Do children know WHanything?

Acquisition of wh-ambiguity in Mandarin

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How do children figure out *wh*-words are *wh*-words?

Wh-words like *what, which, where* are special, but it's not an easy task to figure out they are of one category.

English: movement

(1) Lili ate **something**.

(2) **What** did Lili eat?

How do children figure out *wh*-words are *wh*-words?

What about Mandarin?

- *Wh*-in *situ*, so no word order clues
- Minimal morphology
  $\rightarrow$ Wh-questions are almost string-identical with regular declaratives
- *Wh*-words have non-interrogative interpretations

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  → Wh-questions are almost string-identical with regular declaratives
  Wh-question:

  (3) Lili chi-le shenme
  Lili eat-ASP what

  Declarative with bare NP:

  (4) Lili chi-le shuiguo
  Lili eat-ASP fruits

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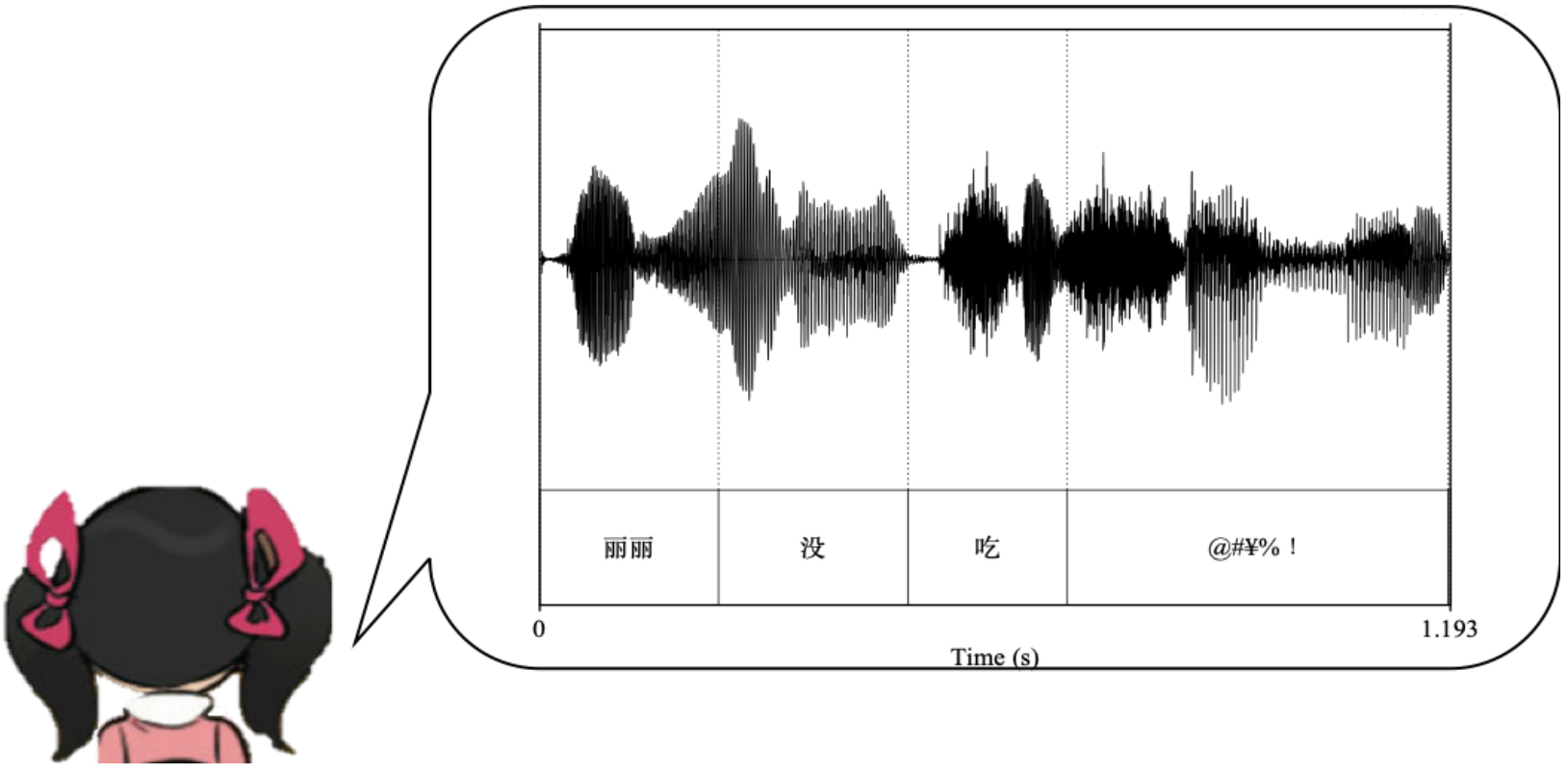
(5) Lili jintian mei chi-le shenme.
Lili today NEG eat-ASP what
"Lili didn't eat much today."

Potential challenges for children



Potential challenges for children

(6) Lili mei chi shenme?
Lili NEG eat what
"What didn't Lili eat?"

Puzzle

However, the non-interrogative interpretations of *wh* might not be a problem at all!

- What is the empirical picture on the acquisition of multiple interpretations of *wh*-items?
- Do children know that *wh* have interrogative and non-interrogative interpretations?

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However, the non-interrogative interpretations of *wh* might not be a problem at all!

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Licensing/constraining contexts

Wh-interrogative interpretation is missing in:

- *Scope of polar question morpheme *A-not-A* or *ma*
- *Focus intervention context
- ...

Wh-existential interpretation appears in:

- Negation
- Polar question
- Episodic positive context
- ...

Wh-universal interpretation appears in:

- Dou

Huang 1982, Li 1992, Cheng 1997 Lin 1998, Dong 2009,Chierchia & Liao 2014, Lin & Giannakidou 2016, Li & Law 2016, Cui &Liu 2019, Yang 2018, among others

Licensing/constraining contexts

In some contexts, only one interpretation is available:

- Dou: *Interrogative, *Existential, ✓Universal
- Polar questions: *Interrogative, ✓Existential, *Universal
- ...

