Do children know WHanything?

Acquisition of wh-ambiguity in Mandarin

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Language
at Maryland

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Wh-indefinites in Mandarin

(1) Xiaoxiao jintian mei chi shenme
     Xiaoxiao today NEG eat what
     a. Interrogative: "What didn't Xiaoxiao eat today?"
     b. Indefinite: "Xiaoxiao didn't eat anything today."

Learning problem

- *Wh*-indefinites are extremely rare in adult input:

Fan 2012, Zhou 2013, Lin et al. 2014

Learning problem

Contexts	Count (%)
As *wh*-questions	976 (97.7%)
Total	**999**

Table 1: Distribution of *shenme* "what" in child-directed Mandarin (Based on Lin 2017, Appendix A)

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In positive episodic sentences	0
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Learning problem

With limited exposure, how do children acquire the indefinite interpretation?

Two proposals

All-at-once hypothesis

- Proposal: Children acquire *wh*-indefinites early, and they can generalize this interpretation to all appropriate environments;

- Evidence: 4.5-year-olds correctly assign the indefinite interpretation in various environments, including ones they have virtually no exposure to.

  Zhou 2013, Zhou et al. 2012, Zhou 2011, Zhou & Crain 2009

Bit-by-bit hypothesis

- Proposal: Children build each licensing environment one by one, and gradually expand the set of licensing contexts for *wh*-indefinites.

- Evidence: Children do not produce *wh*-indefinites consistently until 4.5, and only in limited environments

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All-at-once hypothesis

- ▶ Evidence from 4.5 years old may not be able to support the strong claim;
- ▶ The bit-by-bit hypothesis agrees that children might have acquired *wh*-indefinites by then

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- ▶ Linking hypothesis: Production → Knowledge
- ▶ But even adults do not produce *wh*-indefinites very frequently, so the lack of production by children before 4.5 may not be able to reflect their knowledge.

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- ▶ Linking hypothesis: Production → Knowledge
- ▶ But even adults do not produce *wh*-indefinites very frequently, so the lack of production by children before 4.5 may not be able to reflect their knowledge.

We need to look at a **younger** range, and look at children's **interpretation** instead of production, to test the predictions of these two hypotheses properly.

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1. Do 3yo know the indefinite interpretation of *shenme* "what"? → Exp 1
2. Do 3yo know the indefinite interpretation of *shenme* in environments they have no exposure to? → Exp 2

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All-at-once hypothesis:

- ▶ Yes!
- ▶ Yes!

Bit-by-bit hypothesis:

- ▶ No!
- ▶ No!

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All-at-once hypothesis:

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▸ Yes!

Bit-by-bit hypothesis:

▸ No!

▸ No!

Spoilers: our results support the All-at-once hypothesis

Exp 1: with *dou*

(2) Lili *shenme dou* chi le.
    Lili what   DOU eat ASP
    "Lili ate everything"

▶ The contribution of particle *dou* is heavily debated; in this study, we use one feature of *dou* when it occurs with *wh*-words:

▶ When *shenme* linearly precedes the particle *dou*, the only interpretation available is the indefinite one

Cheng 1995, Li 1995, Huang 1996, Wu 1999, Dong 2009, Xiang 2008, Liu to appear, Xiang 2019, among many others

- ▶ How do we test people's interpretation of *wh*-words?
- ▶ Problem: The two interpretations of *wh*-words change the speech act of the whole sentence!
- ▶ Question-Statement Task
  - ▶ We use participants' responses to infer their perceived speech acts and their interpretation of *shenme*.
    - ▶

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Exp 1 *dou*: Question-Statement Task

