

# Discourse Cues for the Acquisition of Mandarin False-Belief Verb “yǐwéi”

## Background

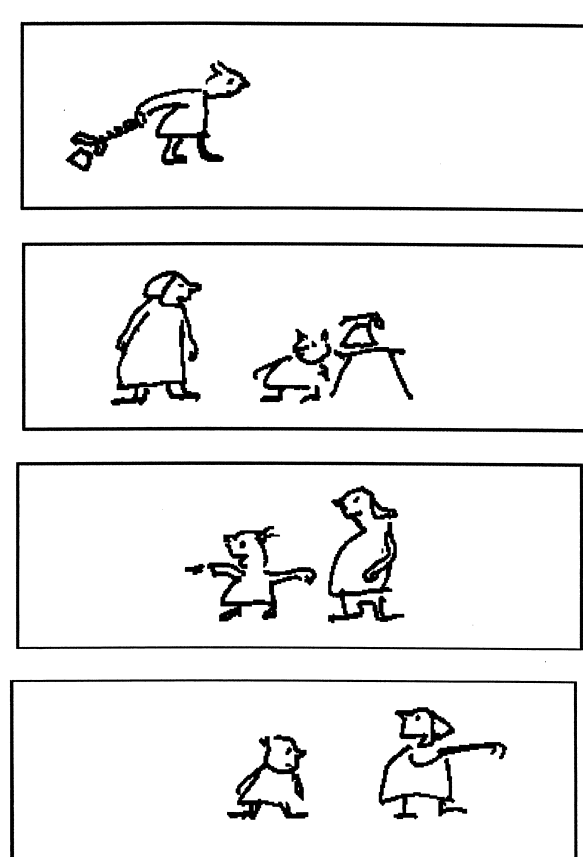
### Theory of mind and language development

The use of false-belief verbs like “yǐwéi” facilitates Mandarin-speaking children’s performance on false-belief tasks. [1] In addition, children’s comprehension ability of “yǐwéi” correlates with their abilities in false-belief task performance. [2] Hence, “yǐwéi” is important in children’s acquisition of theory of mind, yet it is unclear how this verb is learned.

Sally以为玩具在哪里?  
 Where does Sally yǐwéi the toy is?  
 Sally觉得玩具在哪里?  
 Where does Sally juéde the toy is?



“What is Gorp?”



### Acquisition of mental verbs

- Syntactic structure helps constrain the plausible interpretation of a novel word to mentalistic meanings, highlighting the salience of mental states, e.g., in a false-belief scenario, can further prompt reference to mental states. [3]
- There are two common ways to investigate: **corpus analysis** and **Human Simulation Paradigm (HSP)** with adults. [4]

Mystery Verb:	Co-occurring nouns in alphabetical order:	Mystery Verb	Syntax and Selectional Information:
GORP means....?	gramma, you Daddy, Daddy Daddy, you I, Markie Markie, phone, you Mark Mark.	GORP means....?	Why don't you GORP gramma? GORP Daddy, GORP Daddy. You gonna GORP Daddy? I'm gonna GORP Markie. Can you GORP Markie on the phone? GORP Mark. GORP Mark.

co-occurring nouns (left) and syntactic information (right), examples taken from [4].

### Discourse bootstrapping

Children use contextual salient events to learn abstract terms, like negators [5], and they are also sensitive to linguistically coded contextual information during word learning [6]. Specifically during the acquisition of mental state verbs, pragmatic information is leveraged in addition to the syntactic information to constrain the hypothesis space [7].

## Research questions

How do Mandarin-speaking children acquire this false-belief verb “yǐwéi”?

- What distinguishes yǐwéi from other belief verbs, such as juéde?
- Can pragmatic cues in the discourse context help Mandarin-speaking children acquire the false-belief verb “yǐwéi” (incorrectly think)?

