Picking up after sloppy children

What pronouns reveal about children’s analysis of English comparative constructions

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The ability to form comparatives is a fundamental aspect of human cognition, and influences how we approach our interactions and decisions on a daily basis.

Languages worldwide have means for encoding comparatives, but there is cross-linguistic variability in the formation of comparatives.

Why study comparatives?

- Since Bresnan (1973, 1975)’s seminal work on comparatives, recent years have brought theoretical advances in cross-linguistic investigations of the syntax and semantics of comparatives.

Why study comparatives?

- A wide range of developmental studies have probed children’s understanding of comparatives.

Why study comparatives?

- In order to master comparative expressions, children need an implicit understanding of the conceptual, lexical, and structural platforms that allow them to produce such comparatives.

- What do we know about how children approach comparatives?
A glimpse of comparatives in child language
Children produce comparatives that differ markedly from the adult form.

And then I grow more older, and more older, and more older.

Olga 3;7 (Feider 1973)

Yeah, and Joey will get there first than Jason. Jason is a slowpoke.

Abe 3;8 (Kuczaj 1976)

She’s just a silly dog that you ever saw.

Adam, 4;7 (Brown, 1973; cited in Moore 1999)
Interpretation of comparatives

- Children seem to interpret comparatives in a way that diverges from adults.

- Examples:
  
  Tim is taller than Derek (is). <=>
  
  Tim is tall.
  
  The lion is 2 chipanis taller than the tiger. <=>
  
  The lion is 2 chipanis tall. / The lion is taller.

(Bishop & Bourne 1985; Donaldson & Wales 1970; Arii, Syrett, & Goro 2014, *in preparation*)
Where could things go wrong?
Deconstructing comparatives

Maddie wrote more letters to Jack than to Aidan.

Main Clause

Comparative marker

Standard Phrase

In addition to these features:
• Elided material in the Standard Phrase
• Quantifier Raising of the Degree Phrase
Standards in comparatives

Maddie wrote more letters to Jack than to Aidan.

Standard Phrase
Standards in child language

- By age four, children can use the contextual and perceptual cues, and other information about comparison classes, to set the standard of comparison.

  (Barner & Snedeker 2008; Ebeling & Gelman 1988, 1994; Syrett 2007; Syrett, Kennedy, & Lidz 2010, a.o.)

- But they may overlook an explicitly-provided linguistic standard, and do not necessarily know which markers head this phrase.

  (Arii, Syrett, & Goro 2014, in prep.; Moore 1999)
Comparison and *more* in comparatives

Maddie wrote *more* letters to Jack than to Aidan.

Comparison of quantities/amounts

# letters Maddie wrote to Jack (✍✍✍) > # letters Maddie wrote to Aidan (✍)
Comparison and *more* in child language

- By age four, children produce ‘*more*’ and understand the concept of ‘*more*’, and can understand and perform some basic addition and subtraction operations (within subitizing range). (Gelman & Meck 1983; Zur & Gelman 2004)

- But they are mastering the cardinality principle, may have difficulty with certain quantity ratios, and may require certain perceptual supports for comparison.

(Halberda & Feigenson 2008; Hudson 1983; Wynn 1990, 1992, a.o.)
Ellipsis in comparatives

Maddie wrote more letters to Jack than to Aidan.

Maddie wrote more letters to Jack
[than \( \lambda d. \text{Maddie wrote d} \text{ many letters} \) to Aidan]
Ellipsis in child language

- By age four, children produce and comprehend **VP Ellipsis**, and furthermore are sensitive to structural constraints on the elided material.

- But they know about constraints on VPE, it is not clear how much they know about identity constraints on **elided material in comparatives**.
Quantifier Raising in comparatives

Maddie wrote more letters to Jack than to Aidan.

Quantifier Raising of DegP

$\lambda d$. Maddie wrote $d$-many letters to Jack

$\lambda d$. Maddie wrote $d$-many letters to Aidan
Quantifier Raising in child language

- Children demonstrate an ability to deploy the **Quantifier Raising operation** when it is required for interpretation, and are aware there are restrictions on movement.

(Coles-White, de Villiers, & Roeper 2004; Kiguchi & Thornton 2004; Lidz *et al.* 2004; Sugawara *et al.* 2013; Syrett *under review, under revision*; Syrett & Lidz 2009, 2011)
Binding in comparatives

*Maddie\textsubscript{i} wrote more letters to her\textsubscript{i} than to Aidan.

\textit{c-command}

She\textsubscript{i} wrote more letters to Aidan than to Maddie\textsubscript{i}’s sister.

(Lechner 2001, 2004; Bhatt & Takahashi 2011, a.o.)
C-command in child language

- By age four, children appear to have knowledge of c-command and consequences it has for coreference.

Our task: Probe the elided material

- We targeted configurations with pronominal reference in which c-command and identity relations are claimed to constrain the interpretation of the comparative construction.
- Our goal: to determine whether children (and adults) are indeed guided by these constraints.
Our study
Design: Participants

- 26 children recruited from area preschools
  - Range 4;6–6;5, Mean 5;2
- 28 adults (undergraduates at Rutgers)
Design: Procedure

- Combination of TVJT and Act-Out-Task involving a puppet
  - Control TVJT trials (Crain & Thornton 1998)
  - Test Act-Out trials
    - Story told up until a point, adhering to principles inherent to TVJT
    - Child asked to act out target sentence
- Session duration: 30-40 minutes
Design: Stimuli

- Brief Training session
- Control sentences (n=4)
  - simple subject comparatives
  - simple object comparatives
  - c-command without comparison
- Test sentences (act-out) (n=5)
  - 2 subject comparatives
  - 3 object comparatives
Scenario structure

- Two same-gender characters
  - Prince Eric, Buzz Lightyear
- Each had a set of color-coded props
  - 3 blue and 3 green presents
- Two designated recipients
  - Flounder, Eric’s dog
*Nemo delivered more presents from him to Flounder than to Eric’s dog.
King Triton gave more lizards to her than Olivia’s mother.
She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.

