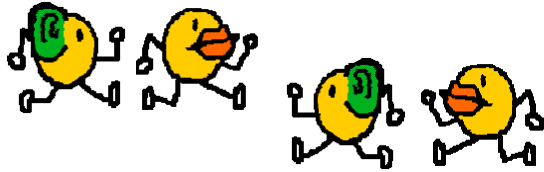


Asymmetries in grammar



Day 2: More asymmetries in child language

Petra Hendriks, LOT Winter School 2009

More asymmetries in child language

- Delay of Principle B Effect
- Bidirectional Optimality Theory
- More asymmetries: Scrambled objects in Dutch & Anaphoric subjects in Dutch
- Discourse influences DPBE
- Implications for theories of grammar

Here you see an elephant and an alligator



- The elephant is hitting himself.
Children: NO
- The elephant is hitting him.
Children: YES

- The elephant is hitting himself.
Children: YES
- The elephant is hitting him.
Children: YES

DPBE: Children's pattern

	Production	Comprehension
Reflexives	✓ (adult-like)	✓ (adult-like)
Pronouns	✓ (adult-like)	✗ (guessing pattern)

Constraints on referring objects

Faithfulness constraint:

- Principle A: Avoid reflexives with a disjoint meaning
(= Reflexives must be locally bound)

Markedness constraint:

- Referential Economy: Avoid full NPs >> Avoid pronouns >> Avoid reflexives

(Hendriks & Spenader, 2004, 2005/6).

Children's production

Input:	FAITH	MARK	Input:	FAITH	MARK
coref. meaning	Princ. A	Ref. Econ.	disjoint meaning	Princ. A	Ref. Econ.
☞ reflexive			reflexive	*!	
☞ pronoun		*!	☞ pronoun		*

Tableau 1:

Production of coreferential meaning

Tableau 2:

Production of disjoint meaning


Children's comprehension


Input:	FAITH	MARK	Input:	FAITH	MARK
reflexive	Princ. A	Ref. Econ.	pronoun	Princ. A	Ref. Econ.
☞ coref.			☞ coref.		
☞ disjoint	*!		☞ disjoint		

Tableau 3:
Comprehension of reflexive

Tableau 4:
Comprehension of (object) pronoun

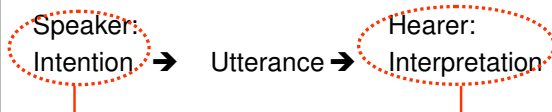
Communication

Speaker: 
Intention → Utterance

Hearer: 
Utterance → Interpretation

Bidirectional optimization

- Speaker's utterance = hearer's utterance
- Hearers are also speakers (and vice versa):



Bidirectional optimization

Bidirectional optimization = Optimization over form-meaning pairs, such that intended meaning of speaker corresponds to actual interpretation by hearer, and vice versa.

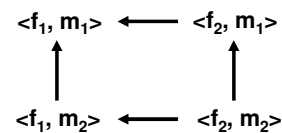
Bidirectional OT

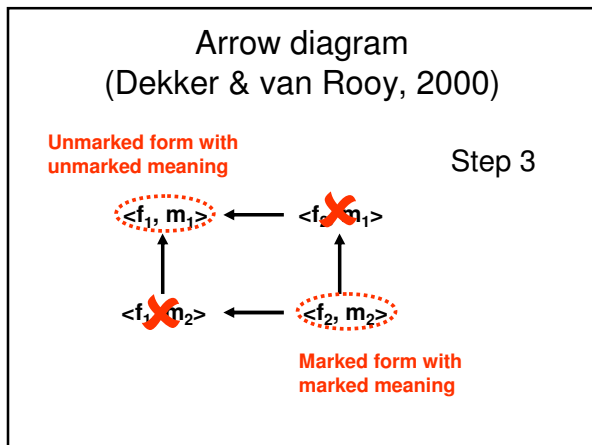
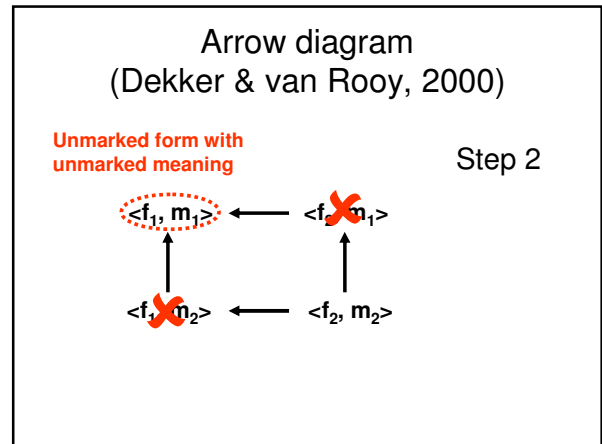
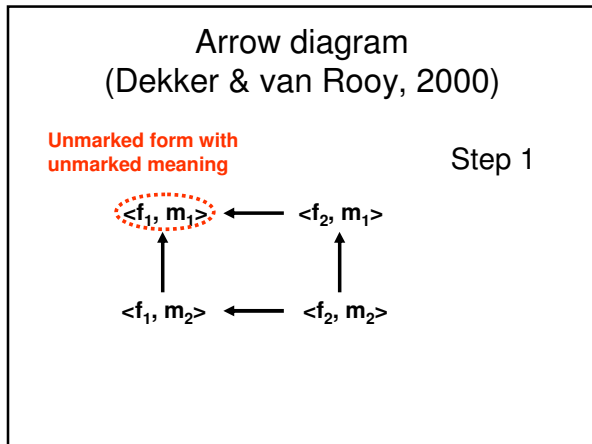
A form-meaning pair $\langle f, m \rangle$ is bidirectionally optimal (Blutner, 2000) iff:

