

Asymmetries in the production and comprehension of (non)active complements

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Overview

- n Background: (Non)factivity and Theory of Mind
- n Asymmetry between production and comprehension
- n Asymmetry across different comprehension tasks
- n Conclusion and open questions

(Non)factivity

Sentential complements differ regarding the status of the truth-values of the embedded propositions (cf. Kiparsky & Kiparsky, 1971; Karttunen, 1972; Schulz, 2002, 2003)

n **Propositional**

He *thought* he bought a ring.

p true or false

n **Factive**

He *forgot that* he bought a ring.

presupposition: p true

n **Negative-implicative**

He *forgot to* buy a ring.

entailment: p false

⌘ Complex interaction of lexical-semantic, syntactic, and discourse-semantic factors

(Non)factivity

Interpretation of complement clauses requires calculation of dependent event variable, but with different properties (Hegarty, 1992; Schulz, 2002, 2003)

propositional $[\exists e \in M_E: \text{buy}(A, \text{rose}, e)]$ **think**(A,e) $M_E =$ set of events in A's mental model

neg.-implicative $[\exists e \in D_E: \neg \text{buy}(A, \text{rose}, e)]$ **forget**(A,e) $D_E =$ set of events in a discourse D

factive $[\delta e: \text{buy}(A, \text{rose}, e)]$ A **forget that** e occurred $\delta =$ discourse binder

Factive complements

Anaphoric expressions, bound to a specific event in the discourse

- ⊠ Event binding triggered by interaction of a tensed complement and a potentially factive (p-factive) matrix predicate like *forget*

Theory of Mind

Knowledge that while there is a single reality different people may have different representations of that reality

Capacity to attribute mental states to other people

- ⌘ distinguish between appearance and reality
- ⌘ **discuss contents of other minds**
- ⌘ make behavioral predictions on that basis

(Johnson, 1982; Olsen & Astington, 1986; Moore & Frye, 1991; de Villiers, 1995, 2000, 2003, 2005; 2007; Milligan et al., 2007)

Relation between ToM and language

Linguistic Determinism Hypothesis

Emergence of false belief understanding rests on the child's mastery of the semantics and syntax of complementation (de Villiers, 1995, 2000, 2003, 2005; de Villiers & de Villiers, 2000; de Villiers & Pyers, 1997, 2002; Schick, de Villiers, de Villiers & Hoffmeister, 2007)

- ⌘ Mastery of false complements under communication verbs taking realis complements (e.g., *say*)
- ⌘ By analogy mastery of false complements embedded by mental verbs (e.g., *think*)

Requirements for factivity

n **Lexical-semantic**

Production/comprehension of p-factive matrix predicates

n **Syntactic**

§ Production/comprehension of tensed complements of p-factive predicates

§ Recognition of factive comp as barrier to adverbial *wh*-movement and neg-raising (*She didn't know that x ≠ She knew that not x*)

n **Disourse-semantic**

§ Calculation of dependent event variable as definite description

§ Presupposition and presupposition failure



n **Cognitive**

Mastery of ToM (false belief)

⌊ The concept of factivity is acquired stepwise

Aim of the talk

Show that the intermediate stages in acquiring the concept of (non)factivity are reflected differently

-  ... in production and comprehension
-  ... in different comprehension tasks

Production and comprehension

Before mastery:



Prediction for production (P1.1)

Stepwise acquisition of components of factive complements: p-factive matrix verbs and tensed complements



Prediction for comprehension (P1.2)

Default strategy across different complement types

Production of sentential complements

Method

- § 2 longitudinal spontaneous speech corpora (Abe, cf. Brown, 1973; Adam, cf. Kuczaj, 1976)
- § Age range: 2;3 to 5;0
- § Analysis of all utterances containing the complement-taking matrix verbs *try*, *want*, *think*, *tell*, *forget*, *say*, *remember*, *hope*, and *wish*

Schulz (2003)

