

# Characterizing speech to and around children across early development

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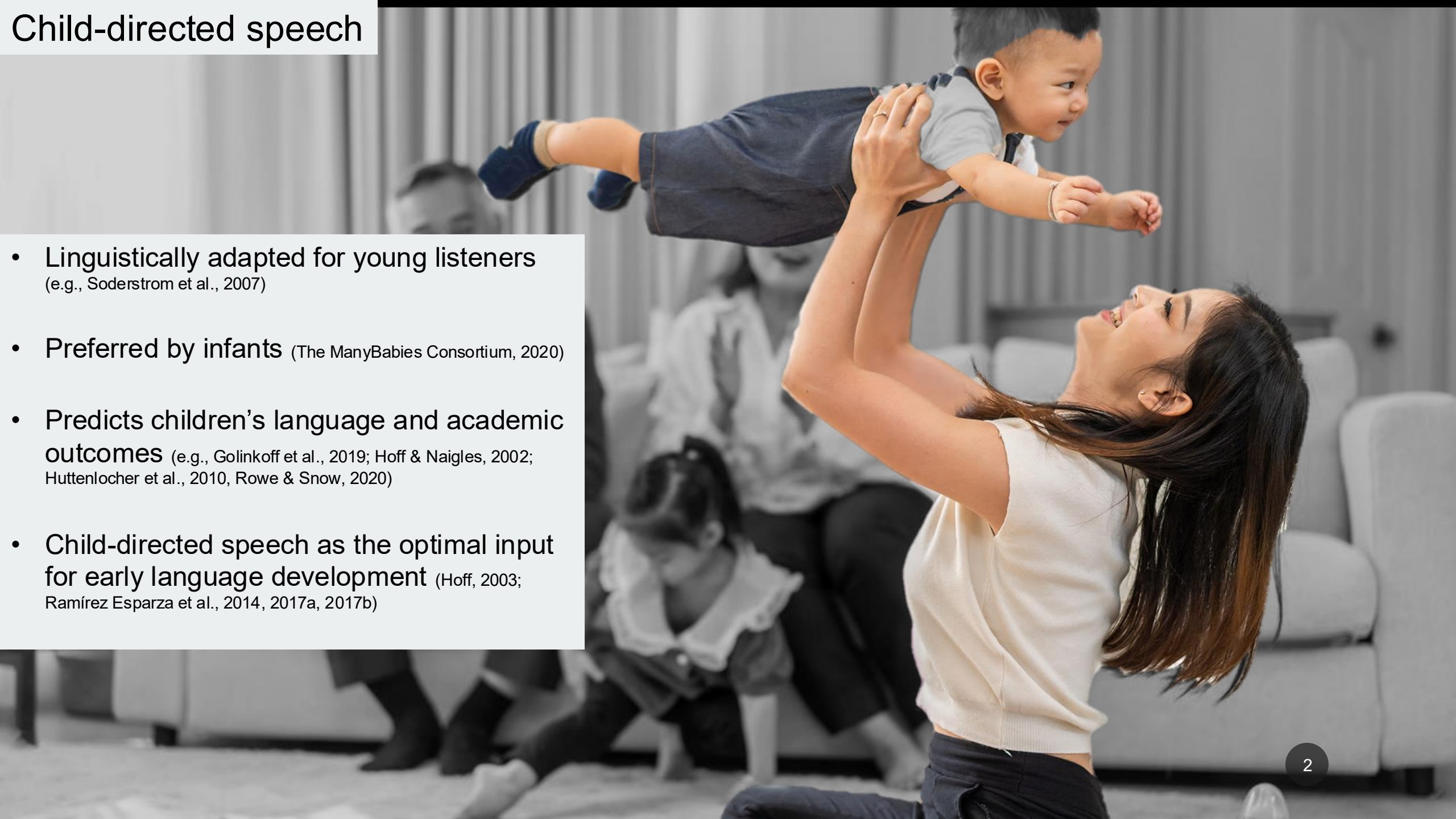
Jasenia Hartman

Bergelson Lab, Harvard University

BUCLD 2025

# Child-directed speech

- Linguistically adapted for young listeners (e.g., Soderstrom et al., 2007)
- Preferred by infants (The ManyBabies Consortium, 2020)
- Predicts children's language and academic outcomes (e.g., Golinkoff et al., 2019; Hoff & Naigles, 2002; Huttenlocher et al., 2010, Rowe & Snow, 2020)
- Child-directed speech as the optimal input for early language development (Hoff, 2003; Ramírez Esparza et al., 2014, 2017a, 2017b)



# Reasons to look beyond child-directed speech

- **Significant variation in child-directed speech, both within & across cultures** (Hart & Risley, 1995; Shneidman & Goldin-Meadow, 2012; Sperry et al., 2019; Cristia et al., 2018)
- **Across cultures, children hear ~3 mins. child-directed speech per hour; exposure to other speech varies widely** (Bunce et al. 2025)
- **Cross-cultural and experimental work suggest children can learn speech directed to others** (Casillas et al., 2020; Foushee et al. 2021)



# Child-directed speech is itself a variable category

- However, prior work often collapses child-directed speech across a range of child listeners.