# cones she[?] gave to Winnie-the-Pooh >
# cones she[?] gave to Sl. B’s Godmother
Children had no difficulty with comparative controls without pronouns.

- More cars drove into the city than into the woods.
- Sheriff Woody fed more bear cubs than Jessie.

They identify the associate and the standard.

They correctly order the associate and the standard on the scale specified by the adjective or more.

Average % of adult-like responses on control comparatives: children: >83%, adults: >99%.
Anticipated response

She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.

she =

[Image of Disney princess with cones next to Hello Kitty with cones]
She gave more cones to Winnie-the-Pooh than [she gave] to Sleeping Beauty’s godmother.
She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.

Another possible response
Unanticipated response

She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.
Unanticipated response

She$_{i}$ gave more cones to Winnie-the-Pooh than [she$_{j}$ gave] to Sleeping Beauty’s godmother.
Unanticipated response

She gave more cones to Winnie-the-Pooh than [she gave] to Sleeping Beauty’s godmother.
She\textsubscript{i} gave more cones to Winnie-the-Pooh than [she\textsubscript{j} gave] to Sleeping Beauty’s godmother.
## Distribution of responses

<table>
<thead>
<tr>
<th># of ‘2-giver’ answers</th>
<th>Children</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
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<tr>
<td>4</td>
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<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

73% of children’s responses!
Conclusions and Discussion
The observed mismatch in pronoun reference resolution suggests that children are working with abstract representations that allow them to QR the DegP and recover the elided material in the standard.

But while the structure of their representation may be similar to or the same as adults’, the interpretation of the elided material appears to differ.

But is this totally unexpected? Perhaps not.
Strict vs. sloppy identity

- The observed mismatch in pronominal reference is analogous to the contrast between ‘strict’ vs. ‘sloppy’ identity.

Sherlock$_i$ saw his$_i$ hat, and Watson$_j$ did $\langle$see his$_{\{i/j\}}$ hat$\rangle$, too.

The girl who gave John$_i$ an award congratulated him$_i$, and the one who gave Bill$_j$ an award did $\langle$congratulate him$_{\{i/j\}}$ $\rangle$, too.

Sloppy identity in child language

- Given the choice, children can fill in both strict and sloppy identity readings in ambiguous structures (Foley 1992; Koster 1994)
  - Big bird scratches his arm and Ernie does too.
  - Scooter moves his penny and Bert does too.
- What we need is something more than just sloppy identity. We appear to need a functional interpretation.
- Here’s why…
She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.

# cones \( f(x) \) gave \( x \) > # cones \( f(y) \) gave to \( y \)

\( x = \) Winnie-the-Pooh, \( f(x) = \) Hello Kitty
\( y = \) Sleeping Beauty’s Godmother, \( f(y) = \) Sleeping Beauty
E-type Pronouns

- In fact, there is a functional interpretation of pronouns.
- Donkey anaphora: e-type pronoun
  - Every man who owns a donkey beats it.
- \( f(x) \) is a contextually salient function from individuals to individuals
  - Domain of \( f \) \{x: x is a recipient of cones\}
  - Value of \( f(x) \) the individual giving cones to x
(Buring 2005, 2011; Cooper 1979; Elbourne 2001; Evans 1977; Heim 1990; Heim & Kratzer 1998)
Conclusions

- Children display **adult-like** competence in deconstructing comparatives.

- They are dealing with **abstract representations**: they recover elided material and have the QR of the DegP.

- However, **in contrast to adults**, they are being overly liberal with the way they reconstruct the elided material.

- On their way to adult-like performance, they would need to acquire **an identity condition** on ellipsis.
Open questions

- What other structures would give rise to e-type pronoun in children’s language?
- What does the functional pronoun interpretation in the standard clause mean for binding within a comparative?
- How children distinguish between structures where they are required to copy an index of an individual vs. those where it is a relationship that matters?
Thank you!
Special Thanks

Participants

- Children, parents, and teachers at our local preschools
- Undergraduate RAs in the Rutgers Laboratory for Developmental Language Studies

Funding

- Rutgers startup grant to Kristen Syrett
- Aresty Research Center
Extra slides
Control stimuli

Control items

- Sherriff Woody fed more animals than Jessie.
- More cars drove into town than into the woods.
- Sebastian found a present from her sister to Ariel’s sister.
- *He ate the cake while the Smurf was dancing.
Design: Target sentences

Subject comparatives

More lambs walked from Belle to him than from Harris’s brother.

*More blocks connected him to Minnie than to Flynn’s horse.

Object comparatives

King Triton gave more lizards to her than Olivia’s mother.

*Nemo delivered more presents from him to Flounder than to Eric’s dog.

*She gave more cones to Winnie-the-Pooh than to Sleeping Beauty’s godmother.
<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject Comparative</strong></td>
<td>12 ( Principle C observed )</td>
<td>5 ( Principle C observed )</td>
</tr>
<tr>
<td><strong>Object Comparative</strong></td>
<td>16 ( Principle C violated )</td>
<td>11 ( Principle C violated )</td>
</tr>
</tbody>
</table>
She\textsubscript{i} gave more cones to Winnie-the-Pooh than [she\textsubscript{j} gave] to Sleeping Beauty’s godmother.
In addition to the binding constraints imposed by c-command, the lexical material in the standard is elided under identity with the material in the main clause. (The ‘she’s must be the same!)

\[
\text{She}_i \text{ wrote more letters to Aidan than [she}_i \text{ wrote] to Aidan’s sister.}
\]