

# Linguistic and non-linguistic cues to acquiring the strong distributivity of *each*

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# To acquire *each*, learners need to figure out its:

**Semantic category:**

Quantity (not property)

→ Syntactic bootstrapping

**Quantificational content:**

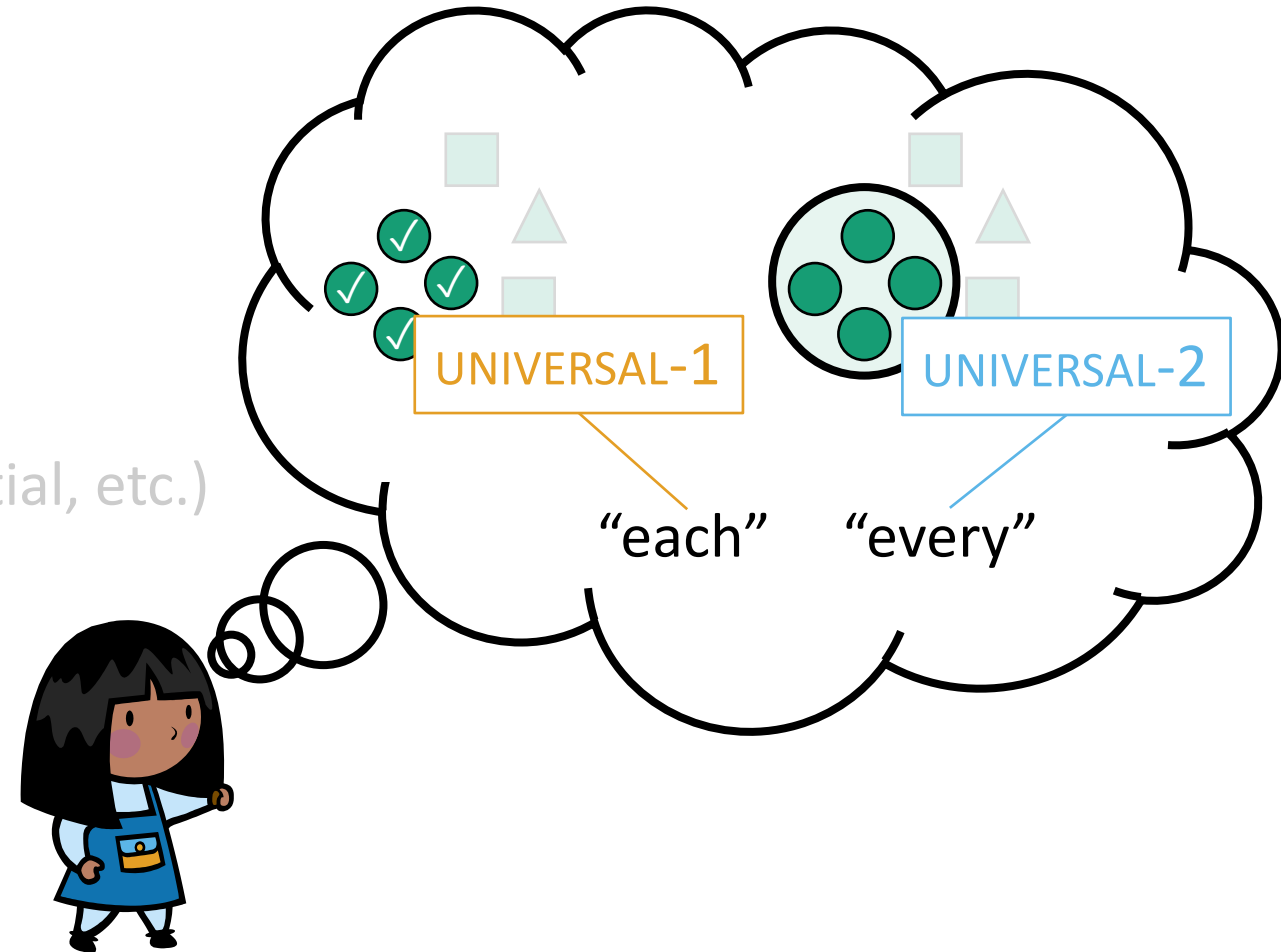
Universal (not proportional, existential, etc.)

→ Pragmatic context

**Representational format:**

Strongly distributive (not like *every*)

→ ?



