PoA at the Left Edge: a Contribution from European Portuguese

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1. Theoretical framework

Correlation between frequency of the *input* and developmental patterns for consonantal PoA (Fikkert e Levelt (2002/5)).

- Booij (1995) - Frequencies of consonantal PoA in the phonological inventory:
  
  Coronal >> Labial >> **Dorsal** (8/6/5)

  Coronal is the most frequent PoA in all types of speech (adult to adult; adult to child; adult to infant)
PoA acquisition data in Dutch - Initial phonological development related to the prosodic word (Fikkert & Levelt, 2002/5):

↑ Stage 1 - One PoA per Word
  *brod* -> [mOp] (Eva, 1;4)

↑ Stage 2 - Vocalic PoA ≠ Consonantal PoA
  *Koffie* -> [’pofi] (Robin, 1;11)

↑ Stage 3 - ≠ consonantal PoA, constrained by word position

Left edge

*LABIAL*  *doen* >> [’bun] Eva (1;7)

*[*DORSAL*  *Kijk* >> [’tEik] Eva (1;9)
Acquisition of PoA and the left edge of the word: universal /preferential status of Labial (Ingram, 1974; Macneilage & Davis, 2000).

2. Aims

I. To evaluate EP acquisition data at the stage where the left edge of the word becomes available for feature assignment.

The role of [Labial e *[Dorsal constraints.

II. To evaluate input frequency effects in PoA developmental patterns.
3. The problem

Levelt (1994) and Fikkert & Levelt, 2002/5 refer to the emergence of [Labial and *[Dorsal at the left of the word as a result of frequent phonotactic patterns in the target system.

EP acquisition data described in Costa & Freitas (2003) refer to the emergence of [Labial, but not to *[Dorsal at the left edge of the word.

Question: Which aspects of the target system may be constraining this behaviour of portuguese children?
4. Methodological issues

4.1 Adult data

Sample from the corpus *Português Falado* (data from de 90’s) (TA90PE (Universidade de Lisboa/ Instituto Camões).

Corpus with:
23012 orthographic words;
23460 phonological objects (16638 prosodic words; 6822 clitics).
### 4.2 Acquisition data

Longitudinal data from 2 monolingual Portuguese children

Frequency of PoA in the Intake and in Production

<table>
<thead>
<tr>
<th>Child/Age</th>
<th>N.º of orthographic words (target)</th>
<th>N.º of words produced</th>
<th>N.º of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inês (0;11.14) / (1;9.19)</td>
<td>3928</td>
<td>4140</td>
<td>23</td>
</tr>
<tr>
<td>Joana (0;11.24) / (2;4.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Age periods analysed:

Inês  (1;6.6 - 1;9.19) S7 / S10
Joana (1;9.25 - 2;4.1) S9 / S13

PoA general developmental stages similar to the ones found in Dutch data (Levelt, 1994; Fikkert & Levelt, 2002/5).

**Stage 1**: One PA per word
/v@S'tidu/ >> [titi] (Inês, 1;5.11)

**Stage 2**: Vocalic PoA ≠ consonantal PoA
/iO'gurt@/ >> ['notO] (Inês, 1;7.12)

**Stage 3**: ≠ consonantal PoA
/'t6~p6/ >> ['pat6] (Inês, 1;9.19)
4.3 Software

*Phon* database
(Rose, 2000) [http://childes.psy.cmu.edu/phon](http://childes.psy.cmu.edu/phon)

FreP: Software that extracts frequency values of phonological items from written text.

Reliability tests for the identification:

- **99.935%** for prosodic words and clitics;
- **99.930%** for stress patterns;
- **99.709%** for syllables;
- **99.746%** for syllabic structure and segmental classes.
Output of FreP

- Segmental classes (C, V, G)
- Syllable: Types, position within the word, stress distribution
- Clitics (length)
- Prosodic words (length)
- Stress distribution within the word
- PoA: Labial, Coronal, Dorsal (regarding position within the word and stress distribution)
5. PoA at the left edge: adult data

Chart 1
Frequency of Labial, Coronal and Dorsal

C >> L >> D

Total of C at syllable Onset
Labial and Coronal present similar values at the Left edge, which are higher than values for Dorsal (both in stressed and unstressed position).

This pattern changes in clitics: Coronal and Dorsal are more frequent than labials.
Labial occurs predominantly at the left edge.

Dorsal is more frequent at the left edge (clitics and non-clitics).
Dorsal is the most frequent PoA at the left edge, but exhibiting values similar to Labial.

