Developmental changes in the neural correlates for artificial grammar learning

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Primary Objective: The primary objective of this study is to understand to which degree the language system of pre-pubertal children is still plastic compared to adults and which brain areas are recruited by these groups when learning an artificial...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Age related factors
Study type	Observational non invasive

Summary

ID

NL-OMON39570

Source
ToetsingOnline

Brief title
Artificial grammar learning in children and adults

Condition

- Age related factors

Synonym
developmental changes

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Leiden
Source(s) of monetary or material Support: Ministerie van OC&W,Onderzoeker is gefinancierd met een persoonlijke beurs van de Universiteit Antwerpen;overige kosten uit de eerste geldstroom

Intervention

Keyword: Artificial grammar, fMRI, language, learning

Outcome measures

Primary outcome

The primary study parameters include:

- Any differences between children and adults in their capability to acquire an artificial grammar, as measured by the number of correct grammaticality judgements in the test phase

- Any differences on the group level between children and adults in the brain area's recruited when acquiring the artificial grammar

- Correlations between 1) age and 2) performace on the grammaticality judgement test and the pattern of brain activation during acquisition of the artificial grammar

Secondary outcome

not applicable

Study description

Background summary

Children start qcquiring their mother tongue early in life by being exposed to speech, imitating speech sounds and finally by cracking the code of syntax. During the course of childhood the development of their mother tongue continous. When, however, a child is not exposed to adult speech, for example in case of deafness, this child will not fully acquire its first language. Observation that first language acquisition after puberty becomes increasingly problematic have led to the hypothesis of a sensitive period for language acquisition. Because most language acquisition studies focus on infants and is in most cases not compared to adult language studies, little is known about how neural processes related to language acquisition differ between children and

adults.

Study objective

Primary Objective: The primary objective of this study is to understand to which degree the language system of pre-pubertal children is still plastic compared to adults and which brain areas are recruited by these groups when learning an artificial grammar from mere exposure.

Secondary Objective(s):
The goals of the current study are twofold. We will use functional Magnetic Resonance Imaging (fMRI) to:
1. Identify brain regions that are associated experience-dependent plasticity during artificial grammar learning.
2. Establish to which extent the involvement of these brain areas is influenced, in a quantitative as well as qualitative way, by both age and the level to which new language structures can be learned from mere exposure.

Study design

This study is designed as a cross-sectional study comparing two groups: adults and children. In this study language learning and experience-dependent plasticity in the language domain during childhood and in adulthood will be tested using an artificial grammar learning paradigm in Dutch monolingual speaking children and adults. Participants will be exposed auditorily to an artificial grammar containing abstract syntactic patterns. After this exposure phase, participants will be tested on their ability to extract the syntactic pattern from the speech stream. During the task, fMRI data will be obtained in order to identify brain areas involved in the acquisition of new linguistic structure during artificial language exposure in adults and children.

Study burden and risks

Behavioral testing: There are no risks associated with behavioral testing except the occasional possibility of some frustration with poor performance or fatigue. There will be breaks between tests in order to allow participants to rest and prevent poor performance due to fatigue. Testing will stop if a subject displays frustration or appears tired.

FMRI testing: There are no known risks associated with participating in an fMRI study. This is a noninvasive technique involving no catheterizations or introduction of exogenous tracers. Numerous human subjects have undergone magnetic resonance studies without apparent harmful consequences. Radiofrequency power levels and gradient switching times used in these studies are within the FDA approved ranges. Some people become claustrophobic while inside the scanner and in these cases the study will be terminated immediately

at the subject's request. The only absolute contraindications to MRI studies are the presence of intracranial or intraocular metal, or a pacemaker. Relative contraindications include pregnancy and claustrophobia. Subjects who may be pregnant, who may have metallic foreign bodies in the eyes or head, or who have cardiac pacemakers will be excluded because of potential contraindications of MRI in such subjects.

Potential Benefits of the Proposed Research to the Participants and Others: Although there is no direct benefit to the participants from this proposed research, there are greater benefits to society from the potential knowledge gained from this study, as described in the next section.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adolescents (12-15 years)
Adolescents (16-17 years)
Adults (18-64 years)
Children (2-11 years)

Elderly (65 years and older)

Inclusion criteria

Healthy volunteers ages: 8-12 and 20-40
right-handed
monolingual native Dutch speakers

Exclusion criteria

metal in the body, neurological disorders, claustrophobia, pregnancy, heart arrhythmia

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	14-07-2013
Enrollment:	40
Type:	Actual

Ethics review

Approved WMO

Date:	19-02-2013
Application type:	First submission
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
	metc-ldd@lumc.nl

Approved WMO Date:	07-05-2014
Application type:	Amendment
Review commission:	METC Leiden-Den Haag-Delft (Leiden)
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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	NL42690.058.12