# Roadmap

*Each* is somehow **more distributive** than *every/all*

- ↳ Linguistic & Psycholinguistic evidence
- ↳ Various syntactic/semantic explanations

Acquisition proposal

- ↳ linguistic + perceptual cues lead to representing domain as object-files

Results of corpus investigation

- ↳ Parents use *each* to quantify over small #s of physically present things

*Each & Every* are “distributive universals”

After class, {each/every} student gathered in the hall.  
(COLLECTIVE)

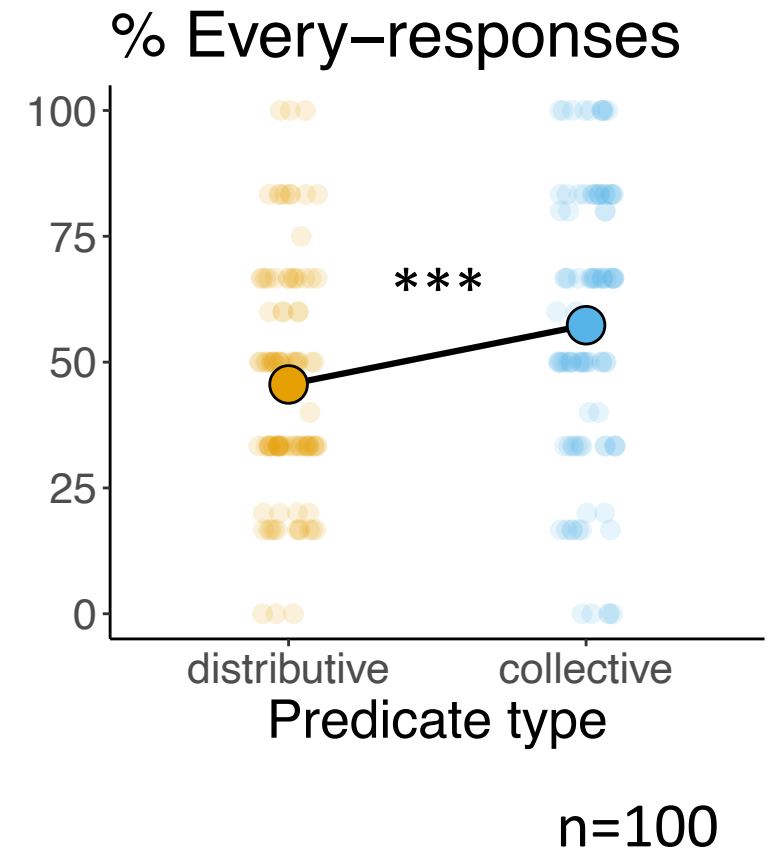


# *Each* is (even) worse with collective predicates

Math class at the local middle school lasts a full hour.

After class, {each/**every**} student gathered in the hall.  
(COLLECTIVE)

After class, {**each**/every} student went to their locker.  
(DISTRIBUTIVE)



# *Each* supports pair-list readings

(1) Which book did you loan to **each** student?

a. ✓ *Frankenstein* to Frank, *Persuasion* to Paula, and *Moby Dick* to Mary

(2) Which book did you loan to **every** student?

a. # *Frankenstein* to Frank, *Persuasion* to Paula, and *Moby Dick* to Mary

b. ✓ There's no one book that I loaned to every student

*Each* is unfriendly to genericity

(3) **Each** martini needs an olive

a. *some particular cocktails are in need of garnishes*

(4) **Every** martini needs an olive

a. *some particular cocktails are in need of garnishes*

b. *in general, the recipe calls for an olive*

# *Each* is unfriendly to genericity

(3) **Each** martini needs an olive

(4) **Every** martini needs an olive

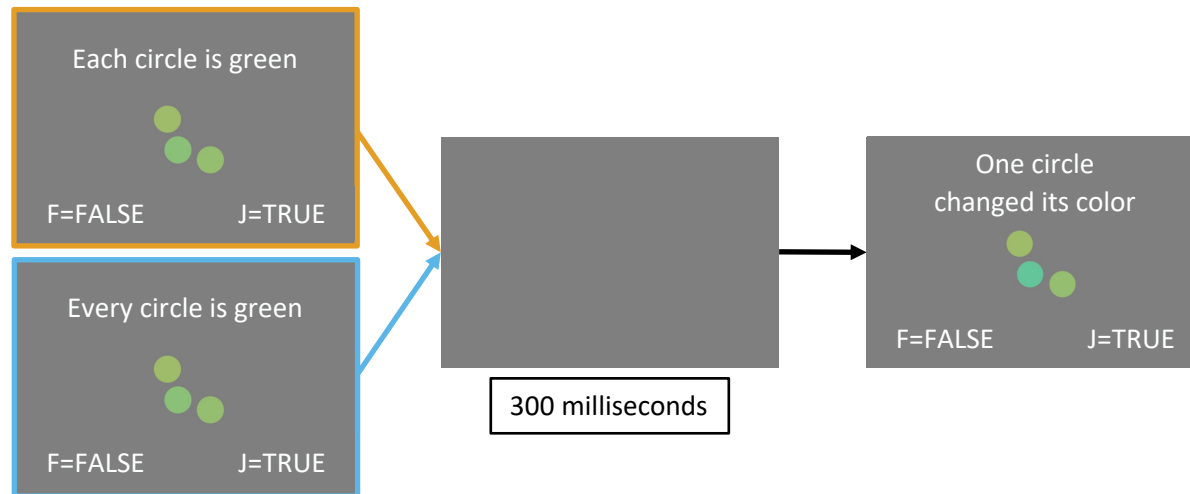
If someone said (3)/(4), how many martinis would you guess they have in mind?

