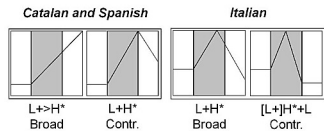


Introduction

Recent investigations [1], [2], [3], [4], [5] showed that tonal targets tend to be more closely aligned with articulatory landmarks than acoustic ones.

This work is part of a wider project aiming at exploring the tonal alignment features for different tonal categories of Catalan (Majorcan variety), Spanish (Madrid variety) and Italian (Lecce variety) in broad and narrow-contrastive focus conditions. In the present study only Catalan and Italian data are investigated.

For Catalan (Central variety), [5] found that H peak coincides with the peak velocity of the closing gesture of lower lip in broad focus accent.



An investigation concerning articulatory aspects of alignment may possibly offer more precise anchors to refer to in the AM analysis.

Corpora

Target words

Open and closed syllables with various segmental composition in paroxitons and proparoxitons:

[mi.'ma.mi] [mi.'mam.li] [la.'la.la] [la.'lal.ma] [na.'na.na] [na.'nan.ma]
[mi.'ma.mi.ma] [mi.'mam.la.ma] [la.'la.la.la] [la.'lal.ma.la] [na.'na.na.na] [na.'nan.ma.na]

Carrier sentences

Question-answer pairs with either a broad or a narrow-contrastive focus accent. Same number of syllables and stress pattern.

Articulatory data (AG500)

6 speakers (3 for Majorcan Catalan and 3 for Lecce Italian)

240 items per speaker (12 target words x 2 focus conditions x 10 repetition) = 1440 tokens

Working hypotheses

- **Articulatory anchors of rising (L1-H) tonal gestures are different in the production of broad and contrastive focus conditions.**

- **Articulatory anchors are different between Majorcan Catalan and Lecce Italian**

A previous investigation [6] was conducted on open syllables for H targets using statistical analysis.

In this study closed syllables, L1 tonal target (start of the H tone gesture) and lag measures of tone-consonantal/vocalic gestures are added in order to determine the articulatory anchors of tonal targets.

Methods

Acquisition

Synchronized EMA and acoustic data. A mini-dialogue was presented on a monitor; the speaker heard the questions and answered using the sentence displayed.

Labeling

Tonal and segmental levels were labeled using PRAAT.

Articulatory level was semi-automatically labeled through MASSA software (developed at CRIL).

Measures

Latencies of tonal targets are measured from:

- onsets/offsets of consonant and vocalic gestures

- peak velocity of gestures

- consonantal/vocalic attainment phases

ipc = 10% of the peak velocity BEFORE the zero velocity point

fpc = 10% of the peak velocity AFTER the zero velocity point

Articulators considered

CONSONANTS - LL (lower lip) for MA(M), TT (tongue tip) for LA(L) and NA(N)

VOWELS - TD (tongue dorsum) for MA(M), LA(L) and NA(N)

Measure of the lag between tonal targets and:

- Consonantal gestures

- A-A vocalic gestures

- I-A vocalic gestures

Legenda: ■ open syllable

■ closed syllable

Statistical significance: *** = $p < 0.001$

* = $p < 0.05$ (univariate ANOVA)

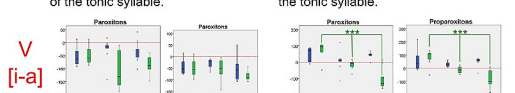
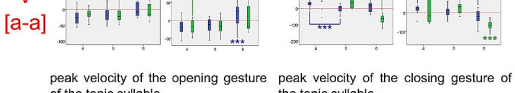
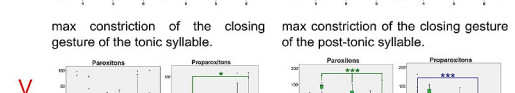
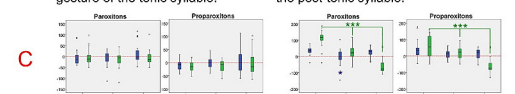
X axis: speakers

Y axis: tone-art.landmark lag in ms

Italian broad focus

L1 target synchronization H target synchronization

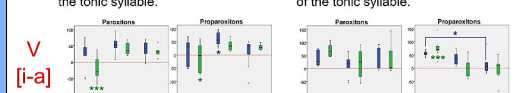
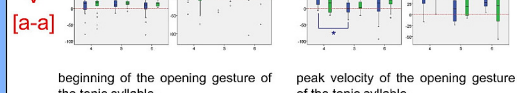
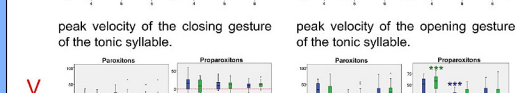
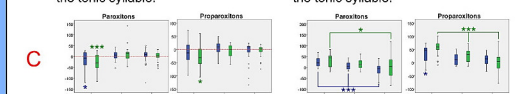
max constriction of the closing gesture of the tonic syllable. max constriction of the closing gesture of the post-tonic syllable.



