Scope Ambiguity in Double Object Sentences

Rosalind Thornton\textsuperscript{1}
Hirohisa Kiguchi\textsuperscript{2}
Cory Bill\textsuperscript{1}

Macquarie University & Miyagi Gakuin Women’s College
A Puzzle

Today I’ll be talking about Double Object sentences. These are ones like ‘John gave Mary the book’

Double object sentences with more than one quantifier present a puzzle:

Sometimes they give rise to a scope ambiguity but in other cases, the scope is ‘frozen’ and they have only one meaning

Why is this?
The Plan

- We’ll explore the theoretical puzzle that the facts present and then turn to child language

- How could children learn such subtle facts from the input?

- This would not be easy, so a demonstration that children have these facts under control would argue for innate linguistic knowledge
Prepositional Datives

Snow White gave every cupcake to a lady

There are 2 QNPs, *every cupcake* and *a lady*, which give rise to an ambiguity

✓ every > a  (surface scope)
  SW gave every cupcake to a different lady

✓ a > every  (inverse scope)
  SW gave every cupcake to a particular lady
Scope Ambiguity

Snow White gave every cupcake to a lady

Snow White gave every cupcake to a lady

Every > a (surface)

A > every (inverse)
Scope Freezing

Consider

Snow White gave a lady every cupcake

The 2 quantifiers are in a different order, and now there are restrictions on their interpretation

 ✓ a > every (surface scope)
   SW gave a particular lady every cupcake

 * every > a (inverse scope)
   SW gave each of the cupcakes to a different lady
Scope Freezing

Snow White gave a lady every cupcake

白雪公主给了一位女士每一个纸杯蛋糕

every > a (inverse)

a > every (surface)
Quantifier Raising

So how do we explain this?

Initially, Quantifier Raising (QR) was thought to allow quantifiers to move in any order at LF, thus explaining ambiguities in scope (May 1977)

But this doesn’t explain phenomena where the ambiguity disappears
Proposal:
QR has to obey Superiority
When the quantifiers raise at LF, they have to keep their original order

This is just like wh-words in multiple wh-questions in Bulgarian

Bulgarian (Rudin 1988)

a. Koj kogo vižda?
   who whom sees
   ‘Who sees whom?’

b. *Kogo koj vižda?

C. Koj kogo $t_{\text{subj}}$ vižda $t_{\text{obj}}$

Wh-words keep their original order when moved
Double Object Sentences

Snow White sold a lady every cupcake

- Bruening proposes that QR is not to IP, but to vP
- v has a feature that attracts Q1 first, then Q2
- The subject is generated vP internally, but raises
Prepositional Datives

Snow White sold every cupcake to a lady

- Bruening proposes the QNPs \( \text{every cupcake} \) and \( \text{a lady} \) are originally sisters.

- Since these are ‘equi-distant’ from the higher projection Superiority doesn’t apply.

- Either element can move first and this gives rise to the ambiguity.
Summary So Far

1. Prepositional Datives: Ambiguous
   Snow White gave every cupcake to a lady

2. Double Object Structures: Scope Freezing
   Snow White gave a lady every cupcake

Next:

3. Double Object Structure
   A lady gave Snow White every cupcake
A lady gave Snow White every cupcake

A particular lady gave SW. every cupcake

A different lady gave SW. each of the cupcakes
Scope Ambiguity

A lady gave Snow White every cupcake
一位女士给了白雪公主每一个纸杯蛋糕。

Lady1 → cupcake
Lady2 → cupcake
Lady3 → cupcake
Lady4 → cupcake
Lady5 → cupcake

A lady gave Snow White every cupcake

Lady → cupcake

every > a (inverse)
a > every (surface)
Another Theoretical Puzzle

1. Snow White gave a lady every cupcake

2. A lady gave Snow White every cupcake

We saw that in 1., the second object couldn’t take scope over the higher object. But in 2., the second object (every cupcake) can take scope over the subject.
Question:
If quantifiers have to raise in their original order, how does the second object raise over the subject NP to give the inverse scope reading?
Bruening’s Proposal

