Pragmatic parentheticals and the acquisition of ‘think’

Shevaun Lewis
Valentine Hacquard
Jeffrey Lidz

LSA 2013
How do young children interpret belief reports?

Dora thinks that Swiper is behind the toy box.
How do young children interpret belief reports?

→ Interesting case study of interactions in conceptual, grammatical, and pragmatic development.

→ Important role for pragmatics:
  – As a factor in children’s task performance
  – As a filter on children’s understanding of context and linguistic input
Outline

• Overview of previous findings
  – Theoretical limitations
  – Empirical limitations
• Pragmatics of belief reports
• Our hypothesis
• Experiment
• Conclusions
Previous findings

• Spontaneous production
  – Children begin producing “mental verbs” as early as 2;2.
  – Most early uses are formulaic; overwhelmingly first person present tense
  – Unambiguous references to mental states are rare until >3;6.

[Shatz et al. 1983; Bloom et al. 1989; Diessel & Tomasello 2001]
Previous findings

• Comprehension
  – 3-year-olds respond incorrectly to yes-no questions about someone’s false beliefs.

Situation: Sally put John’s toy under Box A, but she told John it was under Box B.

*Does John think the toy is under [Box B]?*
*Does Sally think the toy is under [Box B]?

• 4-year-olds respond correctly
• 3-year-olds say “YES” to everything

[Johnson & Maratsos 1977]
Previous findings

• Comprehension (continued)
  - 3-year-olds respond incorrectly to wh-questions about someone’s false beliefs.

  *This girl saw something funny at a tag sale and paid a dollar for it. She thought it was a toy bird but it was really a funny hat. What did she think she bought?*
  - 4-year-olds: A BIRD
  - 3-year-olds: A HAT

[e.g. de Villiers & Pyers 2002; Perner et al. 2003; Tardif et al. 2004]
Previous findings

• Comprehension (continued)
  – Children respond incorrectly to declarative statements about someone’s false beliefs in a truth-value judgment task.

  *Puppy thinks that it is raining outside.*

  • 3-year-olds: 35% accurate
  • 4-year-olds: 56% accurate

[Sowalsky, Hacquard & Roeper 2009]
Generalization

Children seem to have non-adult-like interpretations of ‘think’ in false belief scenarios.

Why?
What is the nature of their non-adult-like interpretation?
Previous accounts

Theory of Mind

Grammar

Interpretation
Previous accounts

3-year-olds have difficulty explicitly reasoning about beliefs, especially false beliefs.

[e.g. Johnson & Maratsos 1977; Perner et al. 2003]
Previous accounts

Theory of Mind

Grammar

3-year-olds have a non-adult-like syntax/semantics for ‘think’

[Diessel & Tomasello 2001; de Villiers & Pyers 2002; de Villiers 2005, 2007]
Our theoretical approach

Theory of Mind

Grammar

Context-appropriate interpretation

Pragmatics
Empirical limitations of previous research

• Emphasis on Theory of Mind → true vs. false belief manipulations, rather than linguistic manipulations

• Use of wh-questions rather than truth-value judgment tasks to gauge interpretation
Our empirical approach

- Truth-value judgment tasks
- Linguistic manipulations
  - Truth of sentence
  - Truth of complement clause
Outline

• Overview of previous findings
  – Theoretical limitations
  – Empirical limitations
• Pragmatics of belief reports
• Our hypothesis
• Experiment
• Conclusions
‘Think’ as belief description

• Belief report is the main point of the utterance.
• Complement clause can be true or false.

A: Why is Anne annoyed at Bob?
B: She thinks he’s blowing off the meeting.
‘Think’ as parenthetical

- Main point is in complement clause
- Complement clause is endorsed as true
- Main clause ‘think’ serves a kind of evidential function

A: Why isn’t Bob here yet?
B: **Anne thinks** he’s blowing off the meeting.

[Urmson 1952; Hooper 1975; Rooryck 2001; Simons 2007]
Where do parenthetical interpretations come from?

- Syntactic structure
  - Adjunction [Bresnan 1968]
  - “Evidential” functional projection [Rooryck 2001]
  - Adjoined lexicalized chunks [Diessel & Tomasello 2001]

- Pragmatic inference [Simons 2007]
  - Relevance
Where do parenthetical interpretations come from?

- Sentences with standard word order are ambiguous between parenthetical and mental state interpretations

  *Anne thinks John is blowing off the meeting.*

- Pragmatic competence is required to choose the appropriate interpretation, even if it is syntactically derived
Parentheticals in acquisition

• Parenthetical uses of attitude verbs are much more frequent than mental state uses in adult speech
  – *I don’t think we should touch that* ok?
  – *I think I should tickle you.*

• Children’s early productions of ‘think’ are parenthetical or formulaic

[Shatz et al. 1983, Bloom et al. 1989, Diessel & Tomasello 2001]
Outline

• Overview of previous findings
  – Theoretical limitations
  – Empirical limitations
• Pragmatics of belief reports
• Our hypothesis
• Experiment
• Conclusions
Our hypothesis

Children’s non-adult-like responses to ‘think’ arise from inappropriate parenthetical interpretations.

