

# Scope Ambiguity in Double Object Sentences

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# 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 could 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

Baixue gongzhu ba mei-yi-ge zhibei dangao gei-le yi-wei nvshi.  
Snow White BA every-one-CL cup cake give-ASP one-CL lady  
白雪公主把每一个纸杯蛋糕给了一位女士。

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

✓ every > a (surface scope)

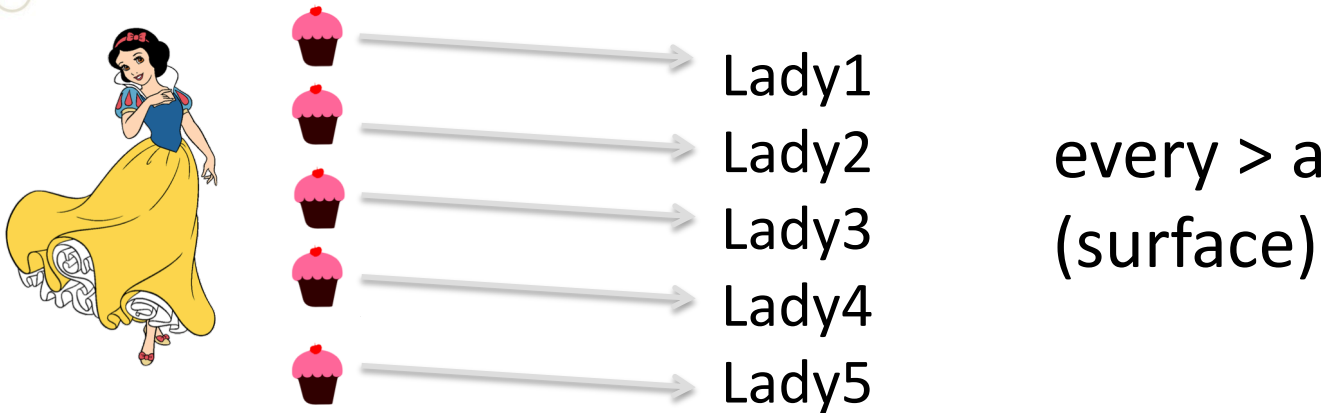
SW gave every cupcake to a different lady

✓ a > every (inverse scope)

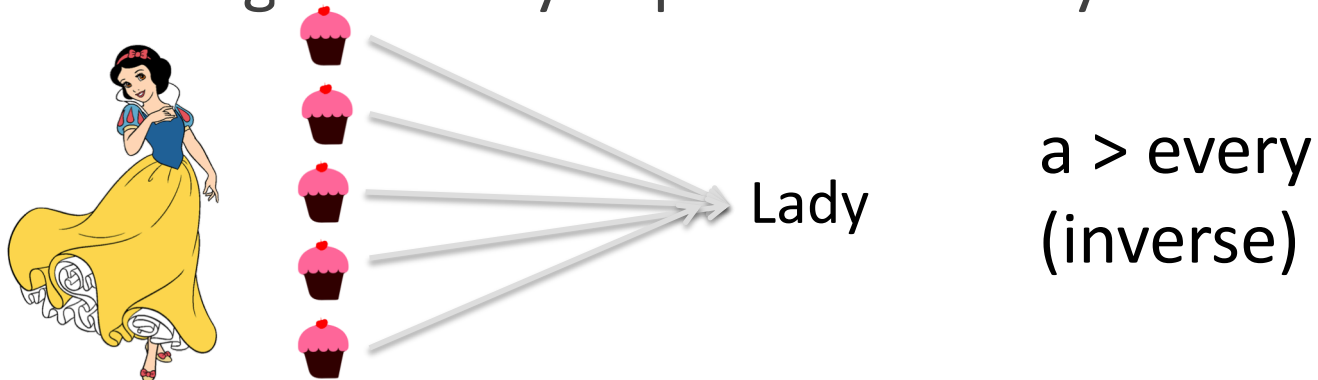
SW gave every cupcake to a particular lady

# Scope Ambiguity

Snow White gave every cupcake to a lady



Snow White gave every cupcake to a lady



# Scope Freezing

Consider

Snow White gave a lady every cupcake

Baixue gongzhu gei-le yi-wei nvshi mei-yi-ge zhibei dangao.  
Snow White give-ASP one-CL lady every-one-CL cup cake  
白雪公主给了一位女士每一个纸杯蛋糕

