LSci 51/Psych 56L: Acquisition of Language

Lecture 20

Development of syntax IV

Announcements

Be working on HW5: due 12/2/20

Be working on review questions for morphology and syntax

Please fill out course evaluations for this class!

Consider taking more language science courses in the future (LSci)!

Pronouns

Pronouns are energy-saving devices that allow us to refer to someone or something (whose identity we know) without using a name (like “Sarah” or “Jareth”) or other noun phrase (like “the girl” or “a very impressive goblin king”).

Sarah thought that she could save her brother.

Jareth was surprised the girl summoned him, and resolved to show her he was a very impressive goblin king.

Pronouns

http://www.thelingspace.com/episode-40
https://www.youtube.com/watch?v=9sqm_cex4kA
1:18 - 2:24

Pronouns

Young children seem to know how to use pronouns – they like to use them if a preceding noun has already established what they refer to.

Imitation task results with 2 ½ and 3-year-old children (Lust 1981):

Experimenter says a sentence with two names:
“Because Sam was thirsty, Sam drank some soda.”

Child replaces second name with a pronoun:
“Because Sam was thirsty, he drank some soda.”

Pronouns

Young children seem to know how to use pronouns – they like to use them if a preceding noun has already established what they refer to.

Imitation task results with 2 ½ and 3-year-old children (Lust 1981):

Experimenter says a sentence with a pronoun before a name:
“Because he was thirsty, Sam drank some soda.”

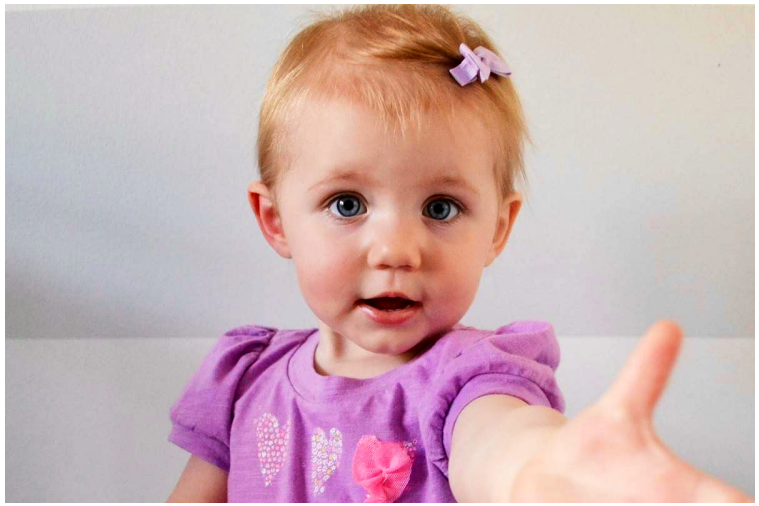
Child replaces name and pronoun so the name comes first:
“Because Sam was thirsty, he drank some soda.”

Pronouns

Moyer et al 2015: “Production studies (Strayer 1977, Shipley & Shipley 1969, Macnamara 1980) suggest that children begin producing pronouns around 15-18 months, starting with first person, then second person, and finally third person pronouns (Shipley & Shipley, 1969, Strayer, 1977; Chiat, 1981; Clark, 1978; Charney, 1980; Oshima-Takane, 1985, 1988, 1996).”

1st person: I, me, my, mine, myself, we, us, our, ours, ourselves

2nd person: you, your, yours, yourself, yourselves

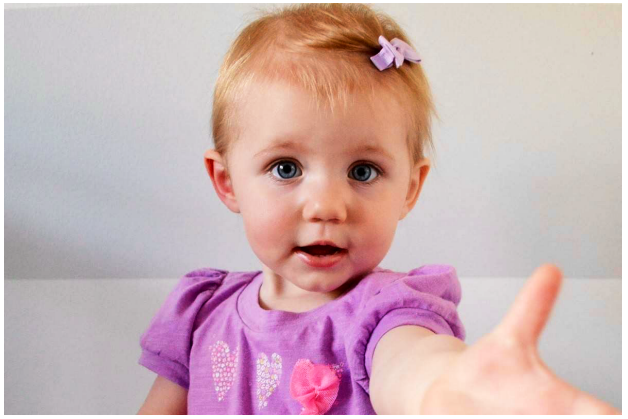


3rd person: he, she, it, they, him, her, them, his, hers, its, theirs, himself, herself, themselves

Pronouns

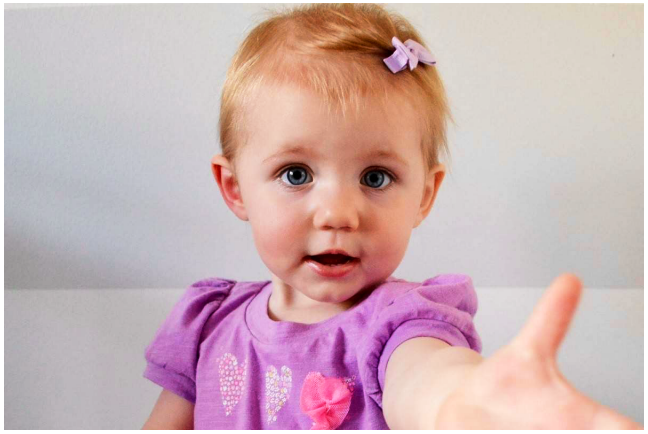
Moyer et al 2015: “These early productions typically include some errors where the child reverses first and second person, but on the whole consistent errors are few (Shipley & Shipley 1969, Bloom, Lightbown & Hood 1975, Huxley 1970, Nelson 1975, Sharpless 1974, Chiat 1982, Oshima-Takane 1985, 1988).”

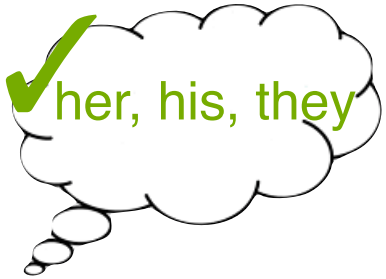
I like you!



