Association Between Facial Emotion Identification And Face Identity Recognition In Adults With Asperger Syndrome

Sophia Schneider, Jennifer Kirchner, Ingo Wolf, Sandra Preissler, Hauke R. Heekeker, Isabel Dziobek
Neurocognition of Decision Making, Max-Planck-Institute for Human Development, Berlin
E-Mail: sophiaschneider@gmx.de

**Background**

The inadequate recognition and interpretation of facial expressions of emotions is an important part of the DSM-IV defining social and communication problems of individuals with autism and Asperger syndrome. It is an open question if emotion recognition abilities are interconnected with face identity recognition (Ganel & Goshen-Gottstein 2004) or if these two processes are independent of each other (Barton et al. 2004). According to researchers in favor of the the former option, face identity recognition might provide a reference frame for facial emotion recognition. However, not much is known about face identity recognition in autism. In this study we investigated both facial emotion processing and face identity recognition in individuals diagnosed with Asperger syndrome (AS) using new sensitive and computer-based tests of these functions. Furthermore, we sought to elucidate which relationships exist between facial emotion processing and face identity recognition in AS.

**Participants and Methods**

A group of 21 individuals with AS (mean age 31.8, SD=8.0; m/f=13/8; mean IQ=127.4; SD=10.6) was compared to a group of 20 neurotypical controls (NC, mean age 29.7, SD=7.6; m/f=15/5; mean IQ=123.3; SD=11.0). The groups did not differ significantly on age, gender, or IQ (p=.39, p=.38, and p=.22, respectively).

To measure facial emotion recognition we used the Facially Expressed Emotion Labeling (FEEL) test (Kessler, Bayerl, Deighton & Traue, 2002). The test consists of a slideshow of portrait pictures showing persons who display the six basic emotions according to Ekman. The individual has to assign the correct label to each emotion. The dependent variable was the total score of correctly recognized emotions.

![Fig. 1: Examples pictures from the FEEL test. The pictures are taken from the JACFEE (Japanese and Caucasian Facial Expressions of Emotion) pictures developed by Matsumoto and Ekman.](image)

For the assessment of face identity recognition we used the Cambridge Face Memory Test (CFMT, Duchaine & Nakayama, 2006). In this test, participants are first introduced to six target faces. Next, they are required to identify one of the target faces in forced choice items consisting of three faces. For each target face, there are some items containing views identical to those studied in the introduction (Part I), some displaying novel views (Part II), and some showing novel views with noise (Part III). Therefore, memory load increases across the parts. In each part, the Dependent Variable was the score of correctly identified target faces. Additionally, a total score was calculated.

![Fig. 2: Left: One of the six target faces that were supposed to be recognized. Middle and right: Example items from the CFMT Part II (middle) and Part III (right).](image)

The participants with AS were diagnosed with autism or Asperger syndrome according to DSM-IV criteria. In addition, the Asperger Syndrome Diagnostic Interview (ASDI, Gillberg & Ehleit, 1994) was used. For 15 participants with AS that had available parental informants, the Autism Diagnostic Interview-Revised (ADI-R) was done.

**Results**

We found significant differences between the AS and NC group in the FEEL (p=0.004), in all three CFMT parts (p=0.012, p=0.000, and p=0.033, respectively), and in the CFMT total score (p=0.002).

![Fig. 3: Results of the FEEL Test and the CFMT](image)

Within-group correlational analyses in the NC group revealed no significant associations between the FEEL and the CFMT Total Score (see Fig. 4, left) or one of its parts. In the AS group, however, there was a highly significant correlation between the FEEL and the CFMT Part I as well as a correlational trend between the FEEL and the CFMT Part II and CFMT Total Score (see Fig. 4, right).

![Fig. 4: Correlation between the FEEL test and the total score of the CFMT.](image)

Tab. 1: Correlation between the FEEL test and the different scores of the CFMT

<table>
<thead>
<tr>
<th></th>
<th>CFMT Part I</th>
<th>CFMT Part II</th>
<th>CFMT Part III</th>
<th>CFMT Total</th>
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<tr>
<td><strong>NC Group</strong></td>
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<td>n=231</td>
<td>n=202</td>
<td>n=206</td>
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<tr>
<td>FEEL</td>
<td>m=381</td>
<td>m=361</td>
<td>m=301</td>
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<tr>
<td>p</td>
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<td>p=0.012</td>
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<td><strong>AS Group</strong></td>
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<td>n=409</td>
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<tr>
<td>FEEL</td>
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<td>m=294**</td>
<td>m=437</td>
<td>m=437</td>
</tr>
<tr>
<td>p</td>
<td>p=0.032</td>
<td>p=0.012</td>
<td>p=0.002</td>
<td>p=0.006</td>
</tr>
</tbody>
</table>

Additionally, we investigated possible associations between the FEEL and CFMT and the diagnostic measures used (DSM-IV interview, ASDI, and ADI), which yielded no significant results.

**Discussion and Conclusion**

Individuals with AS do not show a mere emotion recognition deficit but also a deficit in recognizing face identity. The relationship in the AS group between face identity recognition – especially at levels less dependent on general memory functions (i.e. with noise-free stimuli) – and facial emotion processing might point towards a shared deficient neural mechanism underlying more general face processing. Our findings might also support the notion that face identity provides a reference frame for facial emotion processing specifically in individuals with problems in decoding emotions.

**Literature**

Duchaine & Nakayama (2008), Neuropsychologia 44, No. 4, 576-85.