Quantifier	≤3	4-5	≥6	Infinitely many	Exhaustive (e.g., “all of them”)
<b>Each</b>	<b>62</b>	10	12	0	9
<b>Every</b>	<b>29</b>	13	21	5	30

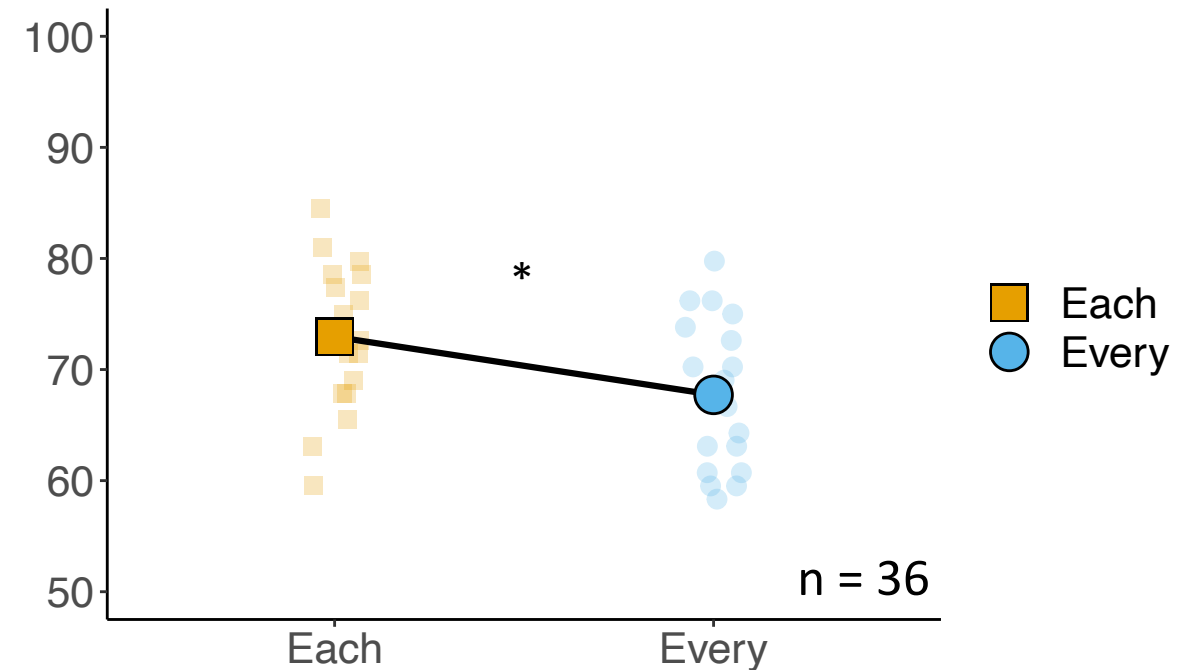
n=198

# *Each* encourages encoding individual properties

*“Each ... directs one's attention to the individuals as they appear, in some succession or other, one by one”* – Vendler (1962)



Change detection accuracy

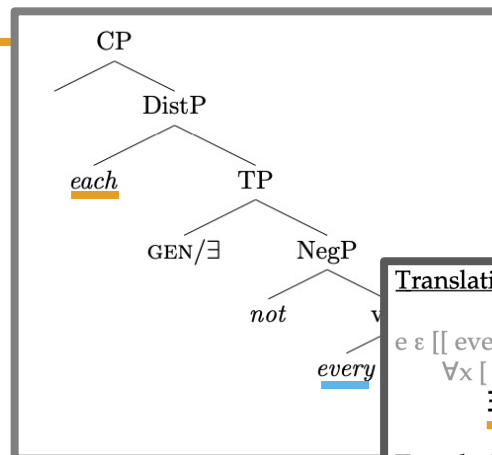


# *Each* is more distributive than *every/all*

- ➡ supports pair-list readings
- ➡ is worse with collective predicates
- ➡ is unfriendly to genericity
- ➡ encourages encoding individual properties

## Syntactic Position

(Beghelli & Stowell 1997)



## Condition on event differentiation

(Tunstall 1998)

