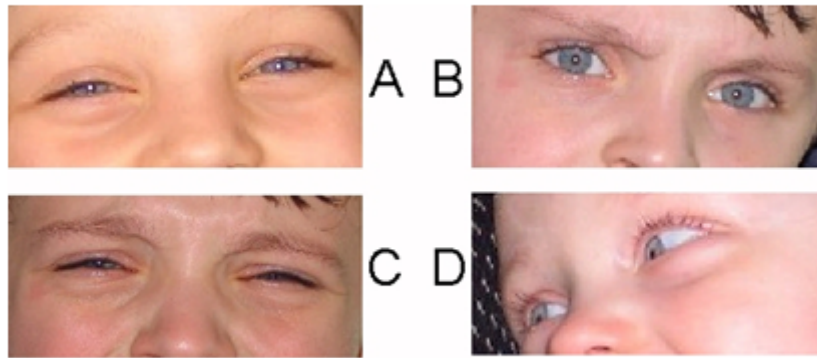


# Autistic Spectrum Disorder & Neurotherapy



Children diagnosed with an Autism Spectrum Disorder have difficulty understanding others. Their brains are functionally and structurally different, delayed on most abilities. One in four suffers from epilepsy and more than half show impaired neurophysiology (e.g., epileptiform spikes, e.g., Chez et al., 2006). Our primate mirror neuron system, the foundation of human rapport and interaction, is slow to develop in these children (Pineda, 2006; Ramachandran, 2000; Williams et al., 2001) due to impaired connectivity between brain areas (Horwitz et al., 1988; Belmonte et al., 2004; Just et al, 2004; Just et al., 2006; Mizuno et al., 2006; Rippon et al., 2006).

### *Eyes test for Children*



Who is angry?

Autistic individuals show desynchronization of language and spatial processing centers compared to healthy children (Kana et al., 2006; Just et al, 2006; Cherkassky et al., 2006). Some show evidence of axonal problems (Barnea-Goraly et al. 2004), others too much local connectivity (Brock et al., 2002; Mizuno et al., 2006).

Ordinarily we cannot influence our brain waves because we are not aware of them. However with modern technology we can visualize our brain activity in real-time on a computer screen, giving us the opportunity to influence and change our brain activity. A neurotherapist adjusts a patient's brainwave activity away from unusual behaviors and toward more normal patterns, socialization training of the brain. A single session of EEG training may be short-lived, but with repeated engagement across a few months of training, brain changes endure and accumulate, granting the child with more cognitive flexibility and capacity for understanding the world.

Jarusiewicz (2002) performed the first well-controlled neurofeedback study, improving the behavior of 12 children with autism, 11 males and 1 female. Thompson & Thompson (2003) reported on 60 individuals with autism spectrum disorder who

improved with neurotherapy, ability to initiate and maintain friendships. Limsila et al. (2004) examined 180 children (aged 3-18) with autism who underwent HEG (blood flow) neurotherapy, which produced strong outcomes in school performance. Coben & Padolsky (2006) and Pineda (2006) reported significant findings on autistic children in major journals. Paoletti & Kaiser (2006) trained Kaiser's son for 20 sessions, improving memory ability and social rapport. The child became calm and less fidgety during sessions, especially when photos of the family were used in training as his rewards. He also cleaned up and washed his hair on his own in latter sessions.

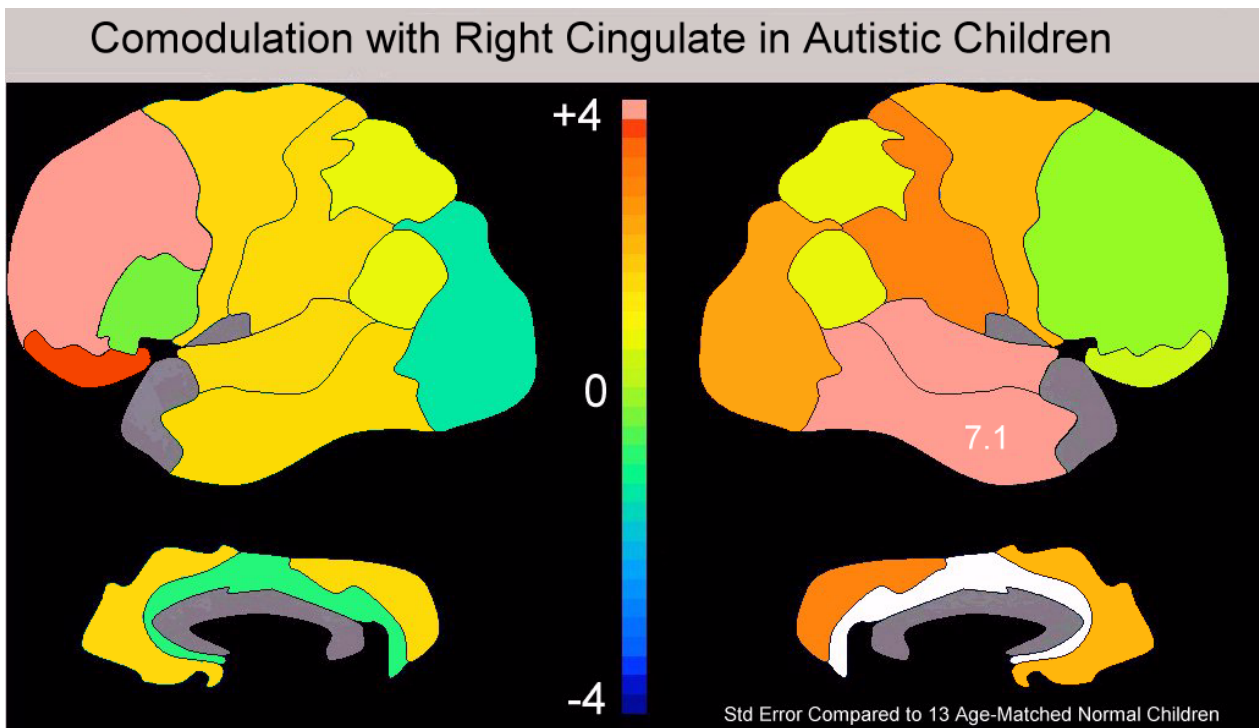


Figure 1. An example of a brain network map for the average connectivity for 12 children diagnosed with Asperger's Syndrome compared to 13 age-matched healthy children. The boundaries depict cortical regions defined by cell types and function. Pink

and blue indicate excessive or diminished connectivity, respectively, compared to a healthy group of children. This map shows hyperconnection between the left frontal dorsolateral cortex and right temporal lobes (pink areas) with the right cingulate cortex in the Asperger children.

More than 200,000 children with autism are served through federally supported programs, a five-fold increase during the last decade. The 2005 Special Education report on Children with Autism estimates per-pupil expenditure for children with autism at three times the expenditure for a regular education student and among the highest per-pupil expenditure for special education services. Socialization training with neurotherapy can relieve the state's and family's burdens.

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