Mapping Properties to Individuals in Language Acquisition

Kristen Syrett
Rutgers University
BUCLD 2014
Introduction
A starting point

Focus: how children learn certain predicates
What is a predicate?

Sentence

DetP  VP
The boys  read a book
<e>  <e,t>
met  are tall
Learning Predicates

A child’s task in learning predicates involves learning about a range of semantic properties:

- Animacy: *be happy, sad, hungry*
- Stage level or individual level: *be hungry v. intelligent*
- The relevant adjectival dimension (size, color, etc.)
- Consequences of set membership: intersective (*wooden*), subsective (*big*), anti-intersective (*fake*), etc.
- **Level of predication**
Learning Predicates

Level of predication

Mixed (ambiguous)

- Read a book
- Lift a block
- Be heavy

Learning Predicates

Level of predication

**Group** level

- Scatter
- Gather
- Meet
Learning Predicates

Level of predication

**Individual** level

- Have brown eyes
- Be tall
- Be round

**Distributive**

Schwarzschild 2009
Learning Predicates

Consequences for distributive predication

Sentences with plural subjects:

The buttons are round.

[The button]s are round.
Learning Predicates

Consequences for distributive predication

Not just about the plural marking on the noun!

The furniture is round.

individuable parts
Count/Mass Distinction

**Count nouns**
- *book, dog, blink*
- *how many ___ ; those ___s ; a ___*

**Mass nouns**
- *rice, water, bread;*
- *how much ___ ; this ___*

**Object mass nouns**
- *furniture, jewelry, clothing, mail;*
- *how much ___ ; this ___*

Individuation
(but: *furniture*)

Divisity of reference
(but: flexible CNs)

Cumulativity
(but: plural CNs)

Distributive predicates are licensed not only with count nouns, but also with object mass nouns:

The [buttons are / furniture is] round.

They are not licensed with substance mass nouns, unless accompanied by a unit of measurement:

*The water is round.
   The drops of water are round.
*The rice is long.
   The grains of rice are long.
Similarly, collectivizers can call attention to the group-level property for groups with individuable parts.

The buttons are round.  TRUE
The group of buttons is round.  FALSE
The furniture is round.  TRUE
The configuration of furniture is round.  FALSE
Individuals v. Group

We can use this distinction to our advantage.

Point to the round buttons/furniture.
Research Questions

Are children aware that distributive predicates obligatorily apply at the individual level, and not the group level? (If so, how early?)

Do they recognize that this constraint on predication applies uniformly to plural count nouns and object mass nouns alike – that the predicate always applies at the atomic level?
The study
Participants

24 adult controls

63 children (32 girls)

5 groups

I: 28-35.9 mos. (2.5-3 years)
II: 36-41.9 mos. (3-3.5 years)
III: 42-47.9 mos. (3.5-4 years)
IV: 48-53.9 mos. (4-4.5 years)
V: 55-66.0 mos. (4.5-5 years)
Pretest session

Elicitation task to confirm that children could distinguish between singular/plural marking and count/mass nouns

Children were required to be successful on more than half of the items in order to proceed to the test session.
Procedure

Pretest session

Children were shown two sets of images and asked to name them as instructed.

EXX: pig (singular count noun), bread (mass noun), apples (plural count noun), blue sand (modified mass noun), red balloons (modified plural count noun)
Procedure

Test session

8 trials
- 2 dimensions (shape, size)
- 4 distributive predicates (2 per dimension)
  (shape: square, round; size: big, tall)

- Each distributive predicate occurred with both a plural count noun and an object mass noun.
- 4 plural count nouns (buttons, pillows, cups, blocks)
- 4 object mass nouns (candy, furniture, fruit, pasta)
  ex. round buttons, round candy
Procedure

Forced choice task

**Familiarization Phase**
- Introduction to objects
- Attention to individual property
- Attention to group property

**Test Phase**
- Individual has target property
- Group has target property
Example trial: count noun
Look at my buttons!
Buttons can be different shapes, sizes, and colors.
You can move buttons around to make different shapes.
Now I’m going to show you some new buttons!
Look, they’re different!
Point to the round buttons.
Similar with object mass noun
Look at my furniture!
You can move furniture around to make different shapes.
Furniture can be different shapes, sizes, and colors.
Now I’m going to show you some new furniture!
Look, they’re different!
Point to the square furniture.
Stimuli

Characteristics of stimuli

Attention drawn equally to properties of individuals and properties of the group

Distributive predicate in consistent frames with no number marking on determiner or verb:

Look at my [NOUN]
You can move [NOUN] around to make…
[NOUN] can be …
I’m going to show you some new [NOUN]
Point to the [DIST-PRED NOUN]
Stimuli

Children were not unaware of the group level property. They spontaneously and frequently commented on the shape of the group.