In some contexts, multiple interpretations are available:

- Negation: ✓Interrogative, ✓Existential
- Episodic contexts: ✓Interrogative, ✓Existential
- ...

Research questions

- When do children learn that *wh*-words like *shenme* have mulitple interpretations *and the environments for each interpretation?*

When: Previous studies

- Asymmetry in children's production: interrogative at 2;6, no indefinite *wh* until 4;0 (Lin et al. 2014);
- 4;6: understand that indefinite *shenme* is allowed under negation, polar question morpheme, and in conditionals (Lin et al. 2017), but still have problem with other contexts;
- 5;0: show sensitivity to the prosodic features associated with the two interpretations of *shenme* (Zhou et al. 2012), but their interpretation of indefinite *shenme* is non-adult like until 8;0 (Huang & Crain 2014).

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  - Are children around age 3;8 (3;1-4;2) aware of the interrogative and indefinite interpretations of Mandarin *wh*?
  - Do they assign the correct interpretation to *wh*-words in different contexts?
    - 1-interpretation-only: Polar question, Exp 1
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One-interpretation-only context: A-not-A

(7) Xiaoyang zhuang-mei-zhuang shenme zai xiangzi-li?
Little Lamb pack-NEG-pack what in box-LOC
Did Little Lamb pack anything in the box?

(8) Xiaoyang zhuang-le shenme zai xiangzi-li?
Little Lamb pack-ASP what in box-LOC
What did Little Lamb pack in the box?

Baseline: Bare NP indefinite

(9) Xiaoyang zhuang-mei-zhuang shuiguo zai xiangzi-li?
Little Lamb pack-NEG-pack fruits in box-LOC
Did Little Lamb pack any fruits in the box?

(10) Xiaoyang zhuang-le shuiguo zai xiangzi-li.
Little Lamb pack-ASP fruits in box-LOC
Little Lamb packed fruits in the box.

Experiment 1

Do children around age 3;8 (3;1-4;2) have two intepretations of *shenme*?

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- Hypothesis 1: children $=$ adults,
  - 2 interpretations,
  - V shenme $\rightarrow$ interrogative, V-not-V shenme $\rightarrow$ indfinite
- Hypothesis 2: children $\neq$ adults
  - Interrogative interpretation only,
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Exp 1: Conditions

Between-subject, 2*2:

Xiaoyang ...	**Zhuang-le** "pack"	*Zhuang-mei-zhuang* "pack-not-pack"
shenme	**What did Little Lamb pack?**	Did Little Lamb pack anything?
shuiguo	**Little Lamb packed fruits.**	Did Little Lamb pack fruits?

Exp 1: Participants

- 72 children (3;1-4;2, mean 3;8)
- 60 adults

Exp 1: Setup

Introducing Xiaoiao!

Exp 1: Setup

Both questions and statements; can't be traditional TVJT!

Exp 1: Setup

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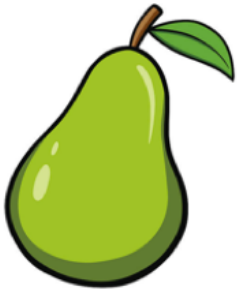

(11) Xiaoyang fang-mei-fang shenme zai
Lamb put-NEG-put what in
xiangzi-li.
box-LOC
"Did Little Lamb put much in the box?"

Huang A. 2014, Huang & Crain 2014, among others

Exp 1: Story

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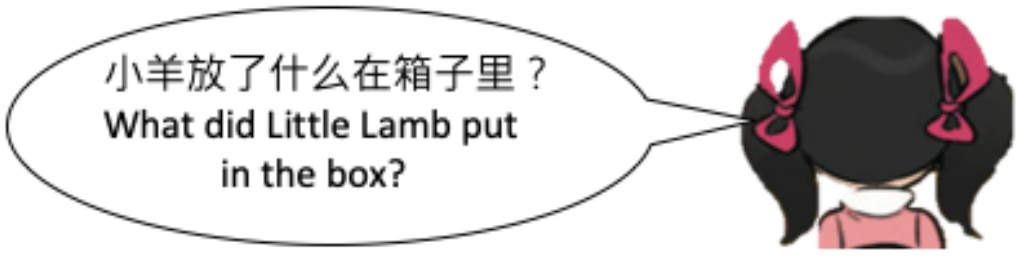
Exp 1 Measurement: Yes/no response

