## New insights into the neurostructural basis of speech production in healthy aging Isabelle Deschamps<sup>1,2</sup> and Pascale Tremblay<sup>1,2</sup> en santé mental I. Centre de recherche de l'Institut en Santé Mentale de Québec, Québec, QC, Canada de Québec 2. Département de Réadaption, Faculté de Médecine, Université Laval, Québec, QC, Canada





# Introduction

One of the most distinctive features of spoken language production is its serial ordering, that is, the organization of speech movements into precise, smooth and coordinated temporal sequences of movements of the lips, tongue, and jaw to produce fluent speech. Surprisingly given the importance of serial ordering in speech production, little is known about the neurobiological mechanisms that underlie the process of temporally organizing speech movements into well-formed sequences. The general objective of the present study was therefore to broaden the current understanding of the neurobiology of motor sequencing during speech production in young and older adults using a neurostructural approach.

# Method

## **Participants**

- 15 healthy young adults (20-34 years)
- 15 healhty older adults (61-74 years)

## Stimuli

- Sequences of 6 French syllables presented visually with two complexity levels

Simple sequence (e.g. /pa-pa-pa-pa-pa/)

Complex sequence (e.g. /pa-ta-ka-pa-ta-ka/) Task

- Read aloud sequences of syllables

## Analysis

- Acoustical analysis were performed using Praat - Accuracy, reaction time and response duration were calculated from the acoustical recordings - Cortical thickness (CT) analyses were performed using Freesurfer (one per measure)





## Results



Our results demonstrate that our sequence complexity manipulation was challenging, resulting in slower, longer and less accurate speech production, in both young and older healthy adults. We also identified a few regions (e.g. dAl,) in which the relationship between CT and our behavioural measures of speech production (response duration, RT and accuracy) differed between the younger and older adults documenting for the first time neurostructural changes in the speech pro-





# Discussion

- Main effect of age and sequence complexity. This

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- Thicker cortex in bilateral dorsal anterior insula duced complexity effects which suggests increased

speech production network perhaps playing a role

- Main effect of sequence complexity, reflecting a longer response preparation time needed to plan

- Main effect of sequence complexity (±16 decline

sulcus and cuneus associated with higher accuracy. Regions involved in the processing of visual infor-

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