Introduction

- Little is known about the developmental course of infants’ perception of linguistic intonation, as previous studies on pitch contrasts have focused on the acquisition of lexical pitch (lexical pitch accent, as in Japanese, or lexical tone, as in Mandarin). Japanese-learning infants are able to discriminate the native pitch accent contrast from as early as 4 months, and their discrimination abilities are maintained during the first year of life (Sato et al., 2008). Similarly, learners of tone languages show a developmental course of tone perception in the first year of life, from as early as 4 months (Mattock & Bumford, 2006; Mattock et al., 2008; Yeung et al., 2013).

- Infants at 7 months have been shown to prefer pairs of syllables with variable pitch when high pitch is in the first syllable, but no preference when duration differed between syllables (Bion et al., 2011). In fact, it has been shown that human infants and nonhuman animals can perceive pitch sequences into trochaic patterns based on pitch, but do not utilize duration as a cue to group sequences into iambic structures (da la Morra et al., 2012). These findings suggest that pitch and duration differences are processed separately, and that discrimination depends on perceptual abilities, while duration is dependent on language experience.

- Intonation languages (e.g., English, Portuguese) use pitch height, pitch direction, and pitch timing (which integrates duration and pitch) to convey phrasal meanings, like sentence type and pragmatic distinctions (Ladd, 2008; Frota, in press).

Experiment 1

Participants

- 40 infants; 20 younger (6 females, M = 5 months 29 days, range 5 months 6 days–6 months 23 days) and 20 older (10 females, M = 8 months 12 days, range 7 months 11 days–9 months 29 days).

Stimuli

- Segmentally varied syllabic one pseudoword utterances produced by a female native speaker in infant-directed speech. Word stress realized on the penultimate syllable.

Habituation trials: stimuli

- lamolo. lamo. la. molo. lo. la. mo. no. nora. nor. nora. nora.

Test trials: stimuli

- lamo. milo. lama. noro. no. nora. rina. lamolo. milolo. lamola. lama. luma. luma. norro. noro. nora. no. nora. nora.

Methodology

- Presentation of test stimuli counterbalanced between groups.
- Half the infants were habituated with lists of utterances, with the stimulus order varying between sessions.
- Stimuli were presented at a rate of 200 ms, with 300 ms between trials.
- Habituation trials consisted of 30 repetitions, with a break every 15 trials.

Discussion

- Significant difference between same and switch test trials (F(1,36) = 54.18, p < .001, η² = .6).
- No effect of age group (F(1,36) = 2.13, p = .15, η² = .06).
- No interaction between trial type and age group (F(1,36) = 3.29, p = .08, η² = .08).
- Paired T-tests: no significant difference between same and switch trials for younger (t(19) = 6.1, p < .001, d = 1.474) and older (t(19) = 4.42, p < .001, d = 0.816) groups.

Experiment 2

Participants

- 28 infants; 12 younger (6 females, M = 6 months 30 days, range 5 months 30 days–6 months 3 days) and 16 older (8 females, M = 12 months 8 days, range 10 months 16 days–14 months 6 days).

Stimuli

- Segmentally varied syllabic one pseudoword utterances produced by a female native speaker in infant-directed speech.

Habituation trials: stimuli

- pamako. dalemo. bitopoma. darone. turano. sinurra. lunurra.

Test trials: stimuli

- silamolo. rumili. quimola. fauma. pinorro. marrenino. cunurra. turrina.

Results

- Preliminary analysis: Significant interaction between trial type and age group (F(1,24) = 5.31, p < .05, η² = .14).
- No effect of trial type (F(1,24) = 1).
- No effect of age group (F(1,24) = 1).
- Paired T-tests: younger group shows no significant difference between same and switch trials (t(11) = 1.35, p = .21), older significant difference (t(13) = 2.29, p < .05).

Discussion

- Results show infants learning European Portuguese demonstrate a discrimination ability for the statement/question prosodic contrast as early as 5 months, and maintain this ability throughout the first year.
- However, for the broad/narrow focus contrast, infants only demonstrate discrimination by 12 months.
- Our findings suggest that the perceptual trajectory of intonation categories depends on the primary cues involved, supporting earlier results that show a protracted development of the perception of intonation.
- Furthermore, our findings suggest that perception of intonation categories based on a pitch direction contrast may be as precarious as lexical tone/lexical pitch accent perception, grouping pitch-contrastive groups as those that tend to show a precarious development of discrimination abilities (i.e., stress and duration/timing-related contrasts – Skoruppa et al., 2013; Frota et al., submitted).

References