Pronouns

Moyer et al 2015: “On the other hand, comprehension data focusing on speech addressed to the child, suggest that children first understand second person pronouns, then first person, and finally third person (Sharpless 1974, Strayer, 1977; Charney, 1980; Loveland, 1984). These studies have looked at a range of ages, from 15 months to 3 years.”





Trickier pronouns

Reflexive pronouns have different forms than “plain” pronouns

myself	me, I	herself	she, her
yourself	you	itself	it
himself	he, him	ourselves	we, us
themselves	they, them		

Trickier pronouns

Reflexive pronouns behave differently than "plain" pronouns:
they are interpreted differently

Jareth thought that Hoggle tricked himself.

Jareth thought that Hoggle tricked him.

Trickier pronouns

Reflexive pronouns behave differently than "plain" pronouns:
they are interpreted differently

Jareth thought that Hoggle tricked himself.

= Jareth thought that Hoggle tricked Hoggle.

Jareth thought that Hoggle tricked him.

= Jareth thought that Hoggle tricked Jareth.

Trickier pronouns

Reflexive pronouns behave differently than "plain" pronouns:
they are interpreted differently

Jareth thought { that Hoggle ~~tricked~~ himself. }

must refer to NP in same clause

Jareth ~~thought { that Hoggle tricked~~ him. }

must not refer to NP in same clause,
but can refer to NP in different clause

Rule: Reflexive pronouns must refer to a noun phrase inside the same clause while regular pronouns must not.

Pronouns

http://www.thelingspace.com/episode-40
https://www.youtube.com/watch?v=9sqm_cex4kA
2:24 - 3:24, 6:24 - 7:20

Pronouns

http://www.thelingspace.com/episode-93
https://www.youtube.com/watch?v=fvohHpylRkY
0:49-1:32: pronouns as variables to be interpreted
1:32-2:20: reflexives in their own clause
2:46-3:26: reflexives and co-indexation

Trickier pronouns

How can we test when children learn this distinction?

Act-Out Task:

“Donald thinks that Mickey Mouse scratched himself.
Show me what Mickey did.”

“Donald thinks that Mickey Mouse scratched him.
Show me what Mickey did.”

Trickier pronouns

How can we test when children learn this distinction?

Act-Out Task:

"Donald thinks that Mickey Mouse scratched himself.
Show me what Mickey did."

(Action: Mickey scratches Mickey)

"Donald thinks that Mickey Mouse scratched him.
Show me what Mickey did."

(Action: Mickey scratches Donald)

Trickier pronouns

How can we test when children learn this distinction?

Comprehension Task (Chien & Wexler 1990):
“Here’s a picture of Mama Bear and Goldilocks.”

or

“Is Mama Bear touching her?”

Children who understand plain pronouns will answer

YES

NO

Trickier pronouns

How can we test when children learn this distinction?

Comprehension Task (Chien & Wexler 1990):
“Here’s a picture of Mama Bear and Goldilocks.”

or

“Is Mama Bear touching herself?”

Children who understand reflexive pronouns will answer

NO

YES

Trickier pronouns

Children between the ages of 3 and 5 years old often do fairly well on the interpretation of reflexive pronouns.

"Here's a picture of Mama Bear and Goldilocks."

or

"Is Mama Bear touching herself?"

NO

YES

Trickier pronouns

However, these same children seem to have trouble with plain pronouns – they'll interpret them as reflexive.

"Here's a picture of Mama Bear and Goldilocks."

or

"Is Mama Bear touching her?"

NO

YES

Trickier pronouns

Interestingly, even though children mistakenly interpret plain pronouns as reflexive, they don't seem to make this mistake in their own productions.

Bloom et al. (1991): Looking at 100,000 spontaneous utterances of three children, beginning at age 2.

me and *myself* were used correctly 95% of the time.

This suggests that children know the distinction between some reflexive and plain pronouns (as evidenced in their own productions), but they have trouble making this distinction for the pronouns tested in the experiments. Perhaps the experiments aren't good at really getting at children's knowledge? (Conroy et al 2009 suggest that previous results are due to experimental artifact.)

Trickier pronouns

Lukyanenko, Conroy, & Lidz (2014) experimental demonstration:

2.5-year-olds also realize some facts about how to interpret plain pronouns in relation to reflexive pronouns and names.

She's patting Katie
= One girl patting another one

She's patting herself
= One girl patting her own head

Trickier pronouns

[Extra]

Sutton, Fetters, & Lidz (2015) experimental demonstration:

2.5-year-old knowledge and experimental behavior impacted more by the speed children can access their syntactic knowledge and not the speed they generally access word meaning.

She's patting Katie
= One girl patting another one

She's patting herself
= One girl patting her own head

Trickier pronouns

Evidence for incomplete knowledge? Children do seem to have trouble using plain pronouns in ways that make it easy to understand what these pronouns refer to.

An excerpt from a four-year-old's description of a picture:

"…she's sitting on the seat airplane…she's giving something to a girl, now she's looking at a book…now she's putting the thing up high."

So what's the problem with this description?

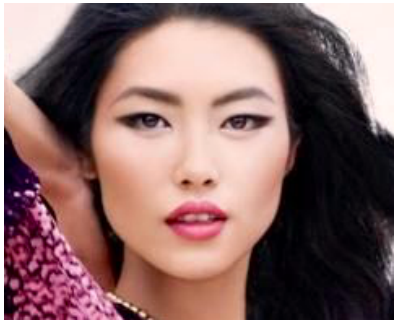
Trickier pronouns

Evidence for incomplete knowledge? Children do seem to have trouble using plain pronouns in ways that make it easy to understand what these pronouns refer to.

An excerpt from a four-year-old's description of a picture:

"…she's sitting on the seat airplane…she's giving something to a girl, now she's looking at a book…now she's putting the thing up high."

So what's the problem with this description? The first *she* refers to a girl and the second *she* refers to a woman. This would be a bit strange for an adult to say, unless there was some indication that the second she is different (perhaps by pointing at the new referent).



