Bootstrapping into Attitudes

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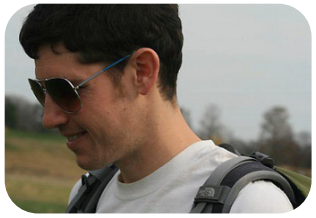

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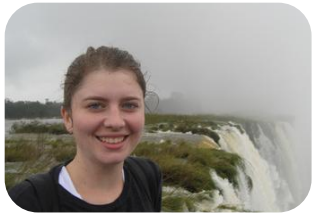

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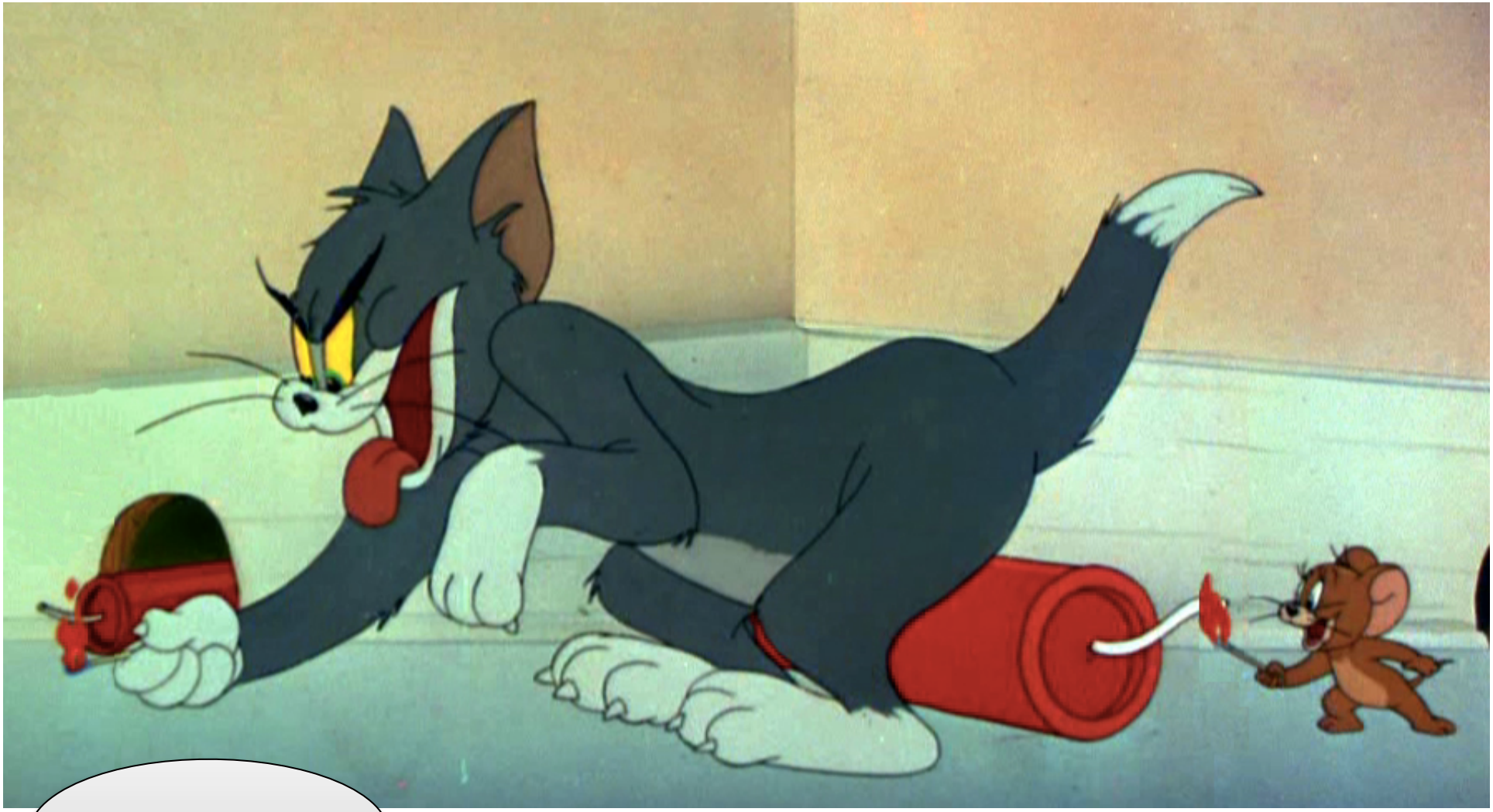
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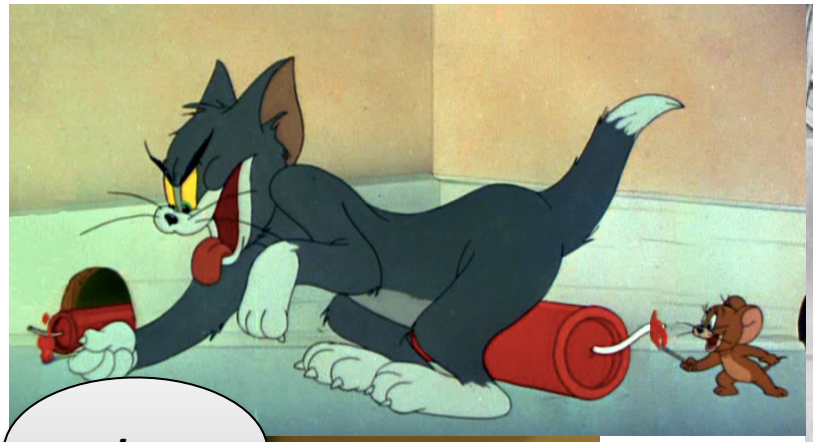

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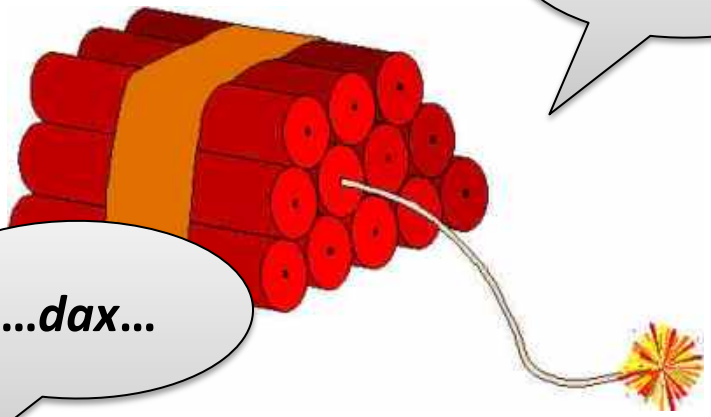

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Bootstrapping into Attitudes

- Not all meaning can be gleaned from situational context alone.

- Attitudes not directly observable. Meaning of attitude verbs (***think, want, know…***) hard to access without ***linguistic context***.

Gleitman 1990; Gillette *et al* 1999; Papafragou *et al* 2004; Gleitman *et al* 2005


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Syntactic bootstrapping

- Children learning meaning of new words work from **constrained space of hypotheses**.
- Principled links between certain semantic and syntactic properties.
  - **Syntactic properties** easier to observe.
  - Syntactic properties provide evidence to the learner about **semantic properties**.

(Gleitman 1990, Pinker 1989, Lidz 2006…)

Pragmatic challenge 1:
Sentence vs. speaker meaning

Often what people ***mean*** goes further than what they ***say***.

S: “Some students turned in their homework”.

Implicature*: Not all students turned in their homework*

Sentence vs. speaker meaning

- What if the child only heard ***some*** in enriched contexts, might she lexicalize ***enriched meaning****?*
  - Probably not for ***some***.

Noveck, 2001; Chierchia et al. 2001, Papafragou & Musolino 2003, a.o.

  - Enough exposure to non-enriched contexts?
  - Expectations about meaning complexity?

Sentence vs. speaker meaning challenge:

Can children always extract ***literal*** content of an expression from the meaning conveyed?

Pragmatic challenge 2: not at issue content

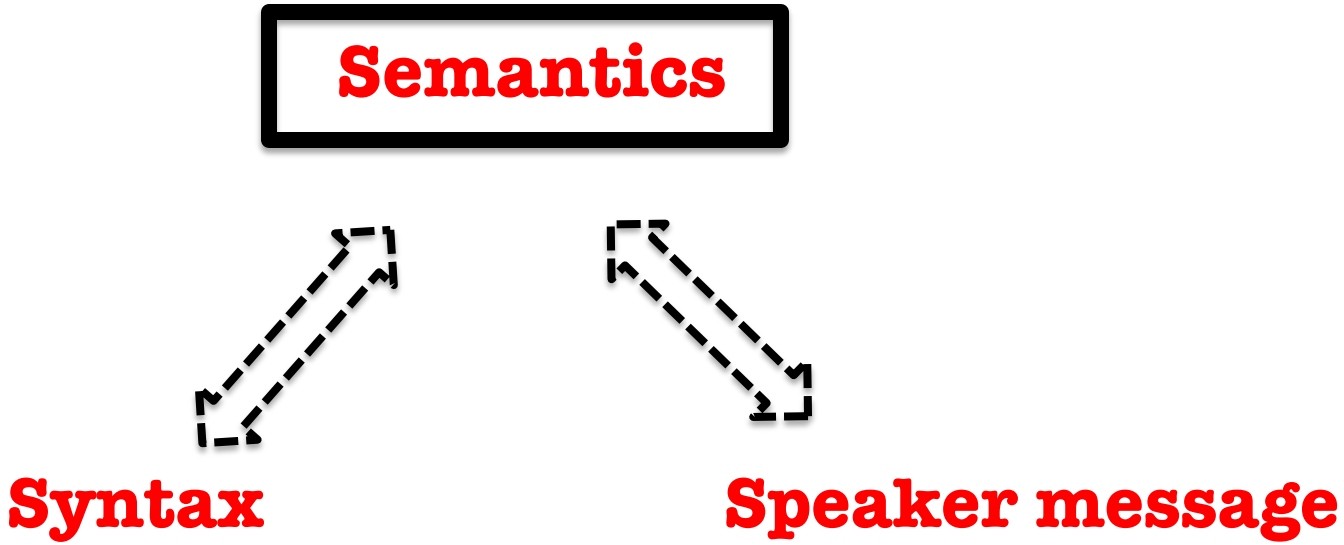
- Certain words impose requirements on state of discourse as conditions for use.