# Speech to different kids has different properties



## Speech to infants

- Short utterances
- Limited & repetitive vocabulary

## Speech to preschoolers

- Diverse vocabulary
- Long utterances

# Child-directed speech: not just caregiver-infant dyads

- However, prior research mainly focus on caregiver-infant dyads
- Children's language environments contain other speakers (e.g., siblings)
  - Vocal input from other children predicts children's output (e.g., Cristia et al., 2022)

# Research questions and goals

## Goal 1: Determine the *nature* of children's language input

- How many speakers are present?
- How many minutes of adult vs. child speech are heard?
- How much speech does each talker direct to the target child, another child, or an adult?

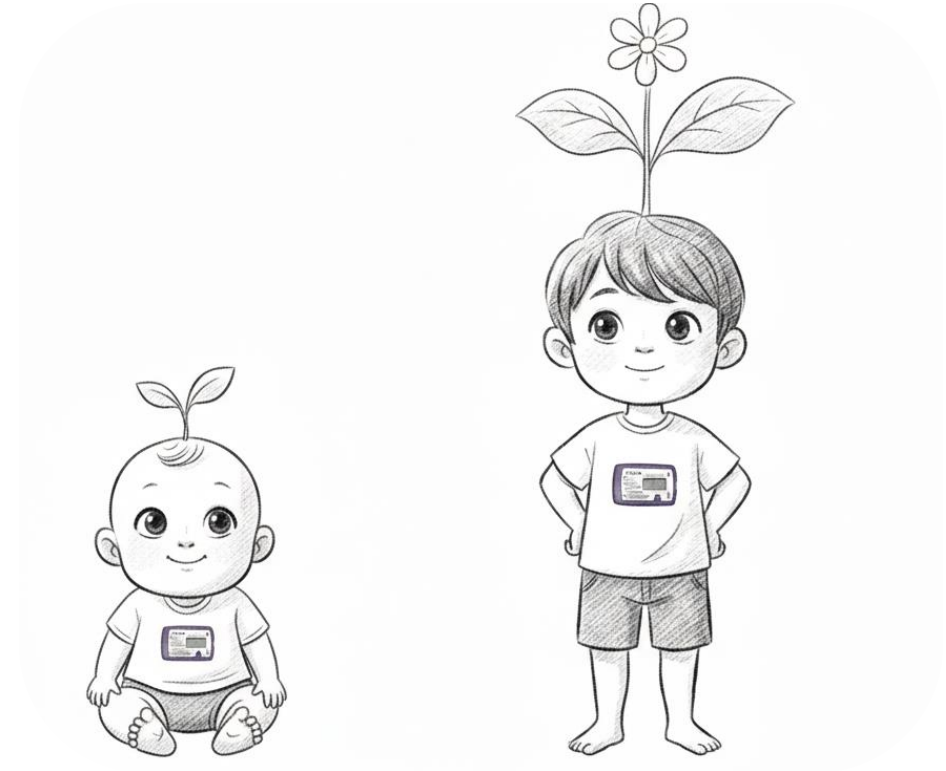
## Goal 2: Examine *developmental changes* in children's language input

- How does speech to and around the child vary when the child is an infant vs. a preschooler?

**Longer term goal (not today):** examine how speech to different listeners link to children's language skills before school age.

# Methods

- SEEDLings corpus
  - longitudinal 16-hr recordings of infants at home from 6 to 17 mo.
  - largely white middle-class household
- 12 infants
  - all infants had at least 1 sibling ( $M_{\text{sibling\_age}} = 4.01$  yrs. old)
  - contributed follow-up recording at 54 mo.
- 2 timepoints
  - daylong recording at infancy (6 to 17 mo.) and at preschool age (54 mo.)

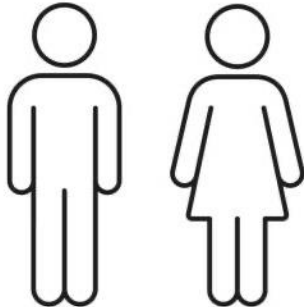


Gemini 2.5 (2025)

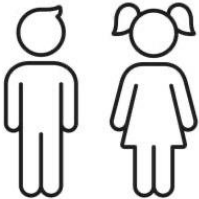
# Annotation approach

Transcribed 15 random 2-min segments (30 mins total per child per timepoint)

**Speaker:**  
(who is talking?)



adult speakers



other child (e.g., sibling) speakers

**Listener:**  
(who is being addressed?)



adult



other child(ren)