### Preliminary findings

- yǐwéi and juéde have different syntactic distributions, and yǐwéi usually occurs in context where there is contrastive information about p.
- yǐwéi relies more on the discourse information than juéde, and discourse context is most useful in recovering the verb when it provides information about p. When discourse cues are not available, people might rely on other types of cues, e.g., syntactic information or word collocations.

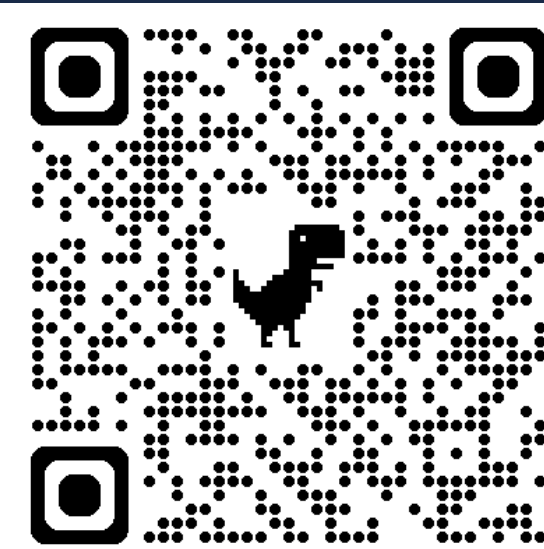
## References

- [1] Lee et al. (1999). *Journal of Child Language*. [2] Brandt et al., (2021). *Cognitive Linguistics*. [3] Papafragou et al., (2007). *Cognition*. [4] Gillette et al., (1999). *Cognition*. [5] Gomes et al., (2026). *Cognition*. [6] Sullivan et al. (2019). *Cognitive Science*. [7] Hacquard & Lidz, 2019. *Mind & Language*.

## Links

Experiments, data:  
<https://github.com/pennydy/yiwei>.

