Baron-Cohen et al. (eyes test)

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> Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry*, *42*(2), 241-251.

Psychology Being Investigated

- **Autism Spectrum Disorder (ASD)**: A neurodevelopmental disorder that affects a person's social and communication skills. Austic individuals misunderstand eye contact, facial expressions, body language, and gestures.
- **High-Functioning Autism (HFA)**: A type of autism, considered a milder form, where individuals can still function well in society and cope with daily activities.
- **Asperger's Syndrome (AS)**: A neurodevelopmental disorder on the autism spectrum that affects a person's social and communication skills, and is characterized by difficulties with social interaction, understanding non-verbal cues, and repetitive behaviors.
- **Theory of Mind**: The ability to understand that others have their own mental states, such as desires, emotions, and beliefs, and that these states can be different from one's own. This ability allows people to explain and predict the actions of others.
- **Social Sensitivity**: The ability to interpret nonverbal cues, specifically those conveyed through the eyes. The studies examine whether individuals with autism have a difference in social sensitivity compared to neurotypical individuals.
- **Read the Mind in the Eyes Test (Revised)**: Participants were presented with 36 photographs of the eye-region of faces and asked to choose the best word from four options that described what the person in the picture was thinking or feeling.

- **Autism Spectrum Quotient (AQ)**: This was a self-report questionnaire that measured the degree to which individuals possess autistic traits. The test had 50 statements where participants had to agree or disagree. Higher scores suggest the person has more autistic traits. Researchers expect an inverse correlation between scores on the Eyes Test and the AQ.

Background

In 1997, Baron-Cohen et al. developed the original Read the Mind in the Eyes Test to assess theory of mind in adults.

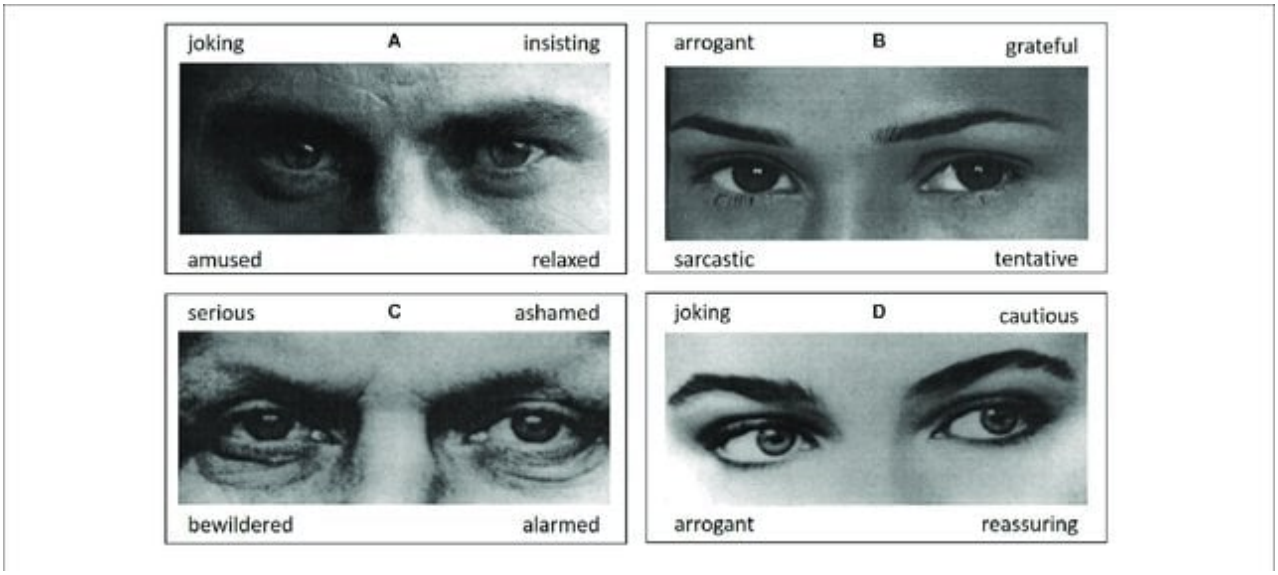
Participants had to choose the best word to describe what the person in the picture was thinking or feeling.

The original test had only two options to choose from, more female faces than male faces, and some basic emotions that were too easy to identify.

Some participants could simply guess the emotion by looking at the direction in which the eyes were gazing.

