

# The use of prosody and gestures for the production of contrastive focus in French-speaking 4 and 5 year olds

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# Information structure: narrow focus

- Highlighting an element that is new in the discourse to distinguish it from possible alternatives

Narrow-focus: “Take a purple **SUITCASE** [Which purple object?]”

Broad-focus: “Take a purple suitcase” [What should I take?]

Broad-focus

vs.

Narrow-focus

[la valise vioLETTE]<sub>AP/IP</sub>  
the suitcase purple



[[la vaLISE]<sub>AP</sub> [vioLETTE]]<sub>AP/IP</sub>  
the suitcase purple

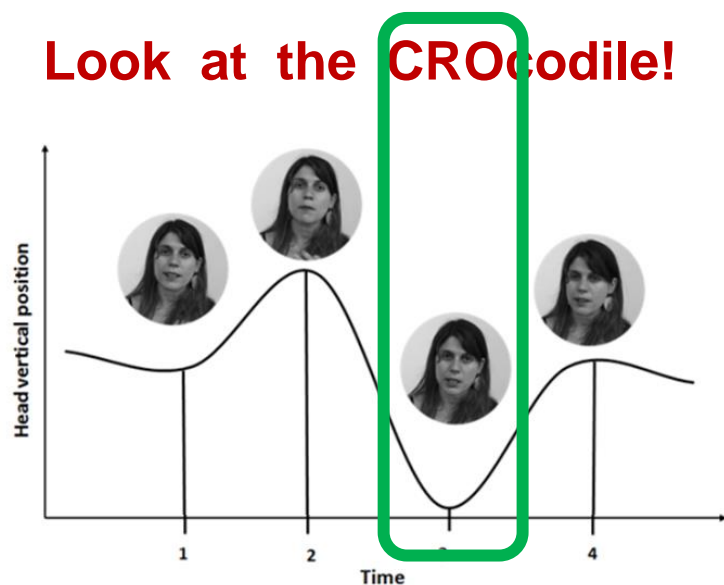


# Contrastive focus in children

- **Late** production of adult-like intonation patterns of focus (7-8 years of age) (Chen, 2011; De Ruiter, 2009)
- **Earlier** use of other prosodic cues to mark new/given (at 4-5 years of age) (Romoren & Chen, 2015; Wonnacot & Watson, 2008)
- **Existing results:**
  - From Germanic languages
  - Using either imitation games or story-telling tasks
  - Only acoustic correlates of focus (no multimodal analyses)

# Interaction prosody ↔ body gestures in production

Esteve-Gibert, Borràs-Comes, Asor, Swerts, & Prieto, in press; Krahmer & Swerts, 2007; Leonard & Cummins, 2011; Rochet-Capellan et al., 2008; Roustan & Dohen, 2010; Yasinnick et al., 2004



Prosodic heads attract the prominent intervals of body gestures.

Prosodic edges determine the specific alignment of gesture apex with respect of the prosodic head.

# In development...

- Early temporal synchronization of prosodic heads and pointing gestures in infants (Butcher & Goldin-Meadow, 2000; Esteve-Gibert & Prieto, 2014).



- Beat gestures seem to accompany child's speech only much later, at around 5-6 years of age (Colletta et al., 2015; Mathew et al., 2014)

# **Aims & research questions**

# How prosody and body gestures interact in the development of focus marking in first language acquisition

1. Do preschool children mark focus with adult-like **prosodic** cues?
  - > H1: Children might be better at using some prosodic cues like phrasing, while adults use both phrasing and intonation.
2. Do preschool children use **gestures** to signal focus, and are these gestures temporally aligned with speech in an adult-like way?
  - > H2: Children will align gestures with the focused element, as adults do.
3. Do prosodic and gesture strategies **interact** to mark focus in development?
  - > H3: If children produce a gesture to signal focus, they will also prosodically mark that element.

# Methods



# Participants

4-year- old French-speaking children (N = 10) [N=20 tested]

5-year-old French-speaking children (N = 10) [N=20 tested]

French-speaking adults (N = 6) [N=18 tested]

# Materials

article + disyllabic noun + disyllabic adjective

**Prends**      **la**      **valise**      **violette**

*Take*      *the*      *suitcase*      *purple*

## Variables:

- Position of focus:
  1. article + NOUN + Adjective
  2. article + noun + ADJECTIVE
- Focus type:
  1. Broad-focus
  2. Contrastive narrow-focus
  3. Corrective narrow-focus