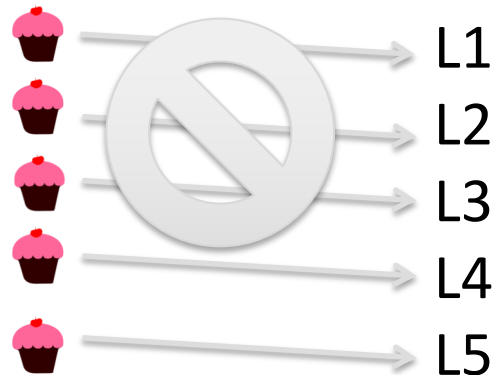
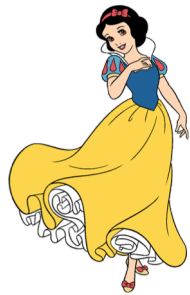
The 2 quantifiers are in a different order, and now there are restrictions on their interpretation

- ✓  $a > \text{every}$  (surface scope)  
SW gave a particular lady every cupcake
- \*  $\text{every} > a$  (inverse scope)  
SW gave each of the cupcakes to a different lady

# Scope Freezing

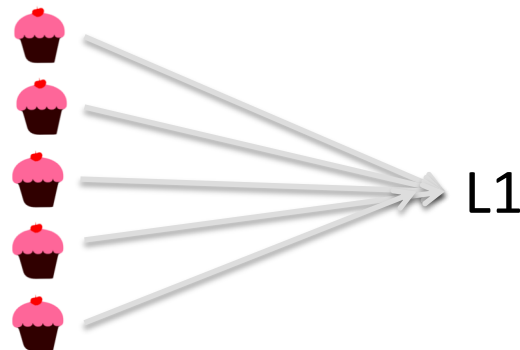
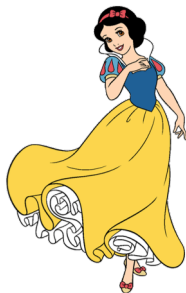
Snow White gave a lady every cupcake

白雪公主给了一位女士每一个纸杯蛋糕



every > a  
(inverse)

Snow White gave a lady every cupcake



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



# Bruening (2001)\*



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


\*Bruening, B. (2001) QR obeys Superiority: Frozen Scope and ACD. *Linguistic Inquiry* 32, 233-273.

# Bulgarian (Rudin 1988)

a. Koj kogo vižda?  
who whom sees  
'Who sees whom?'

b. \*Kogo koj vižda?

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



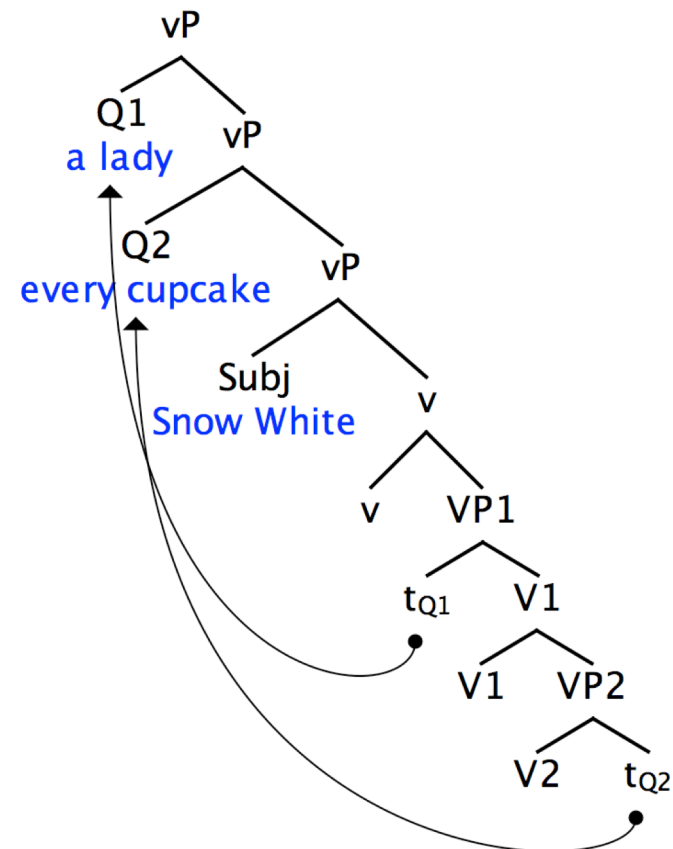
The diagram shows two horizontal arrows pointing to the left. The first arrow starts under  $t_{\text{obj}}$  and ends under  $t_{\text{subj}}$ . The second arrow starts under  $t_{\text{obj}}$  and ends under  $t_{\text{obj}}$ . This illustrates that the subject wh-word ( $t_{\text{subj}}$ ) moves to the front of the clause, while the object wh-word ( $t_{\text{obj}}$ ) remains in its original position.