The problem of assuming knowledge of a pronoun's referent

Alice in Wonderland, Chapter 12, by Lewis Carroll

They told me you had been to her,
And mentioned me to him:
She gave me a good character,
But said I could not swim.

He sent them word I had not gone
(We know it to be true):
If she should push the matter on,
What would become of you?

The problem of assuming knowledge of a pronoun's referent

Alice in Wonderland, Chapter 12, by Lewis Carroll

I gave her one, they gave him two,
You gave us three or more;
They all returned from him to you,
Though they were mine before.

If I or she should chance to be
Involved in this affair,
He trusts to you to set them free,
Exactly as we were.

The problem of assuming knowledge of a pronoun's referent

Alice in Wonderland, Chapter 12, by Lewis Carroll

My notion was that you had been
(Before she had this fit)
An obstacle that came between
Him, and ourselves, and it.

Don't let him know she liked them best,
For this must ever be
A secret, kept from all the rest,
Between yourself and me.

Quantifiers

Quantifiers

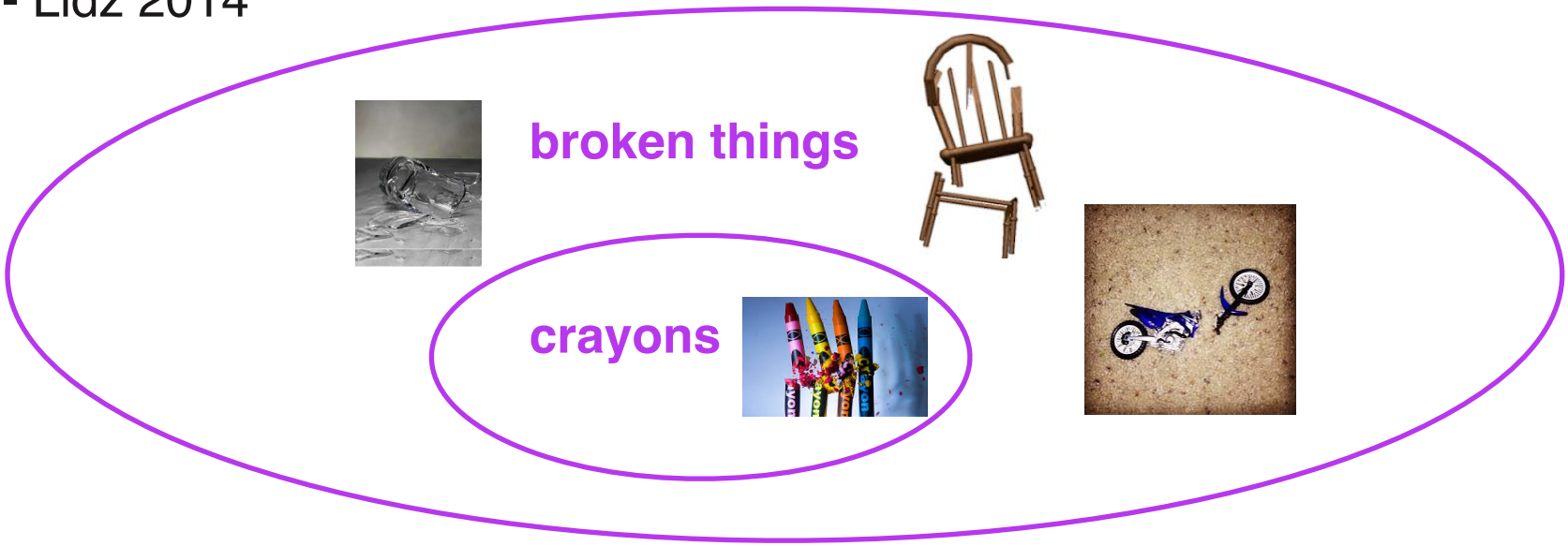
Quantifiers are words that express quantities, like *a, some, every, none,* and *most.*

"We have words whose meanings make reference to specific quantities (*1, 2, 3*,...), to approximate quantities (*a few, several*), to existence (*some, any*), to universals (*every, all*), and to comparisons among quantities (*more, most*). " - Lidz 2014

Quantifiers

Quantifiers are words that express quantities, like *a*, *some*, *every*, *none*, and *most*.

"Quantifiers like *every*, *some*, or *most*, also require representing a relation between two sets. For example, when we say "every crayon is broken," we are expressing a relation between the set of crayons and the set of broken things such that the former is a subset of the latter…" - Lidz 2014



Quantifiers

Quantifiers are words that express quantities, like *a*, *some*, *every*, *none*, and *most*.

"The first problem is simply one of abstraction…they are not tied to concrete referents and can be applied to any noun, with only a few constraints…In addition, their meanings are highly contextually defined. Even a single phrase like *every girl* will pick out a different set of girls and a different number of girls depending on whether the context of discourse is the people in my class or the people in my family." - Wagner 2010

Quantifiers: Cross-linguistic development

https://www.sciencedaily.com/releases/2016/09/160913124720.htm

Testing children in 31 languages grouped into 11 language families.

"…children identified the quantifiers all or none more easily than some or most. This suggests that children acquire quantifiers in the same order basing themselves on factors relating to the meaning and use of each quantifier."