Exp 1 Measurement: *fragment answers



Exp 1: Results

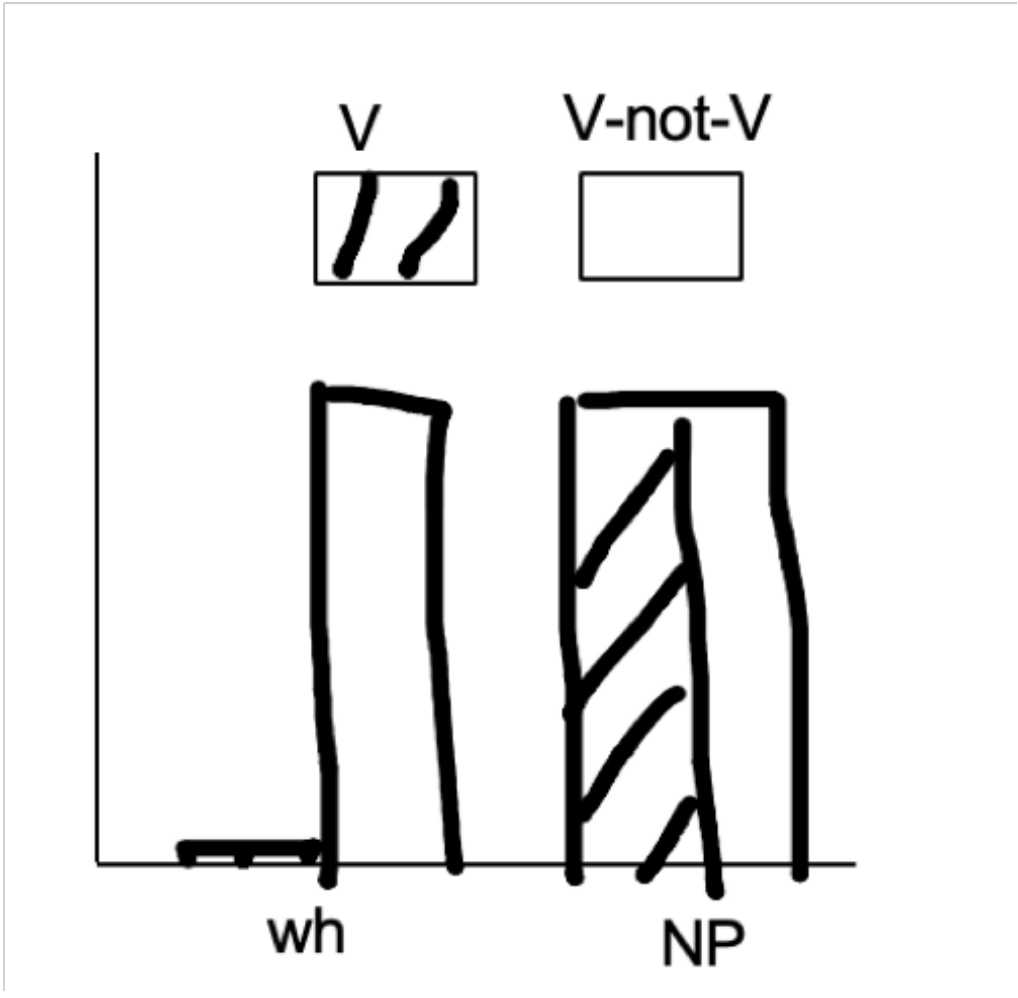
Only include if:

- The child spontaneously produces at least one fragment answer response and one yes-no response during the practice phase
- The child produces at least one "pear and apple" response and one yes-no response for the filler trials in the testing phase

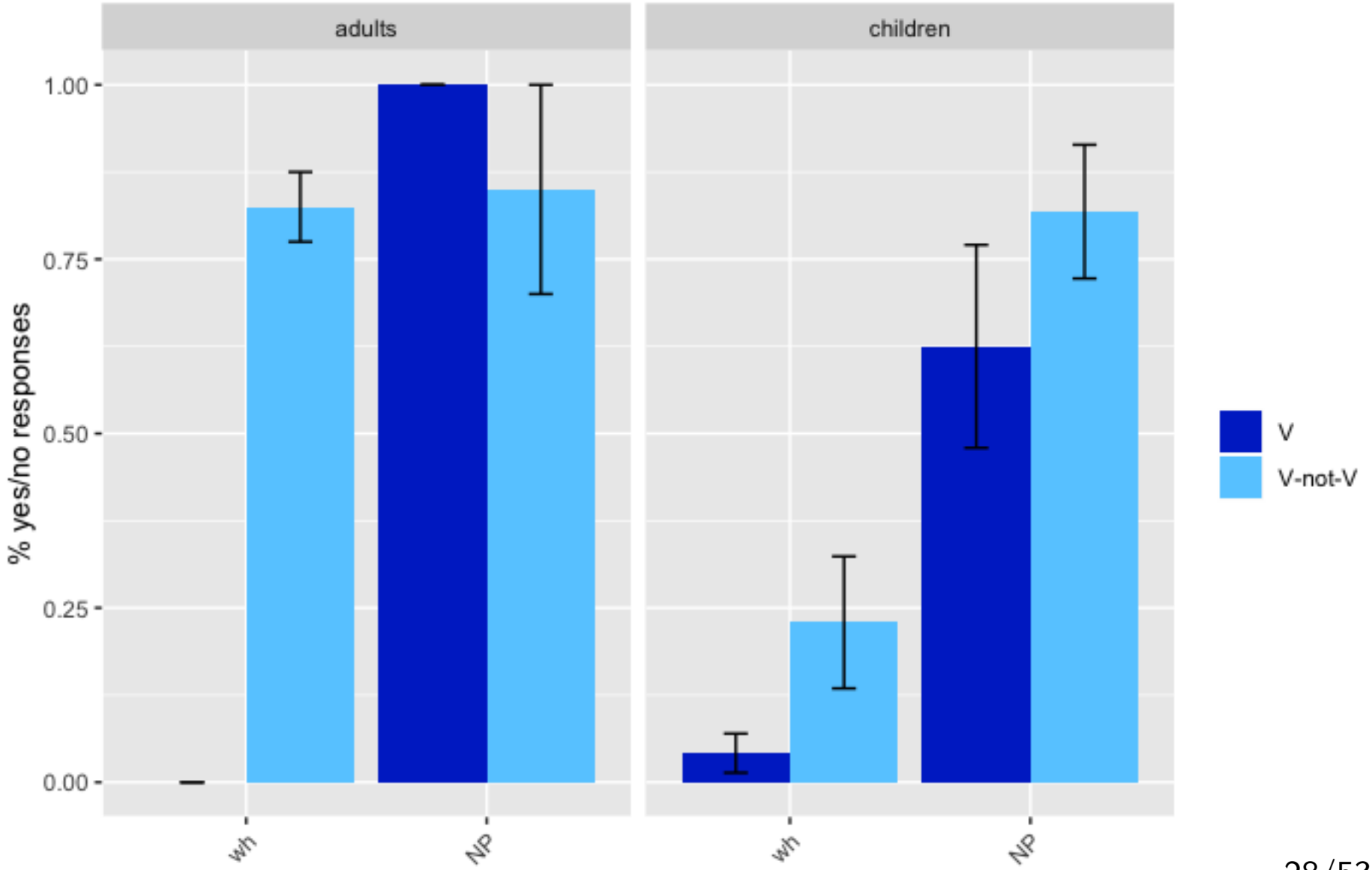
Exp 1: Results

- 48 children (12 per condition; 3;1-4;2, mean 3;8)
- 20 adults (5 per condition)
- Still transcribing and coding...