- “Hey, you made a circle/star!”
- “Look, that’s a square/triangle!”
Results
Results

Adults consistently select the individuals – and not the group – instantiating the target property.

<table>
<thead>
<tr>
<th>% correct</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>count</td>
</tr>
<tr>
<td>shape</td>
<td></td>
</tr>
<tr>
<td>square</td>
<td>100.0%</td>
</tr>
<tr>
<td>round</td>
<td>100.0%</td>
</tr>
<tr>
<td>size</td>
<td></td>
</tr>
<tr>
<td>big</td>
<td>100.0%</td>
</tr>
<tr>
<td>tall</td>
<td>91.7%</td>
</tr>
</tbody>
</table>
Results

Children generally patterned with adults by three years of age. (exception: tall)

Point to the round buttons.

<table>
<thead>
<tr>
<th></th>
<th>I: 2.5-3</th>
<th>II: 3-3.5</th>
<th>III: 3.5-4</th>
<th>IV: 4-4.5</th>
<th>V: 4.5-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>count</td>
<td>mass</td>
<td>count</td>
<td>mass</td>
<td>count</td>
</tr>
<tr>
<td>shape</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>square</td>
<td>66.7%</td>
<td>66.7%</td>
<td>100.0%</td>
<td>75.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>round</td>
<td>75.0%</td>
<td>83.3%</td>
<td>92.3%</td>
<td>84.6%</td>
<td>84.6%</td>
</tr>
<tr>
<td>size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>big</td>
<td>83.3%</td>
<td>91.7%</td>
<td>92.3%</td>
<td>92.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>tall</td>
<td>8.3%</td>
<td>50.0%</td>
<td>53.8%</td>
<td>76.9%</td>
<td>69.2%</td>
</tr>
</tbody>
</table>
Results

Where children diverged from adults: tall
Results

How do these findings fit in the bigger picture of children’s developing conceptual and lexical knowledge?
Child language background
Background

By age 3-4, children produce and comprehend ‘size’ and ‘shape’ words, such as big, tall, round, and square.

*CHI: it be a big snowman. Eve (file 19 2;3)
*CHI: I making a tall tall building. Adam (file 21 3;0)
*MOT: is this a round or a square cookie?
*CHI: a square cookie. Nina (file 34 2;9)

CHILDES (Brown, Suppes); Dale & Fenson 1996
Background

By age 3-4, children produce object mass nouns like furniture and candy. I told my kids, “I ate all of your Halloween candy.”

Barner & McKeown 2005; Gordon 1985
Background

By age 3-4, children are guided by shape in object categorization and word extension.

This is a dax. Which is a dax?

By age 3-4, children demonstrate an understanding of other semantic components of distributive predicates like ‘big’, ‘tall’, and ‘long’.

They map individuals to a context-dependent standard that shifts depending on the comparison class.

Barner & Snedeker 2008; Ebeling & Gelman 1988, 1994; Syrett 2007; Syrett, Kennedy, & Lidz 2010
Background

By age 3-4, children allow both individual- and group-level predication with ‘mixed’ (ambiguous) predicates

Two girls read a book. Two girls lifted a block.

Background

By age 3-4, children are sensitive to number morphosyntax to mark the singular/plural distinction

Look, there is a blicket! / Look, there are some blickets!
Look at the blicket! / Look at the blickets!

Kouider, Halberda, Wood, & Carey 2006
Background

By age 3-4, children are sensitive to lexical differences among count, substance mass, and object mass nouns

Barner & McKeown 2005; Gordon 1985
Background

By age 3-4, children are aware that object mass nouns quantify over individuals. Who has more silverware? shoes

Barner & Snedeker 2005, 2006; and cross-linguistic replications since
Observation

By 3-4, children have knowledge of aspects of adjectival semantics relevant conceptual and perceptual properties part-whole structure of groups number morphosyntax count/substance mass/object mass distinction and recognize that certain predicates pick out properties of individuals.
Conclusions
Conclusions

By three, children seem to have recognized that groups have a decomposable structure with individuable parts, and that distributive predicates modify these atomic parts, regardless of whether the objects are referred to with a count or object mass noun.
Conclusions

Knowledge about the structure of groups and pluralities is recruited for learning about types of nouns and about a range of predicates.
Conclusions

Directionality?

Does knowledge of individual properties and labels for them draw attention to atomic parts of groups, and group structure?

or

Does recognition of the internal structure of groups (picked out by morphosyntax) lead the child to hypothesize that individuals can have properties apart from the group?
Thank You

Funding
Rutgers Startup Grant
Aresty Research Center grants

Research Assistants
Stephanie Buco, Ariana Kalkstein, Kristen Starcher

Preschools, parents, and children