- Utterances made against a variety of background assumptions. How does the child detect which are required by the conventional meaning of an expression?

Not at issue content

Sentences do not come with ‘*#*’ any more than they come with ‘***’.

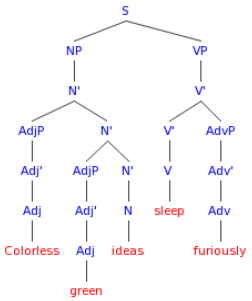
The pragmatic challenge



The pragmatic challenge

Semantics

Syntax



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Speaker message

The pragmatic challenge

Given that children lack direct access to ***semantics***, and only ever hear ***speaker meanings***, how do they untangle semantic and pragmatic contributions?

- Might the child ***lexicalize an implicature***?
- Might she ***miss a presupposition***?

The pragmatic challenge & Attitudes

- **Attitudes** not directly ***observable***.
- Some attitudes associated with ***presuppositions***.
- Prone to ***pragmatic enrichments***:
  - Attitude verbs report speech acts and mental states, and thus are often used for indirect speech acts.

Bootstrapping into Attitudes

- ***When*** and ***how*** do children learn attitude meanings?
- What role do ***syntax*** and ***pragmatics*** play?

Goals:

- Better understanding of young children's ***semantic*** and ***pragmatic*** competence, and acquisition process.
- Inform theories of interfaces between ***syntax-semantics*** and ***semantics-pragmatics***.

Bootstrapping into Attitudes: Road Map

- **'Speaker vs. sentence meaning' challenge:**
  the case of ***want*** and ***think***

- **'Not at issue content' challenge:**
  the case of ***think*** vs. ***know***

think* vs. *want

'sentence vs. speaker meaning' challenge

Early understanding of attitude verbs

Cross-linguistically, *think* is acquired late, but ***want*** isn't.

Previous research suggests that children:

- Don't fully master ***think*** until almost age 5.
- They seem to master ***want*** at least by age 3.

Tardiff & Wellman 2000; Perner et al 2003…

Early understanding of attitude verbs

Young children consistently misinterpret ***think*** sentences.

Typical *think* Fail!

(1) Dora *thinks* that Swiper is behind the chest.

Context:
Swipe is behind the curtain
Dora thinks he's behind the chest

Adults: ***-True!***
3-4 year olds: ***-False!***

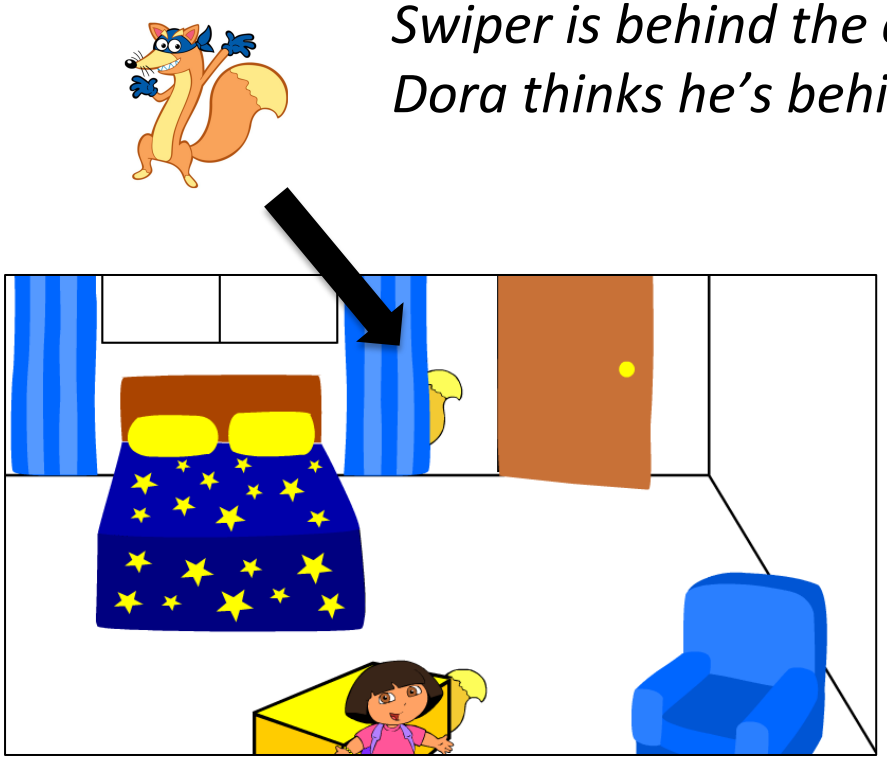
Early understanding of attitude verbs

However, young children do **not** seem to have the same difficulties with ***want*** sentences.

Typical *want* Success!

(2) Dora *wants* Swiper to be behind the chest.

Context:
Swiper is behind the curtain
Dora thinks he's behind the chest



Adults: ***-True!***
3-4 year olds: ***-True!***

want

Whether ***want*** is used to report a desire that ***conflicts with reality***, or ***with the child's own desire***, 3 year olds know that (2) can be true, even is the complement is false.

Kate Harrigan

Harrigan et al, in prep.

Conceptual Development Hypothesis

- ***think*** is acquired late because the concept it expresses, i.e., BELIEF, is itself acquired late.

- ***want*** is acquired earlier because the DESIRE concept is acquired earlier.

Tardiff & Wellman (2000), Perner et al (2003), a.o.

Conceptual Development Hypothesis

Children don't understand that others can have **beliefs** different from their own until they're 4.

They don't have a "**Theory of Mind**", as evidenced by their consistent failure at **False Belief Tasks**.

Doubting the conceptual hypothesis

However:

- ***Infants*** show understanding of false beliefs in implicit measures.

  Onishi & Baillargeon 2005, Song, et al. 2008, Southgate et al. 2007…

- Perhaps **belief concept** in place early on. Failures at *explicit False Belief tasks* due to extra task demands.

Children's understanding of *think*

Pragmatic Hypothesis:

Children learn the right semantics for ***think*** and know that people can be mistaken in their beliefs, but this knowledge is obscured.

Their difficulty with ***think*** is in figuring out what people ***mean*** when they ***say*** '***think***'…

Untangling *sentence* & *speaker* meaning

FB scenario: Swiper is behind the curtain, but Dora thinks he's behind the chest.

(1) Dora thinks that Swiper is behind the chest.

-***FALSE!***

(2) Swiper is behind the chest.

-***FALSE!***

Children seem to respond to the truth of the **complement** rather than truth of **entire clause**.

Understanding *think*

Even ***adults*** sometimes respond to the truth of the complement.

A: Why is John not in his office?

B: Mary thinks he's out of town.

C: Nuh-uh! He's here!

C doesn't deny that Mary holds a particular belief, but denies the content of the *complement* directly.

Understanding ***think*** in context…

Basic use of *think*…

Sometimes we use *think* to *report a belief* which we may not endorse (basic use):

*Dora **thinks** that Swiper is behind the chest.*
(that's why she's looking for him there)

Pragmatic enrichment with *think*

Sometimes we use *think* to *endorse* someone's claim (*pragmatically-derived* "endorsement" use):

A: Why is John not in his office?

B: Mary thinks he's out of town.

What B said: Mary thinks John is out of town.

What B meant: John is probably out of town.
(I heard it from Mary).

Pragmatic enrichment with *think*

A: Why is John not in his office?
B: Mary thinks he's out of town.

- ***Literal*** content of B's utterance doesn't answer A's question.

- **Relevance Implicature:** B's answer addresses A's question if B ***endorses*** John's thought.

- **Quantity implicature**: not *full* endorsement (cf. '*Mary is out of town*')

[Simons 2007]

Pragmatic enrichment with *think*

- Speakers sometimes use ***think*** sentences to '***proffer***' the content of complement clause.

- The complement clause carries the '***main point***'; main clause plays ***evidential*** function.

[Simons 2007]

Pragmatic enrichment with *think*

Perhaps children systematically assume ***endorsement*** uses, even when adults do not?

Pragmatic enrichment with *think*

So that whenever children hear someone ***say***:

"Mary thinks John is out of town"

They assume he ***means***:

"John is (probably) out of town"

And they say:
"false!" if John is not out of town.

Pragmatic enrichment with *think*

Why would children systematically assume enriched uses?

- Uses of ***think*** with endorsement enrichments frequent in ***adult*** speech.
- Reinforced by the fact that many instances of ***think*** are with 1st person subjects.

cf. Diessel & Tommassello (2001)

Pragmatic hypothesis

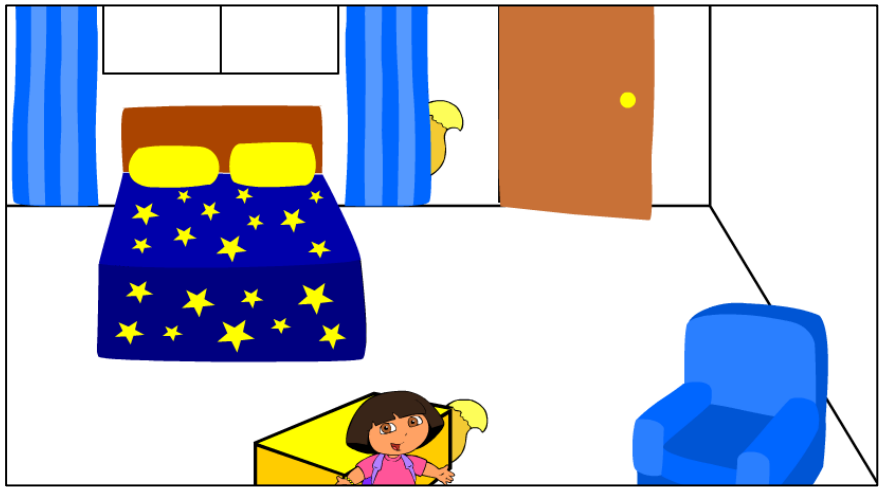
If children's difficulty with ***think*** is primarily **pragmatic**, and not ***conceptual***, they should be able to respond to ***literal*** content in the right contexts.

