

# Non-referential beat and flip gestures follow distinct developmental trajectories of function

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## INTRODUCTION

- **Non-referential gestures**, including beats (a.k.a. batons) and flips (a.k.a. “palm-up” gestures), are an important feature of face-to-face communication, directing attention to **pragmatic and discourse content** (Kendon, 2017; McNeill, 1992).
- **Non-ref. beat gestures** mark **information and discourse structure** (Im & Baumann, 2020; Shattuck-Hufnagel et al., 2016) and offer **cognitive and linguistic benefits** for both speakers and listeners (Biau & Soto-Faraco, 2013; Vilà-Giménez et al., 2021, for a review).
- **Non-ref. flip gestures** are used by adult speakers and signers to convey a **diverse range of epistemic and interactive meanings**, such as ignorance, uncertainty, obviousness, agreement, and turn negotiation (Cooperrider et al., 2018; Müller, 2004).
- Children produce **flip gestures** early in language development (Harris et al., 2017) but with **limited meanings** (Beaupeil-Hourdel & Debras, 2017).
- Both **beat and flip gestures** are **non-referential** and serve **related but different** pragmatic functions in interaction; however, **it is unclear whether they share a similar developmental trajectory**.

## RESEARCH QUESTION

Does the **form** of non-referential beat and flip gestures dictate developmental trajectory of **functional use**?

## METHODOLOGY

### PARTICIPANTS **A**

#### 18 parent-child dyads

- 8 female, 10 male; typically developing
- Longitudinal observation, 1;4 – 4;10
- Racial, ethnic, economic, and educational diversity of Chicago area

### NON-REFERENTIAL GESTURE FORMS **B**

- **Beat gestures**
  - Rhythmic, pronounced
- **Flip gestures**
  - Palm exposed
  - Wrist rotation; flick/twist

### DATA COLLECTION & ANNOTATION

**Spontaneous language and gesture data** were collected as part of a larger longitudinal study of language development from the University of Chicago.

- Participants **visited in their homes** every 4 months (12 sessions) between 14 and 58 months
- Families video recorded for **90 minutes of unguided interaction** at each session
- All parent and child speech **transcribed and annotated for gesture presence, form, and gloss**

**Non-referential gestures** were annotated for pragmatic function.

- Beat and flip gestures considered non-referential; see *Box A*
- Function coded at the level of the communicative act, i.e., co-speech utterance or isolated (no speech) gesture
- Annotation scheme adapted from Ninio et al. (1994) and based on Krifka (2015); see *Box C*



### PRAGMATIC FUNCTIONS **C**

#### •Unmarked assertion

- Explanations, declaratives
- Information responses

#### •Epistemic uncertainty

- Closed questions, open questions
- Expressing absence, ignorance

#### •Epistemic agreement

- Acknowledgements
- Affirmations, agreement

#### •Negation

- Corrections, contradictions
- Negations, disagreement

#### •Requesting communicative act

- Imperatives, action requests
- Object requests

#### •Expressive/performative communicative act

- Exclamations, markings (e.g., thanking, greeting)

## RESULTS (I): Form Onset

Flips and beats have different developmental onsets; flips produced with and without speech onset simultaneously.

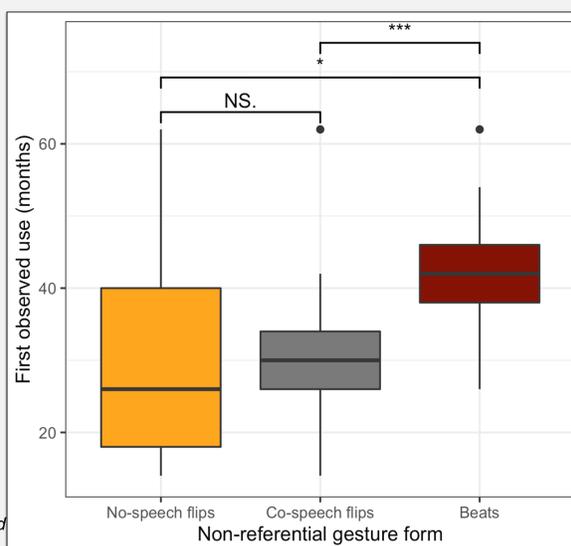
#### Median onset

- Flips w/out speech: 26 months
- Flips w/ speech: 30 months
- Beats: 42 months

#### 3-Way ANOVA

- Beat – no speech flip:  $\text{diff}=10.89, p<.001$
- Beat – co-speech flip:  $\text{diff}=11.56, p<.001$
- Difference in flip form onsets n.s.

*Beat gestures emphasize speech and cannot be produced without speech, by definition.*

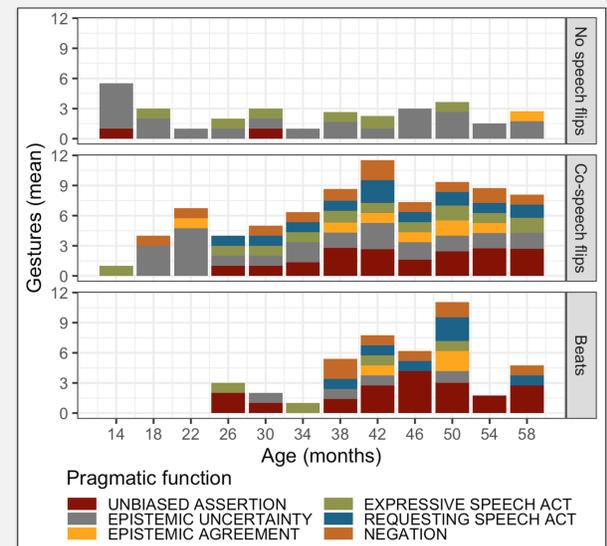


## RESULTS (II): Functional Use

Non-referential gesture forms have different functional use:

- Flips w/out speech: primarily epistemic uncertainty (79.2%) across development
- Flips w/ speech: diverse functions and increased diversity with age
- Beats: primarily unmarked assertion (68.5%) after onset

**Chi-squared**  
(Overall form-function independence)  
 $\chi^2=169.24; p<.001$



## MAIN CONCLUSIONS

- This is the first study that examines the developmental timeline and functions of non-referential gestures.
- Children produce non-referential flip gestures before non-referential beat gestures.
- Different non-referential gesture forms have different developmental trajectories of function. Both form and gesture-speech relation affect gesture function:
  - Beats are primarily produced with unmarked assertions and more rarely with biased assertions and questions
  - Flips produced *without* speech primarily express epistemic uncertainty
  - Flips produced *with* speech serve a diverse range of pragmatic functions
- The functional difference between non-referential flips and beats may explain why beats, but not flips, are predictive of later narrative production ability (Vilà-Giménez et al., 2021).
- Flips seem to emerge as an ignorance emblem and later complement other communicative acts. Future research should explore ignorance as a potential kernel meaning for the flip gesture. In line with Cooperrider et al. (2018), this may provide a link between the seemingly disparate functions of flips in adult speech.

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