### Translation of *Every*

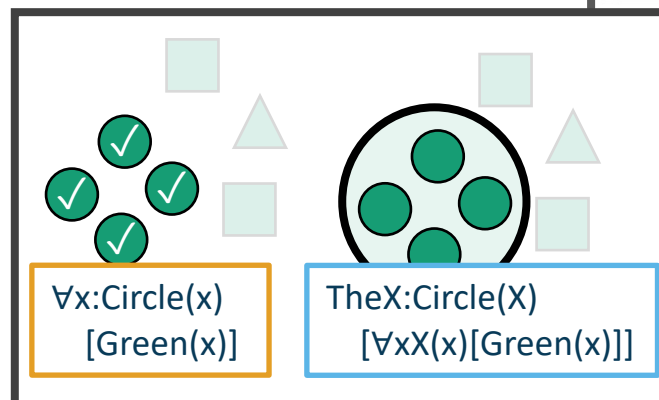
$e \in [[\text{every } N]](f) \text{ iff}$   
 $\forall x [x \in [[N]] \rightarrow \exists e' \leq e [e' \in f(x) \& \exists y [y \in [[N]] \& y \neq x \& \exists e'' \leq e [e'' \in f(y) \& e' \neq e'']] ]]$

### Translation of *Each*

$e \in [[\text{each/every } N]](f) \text{ iff}$   
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## Lexical-semantic difference

(Knowlton, Pietroski, Halberda, & Lidz 2021)



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## Acquisition proposal

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## Results of corpus investigation

- ➡ Parents use *each* to quantify over small #s of physically present things

# Object-files as route of semantic access

*each circle is green*

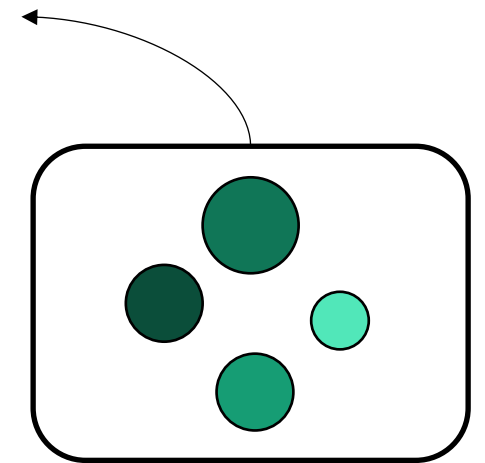
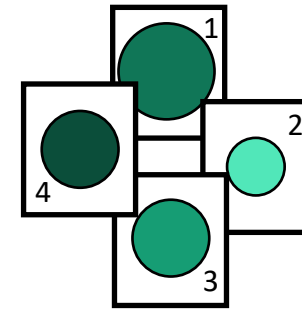
≈ **Any thing** that is a circle is s.t. **it** is green

**Object-file representations** (Kahneman, Treisman & Gibbs 1992)

- ➡ Initiated based on spatial information (Xu & Carey 1996)
- ➡ Working memory limit of 3-4 (Feigenson & Carey 2005)

*every circle is green*

≈ **The things** that are circles are s.t. **they** are all green





# Object-files as route of semantic access

*each circle is green*

≈ **Any thing** that is a circle is s.t. **it** is green

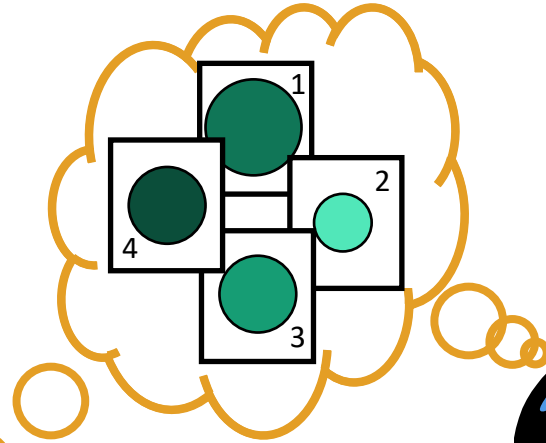
**Object-file representations** (Kahneman, Treisman & Gibbs 1992)

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Which concept of  
universal quantification  
does “each” pick out?

