

Every provides an implicit comparison class when *each* does not

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Takeaway: *Each* and *every* are both distributive universal quantifiers, but two experiments suggest that *every* is better able to provide the necessary plural comparison class for sentence-internal *same* and serve as the plural antecedent for sentence-internal *they*. This supports a lexical-semantic proposal on which *each* and *every* differ in that only *every* groups its first argument.

The different meanings of *each* and *every*

Obvious similarities: *each* and *every* are both universal and distributive

- (1) *Each frog is green* ↔ *Every frog is green* (they're mutually entailing)
- (2) a. **Each/Every frog gathered by the pond* (neither is great with collective predicates)
b. *All the frogs gathered by the pond*

Long-standing observation: *each* is "more individualistic" than *every* [e.g., 1-5]

- (3) a. *Each martini needs an olive* (claim about some particular drinks in the vicinity)
b. *Every martini needs an olive* (general claim/component of a drink recipe)
- (4) a. *Which book did you give to each student?* A: *Frankenstein* to Frank, *Persuasion* to Paula, *Dune* to Dani, ...
b. *Which book did you give to every student?* A: There's no one book I gave to every student

- The challenge: How to account for these sorts of (subtle) differences and the (more obvious) fact that *each* and *every* are both distributive universal quantifiers?

Proposal: *each* and *every* have formally distinct mental representations as their meanings [e.g., 5-7]

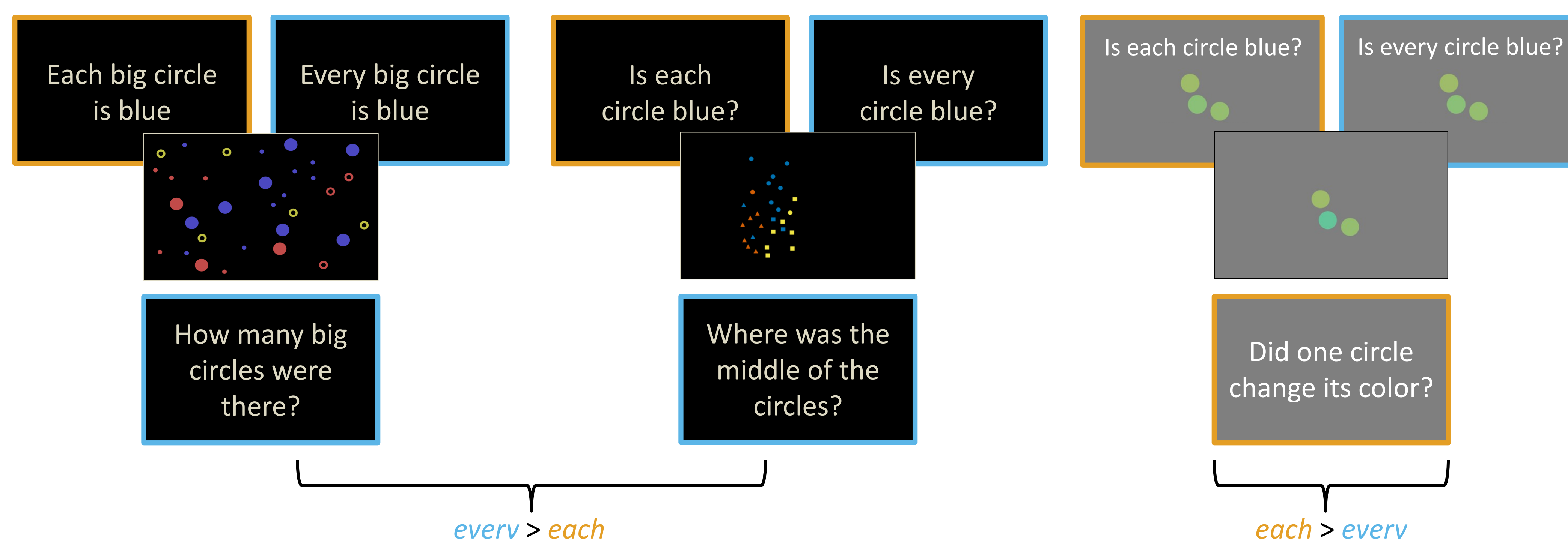
Every's meaning has a semantic constituent corresponding to a grouping of its first argument; *Each's* meaning does not

