

Baby Born Talking - Describes Heaven



- Title of Chapter 9 of Steven Pinker's book "The Language Instinct".
- Of course, children are not born talking.
 But sometimes their
- But sometimes their productive skills may be well ahead of their comprehensive skills.

Overview of the Talk

- · Contrastive stress
- Acquisition of productive and comprehensive skills does not proceed at the same pace.
- · Production sometimes precedes comprehension.
- Proposed explanation in terms of bidirectional Optimality Theory.
- Distinction between speaker's perspective and hearer's perspective.
- Can we use these asymmetries in acquisition as a test for bidirectional optimization?

General Pattern in First Language Acquisition

• Usually, correct comprehension of a given form precedes correct production of this form.

Cf. Bates, Dale and Thal (1995); Benedict (1979); Clark (1993); Fraser, Bellugi and Brown (1963); Goldin-Meadow, Seligman and Gelman (1976); Layton and Stick (1979).

 However, there are exceptional cases where correct production precedes correct comprehension by several years.

Production/Comprehension Asymmetries

- Subject-object order in English (Chapman & Miller, 1975).
 Pronouns (the "Pronoun Interpretation Problem": de Villier
- Pronouns (the "Pronoun Interpretation Problem": de Villiers, Cahillane & Altreuter, 2005; Spenader, Smits & Hendriks, in prep.).
- Indefinite subjects and objects in Dutch (de Hoop & Krämer, to appear).
 Contrastive stress (Cutler & Swinney 1987)
- Contrastive stress (Cutler & Swinney, 1987).Scalar implicatures (e.g., Papafragou & Musolino, 2003).
- Perhaps other phenomena?
- General pattern: Children show correct production by the age of 3 or 4, but fail to show correct comprehension until the age of 6 or 7.

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Types of Explanation for Observed Asymmetries

- Children appear to have the relevant knowledge in production, but in fact they don't (Cutler & Swinney, 1987; McClellan, Yewchuk & Holdgrafer, 1986).
- Children appear to lack the relevant knowledge in comprehension, but this is caused by:
 - processing difficulties (Avrutin, 1999; Reinhart, e.g. 2004),
 - lack of pragmatic knowledge (Chien & Wexler, 1990),
 interference of task requirements or world knowledge (Bloom et
 - al., 1994; Grimshaw & Rosen, 1990; McClellan et al., 1986).

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These asymmetries are real and require a linguistic explanation (this talk).

Do Children Have Knowledge in Production?

- Cutler & Swinney (1987: p. 145): "The previous literature on the development of prosodic competence shows an apparent anomaly in that young children's productive skills appear to outstrip their receptive skills".
- "In general, children's semantic/pragmatic abilities follow the general rule of linguistic performance: production is at best as good as comprehension, it never outstrips it. Only prosodic performa seems to be an exception" (p. 162).
- Their explanation: Accenting is a primitive physiological reaction associated with speaker excitation (cf. Bolinger, 1983). No linguistic intention or underlying meaning representation need be involved in children's correct production of contrastive accent. •

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Focus Particle Only

- The focus particle *only* associates with the focus of the utterance: - Only John swims
- Focus evokes a set of alternatives (contrast set): - {John, Sue, Mary, ...}
- Only asserts that the focused phrase has some property that the other members of the contrast set lack (exhaustivity): - Sue, Mary, ..., don't have the property of swimming.
- A different placement of stress can result in a different choice of the focus, which can give rise to a change in truth conditions.

Bound Focus and Stress

- 1) Tigger only threw a chair to PIGLET.
 - Default stress.
 - Ambiguous: Focus on indirect object or entire VP.
 - False if Tigger also threw a chair to Winnie
 - OR if Tigger also did something else.
- 2) Tigger only threw a CHAIR to Piglet.
 - Marked stress.
 - Not ambiguous: Focus on direct object.
 - False if Tigger also threw a table to Piglet.

Children's Use of Contrastive Stress

- Children's production of default stress and marked stress seems adult-like from the age of 3 or 4.
 - (e.g. Baltaxe, 1984; Hornby & Hass, 1970; Nederstigt, 2001)
- Children's comprehension of default stress is adult-like from the age of 4.
- However, their comprehension of *marked* stress is around chance until at least 5 or 6: They allow for VP focus as well. (e.g., Gennari, Gualmini, Meroni, Maciukaite & Crain, 2001;

Gualmini, Maciukaite & Crain, 2002; Halbert, Crain, Schankweiler & Woodams, 1995, for English, and Szendröi, 2004, for Dutch)

Optimality Theory (OT)

- Introduced into linguistics by Prince & Smolensky (1993).
- · Optimization over possible outputs.
- · Possible outputs are evaluated through the parallel (and possibly
- cross-modular) application of constraints.
- · Constraints are output-oriented:

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- Markedness constraints
- Faithfulness constraints
- · Constraints are potentially conflicting and differ in strength.
- · Speaker's perspective: input is meaning, output is form.
- · Hearer's perspective: input is form, output is meaning.