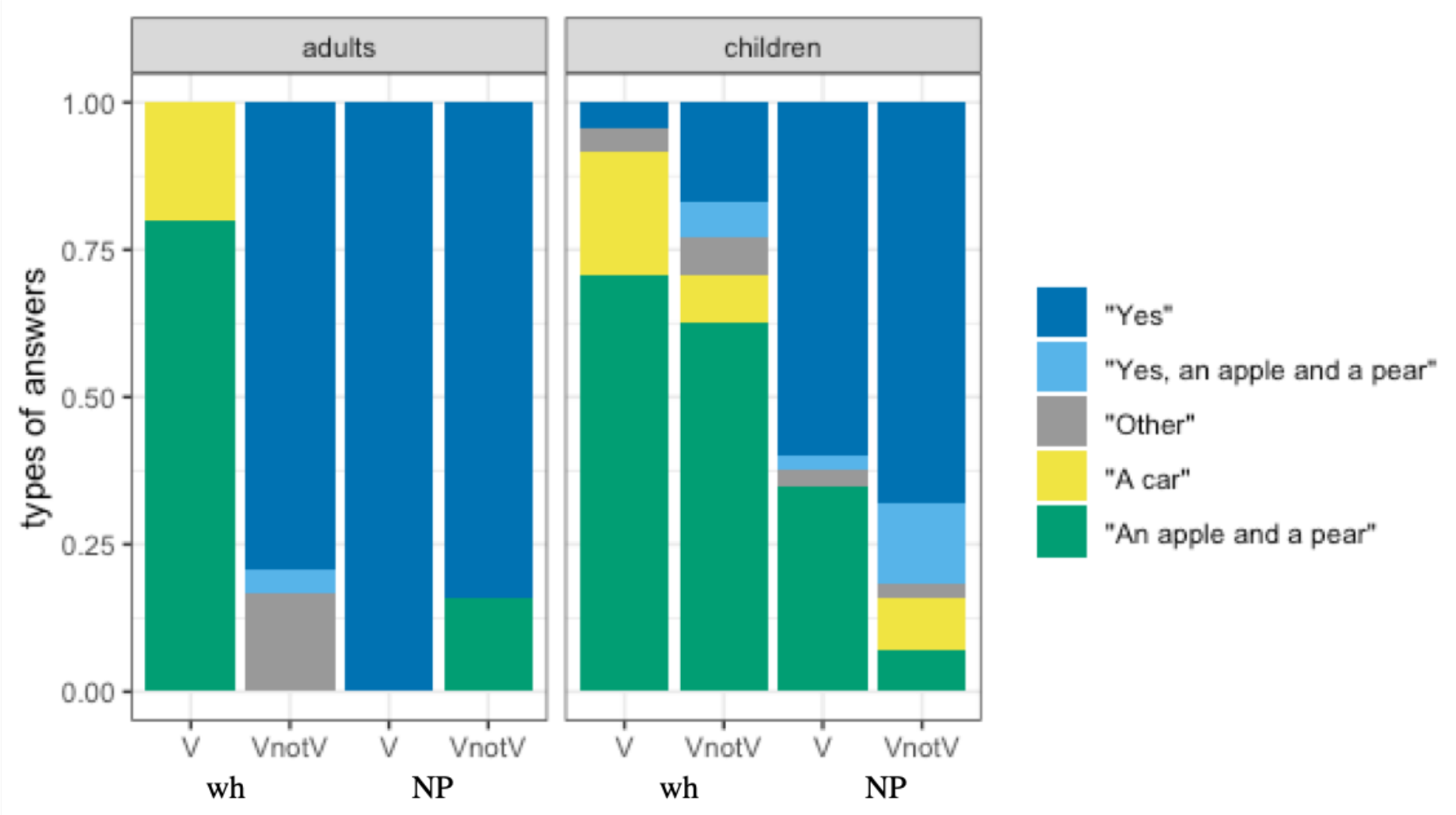
Exp 1: Prediction



Exp 1 Results: Yes/no responses



Exp 1 Results: All responses



Exp 1: Discussions

- For children: shenme $\neq$ shuiguo;
- But V+shenme = V-not-V+shenme.
- These results are consistent with the prediction of H2, that children only have interrogative interpretation.
  - Not likely to be an effect of omitting the yes/no particle; high yes/no responses in V-not-V shuiguo condition.

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Mulitple-interpretation context: Negation

One string, two interpretations:

(12) Lili mei chi shenme
Lili NEG eat what
a. What didn't Lili eat?
b. Lili didn't eat much.

Negation

Wh: ambiguious

(13) Lili mei chi shenme
Lili NEG eat what

a. What didn't Lili eat?
b. Lili didn't eat much.

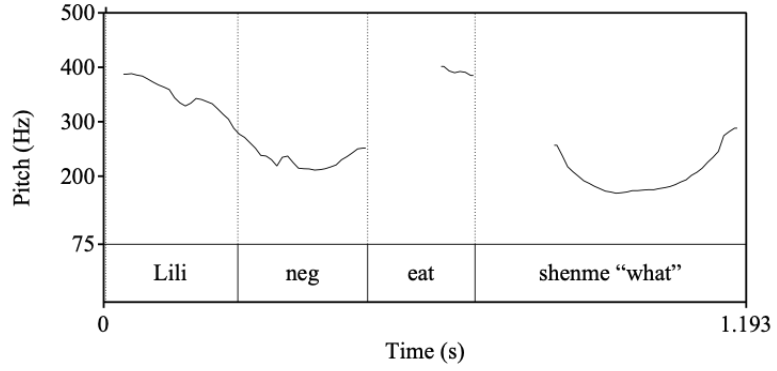
Bare NP indefinites: unambiguous

(14) Lili mei chi shuiguo
Lili NEG eat fruits

a. Lili didn't eat fruits.

