

Acquiring Maximality in Free Relatives and Definite Descriptions

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Introduction: The meaning of FRs and PDDs

SITUATION: There are ten things on the plate and they are all red.

(1) [_{PDD} The things on the plate] are red.
Plural Definite Description (PDD)

(2) [_{FR} What is on the plate] is red.
Free Relative (FR)

FRs and PDDs feel truth-conditionally equivalent.*

*As long as the relevant set is not a singleton.



Introduction: The meaning of FRs and PDDs

SITUATION: There are ten things on the plate and only two are red.

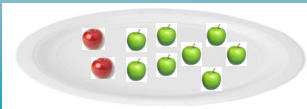
(1) # [_{PDD} The things on the plate] are red.

(2) # [_{FR} What is on the plate] is red.

(3) [Some of the things/something on the plate] is red.

Existentially Quantified/Indefinite DP

FRs and PDDs are NOT existentially quantified.



Introduction: The meaning of FRs and PDDs

SITUATION: There are ten things on the plate and eight are red.

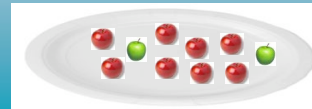
(1) [_{PDD} The things on the plate] are *for the most part* red.

(2) [_{FR} What is on the plate] is *for the most part* red.

(3) # [All the things on the plate] are *for the most part* red.

Universally Quantified DP

FRs and PDDs are NOT universally quantified.



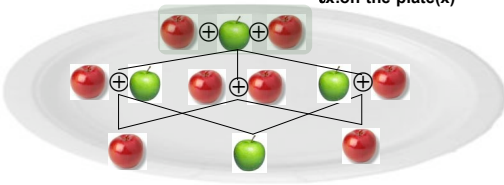
Introduction: The meaning of FRs and PDDs

PDDs and FRs are semantically the same:

both refer to a **maximal individual** ("exhibit maximality")

(Link 1983, Jacobson 1995, Caponigro 2004 a.o.).

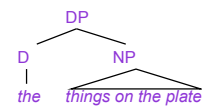
[[_{PDD} The things on the plate]] = } *the individual resulting from*
[[_{FR} What is on the plate]] = } *the sum of all the atomic/plural*
individuals that are on the plate
lx.on-the-plate(x)



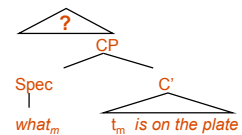
Introduction: The syntax of FRs and PDDs

PDDs and FRs are syntactically different:

PDD

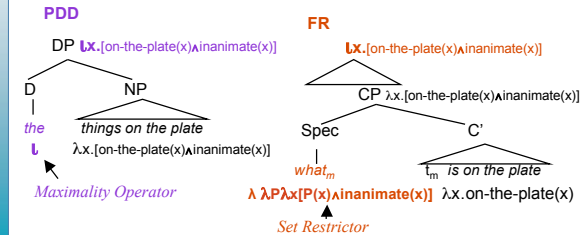


FR



Introduction: The syntax/semantics mapping

- *the* lexically triggers maximality in PDDs
- There is no overt trigger for maximality in FRs
 ⇒ *What* acts a set restrictor, not a maximality operator



Introduction: The syntax/semantics mapping

Evidence that wh-words do not trigger maximality:

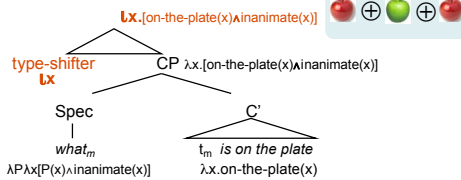
- "Mention-some" wh-interrogatives:
 - ~ **What** can you prepare for the party?
 - ~ **When** can you call me?
- Non-maximal Free Relatives:
 - ~ Captain Kirk went [**where** no man had ever gone before].
 - ~ Call me [**when** you have time].
- Existential Free Relatives:
 - ~ I don't have [**what** to eat]. *New York English*
 'I don't have **anything** to eat'
 - ~ Non ho [**con chi** parlare]. *Italian*
 'I don't have **with whom** to talk'

(Beck and Rullmann 1999; Caponigro 2003, 2004; Grosu 2004; Šimik 2009 a.o.)

Introduction: The syntax/semantics mapping

Caponigro (2004):

- Maximality in FRs is not triggered by any overt lexical element.
- It results from a type-shifting rule handling type-mismatch that is independently needed for bare nominals (Partee 1986, Chierchia 1998, Dayal 2004)



Introduction: Evidence from acquisition

ADULTS

- The view we just presented of treats PDDs and FRs as **semantically identical**, despite their syntactic differences.
- Both refer to **maximal individuals** via an **overt/covert maximality operator** applying to the relevant set.

