Acoustic Properties of Infant-Directed Song and Speech
Isha Rojanala & Melanie J. Spence

Infant Learning Project, School of Behavioral and Brain Sciences

Introduction

Previous studies have found that infants show attentional preferences toward infant-directed song over infant-directed speech.

Identifying acoustic differences and similarities between infant-directed song and infant-directed speech may be useful for understanding why infant attention differs for these two vocalization types. Current literature has found that infant-directed (ID) song is slower in tempo and smaller in frequency range than infant-directed speech.

Previous studies have determined that infants can distinguish acoustic properties in speech that characterize different communicative intent, such as speech produced to comfort infants vs. recruit infant attention. For example, speech produced to elicit infant attention is higher in frequency and does result in more infant attention than speech produced to comfort infants.

No studies have determined whether acoustic differences due to different styles of communicative intent are present in infant-directed song.

In addition, previous studies haven’t discriminated between communicative types when presenting stimuli for infant directed song vs. speech comparisons.

If acoustic differences exist between communicative types of infant directed speech, differentiating between communicative types may impact infant preference for infant-directed speech vs. song.

Methodology

40 recordings from a vocalization corpus of infant directed speech and song from mothers across the world were chosen at random and sorted into four groups: song-attention, song-comfort, speech-attention, speech-comfort.

Recordings in four languages (English, Chinese, Polish, Hazda) were created by mothers in the presence of their infants.

10-sec increments were extracted from each recording and low-pass filtered at 700 Hz to remove semantic content

Praat, was used to analyze mean fundamental frequency (F0), frequency range, and tempo of each recording.

Analysis & Results

Separate two-way ANOVAs examined the effect of Vocalization Type (Song vs. Speech) and Communicative Intent (Comfort vs. Attention-bid) on three acoustic properties:

- Mean fundamental frequency: the average fundamental frequency of across all utterances within the 10-sec interval
- Frequency range: difference between highest recorded fundamental frequency and lowest recorded fundamental frequency across all utterances
- Tempo: total syllables across all utterances over total duration of interval (10 sec)

Main Effects

- Frequency Range:
  - ID Speech is significantly greater in frequency range than ID Song, F (1,36) = 6.58, p<.015, ID Speech (M = 283.13 SE = 28.41), ID Song (M = 227.41, SE = 12.86)
  - Tempo:
    - ID Speech significantly faster in tempo than ID Song, F (1,36) = 11.57, p<.0017, ID Speech (M = 2.12, SE = 0.12), ID Song (M = 1.56, SE = 0.11)

- No other main effects or interactions were significant

Independent t-tests found no significant differences in tempo or frequency range between types of communicative intent for infant directed song or infant directed speech.

However, within infant-directed speech, attention-bid ID speech was significantly higher in mean frequency than comfort ID speech.

Attention-bid ID Speech (M = 280.07, SE = ), Comfort ID Speech (M = 247.67, SE = 0.11), t (16) = 2.08, p<0.027

References

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2. Falk & Tsang, 2015
3. Fernald A., 1989
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Discussion

Consistent with the literature, infant-directed song was found to be significantly slower in tempo and smaller in frequency range than infant-directed speech. Furthermore, attention-bid infant-directed speech was significantly higher in mean frequency than comfort.

No significant acoustic differences were observed between attention-bid and comfort infant-directed song. This would indicate that there are no significant acoustic differences in attention-bid and comforting infant-directed song.

However, the ANOVA analysis found high levels of variability within each category of stimuli. This high variability may be due to the small sample size per category (10 per each).

In addition, a limited number of acoustic measures (tempo, frequency mean, and frequency range) were assessed.

Thus, a new study with a larger sample size and greater breadth of acoustic measures is merited to better determine the presence of acoustic differences and similarities in communicative intent for infant directed song.