

The Online Interpretation of Sentence Internal *Same* and Distributivity

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Adjectives of Comparison

- Languages have lexical means to compare two elements and express identity / difference / similarity between them



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- Languages have lexical means to compare two elements and express identity / difference / similarity between them
- English uses adjectives of comparison (AOCs) like *same*, *different* and *similar*



Sentence-external readings

- Comparing an element in the current sentence and an element mentioned previously
- (1) a. Arnold saw **‘Waltz with Bashir’**.
b. Heloise saw the **same** movie.



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(2) $\left\{ \begin{array}{l} \text{Each student} \\ \text{The students} \\ \text{All the students} \end{array} \right\}$ saw the **same** movie.

- Sentence-internal readings must be licensed by a semantic plural (Carlson, 1987)

(3) #Sue saw the same movie.



Our goal

Investigate how sentence-internal *same* is processed with:



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- 3 of its licensors
 - EACH
 - ALL
 - THE



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- 2 orders
 - Q+AOC: surface scope

(4) $\left\{ \begin{array}{l} \text{Each student} \\ \text{The students} \\ \text{All the students} \end{array} \right\}$ saw the **same** movie.

- AOC+Q: inverse scope

(5) The **same** student saw $\left\{ \begin{array}{l} \text{each movie} \\ \text{the movies} \\ \text{all the movies} \end{array} \right\}$



Previous theories and their predictions

Inverse scope interpretation harder to process than surface scope:

(6) A boy climbed every tree.

Tunstall, 1998, Anderson, 2004, Filik et al., 2004, Radó and Bott, to app.



Previous theories and their predictions

Explanation in terms of covert scope operations:

- Inverse scope requires an extra operation
(Anderson, 2004)



Previous theories and their predictions

Explanation in terms of covert scope operations:

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(7) A boy climbed every tree.

- [every tree] [a boy climbed _]



Previous theories and their predictions

Explanation in terms of discourse model:

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The sentence-internal reading of *same* has to be scopally licensed:

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- *every movie* scopes and distributes over *same*
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But no revision necessary of the discourse model structure because of the meaning of *same*.

- Thus, **same** can help us distinguish between the two theories of inverse scope



Previous theories and their predictions

In addition, previous theories:

- postulated different meanings of *same*
- postulated different meanings for quantificational NPs
(Heim 1985, Carlson 1987, Moltmann 1992, Beck 2000, Barker 2007, Dotlačil 2010, Brasoveanu 2011)



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- Anderson 2004, Dwivedi et al. 2009



Plan

- Experimental study
- Results of the study
- Analysis of the results



Method

- A self-paced reading task testing how easy it is to process sentence-internal *same*



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 - with 3 licensors: EACH, ALL and THE
 - in 2 orders: Q+SAME (quantifier precedes AOC) and SAME+Q (AOC precedes quantifier)
 - i.e., $3 \times 2 = 6$ conditions in total



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 - with 3 licensors: EACH, ALL and THE
 - in 2 orders: Q+SAME (quantifier precedes AOC) and SAME+Q (AOC precedes quantifier)
 - i.e., $3 \times 2 = 6$ conditions in total
- Each condition was tested 8 times
 - four times in sentences most likely judged as true relative to the background scenarios
 - four times in sentences most likely judged as false
 - for a total of 48 stimuli



Example

Sarah and Madeleine are two young women who live in a village that has only three shops, a fabric store, a bakery and a DVD store. Last Monday, Sarah went to the fabric store, then to the bakery and finally to the DVD store, while Madeleine was at home all day.



Example

- - - - -





Example

- think — — — — —



Example

- — that — — — — —



the _____



Example

- — — — — same — — — — —



Example

- - - - - young - - - - -



Example

- - - - - woman - - - - -



Example

- - - - - visited - - - - -



Example

- - - - - each - - - - -



Example

- - - - - shop - - - - -



Example

- - - - - in - - - - -



Example

- - - - - the - - - - -



Example

----- village.



Example

Am I right to think that?



Scenarios

In general, scenarios consist of:

- 2 sets of entities (e.g., women and stores)
- a relation between them (e.g., 'visit')



Method

- 115 participants



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- 2 groups
- each group: 12 items in surface scope, 12 items in inverse scope



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- the participants completed the experiment online
- order pseudo-randomized for each participant



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- no differences, hence final analysis based on merged data sets
- 22 participants excluded because 15% or more questions answered incorrectly
- Length of words and position in sentence factored out



Regions of interest

- Quantifier + 2 following words
- *Same* + 2 following words
- Reading times of full sentences



Quantifier and 2 following words

Surface scope:

- I think that each young woman visited the same shop in the village.