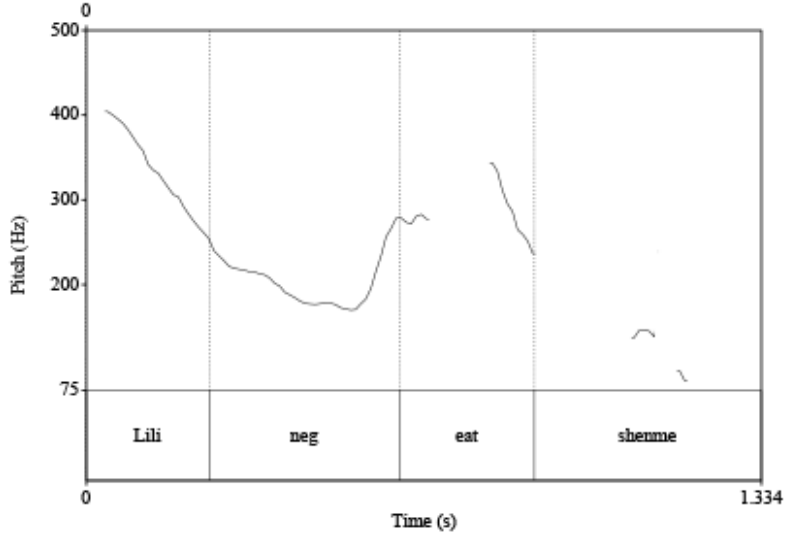
Role of prosody

Interrogative *shenme*:



Expanded pitch range, longer duration

Indefinite *shenme*:



Narrow pitch range, shorter duration

Hu 2002, Dong 2009, Liu, Li & Jia, 2016, Yang 2018

Experiment 2

- Do children around age four know strings with negation + shenme have two interpretations?
- Do they know that prosody disambiguates?

Exp 2: Conditions

Between subject, 2*2:

Xiaoyang mei zhuang ...	+**Prominence**	−Prominence
shenme	**What** didn't Little Lamb pack?	Little Lamb didn't pack much.
shuiguo	Little Lamb didn't pack **fruits**.	Little Lamb didn't pack fruits.

Exp 2: Hypotheses

- H1: children = adults;
  - Interrogative ✓, indefinite ✓, prosody✓
- H2: children ≠ adults;
  - Interrogative ✓, indefinite ✗, prosody✗
- H3: children ≠ adults;
  - Interrogative ✗, indefinite ✓, prosody✗
- H4: children ≠ adults;
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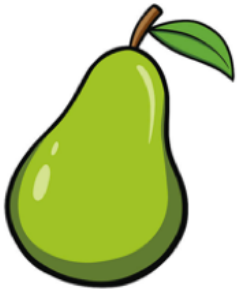
Exp 2: Participants

- 72 children (3;1-4;2, mean 3;8)
- 60 adults

Exp 2: The 3-thing requirement



(15) Xiaoyang mei fang **[shuiguo]** zai
Lamb NEG put fruits in
xiangzili.
box-LOC
"Little Lamb didn't put FRUITS in the box."

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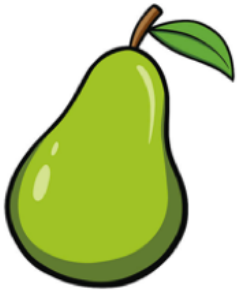
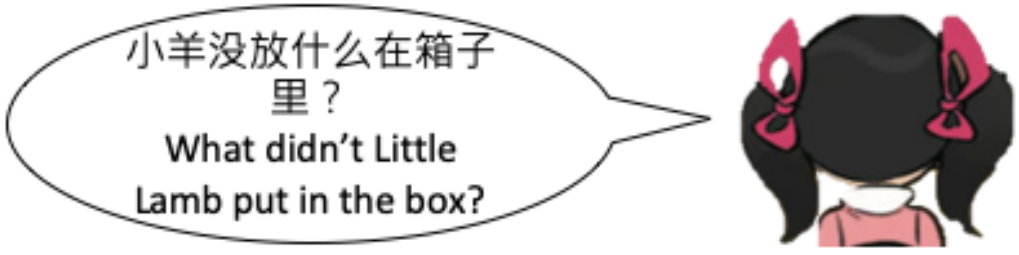


(16) Xiaoyang mei fang shenme zai xiangzili.
Lamb NEG put what in box-LOC
"Little Lamb didn't put much in the box."

Ding et al. 1961, Chao 1968, Zhu 1982, Lv 1985, Cui 2012, Huang and Crain 2014 among others