Wh-words keep their original order when moved

# Double Object Sentences

Snow White sold a lady every cupcake

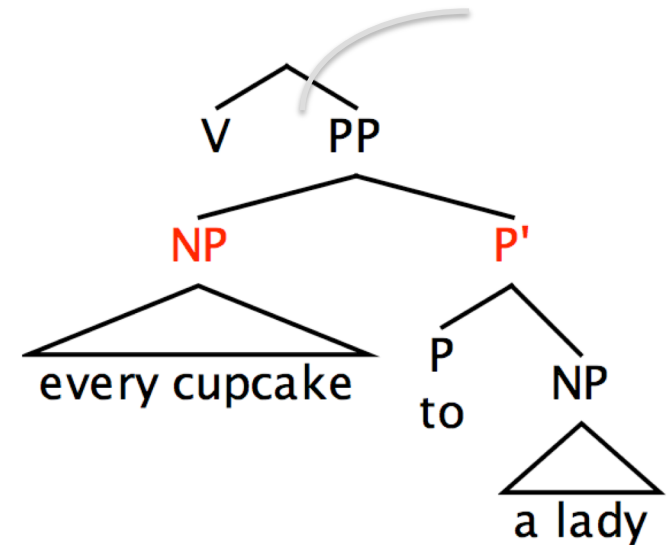
- Bruening proposes that QR is not to IP, but to vP
- v has a feature that attracts Q1 first, then Q2
- The subject is generated vP internally, but raises



# Prepositional Datives

Snow White sold every cupcake to a lady

- Bruening proposes the QNPs *every cupcake* and *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

# Ambiguity Again

A lady gave Snow White every cupcake

Yi-wei nvshi gei-le Baixue gongzhu mei-yi-ge zhibei dangao,  
one-CL lady give-ASP Snow White every-one-CL cup cake  
一位女士给了白雪公主每一个纸杯蛋糕。

✓ a > every (surface scope)

A particular lady gave SW. every cupcake

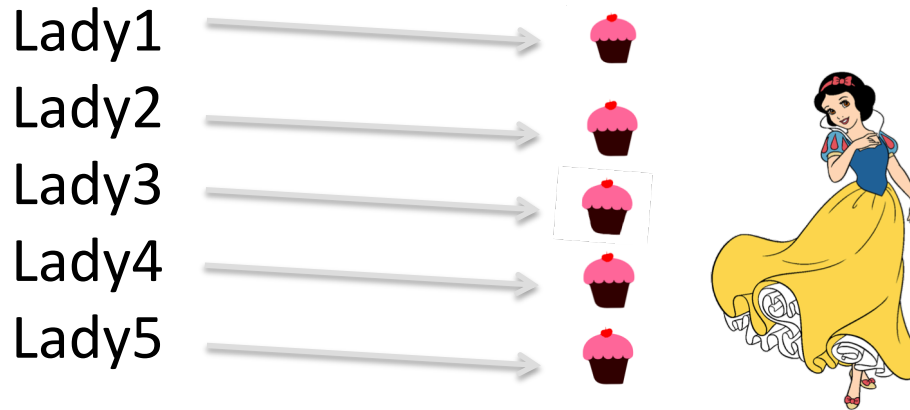
✓ every > a (inverse scope)

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。



every > a  
(inverse)

A lady gave Snow White every cupcake



a > every  
(surface)

