Neural Correlates of "Social Gaze" Processing in High Functioning Autism Under Systematic Variation of Gaze Duration

Alexandra Georgescu
University Hospital of Cologne, Cologne, Germany

Bojana Kuzmanovic
Institute of Neurosciences and Medicine – Ethics in the Neurosciences (INM-8), Research Center Juelich, Juelich, Germany

Leonhard Schilbach
University Hospital of Cologne, Cologne, Germany

Rebecca Kulbida
University Hospital of Cologne, Cologne, Germany

Ralf Tepest
University Hospital of Cologne, Cologne, Germany

Gary Bente
Department of Psychology, University of Cologne, Cologne, Germany

Kai Vogeley
University Hospital of Cologne, Cologne, Germany

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Abstract: Direct gaze is a salient nonverbal signal for social interest and the intention to communicate. In particular, the duration of another's direct gaze can modulate our perception of the social meaning of gaze cues. However, both poor eye contact and deficits in social cognitive processing of gaze are specific diagnostic features of autism. Therefore, investigating neural mechanisms of gaze may provide key insights into the neural mechanisms related to autistic symptoms. Employing functional magnetic resonance imaging (fMRI) and a parametric design, we investigated the neural correlates of the influence of gaze direction and gaze duration on person perception in individuals with high-functioning autism (HFA) and a matched control group. For this purpose, dynamically animated faces of virtual characters, displaying averted or direct gaze of different durations (1 sec, 2.5 sec and 4 sec) were evaluated on a four-point likeability scale. Behavioral results revealed that HFA participants showed no significant difference in likeability ratings depending on gaze duration, while the control group rated the virtual characters as increasingly likeable with increasing gaze duration. On the neural level, direct gaze and increasing direct gaze duration recruit regions of the social neural network (SNN) in control participants, indicating the processing of social salience and a perceived communicative intent. In participants with HFA however, regions of the social neural network were more engaged by averted and decreasing amounts of gaze, while the neural response for processing direct gaze in HFA was not suggestive of any social information processing.