

Effect of age on rate and coarticulation across different speech-tasks

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INTRODUCTION

A slowing down of speech is a well known effect of age [1][2][3]. Still debated are the underlying causes: physiological changes; decline in timing control; a change in the planning of speech; and/or an increase of cautiousness? [4][5][6][7]

Another question concerns the strategies used by speakers to implement rate changes: comparison between studies is complicated, a variety of tasks are used in the literature to elicit changes in rate and results are divergent. [8][9][10]

In this study, our aim is to investigate how older vs younger speakers behave in terms of temporal organization and in terms of articulatory precision of speech targets according to speech task demands

METHODS

27 speakers:

“Younger” (23-54 y.o.) vs “Older” Group (68-90 y.o.)

Three tasks:

★ Non repetitive task (*Reading*)

★ Repetitives tasks :

■ Fast repetition (*RepetMax*)

■ Comfortable Repetition (*RepetComfo*)

Measurements:

★ Temporal organization :

■ Articulation Rate

■ Acceleration

$$\frac{\text{RateRepetMax} - \text{RateRepetComfo}}{\text{RateRepetComfo}}$$

★ Articulatory precision :

■ Acoustic Assimilation

$$\left(\frac{F2-F1}{F1} \right) [a] - \left(\frac{F2-F1}{F1} \right) [i]$$

(/papi/, i.e. coarticulation)

■ Vowel undershoot

$$\left(\frac{F2-F1}{F1} \right) [a]$$

(/papa/, F1 of V1 /a/)

RESULTS

★ *Temporal Organization (Graph 1)*

(a) *Reading vs RepetComfo*:

Slower articulation rate for Older speakers. No significant acceleration in *Repetomfo* for neither group

(b) *RepetComfo vs RepetMax*:

Slower articulation rate for Older speakers. Same degree of acceleration than Younger ones in *RepetMax* → the 2 groups behave the same way