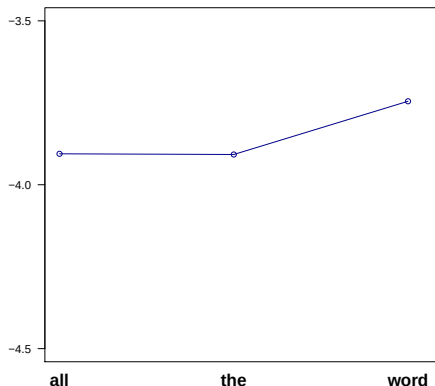
Inverse scope:

- I think that the same young woman visited each shop in the village.



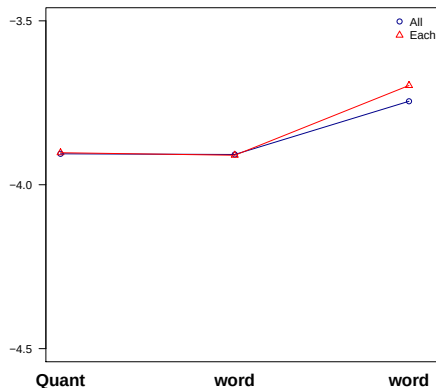
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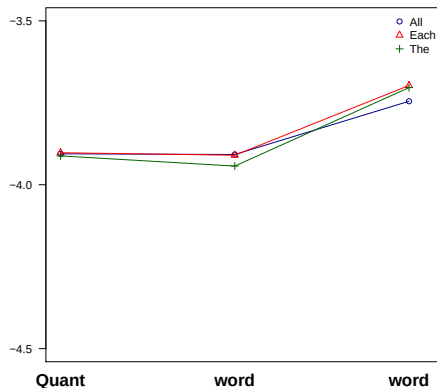
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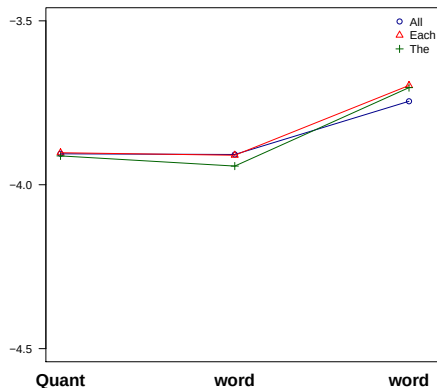
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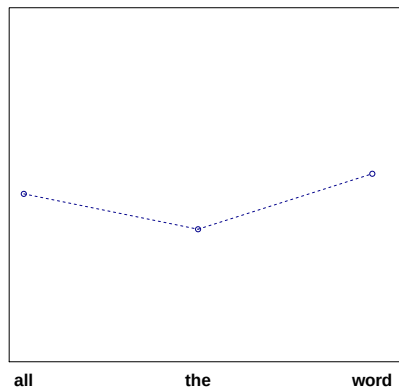


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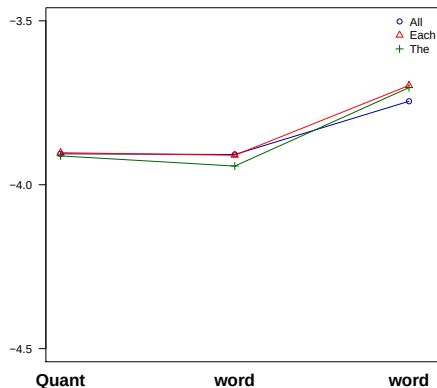


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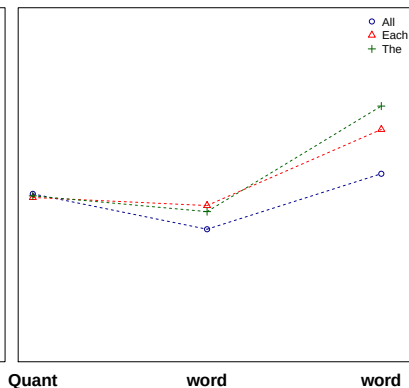


