Early interpretation of stress and pitch contrasts in European Portuguese

Sónia Frota, Cátia Severino, Joseph Butler, Susana Correia & Marina Vigário

Universidade de Lisboa (Laboratório de Fonética & Lisbon BabyLab – CLUL/FLUL)


1. Introduction

Acquisition of phonology requires learning to interpret phonetic variation. Across languages, prosodic properties may vary in their acoustic correlates and the phonological domains they signal.

The task for the young learner: Which variation is meaningless? Which variation conveys meaning, at what prosodic level (word level/phrasal level)?

Discrimination studies have shown (i) early sensitivity to pitch as a general ability, but not early sensitivity to stress; (ii) both language-specific stress perception and lexical tone perception by 9 months (e.g. Nazzi et al. 1998, Mattock & Burrows 2006, Mattick et al. 2008, Weber et al. 2004, Skorupa et al. 2009, Hille et al. 2009).

Word recognition studies have shown that pitch and stress are relevant to English learning infants by 7½ months; pitch register is discarded by 9 months; pitch contour interacts with stress (Jusczyk et al. 1999, Singh et al. 2008, Fikkert & Chen, in press).

2. Stress and Pitch in EP

European Portuguese (EP) is an intonation language with lexical stress:

- Stress is a word level property: Duration is the main cue to word stress (Andrade & Viana 1989, Delgado Martins 2002); stress can be contrastive.
- Pitch is a property of phrase level phonology: Pitch contrasts signal phrase level meanings; Sparse pitch accent distribution (Frota 2002, Vigário & Frota 2003).

- Acquisition of phonology requires learning to interpret phonetic variation. Across phonological domains they signal.

Conveys meaning, at what prosodic level (word level/phrasal level)?

3. Method I: Materials

Auditory stimuli recorded by native speaker in CDS: The disyllabic word form [mila].

Stress contrast: penultimate / final [mila] / [milha]: Cued by duration (stressed syllable) > 132 ms and by the alignment of the pitch fall (through the stressed syllable).

Pitch contrast: declarative / interrogative [H+L*] / [H+L*]: Cued by the low versus rising boundary and by the longer duration of the final syllable in interrogatives (> 117.165 ms).

4. Results

No bias towards any of the objects before the target word was heard (mean age = 1;9; Median age = 1;8).

Only children that learned the trained word were included in the analysis: fixation to the labelled picture > 50% – mean duration = 3.46 sec. (SD = 1.474, p = .001)

Children’s response to the declarative pronunciations (consonant SC, FC, both): Did children respond to the declarative pronunciations (consonants SC, FC, both)?

Only children that learned the trained word were included in the analysis: fixation to the labelled picture > 50% – mean duration = 3.46 sec. (SD = 1.474, p = .001)

ANOVA on the 95% looking time to the labelled picture: Significant main effect of condition (p = .024, 133.843, 4.62, p < .01). Significant interaction between condition and age (younger-group 1-2 vs. older-group 3-4; F(2, 62, 133.843) = 3.39, p = .069)

The children's response to the declarative pronunciations by age: Sensitivity to any of the changes as fixation the labelled picture NOT above chance

Proportion looking time at the labelled object picture across the 4 conditions, by age.

Development from sensitivity to pitch to sensitivity to stress.

5. Discussion

Pitch contour variation is regarded as relevant in new words by 1-year olds, whereas stress pattern variation is not, at odds with native language phonology.

2-year olds seem to be struggling to interpret phonetic variation. Only at 3½ do young learners interpret phonetic variation at the appropriate levels according to the native language. This grammatical tuning is still developing along the 4th and 5ths years.

Is stress variation too subtle a phonetic difference in EP (unlike in English – Curtin 2009)?

1-year olds have difficulties in detecting subtle phonetic contrasts when learning novel words (e.g., Werker & Yuqing 2005, Swingley & Aslin 2007). Production studies for EP have also shown difficulties with stress contrasts in early word production (e.g. Correia 2010).

A later acquisition of the phonology of word stress in EP.

Pitch contour variation is regarded as relevant in new words by 1-year olds, whereas stress pattern variation is not, at odds with native language phonology. 2-year olds seem to be struggling to interpret phonetic variation. Only at 3½ do young learners interpret phonetic variation at the appropriate levels according to the native language. This grammatical tuning is still developing along the 4th and 5ths years.

Is stress variation too subtle a phonetic difference in EP (unlike in English – Curtin 2009)?

1-year olds have difficulties in detecting subtle phonetic contrasts when learning novel words (e.g., Werker & Yuqing 2005, Swingley & Aslin 2007). Production studies for EP have also shown difficulties with stress contrasts in early word production (e.g. Correia 2010). A later acquisition of the phonology of word stress in EP.

Pitch contour variation is regarded as relevant in new words by 1-year olds, whereas stress pattern variation is not, at odds with native language phonology. 2-year olds seem to be struggling to interpret phonetic variation. Only at 3½ do young learners interpret phonetic variation at the appropriate levels according to the native language. This grammatical tuning is still developing along the 4th and 5ths years.

Is stress variation too subtle a phonetic difference in EP (unlike in English – Curtin 2009)?

1-year olds have difficulties in detecting subtle phonetic contrasts when learning novel words (e.g., Werker & Yuqing 2005, Swingley & Aslin 2007). Production studies for EP have also shown difficulties with stress contrasts in early word production (e.g. Correia 2010). A later acquisition of the phonology of word stress in EP.