Introduction

Study focusing on early perception of lexical stress.

Word stress is a prosodic dimension that varies across languages.

- Properties of stress in the phonological grammar: variable stress (Catalan, English, Spanish, Russian);
  fixed stress (French, Finnish, Polish, Turkish).

- BUT a significant interaction: the weighting of cues for stress prominence.

Stress plays a central role in:

Properties of stress in the phonological grammar

• Phonological organisation of prosody
• Language processing and language acquisition

Converging evidence suggesting that infants are equipped with an input processing mechanism initially tuned to prosodic information. Word stress suggested to facilitate:

- Segmentation of the speech signal into words
- Tuned to prosodic information. Word stress suggested to facilitate:

Main finding from previous research: The perception of word stress is language specific > grammar, rhythm, input frequency. Perception develops as a function of the prosodic features of the native language.

Stress in European Portuguese (EP)

EP has variable stress (= Catalan, Spanish, English):

- may fall within last 3 syllables of the prosodic word
- is lexically contrastive (bambo/bambo, bambu/bambu, 'ax/bamboo', exploits [i][p][l][t][s][u][i],[l][p][t][s][u][i],[l][p][t][s][u][i]) make explicit

Correlates of stress – diverse set of cues

- suprasegmental cues: duration (=Spanish, Catalan), low co-variation between stress and pitch accents (=Spanish, Catalan, English),
  segmental cues: vowel quality > reduction of unstressed vowels (=English, Catalan), i, e, a, o, u (=general phenomenon with exceptions)
  uncommon combination: longer duration in stressed syllables, vowel reduction in unstressed syllables, low co-variation stress/accents (most stressed syllables unaccented)

Frequency data (% trochaic disyllabic words: token, type):

- English 74%, 78%; EP 66%, 74%; Spanish 60%–70% / EP in CD5 63%, 70%
  (Pons & Bosch 2010; FrePoP database http://frepop.letras.ulisboa.pt)

Rhythm – mixed properties

• combines Germanic and Romance features: mix of stress-timed and syllable-timed rhythm, but
  NOT perceived as a stress-timed language (Frota et al. 2001, 2002)

No previous infant studies

- Infants & toddlers sensitive to stress location in a word learning study (meu / [m/mu]) (Frota et al. 2012)

Method

Participants

24 infants from monolingual homes in the Lisbon area (16 boys, mean age = 5 months 26 days, range 5 m 2 d – 6 m 28 d)

6 infants excluded due to fussiness (2) and poor tracking (4)

Materials:

Disyllabic segmentally varied nonsense words with penultimate and final stress, uttered by female speaker in CDS. Suprasegmental cues the only cues to stress e.g., [milu] / [mi’lu], [bu] / [bamba], [lax] / [lakambu], [lax] / [lakambu], [i] / [j] or [u] was balanced across training and testing. V = [j] or [u] was always [u].

Training

- infants trained to associate each stress pattern (Trochee/Iamb) with one image and side of screen
- 2 test trials (1 trochee, 1 iamb, counterbalanced)

Test

- screen from 2 frames but no images while listening to novel tokens
- * 2 test trials (1 trochee, 1 iamb, counterbalanced)

Colour of the images alternated between blocks

Results

Discrimination: longer looking time to the target side

No difference in looking times to iambo/ trochaic training trials, NO Discrimination

Training phase: No effect of trained side (F(1,20) = 1.96, p = .18, n2 = .29) or counterbalancing (F(3,20) = 1.3, p = .18, n2 = .09), and no interaction (F(3,20) = 1).

Window: 500ms after onset to 2000ms

ANOVA: No effect of target side (F(1,20)=1.53,p=23.3,707), order (F(1,20)=2.55,p<13.9,11) or stimuli (F(1,20)=1), BUT a significant interaction between target side and stimuli (F(1,20)=8.55,p=5.9,7,23)

Interaction between target side and stimuli > suggest a preference for one of the stress patterns, possibly shown by an asymmetry in looking behaviour

No effect in looking times to trochaic-trained sides, by trochaic and trochaic, test trials

Discussion

Findings confirm that asymmetries in stress perception emerge early in development and are language specific.

We add a new pattern to the previously described dichotomy between Trochaic preference and No preference – lambahic preference.

This new finding is in line with two so far unrelated facts in the literature on EP:

- Early children’s productions: (0:11-2:06) > WS (Correia 2009); and more lambahic targets attempted (Vigário et al. 2006).
- Recent findings show an advantage for Iambs in adult perception of stress (Lu et al., in press).

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Infants first develop the familiar native language pattern.

What language-specific factors shape early perception of stress?

- Native phonological grammar – variable stress/forced stress/stress domain (foot, word, phrase)
- Rhythmic properties – stress timing, syllable timing, mix
- Input frequency – relative distribution of trochees and iambs (modulated by other factors? E.g., direction of citation)
- Others?
- A combination of factors > Ambient language cluster of cues

Troccha bias

No preference

Lambah bias