A lady gave Snow White every cupcake

- There is only one Quantifier to move (every cupcake)
- The subject is already in vP.
- The subject moves to TP for EPP reasons (a>every)
- The subject can optionally reconstruct to vP internal position
- Reconstruction gives the inverse scope interpretation, because then every cupcake c-commands the reconstructed subject (every>a)
Child Language

• We now have a (complicated) theoretical proposal that can handle the subtle facts in the data

Next question:

• Do children know this?
• It would be very tough to learn these facts just by attending to the input
Su (2001)

- Su tested both DO sentences with Scope Freezing and Prepositional Dative sentences using a Truth Value Judgment Task
- Participants were both Mandarin and English-speaking children aged 4 to 6 years
- Finding: Mandarin-speaking children behaved similarly to adults but the English-speaking children did not
- The English-speaking children did not obey Scope Freezing, accepting the illicit reading 72% of the time
Su’s Scope Freezing Findings

Snow White gave a lady every cupcake

English-speaking children: 72% acceptance
Su’s Interpretation

• The difference between children and adults arises because children initially treat the QPs ‘a’ and ‘yi-ge’ as non-quantificational

• Initially, children do not have access to Quantifier Raising

English:
Roughly, children treat the indefinite as a bare plural

Snow White gave ladies every cupcake

This would allow a pairing between ladies and cupcakes
Our Experiment

Scope Freezing

1. Do children obey Scope Freezing?
   Snow White gave a lady every cupcake

We will also use the Truth Value Judgment Task, but we construct the story scenarios differently
Subtle differences in design could make a difference
Our Experiment

Inverse Scope and Reconstruction

2. Can children access the inverse scope reading?

A lady gave Snow White every cupcake

If so, this would support the fact that they have access to the abstract linguistic mechanism of Reconstruction
**Target Sentences**

1. Children obey Scope Freezing
   Children *reject* the reading where each lady gets a cupcake
   *Snow White gave a lady every cupcake*
   白雪公主给了一位女士每一个纸杯蛋糕。

2. Children can access the inverse scope reading
   *A lady gave Snow White every cupcake*
   一位女士给了白雪公主每一个纸杯蛋糕。
   Children *accept* the reading where each lady gives SW a cupcake
Control Sentences

Antecedent Contained Deletion (ACD) sentences

Mickey Mouse gave Jenny the same colour egg the Troll did

These sentences can only be interpreted correctly if children access Quantifier Raising, since ACD structures require this.

We also used them as an exclusion criterion. If children accepted both false items, we excluded them from the experiment.
Controls

Double Object Sentences

Snow White gave every sportsman a drink

These sentences check that allow the interpretation that is ruled out in the Scope Freezing sentences.

These are presented in an unambiguous context so we expected children to accept them.
Controls

Prepositional Datives

We included sentences like:

Donald Duck gave every ice cream to a boy

These items also test children’s access to the interpretation that is ruled out in the Scope Freezing sentences

These sentences are presented in an unambiguous context
Controls
Locatives
We include sentences like:

Donald Duck put a pizza in front of every boy

These sentences have the same ordering of a and every as one kind of DO target, but the indefinite is not in subject position:

A lady gave Snow White every cupcake

Context was ambiguous. These items test children’s access to inverse scope with the same quantifiers but in a different structure.
Participants and Method

- Children ranged in age from 4;0 to 5;10 (mean 4;4 years)
- TVJT delivered as short video clips (due to so many small toys...)
- Puppet watched along with the child and delivered sentences for judgement at the end (live)
- 2 sessions: 13 in Scope Freezing session; 15 in Inverse Scope session
- 13 adults; 7 in Scope Freezing session and 6 in Inverse Scope session
Plot: Snow White Story

- SW has done some baking and made some lemonade and wants to give everything away
- There happen to be ladies and sportsmen at the park
- A (particular) lady who is on roller skates asks for all the cupcakes but SW says the tray will be hard to carry, so suggests she take all the donuts in the basket instead. The lady accepts
  <False that SW gives a particular lady every cupcake>
- SW gives the sportsmen a drink to take with them
- SW gives out all the cupcakes, one to each lady
  <True that SW gives each lady a cupcake>
Scope Freezing: Snow White Story
Puppet’s Statement

Puppet: That was a story about Snow White who was giving away cakes and drinks at the park, and these sportsmen and these ladies. And I know what happened.

