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Demanding an Explanation: Implicit Causality Biases in Discourse Interpretation

Hannah Rohde & Andrew Kehler

Abstract

1. Goal
To clarify the effects of IC biases on discourse interpretation by distinguishing (i) next-mention biases and (ii) biases toward upcoming coherence relations.

2. Previous work on Implicit Causality
Passage completions: strong IC bias to particular referent with 'because' prompt (Caramazza, Grober, Garvey, Yates 1974; McKoon, Greene, Ratcliff 1993; inter alia)

(1) a. IC-1 John annoyed Mary because ____________ . [bias to NP1-John]
   b. IC-2 John scolded Mary because ____________ . [bias to NP2 Mary]
   c. Non-IC John babysat Mary because ____________ . [mixed biases]

However, next-mention bias reduced/eliminated with full-stop prompt (Au 1986; inter alia)

(2) a. IC-1 John annoyed Mary ____________ .
   b. IC-2 John scolded Mary ____________ . [mixed biases]
   c. Non-IC John babysat Mary.

What role of 'because'?
- Modifying salience of event participants directly (Stevenson, Knott, Oberlander, & McDonald 2000)
- Signaling an Explanation coherence relation (Hobbs 1979, Kehler 2002)

3. Using coherence to mode next-mention biases
We generalize Rohde, Kehler, & Elman's (2007) pronoun model to next mention: Biases towards upcoming coherence relations (CRs) combine with biases for which event participant will be mentioned again, conditioned on coherence

(3) P(next_mention = referent) = P(PCR|Explanation) * P(next_mention = referent|CR)

4. Story continuation experiment
2 x 3 design: verb type (IC vs. Non-IC) x continuation type (full stop vs. 'because' vs. dialog prompt – dialog results not discussed here)

Task: construct natural continuation to context sentence and prompt
Materials: 40 IC verbs (20 IC-1, 20 IC-2) and 40 Non-IC verbs

Evaluation: judges annotated for next mention & coherence relation

6. IC-1 Results
Next-mention biases were statistically indistinguishable when only 'because' prompts and freely generated Explanations were considered (F(1,70)<0.0221, p=0.8822; F(1,19)=0.032, p=0.86).

Prompt: 'because'

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Exp</th>
<th>Res</th>
<th>Elab</th>
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<tbody>
<tr>
<td>Because</td>
<td>56</td>
<td>24</td>
<td>55</td>
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p(next_mention = NP1 | 'because') = p(next_mention=NP1 | Explanation)

7. IC-2 Results
Again, next-mention biases statistically indistinguishable when only Explanations are considered ('because' or freely generated) (F(1,61)<1, p=0.982; F(1,36)<1.4598, p=0.2348).

Prompt: 'because'

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<tbody>
<tr>
<td>Because</td>
<td>13</td>
<td>30</td>
<td>46</td>
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</tbody>
</table>

p(next_mention = NP1 | 'because') = p(next_mention=NP1 | Explanation)

8. Non-IC Results
Again, next-mention biases statistically indistinguishable when only Explanations are considered 'because' or freely generated (F(1,61)<1, p=0.982; F(1,36)<1.4598, p=0.2348).

Prompt: full stop

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<th>Elab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Because</td>
<td>65</td>
<td>34</td>
<td>35</td>
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9. A new IC bias
IC verbs create an expectation regarding the direction the discourse is likely to take – specifically a bias towards an upcoming Explanation

Findings for full-stop prompt: IC verbs yield more Explanation continuations than do Non-IC verbs

10. Conclusions
Like Rohde et al.'s results, overall statistics conceal a consistent system of stronger biases once coherence relations are conditioned on. In contrast to previous results:
- Connective alone does not affect referent salience – mediated by coherence
- There are actually two strong biases that differentiate IC and Non-IC verbs: P(PCR|Explanation) is high for IC-1 and IC-2

The presence of a second bias had gone unnoticed because previous studies had not categorized their data by coherence.

References

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