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- This is Xiaoxiao!
- We are going to tell her some stories.
- Let's ask her to turn around so she can't see.
- But she can talk to *you* to find out about the pictures on the screen!
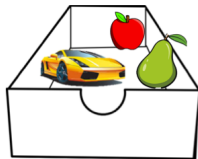
Figure 1: Teacher Kangaroo explains the winning condition: pack all three things in a box
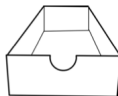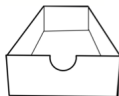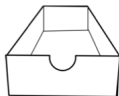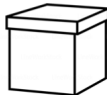
Figure 2: The three competitors are getting ready to pack!
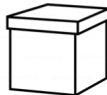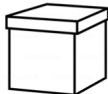
Figure 3: They packed packed packed...now they are ready!
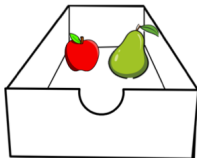
Figure 4: The critical trial (two-out-of-three condition)

[+*dou*]

(3) Xiaoyang <u>shenme</u> *dou* fang zai xiangzi-li le
Lamb   what   DOU put in box-LOC ASP
"Little lamb packed everything in the box."

[-dou]

(4) Xiaoyang ba <u>shenme</u> ∅ fang zai xiangzili le
Lamb   BA what   put in box   ASP
"What did Little Lamb pack in the box?"

[+*dou*] "Lamb packed everything!"
[-dou] "What did Lamb pack?"

Two-out-of-three scenario: Three-out-of-three scenario:
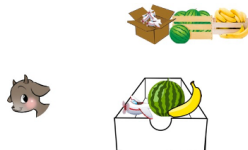
[+*dou*] "No!"   [+*dou*] "Yes!"   [-dou] "Air-
[-dou] "Apple and pear!"   plane, watermelon, banana!"

We use participants' response to infer their perceived speech acts and their interpretation of *shenme*:

- ▶ Interrogative interpretation - *wh*-question - ✗*yes/no*-responses
- ▶ Indefinite interpretation - statement - ✓*yes/no*-responses

To respond to a statement, one can use the following *yes/no*-markers:

To respond to *wh*-questions, one can NOT use utterances with *yes/no*-markers:

To respond to *wh*-questions, one have to name the items in the box:

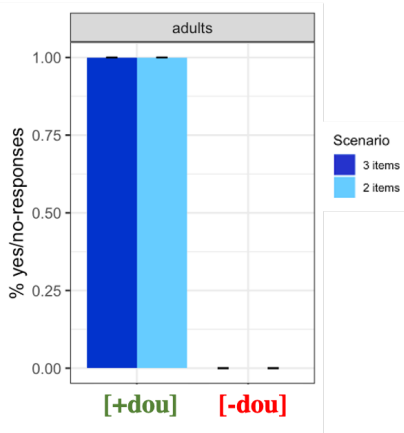# Exp 1 expected responses: summary

[+*dou*]

(5) Xiaoyang <u>shenme</u>
Lamb   what
dou fang zai
DOU put in
xiangzi-li le
box-LOC ASP
"Lamb packed every-
thing in the box."
✓ *yes/no*-response

[-dou]

(6) Xiaoyang ba
Lamb   BA
<u>shenme</u> ∅ fang zai
what   put in
xiangzili le
box   ASP
"What did Little Lamb
pack in the box?"
✗ *yes/no*-response

Exp 1 expected responses: summary

Exactly what adults did (n=32):

Exp 1 *dou*: Practice, fillers

- 3 practice stories to get in the habit of talking to Xiaoxiao
- At testing phase: 4 critical trials, 8 filler trials.
- Filler sentences include: 2 *how-many* questions, 2 polar questions, 2 true statements and 2 false statements to balance the number of questions, yes-responses and no-responses.