target child

# Research questions and goals

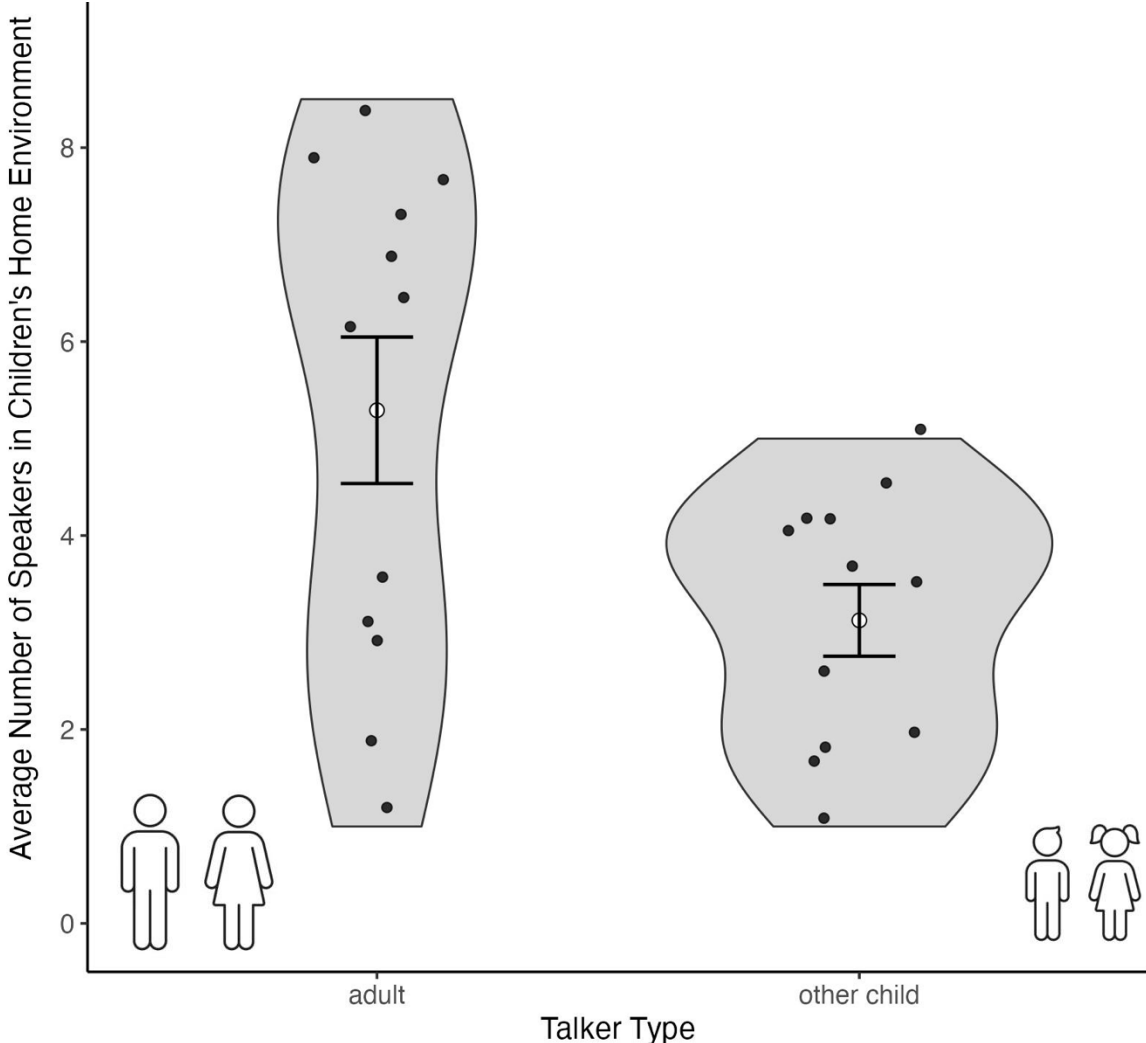
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## Goal 2: Examine *developmental changes* in children's language input

