Baron-Cohen et al. (eyes test)

The challenge in psychology is developing tests sensitive to subtle cognitive dysfunction, particularly in social cognition ***(Social cognition involves understanding and processing social interactions, emotions, and behaviours)***. While there are many tests for young children, few exist for adults with normal intelligence who may have mild social understanding deficits. The "Reading the Mind in the Eyes" Test, developed by Baron-Cohen et al. (1997), is designed to assess an adult's ability to understand another person's mental state by analyzing the eye-region of faces. This test measures theory of mind, which involves attributing mental states to others, though it only addresses the first stage of theory of mind—identifying the mental state, not its content (e.g. compassion for her mother's loss). The "Reading the Mind in the Eyes" Test showed that adult males scored an average of 18.8, while females scored slightly higher at 21.8. Adults with high-functioning autism (HFA) or Asperger Syndrome (AS) scored significantly lower (16.3) compared to sex-matched controls and adults with Tourette's syndrome (TS), who scored similarly to the general population (20.4). The test successfully identified subtle mind-reading difficulties in adults with HFA or AS, supporting previous findings in children with autism. This demonstrated that normal adults can judge mental states from minimal facial cues, leading to further considerations for improving the test.

AIM

The main aims were:

1. To test adults with high-functioning autism (HFA)/Asperger syndrome IASI on the revised eyes test to see if the deficits on the original test were still seen.
2. To see if there is a negative correlation between autism spectrum quotient (AQ) and eyes test scores.
3. To see ff females score higher on the eyes test than males.

DESIGN AND VARIABLES:

- **Independent variables (IVs):**

  1. **Group**: AS/HFA vs. normal adults vs. university students vs. general population.
  2. **Sex**: Male vs. Female.

- **Experimental design**:

  - The first IV (Group) used independent measures (different participants for each group).
  - The second IV (Sex) used independent measures (different male and female participants).

- **Dependent variables (DVs)**:

- **Eyes Test scores**: Participants' ability to identify mental states from eye-region photos.
- **Autism Spectrum Quotient (AQ) scores**: Self-reported traits related to autism.

- **Co-variable**: The correlation between AQ scores and Eyes Test scores was examined.

- **Control**: Randomisation was applied to the order of test items and the use of a glossary for participants to refer to during the test.

SAMPLE

- Group 1: Adults with Asperger Syndrome (AS) or High-Functioning Autism (HFA) (N = 15, all male). They were diagnosed based on established criteria and had normal IQ scores (mean = 115, SD = 16.1) on the WAIS-R.
- Group 2: Normal adults (N = 122) from various occupations and educational backgrounds, including both employed and unemployed individuals. Data on age was available for 88 participants.
- Group 3: Normal university students (N = 103, 53 male, 50 female) from Cambridge University, primarily with high IQ due to stringent entrance requirements.
- Group 4: A general population sample (N = 14) IQ-matched with Group 1 (mean = 116, SD = 6.4), with no significant differences in IQ or age between Groups 1 and 4.

PROCEDURE

Participants in all four groups took the revised eyes test in a quiet room, alone, in either Exeter or Cambridge. The test required them to select which of four words matched the expression of a set of eyes.

There was one correct answer and three foils for each set of eyes. Participants with HFA/AS [Group 1] were also asked to determine the gender of the eyes as a control task. The other groups did not need to do this as neurotypical adults· scores have a ceiling effect. Participants were also asked if they were unsure of any words in the glossary and to read the meaning of these.

Problems with the original eyes test

- **Narrow Score Range**: Increased the number of items from 25 to 36 and expanded response options from 2 to 4, allowing for a broader score range and reducing ceiling effects.
- **Distinguishing the "Broader Phenotype":** The previous version couldn't differentiate between individuals with autism and their relatives. The revised version aimed to improve this by increasing the score range.
- **Complex vs. Basic Mental States**: The original test included easy-to-guess basic emotions, which were removed in the revised version, focusing only on complex mental states for greater challenge.
- **Gaze Direction Clues**: Items based on gaze direction (e.g., "noticing" or "ignoring") were excluded, ensuring a more accurate measure of mind-reading ability.

- **Gender Bias**: The original version had more female faces, so the revised test balanced the number of male and female faces to avoid bias.
- **Difficult Foil Words**: Foil words were made more similar in emotional valence to the target word, increasing the difficulty of distinguishing mental states.
- **Comprehension Issues:** A glossary of terms was added to help participants with language difficulties, ensuring that vocabulary comprehension didn't affect performance.

Eyes Test Development:

- **Target words and foils**: Developed by the first two authors and piloted on eight judges (four male, four female). The criterion for selecting words was that at least five out of eight judges agreed on the target word being the most suitable description, with no more than two judges selecting any foil. Items that didn't meet this criterion were revised and re-piloted.

- **Item analysis**: Data from Groups 2 and 3 were combined, resulting in a sample of N = 225. New criteria were applied: at least 50% of participants had to select the target word, and no more than 25% could select any foil. Items not meeting these criteria were dropped, leaving 36 items.

- **Glossary**: A glossary of mental state terms was provided to participants.