Production of sentential complements

	Adam	Abe
P-factive verb + NP	3;3 <i>forget</i> 3;7 <i>remember</i>	2;4 <i>forget</i> 2;11 <i>remember</i>
Nonfactive verb + tensed complement	2;11 <i>I think that go on</i>	2;7 <i>My mommy said that we make popcorn</i>
P-factive verb + to-infinitive	3;6 <i>I <u>forgot</u> to make sailboat</i>	3;2 <i>You <u>forgot</u> to put your name</i>
Factive complement	4;1 <i>I forgot I gave you some dollars</i>	3;9 <i>I forgot that # I didn't</i>
	4;1 <i>You remember I broke my window</i>	4;4 <i>I remember he never hurts himself</i>

Production of sentential complements study: Summary

- ▣ Production of p-factive matrix predicates first with NP, then with nonfinite complements
 - ▣ Complementizer *that* often absent, independent of the specific complement type
 - ▣ Production of tensed nonfactive complements precedes production of tensed factive complements
- ➔ Stepwise acquisition of (non)factive matrix verbs and sentential complements (P1.1 confirmed)

Comprehension of sentential complements

Methods

TVJ task: Assigning truth-values to sentential complements (Abbeduto & Rosenberg, 1985; de Villiers et al., 1997; Scoville & Gordon, 1980; Schulz, 2003)

Mary remembers that the cat is slow.

Test question: *Is the cat slow?*

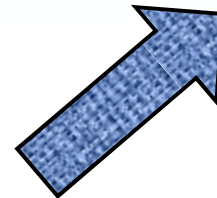
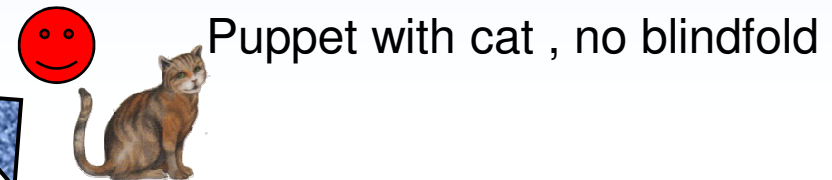
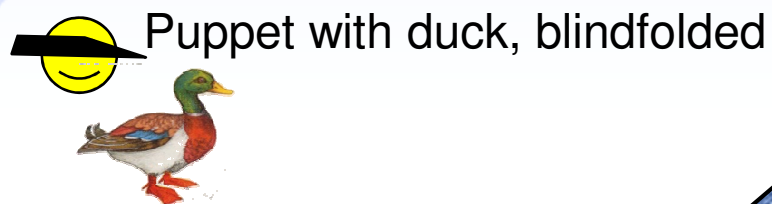
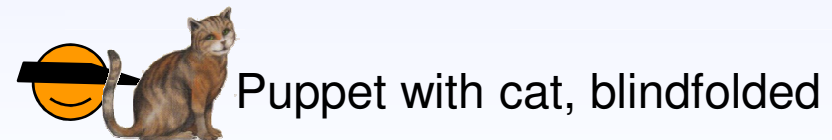
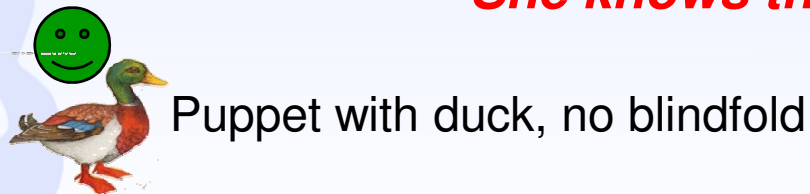
Child: *Yes.*

Comprehension of sentential complements

Methods

Matching a complex sentence to a situation (Léger, 2007)

She knows that she has a cat.



Comprehension of sentential complements study: Summary


- Initial use of the complement-only strategy (COS) between ages 3 and 6: Interpretation of the complement independent of the matrix clause (Harris, 1975; Abbeduto & Rosenberg, 1975; Léger, 2007)

She knows that she has a turtle. = She has a turtle.

She thinks that she has a turtle. = She has a turtle.