Snow White gave every sportsman a drink  
And I know something else that happened.

Snow White gave a lady every cupcake.

Notice that the first test sentence illustrates the interpretation that is ruled out for target sentence scope freezing sentence, which is second...
Sentence Type:
A lady gave Snow White every cupcake

Sentence in Video
A mermaid gave Neptune every shoe
Yi-ge meirenyu gei-le Haishenhua mei-yi-zhi xie.
one-CL mermaid give-ASP Neptune every-one-CL shoe
一个美人鱼给了海神王每一只鞋。
Plot: Neptune Story
(A mermaid gave Neptune every shoe)

• Neptune wants all the trash cleaned up from the ocean
• One mermaid offers to get all the shoes but they are spread all over the place so she decides to take Neptune every bottle instead
  <false that a particular mermaid gave every shoe>
• The fish think about shoes but can’t manage to carry them so they take Neptune every rubber band
• Finally, each mermaid takes Neptune a shoe
  <true that each mermaid gave Neptune a shoe>
Inverse Scope: Neptune Story

(A mermaid gave Neptune every shoe)
Plot: Neptune Story
(A mermaid gave Neptune every shoe)

Puppet: That was a story about Neptune who wanted the ocean cleaned up, and some mermaids and some fish. And I know what happened.
The fish gave Neptune every shoe
And I know something else that happened
A mermaid gave Neptune every shoe
Scope Freezing and Controls
Inverse Scope (Reconstruction)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inverse Scope every&gt;a (True)</td>
<td>60</td>
</tr>
<tr>
<td>Locative a&gt;every (True)</td>
<td>38</td>
</tr>
<tr>
<td>DO Control (False)</td>
<td>3</td>
</tr>
</tbody>
</table>

- **Children**
- **Adults**
Interpretation
Scope Freezing

- The results are different from Yi-Ching Su’s finding of 72% acceptance of the illicit reading.
- In our experiment, it was 40%, and 20% errors for adults.
- This suggests some kind of experimental issue.
- Our experiment:
  
  - Snow White gave every sportsman a drink (T)
  - then
  - Snow White gave a lady every cupcake (F)
- In future, we will flip these and run more children and see if it makes a difference.
Interpretation

Inverse Scope and Reconstruction

- We found that children accept the inverse scope interpretation that requires reconstruction 60% of the time
  
  A mermaid gave Neptune every shoe

- Adults accepted inverse scope only 17%

- The finding that adults are more rigid than children in their scope assignment has been found before (e.g. Thomas Lee 1991, also 2003 in *Journal of Cog Sci*; Zhou & Crain 2009, *Lingua*)
Conclusion

- We have shown that children access the inverse scope reading, supporting access to Reconstruction
  
  *A mermaid gave Neptune every shoe*

- The chances are good that both children and adults will adhere to Scope Freezing once I flip the presentation of the puppet’s judgements, so that I’m not priming the interpretation that is ruled out

- If so, we will be able to show that children have control of these subtle facts about Double Object sentences from the start

- This study will challenge accounts that claim children’s linguistic knowledge is all learning
Thank you!
Future Directions

The Spray-Load verbs also show Scope Freezing

Consider:
1. The farmer loaded a bale of hay onto every truck (every>a)
2. The farmer loaded a truck with every bale of hay (*every>a)
• Mary planted a tomato plant in every flower bed
• Mary planted a flower bed with every tomato plant

• Mary sprinkled glitter