- there is no other bidirectionally optimal pair $\langle f', m \rangle$ such that $\langle f', m \rangle$ is more harmonic than $\langle f, m \rangle$.
- there is no other bidirectionally optimal pair $\langle f, m' \rangle$ such that $\langle f, m' \rangle$ is more harmonic than $\langle f, m \rangle$.

(Blutner, 2000: Weak bidirectional optimization)

Arrow diagram (Dekker & van Rooy, 2000)



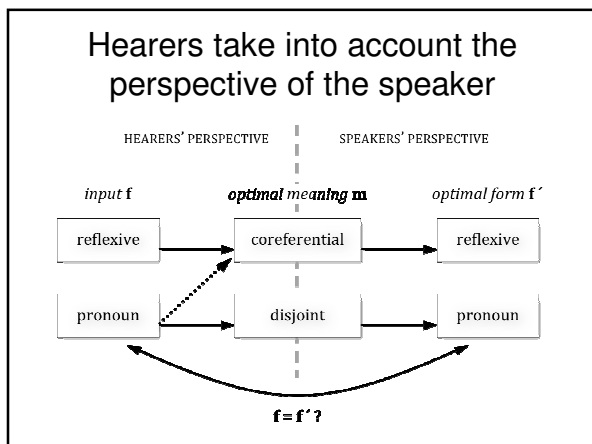


Adults' pattern for referring objects

	FAITH	MARK
	Princ. A	Ref. Econ.
☝ <reflexive, coref.>		
☝ <reflexive, disjoint>	*	
☝ <pronoun, coref.>		*
☝ <pronoun, disjoint>		*

← Principle B is a derived effect

Tableau 5:
Production and comprehension of referring expressions in object position.



- ### Ambiguous pronouns
- For children, object pronouns are ambiguous.
 - For adults, object pronouns are disambiguated because adult hearers take into account the speaker's perspective.
 - Are asymmetries restricted to pronouns?
-

Are asymmetries restricted to pronouns?

- Je mag een knikker twee keer laten rollen.
'you may roll a marble twice'



Object scrambling in Dutch

- Je mag een knikker twee keer laten rollen.
'you may roll a marble twice'
→ Adults: referential reading
→ Children below 7 years old: non-referential reading (Krämer, 2000)
- Je mag twee keer een knikker laten rollen.
'you may roll a marble twice'
→ Adults + children: non-referential reading

Production of scrambled objects

- Dutch children exploit these two syntactic positions in a systematic way in production at age 3 (Schaeffer, 1995).
- Dutch children display the adult pattern in production from age 4 (Schaeffer, 2000).
- So why don't 4-year-olds use this information in comprehension too?

De Hoop & Krämer (2005/6)

- Children's pattern → unidirectional optimization
- Adults' pattern → bidirectional optimization
- Children deviate from the adult pattern when they have to assign a marked meaning to a marked form.

Horn's division of pragmatic labor

Horn (1984):

Unmarked forms go with unmarked meanings, and marked forms go with marked meanings.

Weak bidirectional OT gives rise to Horn's division of pragmatic labor.

Adults' pattern for indefinite objects

C1: Objects get a non-referential interpretation.	MARK	MARK	MARK
C2: Indefinite NPs get a non-referential interpretation.	C1	C2	C3
C3: Indefinite objects do not scramble.			
<non-scrambled, non-referential>			
<non-scrambled, referential>	*	*	
<scrambled, non-referential>			*
<scrambled, referential>	*	*	*

Tableau 6: Production and comprehension of scrambled and non-scrambled indefinite objects

Children

For children:

- Unmarked forms and unmarked meanings are optimal, and therefore easy.
- Marked meanings and marked forms are always suboptimal, and therefore difficult.