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Generalizations: Quant and 2 following words

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Same and 2 following words

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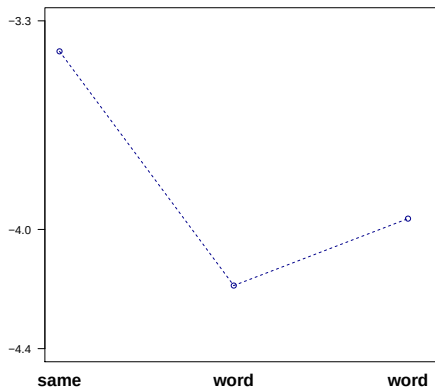
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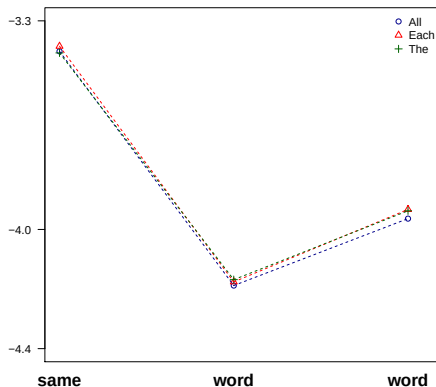
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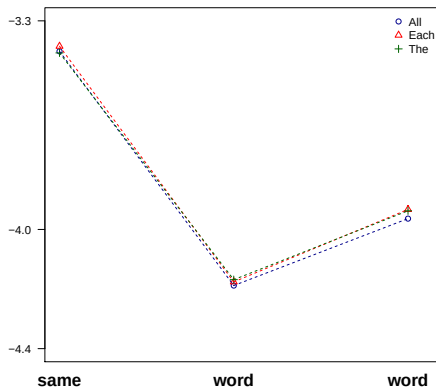
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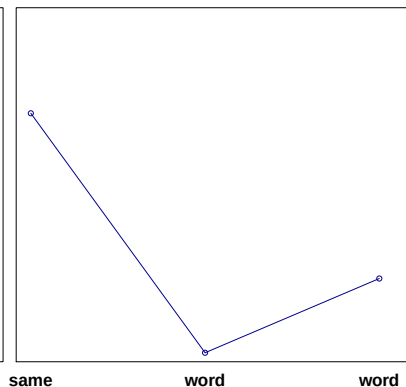


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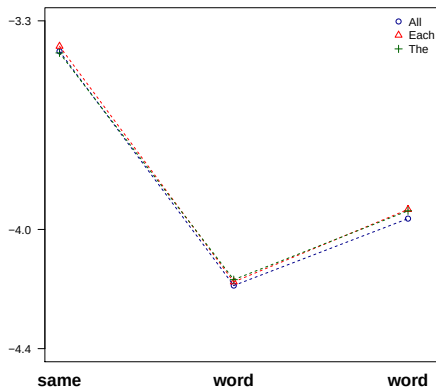


Surface scope

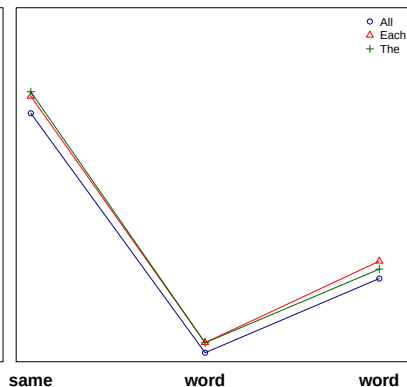


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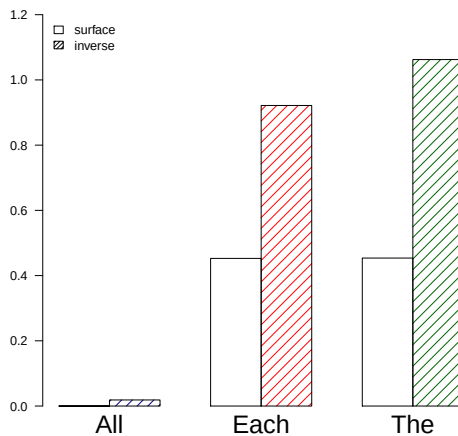


Generalizations: *Same* and 2 following words

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Total times



Generalizations: Total times

- **All:**
 - Surface scope $\approx$ Inverse scope



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- **Each, The:**
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Analysis

Three assumptions about the meanings of:



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- *same* – ambiguous



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Three assumptions about the meanings of:

- *same* – ambiguous
- *each* – requires differentiation
- *the* – ordered interpretations



Assumption 1: *Same* is ambiguous



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... like *different* in many languages (Beck, 2000; Dotlačil, 2010)

- (11) $\left\{ \begin{array}{l} \text{ledere} \\ \text{?Alle de} \\ \text{*De} \end{array} \right\}$ jongen lezen een **ander** boek.
- $\left\{ \begin{array}{l} \text{Every} \\ \text{?All the} \\ \text{*The} \end{array} \right\}$ boys read(s) a **different[1]** book.