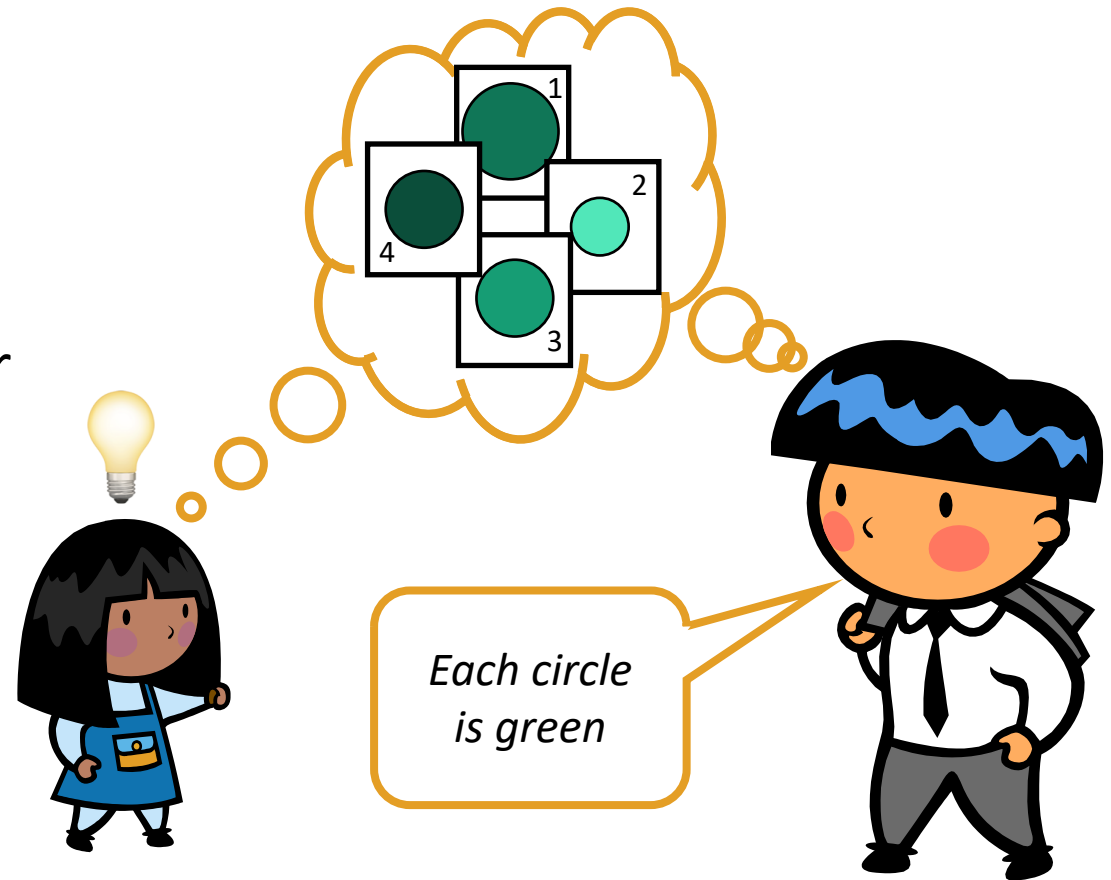


*Each circle  
is green*



# Object-files as route of semantic access

- ➡ Linguistically, *each* encourages treating the domain of quantification as individuals (=object-files)
- ➡ Perceptually, small numbers of physically present objects/actions trigger object-file representations
- ➡ Proposal: quantifying over small, physically present domains = ideal circumstances for acquiring *each*



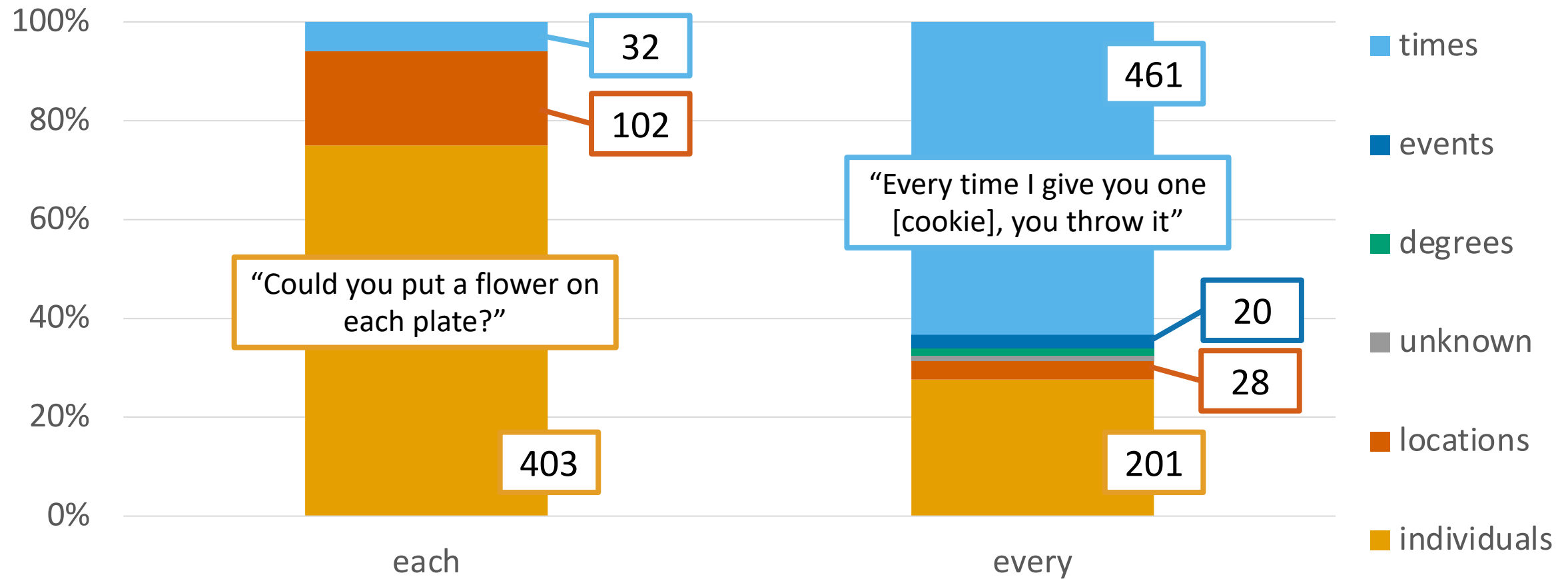
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# What's being quantified over in speech to children?