→ They assume that the main point is the complement clause, and that the truth of the complement is endorsed by the speaker.
Outline

• Overview of previous findings
  – Theoretical limitations
  – Empirical limitations
• Pragmatics of belief reports
• Our hypothesis
• Experiment
• Conclusions
Experiment: Goal

Determine whether children’s responses to a broader range of sentences are consistent with a parenthetical interpretation.
Experiment

• Truth-value judgment task
  – Stories about hide-and-seek
  – Narrated by experimenter with pictures

• Target sentences presented as yes/no questions

• 20 children
  – Aged 3;2-3;6
    (mean 3;4)
Sample Story
Look, it’s Swiper!
Swiper’s hiding here, behind the curtain!
And look, it’s a squirrel!
The squirrel is hiding here, behind the toy box!
Here comes Dora. She’s looking for Swiper.
Dora says, “I see a yellow tail! I know—Swiper is behind the toy box!”
And look, here’s Boots! He’s looking for Swiper too.
He says, “I see a yellow tail! I know—Swiper is behind the curtain!”
Does Dora think that Swiper is behind the toy box?
Experiment: Design

Does Dora think [that Swiper is behind the toy box]?

• **Complement Clause Truth:**
  - *true vs. false vs. unknown*
  → Parentheticalical interpretation, but not belief description, should be sensitive to complement truth.

• **Sentence Truth:**
  - *true vs. false*
  → Parentheticalical interpretation should be blocked for *false* sentences.
Blocking parenthetical interpretations

Parenthetical use of ‘think’ is only licensed when the belief report is true.

[Context: Ann thinks that Bob is home sick, but John knows he’s actually just blowing off the meeting.]
A: Where is Bob?
John: # Anne thinks he’s blowing off the meeting.
Parenthetical hypothesis

• If children have adult-like licensing conditions for their “parenthetical” interpretation, they should not interpret ‘think’ parenthetically when the SENTENCE is false.

→ Children should correctly reject false sentences (even in the false belief condition!).

→ Children should be influenced by COMPLEMENT TRUTH in true sentences.
## Experiment: Design

![Diagram](image)

<table>
<thead>
<tr>
<th>Sample sentences</th>
<th>Sent. Truth</th>
<th>Comp. Truth</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does Boots think that Swiper is behind the curtain?</td>
<td>T</td>
<td>T</td>
<td>TB</td>
</tr>
<tr>
<td>Does Dora think that Swiper is behind the toy box?</td>
<td>T</td>
<td>F</td>
<td>FB</td>
</tr>
<tr>
<td>Does Boots think that Swiper is behind the curtain?</td>
<td>T</td>
<td>?</td>
<td>n/a</td>
</tr>
<tr>
<td>Does Dora think that Swiper is behind the curtain?</td>
<td>F</td>
<td>T</td>
<td>FB</td>
</tr>
<tr>
<td>Does Boots think that Swiper is behind the toy box?</td>
<td>F</td>
<td>F</td>
<td>TB</td>
</tr>
<tr>
<td>Does Boots think that Swiper is behind the toy box?</td>
<td>F</td>
<td>?</td>
<td>n/a</td>
</tr>
</tbody>
</table>
**Experiment: Results**

- When the sentence is *true*, accuracy is highly influenced by complement truth.
- When the sentence is *false*, accuracy is less influenced by complement truth.
Experiment: Results

Higher accuracy with *false* sentences in FB condition.
Outline

• Overview of previous findings
  – Theoretical limitations
  – Empirical limitations
• Pragmatics of belief reports
• Our hypothesis
• Experiment
• Conclusions
Conclusions

• 3-year-olds’ responses to ‘think’ questions are consistent with a parenthetical interpretation
  – When the sentence is true, responses are influenced by the truth of the complement
  – When the sentence is false, children correctly reject it regardless of the complement
Parenthetical ‘think’

Why do children end up with parenthetical-like interpretations in inappropriate contexts?
What goes wrong?

Children have difficulty determining which interpretation is appropriate in context.

Theory of Mind

Pragmatics

Lexical & grammatical knowledge

Context-appropriate interpretation
What goes wrong?

- Theory of Mind
- Pragmatics
- Context-appropriate interpretation
- Lexical & grammatical knowledge

Children’s “parenthetical” interpretations are grammatically encoded.
Evidence for a pragmatic account

• Children’s responses are sensitive to context
A contextual manipulation

1 seeker vs. 2 seekers

QUD: Where is Swiper?
QUD: Which seeker is right?

→ affects relevance of belief in context
A contextual manipulation

Consistently higher accuracy across conditions in the 2-seeker stories.
Evidence for a pragmatic account

- Children’s responses are sensitive to context

- Children’s performance on false belief tasks is also influenced by “pragmatic” factors [c.f. Wellman et al. 2001]
  - Deception
  - Child’s involvement
  - Salience of belief vs. reality
Conclusions

• 3-4 year-olds have an adult-like syntactic/semantic representation of ‘think’

• They have a non-adult-like understanding of the relevance of belief in context
  – Leads to inappropriate uses of the parenthetical interpretation.
Thanks!

Attitudes Group:
• Kate Harrigan
• Aaron White
• Rachel Dudley
• Naho Orita

Undergraduate RAs:
• Faina Kostyukovsky
• Jessica Lee
• Leah Whitehill
• Laura Sherry

Stats help:
• Ewan Dunbar

Infant lab coordinator:
• Tara Mease

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