Exp 1 *dou*: Participants

- 36 children (3;0;17-4;0;0, mean = 3;9, 18 female)
- 4 children quit before moving on to the testing phase
- 32 adults
- Participants' performance was recorded, and then their utterances were transcribed and coded based on the recording.
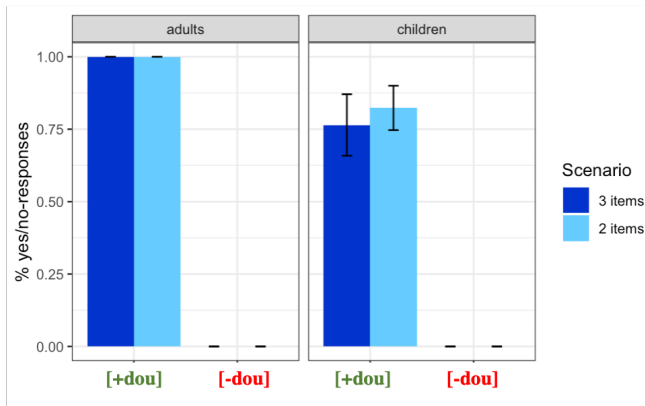
Figure 5: The percentage of *yes/no*-responses by adults and children to sentences with/without *dou*

Exp 1 *dou*: results

Typical response in [+*dou*] condition:

(7) Xiaoxiao ni shuo cuo   le
    Xiaoxiao ni say   wrong ASP
    "Xiaoxiao you are wrong."   Child participant #107

Typical response in [-dou] condition:

(8) You   pingguo he   li.
    Have apple   and pear
    "There's an apple and a pear."   Child participant #130

- ▶ 3yo indeed know the indefinite interpretation of *shenme*!
  - ▶ ✓All-at-once hypothesis
  - ▶ ✗Bit-by-bit hypothesis
- ▶ But the bit-by-bit hypothesis can say this little exposure might be enough:
- ▶ We need to look at another environment:

Exp 1 *dou*: Discussion

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- But the bit-by-bit hypothesis can say this little exposure might be enough:

Contexts	Count (%)
In the restriction of universals (e.g. *dou*)	2 (0.2%)
In (bare) conditional clauses	3 (0.3%)
In polar questions	3 (0.3%)
In imperfectives	9 (0.9%)
In imperatives	2 (0.4%)
In epistemic uncertainty contexts	4 (0.4%)
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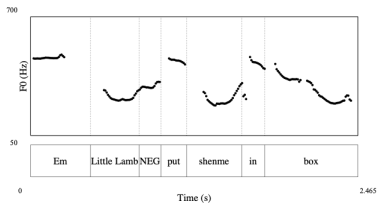- We need to look at another environment:

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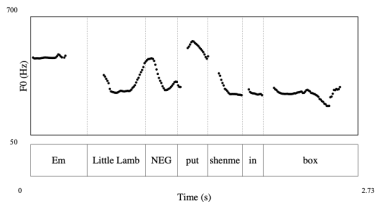| Contexts	Count (%)
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▶ Special feature of negated sentences: the two interpretations of *shenme* are string-identical, and disambiguated by prosody:

(9) Xiaoxiao jintian mei chi shenme
    Xiaoxiao today NEG eat what
    a. Interrogative: "What didn't Xiaoxiao eat today?"
    b. Indefinite: "Xiaoxiao didn't eat anything today."

Exp 2 under NEG: prosody

Interrogative:
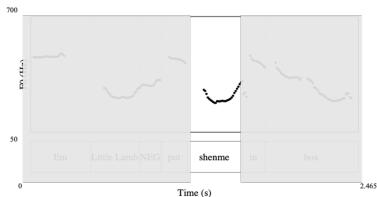

Indefinite:
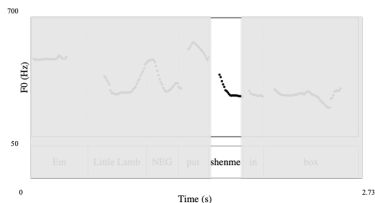
Interrogative: [+Prominence]

Indefinite: [-Prominence]

Hu 2002, Dong 2009, Zhou et al. 2012, Liu et al. 2016, Yang 2018

- Same set-up as Exp 1.
- Use bare indefinite NP *shuiguo* "fruits" as a comparison.

