A detailed look at speech recognition in realistic dynamic listening scenarios

Published: 12-12-2014
Last updated: 22-04-2024

The first sub-project (part 1) aims to identify and characterize realistic dynamic scenarios in which speech communication takes place. In the second sub-project (part 2) we will investigate speech recognition performance in those realistic dynamic...

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

Summary

ID

NL-OMON41199

Source
ToetsingOnline

Brief title
Everyday listening situations

Condition

- Hearing disorders

Synonym
hearing impairment, hearing loss

Research involving
Human

Sponsors and support

Primary sponsor: Academisch Medisch Centrum
Source(s) of monetary or material Support: Hearing Industry Research Consortium,Hearing Industry Research Consortium Grant (call 2013 Perception of dynamic spatial listening scenarios)

Intervention

Keyword: headmovement, hearing impairment, realistic listening scenarios, speech recognition

Outcome measures

Primary outcome

o Set of relevant listening scenarios

o Set of auditory abilities that are critical for spatial speech perception in

complex, dynamic environments.

o Subset of auditory abilities that are reduced in hearing impaired listeners

o Signal attributes that should be provided or compensated in rehabilitation

o An efficient set of laboratory tests to adequately assess auditory abilities

in realistic and dynamic environments, in both unaided and aided conditions for

listeners with hearing impairments.

Disseminating results of this study will lead to more appropriate clinical

tests and will guide clinicians and hearing aid industries in enabling

participation for individuals with impaired hearing.

Secondary outcome

o Sets of recordings from relevant listening scenarios as well as sets of

staged laboratory recordings including

• a single moving target and stationary located interferers

• moving interferers and single stationary located target

• multiple spatially separated targets, as in a group conversation

o Signal attributes that are used in these scenarios

o Setup of real-time head-motion-compensation system (RT-VAS; real time virtual

audio space) in Amsterdam

Study description

Background summary

The primary issue of concern in audiology is the diagnosis and rehabilitation of auditory capacity: hearing loss is the usual reason for referral to a hearing specialist. The ultimate goal is participation in everyday life, despite hearing loss and its consequences. However, it has never been established systematically what configurations (in terms of S/N ratio, masker pattern, masker content, spatial scenario, relative movement etc.) occur in relevant everyday life communication settings and which signal attributes normal hearing and hearing impaired persons utilize to process auditory information in those situations. The underlying hypothesis is that hearing impaired listeners are not able to utilize all signal attributes that are used by normal hearing listeners.

Study objective

The first sub-project (part 1) aims to identify and characterize realistic dynamic scenarios in which speech communication takes place. In the second sub-project (part 2) we will investigate speech recognition performance in those realistic dynamic listening situations for individuals with normal and impaired hearing. We want to know what signal attributes are used in those situations by normal hearing listeners, and how listeners with impaired hearing are capable of processing the signal cues. Specifically we will look at the influence of head movements on speech recognition.

Study design

Exploratory (part 1) and cross-sectional study (part 2).

Study burden and risks

For this study, participants will attend one test session of 3-4 hours. All subjects will undergo audiometry and speech reception clinical tests to assess their hearing. For part 1, five normal hearing subjects will subjectively judge the recorded and created signals. For part 2, twelve normal hearing subjects will be tested with a real-time virtual auditory space setup to determine the influence of head movements on speech recognition and identify the signal attributes normal hearing utilize to process auditory information in realistic

situations. Subsequently, 12 normal hearing and 24 hearing impaired subjects will be tested using a setup of laboratory tests to assess processing of relevant signal attributes by varying those attributes. Participants are at no health risk and not exposed to harmful sound intensities.

Contacts

Public
VU medisch centrum

De Boelelaan 1118
Amsterdam 1081 HZ
NL
Scientific
VU medisch centrum

De Boelelaan 1118
Amsterdam 1081 HZ
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

Part 1:
5 normal hearing subjects:
- normal hearing (pure-tone air-conduction thresholds not exceeding 20 dB HL at any octave frequency from 250 Hz to 4000 Hz in both ears);
- age 18 years or older.;Part 2:
Part 2a:

12 normal hearing subjects:
- normal hearing (pure-tone air-conduction thresholds not exceeding 20 dB HL at any octave frequency from 250 Hz to 4000 Hz in both ears);
- age 18 years or older.;Part 2b:
study group: 24 hearing impaired subjects:
- hearing impaired (average of pure-tone air-conduction thresholds at 500 Hz, 1000 Hz and 2000 Hz of 35dB HL or higher in both ears);
- essentially symmetrical hearing loss (absolute differences not exceeding 15 dB at any octave frequency from 250 Hz to 4000 Hz);
- aided speech recognition (monosyllables) >= 75%;
- Age distributed over wide range, from 18 years and older.;reference group: 12 normal hearing subjects:
- normal hearing (pure-tone air-conduction thresholds not exceeding 20 dB HL at any octave frequency from 250 Hz to 4000 Hz in both ears);
- age-matched to hearing impaired group.;all subjects, part 1 and 2:
- Dutch as native language.

Exclusion criteria

- Conductive hearing loss (average air-bone gap at 500 Hz, 1000 Hz and 2000 Hz exceeding 10 dB or air-bone-gap exceeding 10 dB at one or more frequencies and abnormal tympanogram in either ear);
- serious/relevant medical issues;
- other native language;
- diagnosed cognitive delay (IQ<80);
- specific language impairment (SLI) or psychiatric disorder (e.g. ADHD).

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:	Recruiting
Start date (anticipated):	02-05-2017
Enrollment:	53
Type:	Actual

Ethics review

Approved WMO

Date:	12-12-2014
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	NL50123.029.14