Adaptive Cognition in Autism

Published: 12-12-2013
Last updated: 22-04-2024

The main aim of the current study is to specify neurocognitive mechanisms behind rigid behaviour in autism. For this reason, participants will be required to execute a computer task, in which they will need to make their own choice of tasks, during...

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

Summary

ID

NL-OMON40204

Source
ToetsingOnline

Brief title
Adaptive Cognition

Condition

- Developmental disorders NEC

Synonym
Autism, Autism Spectrum Disorders

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: adaptive cognition, autism, cognitive control, intentions

Outcome measures

Primary outcome

1. Task choice and task execution as behavioural measures, registered during the computer task; the former used to determine behavioural rigidity as the tendency to repeat tasks (repetition bias) and the latter to determine performance deterioration after a task switch (switch costs).

2. Task preparation (intentions) and task execution (actions): slow frontal negativity (contigent negative variation) and positive more parietal component (P3), respectively, as their main EEG markers.

3. Size, shape, and patterns of brain activation (with a specific focus on orbitofrontal areas) measured by (f)MRI.

Secondary outcome

Reading ability, handedness, IQ, age, and gender will be taken as covariates.

Study description

Background summary

Autism is a neurodevelopmental disorder characterised by qualitative difficulties with social interactions, communication, and stereotyped and rigid behaviours (APA, 2000). Its prevalence is relatively common and the impact it has on both the patients and their parents and caregivers is tremendous. Most individuals with autism would require a life-long support, both in their social life and in work settings. The importance of a better understanding of the origins of behavioural rigidity has recently gained more attention. Perhaps the most clear example of this recent shift in emphasis is the importance that rigid behaviours receive in the new version of the diagnostic manual, DSM V. Full comprehension of its neurocognitive mechanisms is, however, still lacking.

Some empirical evidence for behavioural rigidity in autism comes from neuropsychological tests, such as the Wisconsin Card Sorting Test, showing difficulties with flexible adaptation to changes. Intriguingly, however, the

soonest individuals with autism are tested in experimental labs, the difficulty seems to disappear (Poljac et al. 2010). In one of my previous studies, I have asked adolescents with autism to switch between two simple cognitive tasks, which were clearly specified by cues. The finding was that as long as the tasks were unambiguously specified, adolescents with autism had no difficulty with switching between them. The question arises then how to solve this paradox of rigid behaviour in autism that seems to be present in daily lives but seems to mysteriously disappear in experimental settings (Geurts et al. 2009).

Another very interesting finding of Poljac et al. (2010) was that our clinical control group, consisting of adolescents with dyslexia, seemed to experience clear difficulties with these rather simple cognitive tasks and in particular with switching between tasks. This was surprising, since no indication of cognitive control deficits were present in the literature for this patient group, which was exactly the reason why we chose to include them in that study as the clinical control group. In the current study, we want to include this group again, for at least two reasons: 1) research on cognitive control deficits in dyslexia deserves attention and has been almost non-existing so far; 2) it is clear that individuals with dyslexia deal with task switching in a different way than both their typically developing peers and individuals with autism, which make them a perfect clinical control group for our main patient group of interest- individuals with autism. In addition, since both autism and dyslexia are a developmental disorder, to better understand how rigidity develops across age, we will include participants from 12 to 25 years.

The way that the current study aims to solve the paradox of rigid behaviours in autism is by focusing on the control processes that precede task execution, that is the part in which people need to decide what they want to do (intentions), rather than the part in which they implement their decision (actions). One can imagine that if a person is instructed which task to execute, that person does not necessarily need to fully rely on cognitive control processes needed to make decisions, which we constantly do in our daily lives. The intentional part of task performance is typically being omitted in the experimental paradigms designed to test mental flexibility and task switching capacities. It is hence possible that due to the use of these paradigms, we have not succeeded so far to experimentally detect rigid behaviours in autism. It is well known that individuals with autism have problems with creative thinking, problem solving, spontaneous behaviour. The current study tests hence the possibility that rigid behaviours in autism arise from problems in intentions and decision making rather than in their implementations (Poljac & Bekkering, 2012). The study allows us to provide empirical evidence for rigid behaviour in autism and to specify their neural (structural and functional) origins.