Preregistration: <https://osf.io/hn7vx/overview>

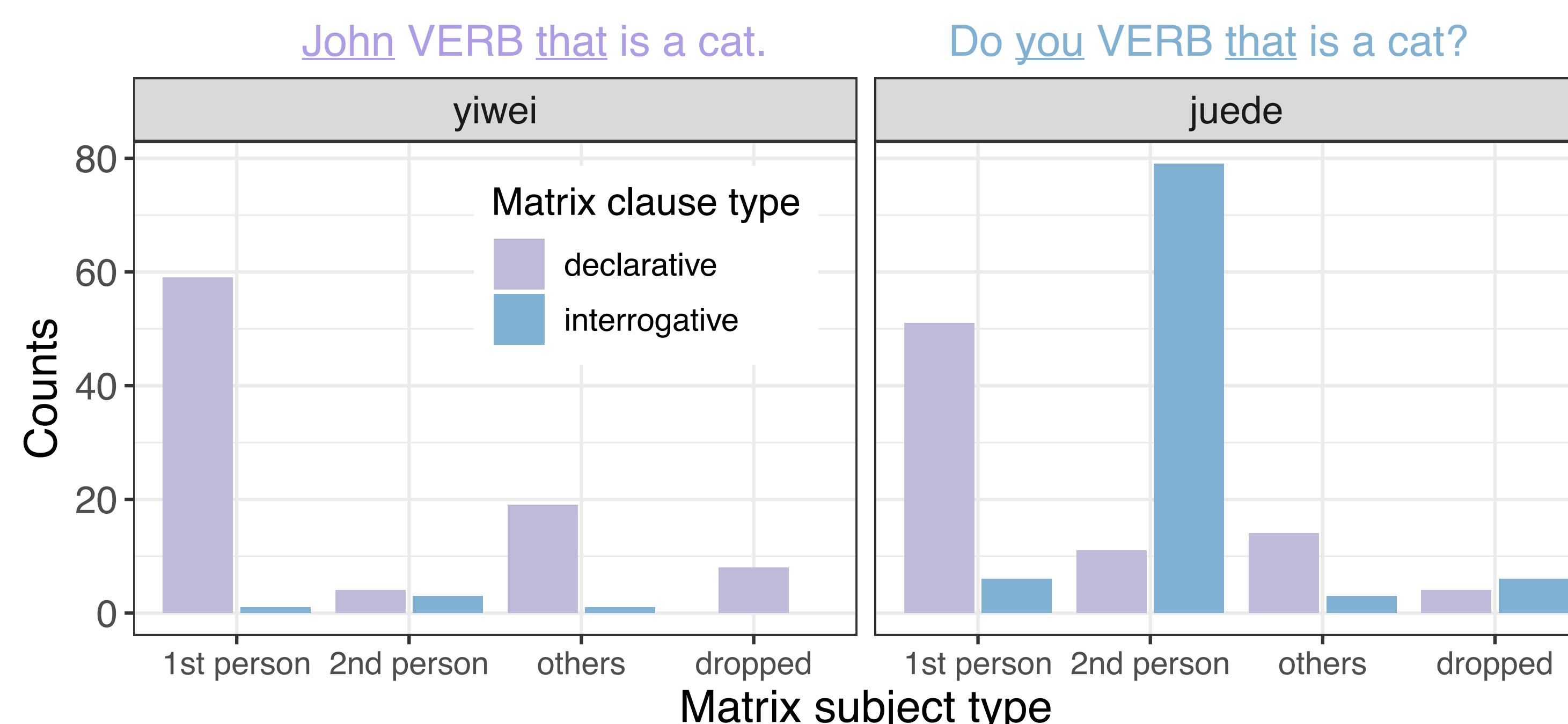


## Corpus study

102 instances of yǐwéi and 2,450 (194 annotated) instances of juéde in child-directed speech in Mandarin CHILDES corpora.