# Another Theoretical Puzzle

1. Snow White gave a lady every cupcake
2. A lady gave Snow White every cupcake

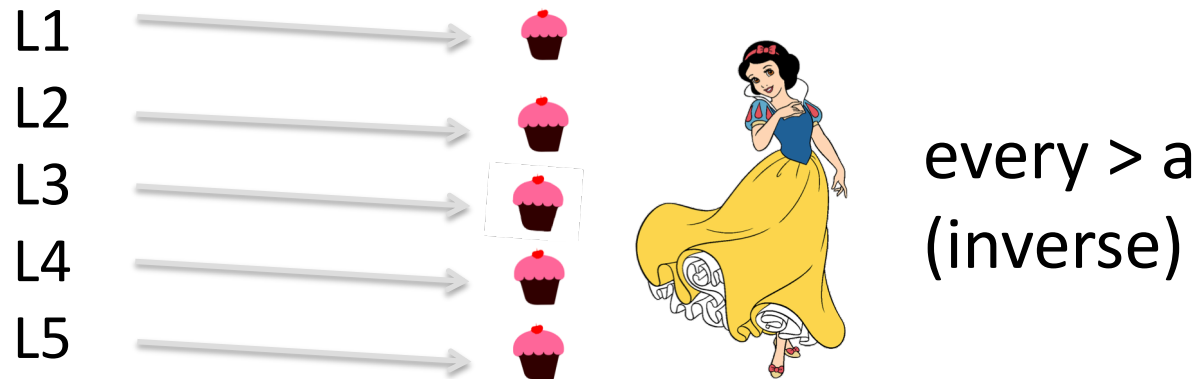
We saw that in 1., the second object couldn't take scope over the higher object

But in 2., the second object (*every cupcake*) can take scope over the *subject*



# Bruening's Proposal

A lady gave Snow White every cupcake



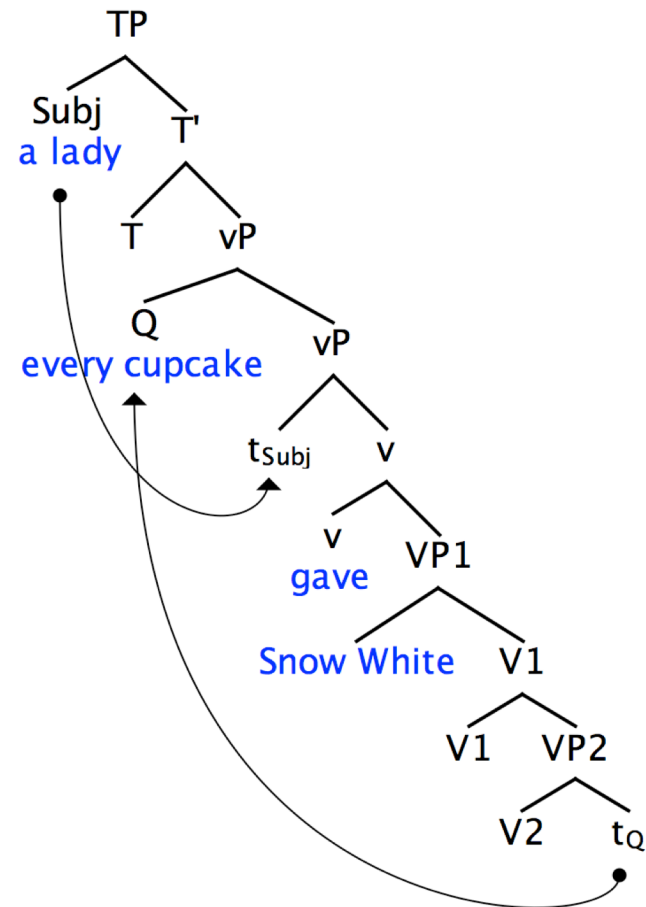
Question:

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:

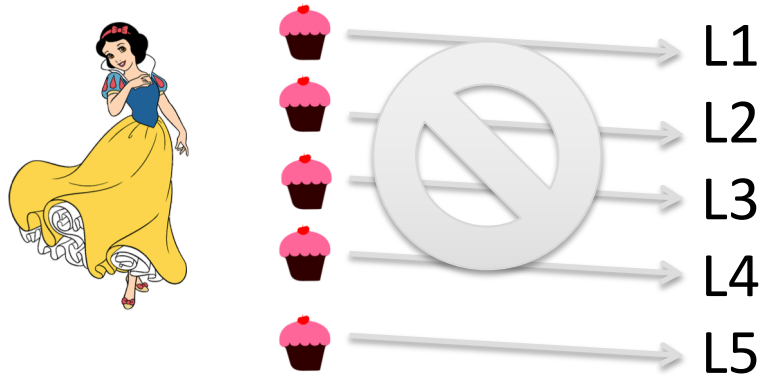
- Do children know this?
- It would be very tough to learn these facts just by attending to the input