Exp 2 Measurement: yes/no response

Exp 2 Measurement: "a car!" response



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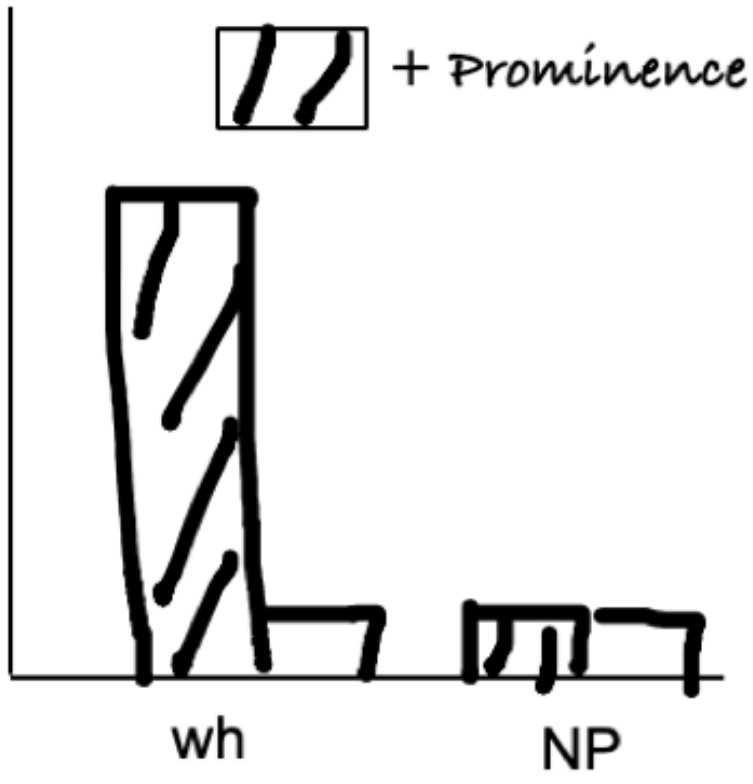

Exp 2 Results: "a car!" responses

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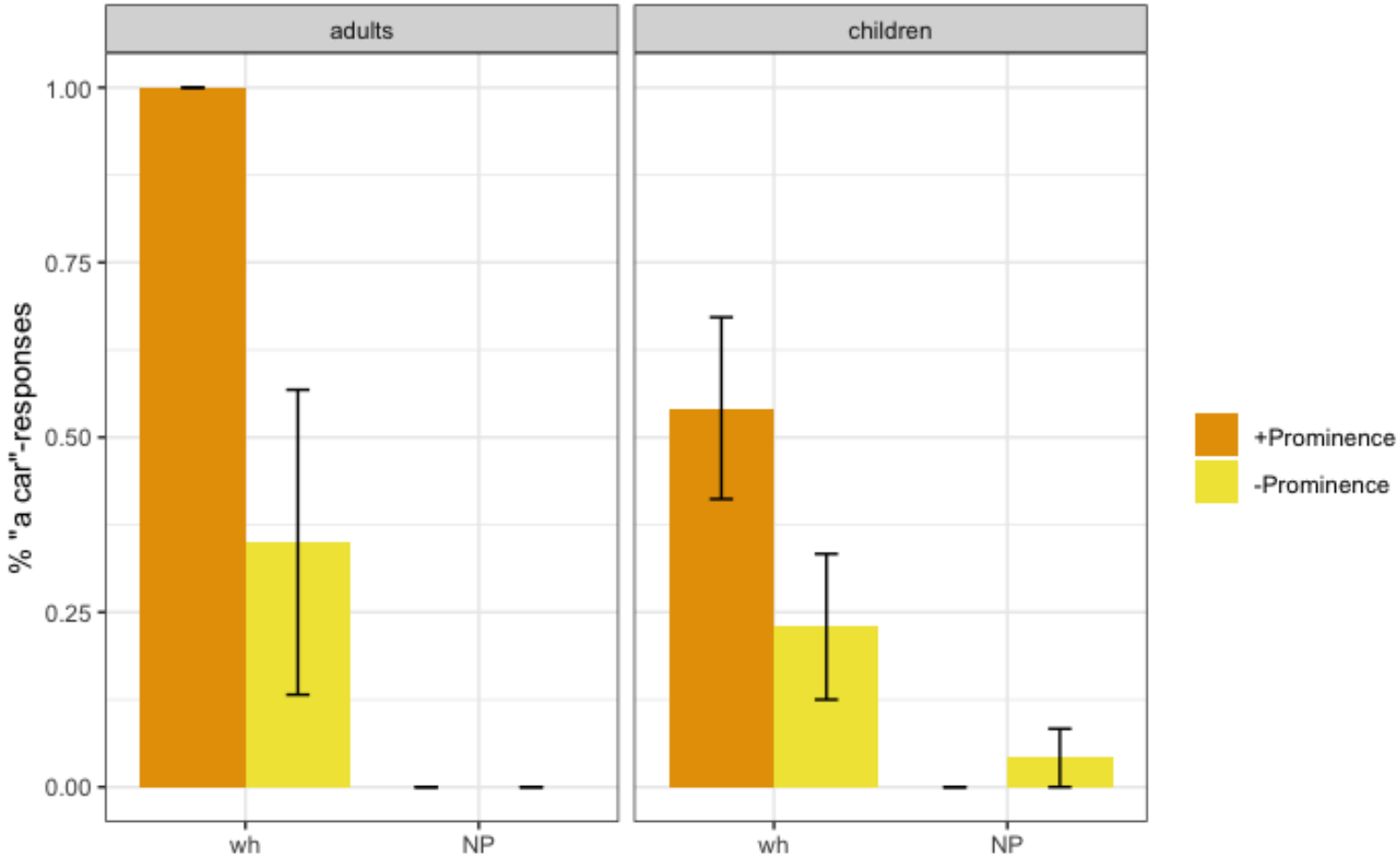