$\exists e \in D_E: \text{have}(\text{she}, \text{turtle}, e)$ $D_E = \text{set of events in a discourse } D$

- Correct interpretation of factive, negative-implicative, and propositional complements reported between age 4 (Abbeduto & Rosenberg, 1985; Pérez-Leroux & Schulz, 1999; Schulz, 2003) and ages 6 to 8 (de Villiers et al., 1997; Léger, 2008)

 Before mastery, default strategy across different complement types (P1.2 confirmed)

Production and comprehension

- @ First occurrences of sentential complements before age 3
- @ Target-like comprehension of (non)factive complements starting at age 4 or 6

BUT

- @ First production of factive complements around age 4
- @ Use of complement-only strategy until 4 or 6



Asymmetry between production and comprehension??

Aim of the talk

Show that the intermediate stages in acquiring the concept of (non)factivity are reflected differently



... in production and comprehension



... in different comprehension tasks

Across comprehension tasks

Tasks assessing interpretation of (non)factive complements may probe different aspects of the phenomenon

Before mastery:



Prediction for comprehension (P2)

Performance across different comprehension tasks may differ

Example study with the same subjects

Experimental design

- § Pretest: Comprehension of simple *wh*-questions
- § Task 1: Understanding False Belief (FB)
- § Task 2: Memory for complements
- § Task 3: Assignment of truth-values

Subjects

- § 15 monolingual German-speaking children
(Mean age: 4;02; age range: 3;05 to 4;10)
- § Control group of 15 monolingual German adults

Schulz & Ludwig (2008)

Task 1: Understanding False Belief

n **Method**

Unseen displacement: predict behavior/mental state based on a character's false belief (cf. Wimmer & Perner, 1983)

n **Design** (Videoclips from J. Weissenborn, Humboldt University, Berlin)

- § Comprehension of 4 *wh*-questions as pretest
- § 2 practice video trials
- § 12 test trials (6 *change-of-location*, 6 *change-of-contents* video clips)
 - 6 simple False Belief questions (*Where will Jana look for X?*)
 - 6 mental state verb questions (*Where does Susi think X is?*)

Task 2: Memory for Complements

Design (replication of J. de Villiers & Pyers, 2002, for German; (cf. also de Villiers, 1995; de Villiers & Pyers, 1997, 2002; Hale & Tager-Flusberg, 2003)

1 practice trial

8 test trials (all with the communication verbs *say*)



The woman said there was a bug in her cereal.



But look, it was just a raisin!

Was hat die Frau gesagt, ist in ihrem Müsli?

What did the woman say was in her cereal?

a bug

False Belief and Memory for Complements: Results

FB mastery = at least 10 out of 12 correct responses (80 % correct)

MFC mastery = at least 7 out of 8 responses correct (87,5 % correct)

	FB failers	FB passers	Adults (all FB passers)
MFC failers	3	0	0
MFC passers	4	8	15

Distribution sig. different from chance ($\chi^2(df=1; n=15)= 6,234, p=.026$)

All FB passers show ceiling performance in the memory for complements task

Task 3: Assignment of truth-values

Method

Variant of the truth-value judgment task: Assign truth-values to sentential complements of factive, propositional, and negative-implicative matrix predicates

Design (Schulz, 1997; 2003)

- § 6 practice trials
- § 12 main trials (10 test trials, 2 fillers)
- § Verbs: *think that*, *forget that*, *find out that*, *forget to*, *fail to*
- § 3 possible responses: *yes*, *no*, *don't know*

Propositional test item

One morning, this boy and his mother made a beautiful cake for after dinner. The boy looked in the bowl and saw a dark spot.