- (5) a. *Each frog is green*
b. $\forall x: \text{Frog}(x)[\text{Green}(x)]$ ≈ any thing that's a frog is green
- (6) a. *Every frog is green*
b. $\text{The } F: \text{Frog}(F) \{ \forall x: F(x)[\text{Green}(x)] \}$ ≈ the frogs_F are such that any thing that's one of them_F is green

- (5b) is like a conjunction of claims about individuals (e.g., "frog₁ is green & frog₂ is green & frog₃ ...")
- (6b) introduces the plural group *the frogs* and distributively (and universally) applies a predicate (being green) to *them*

Prior evidence: distinct verification strategies [e.g., 6,7]

- Participants recall group properties better after evaluating sentences with *every*
- Participants recall individual properties better after evaluating sentences with *each*



- Can we find evidence in support of the proposed meanings in (5-6) outside of sentence verification tasks?

Experiment 1: Sentence-internal *same*

Predicates involving *same* and *different* require a plural comparison class (i.e., *same as what?*) [e.g., 8]

- Plural subjects like (7a) are sensible, but singular subjects like (7b) are infelicitous absent contextual support

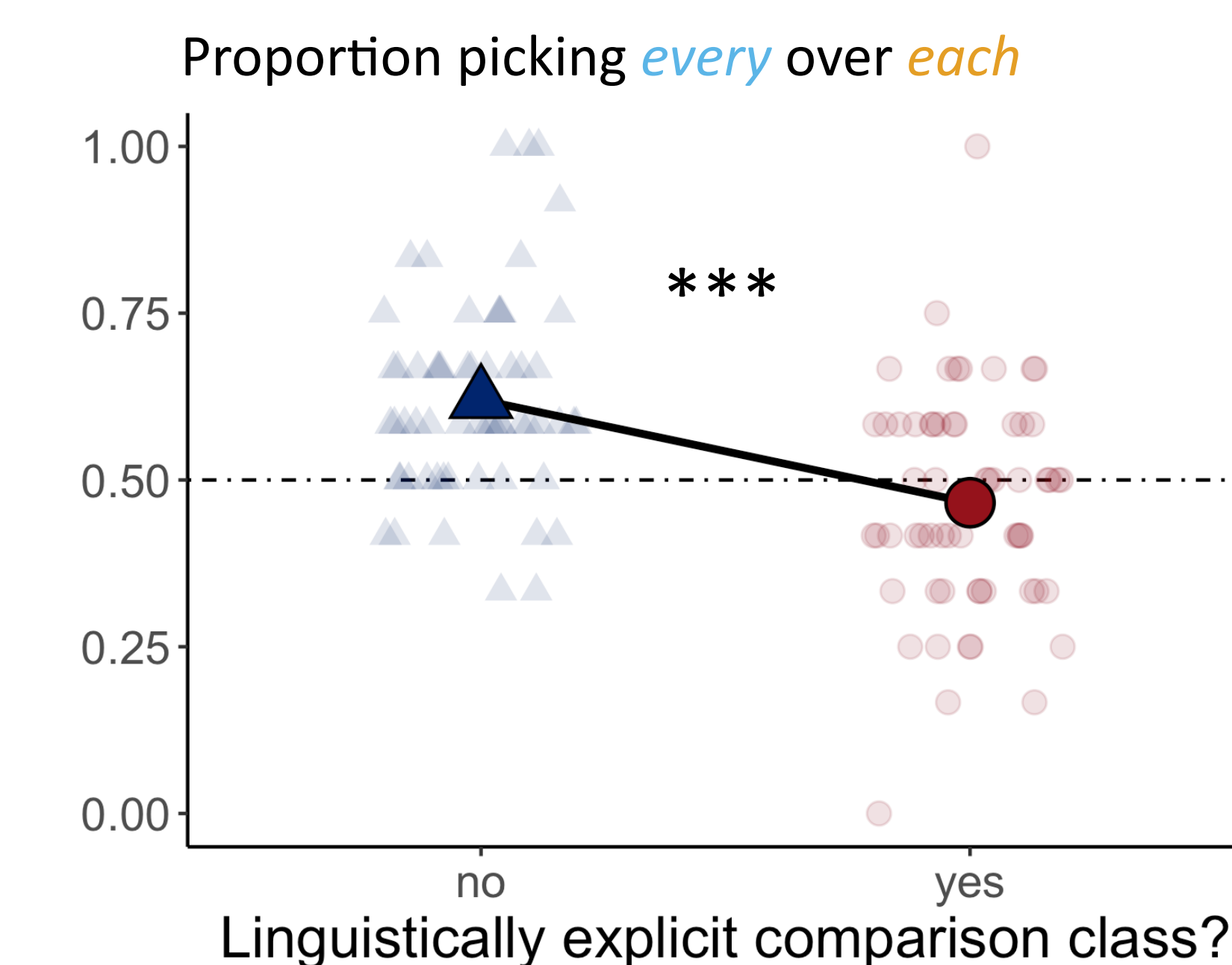
- (7) a. *The frogs are the same color* b. #*Kermit is the same color*