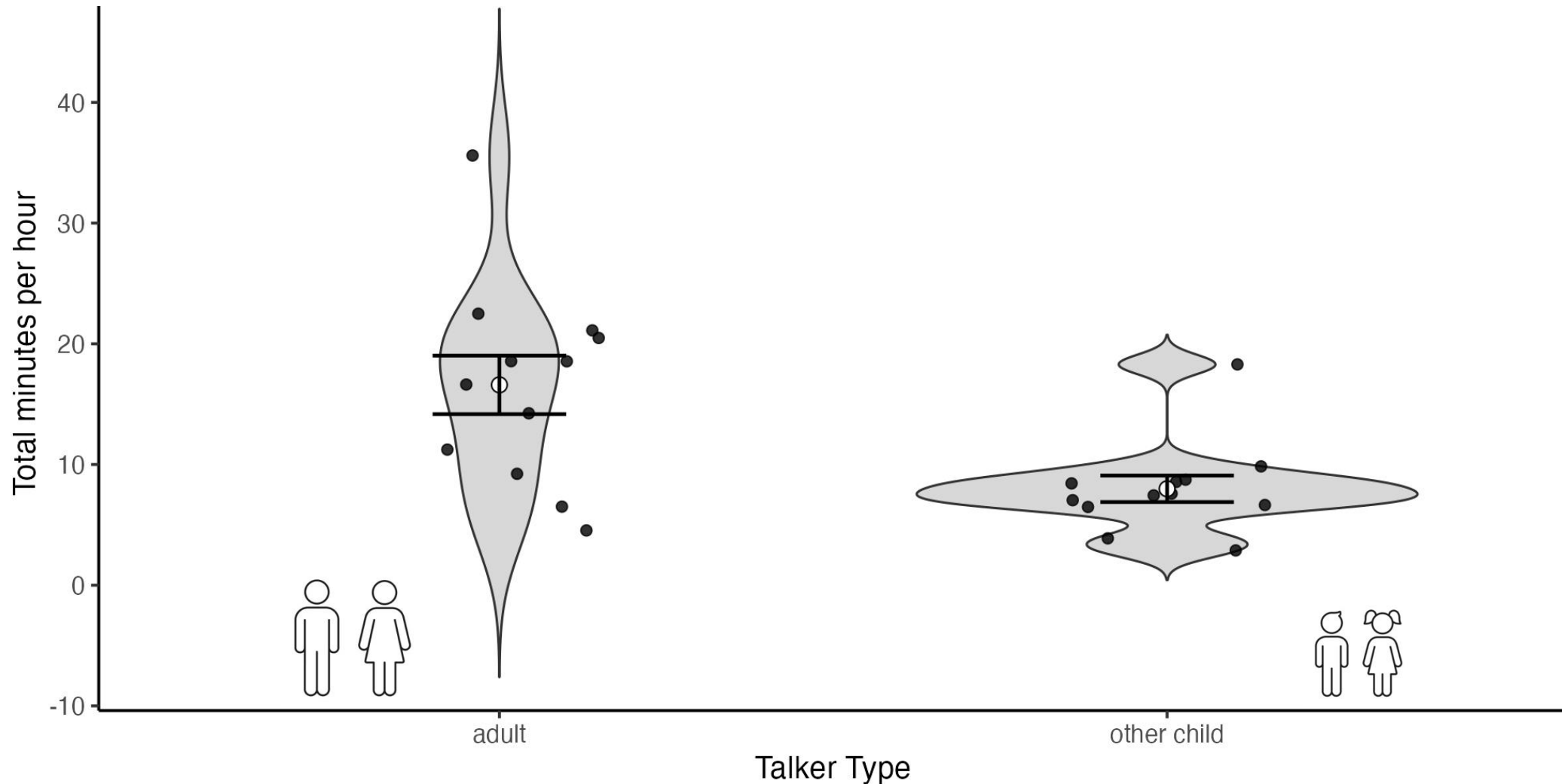
- How does speech to and around the child vary when the child is an infant vs. a preschooler?

# Q1.1: How many speakers are in the target child's environment?



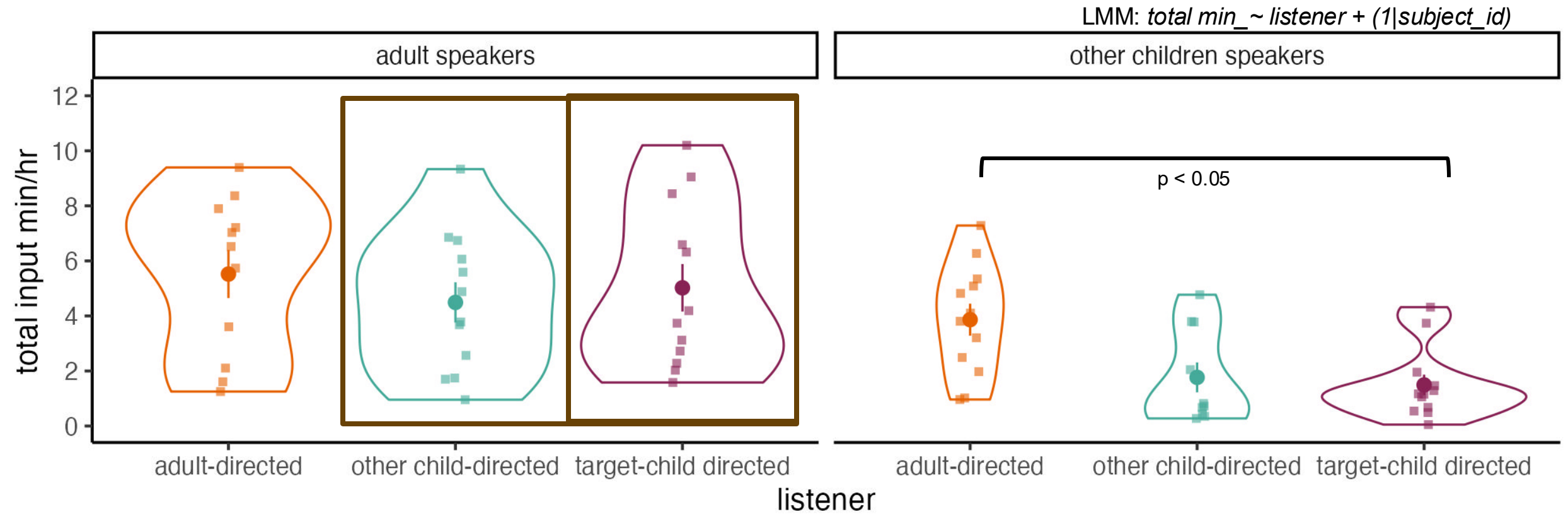
~ 5 adults and ~3 other kids.