Lewis et al. 2012; Lewis 2013; Lewis et al, *in prep.*

Shevaun Lewis

3 year olds' understanding of *think*

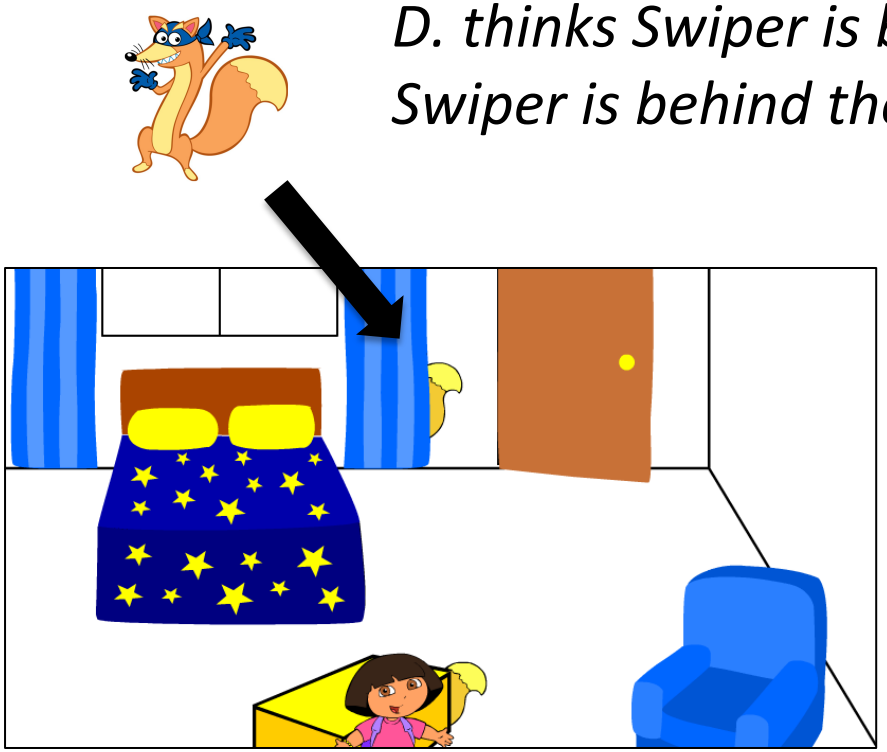
Dora is looking for Swiper…



A game of hide and seek

Typical False Belief Fail

(1) Dora thinks that Swiper is behind the chest.



FB context:

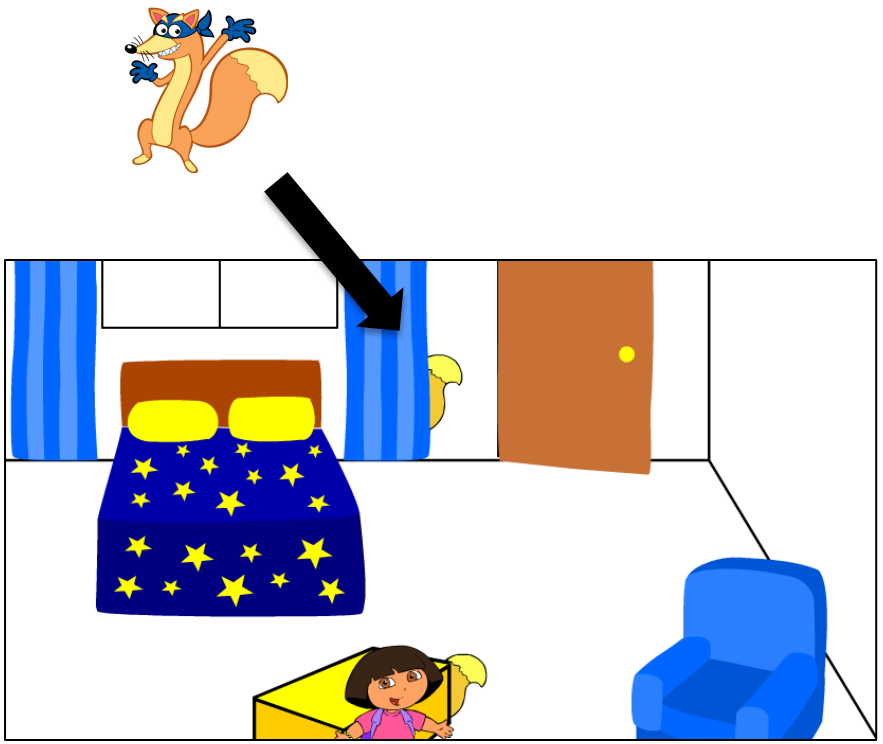
D. thinks Swiper is behind the chest *sentence true*

Swiper is behind the curtain *complement false*

3 year olds: ***False!***

Typical False Belief Fail

(1) Dora thinks that Swiper is behind the chest.



Pragmatic Hypo: kids say ***False!*** because they assume ***endorsement***

Conceptual Hypo: kids say ***False!*** because they can't conceive a false belief.

- Can children respond to ***literal*** meaning as well (i.e., belief attribution?)

- Can they ***reject*** a ***think*** sentence that is ***false***, based on a wrong attribution of belief?

think Fail?

(2) Dora thinks that Swiper is *behind the curtain*.

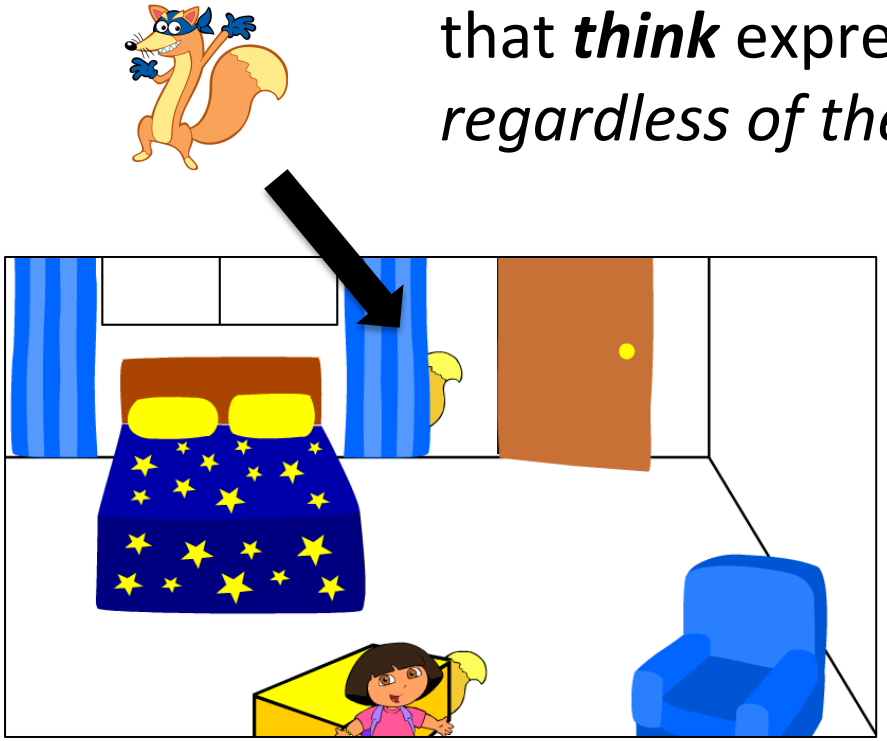
FB context:

D. thinks Swiper is behind the chest *sentence FALSE*

Swiper is behind the curtain *complement TRUE*

think Fail?

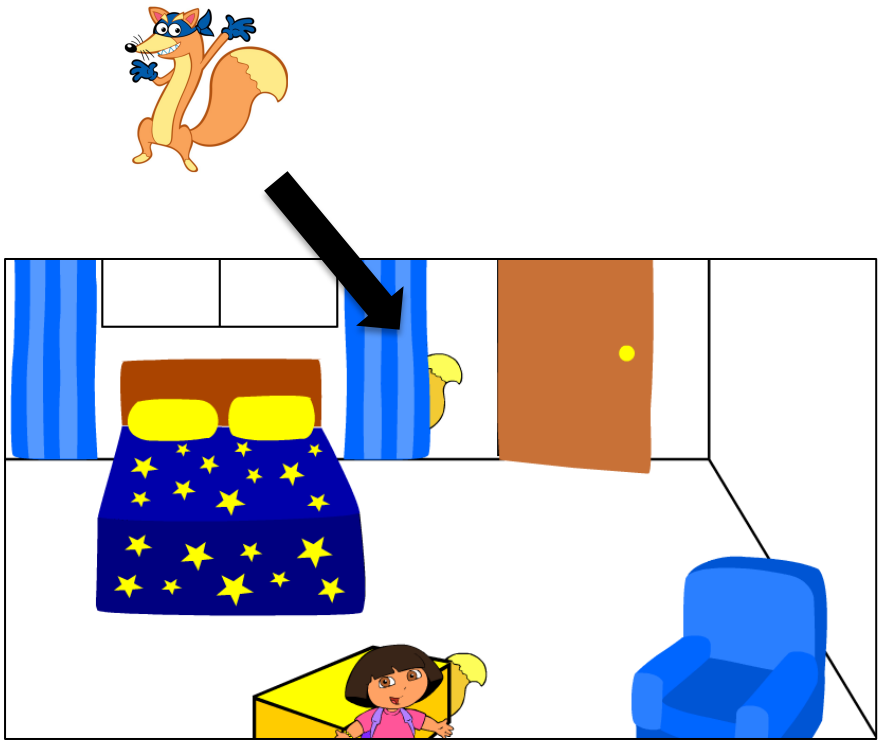
(2) Dora thinks that Swiper is *behind the curtain*.



If children understand the belief attribution that ***think*** expresses, they should ***reject*** (2), *regardless of the truth of the complement.*

think Fail?

(2) Dora thinks that Swiper is *behind the curtain*.



