Genes contribute to biological motion perception and its covariation with autistic traits

With the support by the National Natural Science Foundation of China and the Chinese Academy of Sciences, the research team led by Prof. Jiang Yi (蒋毅) at the State Key Laboratory of Brain and Cognitive Science, Institute of Psychology and University of Chinese Academy of Sciences, unveiled the heritable aspects of biological motion perception and its covariation with autistic traits, which was published in *PNAS* (2018, 115(8): 1937—1942).

Humans can readily perceive and recognize the movements of a living creature, based solely on a few point-lights tracking the motion of the major joints. Such exquisite sensitivity to biological motion (BM) signals is essential to our survival and social interaction. However, compromised visual BM processing has been observed in various genetic conditions including Autism Spectrum Disorder (ASD), a highly prevalent and heritable neurodevelopmental disorder characterized by devastating social deficits. What are the sources underlying the individual differences in BM perception? What accounts for its covariation with autistic traits? Jiang's group probed these issues using the behavioral genetic methodology.

BM perception is subserved by two mechanisms for the processing of local kinematics and global configuration cues — representative of the joint motion or the skeletal structure respectively (Figure). In a series of experiments, more than 150 monozygotic (MZ) and dizygotic (DZ) twin pairs analyzed point-light BM displays based on isolated local or global BM cues, or BM information in general. With this classic twin design, the researchers have disentangled the genetic roots of the two major components underpinning BM perception: while genes can account for about 50% of the individual variation in local BM processing, global BM processing is mainly shaped by common environmental factors, as revealed by genetic modeling analyses. Moreover, participants with higher levels of autistic traits exhibited a decreased ability to process local BM cues with 75% of the covariation accounted for by genetic influences, suggesting a common genetic basis between local BM perception and autistic traits. The heritable aspects of BM perception revealed by this PNAS paper not only adds to our knowledge of specific mechanisms but also hints at how traditional behavioral, physiological, and neuroimaging approaches to the study of BM could be augmented in the future by considering how genetic, epigenetic, and cellular mechanisms also influence ongoing behavior. The study also advances our understanding of the sources of the linkage between autistic traits and BM perception deficits, opening up the possibility of treating the ability to process local BM information as a distinct hallmark of social cognition.

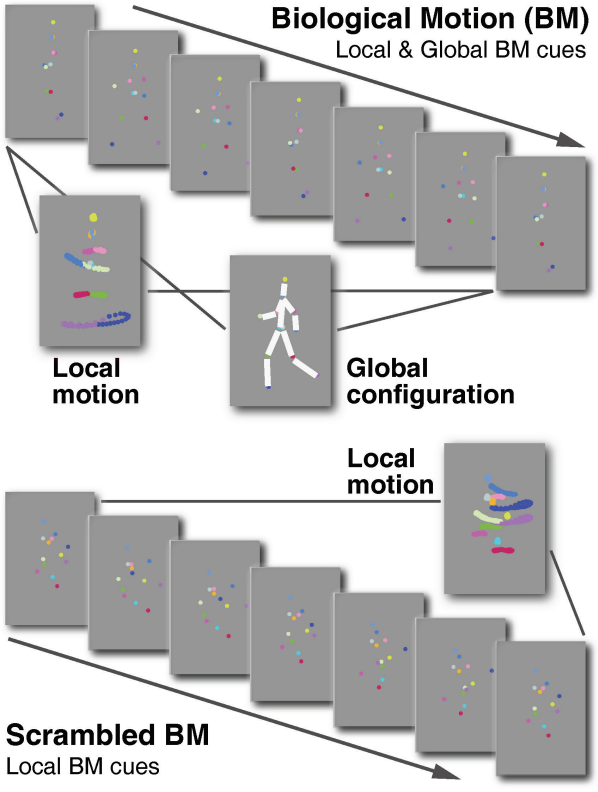

Figure Illustrations of the point-light BM sequences as well as the global and local BM cues conveyed by these stimuli.