# Naturalistic parent-child interactions

LDP Corpus (14 – 58mo): 233,390 utterances

↳ 223 “each”

↳ 139 “every”

↳ 2,915 “all”



“You want one bite of each piece, huh?”




“Every time you color you get better”




“All the yellow ones are in a row”


# Is the domain physically present?



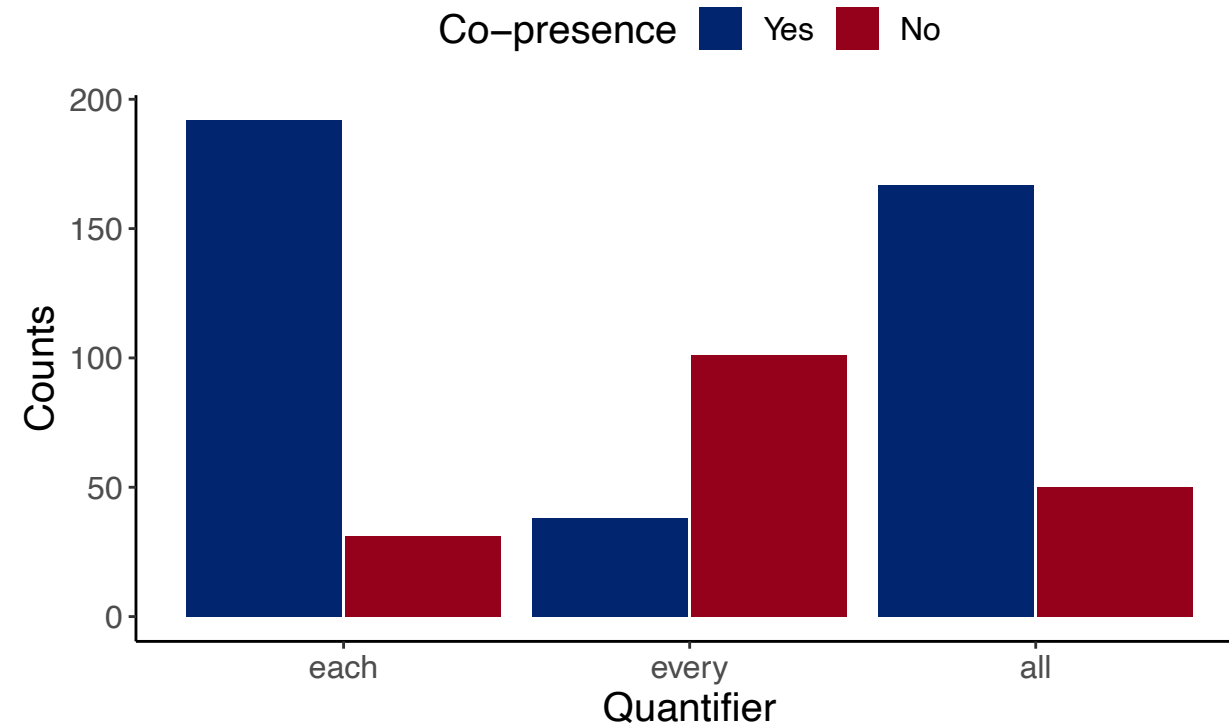
"You want one bite  
of each piece, huh?"