Katsos & 50+ others 2016

Napoleon Katsos, Chris Cummins, Maria-José Ezeizabarrena, Anna Gavarró, Jelena Kuvač Kraljević, Gordana Hrzica, Kleanthes K. Grohmann, Athina Skordi, Kristine Jensen de López, Lone Sundahl, Angeliek van Hout, Bart Hollebrandse, Jessica Overweg, Myrthe Faber, Margreet van Koert, Nafsika Smith, Maigi Vija, Sirli Zupping, Sari Kunnari, Tiffany Morisseau, Manana Rusieshvili, Kazuko Yatsushiro, Anja Fengler, Spyridoula Varlokosta, Katerina Konstantzou, Shira Farby, Maria Teresa Guasti, Mirta Vernice, Reiko Okabe, Miwa Isobe, Peter Crosthwaite, Yoonjee Hong, Ingrida Balčiūnienė, Yanti Marina Ahmad Nizar, Helen Grech, Daniela Gatt, Win Nee Cheong, Arve Asbjørnsen, Janne von Koss Torkildsen, Ewa Haman, Aneta Miękisz, Natalia Gagarina, Julia Puzanova, Darinka Anđelković, Maja Savić, Smiljana Jošić, Daniela Slančová, Svetlana Kapalková, Tania Barberán, Duygu Özge, Saima Hassan, Cecilia Yuet Hung Chan, Tomoya Okubo, Heather van der Lely, Uli Sauerland, Ira Noveck. **Cross-linguistic patterns in the acquisition of quantifiers**. *Proceedings of the National Academy of Sciences*, 2016; 113 (33): 9244 DOI: 10.1073/pnas.1601341113

Quantifiers: Cross-linguistic development

https://www.sciencedaily.com/releases/2016/09/160913124720.htm

Testing children in 31 languages grouped into 11 language families.

In fact, an adult-like understanding of *most* comes in quite late — around 6 (Sullivan, Bale, & Barner 2018).

"Could you put most of the oranges on the plate?"

???

Quantifiers

"A final, and perhaps more difficult problem posed by quantifiers is the fact that their interpretation also depends on the **scope** they take in a sentence. Scope itself is often ambiguous and does not depend on the linear order of elements in a sentence." – Wagner 2010

Quantifiers & Scope

http://www.thelingspace.com/episode-8
https://www.youtube.com/watch?v=XC-MGuj75zQ
0:39 - 5:24

Quantifiers & Scope

"Every kitty didn't sit on the stairs"

✗ No kitties sat on the stairs.

✓ Not all kitties sat on the stairs.

Why are two interpretations available?

Quantifier scope

When two (or more) quantifiers are in a sentence, they interact semantically to determine the sentence's meaning, based on the scope of each quantifier.

Quantifiers & Scope

Quantifier scope

“ **Every** kitty did**n’t** sit on the stairs”

∀ ¬

✗ No kitties sat on the stairs.

✓ Not all kitties sat on the stairs.

Quantifiers & Scope

Quantifier scope

“ **Every** kitty did**n’t** sit on the stairs”

∀ ¬

surface ∀ kitties ***k*** ¬ ***k*** sat on the stairs

“For all kitties k, it’s not true that k sat on the stairs”

No kitties sat on the stairs.

Not all kitties sat on the stairs.

✓

Quantifiers & Scope

Quantifier scope

" **Every** kitty did**n't** sit on the stairs"

∀ ¬

surface ∀ kitties ***k*** ¬ ***k*** sat on the stairs

"For all kitties k, it's not true that k sat on the stairs"

No kitties sat on the stairs.

Not all kitties sat on the stairs.

Quantifiers & Scope

Quantifier scope

" **Every** kitty did**n't** sit on the stairs"

∀ ¬

inverse ¬ ∀ kitties ***k***, ***k*** sat on the stairs

"It's not true that for all kitties k, k sat on the stairs"

Not all kitties sat on the stairs.

Quantifiers

Another quantifier scope example

Everyone saw **a** movie last night.

$\forall$ $\exists$



✔

surface $\forall$ people ***p*** $\exists$ a movie **m** that **p** saw.

"For all people p, p saw a movie m."

Quantifiers

Another quantifier scope example

Everyone saw **a** movie last night.

∀ ∃



✔

(It's okay if it's the same movie. All that matters is that everyone did see a movie.)

surface ∀ people ***p*** ∃ a movie **m** that **p** saw.

"For all people p, p saw a movie m."

Quantifiers

Another quantifier scope example

Everyone saw **a** movie last night.

$\forall$ $\exists$



✔

inverse $\exists$ a movie **m** that $\forall$ people ***p***, ***p*** *saw* ***m***.

*"There's a movie **m** that all people **p** saw."*

Quantifiers

Another quantifier scope example

Everyone saw **a** movie last night.

$\forall$ $\exists$

$\neq$

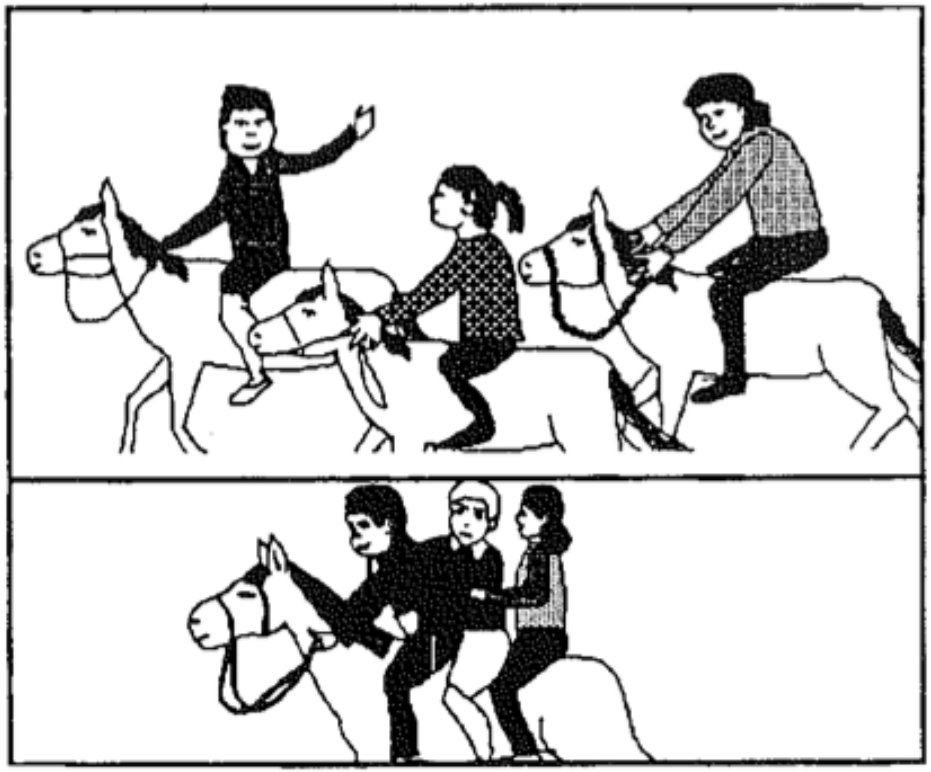
(It has to be the same movie.)

inverse $\exists$ a movie **m** that $\forall$ people ***p***, ***p*** *saw* ***m***.