Pragmatic Hypo: kids say ***False!***
(respond to ***belief ascription***)

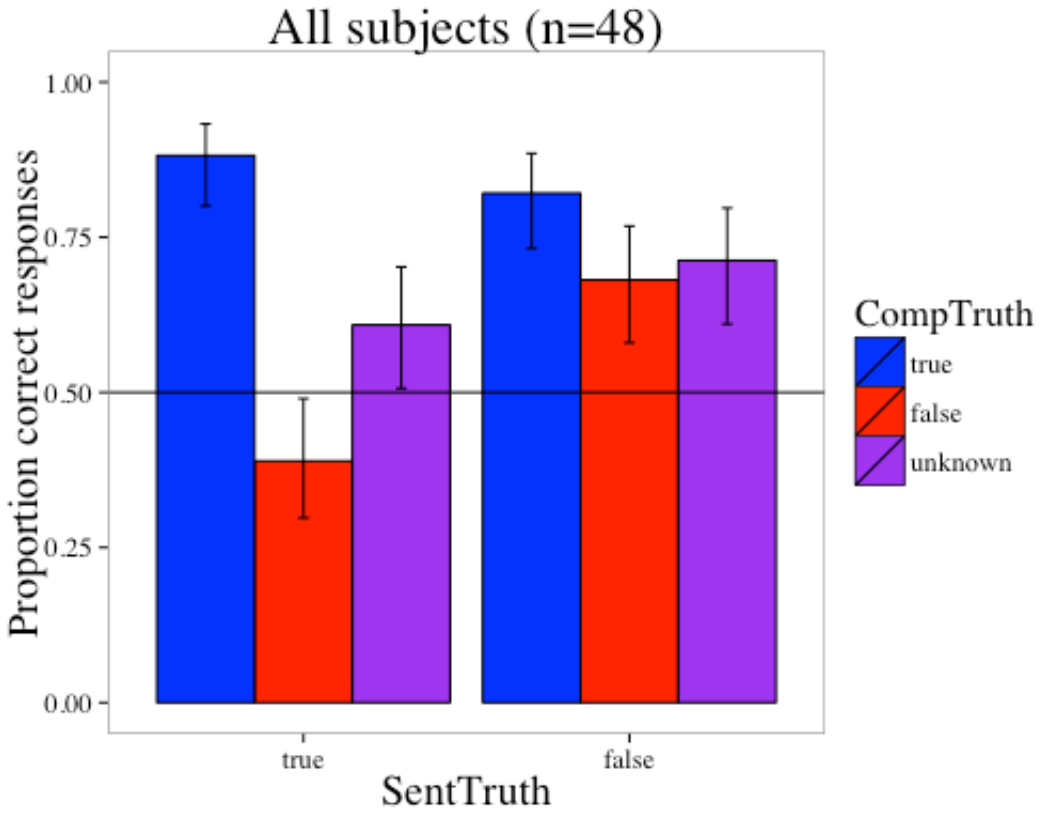
Conceptual Hypo: kids say ***True!***
(complement true; no False Belief)

Pragmatic Hypothesis Predictions

- When the sentence is ***true***, children assume ***endorsement*** and respond to ***truth of the complement***.

- When the sentence is ***false***, children ***reject*** it, *regardless* of the truth of the complement.

Results



3 year olds' responses highly influenced by complement truth when the sentence is ***true***.

3 year olds reject ***false*** sentences, regardless of complement truth.

Results

- *Like adults*, children reject sentences when the ***literal*** meaning is false.
- They further reject sentences when they take the ***speaker meaning*** to be false, even in cases where adults do not.

think

Hypothesis:

- Children have roughly right semantics for ***think***.
- Difficulty is **pragmatic**: children assume enriched meaning for ***think p***, in which speaker endorses truth of ***p,*** even when adults do not

  (either default pragmatic enrichment or lexicalized enrichment)

think vs. want

What about *want*?

- Why are children so good with ***want***?
- Why don't they ever respond to the truth of the complement, as with ***think***?

want

Hypothesis:

- Children have the right semantics for ***want***.
- Children don't respond to the complement with ***want,*** because ***want*** doesn't trigger the kinds of endorsement enrichments ***think*** does.

A: Where is John?

B: #(I want) him to be in Miami.

B: (I think) he's Miami.

think vs. want

Why does ***think*** lend itself to endorsement enrichments and ***want*** doesn't?

thinko = ***think*** but no endorsement interpretation

wanto = ***want*** but endorsement interpretation

- Why no ***thinko*** and ***wanto*** in natural language?
- Why no ***thinko*** and ***wanto*** in *child* language?

Semantics of attitude verbs: *think* vs. *want*

think vs. want: semantic sketch

Two semantic classes of attitude verbs:

- **Representational attitudes** express ***judgments of truth*:**

  think*, *believe, claim, argue…

- **Preference attitudes** express ***preferences:***

  want*, *wish, order, demand…

Bolinger 1968, Searle&Vanderveken 1985, Stalnaker 1984, Heim 1992, Villalta 2000, 2008, Anand&Hacquard 2013…

think vs. want: semantic sketch

- ***think*** (but not ***want***) expresses a **judgment of truth**, which a speaker can endorse *directly*:

(1) Mary thinks that John is in Miami, **which is true**.

(2) Mary wants John to be in Miami, **#which is true**.

(3) Mary **correctly** thinks that John is here.

(4) #Mary **correctly** wants John to be here.

- Or *indirectly* (via relevance implicature):

A: Where is John?

B: Mary thinks (correctly) he's in Miami.

think vs. want: semantic sketch

Because of their ***semantics***:

- ***think*** gets ***endorsement of truth*** enrichments.
- ***want*** doesn't.

thinko & wanto in child language?

- Kids don't know *a priori* '***want***' means **WANT** (*preference*) and '***think***' means **THINK** (*judgment of truth*).
  - Why don't they ever assume endorsement enrichments for ***want***? ***WANTO****?*
  - Given how good they are accepting ***want*** sentences with a false complement, why ***do*** they respond to complement truth with ***think***? ***THINKO****?*
- What gives away ***want*** and ***think***'s semantic classes?

Syntactic Bootstrapping

Syntax cues semantic class.

- **Finiteness of complement?**

  …Elmo DAXES **that** Ernie **is** behind the bench…
  ...Elmo DAXES Ernie **to be** behind the bench…

?Constraint: finite complements = judgments of truth
infinitival complements = preferences

Syntactic Bootstrapping

?Constraint: finite complements = judgments of truth
infinitival complements = preferences

- What about German or Mandarin, which lack same finiteness distinction for ***think*** and ***want***?

(1) Maria **denkt**, dass Peter heute noch **kommt**.

(2) Maria **will**, dass Peter heute noch **kommt**.
*Maria **thinks/wants** that Peter today still comes*

Syntactic cues

Finiteness just one of several syntactic cues that split the attitude pie in the same two halves (within and across languages)…

Syntactic cues

Mood selection in Romance languages:

(1) Marie **veut** que Jean **soit** à Boston.
Marie **wants** that Jean be-**SUBJ** in Boston

(2) Marie **pense** que Jean **est** à Boston.
Marie **thinks** that Jean be-**IND** in Boston

Bolinger 1968, Farkas 1992, Giannakidou 1998…

Syntactic cues

German: ***V2 complementation***

(1) Maria **denkt**, dass Peter heute noch **kommt**.
(2) Maria **will**, dass Peter heute noch **kommt**.
*Maria **thinks/wants** that Peter today still comes*

(3) Maria **denkt**, Peter **kommt** heute noch.
(4) *Maria **will**, Peter **kommt** heute noch.
*Maria **thinks/*wants** that Peter **comes** today still*

Meinunger 2006, Truckenbrodt 2006, Scheffler 2008…

Syntactic cues

Syntactic cues differ cross-linguistically, even if the ***semantic classes*** are the same:

- Finiteness (English…)
- Mood (Romance…)
- V2 complements (German)

Issue: Children do not know they're speaking French vs. English vs. German…

The universality challenge

A syntactic bootstrapping account has to be abstract enough to be ‘universal’, but language-specific enough to be useful to the learner.

Syntactic cues

Cues varies across languages, but **converge** in making a distinction in whether a verb allows syntax of (declarative) '***main clauses***' in its complement (Dayal & Grimshaw 2009).

English

John is in Boston.

Mary ***thinks*** **John is in Boston**.

Mary ***wants*** **John to be in Boston**.

French

John est à Boston.

Mary ***pense*** que **John est à Boston**.

Mary ***veut*** que **John soit à Boston**.

German

John ist in Boston.

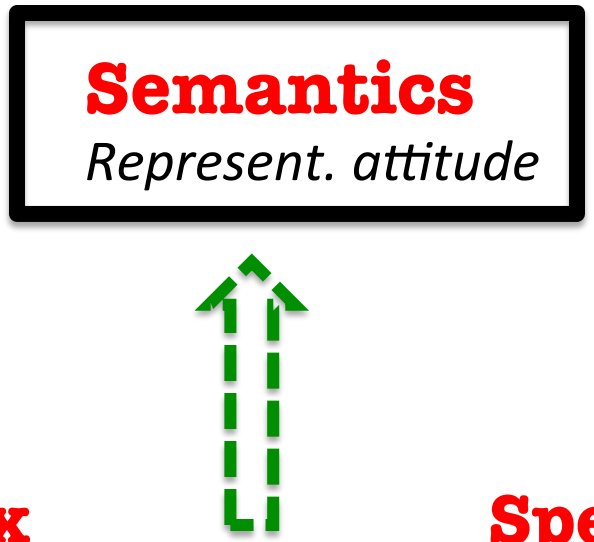
Marie ***denkt***, dass **John ist in Boston**.

Mary ***will***, dass **John in Boston ist**.

