The realization of scalar inferences: Context sensitivity without processing cost

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Different kinds of meaning:
- **Semantic** (Levinson, 2000):
  - Effortlessly, immediately, and in all contexts
- **Pragmatic** (Noveck & Sperber, 2007):
  - Effortfully, at a delay, and only in relevant contexts

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

**Breheny, 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 that 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.

**Hartshorne & Snedeker (submitted)**
- Facilitation for "the rest" only with sufficient lag (~2500 ms) after quantifier

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

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.

Results

**Some of**
- Upper bound only some
- Lower bound some

**Only some of**
- Upper bound only some
- Lower bound some

**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 Breheny 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?

<table>
<thead>
<tr>
<th>Study</th>
<th>Context manipulation</th>
<th>Reading time slowdown at quantifier</th>
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</thead>
<tbody>
<tr>
<td>Present study</td>
<td>Information structure</td>
<td>NO</td>
</tr>
<tr>
<td>Breheny et al. (2006)</td>
<td>Information structure</td>
<td>(Yes; perhaps due to other factors)</td>
</tr>
<tr>
<td>Lewis &amp; Phillips (2012)</td>
<td>Information structure</td>
<td>NO</td>
</tr>
<tr>
<td>Hartshorne &amp; Snedeker (submitted)</td>
<td>Entailment polarity</td>
<td>NO</td>
</tr>
<tr>
<td>Bergen &amp; Grodner (2012)</td>
<td>Epistemic state</td>
<td>YES</td>
</tr>
</tbody>
</table>

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

- Hartshorne & Snedeker (submitted).
- Hartshorne & Snedeker (2009). "The rest" is read faster in upper-bounded context because inference has been realized.
- Miyahara & Sperber (2007). "The rest" is read faster in upper-bounded context because inference has been realized.

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