

Social cognition in children Autism Spectrum Disorders: an eye tracking study

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BACKGROUND: Autism Spectrum Disorders (ASD) is characterized by impairment in social interaction and communication, restricted, repetitive and stereotyped patterns of behaviors or interests. ASD individuals show diminished orientation towards faces and deficits in face recognition. Recently, by using the Face-n-Food paradigm, it had been shown that ASD individuals exhibit deficient face tuning in face-like non-face images (Pavlova et al., Sci Report 2017). For better understanding of the origins of this deficit, we implemented eye tracking methodology.

METHODS: Sixteen individuals (mean age: 14.1 years, 15 males) affected by ASD were enrolled in the study. Face tuning was studied by using Face-n-Food paradigm, a set of ten food-plate images similar with the Giuseppe Arcimboldo style. The images were proposed in a specific order from the last to most resembling a face. Gaze behavior (in terms of percentage of fixation, time spent and gaze map in the areas of interest such as mouth, eyes and outside the face) was recorded by using eye tracking technology during the Face-n-Food stimuli presentation. Data set of 16 typically developed individuals matched by age and gender were used for comparison.

RESULTS: Using eye tracker device, we observed that the percentage of visual fixation on external “face” for each food-plate image is higher in participants with ASD than control group: fixation varies from 10 to 28% in subjects with ASD and from 4 to 12% in healthy controls ($p < 0.01$, Wilcoxon-Mann-Whitney test, two sided). The mean percentage of time spent on area outside the “face” for each food-plate image is significantly higher in subjects affected by ASD than typically developed individuals (8 to 26% in ASD versus 5 to 11% in healthy individuals). The mean percentage of fixation and the mean percentage of time spent on social relevant area (mouth, left eye and right eye) are higher in control group.

CONCLUSIONS: Individuals with ASD are not only less sensitive to faces in non-face images, but their gazing differs substantially from typically developing controls. In particular ADS children seem to focus visual fixation outside the face compared to control group probably because visual attention in ASD individuals was most impaired when stimuli had a high social content.