Syntactic cues

	main clause	complement of *think*	complement of *want*
English	finite	✓finite	✗finite
French	indicative	✓indicative	✗indicative
German	Verb 2	✓Verb 2	✗Verb 2

main clause syntax & representationality



Addressing the Universality Challenge

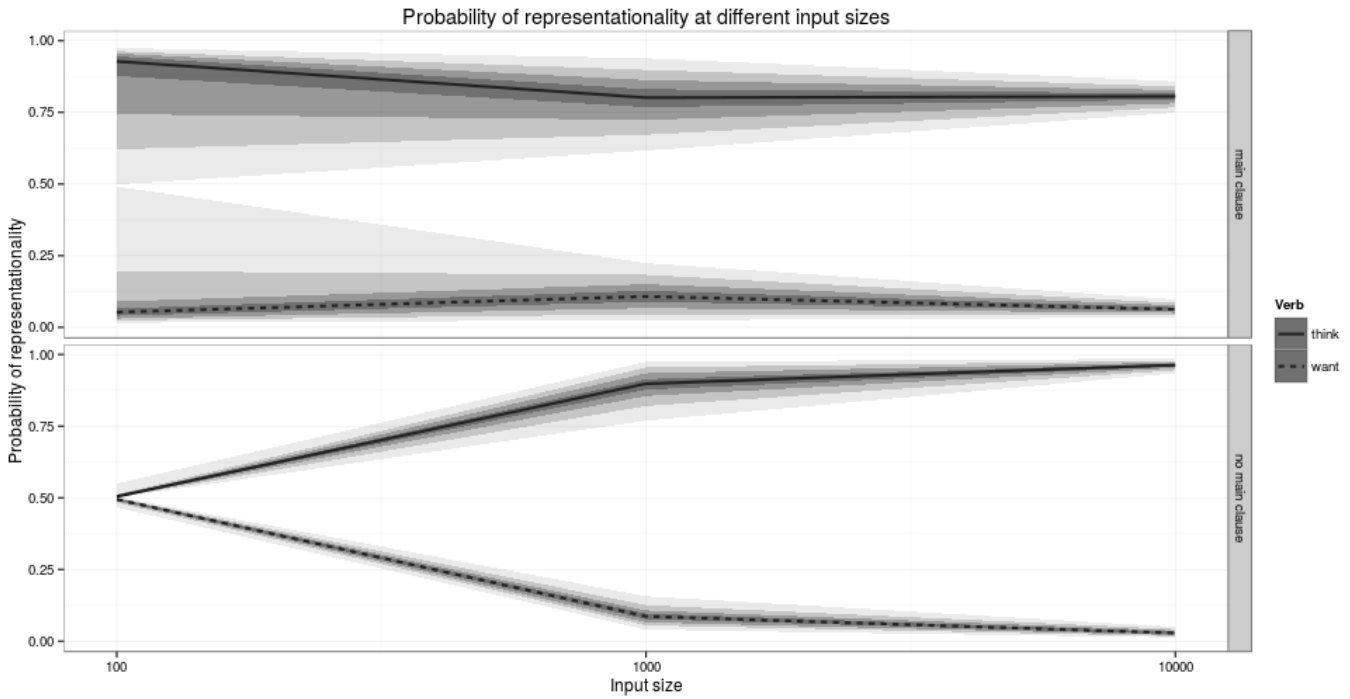
- No need to specify ***particular*** syntactic properties.

- The learner only needs to note whatever ***syntactic features*** appear in (***declarative***) ***main clauses***, and look for same features in ***embedded clauses***.

What Would a Learner Do?

A learner looking for syntactic features in complement clauses that match **main clauses** quickly discovers the **representational/preferential** split.

Aaron White



think vs. want: summary

- Children differentiate ***think*** and ***want*** early on.
- Even when they are not fully adult-like, they know to treat ***think*** and ***want*** differently.

Proposal:

Syntax gives away ***semantic class***, via the types of ***pragmatics*** enrichments these verbs trigger.

think vs. know

‘Not at issue’ challenge

think vs. *know*

- ***Think*** and ***know*** both express belief:

(1) John thinks that Mary is out of town.

(2) John knows that Mary is out of town.

- ***Know*** further presupposes truth of its complement.

think vs. *know*

Can children differentiate ***think*** and ***know***?

- Do they understand that ***think*** is ***non factive***?
- Do they understand that ***know*** is ***factive***?

think: *sentence* v. *speaker* meaning

Three year olds tend to assume endorsement uses of ***think*.**

- **Default** pragmatic enrichment?
- **Lexicalization** of enriched meaning?

child think = adult know??

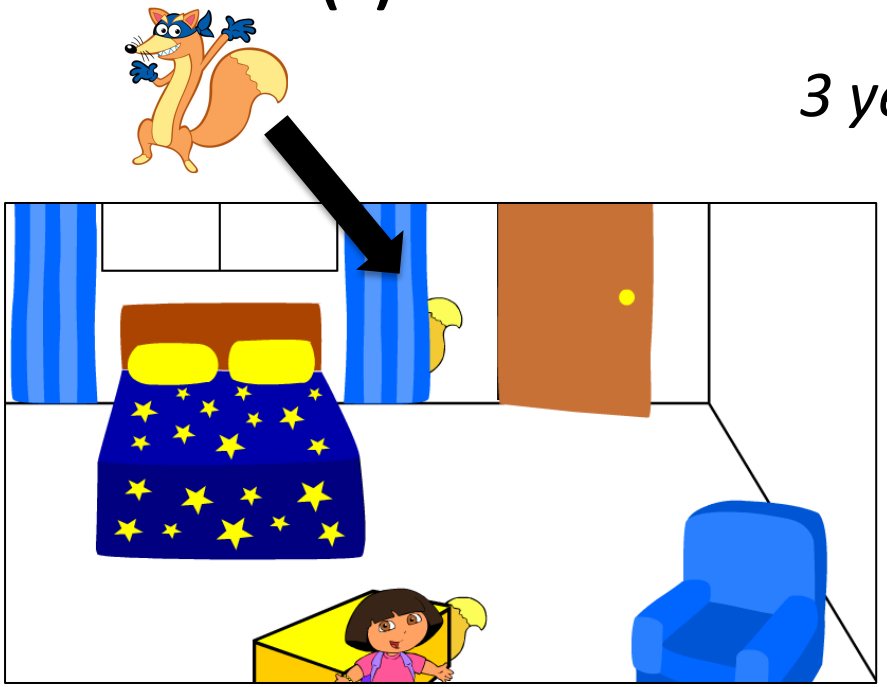
think

(1) Dora thinks that Swiper is behind the chest.

3 year olds: ***False!***

(2) Dora thinks that Swiper is behind the curtain.

3 year olds: ***False!***



Context:
Dora thinks Swiper behind the chest
Swiper is behind the curtain

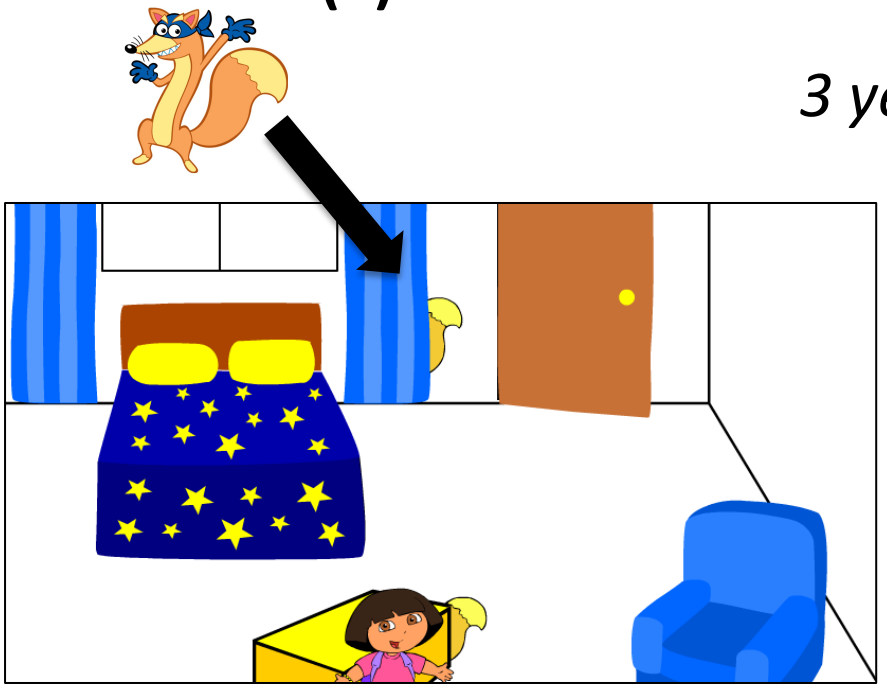
child think = know?

(1) Dora *knows* that Swiper is behind the chest.

3 year olds: ***False!***

(2) Dora *knows* that Swiper is behind the curtain.

3 year olds: ***False!***



Context:

Dora thinks Swiper behind the chest

Swiper is behind the curtain

know: not at issue content

Can the child detect ***know***'s ***presupposition***?

think vs. know

- Children said to not distinguish ***think*** and ***know*** until age 4, and to not use meaning difference for quantity implicatures.

(1) I **think** that the toy is in the blue box.
(2) I **know** that the toy is in the red box.

Cf. Harris 1975; Abbeduto & Rosenberg 1985; Moore et al. 1989…

- Not surprising given endorsement uses with ***think***.

- *Can kids distinguish **think** and **know** under negation?*

3 year olds understanding of *think* vs. *know*

Task: Find the toy!

(1) Lambchop **thinks** that it's in the blue box.

(2) Lambchop **knows** that it's in the blue box.

(3) Lambchop does**n't think** that it's the blue box.

(4) Lambchop does**n't know** that it's in the blue box.

Dudley et al, to appear

Rachel Dudley

Results

- As a group, 3 year olds differentiate ***think*** and ***know***.
- All 3 year olds have ***non*** **factive** ***think***.
- Some 3 year olds have **factive** ***know***.
- Some 3 year olds have ***non*** **factive** ***know***.

think

- Three year olds seem to have adult-like **non factive** semantics of ***think***.

- Tendency to assume endorsement with ***think*** **not** due to **factive** representation of ***think***.

Hypothesis: Difficult with ***think*** sentences is in determining when ***beliefs*** are relevant in context (cf. Lewis 2012).

factivity

- What gives away ***know***'s **factivity** (and ***think***'s ***non*** **factivity**)?
  - ~~*Speakers' commitment to complement p?*~~
  - State of the discourse? (was 'p' *mentioned* before?)
  - Syntax?

- And why don't ***all*** children figure out ***know***'s **factivity** at the same time?

Syntactic clue?

Principled link between *factivity* and ability to take *declarative and interrogative complements?

(1) John knows that Mary left.

(2) John thinks that Mary left.

(3) John knows whether Mary left.

(4) *John thinks whether Mary left.

Cf. Hintikka 1975; Karttunen 1977; Ginzburg 1995; Egre 2007…

at least for doxastics

What's in the input?

Could ***factivity*** variation be due to ***input*** variation?

- What kinds of discourses do ***think*** and ***know*** appear in in child-directed speech?

- Have adult-like children heard more uses of ***know*** with both interrogative and declarative complements than non adult-like children?

Correlations between types of ***think*** and ***know*** sentences in input and performance on factivity task?

