Early Prosody in European Portuguese

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0. Overview

1. Early PWs and EP Grammar

- Cross-linguistic differences in PW structure:
  - Ls showing a constellation of phenomena cuing the PW: Dutch, German, English (e.g. Booij 1995, 1999; Wiese 1996, Hall 1999; Raffelsiefen 1999)
  - Ls with weaker evidence for the PW: Italian, Spanish, Brazilian Portuguese, French (e.g. Kleinhenz 1997, Peperkamp 1997, Bisol 2000, Hannahs 1995a, 1995b)

- EP phonology offers a rich array of evidence for the PW (though resyllabification is Romance-like: Vigário 2003)

- If so, it’s reasonable to assume that grammar may play a role to facilitate early segmentation & production of the PW shapes found in the language (e.g. Cutler 1996, Peters & Strömqvist 1996, Demuth 1996)

- It is excepted that early child speech exhibits word-based phonology, matching the target system
Evidence for the PW in the acquisition data

PW-edges are treated differently from word-internal positions

- Word-final Coda fricatives mastered before word-internal ones
  (e.g. Inês) (Freitas 1997; Freitas, Miguel & Faria 2001)

\[
\begin{align*}
\text{festa} & \quad /'fɛst\upsilon/ \quad [\text{tɛt\upsilon}] \quad (1;9.19) \quad \text{‘party’} \\
\text{estas} & \quad /'e\text{s}\text{t}a\text{s}/ \quad [\text{ɛt\upsilon}\text{s}] \quad (1;10.29) \quad \text{‘these’} \\
\text{versus} \\
\text{bolos} & \quad /'bo\text{l}u\text{s}/ \quad [\text{bol\text{s}}] \quad (1;9.19) \quad \text{‘cakes’} \\
\text{bonecas} & \quad /'bu\text{'n}\text{\text{e}k\text{a}}\text{s}/ \quad [\text{mi\text{'n}\text{e}k\text{a}}\text{s}] \quad (1;9.19) \quad \text{‘dolls’}
\end{align*}
\]
Evidence for the PW in the acquisition data

- Sequences of consonants to be syllabified in different syllables appear word-initially: sC clusters (Marta) (Fikkert & Freitas 1999; Freitas & Rodrigues 2004)

  - estrela /ʃ.trela/ [ʃtɛlə] (2;1.19) ‘star’
  - esticar /ʃ.tiˈkærə/ [ʃ ti kæɹə] (2;2.17) ‘to stretch’

- POA assignment – word-left periphery first (Inês 1;8.2 – 1;9.19) (Costa & Freitas 2003; Costa 2004)

  - copo /kɔˈpoʊ/ [pɐtu] ‘glass’
  - tampa /tɐŋˈpaɾ/ [pɔɾtɐ] ‘cover’
  - folha /fɔˈʎa/ [kuʎa] ‘leaf’
Evidence for the PW in the acquisition data

• Unstressed word-initial vowels do not reduce as word-internal ones, matching the target system:

orelhas /oɾɐʃɐs/ [o̞liˈleɾɐʃ] (Inês: 1;10.29) ‘ears’

*e/ /u/

elefante /elɐfɐtɐ/ [iʃõtĩ] (Luís: 2;0;27) ‘elephant’

*e/ /i/

orelhas /oɾɐʃɐs/ [o̞dɐʒɐʃ] (Luís: 2;2.27) ‘ears’

*e/ /u/

These facts confirm our expectations: word-based phonology (matching the target system) emerges early in EP.
A Frequency Study of PW shape

- Language-specific frequency distributions of PW shapes in the input may constrain PW development.
- Variation depending on the statistical properties of the input language: emergence and development of subminimal PWs and/or PWs with more than a binary foot (e.g. Demuth & Johnson 2003, Lléo 2004, Prieto 2004).
- Analysis of PW shape frequencies in adult speech, child-directed speech and in children’s early productions.