[la valise violette]<sub>broad</sub>

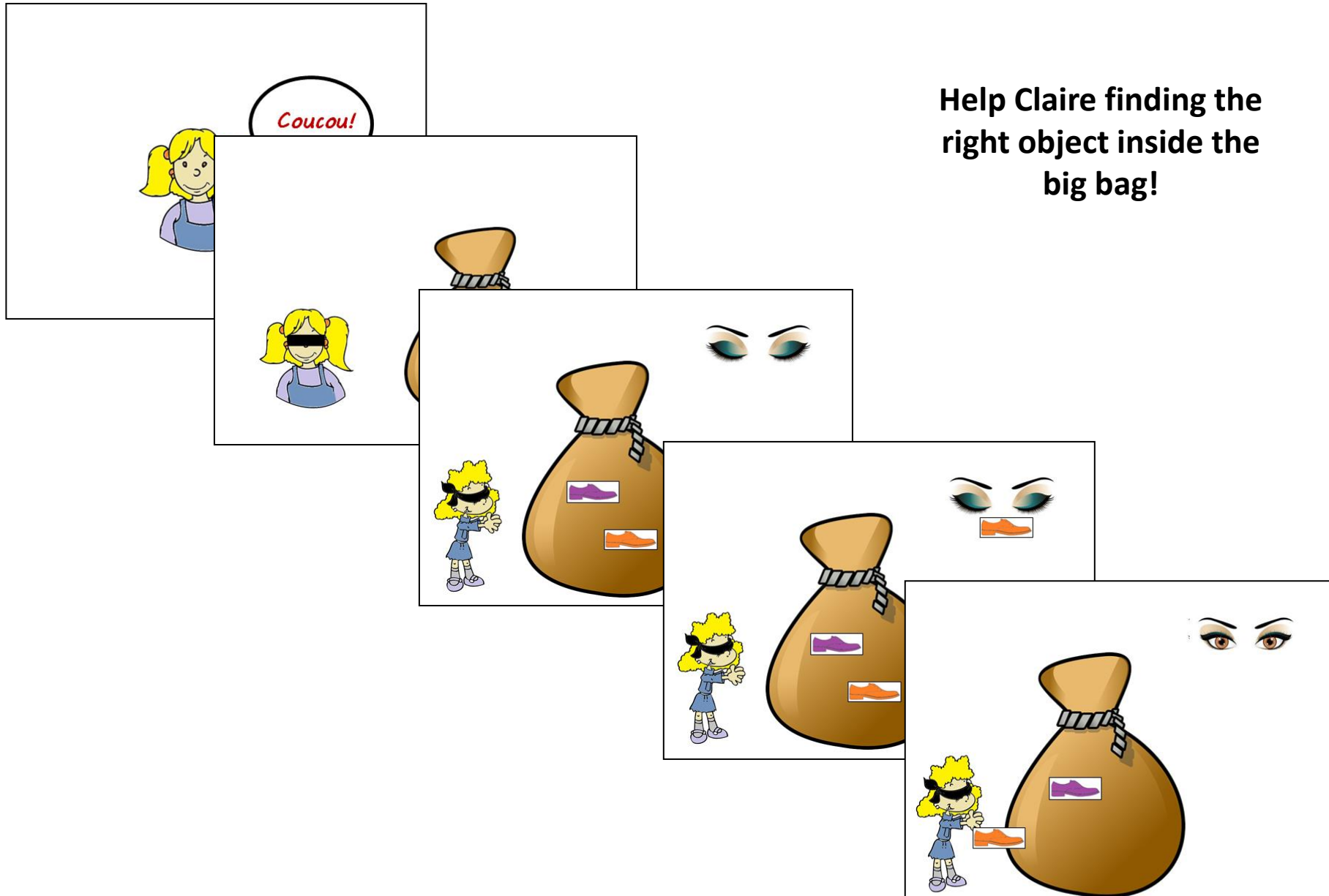
la [VALISE]<sub>contrastive</sub> violette

la [VALISE]<sub>corrective</sub> violette

la valise [VIOLETTE]<sub>contrastive</sub>

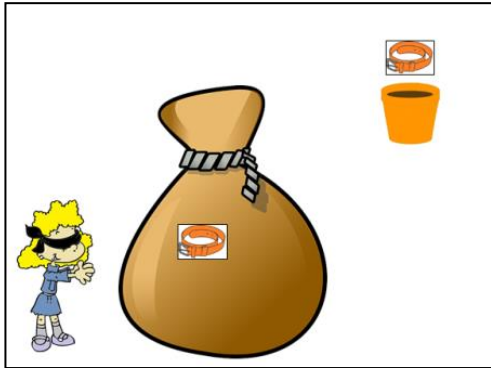
la valise [VIOLETTE]<sub>corrective</sub>

# Production task

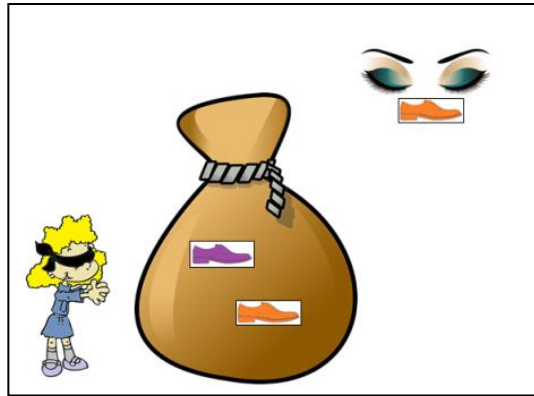


Help Claire finding the right object inside the big bag!

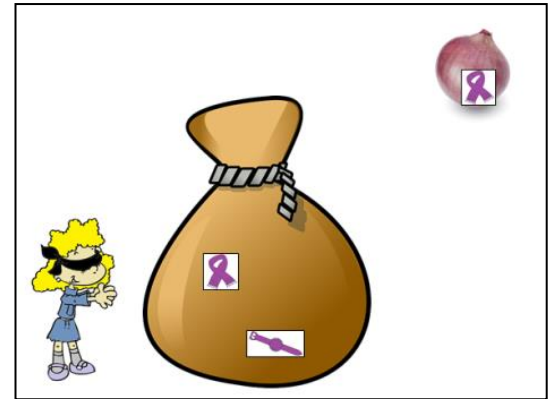
# Possible visual displays



**broad focus**



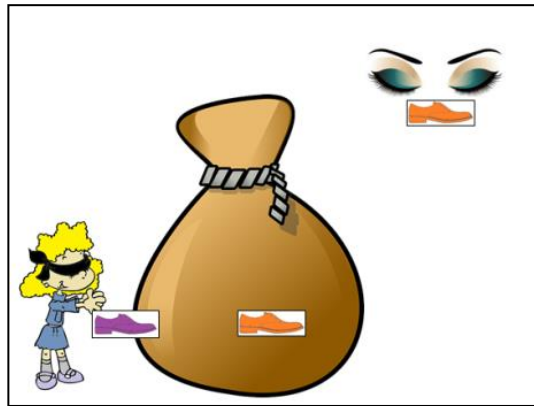
**contrastive focus  
on the adjective**