Rachel Dudley

In conclusion…

Child attitudes

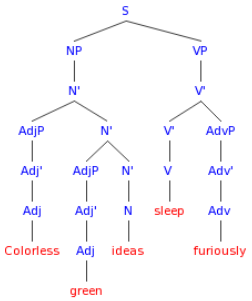
- ***think/know vs. want***: Robust **meaning** difference.
  - Robustly tracked by **syntax**.
  - May help child early on.

- ***think vs. know:*** much more subtle **meaning** difference, which some 3 year olds can detect.
  - **Syntax** may help adult-like 3 year olds.
  - Syntactic cues not as reliable or salient?

The pragmatic challenge

Semantics

Syntax



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Speaker message

Indirect speech acts and syntax

Representational (*think*):

- **Report**: *judgment of truth*
- **Enrichment**: *indirect assertion* *(D thinks) S is behind the chest*
- **Syntax:** declarative main clauses (assertions)

Preferentials *(want):*

- **Report**: *preference*
- **Enrichment**: *indirect request* *(D wants you to) go to your room*
- **Syntax:** imperatives

Rogatives *(ask):*

- **Report**: *question*
- **Enrichment**: *indirect question* *(D is asking) where is S*
- **Syntax:** interrogative main clauses

Indirect speech acts and syntax

- How frequent are ***request*** and ***question enrichments*** in child-directed speech? Do they ever trip up the learner?

- Can and does the learner exploit ***syntactic parallels*** between between ***direct/indirect requests*** and ***direct/indirect questions*** to learn semantics of preferentials and rogatives?

Child pragmatics

Are children "bad" at pragmatics?

- This question presupposes children have prior access to ***literal*** content that inferences are based off.

- However, what children ever get to hear are ***speaker*** meanings, not ***literal*** meanings.

- **Children are in fact *good* at understanding *speakers'* meanings. Sometimes *too* good.**

Thank you!

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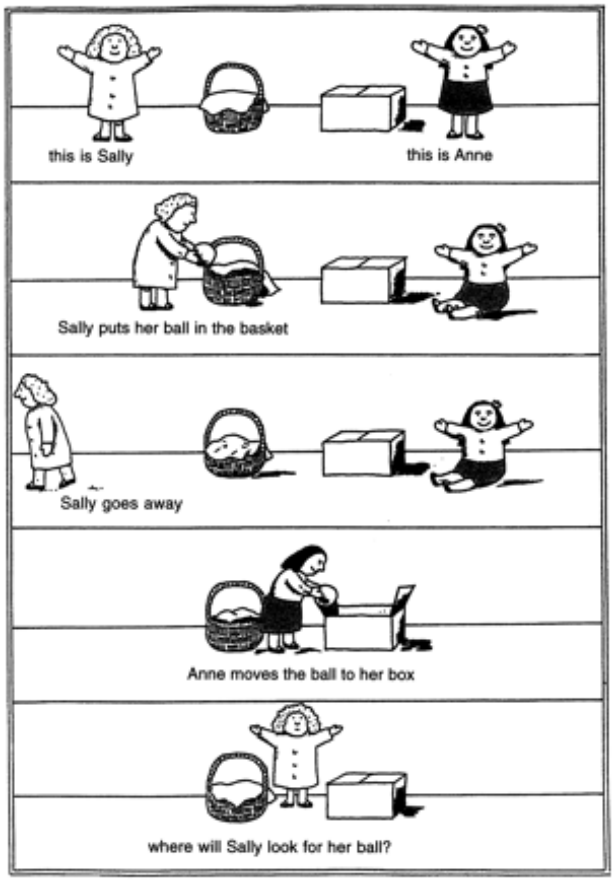
False Belief Understanding



Baron-Cohen, Leslie & Frith (1986)

Change of Location Task
(Wimmer & Perner 1983)

Where will Sally look for her ball?

- Adults and 5-year-olds: *in the basket*
- 3-4 year-olds: *in the box*

Cf. Wellman, Cross and Watson 2001 for meta-analysis

want

- 3-year-olds have difficulty maintaining multiple perspectives:
  - conflict with reality?
  - conflict with own attitude state?
- These conflicts are always present with ***think*** but not with ***want*** in experimental contexts.

want

Typical experimental context for ***think***:

Scenario: Ernie is NOT behind the bench.

(1) Elmo **thinks** that Ernie is behind the bench.

- Conflict with ***reality***
- Conflict with ***child's own belief state***

want

Typical experimental context for ***want***:

Scenario: Ernie is NOT behind the bench.

(1) Elmo **wants** Ernie to hide behind the bench.

- **No** direct conflict with ***reality*** due to future orientation with ***want***
- **No** conflict with ***child's own desire state***

Children's understanding of *want*

Exp 1: Test ***want*** with forced present-orientation in situations that **conflicts with reality**.

Exp 2: Test ***want*** in situations where reported desire conflicts with child's own desire.

Results: 3 year olds succeed at both

Cf. also De Villiers 2005; Rackoczy *et al.* 2007

Kate Harrigan

Children's understanding of *want*

- 3 year olds are adult-like in understanding of ***want***, even when the desire reported conflicts with reality, or with the child's own desire.

- Difficulty with ***think*** can't just be difficulty processing an attitude state representation that conflicts with reality, or with their own attitude state.

hope

- Hope shares semantic and syntactic properties with each ***think*** and ***want***.

- How does ***hope*** fare compared to ***think*** and ***want*** in child language?

Endorsement *want?*

want doesn't get the kinds of endorsement interpretations ***think*** gets. But ***hope*** does.

Bill: Where is Jane?

Sue: #I want her to be in Miami.

Sue: I hope she's in Miami.

x hopes p: x believes that p is possible

[Portner 1992, Scheffler 2008, Anand & Hacquard 2012]

hope

hope shares **meaning components** with both ***want*** and ***think***:

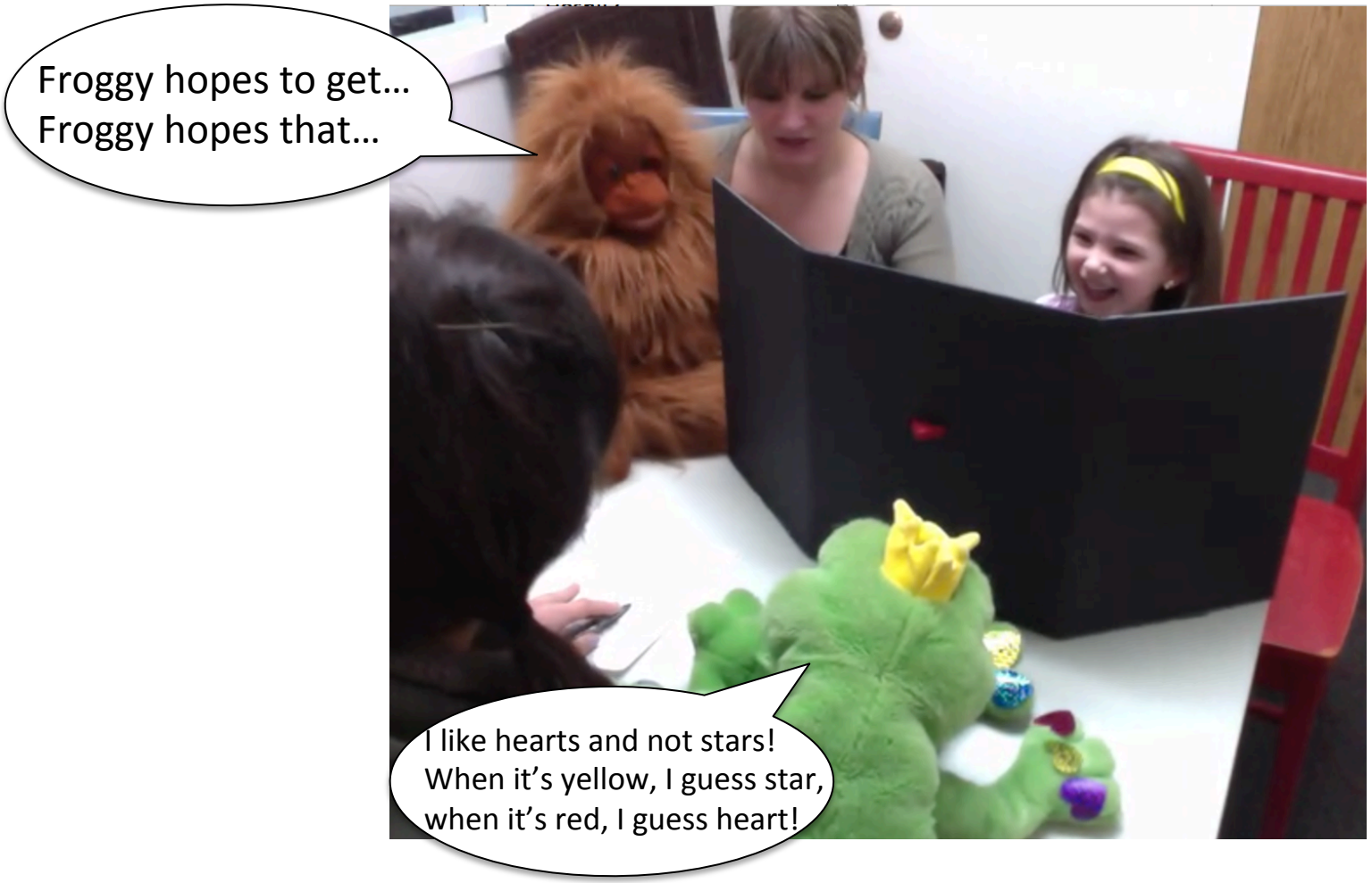
- It expresses a ***desire.***
- It expresses a ***doxastic possibility***, which allows endorsement uses.

hope

hope shares **syntactic properties** with both ***want*** and ***think***:

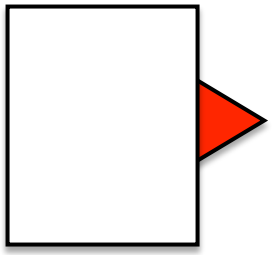
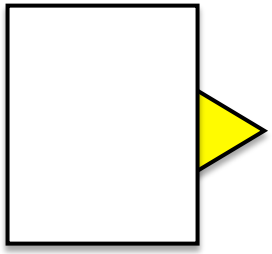
	Finite comp	Infinitival comp	Mood	Slift	V2
think	✓	*	indicative	✓	✓
want	*	✓	subjunctive	*	*
hope	✓	✓	both	✓	✓

