Learning subcategorization properties of attitude verbs in wh-in situ languages

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BUCLD 46

How to distinguish between *think* and *know?*

Xiaoxiao | knows | [the toy is in the box.]

Grimshaw 1979, Lahiri 2002, Égre 2008, White and Rawlins 2020, among many others

How to distinguish between *think* and *know?*

Xiaoxiao **gorps** [what is in the box.]

Grimshaw 1979, Lahiri 2002, Égre 2008, White and Rawlins 2020, among many others

How to distinguish between *think* and *know?*

Xiaoxiao **knows** [what is in the box.]

Grimshaw 1979, Lahiri 2002, Égre 2008, White and Rawlins 2020, among many others

How to distinguish between *think* and *know?*

Xiaoxiao  [what is in the box.]

Grimshaw 1979, Lahiri 2002, Égre 2008, White and Rawlins 2020, among many others

Know and *think* have different subcategorization properties

Xiaoxiao

thinks

+ Declarative ✓
+ Interrogative ✗

knows

+ Declarative ✓
+ Interrogative ✓

Grimshaw 1979, Lahiri 2002, Égre 2008, White and Rawlins 2020, among many others

Mandarin *think* and *know* have the same distinction:

Xiaoxiao

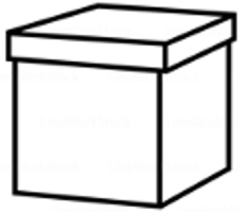
juede
think

+ Declarative ✓
+ Interrogative ✗

zhidao
know

+ Declarative ✓
+ Interrogative ✓

But this subcategorization distinction is masked in Mandarin by wh in-situ:



Xiaoxiao gorp [hezili you shenme]

Xiaoxiao box has what

But this subcategorization distinction is masked in Mandarin by wh in-situ:

+ Interrogative ✗

✓ *juede* think

Xiaoxiao [hezili you shenme]

Xiaoxiao box has what

“What ✓ *zhidao* know aoxiao think is in the box?”

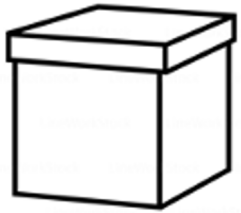
+ Interrogative ✓

- This type of configuration accounts for 39% of [think+clause] sentences in child-directed speech[1]
- How do children learn the correct subcategorization properties of *think*-like verbs?

[1] Data from four Mandarin CHILDES corpora: Beijing, Context, Chang1, Zhou1

To make matters worse: where to interpret the *wh?*

The string seems ambiguous if we don't know the verb:



Xiaoxiao **gorp** [hezili you shenme]

Xiaoxiao box has what

"Xiaoxiao gorps what is in the box."

"What does Xiaoxiao gorp is in the box?"

To make matters worse: where to interpret the *wh?*

But it's actually not ambiguous:

Xiaoxiao gorp [hezili you shenme]

Xiaoxiao box has what

+ Interrogative ✓

"Xiaoxiao gorps what is in the box."

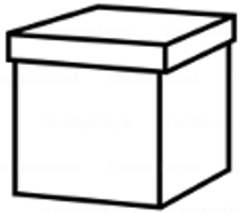
"What does Xiaoxiao gorp is in the box?"

- If *gorp* (like *know*), can take interrogative complements
  wh can take either embedded or matrix scope

Huang 1982 among others

To make matters worse: where to interpret the *wh?*

But it's actually not ambiguous:



+ Interrogative ✗

Xiaoxiao gorp [hezili you shenme]

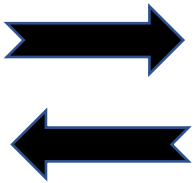
Xiaoxiao box has what

"Xiaoxiao gorps what is in the box."

"What does Xiaoxiao gorp is in the box?"

- If *gorp* (like *think*), can NOT take interrogative complements, *wh* must take matrix scope

Learning the verb subcategorization



Learning wh-scope

+ Interrogative ✓

Xiaoxiao gorp [hezili you shenme]

Xiaoxiao box has what

“Xiaoxiao gorps what is in the box.”

“What does Xiaoxiao gorp is in the box?”

+ Interrogative ✗

This project: how might Mandarin learners solve this chicken-and-egg problem?

This is not just about learning syntactic idiosyncrasies of verbs!

Cross-linguistically, this type of subcategorization differences systematically correlate with abstract semantic differences.

"Is the toy in the box?"