CS: spontaneous data from 3 monolingual Portuguese children – 4.073 tokens (prosodic word forms).
AS: spontaneous adult speech (Português falado 90s): 23.459 tokens
CDS: spontaneous adult speech: 23.207 tokens
PW shape frequencies in the input

Differences
- CDS: monosyllabic CV shapes prevail over trisyllabic and 3+
- AS: balanced distribution monosyllabic and PWs larger than binary foot (28.6% and 27%), monosyllabic CV and long PWs (7.4% and 8%)

Similarities
- Frequency of disyllabic PWs
- Frequency of monosyllabic non-CV PWs

Different frequency-based predictions
Different frequency-based predictions
- **CDS**: child speech will show a high incidence of subminimal PWs, while complying with maximality constraints (i.e. 3+ avoided/truncated in early speech & acquired later)

- **AS**: early child speech will show both the presence of subminimal PWs and larger PWs, thus not complying with constraints on word size
The shape of early words

Word shape frequency in Child Speech and in the input compared (tokens)
The shape of early words

Word shape frequency in Child Speech and in the input compared (tokens)

- Disyllabic shapes predominate, as expected (≈AS/CDS)
- Crucial data: 1, 3, 3+
  - CDS: the % 1 is lower 28/43
  - the % 3 and 3+ is much higher 25/10
  - AS: the % 1 is ≈ 28/29
  - the % 3 and 3+ is also ≈ 25/27

The prediction based on AS frequency patterns was borne out: early CS shows BOTH subminimal and larger words

<table>
<thead>
<tr>
<th>Correlation</th>
<th>CS</th>
<th>AS</th>
<th>CDS</th>
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<tr>
<td>CS</td>
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<td>AS</td>
<td>.99*</td>
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<td>.91</td>
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<tr>
<td>CDS</td>
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<td>.99*</td>
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</table>
Early words: Summary and Discussion

**Summary of findings**
- PW shape frequencies in the input contribute to explain PW acquisition (AS in particular)
- As predicted by the frequency patterns, 3 targets appear early (1;01/1;02) & are produced early (1;02/1;07); 1:CV remain frequent until later stages
- The properties of the input grammar concur to promote the same effect

**Discussion**
- In EP, both the grammar and frequency effects promote the early production of the ≠ word shapes
- Strong evidence for PW in the input grammar may strengthen the frequency effects
- E.g., PW-edges are relatively well-delimited (> other RLs) a tendency is expected to faithfully reproduce edges in CS
Early words: Grammar and Frequency

- English, Spanish, Catalan, EP
  - Grammar: Eng > EP > Sp, Cat
    Prediction: Early production of the ≠ word shapes
    But shapes larger than a binary foot: Sp, EP > Eng, Cat
  - Frequency: Sp (≈30%), EP (27%) > Cat (15%) > Eng (≈5%)
    But Sp, EP > Eng, Cat
    If frequency alone explains the early appearance in Sp and EP, it does not explain the fact that they seem to emerge equally late in Cat and Eng

✓ If a Grammar & Frequency interaction is assumed: a considerably higher frequency in Cat, but much strong grammar cues in Eng.

• Still, little data available!
2. Prosodic structure and coda development

- Prosody is acquired at a very early stage (Gerken 1996, Morgan & Demuth 1996, Christophe et al. 2003a, 2003b, Peperkamp 2003, Prieto & Bosch-Baliarda 2006, a.o.)

- However, the potential relevance of higher-level prosodic structure to syllable development is largely unstudied.