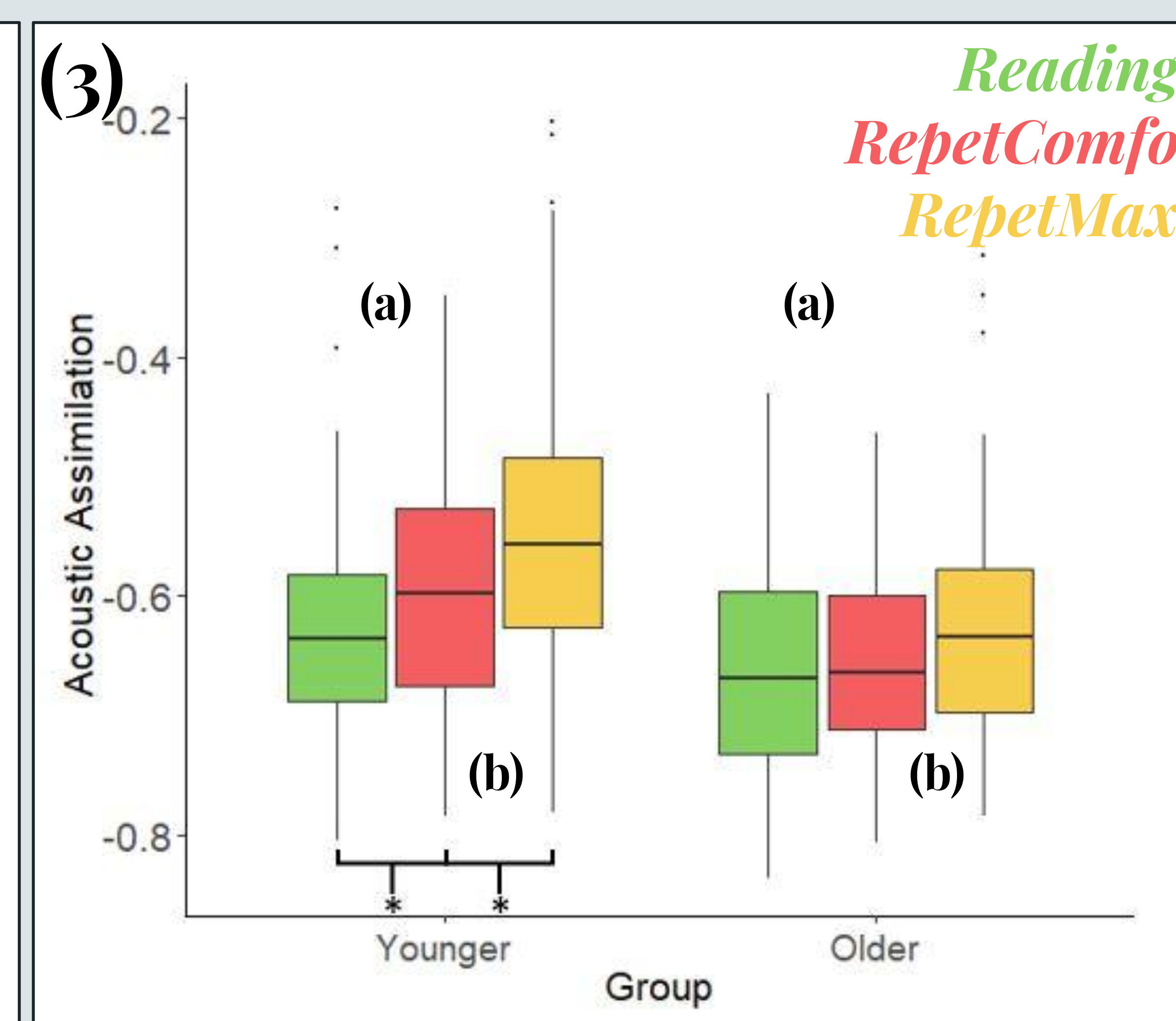
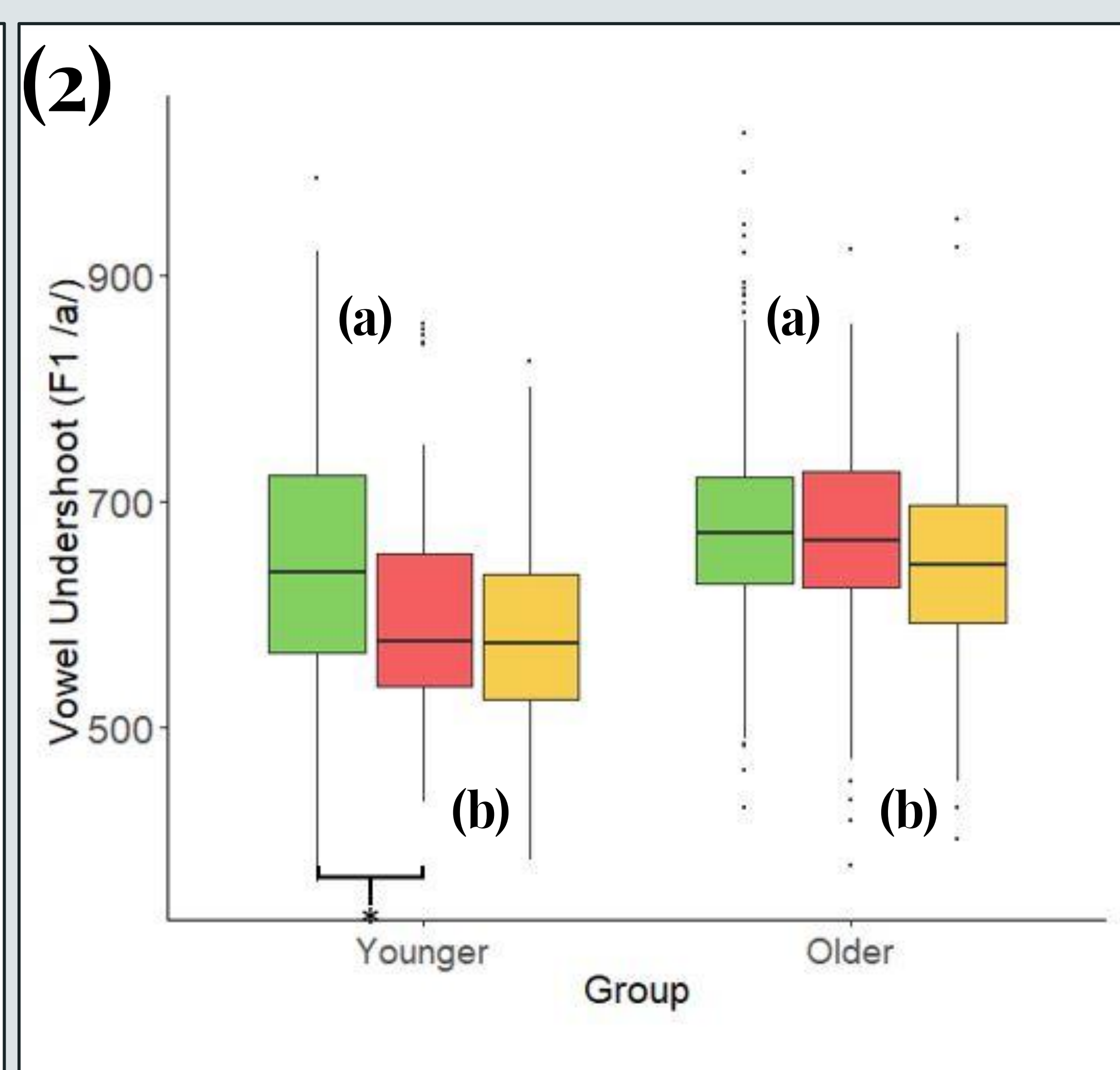
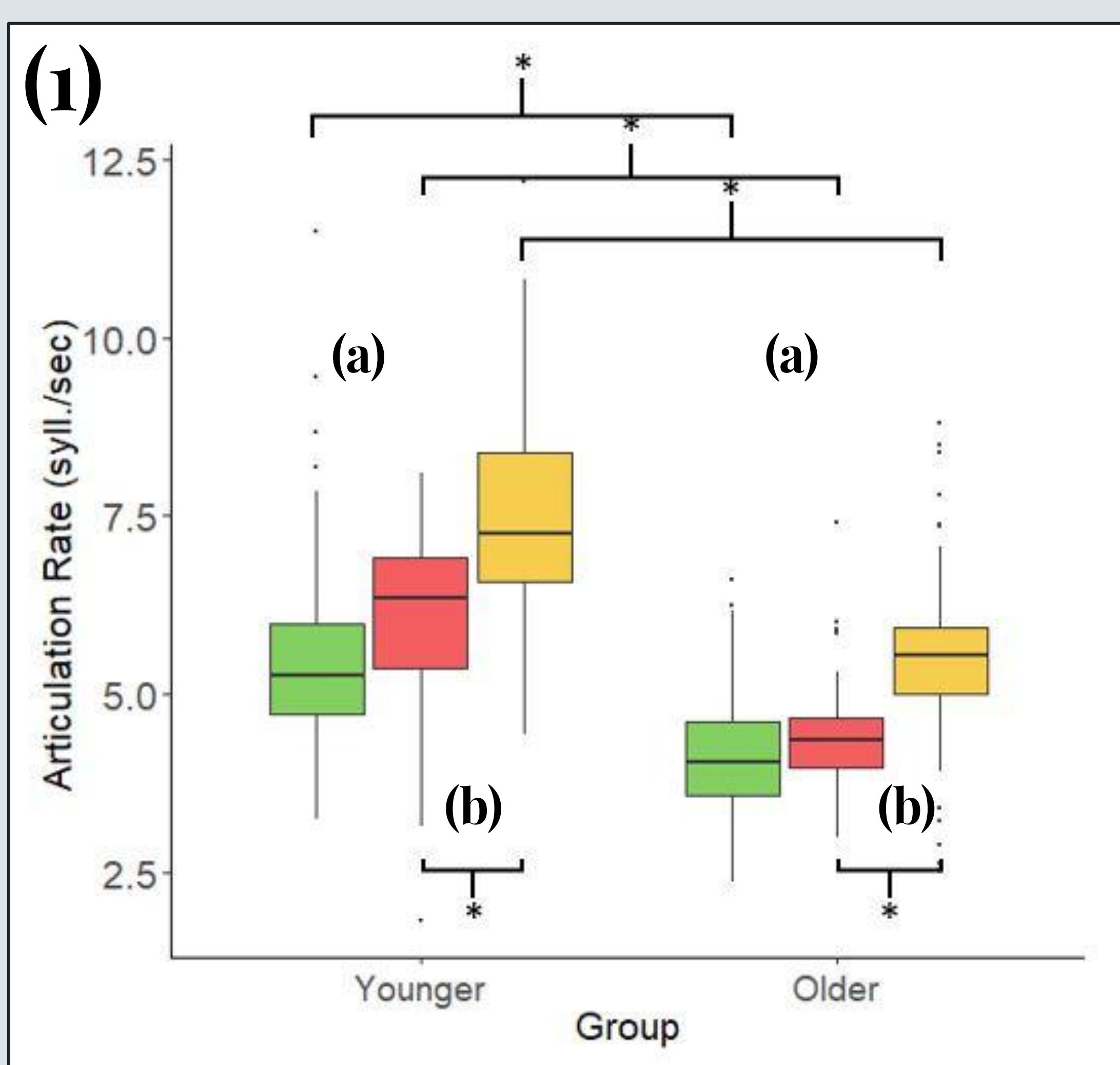
★ *Articulatory Precision (Graph 2 and 3)*

(a) *Reading vs RepetComfo*:

In *RepetComfo* Younger speakers undershoot more their vowels (Graph 2) and present more Acoustic Assimilation (Graph 3); while Older speakers keep their vowel targets constant in both tasks.

(b) *RepetComfo vs RepetMax*:

Neither group undershoots more their vowels in *RepetMax* (Graph 2) but an increase in rate is accompanied by an increase in the degree of Acoustic Assimilation for Younger speakers, but not for Older ones (Graph 3)



PAPER CONTRIBUTIONS

Two main contributions of this study:

★ Different strategies can be adopted to perform a repetitive task (vs. non repetitive task) :

→ We make the hypothesis that the younger speakers are more **performing** than **speaking** in this type of task

★ The second contribution relates to the global slowing down of older speakers :

→ It can be interpreted in terms of cautiousness: indeed, they demonstrate to having control of speech timing, increasing rate when asked to do so. However, they do it without increasing coarticulation or vowel undershoot, so that articulatory precision is preserved.

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