# 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

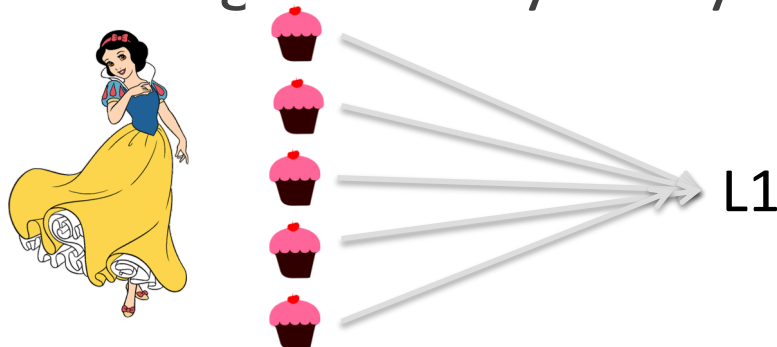
# Su's Scope Freezing Findings

Snow White gave a lady every cupcake



English-speaking  
children: 72%  
acceptance

Snow White gave a lady every cupcake



# 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 **T**

And I know something else that happened.

Snow White gave a lady every cupcake. **F**

Notice that the first test sentence illustrates the interpretation that is ruled out for target sentence scope freezing sentence, which is second