- **Prediction:** *every NP* should behave more like (7a), whereas *each NP* should behave more like (7b)
 - e.g., *every frog* introduces *the frogs*, providing the necessary comparison class for sentence-internal *same*
 - But *each frog* does not introduce a group, so *same* needs to look elsewhere for its comparison class

Experimental items either had or lacked a linguistically-explicit comparison class (e.g., an *as*-phrase with a plural NP)

(8) Ann and Frank decided to throw a school Halloween party.
Surprisingly, student showed up in the same costume $\left\{ \begin{array}{l} \emptyset. \\ \text{as their classmates.} \end{array} \right\}$

- Forced-choice task: 120 participants chose which quantifier made sentences like (8) sound more natural
 - 12 items; between-subjects; implemented in PCIBex [9]
- Result: Participants favored *every* over *each* in the absence of another source of the comparison class for *same*
 - This preference disappeared when the comparison class was made linguistically explicit (through an *as*-phrase)
- Upshot: *every NP* makes *the NPs* more readily available as an implicit comparison class than *each NP*
 - Even absent contextual support [cf. 10]
 - This is expected given the meanings in (5-6)



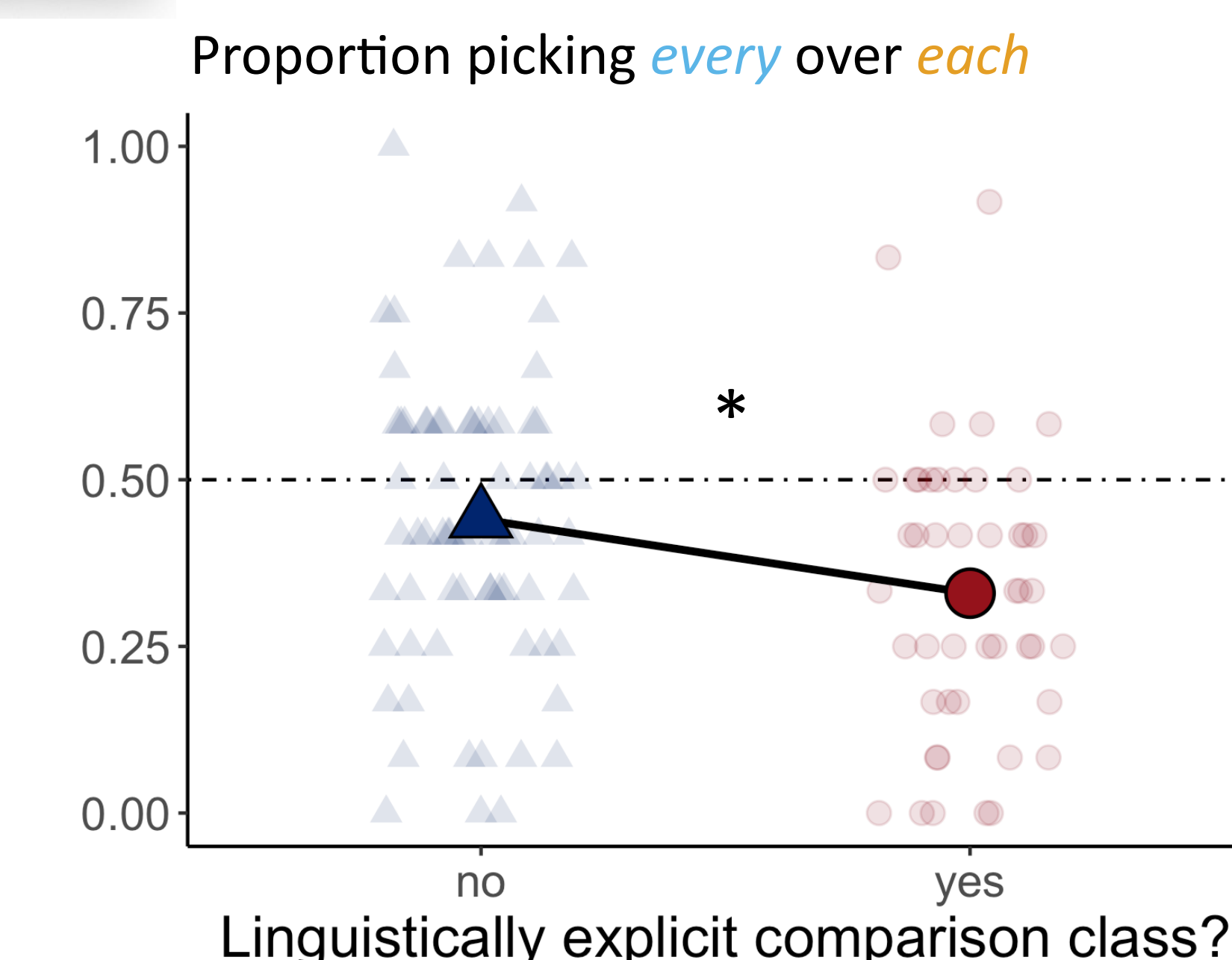
Experiment 2: Sentence-internal *they*

When used with a collective predicate, *they* requires a plural antecedent

- **Prediction:** *every NP* should be a better antecedent for (plural) *they* than *each NP* in the absence of an *explicit antecedent*