**contrastive focus  
on the noun**

12 trials per condition  
(children)

16 trials per condition  
(adults)



**corrective focus  
on the adjective**



**corrective focus  
on the noun**




# Data recordings

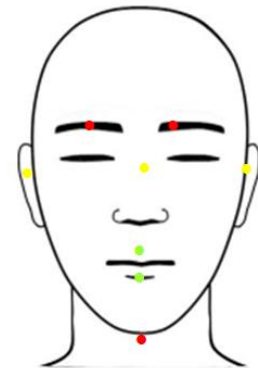
## Children

Video recording (1 camera)  
Audio recording (1 microphone)

## Adults

Video recording (1 camera)  
Audio recording (1 microphone)  
EMA sensors for head gestures

-  Head movements
-  References
-  Articulatory gestures



## Example, child recordings



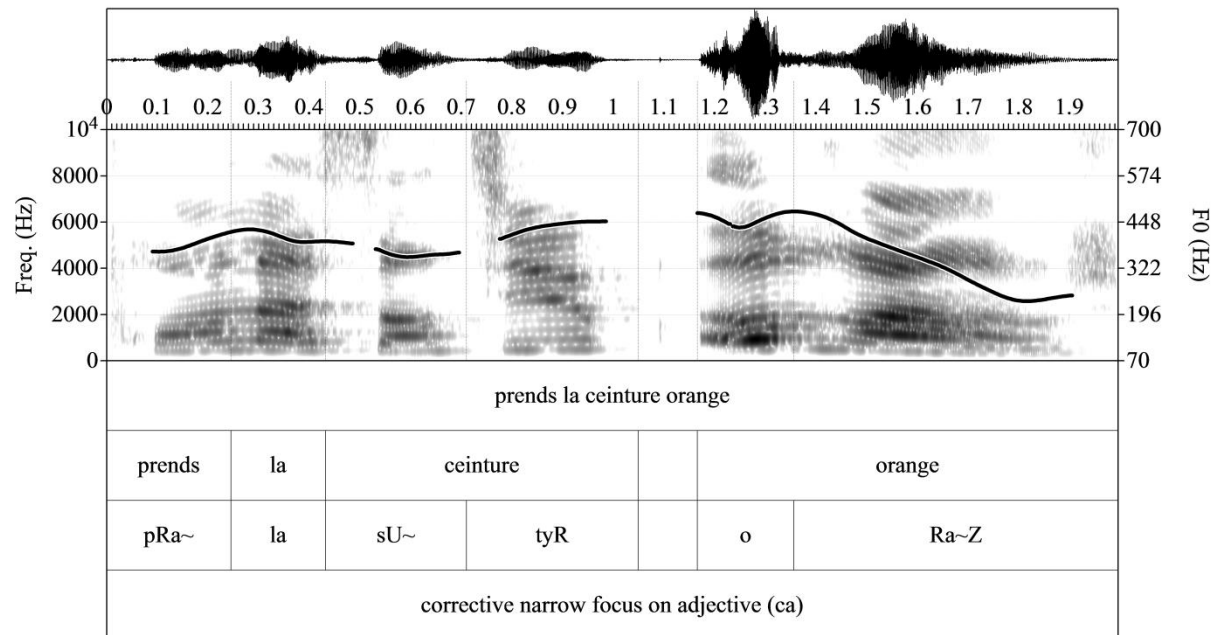
## Example, adult recordings



# Data analysis, prosody

## Praat:

- Duration (words, syllables) → automatic segmentation with SPPAS (Bigi, 2012)
- Pitch max (within the target NP)
- Pitch min (within the target NP)
- Intonation (ToBI)





# Data analysis, gestures

## ELAN annotation tool:

- Gesture during the NP: yes/no
- Type of gesture: head nod, head tilt, eyebrow raising, chin forward, body movement, finger pointing
- Gesture-speech alignment: gesture on the noun, gesture on the adjective, primary on the noun, primary on the adjective

The screenshot displays the ELAN software interface. At the top left, a video window shows a woman and a child sitting at a table with a laptop. The main window is a grid with columns for Utterance, Annotation, Begin Time, End Time, and Duration. The grid contains 18 rows of data. Below the grid is a timeline with playback controls and a selection bar. At the bottom, a detailed view of a specific utterance is shown, including the text 'claire prends une chaussure violette', a word list, and annotations for gesture presence and type.

Utterance	Annotation	Begin Time	End Time	Duration
1	il faut un chapeau violet claire	00:06:35.041	00:06:37.459	00:00:02.418
2	un bonnet ## violet	00:06:51.328	00:06:54.822	00:00:03.494
3	claire il faut une chemise	00:07:13.433	00:07:15.960	00:00:01.927
4	il faut une chaussette orange	00:07:38.338	00:07:40.242	00:00:01.904
5	une chaussette orange	00:07:45.545	00:07:47.514	00:00:01.969
6	une chaussette orange	00:07:53.160	00:07:55.075	00:00:01.925
7	claire il faut des lunettes violettes	00:08:14.510	00:08:17.055	00:00:02.545
8	il faut des lunettes +++ as violettes	00:08:27.499	00:08:34.258	00:00:06.759
9	claire prends une sucette ++ orange	00:08:47.438	00:08:50.341	00:00:02.903
10	claire prends une écharpe violette	00:09:02.928	00:09:04.980	00:00:02.052
11	claire prends une écharpe violette	00:09:12.455	00:09:14.992	00:00:02.537
12	claire prends une chaussure violette	00:09:29.832	00:09:30.342	00:00:01.960
13	claire prends une chaussure violette	00:09:34.602	00:09:37.991	00:00:03.389
14	claire prends un chapeau orange	00:09:49.569	00:09:51.960	00:00:02.391
15	claire prends une chemise violette	00:10:11.382	00:10:13.810	00:00:02.428
16	une chemise violette	00:10:19.822	00:10:21.561	00:00:02.039
17	claire prends une chaussure orange	00:10:56.037	00:10:58.265	00:00:02.228
18	claire prends une ceinture orange	00:11:09.509	00:11:11.482	00:00:01.973