"Every time you  
color you get better"



"All the yellow  
ones are in a row"




*each* vs. *every*:  $\chi^2=133.87$ ,  $p<.001$


*each* vs. *all*:  $\chi^2=5.37$ ,  $p<.05$




# Is the domain physically present? (excluding times)



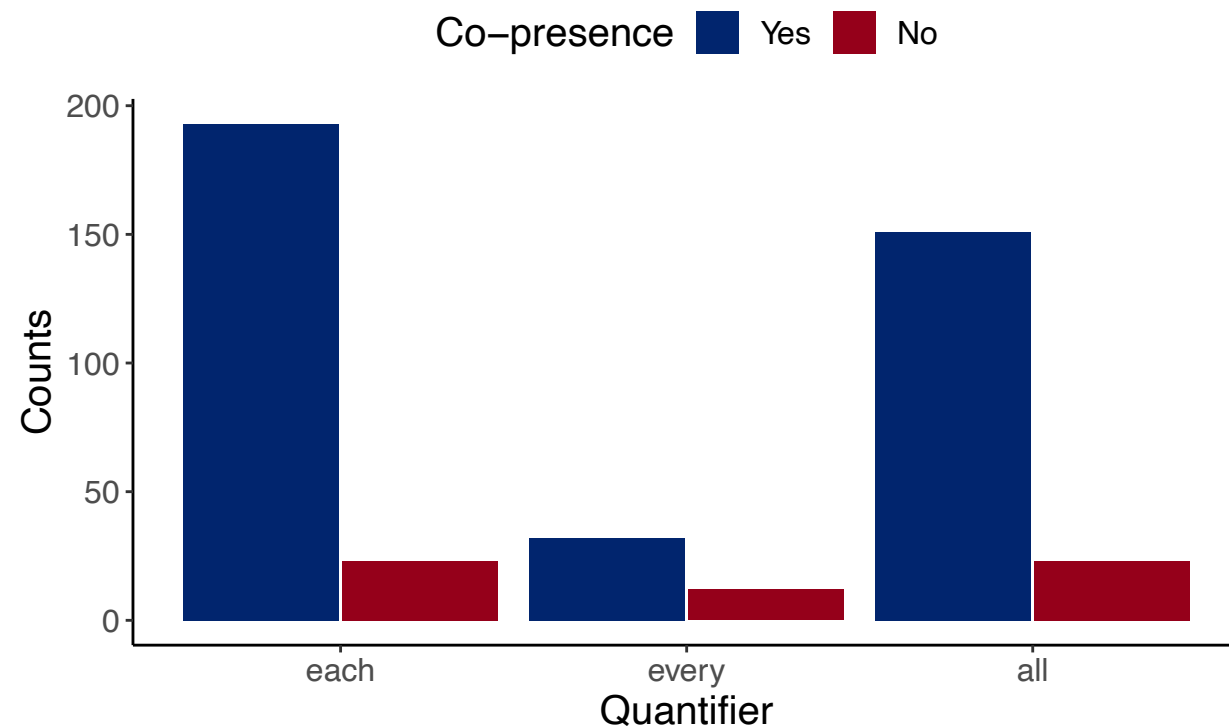
"You want one bite of each piece, huh?"



"Every time you color you get better"




"All the yellow ones are in a row"




*each* vs. *every*:  $\chi^2=7.30$ ,  $p<.01$

*each* vs. *all*:  $\chi^2=0.39$ ,  $p=.53$


# Is the domain within the WM limit?



"You want one bite  
of each piece, huh?"