Hypothesis

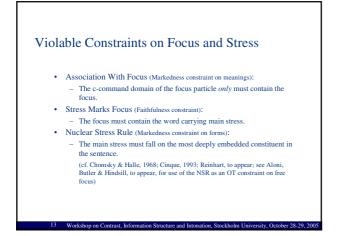
Children's pattern can be modeled by OT:

Speaker's perspective
> Optimization from meaning to form:

- Production of VP focus Production of Indirect Object focus
- Production of Direct Object focus
- Hearer's perspective
 > Optimization from form to meaning:
 - Interpretation of stress on Indirect Object
 - Interpretation of stress on Direct Object

Because the constraints (the grammar) are asymmetrical, the results can be different for production and comprehension.

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	Input: VP focus	Association With Focus	Stress Marks Focus	Nuclear Stress
	Stress on DP _S		*!	*
	Stress on V			*!
	Stress on DP _{DO}			*!
æ	Stress on DP _{IO}			

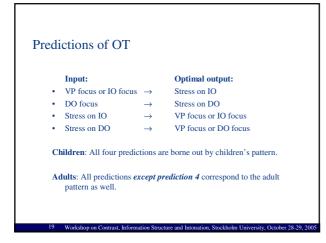
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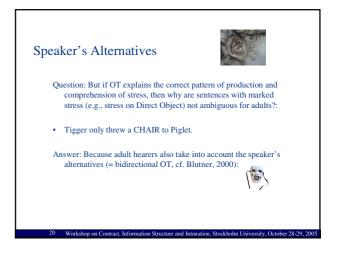
			Object Fo	
	Input: IO focus	Association With Focus	Stress Marks Focus	Nuclear Stress
	Stress on DP _S		*!	*
	Stress on V		*!	*
	Stress on DP _{DO}		*!	*
7 *	Stress on DP _{IO}			

OT F	ro	duction of I	Direct Ol	oject Foci	15	
		Input: DO focus	Association With Focus	Stress Marks Focus	Nuclear Stress	
		Stress on DP _S		*!	*	
		Stress on V		*!	*	
	œ۴	Stress on DP _{DO}			*	
		Stress on DP _{IO}		*!		
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mei	pretation of S	Stress on I	ndirect Ob	ject
	Input: stress on IO	Association With Focus	Stress Marks Focus	Nuclear Stress
	Focus = DP _S	*!	*	
	Focus = DP _{DO}		*!	
æ	Focus = DP _{IO}			
æ	Focus = VP			
	Focus = IP	*!		

ter	pretation of S	Stress on I	Direct Obje	ect	C
	Input: stress on DO	Association With Focus	Stress Marks Focus	Nuclear Stress	
	Focus = DP _S	*!	*		
8	$Focus = DP_{DO}$				
	$Focus = DP_{IO}$		*!		
9	Focus = VP				
	Focus = IP	*!			







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ir	st Round of Optimiz	zation		EE
		Association With Focus	Stress Marks Focus	Nuclear Stress
	<stress dp<sub="" on="">DO, Focus=DP_S></stress>	*	*	*
	<stress dp<sub="" on="">DO, Focus=DP_{DO}></stress>			*
	<stress dp<sub="" on="">DO, Focus=DP_{IO}></stress>		*	*
	<stress dp<sub="" on="">DO, Focus=VP></stress>			*
	<stress dp<sub="" on="">DO, Focus= IP></stress>	*		*
	<stress dp<sub="" on="">IO, Focus= DP_S></stress>	*	*	
	<stress dp<sub="" on="">IO, Focus=DP_{DO}></stress>		*	
ð	<stress dp<sub="" on="">IO, Focus=DP_{IO}></stress>			
ð	<stress dp<sub="" on="">IO, Focus=VP></stress>			
	<stress dp<sub="" on="">IO, Focus=IP></stress>	*		

lo	cking Alternative F	orms		E H
		Association With Focus	Stress Marks Focus	Nuclea Stress
	<stress dp<sub="" on="">DO, Focus=DP_S></stress>	*	*	*
	<stress dp<sub="" on="">DO, Focus=DP_{DO}></stress>			*
	<stress dp<sub="" on="">DO, Focus=DP_{IO}></stress>		*	*
	<stress dp<sub="" on="">DO, Focus=VP></stress>			*
	<stress dp<sub="" on="">DO, Focus= IP></stress>	*		*
х	<stress dp<sub="" on="">IO, Focus= DP_S></stress>	*	*	
х	<stress dp<sub="" on="">IO, Focus=DP_{DO}></stress>		*	
ð	<stress dp<sub="" on="">IO, Focus=DP_{IO}></stress>			
ð	<stress dp<sub="" on="">IO, Focus=VP></stress>			
х	<stress dp<sub="" on="">IO, Focus=IP></stress>	*		