## Q1.2: How many minutes of adult vs. child speech are heard by the target child?



- Target children hear ~ 15 mins. of adult speech
- Target children hear ~ 10 mins. of other child speech

# Q1.3: How much speech does each talker direct to each addressee?



- Target children hear adults talk equally to adults, other kids, and themselves
- Target child hear other children talk mostly to adults

# Interim summary

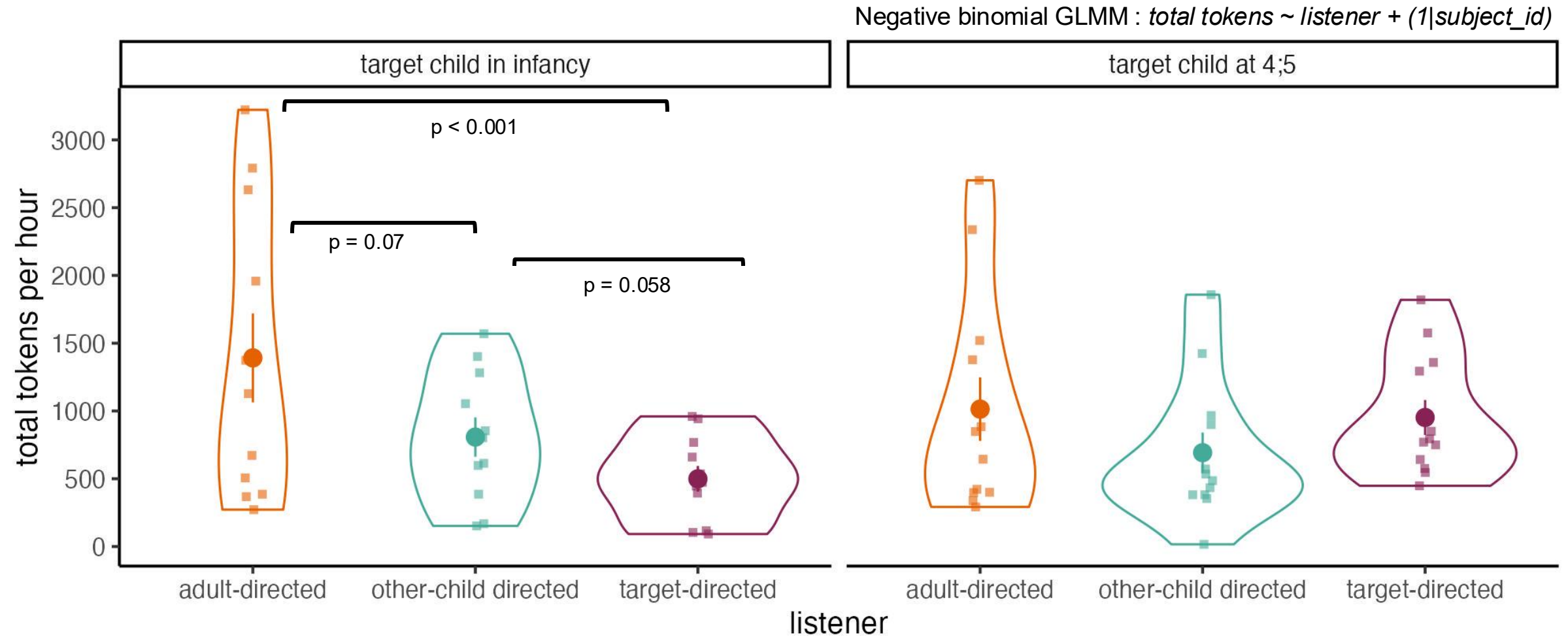
## Goal 1: Determine the *nature* of children's language input

- How many speakers are present? ~ **5 adults and ~ 3 other kids**
- How many minutes of adult vs. child speech are heard? ~**15 min adult speech, ~10 min other child speech**
- How much speech does each talker direct to the target child, another child, or an adult? **target children hear adult talk equally to all listeners and other children talk mostly to adults**

## Goal 2: Examine *developmental changes* in children's language input

- How does speech to and around the child vary when the child is an infant vs. a preschooler?