*"There's a movie **m** that all people **p** saw."*

Quantifiers
[Extra]

Testing children: Picture task (Roeper & DeVilliers 1991)



"Is every child riding a horse?"

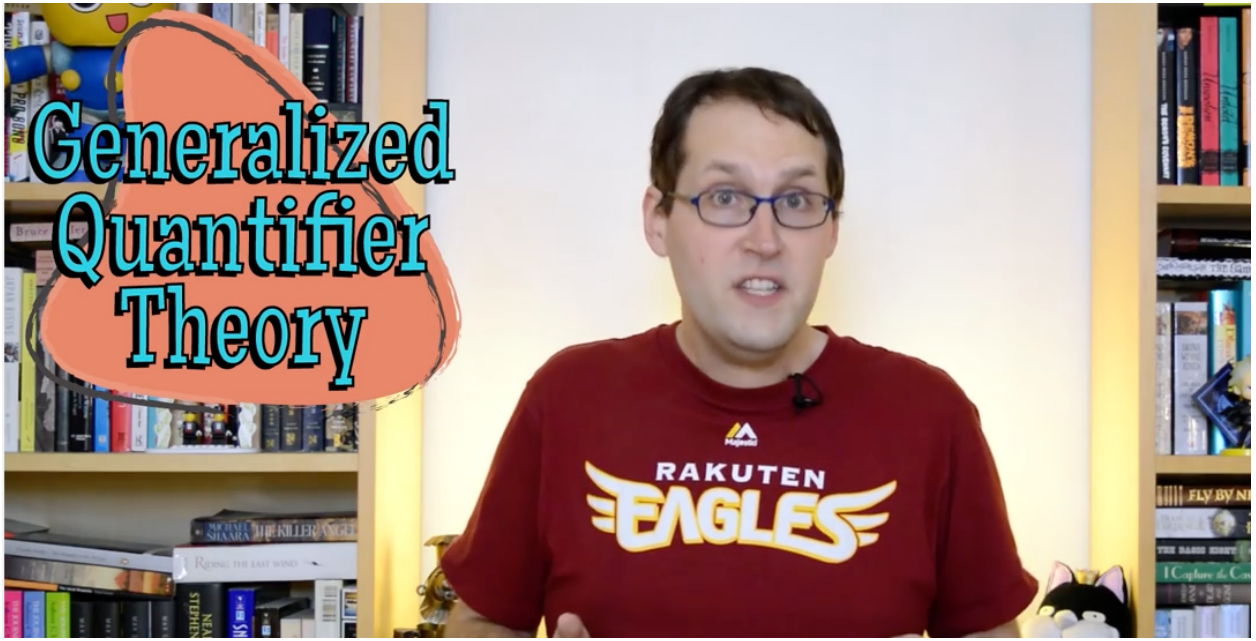
every >> a
("For every child c, c is riding a horse.")

a >> every
("For a horse h, every child is riding h.")

Children as young as three answer "yes", showing they understand either interpretation.

Quantifiers
[Extra]

https://www.youtube.com/watch?v=U1l3C_hmjqM
http://www.thelingspace.com/episode-62



How to interpret quantifiers like “most”

Quantifiers & Scope

Children's preferences for scope (Lidz & Musolino 2002, Lidz 2018)

Children find it easier to interpret scope relations that match the linear order (isomorphic, surface). Adults can more easily get the interpretation that does not match the linear surface order (non-isomorphic, inverse).

Everyone saw **a** movie last night.

$\forall \quad \exists$

Children prefer this interpretation (isomorphic):

scope: every >> a ("every has scope over a")

For every person p, that person saw a movie m.

$\forall \qquad\qquad\qquad\qquad \exists$

Quantifiers & Scope

Children's preferences for scope (Lidz & Musolino 2002)

Children find it easier to interpret scope relations that match the linear order (isomorphic, surface). Adults can more easily get the interpretation that does not match the linear surface order (non-isomorphic, inverse).

Everyone saw **a** movie last night.

$\forall \quad \exists$

As opposed to this one (non-isomorphic):

scope: a >> every ("a has scope over every")

For a movie m, every person saw m.

$\exists \quad \forall$

Quantifiers & Scope

Children's preferences can be changed (Viau, Lidz, & Musolino 2010)
If children are primed with the inverse interpretation, they can more easily access the inverse interpretation in other sentences.



∀ ∃
Everyone saw a movie last night.

Primed with context that supports this one (inverse):
scope: a >> every ("a has scope over every")
For a movie m, every person saw m.

∃ ∀

Quantifiers & Scope

Children's preferences can be changed (Viau, Lidz, & Musolino 2010)

If children are primed with the inverse interpretation, they can more easily access the inverse interpretation in other sentences.

∀ ∃

Everyone saw a movie last night.

Primed with a >> every

∃ ∀

∀ ¬

Every horse didn't jump over the fence.

More likely to get this one (inverse):

scope: n't >> every ("n't has scope over every")

¬ ∀

It is not the case that every horse jumped over the fence.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

??

inverse ¬ ∀ Not all kitties sat on the stairs.

What's really going on with kids and the inverse scope?

5-year-olds

One idea: **grammatical processing** problem

The **inverse scope** is harder to get from the surface string.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

??

inverse ¬ ∀ Not all kitties sat on the stairs.

What's really going on with kids and the inverse scope?

