What the eyes tell us about listening: The neural and cognitive correlates of pupil dilation as measure of listening effort.

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

Summary

ID

NL-OMON37437

Source
ToetsingOnline

Brief title
What the eyes tell us about listening

Condition

- Hearing disorders

Synonym
hearing impairment, hearing loss

Research involving
Human

Sponsors and support

Primary sponsor: Vrije Universiteit Medisch Centrum

Source(s) of monetary or material Support: NWO

Intervention

Keyword: fMRI, processing load, pupil response, Speech perception

Outcome measures

Primary outcome

The main study parameters in the study are: (1) the pupil response evoked during listening to speech in noise and (2) the brain activation during listening to sentences in noise. Sentences will be presented in noise, using a wide range of signal-to-noise ratios (SNRs) covering very low to high comprehension levels.

Secondary outcome

N/A

Study description

Background summary

Currently, there is an urgent need for a well-validated tool to objectively examine listening load in the field of Audiology (Arlinger et al., 2009; Edwards, 2007; Fraser et al., 2009; Rönnberg et al., 2008). Pupil dilation is a promising candidate for an accurate, relatively inexpensive, and unobtrusive physiological listening load index. This study will provide the basis for the interpretation of pupillometry as measure of listening effort.

Study objective

The aim of the study is to strengthen the basis for a new application of pupillometry (i.e., the measurement of pupil dilation) within the field of Audiology. We will compare the pupil response during listening to speech in noise to the activation in brain regions involved in listening. Insight into the neural correlates of the pupil response will aid us in the interpretation of differences in the pupil response between conditions/individuals.

Study design

Experimental study combining functional Magnetic Resonance Imaging (fMRI) and pupillometry. The pupil response and brain activation will be expressed relative to the response to listening to noise or in silence (baseline conditions). Brain activation will be examined using fMRI. We will assess in which brain regions the activation correlates with the pupil response across listening conditions. We will additionally examine group effects (i.e., effects of age and hearing loss) on the test performances, the pupil response and the brain activation during listening.
Subjects additionally perform a working memory and a verbal inference-making test. We will examine the correlation coefficients between the test performances and speech intelligibility (percentage correct word repetition), pupil dilation and brain activation.

Study burden and risks

Participating with this study does not involve any health risks with careful observation of approved safety procedures for audiological testing, fMRI and pupillometry. Pupillometry is based on recordings of a camera emitting infra-red light at a power well below the standard safety guidelines. fMRI is a non-invasive technique based on the natural magnetic properties of oxygenated blood.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Aged between 18 and 30 years of age or between 45 and 65 years of age (middle aged groups), right-handedness, native speakers of Dutch, normal or corrected-to-normal eyesight (correction between -6 to +4 dioptre when wearing glasses).

Exclusion criteria

Having pure-tone hearing thresholds exceeding 20 dB HL at the octave frequencies between 500-4000 Hz (only for the normally hearing participants), dyslexia or other reading problems, claustrophobia, epilepsy, having a history of a neurological or psychiatric disease, having metal in the body that would preclude safety of an MRI scan, and being pregnant or on medication.

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:	Diagnostic

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	31-07-2012
Enrollment:	60
Type:	Actual

Ethics review

Approved WMO Date:	25-04-2012
Application type:	First submission
Review commission:	METC Amsterdam UMC

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	NL39709.029.12