- Goal: PW, PhP and IP (edges and prominence)

- Materials: linguistic diary database of spontaneous production data of L, 1;05-3;04, 6,426 utterances, 18,496 words, annotated for prosodic phrasing on the basis of the target+insights from temporal&intonational properties of the speech of L (LumaLiDa, www.fl.ul.pt/laboratoriofonetica/lumalidaon.htm)
2. Prosodic structure and coda development

- Total nº of [ʃ, r, l] codas in the target: 5535
- Total nº of codas produced by L: 354
- Most common repair strategies: epenthesis [i], C deletion+[i]
2. Prosodic structure and coda development

- Most common repair strategies: epenthesis [i], C deletion+[i]

[sẽj 'ãli] [[sem ar]_,] (airless) 02;05.16
[u t'itu] ... [kojted'iju] [ k'e bǐk'ai]

[[o Tito]_,] [[coitadinho]_,] [[queR brincar]_,] 02;07.16
(Tito, poor thing, (he) wants to play)

['eu v'o ẽud'a t'u // 'eu v'o ẽud 'ai]

[[eu]_, [vou ajudar-te]_,] [[eu]_, [vou ajudar]_,] 02;08.07
[k'ɛru det'ami // k'ɛru det'ai

[[quero deitaR-me ]_,] [[quero deitar]_,] 02;11.11
2. Prosodic structure and coda emergence

Repair strategies: edges

- Before 3;00: 86.7% of L’s utterances > 1PW (MLU of 1.5 at 2;02)

Phrase edges promote RS production
2. Prosodic structure and coda emergence

Repair strategies: prominence

- Before 3;00: 86.7% of L’s utterances > 1PW (MLU of 1.5 at 2;02)

Higher-level prominence promotes RS production
2. Prosodic structure and coda development

- Coda production

[v'ɐmu buk'ɑ a lɐt'ɛn̩s] ... [ɐ lɐt'ɛn̩s] // [v'ɐmu buk'ɑ a lɐt'ɛn̩s]
[[vamoS buScaR]_φ [aS lanteRnas]_φ]_I [[aS lanteRnas]_φ]_I [[vamoS buScaR]_φ [aS lanteRnas]_φ]_I

(Let’s get the torches, the torches, let’s get the torches)

[t'ɑ a juv'e b'ɔlɔs] [[está]_φ [a choveR]_φ [bolas]_φ]_I

(it’s raining balls)

[ɐ m'iŋa j'ufəʃ] [[aS minhaS chuchas]_φ]_I

((the)my pacifiers)

[s'ẽ̞w ɐ m'ɐjə] // du d'ia] [[sãõ]_φ [aS meias]_φ]_I [[do dia]_φ]_I

[ˈete s'ẽ̞w ɐ m'ɐjə du d'ia] [estaS]_φ [sãõ as meiaS]_φ [do dia]_φ]_I

(these are the socks of the day)
2. Prosodic structure and coda emergence

Coda production: prominence

- Before 3;00: 86.7% of L’s utterances > 1PW (MLU of 1.5 at 2;02)

Prominence has no effect on coda production
2. Prosodic structure and coda emergence

Coda production: edges

- Before 3;00: 86.7% of L’s utterances > 1PW (MLU of 1.5 at 2;02)

Phrase edges promote coda production
2. Prosodic structure and coda emergence

- Coda production: the IP edge
- IP-final position as the main prosodic factor that triggers coda production
- Summary
  RS (2:04): emerge at phrase edges and in prominent positions > 65% of RS occur in words which are heads of IPs and/or syllables at the IP-edge (20% are PhP-related)
  Produced codas (3:00): emerge at phrase edges. However the edge effect is not incremental: the crucial factor is the IP-edge.
- Conclusion: higher-level prosodic structure plays a key role!
3. Early intonational development

- Early intonational development in European Portuguese (EP) is largely unstudied.
- Recent studies have reported different results on the relation between the acquisition of intonation and the development of grammar (and the lexicon):
  - Adult inventory acquired before the two-word stage; tone-text alignment mastered from the beginning; pitch scaling mastered later (Catalan: Prieto & Vanrell 2007, Prieto et al. 2008);
  - Adult inventory not acquired before the two-word stage; systematic differences in peak alignment between early CS and AS; correlation with vocabulary size (Dutch: Chen & Fikkert 2007);
  - Intonational development associated with the onset of word combinations; accent range at 1;06 similar to 4;00 (English: Snow 2006).
3. Early intonational development

- Our first goal: to describe the intonational properties of early utterances in EP in the AM framework.
  - We address three questions:
    1. Is the inventory of pitch accents and boundary tones adult-like?
    2. Does the child master the alignment and scaling properties of tonal events?
    3. What does intonation tell us about other prosodic properties of early utterances, namely word stress and prosodic phrasing?