RESULTS

- **Group 1 (Adults with HFA/AS)** performed significantly worse on the **Eyes Test** than the other groups, suggesting that individuals with high-functioning autism or Asperger syndrome have more difficulty reading mental states from the eyes compared to normal adults and students.
- **Females** scored higher than **males** on the **Eyes Test**, but this difference was not statistically significant, meaning it might be due to chance or other factors.
- **Group 1** scored significantly worse on the **Autism Spectrum Quotient (AQ)** than **Groups 3 and 4.** This indicates that adults with HFA/AS have more traits associated with autism, as measured by the AQ, than normal adults or university students.
- **Males** scored higher than **females** on the AQ, meaning men generally exhibited more traits related to autism compared to women in the sample.
- There was **no correlation between Eyes Test score and IQ**, indicating that the ability to interpret mental states from the eyes is not directly related to general intelligence.
- A **negative correlation** of -0.531 between the **AQ score** and **Eyes Test score** for all groups suggests that as the number of autistic traits (measured by AQ) increases, the ability to read mental states from the eyes decreases. This implies that individuals with more autistic traits struggle more with interpreting emotions or mental states from facial expressions.
- In the **student group, Eyes Test scores** were negatively correlated with **social skills** and **communication** categories of the AQ. This suggests that students with poorer social and communication skills tend to score lower on the Eyes Test, meaning they have difficulty understanding mental states from facial expressions.

- **Adults with HFA/AS** scored highly (33 out of 36 or above) on the **gender recognition task**, indicating that their difficulty is specific to recognizing mental states from eyes, not general face recognition.

CONCLUSIONS

The **revised Eyes Test** proved to be a more sensitive tool for measuring **adult social intelligence** compared to the original version. Neurotypical adults scored significantly below the ceiling, allowing the test to better detect subtle individual differences in social understanding. Adults with **HFA/AS** showed impairment on the test but were able to successfully identify **gender** in the control task, confirming that the Eyes Test can effectively detect **subtle social impairments** in adults with normal IQs and differentiate them from control groups.

The **negative correlation** between **AQ (Autism Spectrum Quotient)** scores and **Eyes Test** scores suggests that both tests can be used together to assess the **severity of autistic traits**, with higher AQ scores corresponding to poorer performance on the Eyes Test.

EVALUATIONS

Ethical issues - An ethical weakness of the study is the potential psychological harm to participants with **HFA/AS**, as they may have struggled to understand the emotions depicted in the eyes, leading to distress or embarrassment. This could result in lowered self-esteem after the test.

Methodological issues – Reliability - A strength of the study is its high level of **standardization**, with all participants viewing the same 36 pairs of eyes, consistent image size, black-and-white format, and four response options. A glossary of terms was also provided. This ensures reliability and allows other researchers to replicate the study and re-examine findings, such as the gender differences.

Methodological issues – Validity - **Lack of Random Allocation:** The study could not randomly allocate participants to groups due to naturally occurring variables (e.g., diagnosis of HFA/AS, male/female). This may have led to participant variables within each group, potentially affecting performance on the Eyes Test and reducing the validity of the results. Differences observed between groups may not have been solely due to the independent variable.

Methodological issues – Validity - **Theory of Mind:** The study may not have fully measured theory of mind as claimed. It only assessed the first stage of theory of mind—recognizing mental states—without considering the second stage, which involves understanding the reason behind those emotions. This limits the test's validity as a measure of theory of mind.

Objectivity and subjectivity - **Quantitative Data:** A strength of the study was its objectivity, as the data collected was quantitative. The task involved fixed-choice answers, meaning there was no need for interpretation from the researchers. This eliminated researcher bias in analyzing responses and increased the study's validity.

Generalizations and Ecological Validity

Generalizing Beyond the Sample: A weakness of the study is that its findings may not be generalizable to all individuals with HFA/AS. The HFA/AS group consisted of only 15 self-selected male adults, which could lead to a biased sample. These participants might have been

particularly motivated or interested in the study, making them unrepresentative of the broader population with high-functioning autism.

Generalizing to Everyday Life: The Eyes Test used static images of eyes, which may not accurately reflect how people process emotions in real-life situations. In real life, individuals use facial movements, verbal, and non-verbal cues to interpret emotions, which means the test lacks ecological validity and does not fully measure real-world ability to recognize mental states.

ISSUES AND DEBATES

Individual and Situational Explanations:

1. **Individual Explanation:** Adults with HFA/AS scored lower on the Eyes Test compared to neurotypical adults, suggesting that individuals with HFA/AS may have difficulties with cognitive processing of emotions shown through facial expressions. This supports the idea that there are individual differences in emotional recognition abilities.

2. **Situational Explanation:** However, it could be argued that people with HFA/AS may perform better in some situations than others. For example, they might find recognizing certain emotions, like sadness versus jealousy, more difficult. They may also perform better in situations with fewer distractions and when given more time to process the emotions.

Applications to Everyday Life:

1. **Other Clinical Groups:** The Eyes Test could be used with other clinical groups, such as individuals with brain damage, to assess potential deficits in social intelligence. If a patient scores poorly, therapists could intervene to help them improve their emotional recognition skills.

2. **Education:** The test could be used by educators to assess a student's level of social intelligence. A low score on the Eyes Test could indicate difficulties with theory of mind, prompting teachers to provide additional support and lessons to help the student develop these skills.

Links to assumptions

There were differences in Eyes Test score between individuals with HFA/AS and neurotypical controls, showing that there are individual differences in people's cognitive processing of emotions shown by facial expressions