5-year-olds

grammatical processing

Another idea: **pragmatic context** management problem.

Children thought the topic of conversation (the implicit **Q**uestion **U**nder **D**iscussion) was something else and this utterance doesn't answer that QUD very well.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

inverse ¬ ∀ ?? Not all kitties sat on the stairs.

Did none of the kitties sit on the stairs?

Do kitties like stairs? **QUD** *How many kitties sat on the stairs?*

5-year-olds

grammatical processing

Another idea: **pragmatic context** management problem.

Children thought the topic of conversation (the implicit **Q**uestion **U**nder **D**iscussion) was something else and this utterance doesn't answer that QUD very well.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

??

inverse ¬ ∀ Not all kitties sat on the stairs.

Kitties don't like stairs

expectations about the world

Kitties love stairs.

Kitties don't care about stairs.

5-year-olds

grammatical processing

Another idea: **pragmatic context** management problem.
QUD

Children's prior **expectations about the world** make this utterance less informative.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

??

inverse ¬ ∀ Not all kitties sat on the stairs.

QUD

grammatical processing

expectations about the world

5-year-olds

It's hard to manipulate only one of these factors in experimental research investigating children's responses.

Quantifiers & Scope

Quantifier scope

✗ "**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

??

inverse ¬ ∀ Not all kitties sat on the stairs.

QUD

grammatical processing

expectations about the world

5-year-olds

Using a computational cognitive model that formalizes the separate contribution of each factor, Savinelli, Scontras, & Pearl (2017) determined which ones have the largest impact on children's observed behavior.

Quantifiers & Scope

Quantifier scope

"**Every** kitty did**n't** sit on the stairs"

∀ ¬ **Every** kitty did**n't**

inverse ¬ ∀ ?? Not all kitties sat on the stairs.

QUD

grammatical processing

expectations about the world

5-year-olds

The pragmatic factors seem to be the driving force behind children's behavior. This suggests that 5-year-olds are still developing their ability to manage the pragmatic context of a conversation as well as adults do.

Recap

Pronouns can also be difficult, since there are different rules of interpretation for plain pronouns and reflexive pronouns.

Quantifiers are also more difficult since they can interact with each other to form the interpretation of a sentence. In many cases, the meaning of the sentence is ambiguous since more than one interpretation is possible.

Children have preferences for how to interpret scopally ambiguous utterances — they prefer the surface interpretation over the inverse interpretation. However, in some cases this may be because pragmatic factors disfavor the inverse interpretation because it's not as informative as the surface interpretation would be.

Questions?

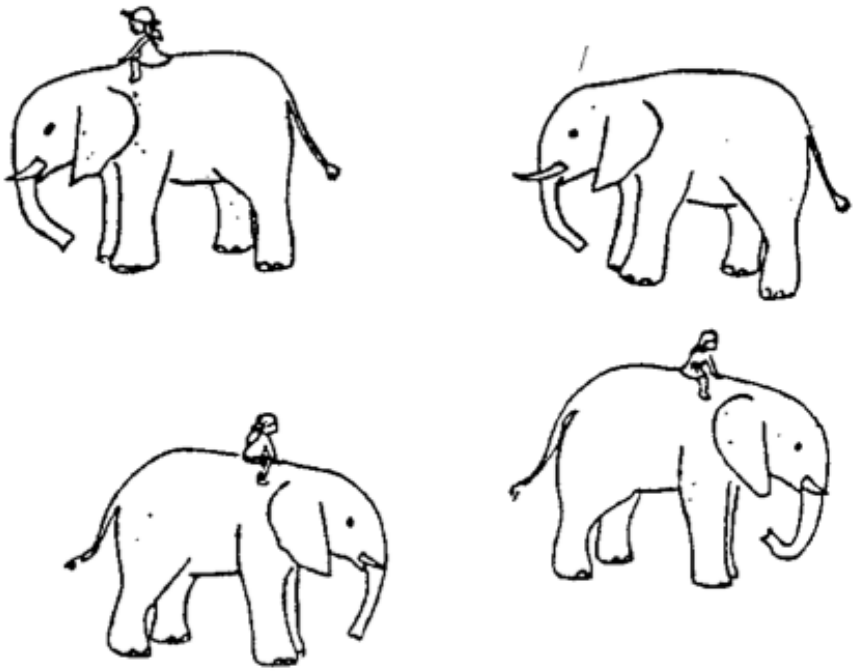
You should be able to do all the review questions for morphology & syntax, and all the questions for HW5.

Extra Material

Quantifier spreading

[Extra]

However, children seem to have trouble sometimes (Philip 1991)



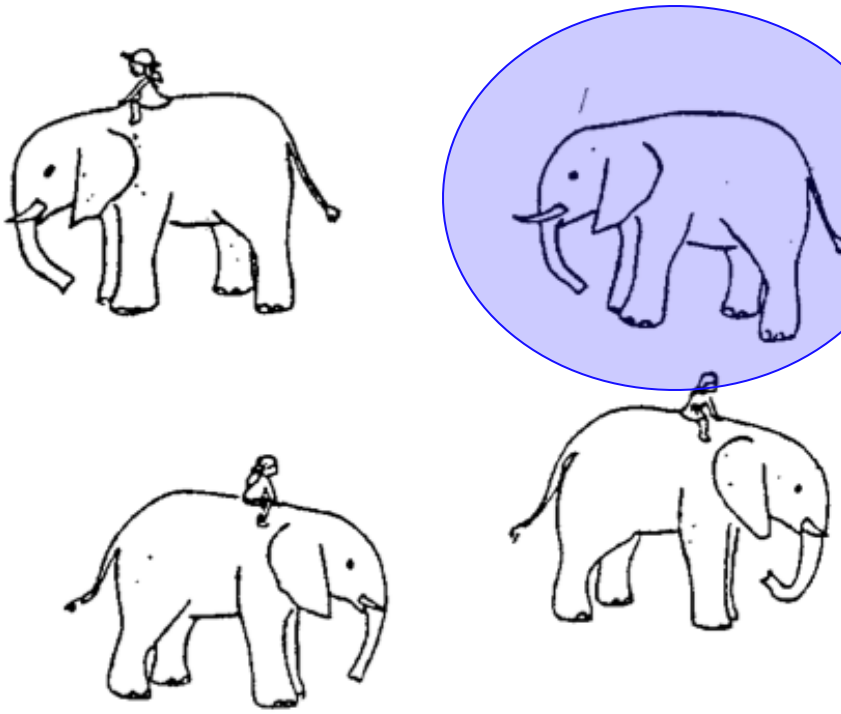
"Is every girl riding an elephant?"