- Our second goal: to assess whether intonational development is correlated with grammatical and lexical development.
Prosodic organization of Language - II

Prominence and Intonation

A introdução segundo ouvi dizer apresenta a teoria dos domínios
Method

- **A case study**
  One monolingual child aged between 1;00 and 2;02 (L)

Empirical database:
- a longitudinal corpus of every other week videotape recordings of about 60 minutes each (inv+par; Lab. Psicolingüística, FLUL)
- a corpus of audio recordings made on a nearly daily basis (par; Lab. Fonética, FLUL; available)

- **Materials**
  443 utterances (all 1 & 2 word meaningful utterances from 1;00 to 1;05; first 20 utterances from 1;06 to 1;11 and 2;02). 22 utts were unusable (poor sound quality) > 421
  Average 32.4 utts / month
  Criteria for meaningful utterances:
  1. Relation to adult word
  2. Context: appropriate use
  3. Consistency (in relevant stage)
  4. Adult confirmation (interaction)
  CDS: exploratory analysis random sample of 50 utterances
Method

- Prosodic analysis


H+L* is the most common nuclear accent

Table 1. EP tunes: labels, realization of the nuclear contour, usage.

<table>
<thead>
<tr>
<th>Labels</th>
<th>Realization</th>
<th>Context/ Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H) H+L* L%</td>
<td></td>
<td>Neutral declarative</td>
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<tr>
<td>(H) H*+L L%</td>
<td></td>
<td>Topic phrase</td>
</tr>
<tr>
<td>(H) H*+L !H+L* L%</td>
<td></td>
<td>Focused declarative</td>
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<tr>
<td></td>
<td></td>
<td>Early focus</td>
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<tr>
<td>L*+H H%</td>
<td></td>
<td>Continuation</td>
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<tr>
<td></td>
<td></td>
<td>Parenthetical</td>
</tr>
<tr>
<td>(H) H+L* L%</td>
<td></td>
<td>Wh-question</td>
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<tr>
<td>(H) H+L* LH%</td>
<td></td>
<td>Neutral yes-no question</td>
</tr>
</tbody>
</table>
2. Method

Requests are all low

H*+L is used in focused declaratives and commands

Two kinds of calling contours

Only 17% of IP-internal stressed syll are accented

Our observations strongly suggest that the same set of contours is used in CDS (although with wider pitch range)
Results

- Intonation and language development

<table>
<thead>
<tr>
<th>Age</th>
<th>1;00</th>
<th>1;01</th>
<th>1;02</th>
<th>1;03</th>
<th>1;04</th>
<th>1;05</th>
<th>1;06</th>
<th>1;07</th>
<th>1;08</th>
<th>1;09</th>
<th>1;10</th>
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<th>2;01</th>
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<tr>
<td>MLU w</td>
<td>1.06</td>
<td>1.14</td>
<td>1.10</td>
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<td>1.18</td>
<td>1.05</td>
<td>1.20</td>
<td>1.29</td>
<td>1.26</td>
<td>1.46</td>
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<td>1.18</td>
<td>1.06</td>
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Results

- Utterance type

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<tr>
<th>Type</th>
<th>Count</th>
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<td>Decl</td>
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<td>Foc</td>
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<td>Req</td>
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<td>Com</td>
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<td>Call</td>
<td>8.79</td>
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<tr>
<td>Low call</td>
<td>4.28</td>
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Word size >1.5
Results

• Utterance type

<table>
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<tr>
<th>Utterance type</th>
<th>Value</th>
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<tr>
<td>Decl</td>
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<tr>
<td>Low call</td>
<td>4.28</td>
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Word size >1.5
Call  
Low call  
1:07  
be´a be´a  ‘Mami, Mami’