Children's pattern

C1: Objects get a non-referential interpretation.	MARK	MARK	MARK
C2: Indefinite NPs get a non-referential interpretation.	C1	C2	C3
C3: Indefinite objects do not scramble.			
<non-scrambled, non-referential>			
<non-scrambled, referential>	*	*	
<scrambled, non-referential>			*
<scrambled, referential>	*	*	*

Tableau 7: Production/comprehension of indefinite objects

Puzzle

- If pronouns and reflexives also conform to Horn's division of pragmatic labor, then pronouns are the marked forms.
- But pronouns are structurally less complex than reflexives!
- Perhaps pronouns are marked because they carry a weaker (less specific) meaning than reflexives.

Acquisition delays

- Reinhart (2006): Acquisition delays only occur in comprehension, because in production a speaker already knows what she wants to say.
- Bidirectional OT: Acquisition delays may occur in comprehension as well as in production (depending on the constraints).

Referring expressions

- Often, several forms could be used to refer to the same thing.
- Choice depends on topicality (Givón, 1993), accessibility (Ariel, 1990) or givenness (Gundel et al., 1993) of the intended referent.
- Speakers will generally use the form that is just informative enough on a scale of informativity (Gundel et al., 1993).

Pronouns

Pronoun Rule (Centering Theory: Grosz, Joshi & Weinstein, 1995):

- If any Cf in an utterance is represented by a pronoun, then the Cb must be represented by a pronoun.
- Pronouns are felicitously used to refer to discourse-salient entities, in particular the discourse topic.

Constraints on referring subjects

Markedness constraint:

- Referential Economy:
Avoid full NPs >> Avoid pronouns >>
Avoid reflexives

Faithfulness constraint:

- Pronouns refer to topics.

(Wubs, Hendriks, Hoeks & Koster, in press).

Adults' pattern for subjects

	MARK	FAITH
	Ref. Econ.	Pro. Top.
<pronoun, +topic>		
<pronoun, -topic>		*
<full NP, +topic>	*	
<full NP, -topic>	*	

Tableau 8:

Production and comprehension of referring expressions in subject position.

Children's production

Input:	MARK	FAITH
+topic	Ref. Econ.	Pro. Top.
☞ pronoun		
full NP	*!	

Tableau 9:
Production of topic

Input:	MARK	FAITH
-topic	Ref. Econ.	Pro. Top.
☞ pronoun		*
full NP	*!	

Tableau 10:
Production of non-
topic

Children's comprehension

Input:	MARK	FAITH
pronoun	Ref. Econ.	Pro. Top.
☞ +topic		
-topic		*!

Tableau 11:
Comprehension of
subject pronoun

Input:	MARK	FAITH
full NP	Ref. Econ.	Pro. Top.
☞ +topic		
☞ -topic		

Tableau 12:
Comprehension of full
NP subject

Predicting delays in production

Delays are predicted when the output of unidirectional optimization is different from the output of bidirectional optimization:

- As speakers, children are predicted to produce unrecoverable pronouns after topic shift.
- As hearers, children are predicted to fail to interpret full NPs as signaling a topic shift.

Wubs, Hendriks, Hoeks & Koster (in press)

Experiment:

- Production of 4 stories based on series of pictures
- Comprehension of 8 pre-recorded stories
- Auditory memory task (see Thursday)

Participants:

- 31 Dutch children (4;3-6;5, mean: 5;6)
- 23 Dutch adults (20;7-30;9, mean: 24;7)

A pirate is walking with a ball. He kicks away the ball. But then the ball falls into the water and he starts to cry.

A knight arrives with a fishing net. He scoops the ball out of the water. And then the pirate has his ball back again.

Adult: **He** scoops the ball out of the water. And then **the pirate** has his ball back again.

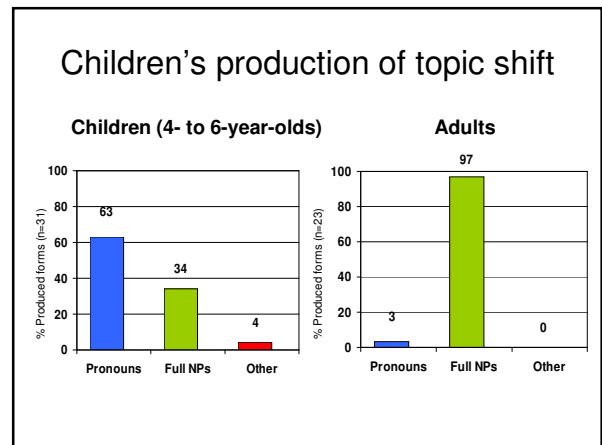
Björn (5;6 y.o.): And then **he** was scooping it out of the water. And then **he** was very happy.