### Syntactic distribution

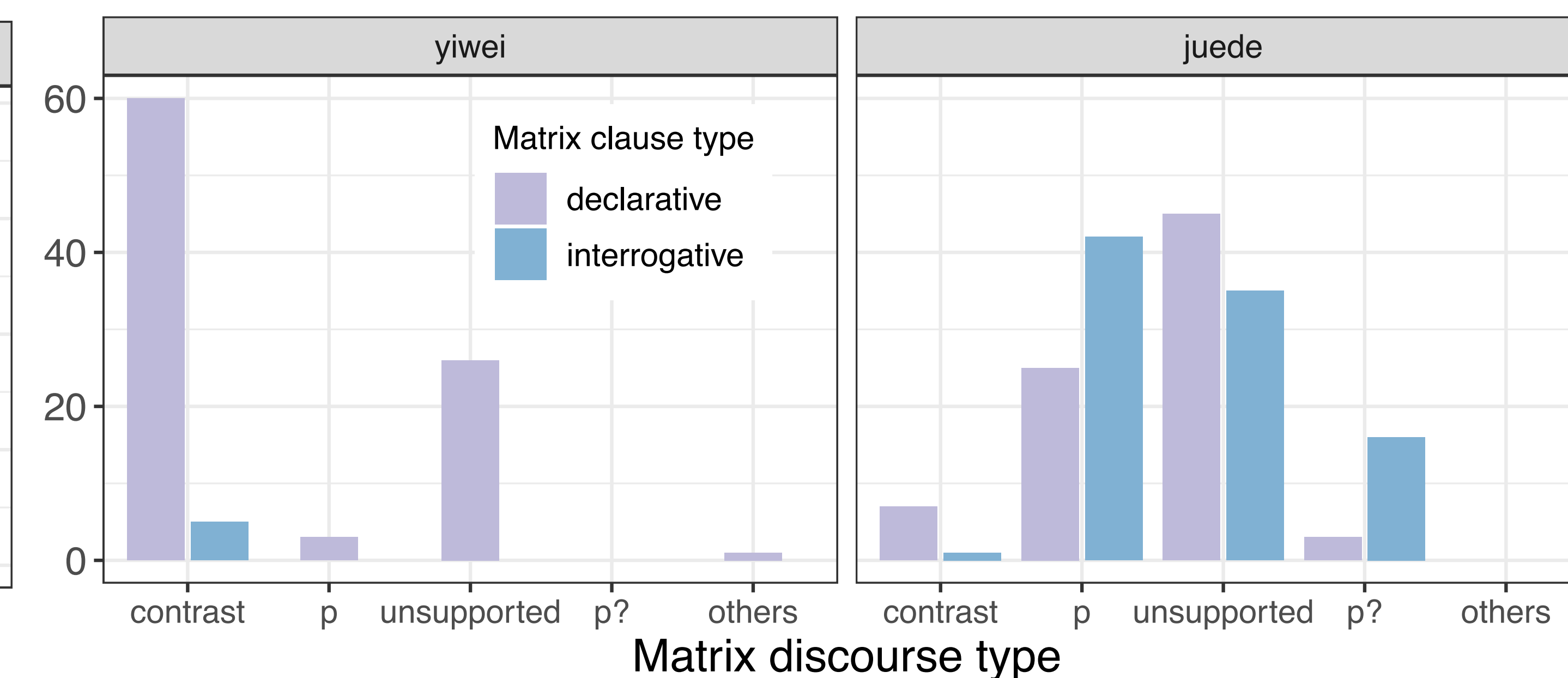
- Subject type: first-person, second-person, dropped, and others
- Sentence type: declarative, interrogatives (e.g., polar questions, wh-questions, tag questions)