every >> a

Quantifier spreading

[Extra]

However, children seem to have trouble sometimes (Philip 1991)



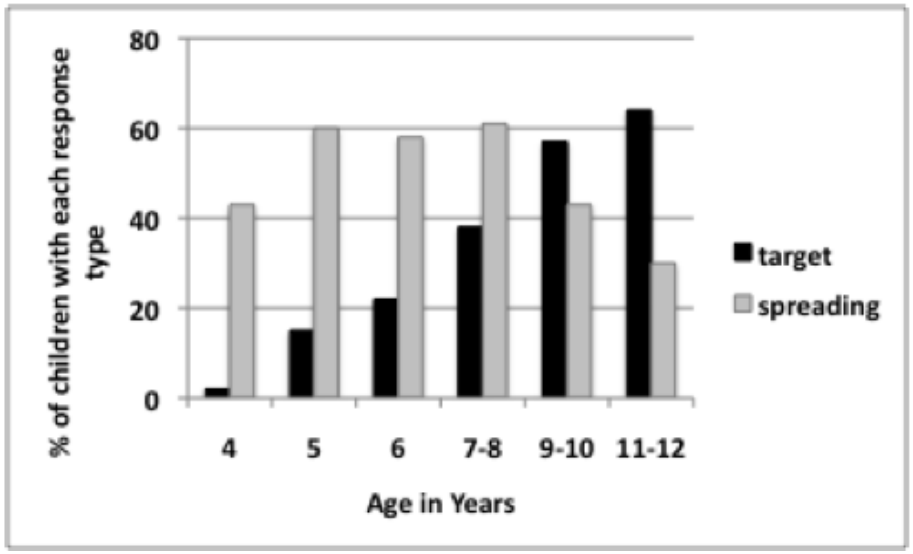
"Is every girl riding an elephant?"

every >> a

Children answer "no" – and say that this is not true because there is one elephant not being ridden! (even though every doesn't modify elephant). This is called quantifier spreading, since the quantifier "every" seems to have spread to the noun "elephant".

Quantifier spreading
[Extra]

Quantifier spreading seems to persist for quite a long time – even up through age 12 for some children.



Roeper, Pearson, & Grace 2011
Sample of 333 children

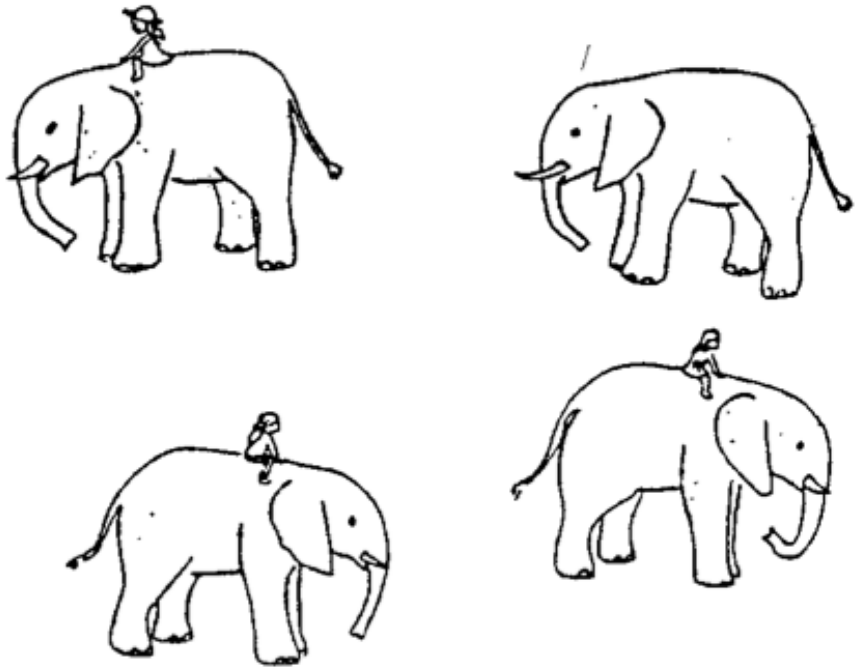
Target = adult interpretation
Spreading = quantifier spreading interpretation

Quantifier spreading
[Extra]

One explanation of what children are thinking (Roeper, Pearson, & Grace 2011): Children may assume “every” is an adverb that modifies the entire event described by the clause.

“Is every girl riding an elephant?” → every(girl riding an elephant)?

≈ is every event here an event of a girl riding an elephant?



Quantifier spreading
[Extra]

Even though this might seem odd to us as adult speakers, “only” behaves this way in English:

Jack needs to leave. Only he wants a hug from Lily first.

means something like

“It’s just that he wants a hug from Lily first”