(L+H* !H%)  
Vocative chant (greeting)

(L+H* L%)  
Low vocative chant (insisting call)

Call  
Low call  
1:08  
´te:´te:  ‘Tito, Tito’
Results

- **Choice of tonal events** (% correct shape)

- **Main deviant patterns**

**AS/CDS:**
- Decl: H+L* L%
- Call: (L)H* !H
- Int: H+L* LH%
- Req: H L* L%
- Com: H*L L%

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## Table

<table>
<thead>
<tr>
<th>Decl</th>
<th>Focus</th>
<th>Req</th>
<th>Com</th>
<th>Calling</th>
<th>Low call</th>
<th>Int</th>
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<td>100</td>
<td>21</td>
<td>97</td>
<td>89</td>
<td>100</td>
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### Time Table

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</table>
Results

- Accent and Stress

Stress patterns in disyllables:
Initially: level stress and stress shift
Final stress becomes stable first

- Level stress: with different pitch accents & both final and penult
  `m6`m6~ (1;05) m6`m6~ ‘mum’
  `pa`pa (1;06) `bOl6 ‘ball’

- R Stress shift: with diff accents, including H+L* and H*+L
  `pa`pa (1;08) `bOl6 ‘ball’

- L Stress shift: with H*+L
  `m6m6 (1;06) m6`m6~ ‘mum’
Results

- Accent and Stress
  - Our findings strongly suggest an interplay between accent and stress in acquisition

<table>
<thead>
<tr>
<th>Stress patterns in EP: Penult 76%; Final 22%+ Monosyl 22%</th>
<th>Frota et al. 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phrasal prominence is final</td>
<td></td>
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<tr>
<td>Main phonetic correlate for word stress: duration</td>
<td>Delgado Martins 2002</td>
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<tr>
<td>Stress is not cued by tone: pitch accent distribution is sparse (only 17% of IP-internal word stresses are pitchaccented Vigário &amp; Frota 2003)</td>
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<tr>
<td>HL* is the most common nuclear accent</td>
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</table>


- May account for (i) why stress is not straightforward, (ii) tendency to have H*T with penult stress or L stress shift, (iii) initial later alignment of leading H in HL* (no L stress shift with HL*)
Results

- Phrasing

  Initial stage: disyllabic targets, if uttered with 2 syllables, tend to be produced with one pitch accent per syllable (usually falling accent). 88.4% of such cases occur until 1;04.

  44% of words uttered with 2 syllables show 2 pitch accents (n=38/87). End of this stage coincides with the onset of disyllabic words: word size > 1.5 at 1;04.

  Other properties:
  - Level stress predominates (64%)
  - Longer duration of C2 in C1VC2V (similar to C2 between words)
  
  e.g. Demuth & McCullough 2008

  Suggests: syllable≈PW≈phrase >> PW≈phrase
3. Intonational development: summary

- **Choice of tonal events** (for the range of contours produced) is mostly correct as early as at 1;05; coincides with (i) use of a variety of utterance types, (ii) word size > 1.5
- **Inventory of pitch accents and boundary tones is adult-like** at 1;09 (=Catalan); coincides with lexicon size > 20)
- **No early mastery of tone-text alignment** (=Catalan, =Dutch): initially <H+L*. At **1;09** alignment similar to AEP. Initially, level stress and stress shift. After **1;09**, stress patterns stable. Interplay between pitch accent and stress.
- **Scaling not mastered from the beginning**. It seems to become stable before alignment (=Cat), for Decl. at 1;06. But there are aspects of scaling not mastered until later (!H in calls).
- Evidence (tonal, duration) for the construction of prosodic phrasing
4. Development of temporal patterns