yǐwéi rarely occurs in questions and is usually to express one’s own false belief.

### Pragmatic information

- [contrast] That is not a cat./That is a dog.
- [p] That is a cat.
- [unsupported] Let’s play together.
- [p?] Is that a cat?



yǐwéi usually occurs with contrasting information about p.

## Behavioral experiment: HSP

### Conditions

Within participants: 2 verbs (yǐwéi vs. juéde) x 2 types of discourse (supported vs. unsupported)  
 Between participants: context presence vs. absence

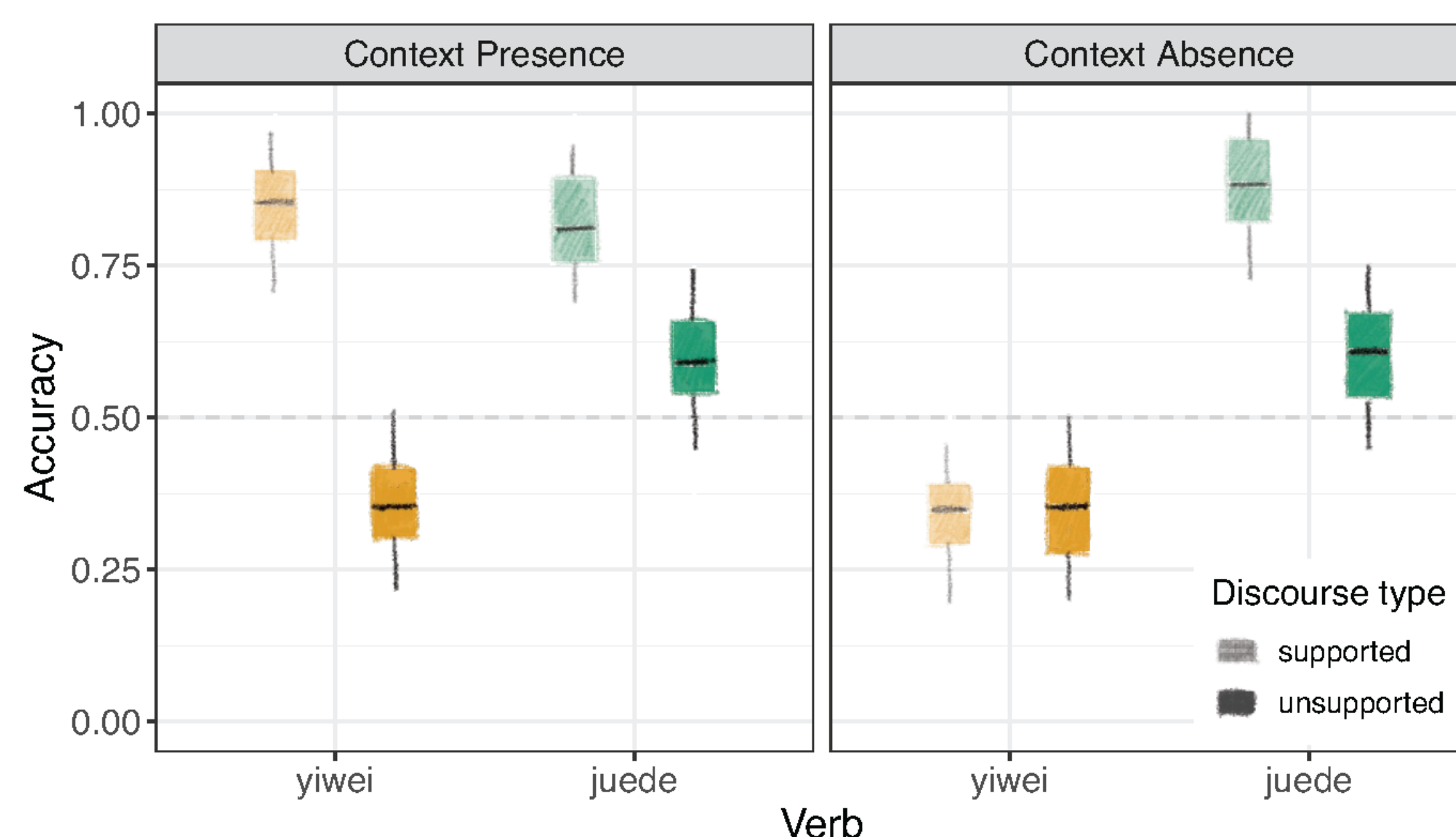
### Task

2AFC: yǐwéi vs. juéde 4 conditions x 10 stimuli per condition

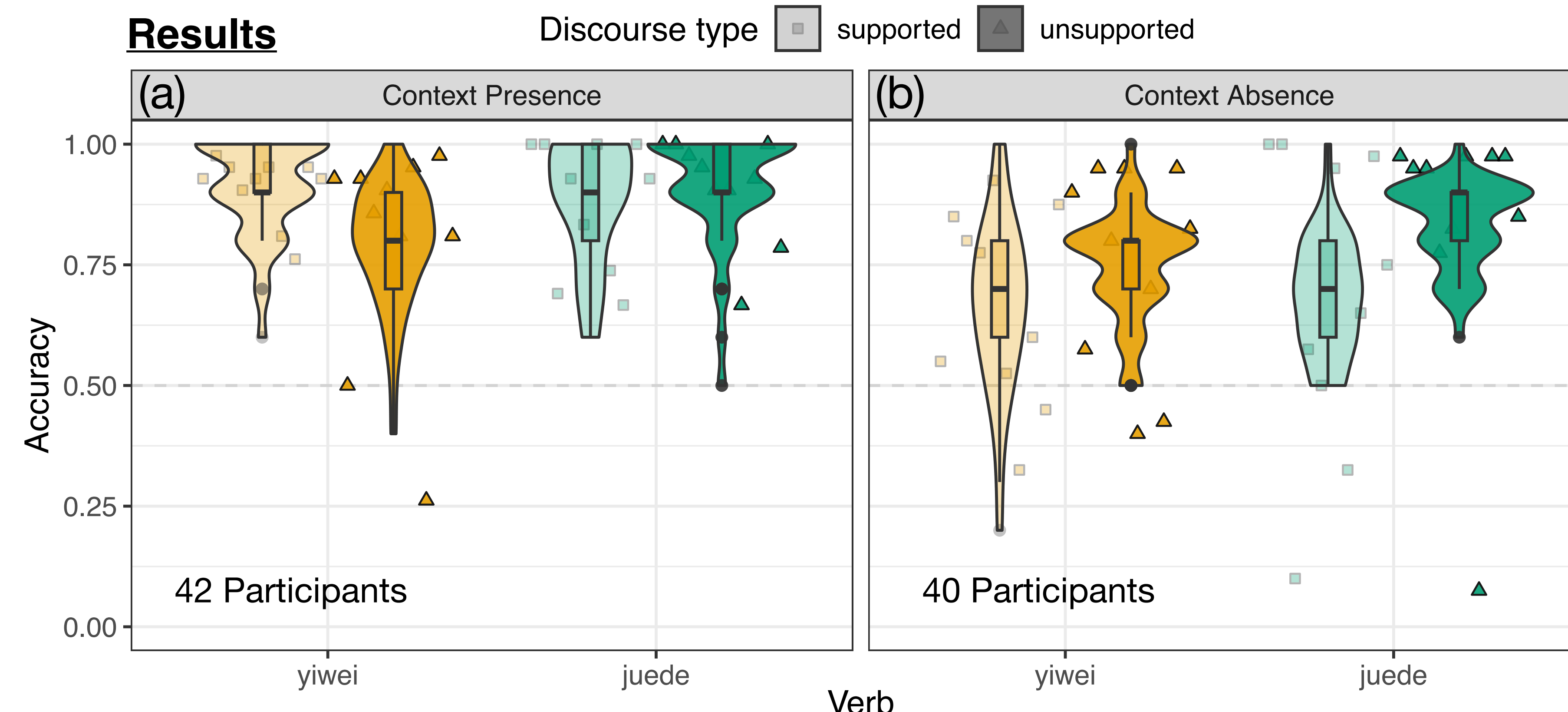
### Stimuli

supported discourse	unsupported discourse
ADU: This was really well done. ADU: Who made this? CHI: (This was) made by Uncle. ADU: Oh! ADU: It was Uncle who made it? ADU: I ____ it was made by Grandma. ADU: Such a beautiful car. ADU: Oh no!	CHI: Right! ADU: Then who is this? CHI: This is the hen.. ADU: Yeah. ADU: The hen saw that the little sister walked over. ADU: ____ the little sister was going to take the chicks. ADU: And was very angry. ADU: What did the hen do to the little sister?