Between subject, 2*2:

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

Xiaoyang mei zhuang ...	[+**Prominence**]	[−Prominence]
shenme	✗ *yes*/*no*-responses	✓ *yes*/*no*-responses
shuiguo	✓ *yes*/*no*-responses	✓ *yes*/*no*-responses

Exp 2 responses: summary

Xiaoyang mei zhuang ...	+**Prominence**	−Prominence
shenme	✗*yes/no*-responses	✓*yes/no*-responses
shuiguo	✓*yes/no*-responses	✓*yes/no*-responses

Adults (n=56) behaved exactly like this:
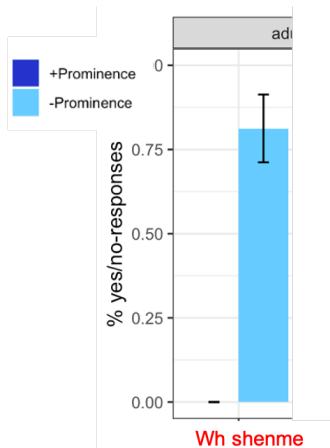
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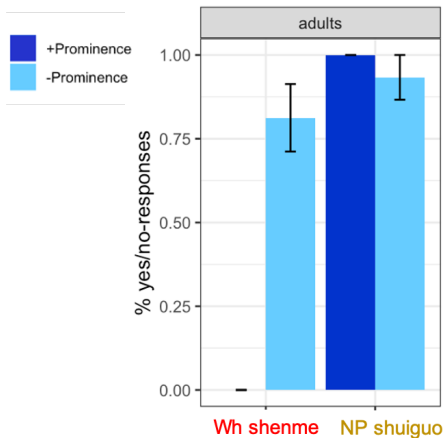
Exp 2: Participants

- 56 children (3;0;26-3;11;28, mean = 3;8, 35 female)
- 56 adults
- Same fillers and practices as Exp 1

Exp 2: results
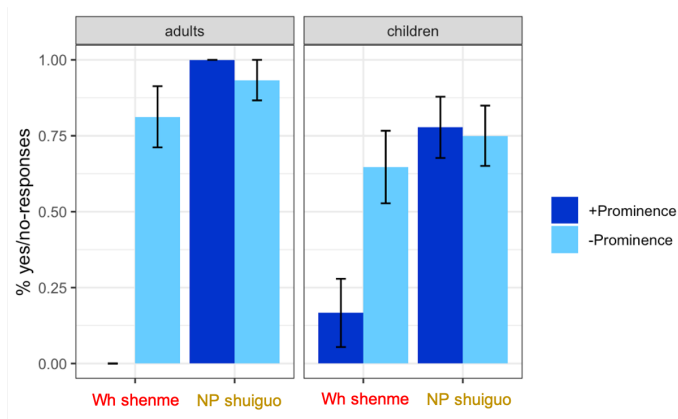
Figure 6: The percentage of *yes/no*-responses by adults and children to wh/NP with/without prominence

Exp 2: responses

Typical response to **shenme + prominence**:

(10) Xiaoqiche.
      Car
      "A car."   Child participant #281

Typical response to *shenme* - prominence:

(11) Bu dui,   fang-le   pingguo.
      NEG right, put-ASP   apple
      "Wrong, she packed an apple."   Child participant #233

- 3yo know the indefinite interpretation of *shenme* in an environment they have no exposure to!

Conclusion

- 3yo know the indefinite interpretation of *shenme* in an environment they have very little exposure to (*dou*)
- ...and in an environment they have virtually no exposure to (in NEGated sentence).

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- 3yo know the indefinite interpretation of *shenme* in an environment they have very little exposure to (*dou*)
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All-at-once hypothesis

► Children can generalize their knowledge about *wh*-indefinites to all appropriate environments, even ones they do not have exposure to.

Bit-by-bit hypothesis

► Children build each licensing environment one by one, and gradually expand the set of licensing contexts for *wh*-indefinites.

General Discussion

All-at-once hypothesis

- ▶ Children can generalize their knowledge about *wh*-indefinites to all appropriate environments, even ones they do not have exposure to.

