

## BACKGROUND

Habituation paradigms show that 6-month-olds categorize audio-only and audiovisual infant-directed speech (IDS) utterances based on the communicative intent of the message (i.e. approving & comforting).<sup>1,2,3,4</sup>

- Categorization is a cognitive mechanism allowing similar information to be grouped together into perceptual categories.<sup>5</sup>
- Communicative intent: meaning or intended function of the speaker's utterance. Intent is displayed in both facial and vocal speech.<sup>6</sup>

IDS	Vocal Features	Facial Features
Approving	Higher F <sub>0</sub> , Wider F <sub>0</sub> range	Wide eyes, Smiling mouth
Comforting	Lower F <sub>0</sub> , Narrow F <sub>0</sub> range	Sad eyes, Frowning mouth

Audiovisual speech is naturally synchronous and sensory redundant.<sup>7,11</sup> Synchrony between auditory and visual streams directs sensory exploration in the first postnatal months.<sup>7,8,13</sup>

- Redundancy ensures infants attend to acoustic and visual information that belong together over discordant streams of information - an essential component of adult perception.<sup>9,10,19</sup>

Prior research investigated how facial-vocal synchrony impacted infants' categorization of IDS intents. 6-month-olds categorized synchronous but did not categorize desynchronous IDS intents.<sup>1,4</sup>

- Desynchronous IDS: visual and auditory streams communicate different utterances in the same intent category.
- The absence of sensory redundancy may have impacted infants' failure to categorize desynchronous IDS in past studies. Auditory and visual streams may have been perceived as two separate unimodal events.

## RESEARCH OBJECTIVES

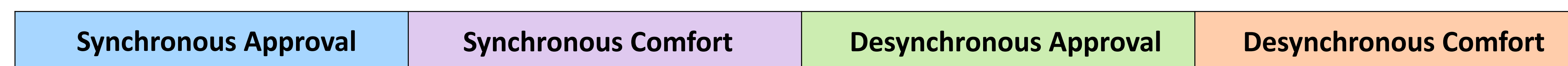
1. To examine 6-month-old infants' eye-tracking of synchronous approving and comforting audiovisual ID faces.
2. To examine the effect of facial-vocal desynchrony on infants' scanning of speaking ID faces.

## HYPOTHESES

1. Longer looking to mouths in approval conditions, based on prior research<sup>6,15,20</sup>
2. Longer looking to mouths during desynchronous IDS vs. synchronous IDS

## METHOD

- Infants viewed stimuli on Tobii T60XL eye-tracker, sitting on parent's lap
- Five-point calibration followed by stimulus presentation
  - One 15-second pre-test trial: silent animated drum (not analyzed)
  - Two 10-second audiovisual videos of one of two female speakers delivering English IDS in either an approving (N = 23) or comforting (N = 24) intent message
  - Participants viewed one synchronous and one desynchronous video of the same talker with presentation order counterbalanced across participants. Infants randomly assigned to one of four experimental conditions:



- Synchronous stimuli were normal audiovisual IDS utterances
- Desynchronous stimuli were created by pairing the audio of an IDS utterance with the video of a different IDS utterance from the same intent category so that the audiovisual information did not match. For example, audio "Poor baby" was presented with video of talker's face producing "Aw, I'm sorry". Speech onset and offset times were misaligned by 1 second.<sup>9,10,14</sup>