Timeline: 00:09:33.000 - 00:09:39.000

Utterance: claire prends une chaussure violette

Words: claire # prends une # chaussure violette

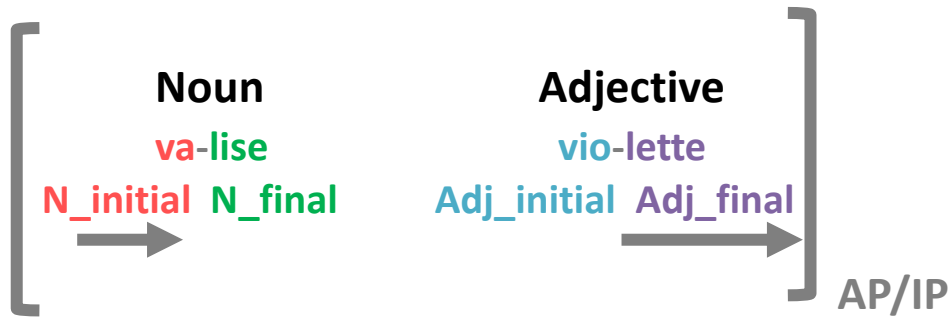
Condition: cn

presence & alignment of gesture: on noun

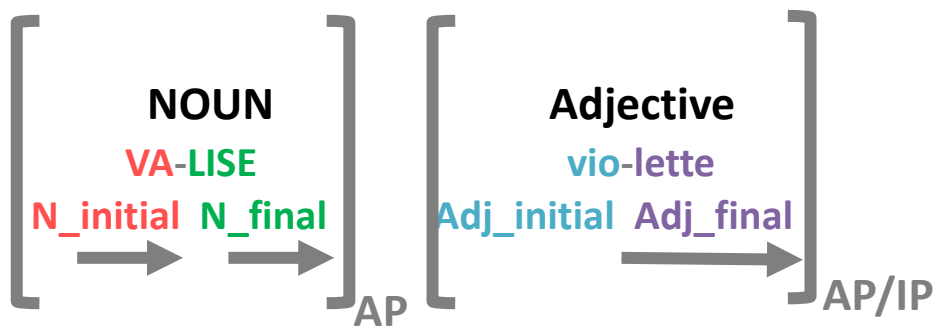
type of gesture: nod

# Results

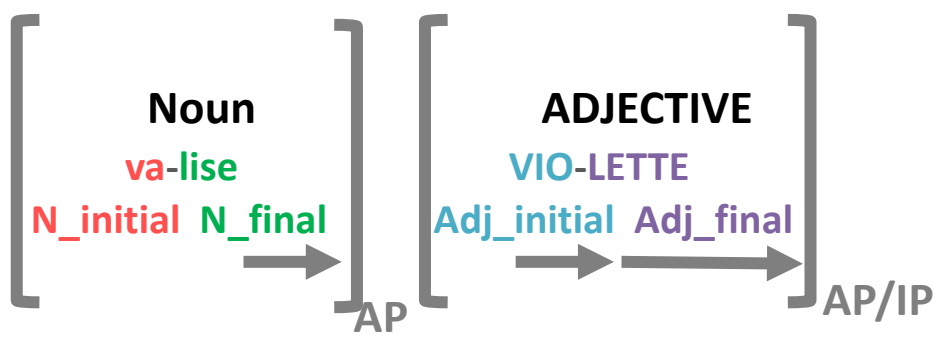
# Prosodic cues for focus marking, expectations