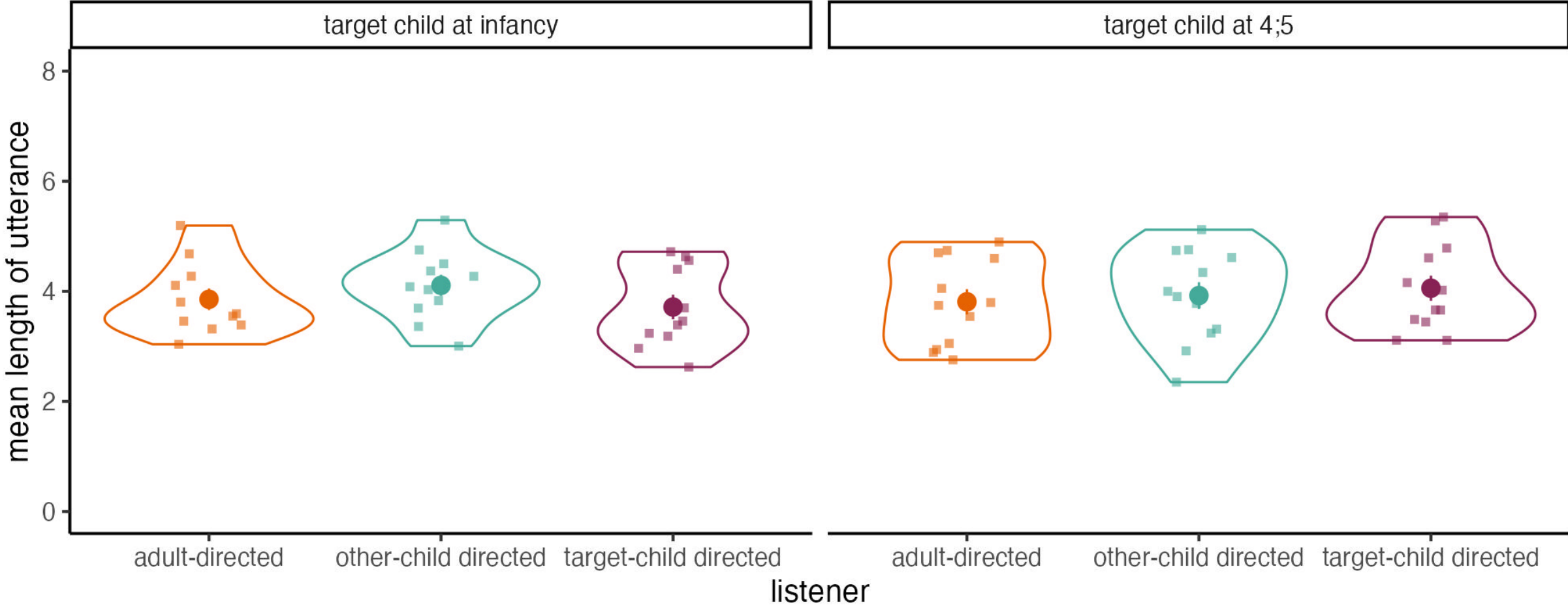
## Q2.1: How does *the amount of input* to each listener vary across time?



- Infancy: target children hear 2x more words directed to adults than themselves or other kids
- Preschool age: target children hear no difference in # of words directed to each addressee

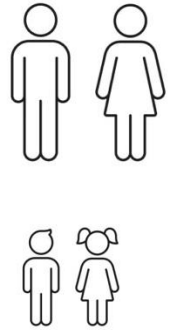
# Q2.2: How does *utterance length* to each listener vary across time?







LMM:  $mlu_w \sim listener + (1|subject\_id)$



- Infancy & preschool age: target children hear no difference in mean length of utterance across addressee.

## Q2.3: How does speech to each listener vary across time and by speaker?



Speaker	Target child at infancy			Target child at 4;5		
Adult	<ul style="list-style-type: none"> <li>marginally more words to adults than to the target child</li> <li>utterance length similar across addressees</li> </ul>			<ul style="list-style-type: none"> <li>no difference across addressee</li> </ul>		
Other kids	<ul style="list-style-type: none"> <li>talk more to adults and use longer utterances</li> </ul>			<ul style="list-style-type: none"> <li>no difference across addressee</li> </ul>		
	Adult	Other child	Target child	Adult	Other child	Target child
	Listener					
						

- Infancy: target children hear adults and other child speakers direct more words towards adult than to themselves
- Preschool age: target children hear no difference in word count or utterance length across speakers and listeners

# Summary

## Goal 1: Determine the *nature* of children's language input

- How many speakers are present? ~ **5 adults and ~ 3 other kids**
- How many minutes of adult vs. child speech is heard? ~**15 min adult speech, ~10 min other child speech**
- How much speech does each talker direct to the target child, another child, or an adult?

**target children hear adult talk equally to all listeners and other children talk mostly to adults**

## Goal 2: Examine *developmental changes* in children's language input

- How does speech to and around the child vary when the child is an infant vs. a preschooler?