Hope

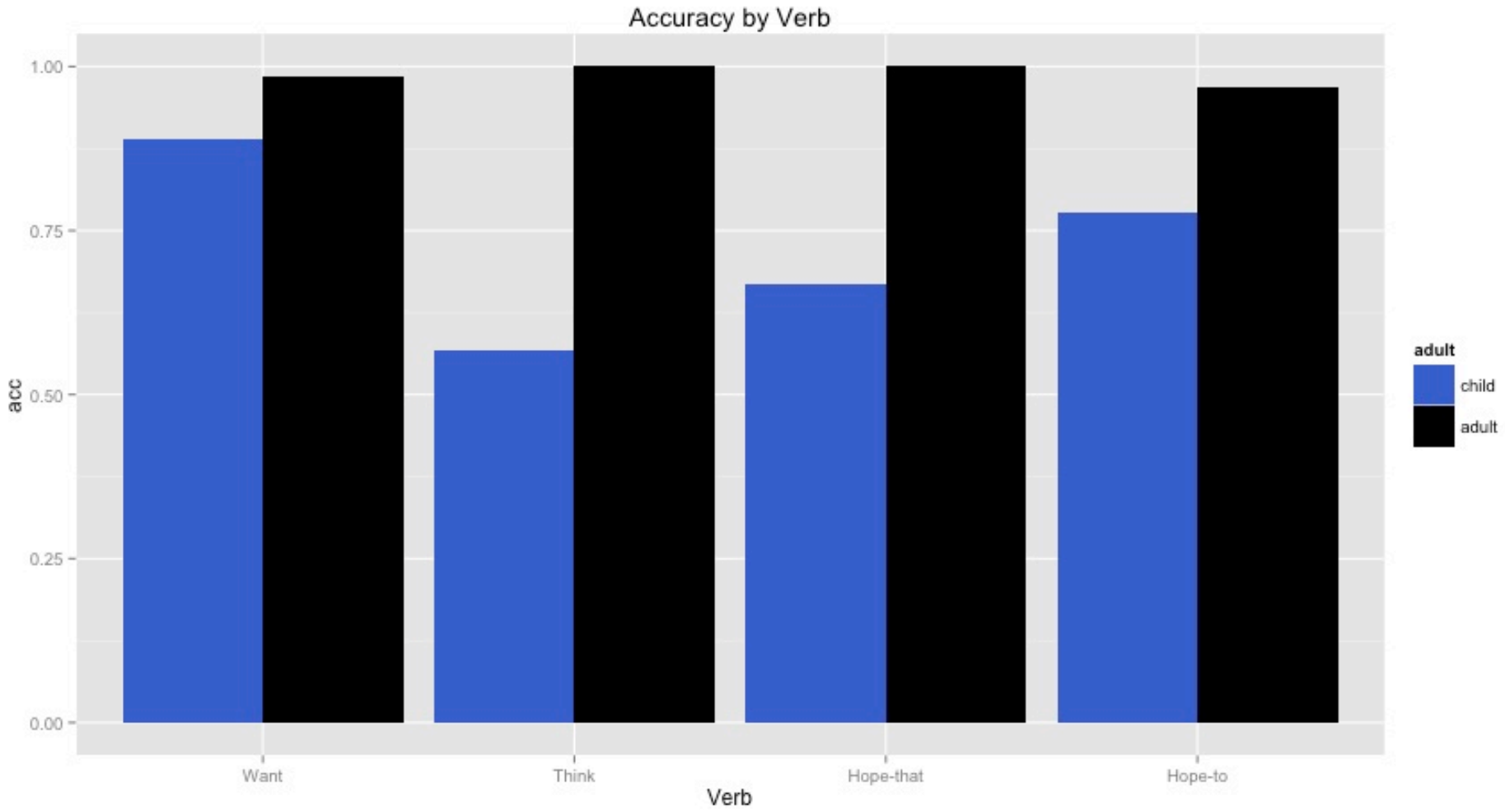

Froggy hopes to get…
Froggy hopes that…
I like hearts and not stars!
When it's yellow, I guess star,
when it's red, I guess heart!

Hope: Design

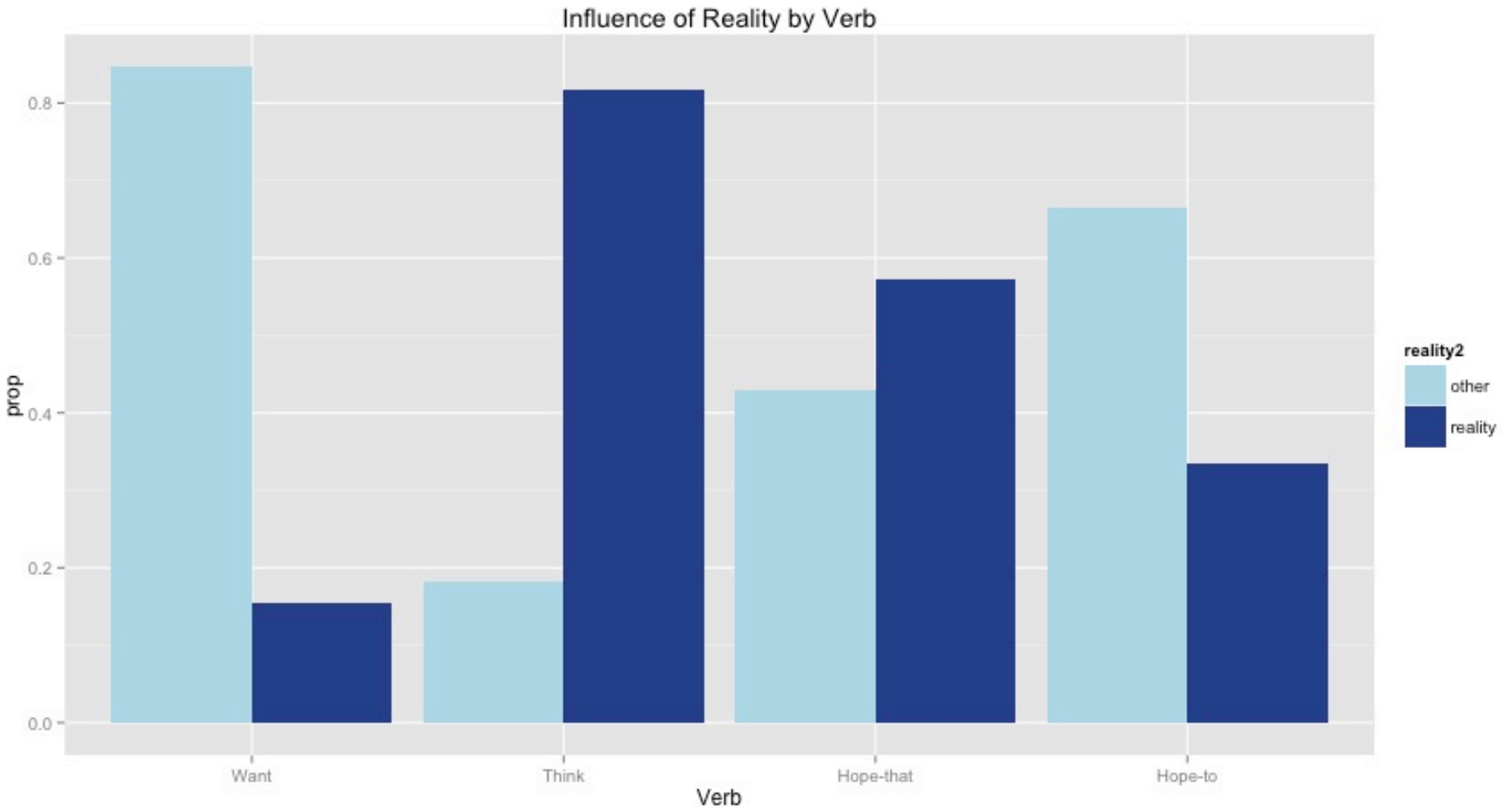
Breakdown of conditions: Adult-like responses

Clue	Actual		Want	Think	Hope	
		♡	✔	✔	✔	1
		☆	✗	✗	✗	2
		♡	✔	✔	✔	3
		☆	✗	✗	✗	4
		♡	✔	✗	✔	5
		☆	✗	✔	✗	6
		♡	✔	✗	✔	7
		☆	✗	✔	✗	8