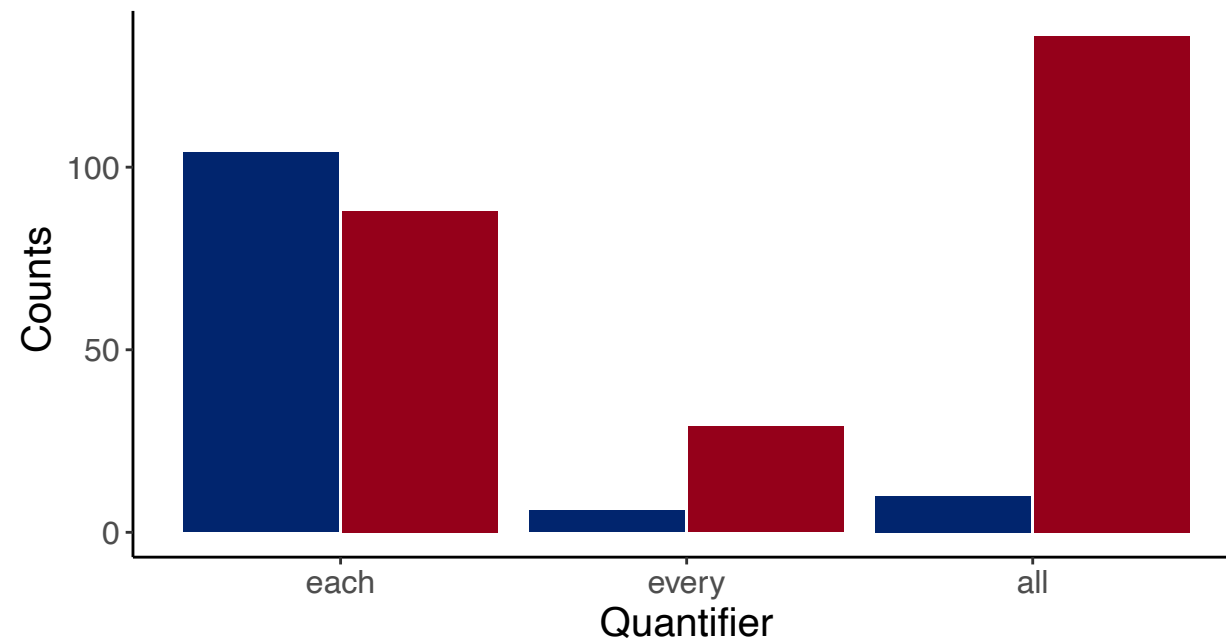


"Every time you  
color you get better"



"All the yellow  
ones are in a row"

Within working memory limit (< 4 items) ■ Yes ■ No

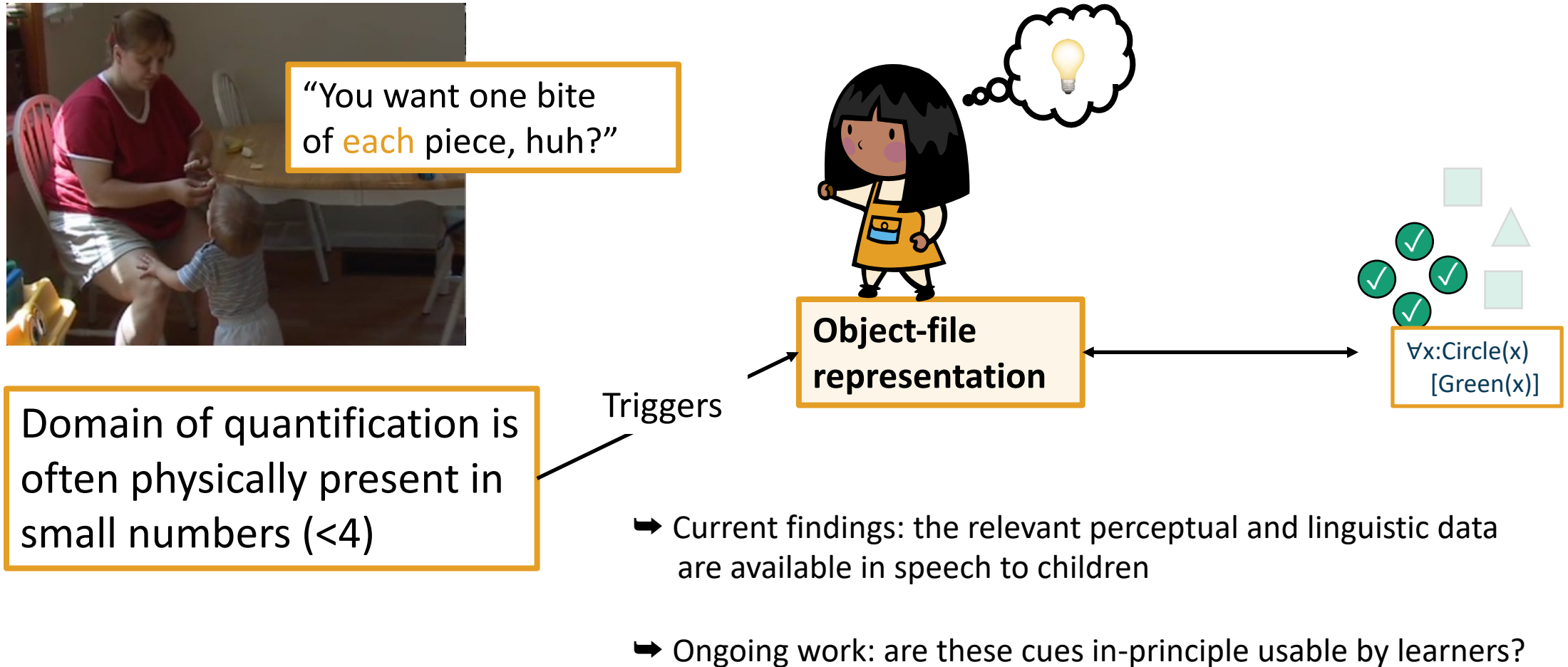


*each* vs. *every*:  $\chi^2=16.25$ ,  $p<.001$

*each* vs. *all*:  $\chi^2=80.97$ ,  $p<.001$



# Object-files as a route of semantic access





# Thanks!

**mindCORE**

Center for Outreach, Research, and Education

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Finger painting courtesy of Alex Oppenheimer (1;6)