BROAD-FOCUS



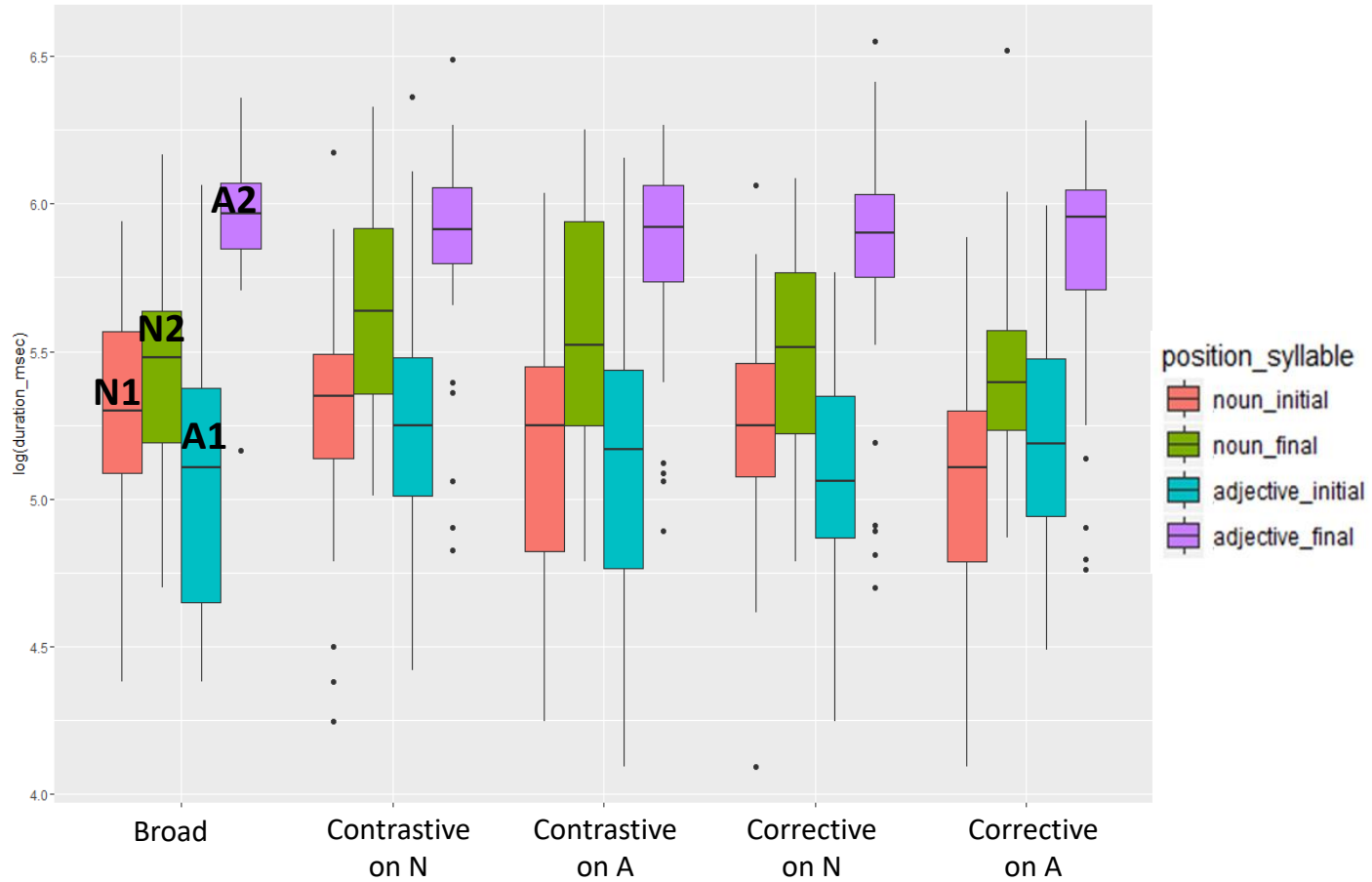
NARROW-FOCUS ON NOUN



NARROW-FOCUS ON ADJECTIVE

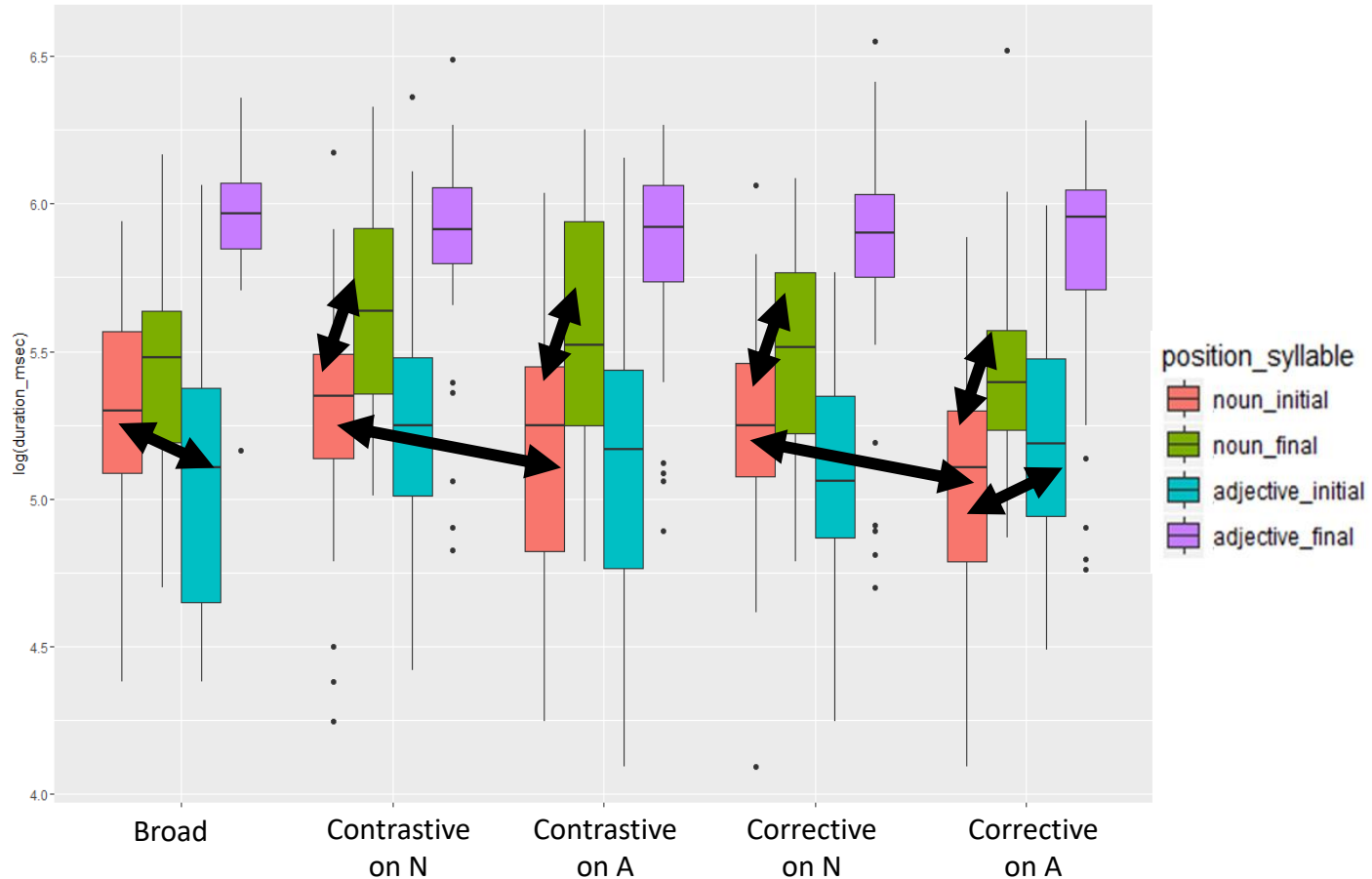
# Prosodic cues for focus marking

adults



# Prosodic cues for focus marking

adults