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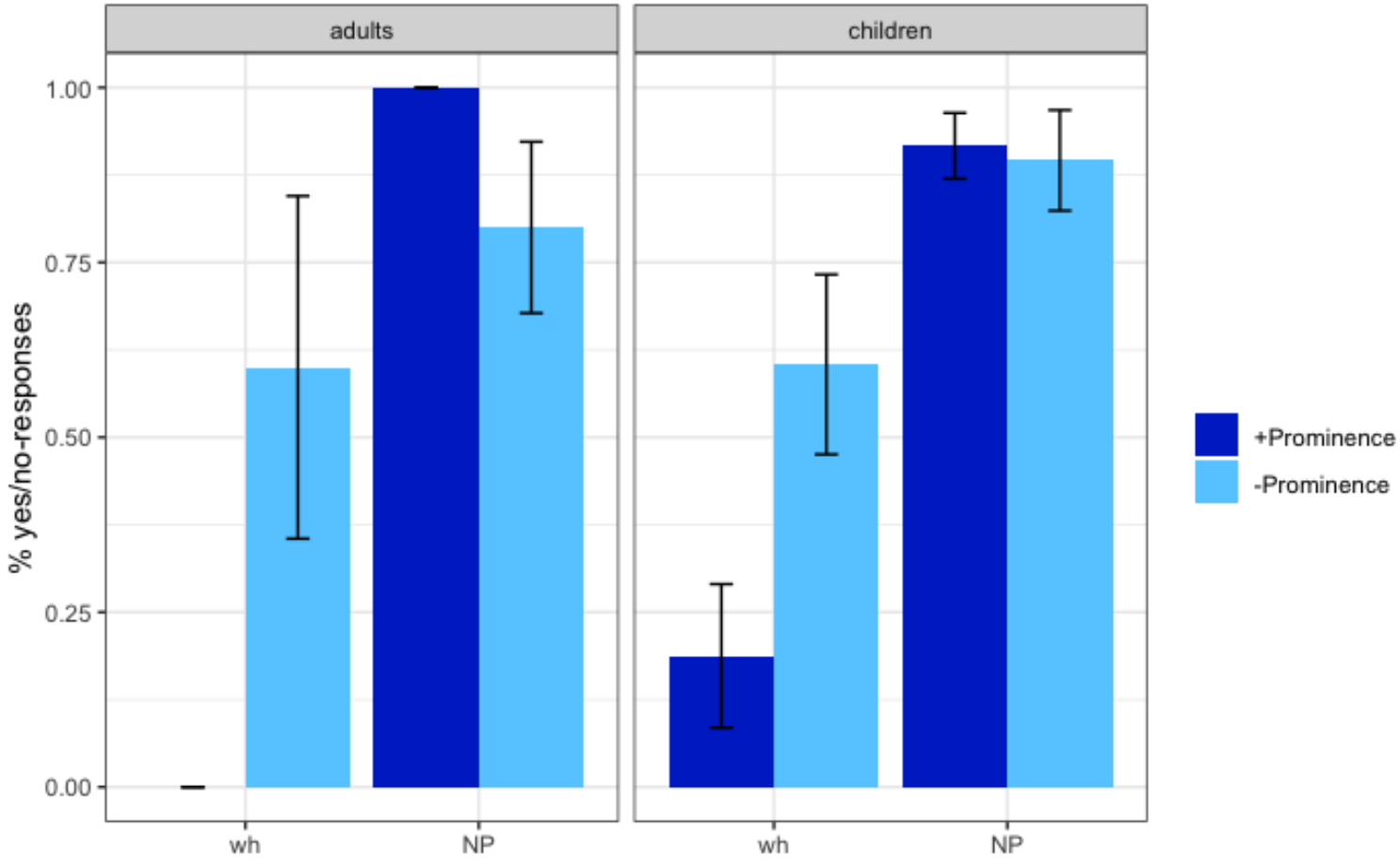

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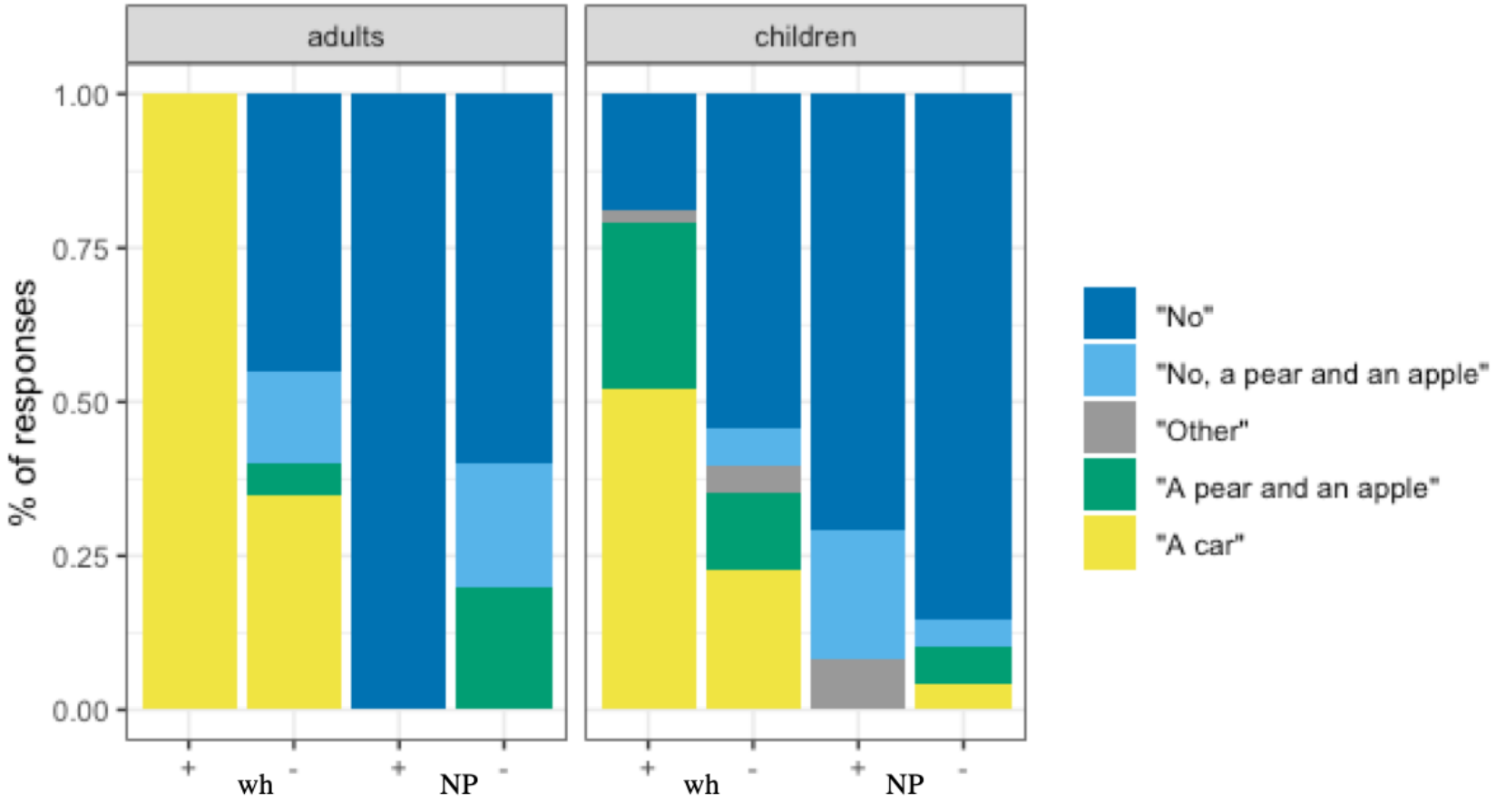

