



# A Test of Voice Familiarity Effects on 4-Month-Olds' Categorization of Infant-Directed Speech

Melanie J. Spence, Kristin J. Atchison, Elvalicia Granado and Julie F. Sokolsky  
The University of Texas at Dallas



## Abstract

This study examined the effect of voice familiarity on 4-month-old infants' categorization of approving and comforting infant-directed speech (IDS). Previous studies have shown that 4-month-olds did not categorize IDS presented by unfamiliar talkers. Infants ( $n=37$ ) were familiarized with a female voice and then tested for categorization of approving and comforting IDS spoken by that voice. Categorization was assessed using a habituation procedure in which either approving or comforting IDS was presented contingent on fixation of a visual stimulus. Following habituation, four test trials occurred, consisting of two novel stimuli from the familiarization category and two novel stimuli from the unfamiliar category. Infants discriminated the familiarization and novel categories only when approval IDS followed comforting IDS ( $F(2, 70) = 3.587, p = 0.033$ ). The results suggest that approving IDS, with higher fundamental frequency and more variable contours, elicits more attention following lower-frequency comforts than do comforts following approvals. This finding is consistent with results of other studies testing 4-month-olds' IDS categorization while viewing non-face visual stimuli.

## Introduction

- ❖ Infant-directed speech (IDS) may communicate speakers' affect and emotion to infants:
  - Adults vary IDS prosody as a function of context & intent (Fernald, 1992; Papousek et al., 1991; Stern et al., 1982)
  - IDS regulates infant affect & behavior (Cooper & Aslin, 1990; Fernald, 1993; Pegg et al., 1992)
- ❖ If IDS serves these functions
  - Infants must categorize different prosodic IDS classes to discriminate speaker affect and intent.
- ❖ Previous studies have found that 6-month-olds, but not 4-month-olds, categorized approving and comforting IDS produced by:
  - Multiple unfamiliar talkers
  - Single unfamiliar talker
    - (Moore, Spence, & Katz, 1997; Spence & Moore, 2003)
  - 4-month-olds categorized IDS when presented with a female face (Spence, Chuang, & Sokolsky, 2004)
    - Younger infants may need additional cues for categorization
- ❖ Another cue that may aid categorization is talker-specific information
  - Speech processing may be a "talker-contingent process" (Nygaard, Sommers & Pisoni, 1994):
    - Talker familiarity improved adults' intelligibility of novel words in noise (Nygaard & Pisoni, 1998)
    - Adult memory for words is better when words are spoken by a single talker (Mullennix, Pisoni, & Summers, 1989)
    - Preschoolers' word recognition is negatively affected by talker variability (Ryalls & Pisoni, 1997)
    - 7.5-month-olds recognized words spoken by same gender talker (Houston & Jusczyk, 2000)

## Purpose

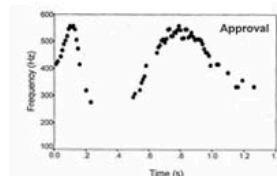
- ❖ This experiment tested if four-month-olds categorized approving and comforting IDS spoken by a familiar voice.
  - Infants were familiarized with one voice and tested with the **same voice** in the categorization experiment.
  - During the categorization task:
    - Infants first habituated to one IDS category
    - Presented 2 novel IDS stimuli from familiarized category
    - Presented 2 IDS stimuli from novel category

## Methods

- ❖ **Participants**
  - 37; 3.5- to 4.5-month-olds
- ❖ **Auditory Stimuli**
  - Familiarization task: 10 nursery rhyme phrases
  - Categorization task: 10 approving & 10 comforting IDS
  - All stimuli produced by one female talker
- ❖ **Procedure:**
  - Familiarization task:
    - Habituation criterion of 20 trials
  - Categorization task:
    - Habituated to approvals or comforts
    - Habituation criterion: 3 consecutive trials decreased 50% or below 1st 3 trials of habituation (Habit 2000; Cohen, Atkinson & Chaput, 2000)
  - Four test Trials:
    - Within-Category test trials: 2 novel IDS stimuli from the familiar IDS category
    - Between-Category test trials: 2 IDS stimuli from the novel IDS category

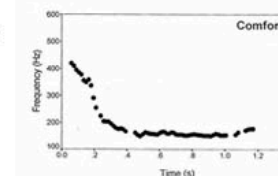
Approving ID speech:

- High mean F0
- High mean F0 variability
- Bell-shaped frequency contours



Comforting ID speech:

- Low mean F0
- Low F0 variability
- Falling frequency contours

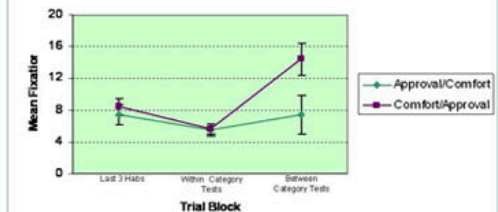


## Acknowledgements

- ❖ This research was funded by:
  - Timberlawn Psychiatric Research Foundation Award; UTD Faculty Research Initiative Award; Callier Excellence in Education Award
- ❖ Address correspondence and reprint requests to:
  - Melanie J. Spence: School of Behavioral & Brain Sciences; University of Texas at Dallas; Box 830688, GR 4.1, Richardson, TX 75083-0688, mspence@utdallas.edu

## Results

- **ANOVA:**
  - Familiarization Stimuli (Approval and Comfort) x Trial Type (Last Habituation, Within-Category Test Trials, Between-Category Test Trials)
  - Dependent measure: Mean fixation time
  - **Familiarization Stimuli X Trial Type Interaction:**
    - $F(2, 70) = 3.587, p = 0.033$
- **Pair-wise Comparison:**
  - Comfort Group:
    - Last 3 Habituation Trials & Between Category Tests:
      - $M\ diff = 6.024, SE = 1.258, p = 0.051$
    - Within Category Tests & Between Category Tests:
      - $M\ diff = 8.752, SE = 2.605, p = .009$
  - Approval Group:
    - No significant differences



## Discussion

- ❖ 4-month-olds discriminated approvals following comforts, but did not discriminate comforts following approvals.
  - This implies infants responded to acoustic properties of approving stimuli
  - Results consistent with earlier studies using unfamiliar voices
- ❖ Why didn't voice familiarity facilitate processing?
  - Different prosody & utterances at familiarization and categorization tests
  - Inadequate voice familiarization for discriminating approving and comforting stimuli
  - IDS presented in absence of social context or interaction
- ❖ Conclusion:
  - Voice familiarity in this study was not sufficient to aid categorization of IDS.