This made the test too easy which led to ceiling effects – when everyone gets a high score because the task is too easy.

The 2001 revised version was developed to address the shortcomings of the original test, providing a more reliable and valid measure of social intelligence.



For each photograph, the most appropriate mental state term shall be selected out of four response options. Correct responses are (A) insisting, (B) tentative, (C) serious, and (D) cautious.

The revised test has four options and a more equal balance of male and female faces. The revised test also uses more complex mental states and includes a glossary to help with word comprehension.

Aims

- To test whether the revised version of the eyes test would work on a group of autistic adults.
- To see whether normal non-autistic females would score higher in the revised eyes test than normal males.
- To investigate if there would be an inverse (negative) correlation between performance on the Revised Eye Test and scores on the Autism Spectrum Quotient (AQ) in a sample of normal adults.

Method

Sample

The study used a combination of **volunteer and opportunity sampling** techniques.

Group 1 consisted of volunteers who responded to advertisements, while Groups 2 and 3 were recruited using opportunity sampling from community locations.

Group 4 was comprised of randomly selected individuals who matched the IQ of group 1.

Group 1: Adults with Asperger Syndrome (AS) or High-Functioning Autism (HFA)

15 male adults with Asperger's Syndrome (AS) or High-Functioning Autism (HFA).

They were recruited through advertisements in the UK National Autistic Society magazine or similar support groups, and were diagnosed at specialist centers using established criteria.

The participants had a mean **IQ of 115** with a standard deviation of 16.1, which is within the normal range. Their average age was 29.7 years.

Group 2: General Population Control Group

This group consisted of **122 adults** from the general population.

They were recruited from adult community and education classes in Exeter and public library users in Cambridge.

They had a broad mix of occupations and educational backgrounds.

Data on age was available for 88 of these participants. The mean age was 46.5 years.

This group served as a **control group** to compare the performance of individuals with autism with those without.

This group did not take the Autism Spectrum Quotient (AQ) test.

Group 3: Student Control Group

This group comprised **103 undergraduate students** from Cambridge University.

There were **53 males and 50 females** in this group.

The students were assumed to have a high IQ due to the stringent entrance requirements of the university, and their IQ was not tested.

The mean age of this group was 20.8 years.

This group was a **control group** used to compare the experimental group with a group of high IQ individuals.

Group 4: IQ-Matched Control Group

This group consisted of **14 randomly selected adults** from the general population whose **IQ scores were matched** with those of Group 1.

The mean IQ of this group was 116 with a standard deviation of 6.4, which was similar to that of Group 1.

The mean age of this group was 28 years.

This group was included to control for the possible influence of intelligence on theory of mind test performance.

This was a **matched-pairs design group**.

Design

The 2001 study used a quasi-experimental design with a closed questionnaire, incorporating independent groups and matched pairs, along with a naturally occurring independent variable.

This design allowed researchers to investigate the relationship between autism, theory of mind, and social intelligence, while controlling for factors such as IQ and gender.

Independent variable

The independent variable (IV) was whether participants had Asperger Syndrome (AS) or High-Functioning Autism (HFA) or were neurotypical.

This was a naturally occurring variable, meaning the researchers did not manipulate it, but rather grouped participants based on their pre-existing condition.

The IV had **four levels**:

1. Adults with AS/HFA (Group 1)
2. Neurotypical adults from the general population (Group 2)
3. Undergraduate students (Group 3)
4. IQ-matched controls (Group 4)

Gender was also considered as an independent variable.

Dependent variable

It's important to understand that while the study aimed to investigate theory of mind, **it didn't measure theory of mind directly**.

Instead, the researchers used the scores on the Revised Eye Test (RET) and Autism Spectrum Quotient (AQ) test as **indicators** of a participant's ability to understand the mental states of others.

The RET score represented the number of correct mental state identifications out of 36.

Participants who scored highly on the Revised Eye Test demonstrated good **social sensitivity** and a well-developed **theory of mind**.

The AQ test scores represented the degree of autistic traits with the higher scores indicating more traits.

Procedure

1. Development of the Revised Eyes Test:

- Two of the experimenters created the target words and foils.
- The items were then piloted on **eight judges**.