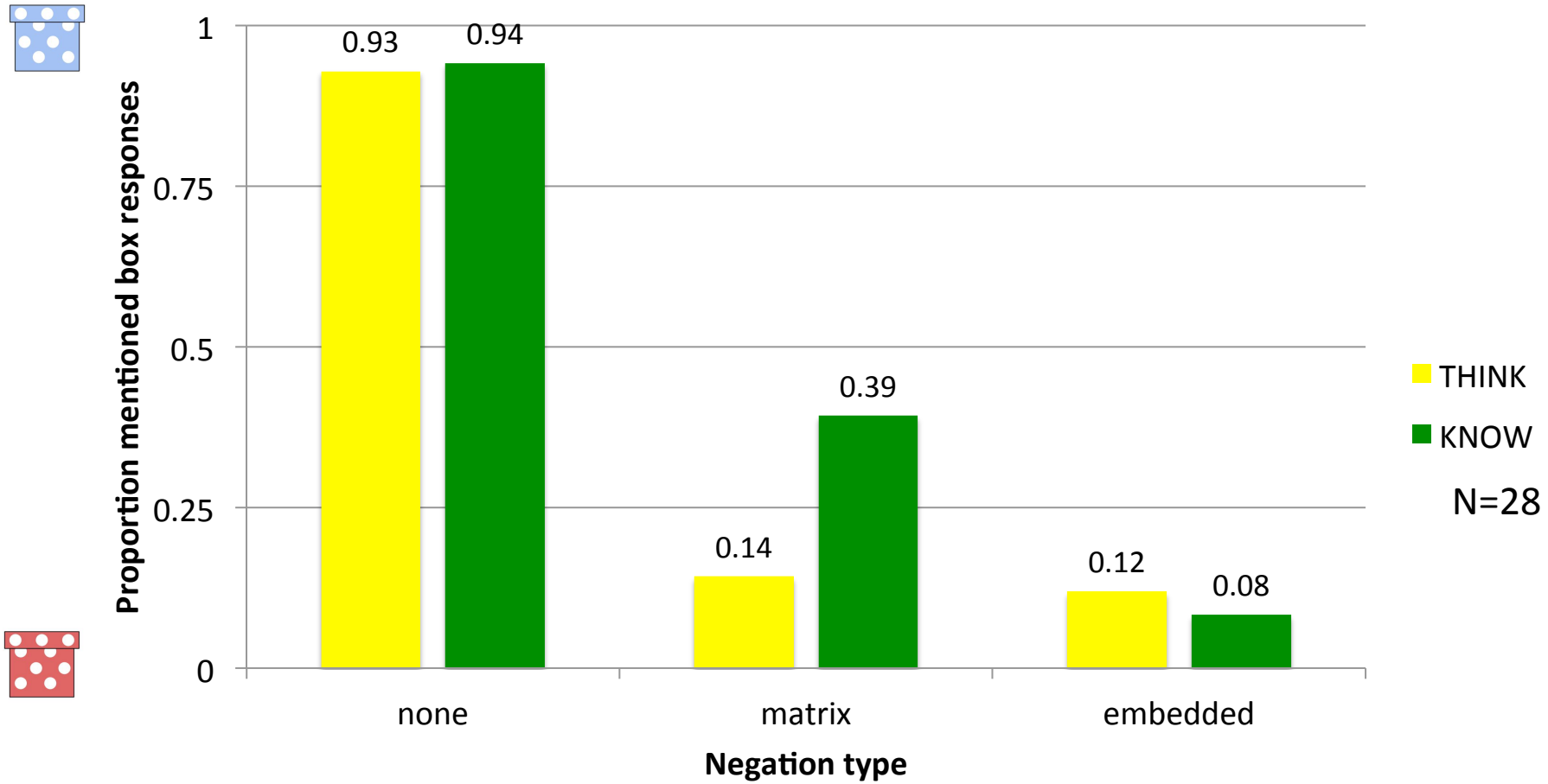
Results: *hope vs. think vs. want*



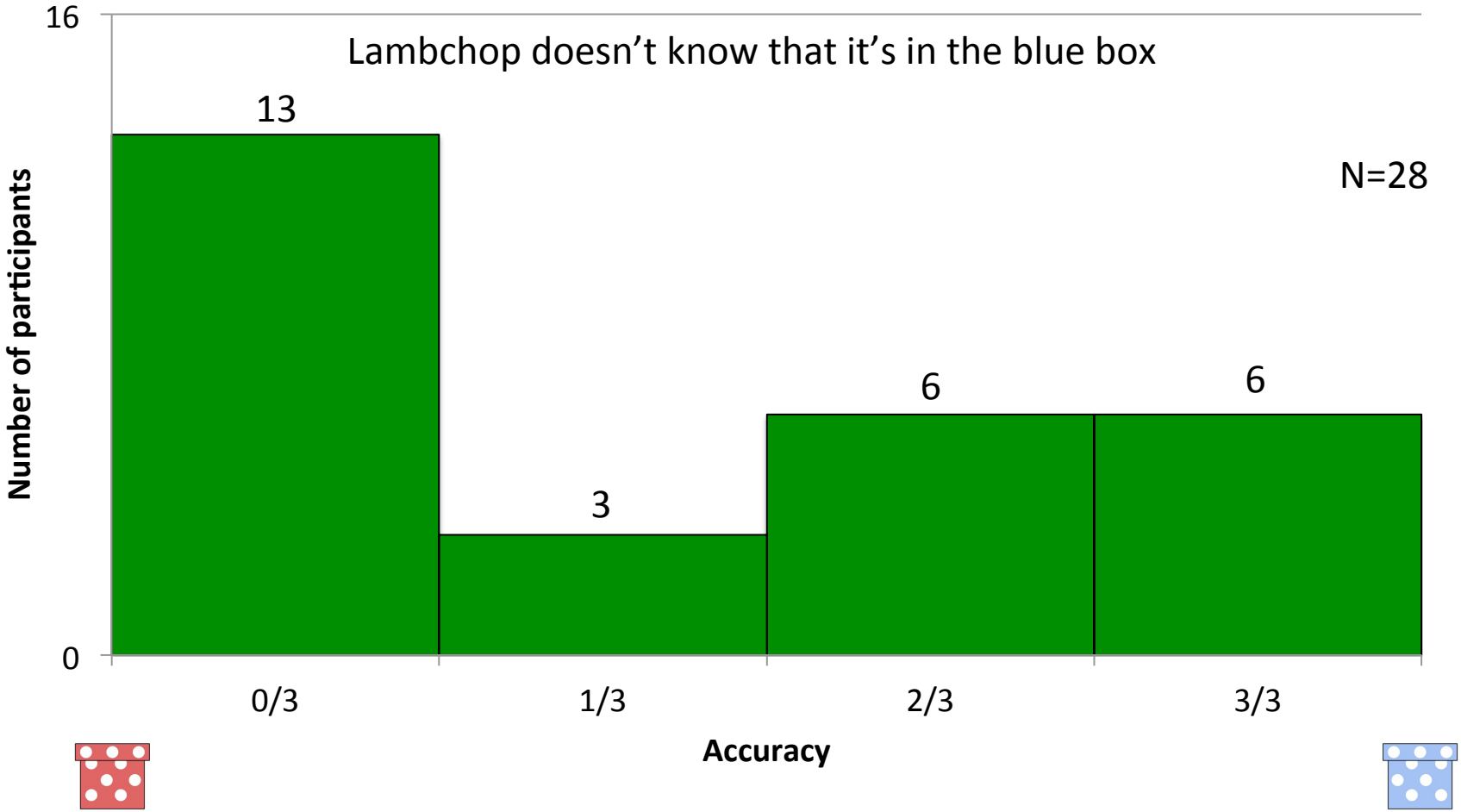
Results: *hope vs. think vs. want*



Results: *think vs. know*



Individual measure: accuracy on know-matrix



think vs. know

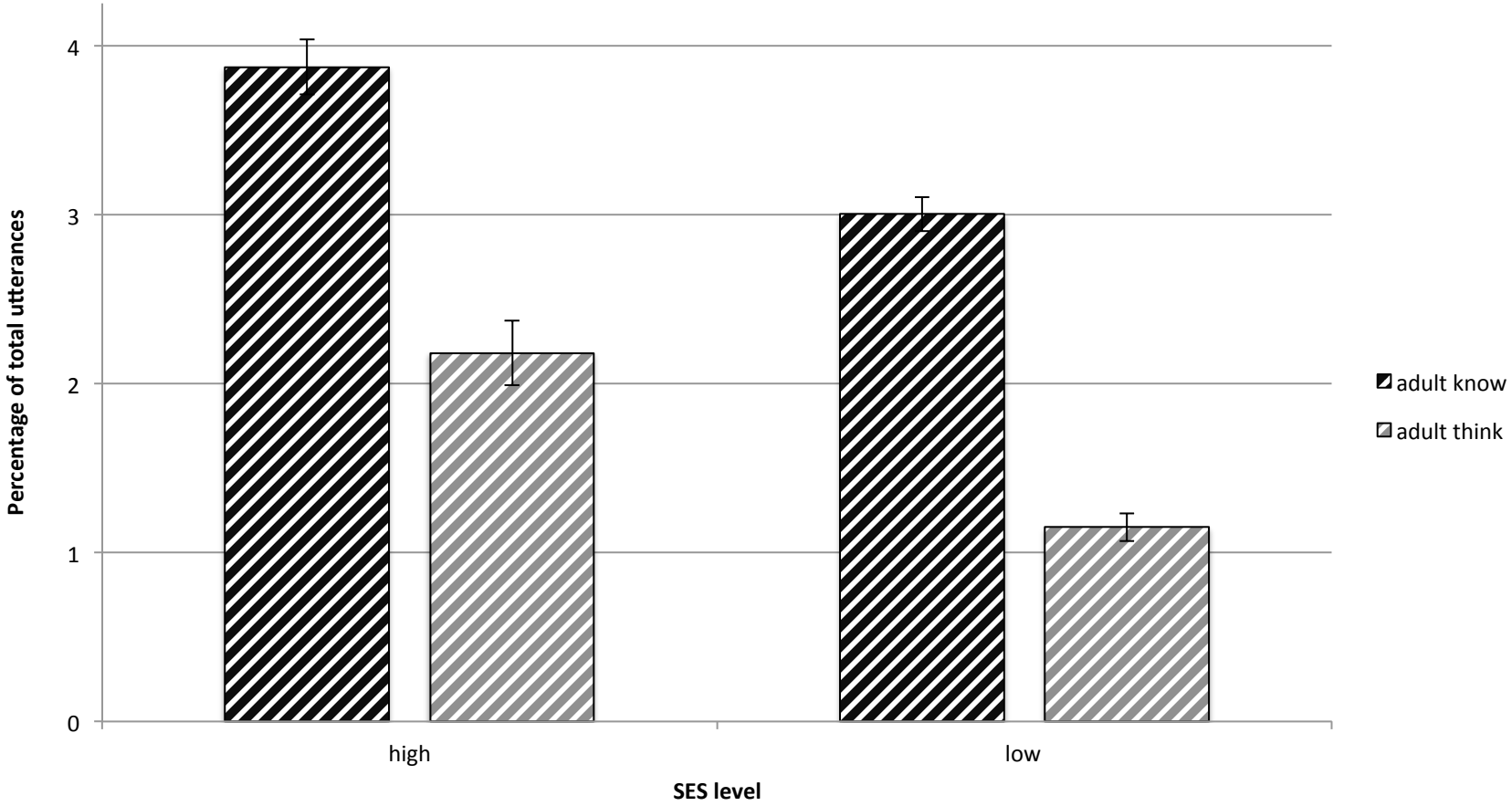
- Children from low SES backgrounds show delays on FB and vocabulary tasks, compared to children from high SES backgrounds.

- Quantitative and qualitative corpus analysis of child-directed speech from low vs. high SES backgrounds.

- 'Where is the toy' task in children from low vs. high SES backgrounds.

Dudley et al, *in progress*

know vs. think: corpus study



know vs. think: corpus study