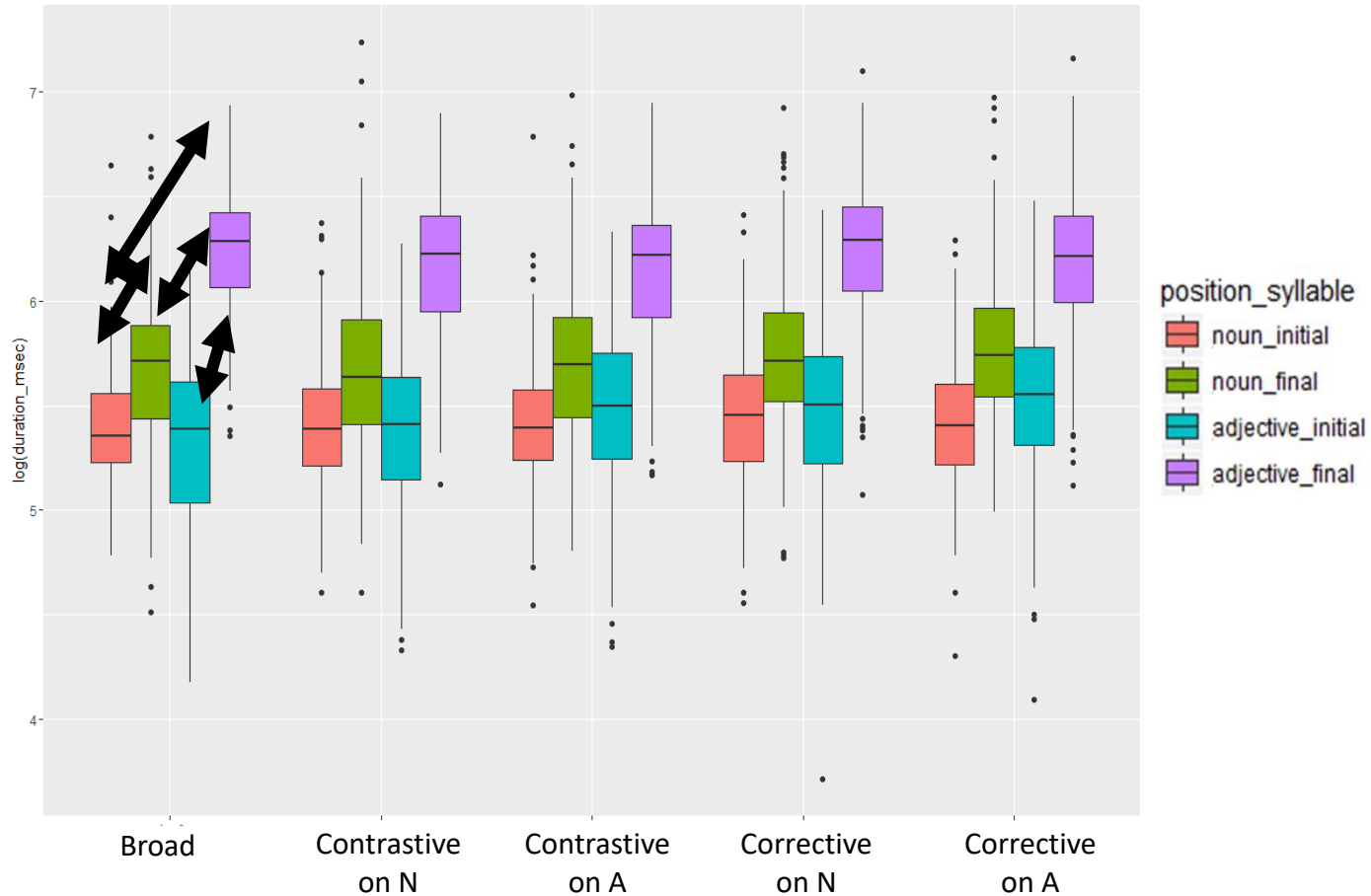


$\text{lmer}(\log(\text{duration\_msec}) \sim \text{position\_syllable} * \text{condition} + (1 | \text{participant}) + (1 | \text{trial}), \text{df})$