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- (12) $\left\{ \begin{array}{l} \text{\#ledere} \\ \text{Alle de} \\ \text{De} \end{array} \right\}$ jongen lezen **verschillende** boeken.
 $\left\{ \begin{array}{l} \text{\#Every} \\ \text{All the} \\ \text{The} \end{array} \right\}$ boys read(s) **different[2]** book.



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Same[1]: identity between two entities

- Sentence-external:

- (13) a. Arnold saw ‘Waltz with Bashir’.
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- (14) $\left\{ \begin{array}{l} \text{Each boy} \\ \text{All the boys} \end{array} \right\}$ saw the same[1] movie.



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- Sentence-internal:

- (14) $\left\{ \begin{array}{l} \text{Each boy} \\ \text{All the boys} \end{array} \right\}$ saw the same[1] movie.

For any two boys b_1 and b_2 , b_1 's movie = b_2 's movie



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- Sentence-internal:

(15) $\left\{ \begin{array}{l} \text{Each boy} \\ \text{All the boys} \end{array} \right\}$ saw the same[1] movie.

- The distributive quantifier temporarily creates in its scope interpretation contexts of sentence-external form

boy ₁
boy ₂
boy ₃

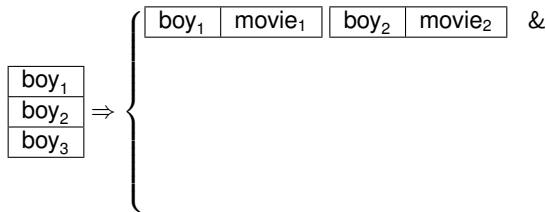


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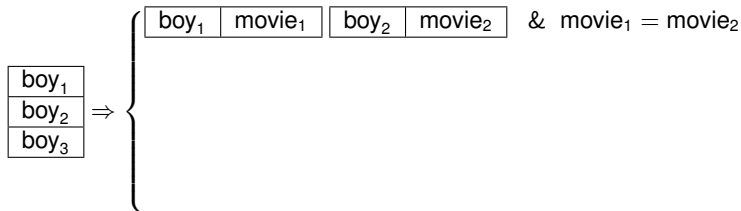


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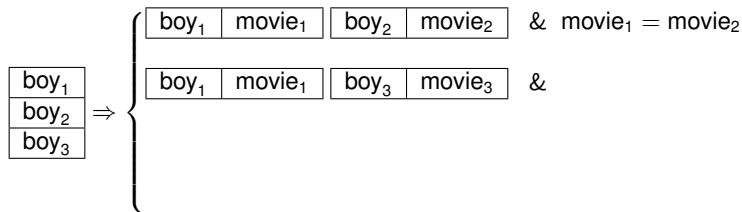


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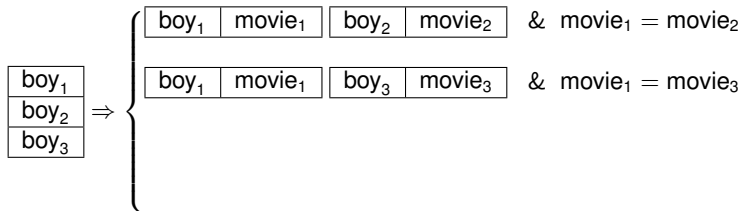


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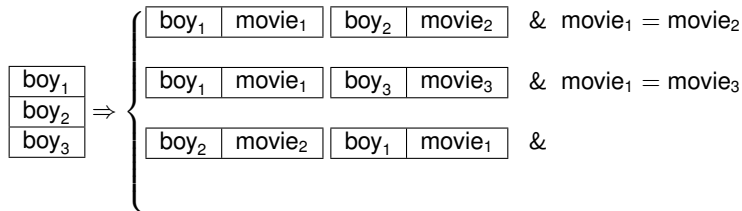