**infancy: mostly hears speech directed to adults but similar utterance length listeners**

**preschool: hear similar amount of speech and utterance length across listeners**

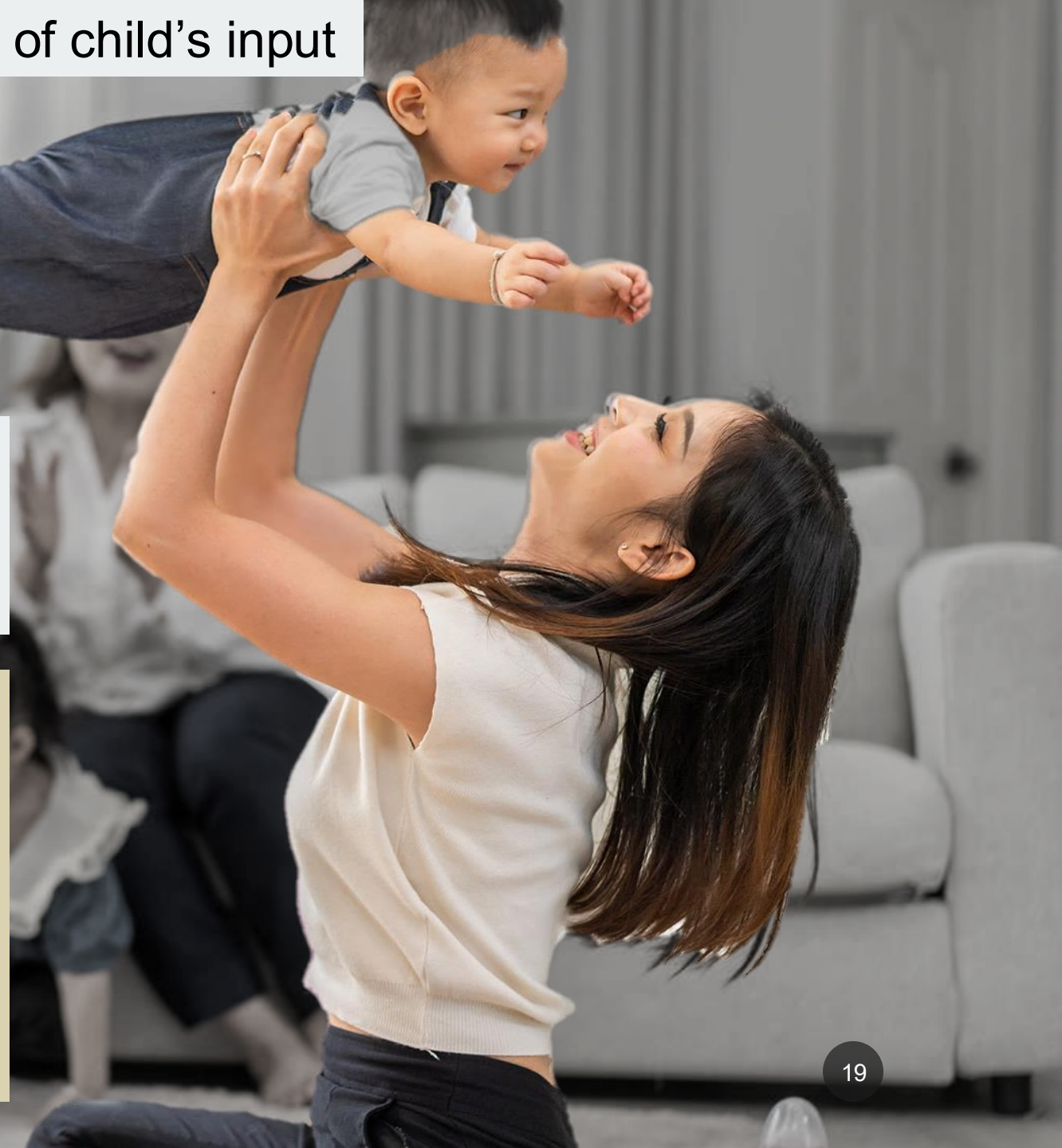
# Child-directed and beyond: A richer picture of child's input

## Prior work

- Focused on caregiver-infant dyads and child-directed speech
- Child-directed differs for infants vs. preschoolers

## Current work

- Focused on multiparty settings and other sources of input (i.e. speech to target child, other-child, or adult)
- Speech input to target child differs at infancy vs. preschoolers
  - Over time, speech quantity evens out across addressees; utterance length remains stable



# Future directions

- Other speech properties (e.g., syntax) in children's language input
- Relationship between overheard speech and children's language outcomes
- Role of age and input features in shaping children's learning from overheard speech

# Acknowledgements



National Science Foundation  
Directorate for Social, Behavioral and  
Economic Sciences