Temporal patterns in adult speech may differ across languages:
- The stretch over which FL is realized varies (Frota 2000; Byrd, Krivokapic & Lee 2006)
- Shortening of syllabic duration as a function of the number of syllables (Oller 1973)
- Rhythm (Ramus, Nespor & Melher 1999, Frota & Vigário 2001)

Development of temporal patterns? Two main issues:
- Development of prosodic structure (‘bottom-up’ or ‘top-down’ constrains on speech production - e.g. Gerken 1996, Natani et al. 2003)
4. Development of temporal patterns

- Goals:
  - Examine the development of temporal patterns in EP, with two aims:
    1. Contribute to the debate over the role of biological factors and the native language (by examining similarities/differences across languages)
    2. Contribute to the study of the emergence of prosodic structure in production (especially utterance/intonational phrase and word)
  - 1st study of the development of temporal patterns in EP: integration with research on intonational development (Frota & Vigário 2008) >> same child, same materials
### Method

- **Case study**
  One monolingual child: 1;04 a 2;04 (L)

- **Database:**
  - a corpus of audio recordings made on a nearly daily basis (LumaLiDaAudy, Lab. Fonética da FLUL)
  - targets and actual production orthographically and phonetically transcribed (M. Cruz & N. Matos; S. Frota)

- **Materials**
  All utterances with meaning & that could be acoustically analysed

Criteria for meaningful utterances:
1. Relation to adult word
2. Context: appropriate use
3. Consistency (in relevant stage)
4. Adult confirmation (interaction)
Method

- **Acoustic analysis**
  SpeechStation 2.0:
  Spectrograms + waveforms
  Silence of stops in initial position excluded from the measures

- **Duration measures**: Syllable, PW (target), Utterance (=IP) ("vocalizations separated from all others by audible breaths or in accord with adult judges’ intuitions about utterance boundaries" Oller & Linch 1992)

- **Other measures**
  Status of each syllable >
  Stress
  position in PW and IP (initial, medial, final, monosyllabic)

  **Size of the PW** >
  nº segments; nº syllables

  **Size of the IP** >
  nº segments; nº syllables; nº PWs

- **Statistics**
  SPSS16.0 & Statistica5.1
  Correlations analysis (Pearson) and analysis of variance (p<.01)
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<td>3 (1)/2 (3)</td>
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Período: 1,06 años de edad
Palabra alvo: pé
Posición en el enunciado: 5

[p a]
Nome do fichário: 010505a Dec Lindo
Período: 1,06 anos de idade
Palavra alvo: mamã
Posição no Enunciado: 5
Nome do arquivo: 080106c Decl
Período: 2,02 anos de idade
Palavra alvo: carro
Posição no Enunciado: 5
Results

- Linguistic development of L audio+video (Frota & Vigário 2008)

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<th>1:09</th>
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<td>1.18</td>
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<td>1.26</td>
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Lexicon size

- Wp>20
- Wp>50a
- Wp>50b
- Wp10-20a
- Wp10-20b
Results

• In our data
  Is the size of the units under analysis different?
  Tukey HSD test; sig. = p < .01
  • Only for IP at wp>50b

Different predictions
Frota & Vigário (2008):
  • 1;04; 1;09; 2;02
In this set of data:
  • 2;03-04
Results

Correlations and their development

Results suggest two moments of reorganization of temporal patterns:

- 1;04 – syllable / word (PW duration and nº of syllables)
- 1;08-09 – syllable duration and nº of units at higher domains
  - Dur syl/nºsyl IP > Dur syl/nºsylPW > Dur PW/nºsyl IP
- 2;02 e 2;03-04 show the same behaviour

Results support the predictions based on general measures of development and not on measures derived from the specific set of data under analysis.