*The boy **thought** that there was an ant in the bowl.*

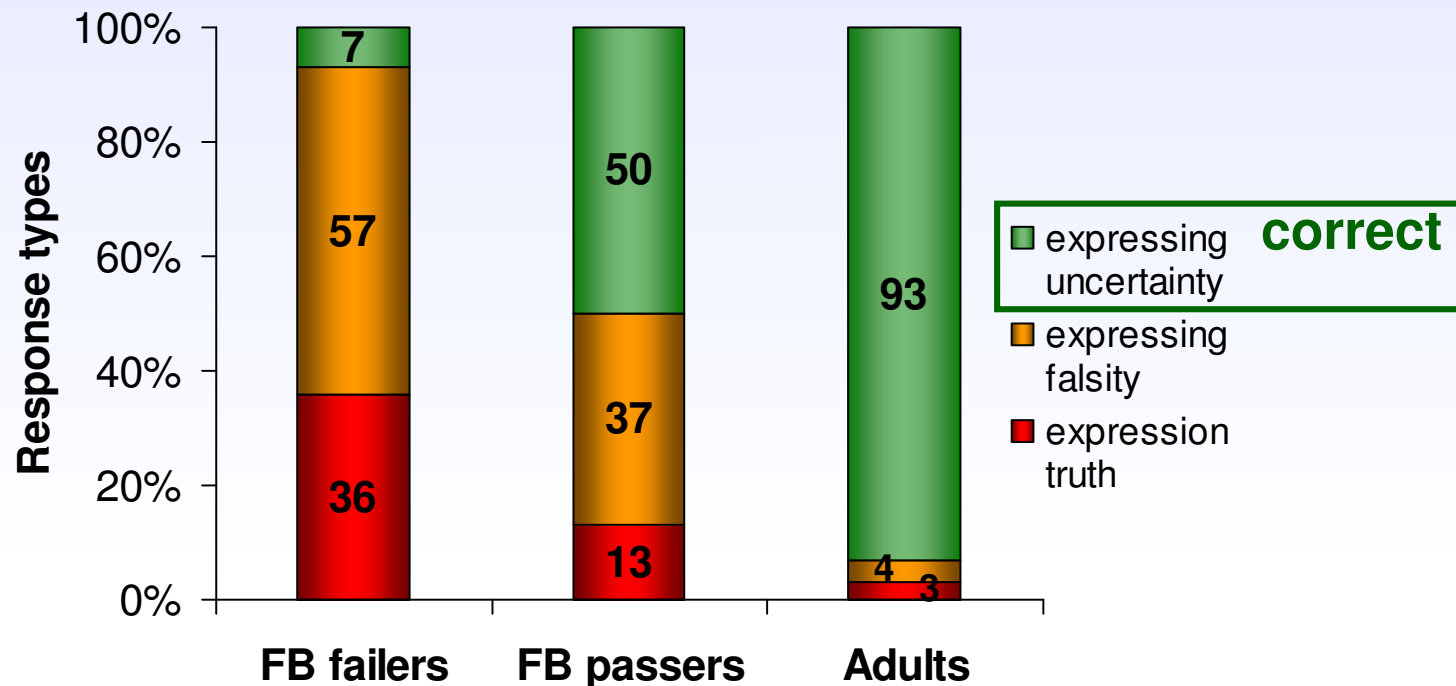
*Der Junge **dachte**, dass in der Schüssel eine Ameise ist.*

*Q1: Was there an ant in the bowl?
maybe.*

*Q2: What did the boy see?
Who knows, a raisin? It doesn't say.*

FB and assignment of truth-values: results

Responses to propositional complements (composite score)



Significant difference between the performance of FB passers and FB failers (Wilcoxon $W = 24.0$, $p = .014$)

⌘ **BUT:** no ceiling effect for FB passers

Studies of comprehension of sentential complements: Summary

@ Memory of complements task

All FB passers master the memory of complements task

@ Assignment of truth-values

FB passers show significantly better performance on propositionals than FB failers (7% vs. 50 % correct), but are far from adult-like performance (93 %)



Matching a false complement against reality less complex than assigning an indeterminate truth value to propositional complements (P2 confirmed)

But is that asymmetry?

Conclusion



Intermediate stages in production

Stepwise acquisition of the components: matrix verbs, complement types



Intermediate stages in comprehension

Default interpretation strategies like Complement-only strategy (COS)



Only full understanding of the concept (non)factivity results in symmetrical production and comprehension abilities

Open questions

- ? Production of factive complements related to mastery of FB?
- ? Does the COS-default strategy also apply to languages like German, where word order differs in main and complement clauses?
Tom knows that [Sue has a dog].
*Tom weiß, dass [Sue einen Hund **hat**.]*
- ? What is the default interpretation strategy for nonfinite complements?

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If you are interested in a copy of the slides, email me: P.Schulz@em.uni-frankfurt.de



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