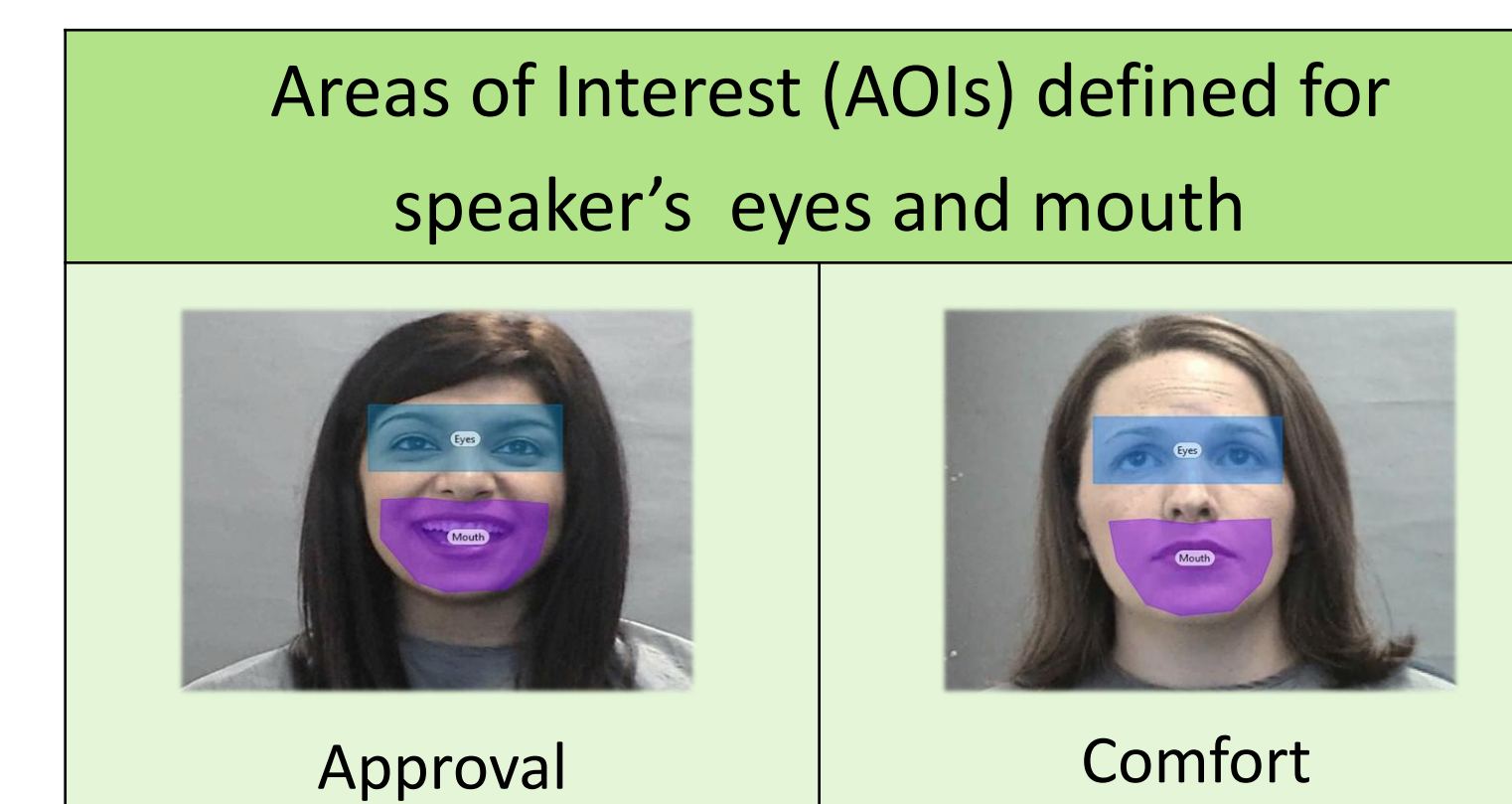
## PARTICIPANTS

- 6-month-old typically developing infants
- N = 47; 27 males, 20 females; M age = 178 days, SD = 11 days
- Only infants from monolingual English speaking families were included in the final sample

## ANALYSES

- One mixed design ANOVA
- DV: Proportion of Total Looking Time (PTLT) to each AOI out of total looking time during first 2.5 seconds of trial one<sup>6,14,15,16,17</sup>

Stimulus Type	X	Message Intent	X	AOI
Synchronous, Desynchronous	X	Approval, Comfort	X	Eyes vs. Mouth



