The gaze that hinders expression

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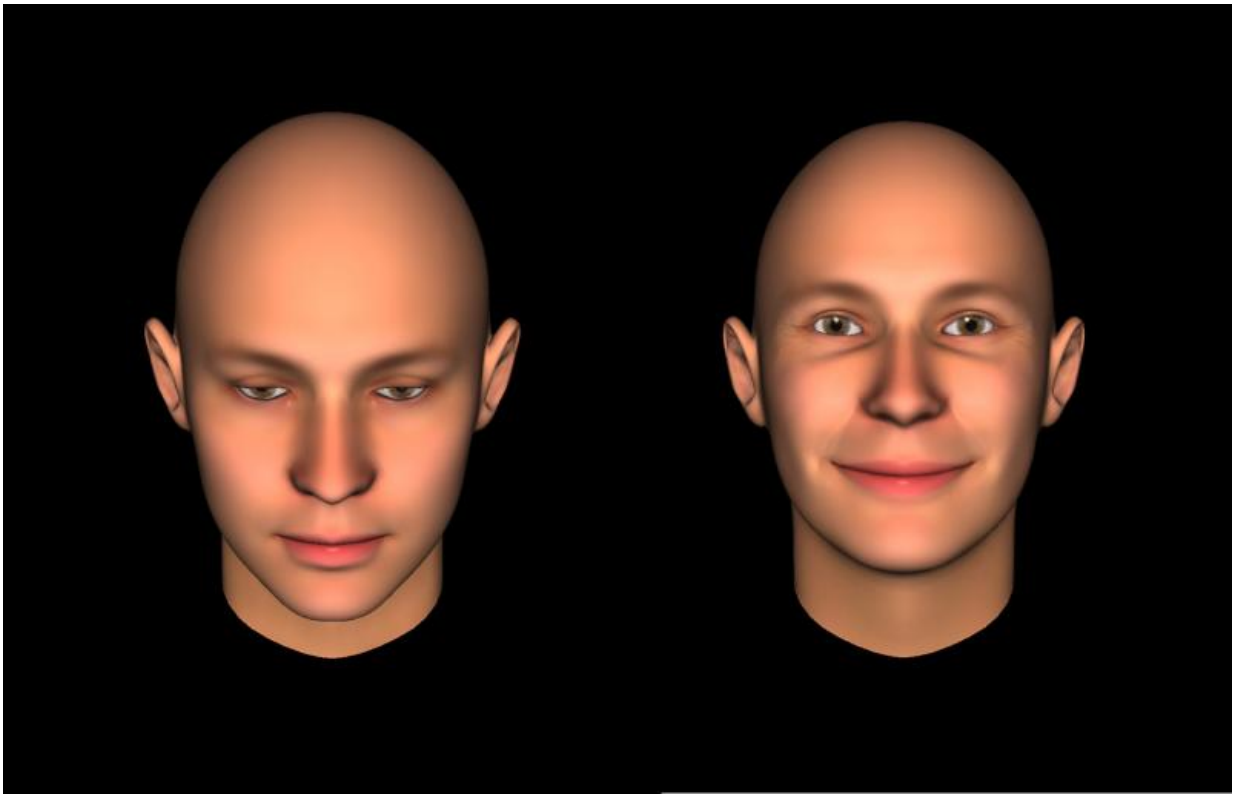

Avatars similar to those used in the experiment. Credit: Sebastian Korb

Empathy - the ability to identify and understand other people's emotions - has many components, some sophisticated and involving complex thought processes, others basic but essential nonetheless. The latter include joint attention - which is activated by direct eye contact between two or more individuals, and allows them to focus their attention on the

same object; and facial mimicry - the tendency to reproduce on one's own face the expressions of emotion seen in others. Subjects suffering from autism have difficulty with both these abilities, but according to a new study just published in *Autism Research*, it is also important to study how these two functions interact.

"Empathy is an essential human trait in social relations", explains Sebastian Korb, a researcher at the International School for Advanced Studies (SISSA) in Trieste and one of the study authors. "According to embodied cognition theories, to better understand the facial expression of the person in front of us we reproduce the same expression on our face". This does not necessarily mean that if we see someone smiling we smile as well, even though this does happen sometimes. More often, however, the facial muscles involved in smiling are indeed activated, but so subtly that the movement is invisible to the naked eye.

The known difficulty autistic people have in interpreting other people's emotions could stem from reduced facial mimicry, since many studies have demonstrated that this function is defective in these subjects. Other studies have shown that joint attention is also impaired in autism, and this is another function that has huge relevance for social interaction. Nevertheless, the impairments in facial mimicry and joint attention in autism remain controversial and poorly understood. For this reason, "we believe the interaction between these two abilities deserves plenty of attention", explains Korb. "In our experiments, we saw that in persons with more pronounced autistic traits, joint attention tended to 'disturb' facial mimicry, whereas in normal subjects it facilitated it".

A question of interaction

It should be noted that the 62 subjects who took part in the experiment were not individuals with a clinical diagnosis of autism. Instead, researchers used a questionnaire measuring the autistic tendencies of

normal persons. In fact, it has been demonstrated that everyone has more or less autistic traits, although in most cases these tend to be mild and therefore do not lead to a diagnosis.

During the experiment, the subjects interacted with an "avatar", a three-dimensional interactive face (in the sense that it responded to the subject's gazing behaviour). At the beginning of each trial, the avatar looked down, but as soon as the subject's gaze (monitored by means of an eye-tracking system) moved towards the avatar's eye region, the avatar looked up and he could either make eye contact with the subject (condition of joint attention) or avert his gaze and look up (condition of no joint attention). Subsequently, the avatar shifted his gaze to focus on one of two objects to the side, while the eye-tracker recorded whether or not the subject's gaze followed that of the avatar. At that point, the avatar could either smile or make an expression of disgust. During the trial, the subject's facial mimicry was measured by facial electromyography (a method used for recording muscle activation).

"What we observed is that in conditions of joint attention and where the avatar smiled, the subjects with more pronounced autistic traits tended to show less activation of the major smile muscle, whereas those with milder or no autistic traits showed a much more amplified expressive response", explains Korb. "Individuals without autism tend to display a stronger empathic response (and facial mimicry) to persons with whom they have established eye contact and joint attention. However, if the subject has autistic tendencies then the eye contact can disturb and diminish facial mimicry".

"In order to understand both the mechanisms underlying normal social interaction and the altered processes involved in autism, it is therefore important to observe not only which functions are impaired but also how these functions work together", concludes Korb.