The impact of aging, cognition, and sensory function on speech

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The aim of this study is to better understand the relation between cognition, sensory functions and motor control for speech in older age. Thereby, we strive for improved speech-based discrimination of typical aging from neurodegenerative declines.

Ethical review	Approved WMO
Status	Pending
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON57444

Source
ToetsingOnline

Brief title
Speech changes in typical aging and neurodegenerative diseases

Condition

- Other condition
- Movement disorders (incl parkinsonism)

Synonym
dysarthria, Pathological speech

Health condition

neurodegenerative disorders

Research involving
Human

Sponsors and support

Primary sponsor: Rijksuniversiteit Groningen
Source(s) of monetary or material Support: NWO

Intervention

Keyword: aging, Mild Cognitive Impairment, Parkinson's disease, speech motor control

Outcome measures

Primary outcome

The most important research parameters are acoustic changes of speech in

response to feedback perturbations and kinematic measures of breathing.

Secondary outcome

The secondary study endpoints are acoustic measurements of voice pitch,

acoustic characteristics of articulation during unperturbed speech and

subjective speech complaints.

Study description

Background summary

Previous research suggests that speech motor control for pitch declines as we age. However, as voice-level control differs from articulatory-level and breathing control, it is unclear how aging affects speech motor control for articulation and respiration. While such changes do usually not lead to speech problems in typical older adults, declining speech motor control may cause speech impairments in neurodegenerative diseases such as Parkinson*s and Alzheimer*s disease. The underlying mechanisms of those speech impairments are unclear. While people with Parkinson*s Disease primarily show sensory but also some cognitive impairments, people with Alzheimer*s Disease primarily show cognitive but also some sensory impairments. Yet, the relation of cognitive and sensory decline, and declining speech motor control remains to be clarified.

Study objective

The aim of this study is to better understand the relation between cognition,

sensory functions and motor control for speech in older age. Thereby, we strive for improved speech-based discrimination of typical aging from neurodegenerative declines.

Study design

The study is designed as a cross-sectional observational study. The participants will complete several tasks during two experimental sessions. They will complete behavioural tasks targeting (1) various cognitive abilities, and (2) auditory as well as somatosensory perception. Furthermore, they will complete (3) speech tasks, while being recorded acoustically. At the same time, respiratory patterns will be recorded through electromagnetic articulography (EMA).

Study burden and risks

Participation in this study is not related to any known risks or benefits. A slight burden could be fatigue due to the duration of the experiment (appr. 2 hours per session). To reduce this burden, tasks are varied, and breaks are included in the experimental procedure. Breaks will also be added or prolonged on the participants* request. Moreover, the session has been split into two sessions in order to reduce the burden for participants. For the behavioural assessment of sensory functions, sanitised plastic domes will be gently pressed against participants* tongue and lips. For several tasks, participants will wear a microphone and headphones to listen to sounds or their own voice in a regular, conversational amplitude. For the speech tasks specifically, EMA sensors will be attached to their chest, the back (i.e., spine), and (if possible) the abdomen in order to record respiratory and articulatory kinematics. Those sensors are easily removable. If participants with Parkinson*s disease have undergone Deep Brain Stimulation (DBS) in the past, they cannot participate in the study due to the EMA recordings which rely on an electromagnetic field.

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

- Native speaker of Dutch

Only for the group of people with a sensorimotor disorder:
- Diagnosed with Parkinson's disease

Only for the group of people with a cognitive disorder:
- Diagnosed with mild cognitive impairment

Only for the group of control participants:
- No prior speech or language impairments

Exclusion criteria

- Lack of ability to give informed consent (i.e., incapacitation) - in any case of doubt, the (in-)capacitation will be determined by a physician
- History of stroke or other neurological or psychological disorder
- Self-reported signs of depression
- Stuttering or other speech and language problems that are not related to PD or MCI
- Severe impairment of vision
- Metal at or close to the head, chest or abdomen (e.g., piercings, pacemaker, etc.)

- History of Deep Brain Stimulation (DBS)

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:	Pending
Start date (anticipated):	01-12-2024
Enrollment:	120
Type:	Anticipated

Ethics review

Approved WMO

Date:	25-04-2025
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

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	NL87470.042.24