Development of correlation patterns between syllable duration and nº of units at higher levels > ‘u-shape’ – discontinuity pattern explained by linguistic acquisition vs. Continuity based on biological factors (Robb & Saxman 1990, Snow 1994, 2006) > emergence of prosodic structure.
Results

- Syllable duration by position
  - Up to wp>20, similar pattern of durations in PW and IP
  - From wp>20 (1;08-09), onwards, clear final lengthening at IP-level and reduction of duration of syl at I and M positions
  - Supports reorganization at 1;08-09 (correlations)
  - Separation PW / IP: final lengthening at IP-level in adult speech vs. PW (Frota 2000)

<table>
<thead>
<tr>
<th></th>
<th>Dur. Sil</th>
<th>Wp&lt;20</th>
<th>Wp&gt;20</th>
<th>Wp&gt;50</th>
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<td>463</td>
<td>Ns</td>
<td>491</td>
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**PW: average values**

**IP: average values**

* sig. = p<.01
Results

Final lengthening:
Syllable duration and position at IP

Syllable duration and stress, by position

No significant result. Just a tendency towards longer stressed syllables, that disappears at wp>20, and the final position effect emerges at wp>50
Results

Syllable duration and stress, by position

1 = Initial; 2 = Medial; 3 = Final; 5 = Monosyllabic
Results

- Duration of similar syllables
  - [pa, ma, ma]; N=99
  - **Tendency towards shorter syllables** (after 1;04);
    diff. Significant wp10-20b (1;06) & wp>50b (2;03-04)
  - EP different from French (DeBoysson-Bardies et al. (1981) >
    longer syllables between 18 to 20 months);
  - EP different from English (Robb & Saxman (1990) > no regular
    pattern change between 7 and 27 months; Kent & Forner 1982 >
    reduction of duration as a function of maturation from 4;00 onwards)
Summary

- Results show **two moments of reorganization of temporal patterns**: 1;04, coincides with the emergence of disyllabic words (‘wsize’ > 1.5); 1;08-09, coincides with 1st lexical explosion and precedes IP>1.5PW (Frota & Vigário 2008).
- Development of correlation patterns between syl duration and nº of units at higher levels > 'u-shape' – discontinuity explained by acquisition (Robb & Saxman 1990, Snow 1994, 2006) > emergence of prosodic structure.
- From 1;08-09, **FL at the IP-level** and reduction of syl duration at I e M, clear distinction between PW and the IP patterns (≈ PE, Frota 2000).
- Evidence for the role played by **native language**.
- Temporal patterns provide evidence for construction of **prosodic structure**.
Discussion

- **Development of prosodic structure**: ‘bottom-up’ or ‘top-down’ process
  - Findings from the intonational development of L (Frota & Vigário 2008) have shown an initial stage where ‘syllable≈PW≈phrase’. The end of this stage coincides with the emergence of disyllabic PW at 1;04: ‘syllable≠PW≠phrase’
  - This matched with 1º **moment** of reorganization of temporal patterns: e.g. Correlation between PW duration and n°syls.
  - Duration findings show 2º **moment** of reorganization at 1;08-09, compatible with the interpretation that PW≠phrase. Coincides with 1st lexical explosion, with the development of the intonational system, and it is precursor of ‘two-word stage’: e.g. dif. Duration patterns PW / IP.

- Evidence for the **Hypothesis** of development of prosodic structure (Frota & Vigário 2008): syllable≈PW≈phrase>> syllable≠PW≠phrase>> syllable≠PW≠phrase
Early prosody: General summary

- Early production of the ≠ word shapes (input frequency and grammar effects), matching the target
- Higher-level structure constrains coda development: RS (2;04)/Coda production (3;00)
- Inventory of pitch accents and boundary tones is adult-like at 1;09 (coincides with lexicon size)
- Convergent evidence from intonation and duration patterns for the emergence of prosodic structure
  syllable≠PW≠phrase>> syllable≠PW≠phrase>> syllable≠PW≠phrase

Obrigada!
References


References


Robb, Saxman & Grant, 1989. Vocal fundamental frequency characteristics during the first two years of life. JASA 85.4, 1708-1717.


References


Papers and presentations (co)authored by S. Frota are available at http://www.fl.ul.pt/laboratoriofonetica/personal/sfrota/
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