Social functioning, systemising ability and emotion recognition in autism spectrum conditions

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INTRODUCTION

- Individuals with autism spectrum conditions (ASC) are found to have marked difficulties in empathising with others, which includes the ability to recognise emotional states.2-3
- Recent evidence suggests that alongside such deficits may exist strengths in the ability to systemise: to deal with concepts that have definitive rules, such as maths, physics and computers.3
- An enhanced ability to systemise may also provide a compensatory mechanism in the social realm, by way of rule-based learning about emotional states.4
- However, the relationship between severity of functioning in ASC, systematic abilities and how this may influence emotion recognition with human and non-human stimuli remains unclear.
- If those with ASC are using systemising as a compensatory mechanism for emotion recognition, they may have preserved or enhanced non-human emotion recognition.

AIMS

- To test the relationship between severity of functioning, systemising strengths and performance on an emotion recognition task with human and non-human stimuli in individuals with and without ASC.

METHODS

Sample

- 15 children with ASC and 84 children without ASC aged 11-15 were recruited from local specialist and mainstream schools respectively.
- Groups were matched for age and verbal IQ (see Table 1).

<table>
<thead>
<tr>
<th></th>
<th>ASC group (n=15)</th>
<th>Non-ASC group (n=84)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male : Female ratio</td>
<td>14 : 1</td>
<td>49 : 34</td>
</tr>
<tr>
<td>Age</td>
<td>11.1 (±1.0)</td>
<td>11.7 (±1.1)</td>
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<tr>
<td>Verbal IQ</td>
<td>98.7 (±1.3)</td>
<td>100.8 (±2.1)</td>
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Table 1: Participant characteristics for the ASC and non-ASC group

Materials

- All the children completed the short-form Social Responsiveness Scale (SRS)5, the child Systemising Quotient (SQ) and Empathising Quotient (EQ)6 and an emotion recognition task with human and non-human stimuli (see Figure 1).

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REFERENCES


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RESULTS

Table 2: Group averages across all measures. Note that higher scores on the SRS and lower scores on the EQ denote decreased social function.

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<th>ASC group (n=15)</th>
<th>Non-ASC group (n=84)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS score (max 33)</td>
<td>20 (±2.5)</td>
<td>14 (±4.6)</td>
</tr>
<tr>
<td>EQ score (max 54)</td>
<td>17 (±7.4)</td>
<td>31 (±12.8)</td>
</tr>
<tr>
<td>SQ score (max 56)</td>
<td>38 (±8.1)</td>
<td>27 (±13.9)</td>
</tr>
<tr>
<td>Emotion task score (max 36)</td>
<td>28 (±7.9)</td>
<td>26 (±9.3)</td>
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Table 2: Group averages across all measures. Note that higher scores on the SRS and lower scores on the EQ denote decreased social function.

- The ASC group scored significantly lower on the EQ (d = 1.98) and significantly higher on the SRS (d = 0.53) and SQ (d = 1.67), as expected.
- Severity of social functioning, as measured by the SRS and EQ showed significant correlations with overall performance on the emotion task for both the ASC (r = -0.21 and r = 0.36) and non-ASC groups (r = -0.31 and r = 0.33), in the directions expected.
- However, an unexpected finding was a significant positive correlation between SQ and emotion task scores for the ASC group (r = 0.39).
- Additionally, the ASC group performed as well as controls on the emotion task.
- Further analysis showed that these unexpected results may be attributable to reduced, although non-significant, performance across all human stimuli and significantly better performance across all non-human stimuli in the ASC group (d = 0.47) (see Figure 2).
- Performance was unrelated to verbal IQ for either group.

CONCLUSION

- Overall, the findings suggest that both severity of functioning and systemising ability in ASC is related to the ability to recognise emotions.
- In particular, increasing empathising and systemising scores predict better emotion recognition performance.
- Furthermore, whilst controls show difficulties in recognition of non-human stimuli, individuals with ASC do not show the same detrimental effect.
- This may be explained by a reduced salience to human stimuli and/or compensatory mechanisms in processing features by the ASC group7, which in turn may be related to an enhanced ability to systemise.
- An enhanced ability to systemise is likely to be dependent on specific neural regions8,9.
- These findings suggest that ‘hardwiring’ of associated neural regions may have taken place by later childhood.

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This work is funded by the Engineering and Physical Sciences Research Council and is the first part of a three-year project to develop an intelligent maths tutor for children with ASC.