
This version is available at https://strathprints.strath.ac.uk/55175/

Strathprints is designed to allow users to access the research output of the University of Strathclyde. Unless otherwise explicitly stated on the manuscript, Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Please check the manuscript for details of any other licences that may have been applied. You may not engage in further distribution of the material for any profitmaking activities or any commercial gain. You may freely distribute both the url (https://strathprints.strath.ac.uk/) and the content of this paper for research or private study, educational, or not-for-profit purposes without prior permission or charge.

Any correspondence concerning this service should be sent to the Strathprints administrator: strathprints@strath.ac.uk
SPEECH RATE STRATEGIES IN YOUNGER AND OLDER ADULTS
Hayo Terband1, Frits van Bredijk, Rafael Neto Henriquek, Pascal van Lieshoutk, Ben Maassenk & Anja Lowitk

1Centre for Language and Cognition & University Medical Centre, University of Groningen, Groningen, the Netherlands; 2Div. of Speech and Language Therapy, University of Strathclyde, Glasgow, UK; 3Department of Speech-Language Pathology, Oral Dynamics Lab, Department of Psychology, Institute of Biometrics and Biomedical Engineering, University of Toronto, and Toronto Rehabilitation Institute, Toronto, Canada.

Introduction

Effects of speech rate changes on kinematic movement characteristics and stability of speech movements were assessed in younger and older speakers using electromagnetic mid-sagittal articulography (EMMA).

Several studies have indicated a general decrease in speed and accuracy of speech output in older compared to younger speakers [1-4]. In a previous study investigating repeated productions of syllables /pa/, /ma/ and /ta/ at different speech rates, we found that older adults when slowing down, more prominently increased duration and decreased peak velocity in closing movements compared to younger adults [5-6]. As a possible explanation we proposed that older adults may evidence a mechanism that facilitates a closed loop control system to maintain movement stability, possibly due to a reduced quality of somatosensory input.

The aim of the present study is to investigate this phenomenon further using a repeated speech task with target words /api/ and /ipa/, which regarding jaw and lips, involve three-step movement schemes consisting respectively of one closing and two opening movements and two closing and one opening movement (Tab. 1; Fig. 1).

Method & materials

Table 1: Description of the different phases in movement cycles of bilabial opening/closure for the repeated productions of [api] and [ipa].

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>Full closure from full opening</td>
</tr>
<tr>
<td>2.000</td>
<td>Half opening to final opening</td>
</tr>
<tr>
<td>3.000</td>
<td>Half opening to full opening</td>
</tr>
<tr>
<td>1.000</td>
<td>Full closure from full opening</td>
</tr>
<tr>
<td>2.000</td>
<td>Half opening to final opening</td>
</tr>
<tr>
<td>3.000</td>
<td>Half opening to full opening</td>
</tr>
</tbody>
</table>

Results

Speech rate (Fig. 2)

• Both groups successfully changed speech tempo across rate conditions (Rate [F(2,64.809) = 77.038, p < .001]).
• Elderly adults were slower at normal and slow rates compared to young adults, but equally fast at the fast rate (Group [F(1,77.887) = 6.369, p < .05]).

Variability (cSTI) (Fig. 3)

• No effects of Rate, Group or Target.

Discussion & Conclusions

• Elderly adult speakers appear to be capable of slower repetition rates while maintaining the same stability compared to young adults (Fig. 6).
• In contrast to our expectations, the results on 3-step movement cycles showed the most prominent increase for elderly adults compared to younger adults for the duration of the full opening from [p] to [a] in /api/ (Fig. 7).

References