# Movie

## 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)



N  
S

# 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

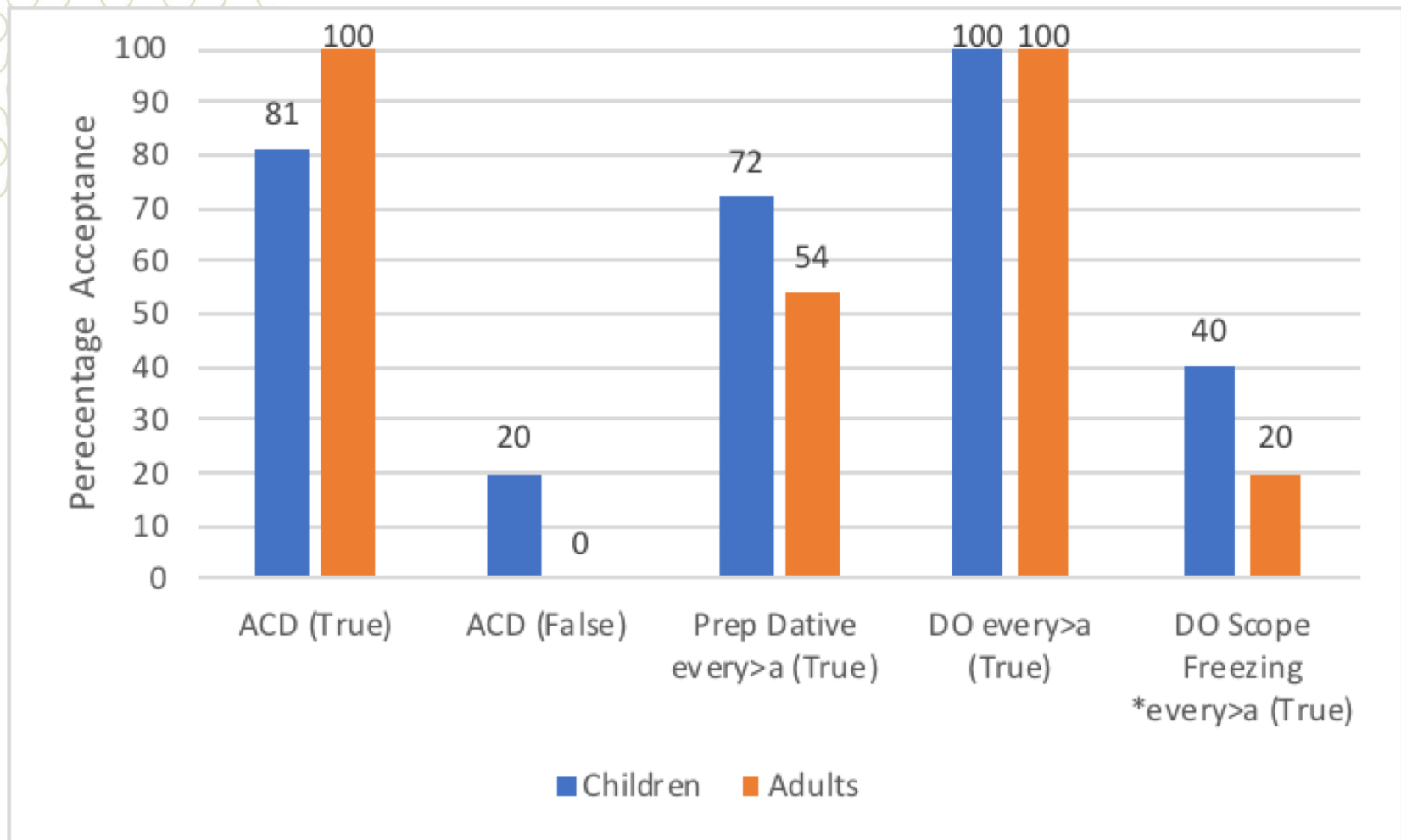
**F**

And I know something else that happened

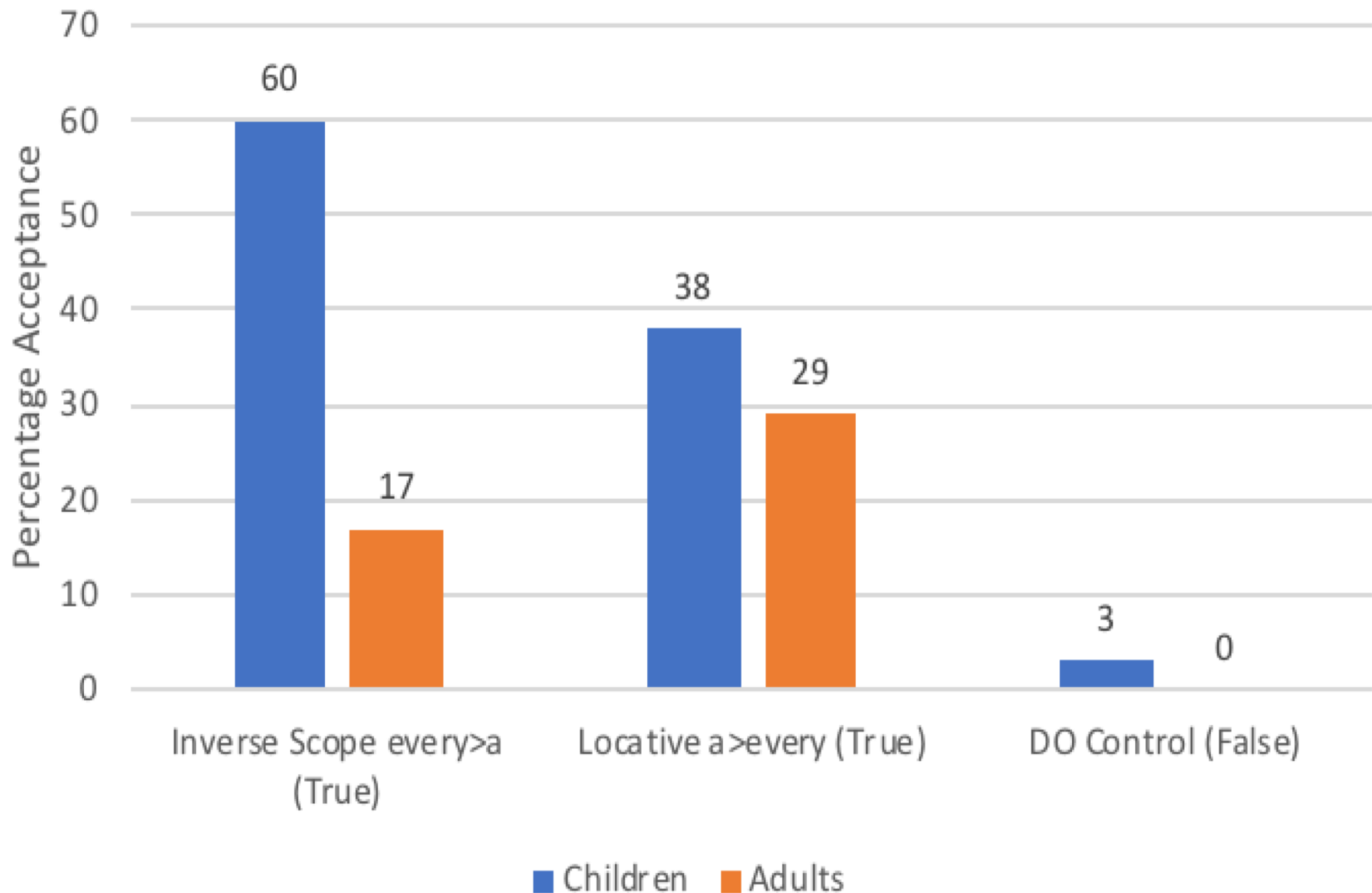
A mermaid gave Neptune every shoe

**T**

# Scope Freezing and Controls



# Inverse Scope (Reconstruction)



# 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