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Abstract

Demanding an Explanation: Implicit Causality Biases in Discourse Interpretation

Hannah Rohde & Andrew Kehler

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

Previous passage-completion studies report strong biases regarding who will be mentioned next following implicit causality (IC) verbs with a ‘because’ prompt. However, these biases are reduced/eliminated with a full-stop prompt.

[1] a. John scolded Mary because ________. [strong bias to Mary]

Proposal: In light of recent results showing two types of coherence-driven expectations in pronomin interpretation, we compare responses to contexts like (1a-b): We predict that IC biases depend both on expectations about upcoming continuation types (P(coherence)) and on biases for which event participant will be mentioned again conditioned on coherence (Proposition 1 coherence).

Results: By categorizing responses by coherence relation, we localize the previously reported IC bias to Explanation relations. We find an additional IC bias concerning P(Explanation). This bias has gone unnoticed because previous work has not categorized responses by coherence.

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.

\[
P(\text{next mention} | \text{reference}) = \sum P(\text{CR}) \cdot P(\text{next mention} | \text{reference}) \cdot P(\text{CR})
\]


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

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’

p(next_mention = NP1 | ‘because’) = p(next_mention = NP1 | Explanation)

[6] IC-1 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’

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

p(next_mention = NP1 | ‘because’) = p(next_mention = NP1 | Explanation)

[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

7. IC-2 Results

Again, next-mention biases statistically indistinguishable when only Explanations are considered (‘because’ or freely generated) (F(1,73) = 0.4424, p = 0.5081; F(1,19) = 1.2235; p = 0.2825)

Prompt: ‘because’

p(next_mention = NP1 | ‘because’) = p(next_mention = NP1 | Explanation)

[7] Prompt: full stop

p(next_mention = NP1 | ‘because’) = p(next_mention = NP1 | Explanation)

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(‘because’ = Explanation) is high for IC-1 and IC-2

P(next_mention = NP1 | Explanation) is high for IC-1 and low for IC-2

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

10. Conclusions

References


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