The pragmatics of belief reports in development

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WCCFL 30
Main Claim

• Previous research has suggested that children do not acquire an adult-like representation of ‘think’ until almost 5 years of age.

• Our results suggest that adult-like competence is in place earlier, but it is obscured by pragmatic factors, among other things.
I’m putting this cupcake in the fridge, so NOBODY TOUCH IT!!!
She'll never find it in the back of the cupboard!
When Valentine comes back, where will she look for the cupcake?

**Adults/5-year-olds:**

Because that’s where she left it!

**3-4 year-olds:**

Because that’s where it is!

[Wimmer & Perner 1983 and many others; for review: Wellman et al. 2001]
Where does Valentine think the cupcake is?

Adults/5-year-olds:

3-4 year-olds:

[e.g. de Villiers & Pyers 2002, Perner et al. 2003]
Valentine thinks that the cupcake is in the fridge.

<table>
<thead>
<tr>
<th>Adults/5-year-olds:</th>
<th>3-4 year-olds:</th>
</tr>
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<tbody>
<tr>
<td>TRUE</td>
<td>FALSE</td>
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*She thinks that because that’s where she put it.*

*Because the cupcake is in the cupboard.*

[Sowalsky, Hacquard & Roeper 2009]
Generalization

When interpreting ‘think’, young children seem to evaluate the complement clause with respect to the actual world.

Valentine thinks that the cupcake is in the fridge.
Question

How do children represent the meaning of ‘think’ during the period when their behavior is non-adult-like?
Traditional answer

• Children have a non-adult-like interpretation of ‘think’ because they have a non-adult-like concept of belief.

• Perner et al. 2003:
  “The claim about conceptual progress is that relatively young children can understand action that involves propositional attitudes in which the embedded clauses refer to existing or nonexisting situations. Only later do children understand that a mistaken believer takes a false proposition about the world as true of the world.”
Rethinking the conceptual explanation

- Recent evidence from more implicit measures suggests that infants as young as 13 months understand false beliefs. [e.g. Onishi & Baillargeon 2005, Song et al. 2008, Southgate et al. 2007]

- Individual children can demonstrate their understanding implicitly, while still failing “explicit” (verbal) tasks. [Clements & Perner 1994]
Alternative hypotheses

• Processing difficulty

• Semantic misrepresentation

• Pragmatic difficulty
Processing difficulty

• Conflicting representations of the world are difficult to process

• Children often default to their own belief.
Semantic misrepresentation

• Children have an incorrect representation of the meaning of ‘think’.
  – Ignore ‘think’
    *The cupcake is in the fridge.* → FALSE
  – ‘think correctly’
    *Valentine thinks correctly that the cupcake is in the fridge.* → FALSE
Pragmatic difficulty

- Children have an adult-like semantic representation for ‘think’, BUT
- They often do not grasp the relevance of belief in context.

→ Non-adult-like parenthetical interpretations?
Parenthetical ‘think’

- Complement clause carries main point of utterance
- Main clause ‘think’ serves a kind of evidential function

A: Why is Jeff late for our meeting?
B: He’s playing with his iPad, I think.
   Valentine thinks he’s playing with his iPad.

Parenthetical ‘think’

• Parenthetical uses of attitude verbs are much more frequent than mental state uses in adult speech
  [Diessel & Tomasello 2001]

• Children’s early productions of ‘think’ are parenthetical or formulaic
  [Shatz et al. 1983, Bloom et al. 1989, Diessel & Tomasello 2001]
Experiment

• Truth value judgment task
  – Story with animated video
  – Target sentence uttered by puppet

• 40 children
  – aged 3;10-4;5 (mean 4.0)
  – 19 boys
Experiment: Example
Experiment: Design

- Story manipulation:
  - KNOWLEDGE → affects conflict

knowledge vs. ignorance
Experiment: Design

• Story manipulation (between subjects):
  – SEEKERS → affects relevance of belief

 1 seeker vs. 2 seekers

QUD: Where is Swiper? Will Dora find him?

QUD: Which seeker is right? What is each seeker’s guess?
Experiment: Design

• Sentence manipulation:
  – **BELIEF TYPE**
    
    *True Belief*: Boots thinks…
    
    *False Belief*: Dora thinks…

**Note**: **BELIEF TYPE** is unknown in the *ignorance* condition.
Experiment: Design

- Sentence manipulation (counterbalanced across scripts):
  - **Sentence Truth:**
    - *True*: Dora thinks that Swiper is behind the toybox.
    - *False*: Dora thinks that Swiper is behind the curtain.
Experiment: Design

- Sentence manipulation (between subjects):
  - **Verb**:
    
    *Think*: Dora thinks that Swiper is behind the toybox.
    *Said*: Dora said that Swiper is behind the toybox.
Experiment: Design

True Belief:

TRUE: Boots thinks that Swiper is behind the curtain.
FALSE: Boots thinks that Swiper is behind the toybox.
Experiment: Design

False Belief:

TRUE: Dora thinks that Swiper is behind the toybox.
FALSE: Dora thinks that Swiper is behind the curtain.
**Experiment: Design**

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Sample sentences                      Belief | Sent. Truth | Comp. Truth
---------------------------------------------|------------|-------------
Boots thinks that Swiper is behind the curtain. | TB | T | T
Boots thinks that Swiper is behind the toybox. | TB | F | F
Dora thinks that Swiper is behind the toybox. | FB | T | F
Dora thinks that Swiper is behind the curtain. | FB | F | T
```
Experiment: Predictions

• Processing difficulty:
  – Adult-like in the ignorance condition.
  – No difference between 1 and 2 seeker conditions (or more difficulty with 2 seekers because of increased complexity).
  – No difference between think and said
Experiment: Predictions

• Semantic misrepresentation
  – No better than chance in the ignorance condition, where truth of complement clause cannot be evaluated.
  – No difference between 1 and 2 seeker conditions.
Experiment: Predictions

• Parenthetical hypothesis:
  – No better than chance in the ignorance condition, where truth of complement clause cannot be evaluated.
  – More adult-like in stories with 2 seekers, because of increased salience/relevance of belief.
Experiment: Results

Ignorance condition no different from chance.
Experiment: Results

said better than think across conditions

(n = 14) (n = 11)
Experiment: Results

2 seekers consistently better across conditions

![Bar chart showing proportion correct responses for 1 seeker vs. 2 seekers across conditions. The chart indicates that 2 seekers perform better on average, with n = 14 for 1 seeker and n = 15 for 2 seekers.](chart.png)
Conclusions

• 4-year-olds have an adult-like representation of ‘think’ available to them

• 4-y.o. have a non-adult-like understanding of the relevance of belief in context
  – Leads to inappropriate uses of the parenthetical interpretation.
Future directions

• How young is the adult-like interpretation of ‘think’ in place?
  – Currently testing 3-year-olds

• What other factors influence children’s use of context?
Thanks!

- Kate Harrigan
- Aaron White
- Colin Phillips

Undergraduate RAs:
- Faina Kostyukovsky
- Jessica Lee
- Leah Whitehill

Stats help:
- Ewan Dunbar

Infant lab coordinator:
- Tara Mease

This work was supported in part by NSF BCS-1124338.