# Prosodic cues for focus marking

children

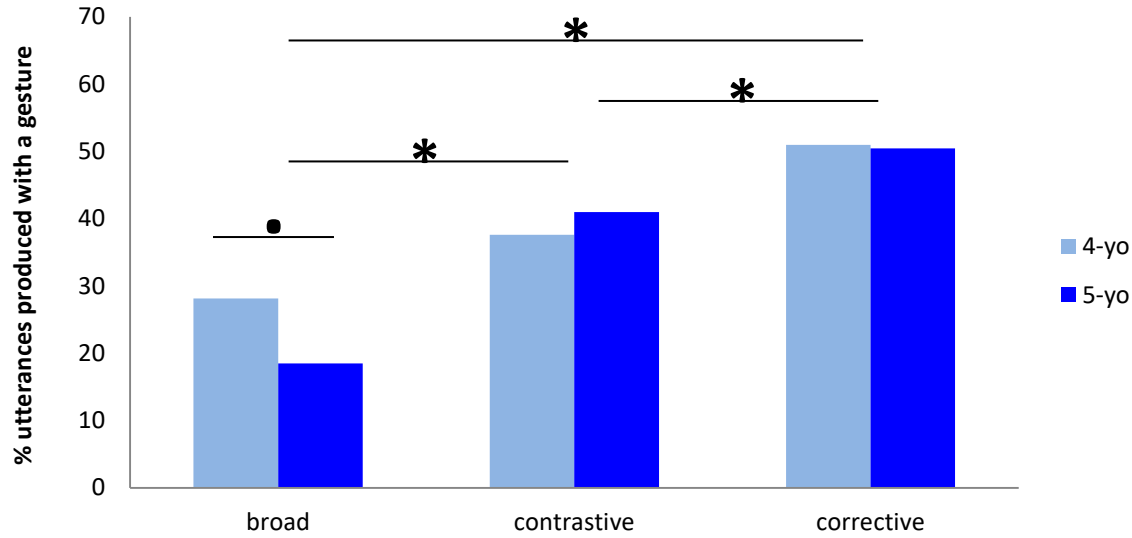
No effect of  
condition nor age



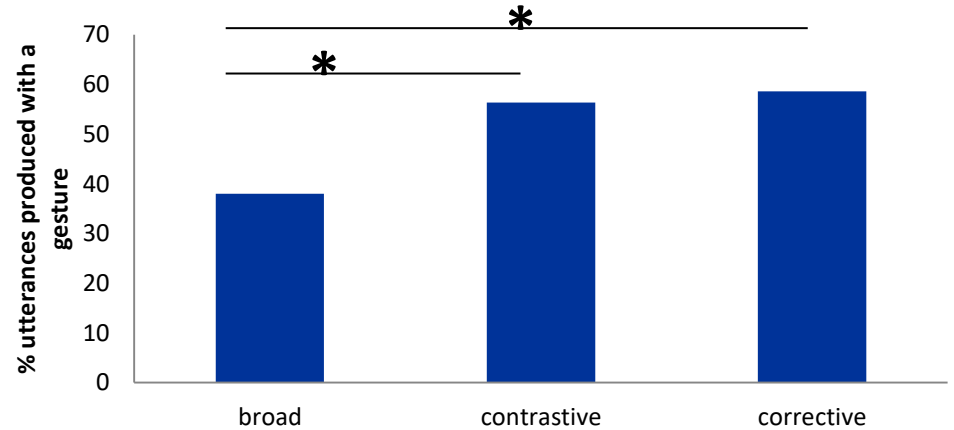
$\text{lmer}(\log(\text{duration\_msec}) \sim \text{position\_syllable} * \text{condition} * \text{age} + (1 | \text{participant}) + (1 | \text{trial}), \text{df})$