NSF SPRF #2405645



Erika Bergelson

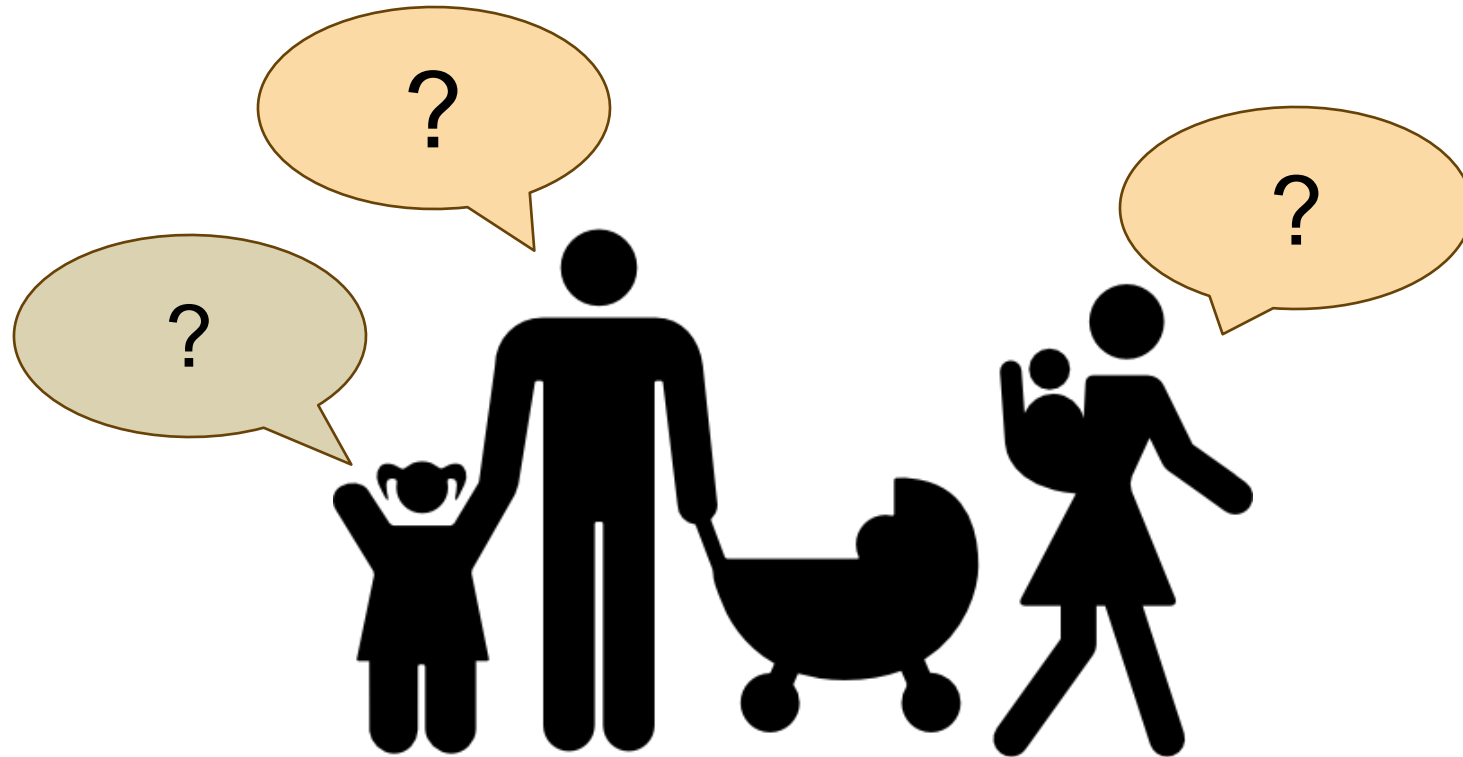


Michika Ito



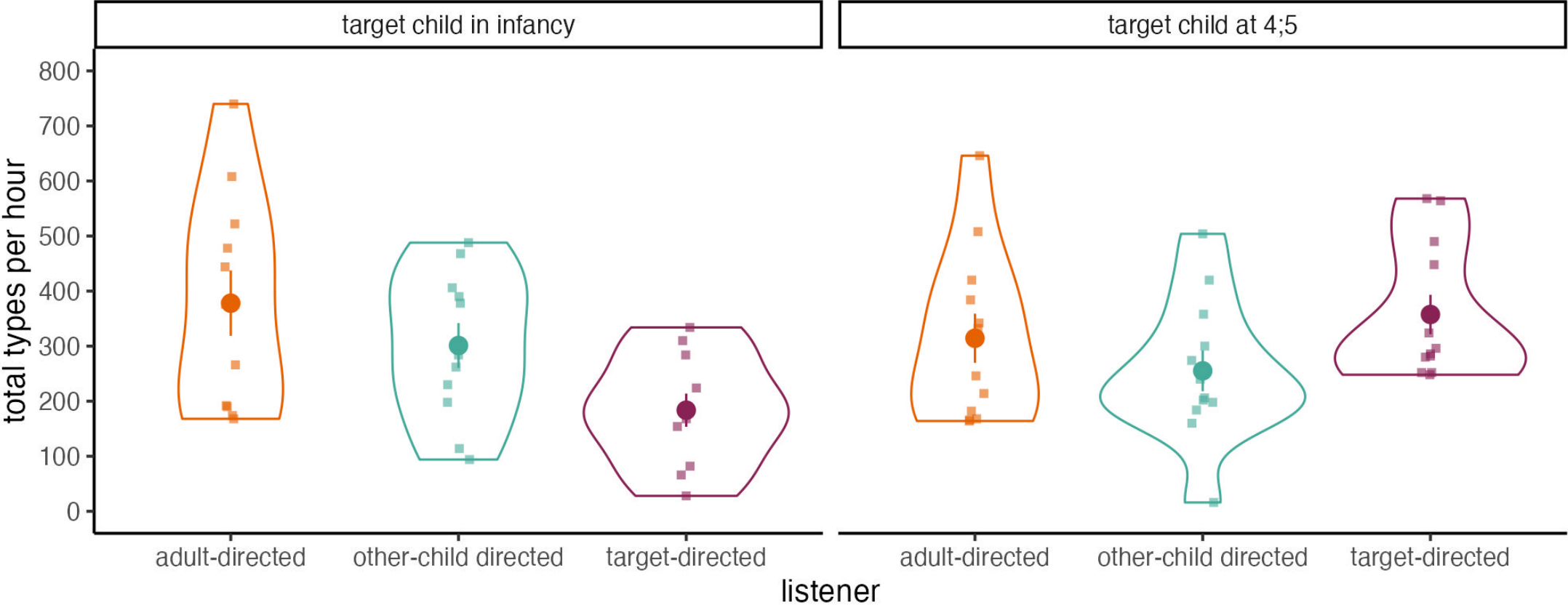
Tarun Sepuri

# Questions?



EXTRA SLIDES

# How does the number of unique words to each listener vary across time?



how does speech to each listener vary across time and by adult speakers' gender?