- For a target word to be considered suitable, at least **five out of the eight judges** had to agree that it was the most appropriate descriptor for the emotion shown in the eyes.
- Additionally, **no more than two** of the eight judges could pick the foil.
- Items that did not meet these criteria were revised by creating new target words and foils.
- The revised items were then re-assessed by the judges until the item “passed” the criteria.

This process ensured that the target words were the most appropriate descriptors for the emotions being shown in the eyes and that the foil options were not easily confused with the target.

2. Administration of Tests:

> The procedure was designed to measure the ability to recognize and interpret mental states based on cues from the eyes and to assess the level of autistic traits in the participants.

The tests were administered by trained researchers in a standardized way.

The tests were administered individually in a quiet room at either Cambridge or Exeter University.

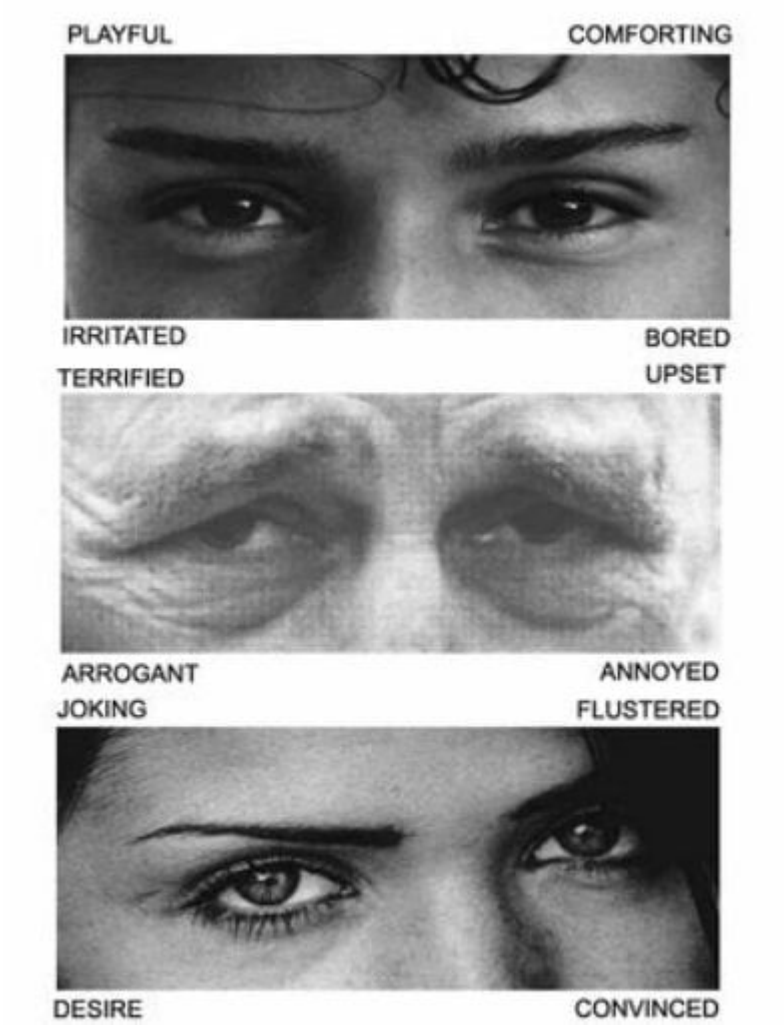
There was no time limit for completing the tests.

Each participant completed a practice test before starting the main tests

Participants were given a glossary of terms and could ask for clarification. They were allowed to use the glossary during the test.

3. Revised Eye Test:

- Participants were presented with **36 sets of eyes**.
- Each set consisted of a black and white photo of the eye region of a face.
- For each set of eyes, participants were given **four words to choose from**: one target word (the correct answer) and three foil words (incorrect answers).
- Participants were asked to choose the word that best described what the person in the photograph was thinking or feeling.
- The foil words were chosen to be similar in valence or intensity to the target word but had different meanings.



4. Autism Spectrum Quotient (AQ) Test:

Participants in Groups 1, 3, and 4 completed the AQ test.

The AQ test is a **self-report questionnaire** designed to measure the degree to which an individual possesses autistic traits.

The test consists of 50 statements that participants rate on a binary scale (agree or disagree).

5. Gender Identification for Group 1:

Group 1 participants had to identify the gender of the person in the eye photographs, as a control task.

If they could not do this easy task, the test results might be affected by vision, and not theory of mind.

