

ALTERED MOTION PERCEPTION IN AUTISM

In children with autism spectrum disorder (ASD), perception of biological motion—a faculty that is crucial to social development—is impaired from as early as 2 years of age. Klin *et al.* found that the viewing patterns of children with ASD were random relative to social content, but showed a preference for physical contingencies in the stimuli. This finding suggests that neurobiological differences at this early age could underpin the later social difficulties seen in individuals with ASD.

A preference for biological motion is found from early infancy across species, and is fundamental to the development of adaptive relationships. This mechanism is independent of other types of motion perception, and its neural circuitry overlaps with that for perceiving other social signals. Atypical visual and neural processing of biological motion and social information are found in school-age children with ASD, along with the hallmark behavioral deficits in social interaction that characterize these disorders. The developmental interaction between these behavioral and neurobiological symptoms has, however, been unclear to date.

Klin *et al.* recruited infants with ASD, as well as typically developing and developmentally delayed infants, with a mean age of 2 years. To test the infant's responses to biological motion, point-light animations of children's games, accompanied by their associated sounds, were shown. These stimuli were presented in a preferential looking paradigm, alongside inverted versions of the same animations, shown in reverse. Visual scanning data showed that both control groups preferred the upright, forward animation, whereas the ASD group showed no attentional preference. This failure to detect biological motion at a very young age has clear implications for social development.

The researchers noted, by chance, a visual preference in the ASD group when viewing one particular animation, in which the actor claps several times. Klin *et al.* suspected that the physical contingency created between the light points colliding and the sound of the clap might have attracted the attention of the children with ASD. The researchers quantified the level of audiovisual synchrony (AVS) in the animations, and found that this accounted for 90% of the autism group's variance in viewing, but did not correlate with the data from the control groups. In a follow-up study with a second cohort of infants with ASD, Klin and colleagues successfully used AVS levels to predict viewing patterns in a new set of animations. This work shows that nonsocial physical contingencies influence viewing patterns in children with ASD, whereas biological motion signals have no effect.

The primary symptoms of ASD are social, and, therefore, intrinsically shaped by experience, yet ASD has a strong genetic basis. The perception of biological motion is a fundamental mechanism that underlies social development, and has now been shown to function atypically from a very early age in ASD. Klin and colleagues suggest that “genetic predispositions are probably exacerbated by experiences that are increasingly atypical” in ASD. Further investigations could focus more acutely on “neurobiological anomalies that may predispose individuals to altered avenues of learning,” and increase our understanding of the delicate relationship between neural and behavioral specialization in development.

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Original article Klin, A. *et al.* Two-year-olds with autism orient to non-social contingencies rather than biological motion. *Nature* 459, 257–261 (2009).