

# On the Acquisition of Maximality

Ivano Caponigro<sup>1</sup>, Lisa Pearl<sup>2</sup>, Neon Brooks<sup>3</sup>, David Barner<sup>1</sup>

<sup>1</sup>University of California, San Diego; <sup>2</sup>University of California, Irvine; <sup>3</sup>University of Chicago

## Introduction

- English adult speakers judge (1) and (2) truth-conditionally equivalent (as long as the relevant set containing more than one atomic entity):

(1) **[DEFINITE DESCRIPTION]** The things on the plate] are mine.

(2) **[FREE RELATIVE]** What is on the plate] is mine.

- Plural Definite Descriptions (PDDs) and Free Relatives (FRs) are syntactically different, but semantically identical: they both refer to a **maximal individual** (Link 1983, Jacobson 1995, Caponigro 2004 a.o.).

**[PDD]** The things on the plate]] **[FR]** What is on the plate]]

= iota [BE-ON-THE-PLATE(x)]  
(the individual resulting from the sum of all  
the atomic individuals that are on the plate)

## Previous Acquisition Work

- Children have difficulty assigning the correct interpretation to both PDDs (Munn, Miller, & Schmitt, 2006) and FRs (Modyanova & Wexler 2008).
- The age when children acquire adult-like interpretations for PDDs and FRs has not been established.
- PDDs and FRs have never been compared directly in an acquisition study; different methods have been used to investigate them, making it difficult to compare previous results.

## Our Main Questions

- At what age are children aware of the **identity in meaning** between PDDs and FRs, despite their difference in form?
- At what age do children interpret PDDs and FRs as referring to **maximal individuals**?

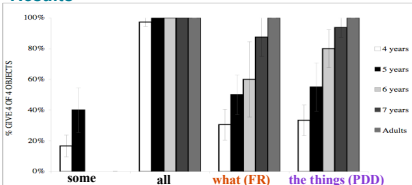
## 1. Act-Out Task

### Methods

- Participants: 4yo (18); 5yo (10); 6yo (5); 7yo (8), adults (7).
- Participants were shown a bucket and a plate, each with 4 fruit inside. They were instructed to put food from one container into the experimenter's hands on each trial, and to listen carefully to the request.

TRIAL TYPE:	"Can you give me..."
Free Relative (FR)	"...what's on the plate?"
Plural Definite Determiner (PDD)	"...the things on the plate?"
Quantifier Controls	"...some of the things on the plate?" "...all the things on the plate?"

### Results



The vertical axis shows the percent of the time participants gave **all 4 objects** on the plate (a "maximal" interpretation).

- ANOVA [5(Age group) X 2(request type: FR vs. PDD)];
  - significant main effect of age group ( $F(4,43)=6.69, p<.001$ )
  - no significant difference between FR and PDD ( $F(1,43)=2.68, p>.0.1$ ).
- Significant correlations between age group and performance for FRs ( $r=0.55, p<.001$ ) and PDDs ( $r=0.56, p<.001$ ).

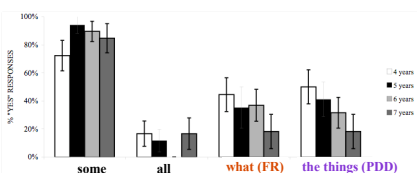
## 2. Truth-Value Judgment Task

### Methods

- Participants: 4yo (18), 5yo (17), 6yo (19), 7yo (11).
- 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 (iii) both cookies and onions. Each picture was shown on 5 trials.

TRIAL TYPE:	"Does Cookie Monster like..."
Free Relative	"...what's on the plate?"
Definite Determiner	"...the things on the plate?"
Quantifier Controls	"...some of the things on the plate?" "...all the things on the plate?"

### Results



The vertical axis shows the percent of the time participants said yes for each question on **mixed plate trials** (half onions and half cookies).

- ANOVA [4(Age group) X 2(request type: FR vs. PDD)];
  - no significant difference between FR and PDD ( $F(1,61)=0.70, p>.0.1$ ).
- No significant correlations between age group and performance for FRs ( $r=-0.133, p>.0.1$ ) and PDDs ( $r=-0.118, p>.0.1$ ).

## 3. Corpus Analysis

### 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.

### Results

NPs	Definite NPs	Plural Definite NPs (PDDs)	Embedded Clauses	WH clauses	WH embedded clauses	Free Relatives (FRs)
79892	7901	1169	3618	8521	1963	157

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

• If children are tracking how often lexical items predict a maximal interpretation, the definite determiner **the** has **perfect predictive power** (7901 of 7901; 1169 of 1169) while the **wh-words** used in FRs are only associated with a maximal interpretation in subordinate clauses **8% of the time** (157 of 1963).

## Discussion

- Children start interpreting PDDs and FRs as **referential expressions** referring to maximal individuals at the same point in development, **between 6 and 7 years old**.
- Since PDDs and FRs **differ significantly in their frequency in child-directed speech**, these results indicate a global change in how children interpret maximal expressions that appears to be independent from how frequently the words are used in their input.
- Younger children** treat PDDs and FRs as **semantically similar to indefinites** like *some of the things on the table* (existential quantification), while they assign the correct interpretation to quantified nominals like *all the things on the table* (universal quantification).
- Have younger children not yet mastered maximal individuals, or do they not yet know that there are linguistic expressions that refer to maximal individuals?