Atlas of Science
another view on science
https://atlasofscience.org

Social rank recognition is altered in autism spectrum disorder

Humans and many other animals spend their lives in social groups, along with constructing social hierarchy within the groups. Since social hierarchy is a principal determinant for allocation of limited resources for individuals in a group, assessments of social rank of these individuals in the group is a crucial ability. Accumulating evidence suggests that social rank recognition may be mediated through two distinct processes, one that is based on social contexts (social signs and gestures provoking social rank; Fig. 1a) and the other that is based on physical characteristics (physical characteristics provoking social rank, such as difference of body sizes; Fig. 1b). Studies have shown that the neural network consisting of the medial prefrontal cortex and relevant brain areas process social rank recognition with social contexts, whereas the neural network that mediates mathematical and quantity processing involving the intraparietal sulcus plays a role in social rank recognition with physical characteristics.

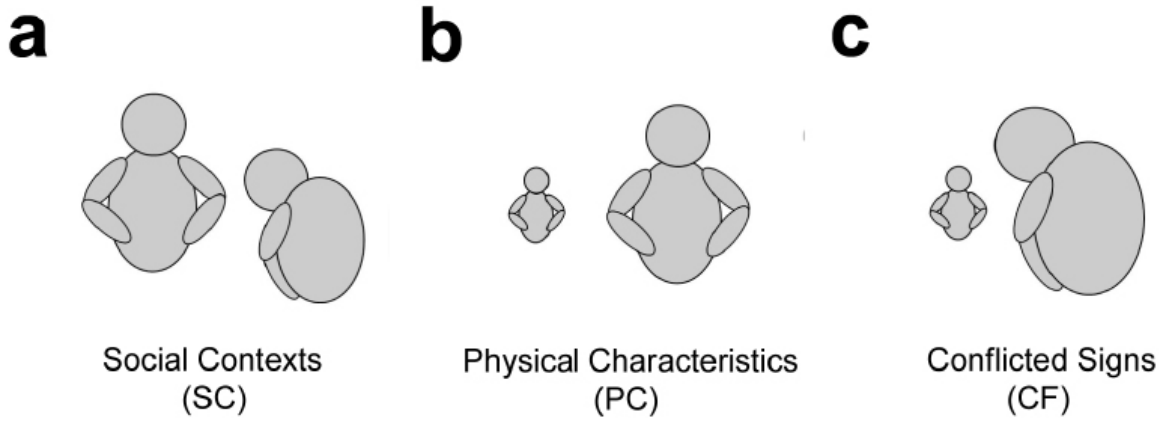

Fig. 1. Diagram illustrating social rank recognitions with social contexts (a), physical characteristics (b), and conflict between them (c).

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by social communication deficits. For instance, ASD subjects exhibit difficulties in assessment of emotions and thoughts of others from social signals such as facial expressions and behavioral intentions. However, whether recognition of social rank of other individuals is also impaired in this disorder remained unknown.

Our study has demonstrated that ASD children exhibited more robust social rank recognition than typically developing (TD) children, especially when social contexts and physical characteristics conflicted with each other in social rank recognition (Fig. 1c). Social rank recognition with social contexts was correlated with that with physical characteristics in ASD, but not in TD children. Furthermore, utilizing optical illusions, whether social rank recognition, especially with physical characteristics, was literally related to perceived size difference was evaluated. In this analysis, social rank recognition with physical characteristics was associated with optical illusions both in ASD and TD children, whereas such association between optical illusions and social rank recognition with social contexts was observed in ASD, but not TD children.

These results collectively suggest that social contexts and physical characteristics are processed in distinct neural systems, and these neural systems may compete with each other in recognition of social rank with conflicted social contexts and physical characteristics; however, such competition of the systems may be absent in ASD. Thus, ASD subjects could develop a compensatory strategy against deficits of social cognition when it comes to recognition of social hierarchy, which could be a consequence of impaired social processing system.

Yukiori Goto
Department of Artificial Intelligence and Technology, Graduate School of Informatics, Kyoto University, Japan

Publication

Atypical Social Rank Recognition in Autism Spectrum Disorder
Shino Ogawa, Mayuko Iriguchi, Young-A Lee, Sakiko Yoshikawa, Yukiori Goto
Sci Rep. 2019 Oct 30