Xiaoxiao

juede think

+ Declarative ✓
+ Interrogative ✗

Non-factive

[the toy is in the box.]

zhidao know

+ Declarative ✓
+ Interrogative ✓

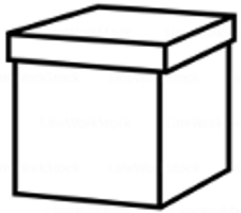
Factive

Learners might use subcategorization differences to **bootstrap semantics**.

→ They need to know the subcategorization differences!

Gleitman 1990, Gillette et al. 1999, Egre 2008, Spector and Egre 2015, Dudley et al. 2017, Theiler et al. 2018, Hacquard & Lidz 2019, Huang et al., to appear, White and Rawlins 2020

Our hypotheses: there are non-word order cues that can be very informative for learners



Xiaoxiao **gorp** [hezili you shenme]

Xiaoxiao box has what

(i) "Xiaoxiao **gorps** what is in the box."

(ii) "What does Xiaoxiao **gorp** is in the box?"

Cues that learners might use:

1. **Speech acts**
2. **Question particles**

Analyze 4 Mandarin CHILDES corpora (Beijing, Context, Chang1, Zhou1), by extracting sentences containing verbs with "know" and "think"-like semantics and "**potentially-interrogative**" complements.

1. Speech act cues

Xiaoxiao **juede** hezili you shenme

Xiaoxiao think box has what

“What does Xiaoxiao think is in the box?”

“Think” does not allow interrogatives.

Wh-phrase takes matrix scope.

More likely to be wh-question.

Xiaoxiao **zhidao** hezili you shenme

Xiaoxiao know box has what

“Xiaoxiao knows what is in the box.”

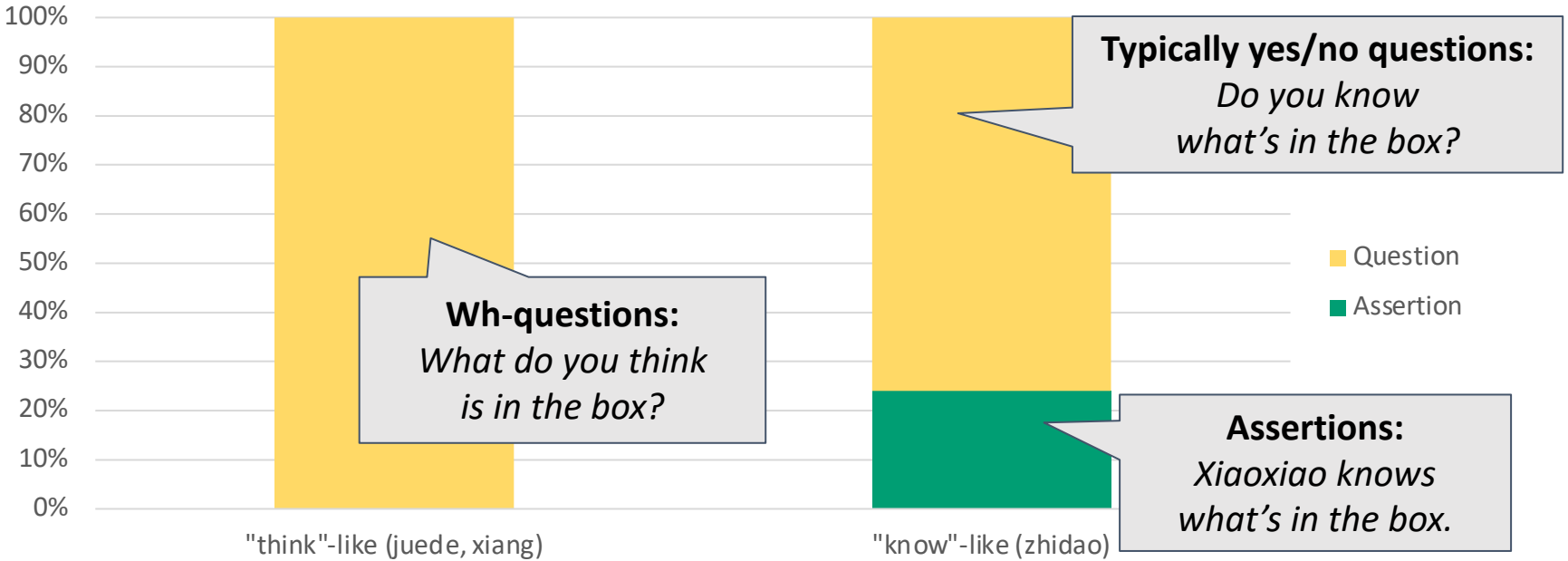
“Know” allows interrogatives:

Wh-phrase doesn’t have to take matrix scope.