(9) After at the school party, student was told that they should gather around the table.

- Forced-choice task: 120 participants chose which quantifier made sentences like (9) sound more natural
 - 12 items; between-subjects; implemented in PCIBex [9]
- Result: Participants favored *every* over *each* more when when the *explicit antecedent* was absent
- Upshot: *every NP* makes *the NPs* more readily available as a plural antecedent than *each NP*
 - As expected given the meanings in (5-6)



[1] Vendler (1962) *Each and every, any and all* [2] Kroch (1974) The semantics of scope in English [3] Beghelli & Stowell (1997) Distributivity and negation: the syntax of *each* and *every* [4] Tunstall (1998) The interpretation of quantifiers: semantics and processing [5] Knowlton, Trueswell, & Papafragou (2022) A mentalistic semantics explains *each* and *every* quantifier use [6] Knowlton, Pietroski, Halberda, & Lidz (2022) The mental representation of universal quantifiers [7] Knowlton (2021) The psycholinguistics of universal quantifiers [8] Kuhn (2015) Cross-categorical singular and plural reference in sign language [9] Zehr & Schwarz (2018) Penn controller for internet based experiments [10] Brasoveanu & Dotlačil (2015) Sentence-internal *same* and its quantificational licensors Thanks to Zoe Ovans, John Trueswell, Anna Papafragou, Paul Pietroski & Jeff Lidz for helpful discussions and MindCORE for funding