Results

> **Aim 1**: To test if the revised version of the Read the Mind in the Eyes Test would be successful at differentiating participants with AS or HFA (High Functioning Autism) from the general population.

The AS/HFA group scored significantly lower on the Eyes Test compared to the other three groups.

The mean score for the AS/HFA group was **21.9 out of 36**, while the control groups had mean scores ranging from 26.2 to 30.97.

This supported the hypothesis that adults with autism have impaired theory of mind and have difficulty identifying emotions from the eye region.

The AS/HFA group did not show any impairment in the gender identification task, indicating that their lower performance on the Eyes Test was not due to problems with basic visual perception.

> **Aim 2**: To test if there is an inverse (negative) correlation between performance on the revised Eyes Test and scores on the Autism Spectrum Quotient (AQ) in a sample of normal adults.

The study found a significant **negative correlation** (-0.53) between scores on the Eyes Test and the AQ test across all groups.

This means that participants who scored higher on the AQ test (indicating more autistic traits) tended to score lower on the Eyes Test (indicating difficulty in reading emotions), and vice versa.

> **Aim 3**: To test if non-autistic females would score higher on the revised Eyes Test than non-autistic males.

The study found that **females scored higher than males** on the Revised Eyes Test within the normal adult groups (Groups 2 and 3).

For example, in the student group (Group 3) the mean score for females was 28.6 compared to 27.3 for males.

Conclusion

- The revised eyes test (2001) replicated the findings of the original eyes test (1997).
- Normal females are able to judge emotions better than normal males.
- Males are more likely to develop autistic tendencies than females.

- The AQ Test and eyes test are inversely (negatively) correlated. These findings support the idea that autistic traits are related to impaired theory of mind.

Strengths

1. Improved Validity

The revised “Reading the Mind in the Eyes” test was developed to address the issues present in the original test.

The original test had problems, including having too few response options (only two) which made the test too easy.

The revised test increased the number of choices to four, which reduced the chance of guessing the correct answer and made it more difficult to achieve a high score by chance.

The revised test used only **complex mental states**, which are more difficult to identify, instead of both basic and complex mental states, which made the test more challenging and reduced the likelihood of a **ceiling effect**.

The use of a **glossary** helped ensure participants understood the meaning of the emotion words used in the test, which was an issue in the original study because some participants may not have understood the words, which would have led them to guess.

The revised test also corrected the gender imbalance of faces by using an equal number of male and female faces.

These modifications helped to increase the validity of the test as a measure of social intelligence and theory of mind.

2. Controlled Experiment

The study used a **quasi-experimental design** which allowed for some level of control over variables, meaning that researchers could be more confident that the independent variable (group membership) had an effect on the dependent variable (test scores).

While random allocation was not possible due to the nature of the groups, there were efforts to control for other confounding variables, such as **matching the IQ** of the autism group to one of the control groups.

The use of an IQ matched group allowed researchers to control for the influence of IQ on the results.

The results of the study showed that there was no correlation between IQ and scores on the Eyes Test, suggesting that this is independent of general intelligence.

Weaknesses

1. Low Eccological Validity

The most prominent weakness is the **lack of ecological validity**.

The Eyes Test uses **static images** of eyes to assess theory of mind.

In real life, people do not judge emotions from static images alone; they consider dynamic cues like body language, facial expressions, tone of voice, and situational context.

This means that the test might not accurately reflect how people interpret emotions in everyday interactions.

The use of static images with limited facial cues may simplify the complex process of emotion recognition, making it an **artificial task** that does not accurately mimic real-world social interactions.

Because the AQ test is a **self-report questionnaire**, participants may give socially desirable responses or untruthful answers, further reducing the ecological validity.

2. Limited Generalizability

The sample size of the autistic group was small (**only 15 male adults**).

This **small sample** makes it difficult to generalize the findings to the larger population of individuals with autism spectrum disorder (ASD).

The **autistic sample was exclusively male**, so the results cannot be generalized to **females with autism**.

The study also lacks representation from children with autism.

The study was conducted **only in the UK,** limiting the generalizability of the findings to other cultures where emotional expression might be interpreted differently.

3. Limited Data

The study relies entirely on **quantitative data**, specifically scores from the Revised Eye Test and the Autism Spectrum Quotient (AQ) test.

This means there is a lack of **qualitative data**, so there is no insight into the reasons behind the participants' choices or thought processes.