# Gestures for focus marking

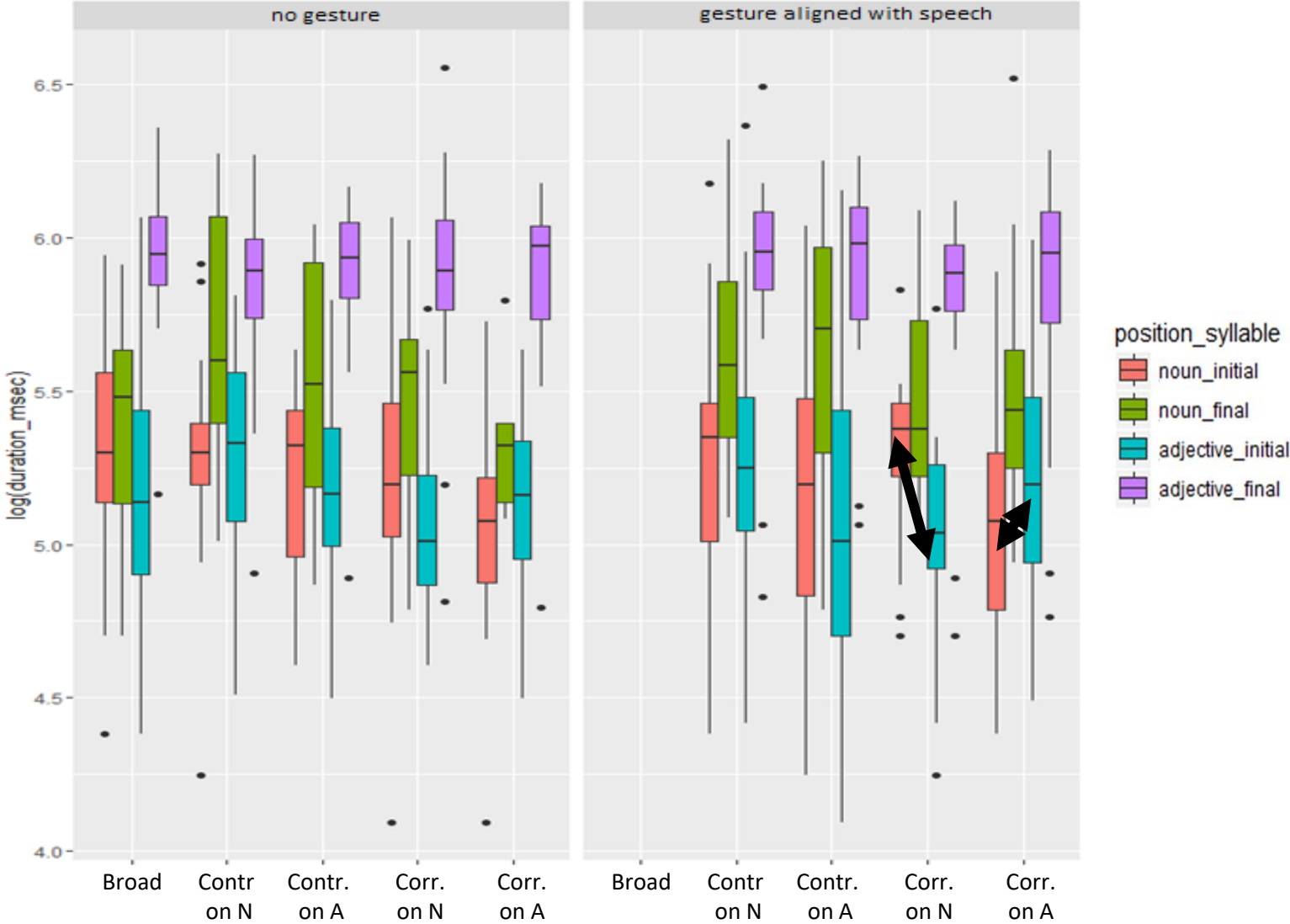
## children



## adults

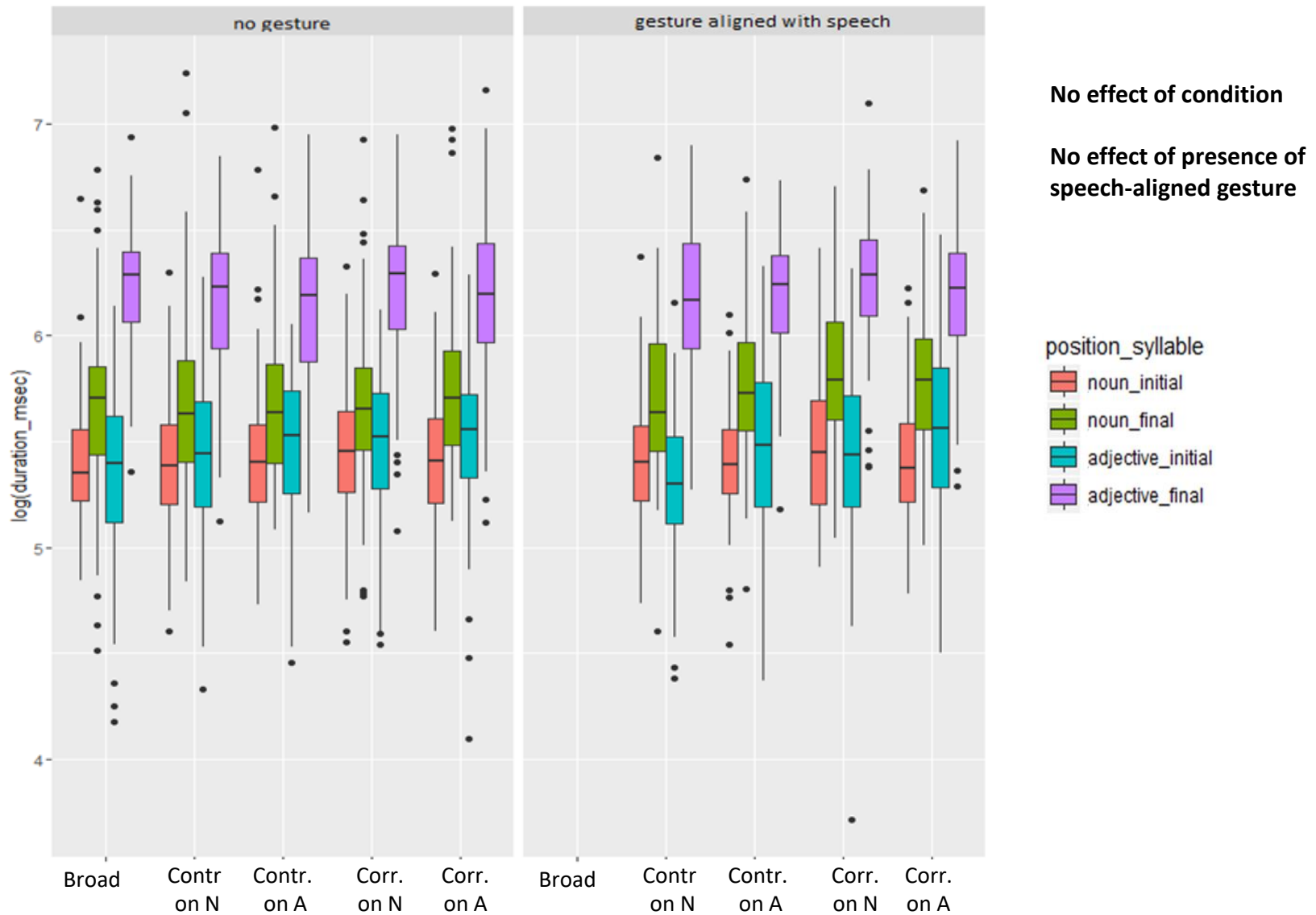


# Interaction of prosodic and gesture cues, adults











# Interaction of prosodic and gesture cues, children



# **Discussion & Conclusion**

# Summary of the results

	Adults	Children
Use of prosody focus (syllable duration)		
Use of body gestures		
Interaction prosody-gestures		

- Appropriate **task** to elicit spontaneous (but controlled) production of the broad/narrow focus distinction.
- Both adults and children use **body gestures** to focus narrowly one element in the discourse:
  - **Children:** corrective narrow-focus > contrastive narrow-focus > broad-focus
  - **Adults:** corrective and contrastive narrow-focus > broad-focus
- Adults mark focus prosodically through differential **syllable duration**, but preschool children do not master this cue yet.
- Prosodic and gestures cues do not seem to **interact** in the preschool children's marking of focus, while they do in adults.

**Preschool children can produce focus but they use visual strategies to do so.**

## Acknowledgments:

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**Helene Mottier**, children's testing

**Tim Mahrt**, Python scripts

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# Thanks for your attention!