CHILDREN

- We think the investigation of how children understand PDDs and FRs brings **further support** to this view.
- Our acquisition findings show that children treat PDDs and FRs as **semantically identical from very early on**, despite a strong difference in their frequencies in the input.

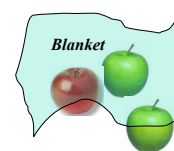
Preview

- Review of previous acquisition studies
- **Experiment 1:** Truth-Value Judgment Task
- **Experiment 2:** Act-Out Task
- **Corpus Study:** Children's input
- Discussion, conclusions, and outstanding issues

Previous Acquisition Work

Modyanova & Wexler (2008) study only FRs with a TVJ Task:

- **Set-up:** 2 green apples and 1 red apple under a blanket (partially lifted so that children can see under it).
- **TVJ Task:** Answer the question "Is [**FR**what is under the blanket] red?"



Previous Acquisition Work

Modyanova & Wexler (2008) study only FRs with a TVJ Task:


- **Set-up:** 2 green apples and 1 red apple under a blanket (partially lifted so that children can see under it).
- **TVJ Task:** Answer the question "Is [FR what is under the blanket] red?"
- **Results:** % of correct answers (i.e. "No" answer)

3-5 yo (16)	6-8 yo (13)	9-12 yo (9)	18-24 yo (22)
17%	22%	33%	30%

- **Conclusion:**
~ Children do not interpret FRs as referring to maximal individuals
- But adults don't either!
~ Something wrong with the task?

Previous Acquisition Work

Munn, Miller, Schmidt (2006) study only PDDs with an Act-Out Task:

- **Set-up:** 
- **Act-Out Task:** "Give me the frogs next to the barn"
- **Results:** % of correct 'maximal' responses

Children (15) (3,0-5,5; mean 4,1)	94.9%
Adults (44)	100%

- **Conclusion:**
~ 94.9 % of children that give more than one frog give them all.
~ But 17.2% of younger children gave only one frog (and were not counted for the % of maximal responses)
~ Also, the task involves a complex/vague item like "next"
~ No control items (some); no data by age, so hard to see if there is any development.

Previous Acquisition Work

- Children have difficulty assigning the correct interpretation to FRs.
- They seem to do better with the correct interpretation of PDDs.

However...

- Different methods have been used to investigate PDDs and FRs, making it difficult to compare the results.
- PDDs and FRs have never been compared directly in an acquisition study.
- The age when children acquire adult-like interpretations for FRs has not been established.
- It is not clear when younger children assign a maximal interpretation to PDDs and FRs.

Experiment 1: Truth-Value Judgment Task

PARTICIPANTS: 58 children (4 years, 5 years, 6 years, 7 years), 11 adults.

TASK: Participants were told: "Cookie Monster really likes cookies, but he does NOT like onions." They were shown pictures of (i) plates of cookies, (ii) onions, or crucially (iii) both cookies and onions. Each picture was shown on 5 trials.



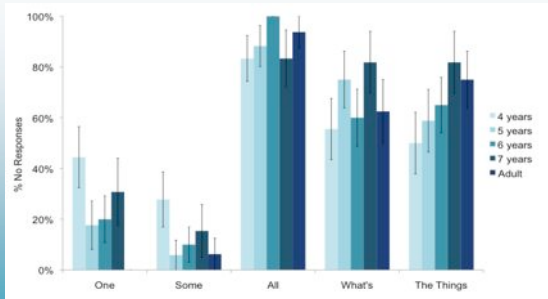
Does Cookie Monster like some of the things on the plate?

Does Cookie Monster like all the things on the plate?

Does Cookie Monster like what's on the plate?

Does Cookie Monster like the things on the plate?

Exp 1: Truth-Value Judgment Task Results



Does Cookie Monster like...?



Exp 1: Truth-Value Judgment Conclusions

1. Children treat FRs and PDDs the same, and different from "some".
2. Do not treat them as maximal, even at age 7.
3. Adult behavior is similar to children's: non-maximal

TVJ captures a difference between **maximal** expressions and other quantifiers, but also appears to depend on other factors.

An alternative method: Act-Out Task

Experiment 2: Act-Out Task

PARTICIPANTS: 66 children (4 years, 5 years, 6 years, 7 years)
7 adults

STIMULI: 2 sets of 4 fruits

INSTRUCTIONS: Can you give me...



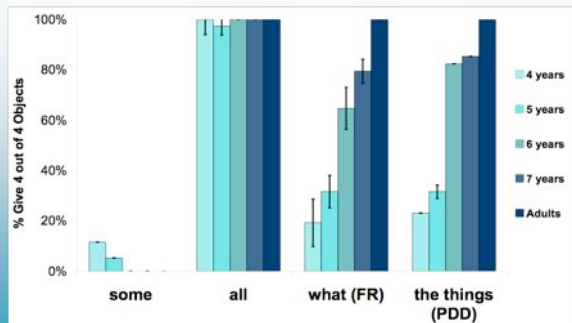
... some of the things in the bucket?