The use of a **close-ended questionnaire** does not provide insight into the participants' reasoning.

It also does not allow for in-depth analysis or understanding of the cognitive processes behind the results.

4. Potential for Guessing

While the revised test reduced the chance of guessing compared to the original version, there was still a one in four chance of participants guessing the correct answer.

This could affect the validity of the results.

Ethics

Participants, especially those with AS/HFA, may have felt psychological distress by not understanding the emotions in the eyes

Some participants, particularly in the autistic group, **did not submit their AQ test papers**, which may suggest feelings of distress or shame associated with having their autistic traits measured.

This may indicate that the process of testing for autistic characteristics might have caused them some level of distress.

Issues and Debates

Application to everyday life: Diagnostic Tool for AS/HFA

The Revised Eyes Test can be used to **diagnose** individuals who may have difficulties in social cognition, even if they have not been formally diagnosed with autism.

Those who score low on the test may show a lack of theory of mind.

The test can also be used to help improve social intelligence by giving extra lessons to students who need help.

Individual vs. situational explanations

While the study does not completely rule out situational factors, it primarily emphasizes the role of **individual traits** in explaining differences in the ability to identify emotions and mental states.

The standardized procedures, matched pairs design, and consistent findings across different groups point to the conclusion that the ability to understand emotions is more about individual abilities and less about the situation itself.

This does not mean that nurture has no influence on the development of social skills and theory of mind.

It could be that those with autism may improve their social skills if they work with a therapist.

However, the study itself focuses on demonstrating that theory of mind is an individual trait and ability.

Reductionism vs. holism

The study focuses on the ability to recognize mental states solely from images of the eyes.

This is a very narrow aspect of social interaction, which typically involves many other cues, including body language, tone of voice, and context.

By isolating this one element, the researchers **reduce the complexity** of social cognition to a single variable that can be easily measured.

Keep Learning

To help reinforce your understanding and prepare for potential exam questions, here are some practice questions related to this study and the Cambridge International AS & A Level Psychology 9990 syllabus:

Recall and Description:

1. From the study by Baron-Cohen et al. (eyes test):
    - **Identify the sampling technique** used to recruit the AS/HFA group in this study.
    - **State the number of participants** diagnosed with AS/HFA in this study.
    - **Identify three features of the sample** used for Group 4.
    - **Name the test that was being revised** in this study.
    - **Outline one aim of this study**.
    - **Describe the original version** of the 'Reading the Mind in the Eyes' test.
    - **Describe the procedure** of the eyes test.
    - **Describe how the target words and foils were developed** for the revised 'Reading the Mind in the Eyes' test.
    - **Describe the theory that Baron-Cohen et al. were testing** with their 'Reading the Mind in the Eyes' Test.
    - The AS/HFA participants were the only group asked to make two judgments about each photograph. One of these judgements was about the emotion in the photograph. **Name the other judgement** this group was asked to make about each photograph.
    - **Identify the two ways that the revised eyes test increased the range of scores** a participant could obtain.
2. From the study by Baron-Cohen et al. (eyes test), **outline one result** from this study. Refer only to results from the eyes test in your answer.
3. From the study by Baron-Cohen et al. (eyes test):
    - **Outline one result** in relation to the Autism Spectrum Quotient (AQ).
    - **Outline one result comparing the participants of Group 1 to the participants of Group 2.** You must use data in your answer.

Application and Evaluation:

1. Two friends, Danilo and Noah, are discussing the validity of the study by Baron-Cohen et al. (eyes test). Danilo thinks the study has validity, but Noah thinks the study does not have validity. **Explain one reason why Danilo is correct and one reason why Noah is correct, using evidence from this study**.
2. **Evaluate the study** by Baron-Cohen et al. (eyes test) in terms of two strengths and two weaknesses. At least one of your evaluation points must be about **generalizations** or the **use of self-reports**.
3. **Outline one methodological strength** of this study.
4. **Outline one ethical weakness** of this study.
5. **Suggest one real-world application** based on the results of this study.

6. **Explain one useful application of the findings**, if child participants were used in this study.
7. **Explain how one finding** from the Baron-Cohen et al. study (eyes test) **supports one of the assumptions of the cognitive approach**.
8. The study by Baron-Cohen et al. (eyes test) used adult participants, although similar studies have used children. **Describe one methodological problem that could arise if child participants were used in this study**.