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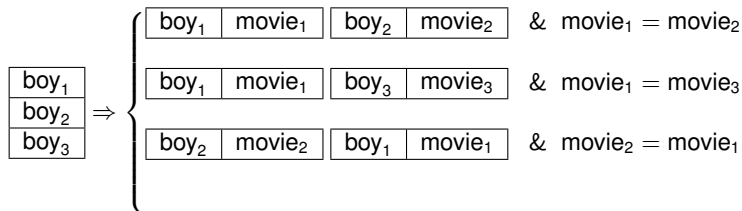


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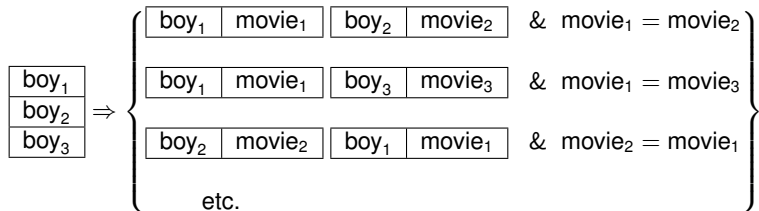


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Assumption 1: *Same is ambiguous*

Same[2]: relates parts of a plural individual to one entity by a binary relation R

Dowty, 1985, Barker, 2007

(16) $\left\{ \begin{array}{l} \text{The boys} \\ \text{All the boys} \end{array} \right\}$ saw the same[2] movie.



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- plural individual = the boys
- R = saw movie
- same[2]:
‘saw movie’ relates any two boy atoms to the same entity



Assumption 1: *Same* is ambiguous

Sentence-internal reading with **same**[1]:

- all the work is done by the distributive quantifier (the licensor)



Assumption 1: *Same* is ambiguous

Sentence-internal reading with **same[1]**:

- all the work is done by the distributive quantifier (the licensor)

Sentence-internal reading with **same[2]**:

- all the work is done by *same*



Assumption 2: *Each* requires differentiation

Tunstall, 1998: *Each* needs “differentiated” events in its scope

- (17) Jake photographed $\left\{ \begin{array}{l} \text{\#each student} \\ \text{every student} \\ \text{all the students} \end{array} \right\}$ in the class, but
not separately.



Assumption 3: Ordered readings for *The*

COLLECTIVE >> CUMULATIVE >> DISTRIBUTIVE

- (18)
- a. The boys elected the representative.
 - b. The boys hugged the girls.
 - c. The boys had a sip of juice.

Brooks and Braine, 1996, Frazier, Pacht, and Rayner, 1999,
Dotlačil and Brasoveanu, in prep.



Accounting for generalizations

The is interpreted collectively by default, so incompatible with *same*:

(19) # The boys elected the same president.



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- and for full-sentence readings times in surface scope

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Each requires differentiation:

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Hence:

- **Each** > **All** for reading times on *same* in surface scope

(24) Each/all the young women visited the same shop in...

- and for full-sentence readings times in surface scope

(25) Each/all the young women visited the same shop in...



Accounting for generalizations

No difference in full-sentence reading times between **Inverse scope** and **Surface scope** for **All**, hence:

- no evidence for processing costs of covert scoping operations



Accounting for generalizations

- **Inverse scope** > **Surface scope** for **Each** and **The** for full-sentence reading times

(26) The same young woman visited each shop / the shops. . .



Accounting for generalizations

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- **Each, The** > **All** for reading times on QUANT in inverse scope

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(27) The same young woman visited each shop / the shops . . .

Each and **The** (unlike **All**) force disambiguation of **same**:

- *same*[1] for **Each**
- *same*[2] for **The**



Accounting for generalizations

- **Inverse scope** > **Surface scope** for **Each** and **The** for full-sentence reading times

(26) The same young woman visited each shop / the shops. . .

- **Each, The** > **All** for reading times on QUANT in inverse scope

(27) The same young woman visited each shop / the shops . . .

Each and **The** (unlike **All**) force disambiguation of **same**:

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- *same*[2] for **The**

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Late disambiguation takes extra time
(Clifton and Staub, 2008)



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- Surface-scope slowdown on **Each** and **The**, as compared to **All**, because of lexical incompatibility with **same**



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