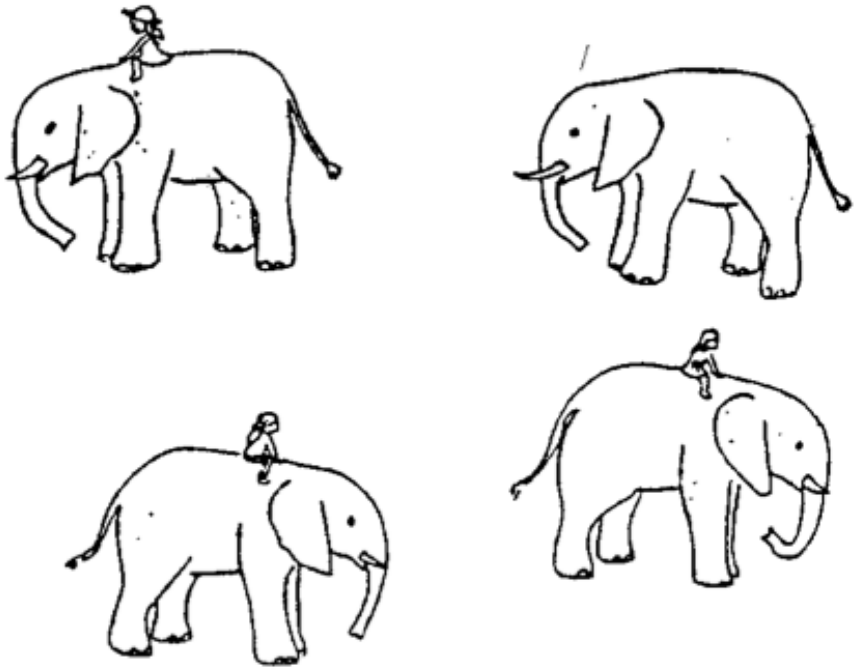
- → The event is only one of him wanting a hug from Lily first
- → only(he wants a hug from Lily first)

rather than he’s the only one that wants a hug

- → *only(he) wants a hug from Lily first*

Quantifier spreading
[Extra]

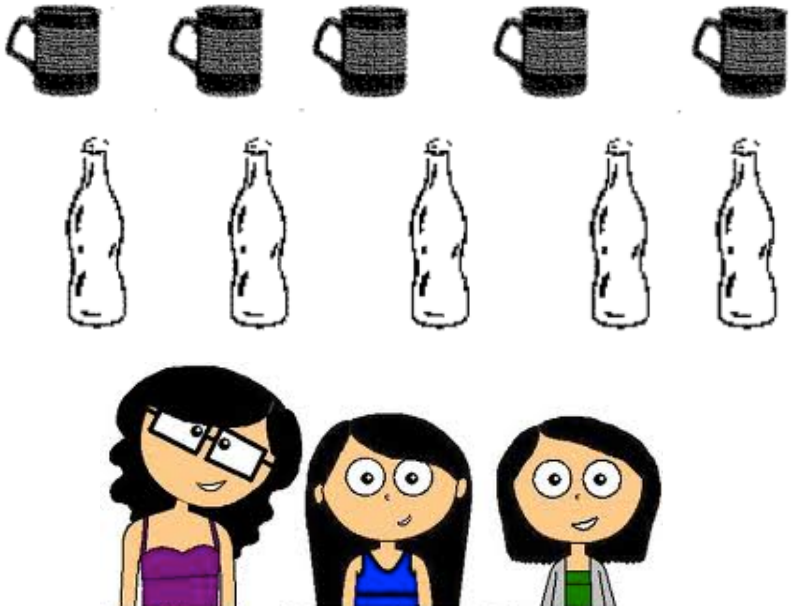
Another potential issue: Children are much more sensitive to the communicative context of a question. It's somewhat strange to ask about something that's obvious from the picture – like whether each girl is riding an elephant.



Quantifier spreading
[Extra]

A more context-friendly setup (Crain et al. 1996)

Story: A mother talks with her two daughters about whether they should drink soda or hot cider after skiing. The girls express a preference for soda, but are persuaded by their mother's example to have cider.

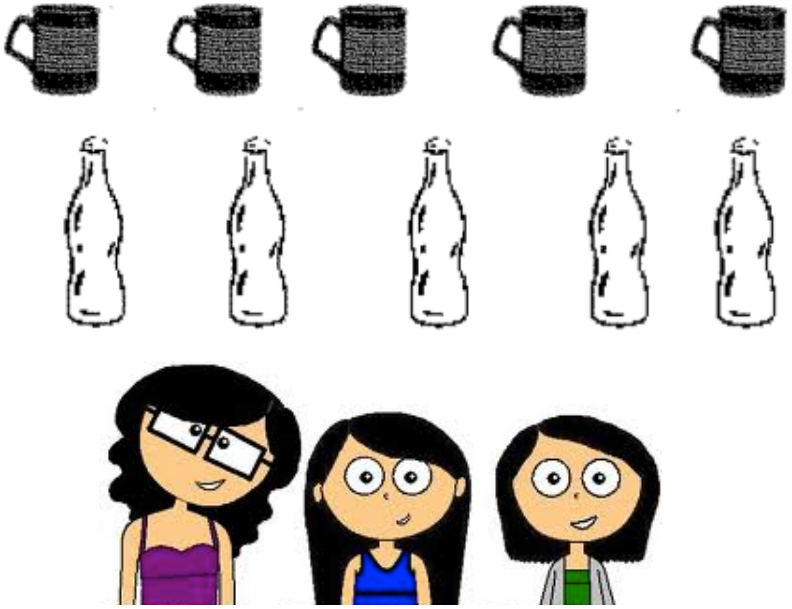


"Did every skier drink a cup of apple cider?"

(Not apparent from the picture what happened – children have to recall from the story what happened.)

Quantifier spreading
[Extra]

Crain et al. 1996: Children between the ages of three and five years old responded "yes" (just like adults would). This suggests that some of young children's previous issues with interpreting these kinds of questions may stem from an issue in the experimental setup. Specifically, children are sensitive to the pragmatics of asking a question (don't ask if it's obvious). If a question violates this rule, children search for an alternative meaning for the question.



"Did every skier drink a cup of apple cider?"

(Not apparent from the picture what happened – children have to recall from the story what happened.)

Quantifier spreading
[Extra]

Kiss & Zétényi 2017

More evidence for sensitivity to context.

Interpretation problems like quantifier spreading only occur “when the visual stimulus in a sentence-picture matching task is a minimal model abstracting away from the details of the situation…When the iconic drawings were replaced by **photos taken in a natural environment rich in accidental details, the occurrence of quantifier spreading was radically reduced**.”