Study objective

The main aim of the current study is to specify neurocognitive mechanisms

behind rigid behaviour in autism. For this reason, participants will be required to execute a computer task, in which they will need to make their own choice of tasks, during which brain activity will be measured (EEG). We expect that individuals with autism will show deviant patterns of overt and covert behaviour related to task intentions and decisions (task choice and preparation), but not in their eventual implementation (task execution). For participants with dyslexia, we expect this pattern to be reversed: they are expected to experience no problems with task intentions and decisions, while having problems with task execution. These data will be then connected to the brain areas previously shown to be related to rigid behaviours (Gusnar et al. 2003). Finally, we intend to investigate the development of rigid behaviour in autism by taking into account how behavioural and neural expressions of rigidity are modulated by age (12-25 yrs) and by comparing these data patterns to those of their typically developing peers and peers with dyslexia.

Study design

This is a non-invasive behavioural, EEG, and MRI study, with a developmental character.

In a period of one year, data will be collected from 30 individuals with autism, 30 clinical controls (dyslexia), and 60 typically developing controls, equally distributed across age (12-25 yrs). The groups will be matched on IQ, age, and gender. The testing will take place at the Donders Institute, including a computer task, during which the brain activity will be recorded by means of EEG. This part takes around 40-50 minutes. In addition, scanning of the brain structure, brain connectivity and resting state connectivity will be administered by means of a 1.5T MRI scanned for about 30 minutes.

Altogether, the project is estimated to last for around 2 years. Data collection phase will take place at the Donders Institute and should be done within one year, including the behavioural computer task that goes together with the EEG recordings, and the scanning with the 1.5T scanner. After data collection, one year is reserved for the analysis and different types of reports (conference papers, peer- reviewed papers).

Study burden and risks

This study assesses brain activity related to behavioural rigidity through EEG, and relates these functional measures to the more structural brain features through MRI. In that sense, these measures might reveal a certain brain (activity) deviation. In this case, an independent medical doctor (as specified in our protocol) will be contacted.

Generally speaking, there is no risk connected to the participation in EEG or MRI experiments. The load during the EEG part is not much different from the

load that goes together with a simple cognitive task measuring task switching (with a similar version of this task previously assessed by the project leader, E Poljac). Regarding the MRI part, the (cognitive) load is minimal, as the participants will be required to lie still for around 30 minutes. The space is, however, relatively small, with a relatively hard noise made by the scanner itself, and this can indeed be experienced by some people as somehow frightening. The Donders Institue is, however, highly experienced in this type of research across all ages, and by means of the dummy scanner that allows for a try out and practicing through a simulation of the real scanning situation, the psychological load should be minimal: from previous research we know that children and adolescents (with autism) do not usually experience any troubles while participating in an MRI study. Obviously, all the participants can decide whether to participate or not before coming to the Donders Institute, as well as during the dummy practice and they can always stop with their participation even during the real scanning itself.

Contacts

Public
Radboud Universiteit Nijmegen

Montessorilaan 3
Nijmegen 6525 HR
NL
Scientific
Radboud Universiteit Nijmegen

Montessorilaan 3
Nijmegen 6525 HR
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age

Adolescents (12-15 years)
Adolescents (16-17 years)
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Age: 12 to 25 years old
Intelligence: total IQ higher than 80
Participants with autism
Typically developing control participants
Participants with dyslexia

Exclusion criteria

Motor impairments in the upper limbs (keyboard is used for the behavioural task);
Metal in the body (due to the MRI);
History of epilepsy (due to the EEG);
Typically developing control participants should have no records of neurological or developmental disorders;

Study design

Design

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

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	10-01-2014
Enrollment:	120

Type:	Actual

Ethics review

Approved WMO Date:	12-12-2013
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)
Approved WMO Date:	10-12-2014
Application type:	Amendment
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	ID
CCMO	NL45181.091.13