Willemijn (6;2 y.o.): And **he** has caught the ball in a net. Now **he** has his ball back again.

Coding of production stories

Scoring by 2 independent annotators (96.8% agreement on topic shift, 95.8% agreement on target item):

- Determine topic:
 - Topic is mentioned in previous utterance.
 - Topic is pronominalized.
 - Topic is subject.
- Determine topic shift.
- Target picture: Pronoun, full NP or other?



The knight scoops the ball out of the water. And then **the pirate** has his ball back again.

~~And then **he** has his ball back again.~~

Adult: he = the knight

Design comprehension experiment

Participants heard 8 stories about 2 characters:

- 4 stories with topic shift
- 4 stories without topic shift

Final sentence of story included an in principle ambiguous pronoun.

Example of topic shift story

1. **The cleaning-lady** wants to go feed the ducks.
2. **She** gets the old bread out of the breadbox.
3. **She** asks **a teacher** (fem.) to come along.
4. **The teacher** (fem.) tears the **cleaning-lady's** bread in pieces.
5. And then **the teacher** (fem.) gives the **cleaning-lady's** bread to the ducks.
6. **She** thinks ducks are very sweet little animals.

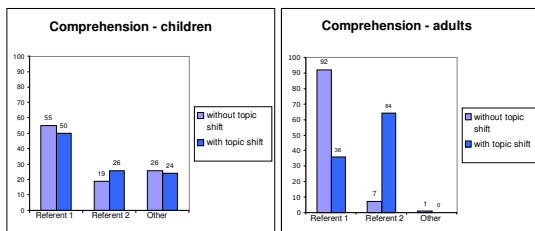
Question: **Who** thinks ducks are very sweet little animals?

Example of non-topic shift story

1. **A clown** has just painted his own face.
2. **He** wants to paint someone else.
3. **He** comes across **a cook** (masc.) in the kitchen.
4. **The clown** decides to paint **the cook** (masc.).
5. And then **the clown** paints a real tough face on **the cook** (masc.).
6. **He** thinks it turned out great.

Question: **Who** thinks it turned out great?

Results comprehension



No significant differences between conditions

Conditions differ significantly

Discussion results Wubs et al.

Production:

- Children produce significantly more unrecoverable pronouns than adults do (63% vs. 3%).

Comprehension:

- Children seem to fail to interpret full NP as marking topic shift.
- Alternatively: Children do not know that pronouns refer to topics.



Combining the two analyses

- Object pronouns: interaction between Princ. A and Ref.Econ.
- Subject pronouns: interaction between Ref.Econ. and Pro.Top.
- Prediction: If object pronouns are in principle ambiguous for children, Pro.Top. should result in preference for topic.

Children's comprehension

Input:	FAITH	MARK	MARK
pronoun	Princ. A	Ref. Econ.	
coref.			
disjoint			

Input:	FAITH	MARK	MARK
pronoun & topic ≠ subject	Princ. A	Ref. Econ.	Pro. Top.
coref. & -topic			*!
disjoint & +topic			

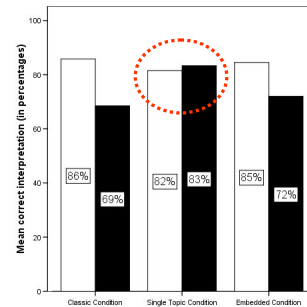
Tableau 4:
Comprehension of (object) pronoun

Tableau 13:
Comprehension of (object) pronoun

Spender, Smits & Hendriks (2009)

- Classic condition:
 - Here you see an elephant and an alligator.
 - The elephant is hitting him/himself.
- Single topic condition:
 - Here you see an alligator.
 - The elephant is hitting him/himself.
- Embedded condition:
 - The alligator says that the elephant is hitting him/himself.

Comprehension reflexives (white) vs. pronouns (black)



No pronoun
interpretation
problem in Single
Topic Condition



Clearly established
topic resolves
DPBE!

Today's conclusions

- Children as speakers do not seem to take into account the hearer, resulting in unrecoverable subject pronouns.
- Children as hearers do not seem to take into account the speaker, resulting in a guessing pattern with object pronouns and a non-adult interpretation of scrambled objects.
- This suggests that children are unable to optimize bidirectionally.