MOT: Is it a mosquito? CHI: No. MOT: Then what is it? CHI: A ladybug. MOT: Oh, it is a ladybug. MOT: You ____ it is a ladybug. MOT: The spider didn't respond. MOT: He's busy spinning the web.	MOT: Look, doesn't it look like an egg? MOT: How to put it together? CHI: Put it together like this! MOT: Put it together like this. MOT: Right. MOT: I also ____ this puzzle is a little hard. MOT: Okay. MOT: Ah, I know.

### Predictions



### Results



- The effect of verb was marginally significant;
- The effect of discourse type and the interaction were not significant.
- Neither the two main effects nor their interaction was significant.

Overall, the accuracy was qualitatively trending in the predicted direction. The accuracy was higher in the presence of the context than in its absence, and higher in a supported context than in an unsupported one.

## Future directions

- What are some other syntactic cues that might distinguish yǐwéi (e.g., adverbial modifications, aspectual and modal markers, etc)? (extending the corpus study)
- What happen if yǐwéi is less salient in an open-ended version of the HSP? (extending the behavioral study)
- Can we find and annotate more child-direct speech data involving yǐwéi, and increase the number of stimuli in the behavioral study?
- Does yǐwéi compete with juéde and other belief verbs during acquisition?
- Is yǐwéi harder or easier to learn than juéde and other belief verbs?