)C	king Alternative M	eanings		
		Association With Focus	Stress Marks Focus	Nuclear Stress
	<stress dp<sub="" on="">DO, Focus=DP_S></stress>	*	*	*
	<stress dp<sub="" on="">DO, Focus=DP_{DO}></stress>			*
Х	<stress dp<sub="" on="">DO, Focus=DP_{IO}></stress>		*	*
Х	<stress dp<sub="" on="">DO, Focus=VP></stress>			*
	<stress dp<sub="" on="">DO, Focus= IP></stress>	*		*
Х	<stress dpio,="" focus="DPS" on=""></stress>	*	*	
Х	<stress dp<sub="" on="">IO, Focus=DP_{DO}></stress>		*	
ð	<stress dp<sub="" on="">IO, Focus=DP_{IO}></stress>			
8	<stress dpio,="" focus="VP" on=""></stress>			
х	<stress dp<sub="" on="">IO, Focus=IP></stress>	*		

Second Round of Optimization

		Association With Focus	Stress Marks Focus	Nuclear Stress
	<stress dp<sub="" on="">DO, Focus=DP_S></stress>	*	*	*
8	<stress dp<sub="" on="">DO, Focus=DP_{DO}></stress>			*
Х	<stress dp<sub="" on="">DO, Focus=DP_{IO}></stress>		*	*
Х	<stress dp<sub="" on="">DO, Focus=VP></stress>			*
	<stress dp<sub="" on="">DO, Focus= IP></stress>	*		*
Х	<stress dp<sub="" on="">IO, Focus= DP_S></stress>	*	*	
Х	<stress dp<sub="" on="">IO, Focus=DP_{DO}></stress>		*	
ð	<stress dp<sub="" on="">IO, Focus=DP_{IO}></stress>			
ð	<stress dp<sub="" on="">IO, Focus=VP></stress>			
Х	<stress dp<sub="" on="">IO, Focus=IP></stress>	*		

Modeling Children's Pattern

- · Optimality Theory distinguishes between speaker's perspective and hearer's perspective.
- Children's problems in comprehension seem to be the result of adopting a hearer's perspective (unidirectional optimization). ➔ Production/comprehension asymmetries.
- Cf. de Hoop & Krämer's (to appear) OT analysis of the interpretation of indefinites; Hendriks & Spenader's (2004) OT analysis of pronoun interpretation.

Modeling the Adult Pattern

- Adult-like production and comprehension seem to be the result of the ability to take into account the conversational partner's alternatives as well (bidirectional optimization). → Symmetrical competence grammar.
- · Bidirectional optimization appears to be acquired relatively late (from the age of 6-7)

Reinhart's Reference-Set Computation

- Reinhart (2004): Reference-set computations are required by the parser (both for children and adults) only when interpreting marked stress, resulting in extra processing costs.
- Prediction Reinhart: For children as well as adults interpreting marked stress is more difficult than interpreting default stress.
- Prediction OT model: If bidirectional optimization is automatized, and if ambiguity is assumed to yield processing difficulties, adults are expected to experience more difficulties with default than with marked stress.
- Gennari, Meroni & Crain (in press) show by means of an eye-tracking experiment with 53 adult subjects that marked stress facilitates comprehension. \rightarrow Cf. OT model.

Counterevidence?

- Children have difficulty comprehending contrastive stress
- · Children have difficulty calculating scalar implicatures
- However: According to Miller, Schmitt, Chang & Munn (2005), children (4;1-5;5) are correctly able to access the quantity •
- implicature associated with focused some.
- Target sentence: Make some faces happy
- Implicature: some → not all
- Result: 90% adult-like comprehension when some is stressed; only 50% adult-like comprehension when some is unstressed.
- Their conclusion: Children as young as 4 are already able to correctly calculate scalar implicatures. Contrastive stress facilitates calculation of the implicature

Discussion

- Miller et al.'s results are a striking exception to the general pattern that 4 year olds have difficulties with contrastive stress and implicatures.
- What is happening here?
- Possible explanation: Target sentences require no calculation of implicature, but merely the activation of a contrast set. Children are able to do this from a young age on.
- Perhaps we can use production/comprehension asymmetries as a test for bidirectional optimization. Contrast set: Does not require reasoning about alternative forms
- and meanings.
- Contrastive stress, implicatures, etc.: Require reasoning about alternative forms and meanings

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