

ON THE SYNCHRONISATION OF ARTICULATORY GESTURES WITH ACCENTUAL F0 PEAKS

Doris Mücke, Martine Grice
IfL Phonetik, University of Cologne, Germany
 doris.muecke@uni-koeln.de

Introduction

We report on a production experiment investigating the temporal synchronisation of F0 peaks in rising pitch accents with landmarks in the acoustic and kinematic signals. We explore how peaks in F0 corresponding to H tones in L+H* pitch accents are temporally aligned with landmarks of acoustic *segments* (e.g. CV boundaries) and with landmarks of dynamically defined articulatory *gestures* (Browman & Goldstein, 1988). Acoustic studies have shown that the status in the intonational hierarchy of pitch accents can affect the alignment of the corresponding F0 peak (e.g. Schepman, et al., 2006, for Dutch). Here we investigate the effect of pitch accent on acoustic and articulatory alignment in German.

Methods and Results

Two speakers of the Düsseldorf variety read meaningful sentences constructed so as to systematically vary (i) accent status, (ii) articulation rate (normal and fast) and (iii) syllable structure in the accented syllable (CV: and CVC). Recordings were carried out using EMMA, with sensors placed on lower lip, tongue tip and tongue body. Time stamps of turning points in the F0 contour were compared with landmarks in the acoustic and kinematic signals. We found tonal targets to be more tightly synchronised in time with articulatory movements than with segment boundaries. There was a clear effect of accent status but no effect of (ii) or (iii). *Prenuclear*: The peak occurs during the vowel of the unstressed syllable [mi] or [ni] following the accented syllable [ma] or [na], and coincided with landmarks of oral gestures for this vowel (target of vocalic tongue body raising and transvocalic minimum of tip/lip closure, fig.1a-b). *Nuclear*: The peak occurs during the intervocalic consonant. It aligns consistently with the target of the consonantal lip/tip gesture (fig.1c) corresponding to this consonant.



Discussion

A target shift was found between nuclear and pre-nuclear accent alignment. In the acoustic domain, the H peak was shifted from a vocalic segment to the preceding consonant, although no specific acoustic anchor (onset or offset of segment) was found to predominate. In the articulatory domain alignment was more stable across articulation rate and syllable structure, and the target was shifted from one articulatory gesture to another (fig. a,c). We could reinterpret these results as involving an alignment shift from one state in the virtual cycle of a single dynamical gesture to another, such as the onset of a primary constrictor's movement of the tongue tip or lower lip to the achievement of a respective goal.

References

- Browman, C.P. & Goldstein, L. (1988). Some Notes on Syllable Structure in Articulatory Phonology. *Phonetica*, 45, 140-155.
 Schepman, A., Lickley, R., & Ladd, D.R. (2006). Effects of vowel length and „right context“ on the alignment of Dutch nuclear accents. *Journal of Phonetics*, 34(1), 1-28.