✓

Bit-by-bit hypothesis

- ▶ Children build each licensing environment one by one, and gradually expand the set of licensing contexts for *wh*-indefinites.

What's next?

- ▶ The All-at-once Hypothesis is a strong hypothesis! What kind of knowledge prompts kids to generalize?
  - ▶ The distribution of *wh*-indefinites in different languages vary;
  - ▶ E.g. while *wh*-indefinites in Mandarin behave like modal indefinites, in German they are restricted to VPs; in Japanese, morphological markers (e.g. *-mo*) are required; in some Mayan languages
- ▶ We need more data from other languages to develop a richer grammatical theory on the syntax and semantics of *wh*-indefinites to help us understand why Mandarin children are so ready to make the generalization.
- ▶ Stay tuned!

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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

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- *LSLT at UMD*, especially Shevaun Lewis
- *Workshop on Theoretical and Experimental Linguistics at Tsinghua University*, especially
  Liu Mingming, Li Haoze, Li Yafei, Yang Xiaolu, Yang Yang, Zhou Peng
- *MAPLL-TCP-TL at Kobe University*
- You!

Language at Maryland

Questions?

- ▶ Slides are posted online at:
  `yu-an.github.io/projects`
- ▶ You can also email me:
  yuanyang@umd.edu

Bibliography I

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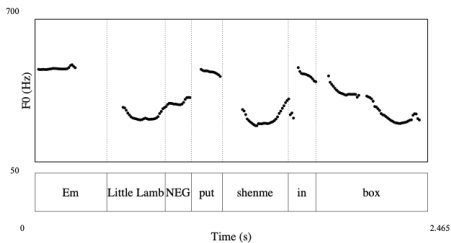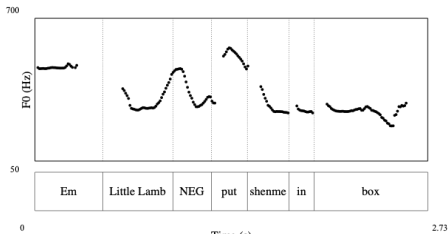# Exp 1 *dou*: prosody

[+*dou*]

[-dou]
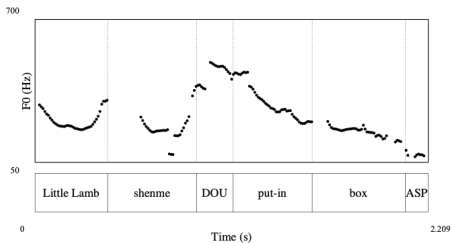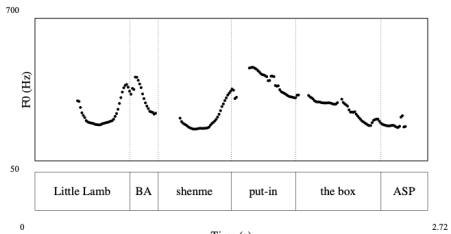
shenme [+Prominence]

shenme [-Prominence]
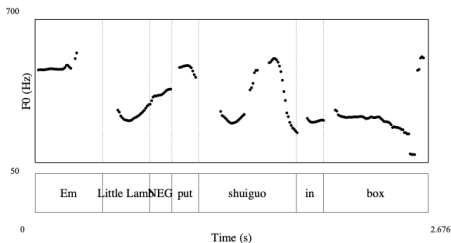
shuiguo [+Prominence]

shuiguo [-Prominence]
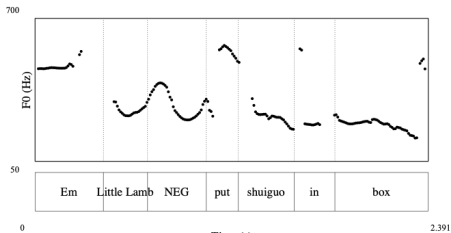
For some speakers, *shenme* under NEG can be interpreted as "not much" instead of "not anything":

(12) 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, Huang and Crain 2014 among others

Exp 2 Results: Accuracy