## RESULTS

### Main Effect of AOI (Eyes, Mouth)

$F(1, 43) = 6.10, p = .02$

Eyes (M = 22% of TLT) < Mouths (M = 40% of TLT)

### Main Effect of Message Intent (Approval, Comfort) X AOI

$F(1, 43) = 6.14, p = .02$

### Message Intent X Stimulus Type X AOI Interaction

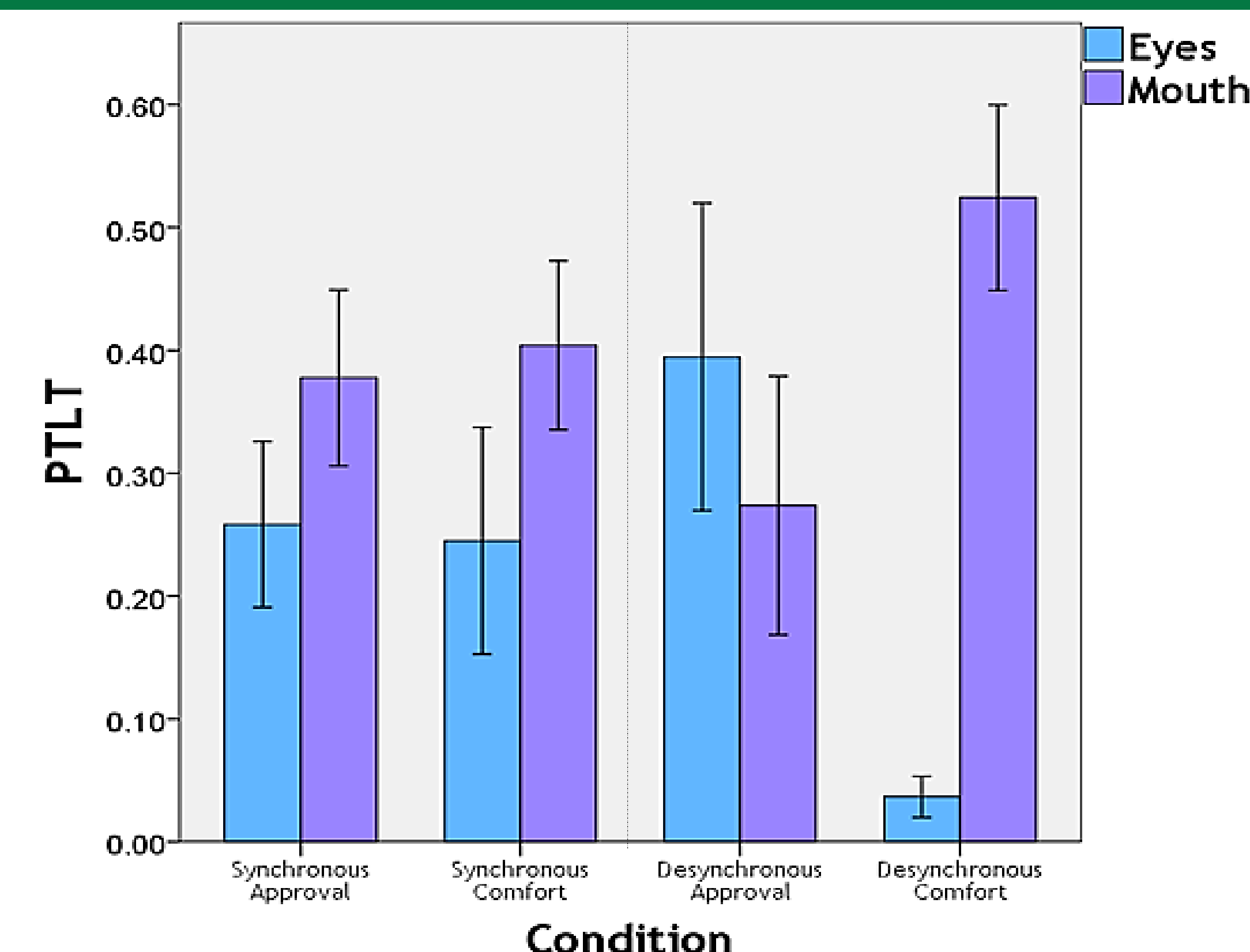
$F(1, 43) = 4.75, p = .04$

**Synchronous Approval:** Eyes = Mouth (NS)

**Synchronous Comfort:** Eyes = Mouth (NS)

**Desynchronous Approval:** Eyes = Mouth (NS)

**Desynchronous Comfort:** Eyes < Mouth ( $t(13) = 6.15, p = .001$ )



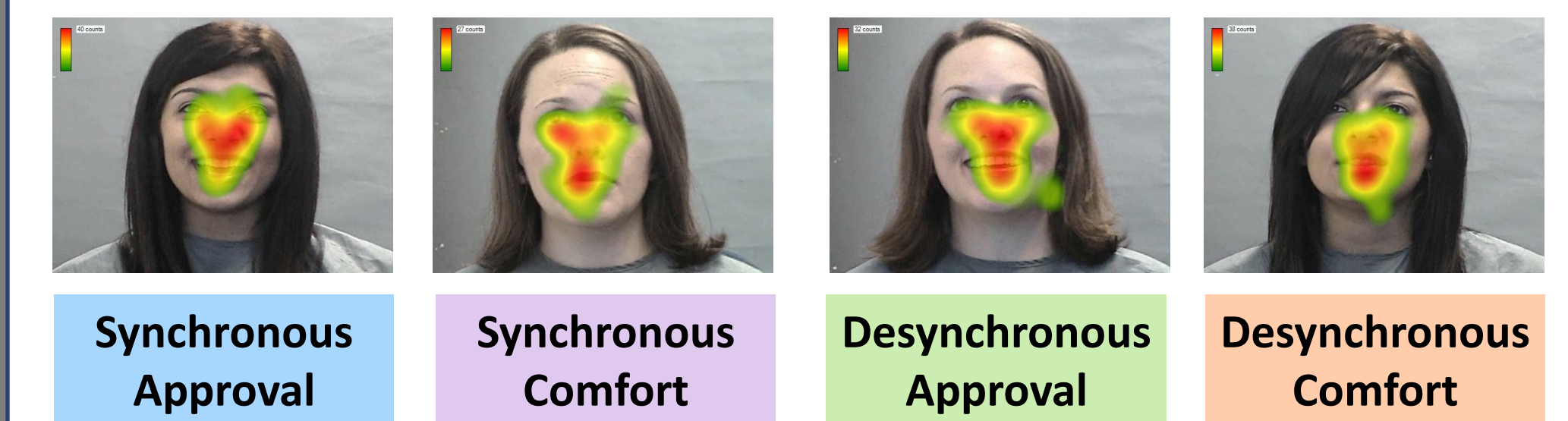
## DISCUSSION

Fixation patterns provide support for prior work suggesting infants actively process areas of faces that provide language-specific information and rely on audiovisual synchrony cues when processing fluent speech.

For **synchronous** stimuli, there was no significant difference in looking at eyes vs. mouth, though infants tended to look more at mouths. Fixation patterns for approving and comforting IDS did not differ, consistent with previous findings.

However, looking patterns were disrupted for **desynchronous** speech.

- Infants looked almost exclusively at the mouth for desynchronous comforting speech but tended to look longer at the eyes for desynchronous approving speech.



- Because the emotion conveyed by comforting IDS is typically less intense in facial-vocal features than approving IDS, infants may have spent more time on the mouth, the most salient visual signal, of the desynchronous comforting stimulus to determine the intent of the signal.<sup>6,20</sup>
- Results suggest that facial-vocal desynchrony disrupts typical facial scanning patterns for this age group and may have influenced infants' failure to categorize communicative intent of desynchronous infant-directed speech in prior studies.

## REFERENCES & ACKNOWLEDGEMENTS

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