# Differences in Information-Seeking Behavior Between Typically-Developing Children and Children with Autism Spectrum Disorder

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The main objective of this study is to investigate whether there are differences in the way factors such as learning progress (LP) maximization and prediction error (PE) minimization drive the exploratory behavior of children with autism compared to...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Developmental disorders NEC
Study type	Observational non invasive

# Summary

## ID

NL-OMON56157

**Source** ToetsingOnline

Brief title Information Seeking Autism

# Condition

• Developmental disorders NEC

**Synonym** Autism, Autism Spectrum Disorder

**Research involving** Human

### **Sponsors and support**

#### Primary sponsor: Radboud Universiteit Nijmegen

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#### Source(s) of monetary or material Support: Ministerie van OC&W

#### Intervention

Keyword: Autism Spectrum Disorder, Curiosity, Exploration, Information Seeking

#### **Outcome measures**

#### **Primary outcome**

The main behavioral measures will be:

- Performance measures in behavioral task:
- o Accuracy (i.e., prediction error)
- o Duration of total play (i.e., total number of trials played)
- o Duration of play for each environment
- o Number of switches
- o Video recording of test session (touch-screen task and non-verbal IQ
- assessment)
- Computational modelling obtained variables:
- o Learning progress (LP)
- o Expected learning progress (ELP)
- o Expected prediction error (EPE).
- Restricted, Repetitive Behavior indexes:
- o Childhood Routines Inventory-Revised (CRI-R) (Evans et al., 2017)
- o Intolerance of Uncertainty Questionnaire (Dutch translation) (IUS) (Sexton &
- Dugas, 2009) (IUS)
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o Restricted and Repetitive Behaviors Scale - Revised (RBS-R-NL) (Bodfish et al., 1999; Lam & Aman, 2007)
- Non-Verbal IQ: 6-40 Snijders-Oomen Non-Verbal Intelligence Test (SON-R)

(Tellegen & Laros, 2017)

- Autism Diagnostic Observation Schedule (ADOS-2, only when available) (Bildt et al., 2013)

Based on previous findings, we expect that LP might guide the exploratory behavior of children with ASD differently compared to their TD counterparts. We hypothesize that children with ASD might remain for longer in the environments even as LP decreases. In addition, we expect to observe in children with ASD a relation between longer persistence in environments despite a decreasing LP and higher scores of RRBs.

#### Secondary outcome

Not applicable

# **Study description**

#### **Background summary**

Autism spectrum disorder (ASD) is characterized by restricted, repetitive behaviors and interests (RRBs) which results in a reduced tendency to explore and examine their surrounding environments. These atypical patterns of exploration might lead autistic children to miss or avoid learning opportunities offered by the environment. Recently, it has been suggested that typically-developing (TD) individuals tailor their attention to maximize the information they can obtain from the environment. Infants look longer to stimuli that offer more opportunity for learning. Likewise, TD adults engage longer in environments where they can learn the most from, and their exploration of new environments is guided by how much information they expect to gain from them. However, it remains unclear whether the explorative behavior of autistic individuals is similarly guided by learning progress. Our study aims to elucidate which mechanisms underlie the explorative behavior of autistic children, and whether underlying differences in these mechanisms might explain some of the atypical exploration patterns commonly reported in ASD. We hypothesize that learning progress might guide exploratory behavior of children with autism differently compared to TD children and that children with autism might remain for longer in environments even as learning progress decreases.

#### Study objective

The main objective of this study is to investigate whether there are differences in the way factors such as learning progress (LP) maximization and prediction error (PE) minimization drive the exploratory behavior of children with autism compared to TD children. Using a behavioral task [motion-pattern learning task] implemented as a tablet game and computational modelling techniques we want to investigate how ASD and TD children learn in different offered environments and the learning opportunities they seek. The second objective of this study is to relate potential differences in the way LP and PE drive exploration in children with ASD in relation to their particular score profiles of repetitive, restricted behaviors.

#### Study design

The proposed study is a behavioral study in which children will be presented with a motion-pattern learning task with different environments containing learnable sequences that will vary in the amount of learning progress children can make. Children\*s behavioral responses will be recorded to assess accuracy (i.e., prediction error: PE), duration of play and environment selection. A hierarchical reinforcement learning model (Velázquez et al., 2019) will be used to quantify children\*s learning-related measures for task engagement and future environment choice such as learning progress (LP), expected learning progress (ELP) and expected prediction error (EPE) on the basis of children\*s performance measures. Based on these learning-related measures, we will test our predictions on what drives children\*s engagement and continuous play with an environment or switch to a different one. As well as what explains what they chose to explore next.

#### Study burden and risks

Our study requires one visit to the Baby & Child Research Center (BRC) at the Donders Centre for Cognition, with a time investment of about one hour. We will present children with a behavioral task (touch-game on a tablet) and record their responses. Additionally to the experimental task, during the test session, children will undergo an IQ test (duration of 50 minutes). Previous to the test session, parents will be asked to complete three standardized questionnaires which will be available to them in online form through LimeSurvey (duration of around 30 minutes). The risks associated with these measurements are negligible, no adverse events are expected, and the burden for the participants is considered to be minimal. Stimuli have been chosen to be interesting and pleasurable for children.

We chose to include minors of 6-8 years old in our study because of several reasons. First, ASD is a developmental condition which is characterized by its early onset. Although experienced clinicians are able to reliably diagnose ASD in children as young as 2 years old, the average age when children are identified with ASD in Netherlands is of 56-116 months (van\*t Hof et al., 2021). We are interested in finding out how emerging autistic traits impact curiosity-driven exploration in a developing population. In addition, several studies have pointed at developmental changes in the manifestation of RRBs in ASD children, where motor and sensory stereotypies decrease with age, but more complex RRBs such as insistence of sameness, restricted interests and ritualistic behaviors become more prevalent as age increases (Bishop et al., 2006; Esbensen et al., 2009). We thus decided to test a sample of children in an age range (6 to 8 years old) where a clinical ASD diagnosis is already present, as well as the manifestation of more complex, high-order RRBs. Finally, this age group is also easily accessible for our research, which enables us to recruit a sample size that will allow us to come to reliable conclusions.

# Contacts

#### Public

Radboud Universiteit Nijmegen

Thomas van Aquinostraat 4 Nijmegen 6525GD NL **Scientific** Radboud Universiteit Nijmegen

Thomas van Aquinostraat 4 Nijmegen 6525GD NL

# **Trial sites**

## **Listed location countries**

Netherlands

# **Eligibility criteria**

Age Children (2-11 years)

## **Inclusion criteria**

Autism group:

- Age between 6 and 8 years old
- Clinical diagnosis of Autism Spectrum Disorder Control group:
- Matching non-verbal IQ with autism group
- Age range between 6 and 9 years old
- No indication of delayed cognitive development

## **Exclusion criteria**

Autism group and Control group: - Psychiatric (co-)morbidity (except ADHD)

# Study design

# Design

Primary purpose: Other	
Masking:	Open (masking not used)
Allocation:	Non-randomized controlled trial
Intervention model:	Other
Study type:	Observational non invasive

### Recruitment

NL Recruitment status:

Recruiting

Start date (anticipated):	22-01-2024
Enrollment:	90
Туре:	Actual

# **Ethics review**

1.14/140

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Approved WMO	
Date:	16-10-2023
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

# **Study registrations**

### Followed up by the following (possibly more current) registration

No registrations found.

# Other (possibly less up-to-date) registrations in this register

No registrations found.

### In other registers

Register CCMO ID NL83422.091.22