Memory in Presupposition?

Anaphoric presupposition triggers such as again and too are thought to establish a dependency relationship between the trigger and its presupposed content.

- e.g. Beck (2007), Heim (1992), Kripke (1990/2009), van der Sandt (1992), among others.
- Like other anaphoric dependencies, establishing presuppositional dependencies likely relies on memory processes. There are three possibilities:
  1. Discourse content may be actively maintained in working memory.
  2. Previous experimental work suggests that the processing of presuppositions exhibits a locality bias (Kim 2015), suggesting a serial search retrieval mechanism.
  3. However, presupposition triggers like again have been reported to be rapidly sensitive to presupposition violations (Tiemann et al., 2015), suggesting a direct access retrieval mechanism.

Hypotheses & Predictions

These three possibilities may be distinguished by differences in the availability and retrieval speed of the presupposed content.

- If actively maintained → there should be no difference in either availability or retrieval speed as dependency length increases.
- If retrieved → availability should be reduced as dependency length increases.
- If not via direct access → retrieval speed should be slowed as dependency length increases, indicating serial search (McElree, 2000).

Experiment 1: Again

Speeded acceptability judgement (N = 34) on MTurk.
- 96 items: Content (Explicit vs Inferred), Context (Different vs Same VPs), Distance (Zero vs One vs Two)
- Sample items:
  - Explicit: Beth went diving/yesterday. […] […] Today, she went diving again.
  - Inferred: Beth got divorced/yesterday ten years ago. […] […] This year, she got married again.

Analysis

- Score analysis:
  - Participants were more accurate at resolving the presuppositional dependency with Explicit content compared to Inferred content (t = 2.661, p < 0.01).
  - But the critical factor of distance played no role, suggesting no availability differences.

Diffusion model analysis:

- No differences in availability (Explicit: τa = 1.408, τn = 1.006; Inferred: τa = 1.004, τn = 0.926).
- Hint of retrieval speed differences (Explicit: τ = 2.423, n = 0.562; Inferred: τ = 1.872, n = 0.926).
- Taken together, the interaction between Distance and VP type lends support for memory retrieval in the processing of again.

Confounds:

- The use of pronouns in the final clause may have already activated memory search.
- Maximized presupposition & temporal adverbials → upcoming materials may be predictable.

Experiment 2: Too

Acceptability judgement (N = 60) on MTurk.
- Based on a 7-point Likert scale
- 64 items: VP (Different vs Same), Distance (Near vs Far), Trigger (Too vs No Too)
- Sample items:
  - Different: If the editor plagiarized, then everyone at the publishing house would be shocked to hear that the critics (Hyponym too).
  - Same: If the editor plagiarized, then everyone at the publishing house would be shocked to hear that the critics plagiarized (too).

Analysis

- A significant interaction between distance and context (τ = 3.366, p < 0.01).
- No Trigger: main effects of distance (τ = 10.837, p < 0.01) and context (τ = 7.953, p < 0.01).
- Too Trigger: a distance effect only in the Same VP condition (τ = 6.348, p < 0.01), but not in the Different VP condition (τ = 0.476, p = 0.634).
- This finding of distance effects suggests that there are memory retrieval processes at play.

Reaction times:

- In the Near condition, sentences with too elicited longer response times (~870 ms) compared to sentences without too in the Same VP condition, where the presupposition is satisfied.
- This suggests that successful presupposition retrieval and subsequent discourse update may be costly.

Experiment 3: Too

Speeded acceptability judgement (N = 64) on MTurk.
- Same materials as Experiment 2
- An experimenter-paced, phrase-by-phrase sentence reading task followed by an end of sentence acceptability judgment (N = 60) on MTurk

Analysis

Acceptability ratings:

- A significant interaction between distance and context (τ = 3.366, p < 0.01).
- No Trigger: main effects of distance (τ = 10.837, p < 0.01) and context (τ = 7.953, p < 0.01).
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General Discussion

Key findings:

- Our results support the idea that the processing of anaphoric presupposition triggers involves memory retrieval processes.
- In particular, the comprehension of the presupposition of too favors a local antecedent in terms of accuracy but not retrieval speed, supporting a content-addressable, direct access mechanism.

Implications:

- Retrieval of the presupposed content of too by a direct access mechanism fits well with evidence for other types of linguistic dependencies, such as pronoun resolution (Foraker & McElree, 2007), VP ellipsis (Martin & McElree, 2008), and shicinc (Martin & McElree, 2011).
- These findings contribute to a growing body of experimental work on the processing of discourse dependencies and raise questions of whether other types of presupposition triggers also initiate the same memory retrieval process.

Remaining questions:

- What cues are being used during the retrieval process of too?
- Are the hints of difference in the τ parameter ephemeral, or are they related to memory processes?
- If the latter, are they related to memory access via serial search, or do they indicate memory retrieval of the stored content (Wagers & Phillips, 2014)?
- What are the processing costs for memory retrieval and presupposition update? How are these related to presupposition accommodation, where memory retrieval will fail but the context can still be updated?

Table 1: mean values for experimental conditions (too vs no too)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Near</th>
<th>Far</th>
<th>Same</th>
<th>Different</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too</td>
<td>1.95</td>
<td>2.09</td>
<td>1.80</td>
<td>2.00</td>
</tr>
<tr>
<td>No Too</td>
<td>1.93</td>
<td>1.97</td>
<td>1.85</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Table 2: mean values for parameter fits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>τn</th>
<th>τa</th>
<th>δ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too</td>
<td>1.95</td>
<td>1.408</td>
<td>0.16</td>
<td>0.93</td>
</tr>
<tr>
<td>No Too</td>
<td>1.93</td>
<td>1.004</td>
<td>0.44</td>
<td>0.84</td>
</tr>
</tbody>
</table>

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