Less likely to be wh-question.

Speech acts of VERB+potential interrogatives

“Xiaoxiao VERB box has what”



2. Also helpful: yes/no question particle

Yes/no question particle *ma* cannot co-occur with wh-questions

Xiaoxiao **juede** hezili you shenme

Xiaoxiao think box has what

"What does Xiaoxiao think is in the box?"

More likely to be wh-question.

Cannot co-occur with *ma*.

Xiaoxiao **zhidao** hezili you shenme ***ma***

Xiaoxiao know box has what ***Q***

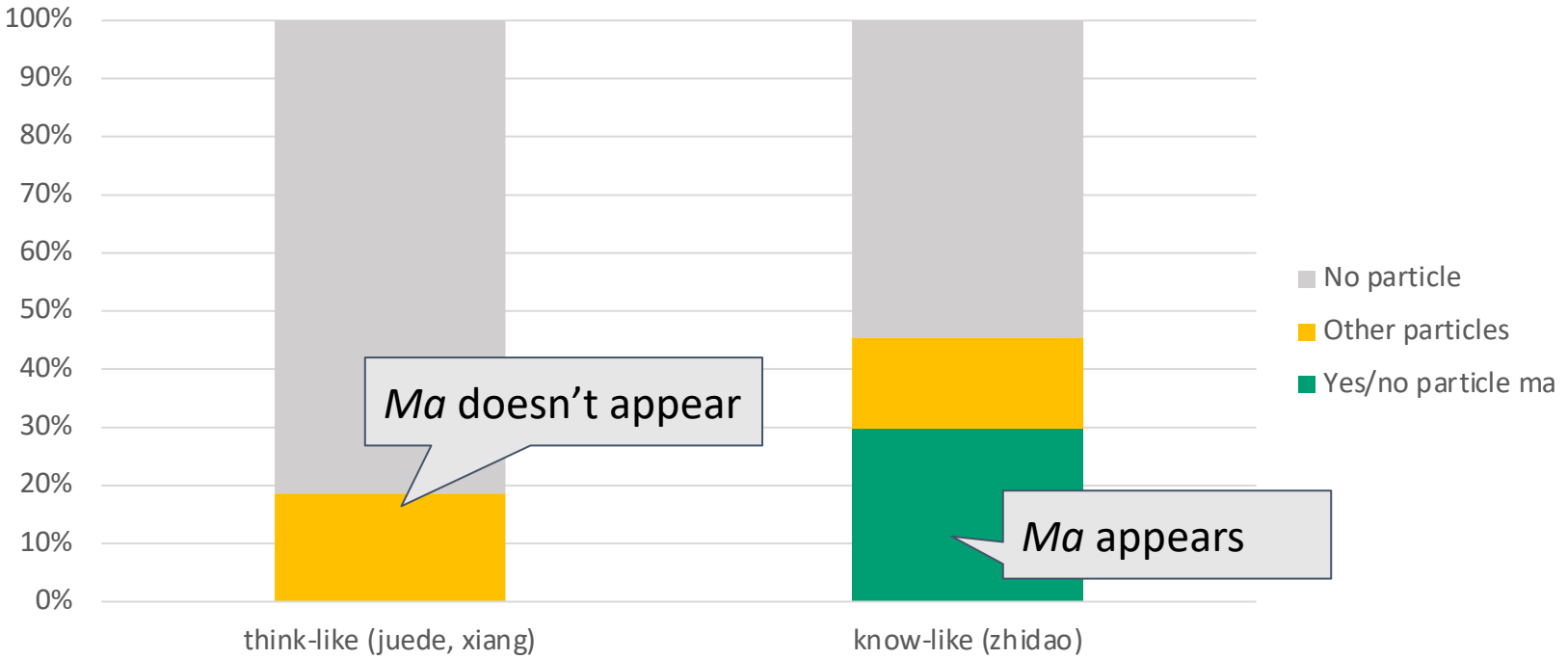
"Does Xiaoxiao know what is in the box?"

Often a yes/no question that

co-occurs with *ma*.

Particles occurring with VERB+potential interrogatives

"Xiaoxiao VERB box has what PART"



Conclusions

In Mandarin, a wh-in situ language, there are non-word order cues in the child-ambient speech, which can help differentiate between verbs like *think* and *know.*

Open questions: What other cues are there? Are learners indeed sensitive to these cues?

Come to our virtual poster!

Ask us about:

- Verbs that only select interrogative complements, e.g. *wen* “ask”
- Our next steps for this project