... all the things in the bucket?

... what's in the bucket?

... the things in the bucket?

Exp 2: Act-Out Task Results



Effect of age ($F(4,43)=6.69, p<.001$) (true for each form individually)
No difference between FRs and PDDs ($F(1,43)=2.68, p>0.1$).

What our experiments tell us

- Adult-like, maximal interpretation emerges at the **same point in development** for FRs and PDDs.
- Initially, both forms similar to existential indefinite like "some NP".
- Children have no problem with "all the NP" at same age.

Corpus Study: Children's Input

Methods:

- Analysis of 205,320 word tokens (9365 word types)
- From portions of the VanHouten, Valian, VanKleeck, Bates-Free20, Bates-Snack28, and Bates-Story28 datasets in CHILDES.

Corpus Study: Children's Input

NPs	Definite NPs	Plural Definite NPs (PDDs)	WH embedded clauses	Free Relative (FRs)
79892	7901	1169	1963	157

Children encounter PDDs more than **7 times as frequently** as they encounter FRs (1169 vs. 157).

Corpus Study: Children's Input

NPs	Definite NPs	Plural Definite NPs (PDDs)	WH embedded clauses	Free Relatives (FRs)
79892	7901	1169	1963	157

If children learn by tracking input frequencies, they should learn PDDs refer to maximal individuals before they learn this for FRs...but they don't.

Input frequency doesn't predict simultaneous emergence.

Corpus Study: Children's Input

NPs	Definite NPs	Plural Definite NPs (PDDs)	WH embedded clauses	Free Relatives (FRs)
79892	7901	1169	1963	157

Key words:

the is always associated with a maximal individual (100% of the time)
(7901 of 7901; 1169 of 1169)

wh-words in embedded clauses are associated with a maximal individual only 8% of the time
(157 of 1963).

Corpus Study: Children's Input

NPs	Definite NPs	Plural Definite NPs (PDDs)	WH embedded clauses	Free Relatives (FRs)
79892	7901	1169	1963	157

If children learn by tracking association frequencies of individual expressions, they should learn PDDs refer to maximal individuals before they learn this for FRs...but they don't.

Association frequency doesn't predict simultaneous emergence.

Summary

Experimental results:

- At any stage, children treat FRs and PDDs as semantically the same.
- Between 6 and 7 years old, children acquire an adult-like interpretation of FRs and PDDs as referring to **maximal individuals**.

Corpus analysis results:

- Frequency of individual expressions and individual key words associated with these expressions does not predict this developmental trajectory.

Outstanding issues and future work

Question

Why do children always seem to interpret PDDs and FRs the same way no matter their age?

Our hypothesis

Common semantic representation that children acquire as they are exposed to both PDDs and FRs.

- ⇒ This would explain why the interpretation for these expressions is always the same - data from both expressions is used to learn the interpretation for both expressions.

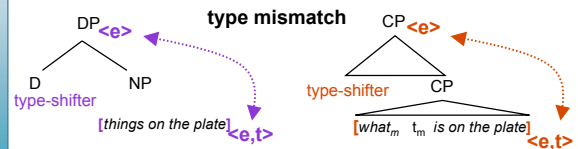


How to interpret "the things on the plate"?
How to interpret "what's on the plate"?
PDD + FR data = answer

Outstanding issues and future work

Speculation on the link

Children realize that a semantic operation is needed to fix a type mismatch, whether this operation is lexically triggered by *the* or not.
Initial hypothesis: the same operation should be used for both expressions, linking them together.



Outstanding issues and future work

Question

Why do children learn that **PDDs** and **FRs** refer to a maximal individual so late in acquisition (6 or 7 years old)?

Hypothesis

The concept of maximal individuals is problematic for younger children.

Prediction

Then children should have trouble with other expressions that refer to maximal individuals.

Borne out?

Children have difficulty with **collective nouns**: 4-year-olds often count members of families, rather than families themselves

Take Home Message

Experimental results have shown us that children treat **PDDs** and **FRs** as semantically the same very early (4 yrs), though they learn these expressions refer to maximal individuals much later (6-7 yrs)

Corpus analysis results have shown that the fact that children treat **PDDs** and **FRs** as semantically the same cannot be explained solely by frequency in the input of the individual expressions or associated key words.

Our results support the view that the meaning of **PDDs** and **FRs** results from the same general semantic principles.

One cause of the observed late acquisition behavior may be that children have difficulty mastering the concept of maximal individuals, independent of these expressions.

Thank you to ...

- The children who participated to our experiments and their parents
- Jennifer Audet
- The babblers at SemanticsBabble at UC, San Diego (in particular, Jonathan Cohen, Kate Davidson, Simone, Gieselman, Dave Hall)
- Francesca Panzeri