Italian contrastive focus

L1 target synchronization H target synchronization

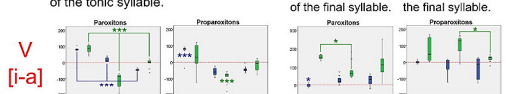
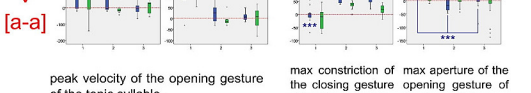
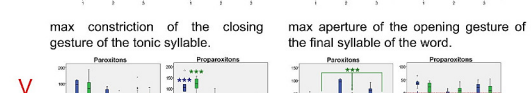
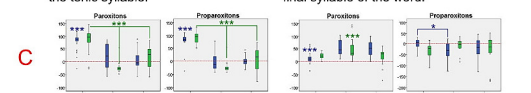
peak velocity of the closing gesture of the tonic syllable. peak velocity of the opening gesture of the tonic syllable.



Catalan broad focus

L1 target synchronization H target synchronization

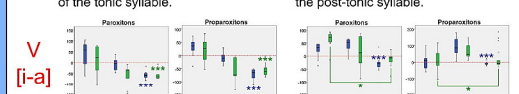
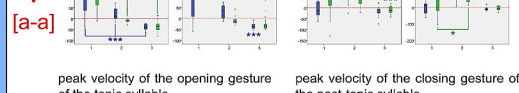
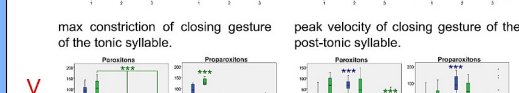
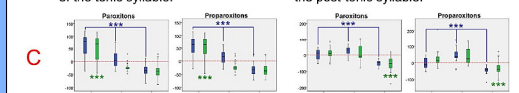
max constriction of closing gesture of the tonic syllable. max aperture of opening gesture of the final syllable of the word.



Catalan contrastive focus

L1 target synchronization H target synchronization

max constriction of closing gesture of the tonic syllable. max constriction of closing gesture of the post-tonic syllable.



Conclusions

- In both languages, there seems to be more stability in low targets than in high targets.

- Lecce Italian data show a better coordination with positional landmarks (consonantal and vocalic closing gestures) in broad focus condition and peak velocity (closing gestures for low targets and opening gestures for high targets) in contrastive focus condition.

- Majorcan Catalan data show a strong interspeaker variability; there seems to be a better coordination with positional landmarks (closing gestures for low targets and opening gesture for high targets) in broad focus and maximum constriction and velocity in contrastive focus.

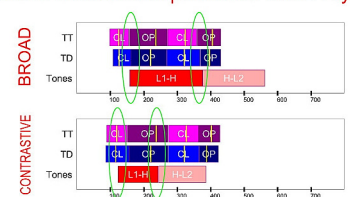
Gestural scores

(based on the actual means of the landmarks)

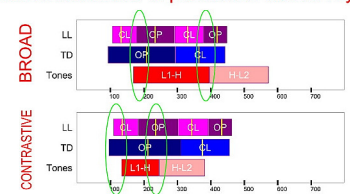
Italian

- No differences between open and closed syllables
- No differences between paroxitons and proparoxitons

Means of landmarks in paroxitons with LA syllable



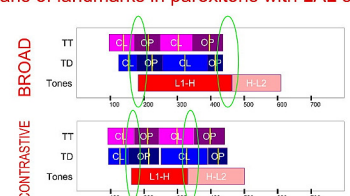
Means of landmarks in paroxitons with MA syllable



Catalan

- Many interspeaker differences.
- Because of too advanced landmarks in productions, speaker 1 was excluded in broad focus and speaker 2 was excluded in contrastive focus.

Means of landmarks in paroxitons with LAL syllable



Means of landmarks in paroxitons with MA syllable