↑ T-Test

Coronal is \(\neq\) from Dorsal
Coronal is \(\neq\) from Labial
Labial is not \(\neq\) from Dorsal
\(P < .001\)
6. PoA at the left edge: the acquisition data

Evolution of consonantal PoA

Chart 6: PoA Joana

Token
[ˈpapa]
[ˈkɑ]
[ˈbiBi]
[ˈkɑ]

Target
/ˈtapə/
/ˈfraldə/
/ˈbiɡoʊdə/ /ˈkɑrlə/

Child/Age
Inês S4 (1;3.6)
Inês S6 (1;5.11)
Joana S7 (1;6.24)
Joana S8 (1;8.4)
Stage 3: The left edge of the word becomes available for feature specification

Inês – from S9 (1;8.2)
Joana- from S11 (2;0.9)

/s6’patu/ ➢ [papatoj] /p6’Lasu/ ➢ [p6’JaS]
/6 ‘t6~p6/ ➢ [a’pata] /p6S’tor/ ➢ [p@’to]
/‘lapiS/ ➢ [‘patu] /p6’lituS/ ➢ [p@’kiki]
/‘E ‘k6jZu/ ➢ [‘E ’gEtu] /‘barku/ ➢ [‘maku]
/‘kaRu/ ➢ [‘kadu] /l6j’tiJu/ ➢ [ka’kiJo]
/‘pO ‘talku/ ➢ [‘pO’katu] /6k6’bo/ ➢ [k@’bo]
PoA frequency at the left edge

Total of occurrences per position within the word

↑ Labial is the preferred PoA at the left edge (intake and production)
↑ Coronal is demoted in this position.
↑ Dorsal is available at the left edge.
PoA frequency at the left edge

Total of occurrences per position within the word

Labial is the preferred PoA at the left edge (intake and production)
Coronal is demoted in this position.
Dorsal is available at the left edge.
7. Discussion

PoA frequency at the left edge (Adult data)

Dutch:
Coronal>>Labial>>Dorsal

Labial>>Coronal>>Dorsal (without clitics)

EP:
Labial>>Coronal>>Dorsal (without mono)
At stage 3: feature constraints at the left edge of the word

**Dutch acquisition data:**

↑ [Labial (Labial must be assigned to the left edge)]

↑ *[Dorsal (Dorsal cannot be assigned to the left edge)]

**EP Acquisition data:**

↑ [Labial: Preference for Labial at the left edge and demotion of Coronal at this position (cf. charts 7-10)]

↑ No *[Dorsal]
Question: **Why is the constraint *Dorsal demoted in EP?**

Dorsal PoA in adult speech:

- occurs only in 15% in the whole corpus (onsets cf. Chart 1)
- is the less frequent PoA in word initial position (cf. Chart 2)
- occurs mainly in unstressed monossylables (cf. Chart 2).

Apparently, Dorsal is more frequent in non-prominent positions.
But …

Labial $>>$ **Dorsal** $>>$ Coronal (without mono cf. chart 3)  
**Dorsal** $>>$ Labial $>>$ Coronal (with mono cf chart 4)  

$\uparrow$ Frequency values of Dorsal are higher when mono are taken into account.

$\uparrow$ Dorsal is frequently associated with unstressed monossyllables - proclitics (cf chart 2)

Despite global values of frequency (cf. Chart 1 - Coronal,; Chart 2 - Labial at the left edge), Dorsal is not demoted.

$\downarrow$ This might be due to the fact that Dorsal is associated with grammatical information (prosodic and morphosyntactic constituency), therefore occurring in prominent positions.
According to Vigário (2003), proclitics are computed as the initial syllable under the prosodic word domain.

Vigário, Freitas & Frota (2006) show that this characteristic of proclitics contributes to the early emergence of trisyllabic word shapes (by increasing the length of prosodic words).

If portuguese children are interpreting the left edge of the prosodic word as a prominent position, for word processing, than Dorsal becomes a prominent PoA (cf charts 2-4), demoting *[Dorsal.

Prominence of the **Dorsal** PoA
8. Final Remarks

I. Emergence of [Labial at stage 3...

As a consequence:

(i) of its universal status (preference for Labial over Coronal);

(ii) of frequency effects of the input (predominance of Labial at the left edge (cf. chart 2).
II. Coronal is the most frequent PoA in syllable onset (cf. chart 1); however, Labial is the most frequent PoA at the left edge, both in adult data and in acquisition data. (cf. charts 2, 7-10).

If left edge = any syllable onset ↑ CORONAL + frequent

If left edge ≠ any syllable onset ↑ LABIAL + frequent

**Left edge ≠ any syllable onset**

Empirical evidence: children extract information from the left edge and not from global frequency.
The demotion of *[Dorsal in the phonological development of Portuguese children results from the preferential association of Dorsal to proclitics.

Empirical evidence to the early development of the Prosodic Word.