Exp 2: Discussion

- On the yes/no measure, children behave the same as adults, and the wh+prominence condition is different from the other three conditions;
- This is consistent with H1, namely children are aware of the two interpretations of shenme;
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Exp 2 discussion: why "a pear and an apple" response?

- But on the "a car!" response measure, there is no difference between wh+prominence condition and the other three;
- This could be due to the large number of "a pear and an apple" response;
- The type of response (fragment answer) is correct, but the content is not;
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General Discussion

- 3yos are aware of both the indefinite and interrogative interpretations of *shenme*;
- In Exp 1, we find that they are not aware that *shenme* is interpreted as an indefinite in polar questions;
- But in Exp 2, we find that they are sensitive to the prosodic distinction between interrogative and indefinite interpretation.

General Discussion: why not polar questions?

- This result is consistent with what Lin et al. (2017) found with elicited immitation task: polar question context has a lower accuracy rate than negation context.
- One possibility is that, when there are two potential question morphemes in the sentence, in this case, a polar morpheme and a *wh*-morpheme, children have problem processing the sentence, and give the maxim amount of information $\rightarrow$ future work!

Thanks!

To the children, teachers, directors, and parents at:

- Hong Ying School, Tangjialing
- Xinglinwan Preschool associated with Chinese Academy of Science
- Shangzhuang Science Park Preschool
- Yiming Preschool, Shangzhuang
- Xintongxin Kindergarten, Chengde

General discussion: prosody in Exp 1?

In Exp 1, children only have interrogative interpretation. One could ask whether this is because the prosody of *shenme* is different in these two experiments. But:

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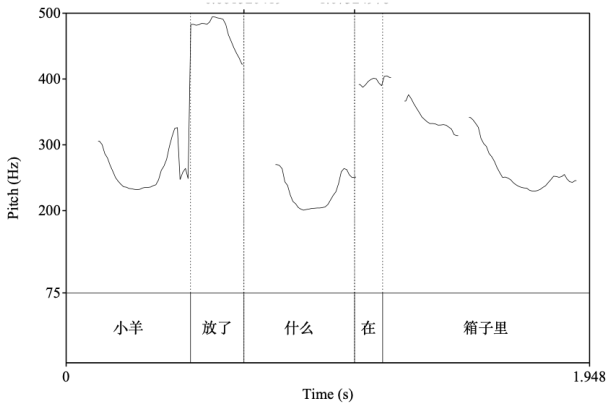
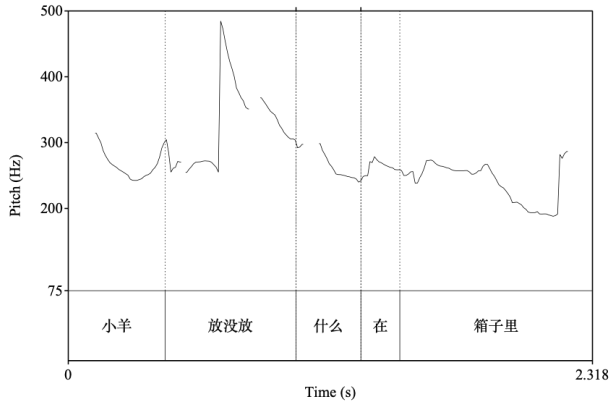
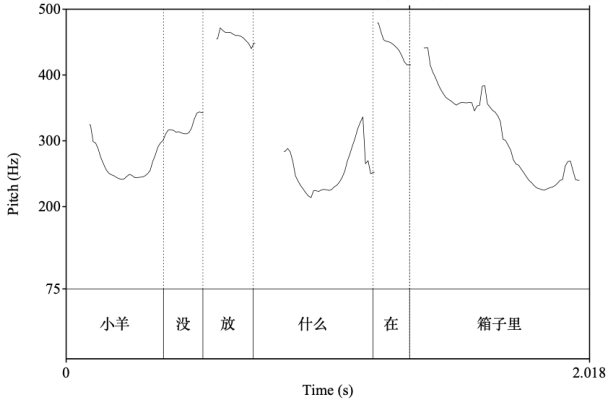
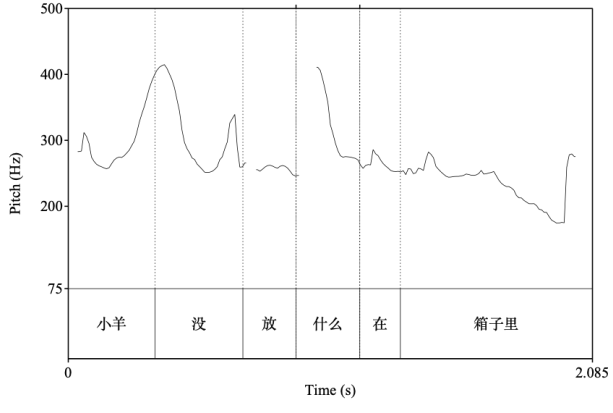
Exp 1:





Exp 2:





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