



# The realization of scalar inferences: Context sensitivity without processing cost

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## Processing of meaning

### Different kinds of meaning:

- Meaning inherent to a word/phrase (**semantics**)
- What a person wants to express with that word/phrase (**pragmatics**)

How are these kinds of meaning negotiated during comprehension?

## Case in point: scalar inference

**Some of** has both semantic and pragmatic readings:

- 1) "Some of the students are hard-working."
  - "At least one [possibly all] of the students is hard-working."  
*semantic reading*
  - "At least one, but **not all**, of the students are hard-working."  
*pragmatic reading (scalar inference)*

## How are scalar inferences realized?

- **Default accounts** (Levinson, 2000):
  - Effortlessly, immediately, and in all contexts
- **Context-driven accounts** (Noveck & Sperber, 2007):
  - Effortfully, at a delay, and only in relevant contexts
- **Constraint-based account** (Degen & Tanenhaus, 2011):
  - Effortlessly and rapidly if sufficient contextual cues are available, otherwise effortfully and slowly

## Investigating scalar inferencing with self-paced reading

### Breheeny, Katsos, & Williams (2006)

- **Upper-bounded (inference-supporting context):**
    - Mary asked John whether he intended to host all of his relatives in his tiny apartment. John said he intended to host some of his relatives. The rest would stay in an apartment.
  - **Lower-bounded (inference-nonsupporting context):**
    - Mary was surprised to see John cleaning his apartment and she asked the reason why. John said he intended to host some of his relatives. The rest would stay in an apartment.
- UB > LB**      **UB < LB**
- "The rest" is read faster in upper-bounded context because inference has been realized
  - "Some of his relatives" is slower in upper-bounded context because realizing the inference is effortful
    - But there are other differences in context (Huang & Snedeker, 2009) and slowdown could be due to repeated noun penalty (Hartshorne & Snedeker, submitted)

### Hartshorne & Snedeker (submitted)

- Facilitation for "the rest" only with sufficient lag (~2500 ms) after quantifier

**Questions for the present study:** Does inferencing trigger a processing cost at the quantifier (Breheeny et al., 2006)? Does it only occur at long lag times (Hartshorne & Snedeker, submitted)?

## Methods

• **Materials:** 48 target vignettes, contrasting Context (upper-bound vs. lower-bound) and Explicitness (*some* vs. *only some*):

• **Some vignette:** Mary was preparing to throw a party for John's relatives. / She asked John whether (*all of them/any of them*) were staying in his apartment. / John said that / some of them / were. / He added / that / the rest / would be / staying / in a hotel.

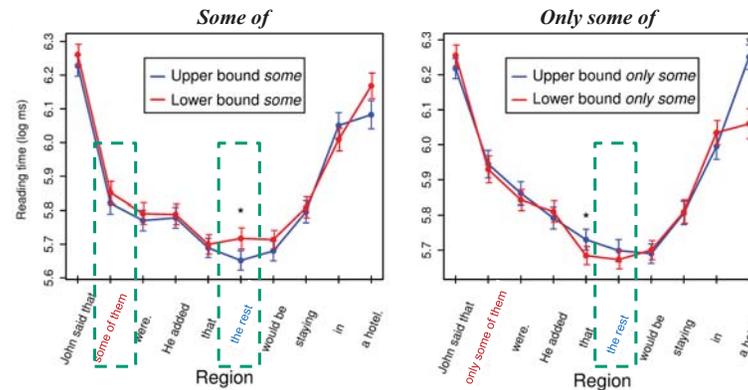
• **Only some vignette:** Mary was preparing to throw a party for John's relatives. / She asked John whether (*all of them/any of them*) were staying in his apartment. / John said that / only some of them / were. / He added / that / the rest / would be / staying / in a hotel.

• **Fillers:** 48 as above but without "the rest"; 48 with "all of" in the critical quantifier position (and without "the rest"); 48 with other quantifiers in the critical quantifier position

• **Participants:** 29 native English speakers (20 women; ages 18-56, median 19)

• **Procedure:** Non-cumulative moving-window self-paced reading, comprehension questions on 33% of trials

## Results



### Reading times at the rest:

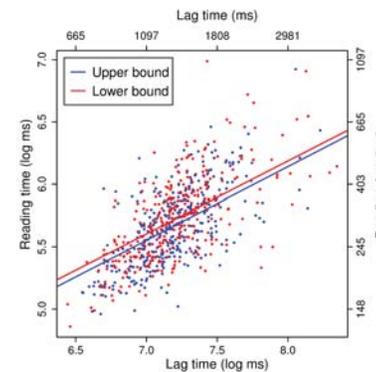
- Faster in upper-bounded contexts than lower-bounded contexts
- Confirms that the inference was context-dependent

### Reading times at some of them:

- No difference between contexts

### Lag time effect:

- No relationship between context effect and lag time (amount of time between "some of them" and "the rest")—context effect present across full range of lag times



## Discussion

### Reading times at "the rest":

- Inference was not realized (or was cancelled) in lower-bounded context, but was realized in upper-bounded context
- Consistent with predictions of all accounts
- Facilitation emerged regardless of lag time

### Reading times at "some of them":

- No evidence for extra processing cost when inference is realized
  - Slowdown in Breheeny et al. (2006) may have been due to other factors
- Inconsistent with context-driven accounts (which predict processing cost)
- Potentially consistent with default accounts (which predict no processing cost)
- Consistent with constraint-based account (which predicts no processing cost if contextual cues are strong)

### Different contextual manipulations yield different cue strengths?

| Study                             | Context manipulation  | Reading time slowdown at quantifier? |
|-----------------------------------|-----------------------|--------------------------------------|
| Present study                     | Information structure | <b>NO</b>                            |
| Breheeny et al. (2006)            | Information structure | (Yes; perhaps due to other factors)  |
| Lewis & Phillips (2012)           | Information structure | <b>NO</b>                            |
| Hartshorne & Snedeker (submitted) | Entailment polarity   | <b>NO</b>                            |
| Bergen & Grodner (2012)           | Epistemic state       | <b>YES</b>                           |

### Conclusions:

- Few experiments show direct evidence for processing cost in realizing scalar inference; overall pattern of results is most consistent with constraint-based accounts
- Will be worthwhile to test for processing costs using other measures in the future

## References

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