Demanding an Explanation: Implicit Causality Biases in Discourse Interpretation
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Abstract

Problem: 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. 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 (Carmazana, 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).

Prompt: full stop

What role of ‘because’?
• Modifying salience of event participants directly (Stevenson, Knott, Overlander, & 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

(P(next_mention = referent) = \sum \chi_{CR}(P(next_mention = referent)\& CR)

P(CR=Explanation) = 1 with ‘because’, but P(CR=Explanation) < 1 in full-stop

Next-mention bias, P(next_mention | Explanation), is predicted to remain constant across Explanations – with both ‘because’ and full-stop Explanations.

4. Story continuation experiment

2 x 3 design: verb type (IC vs. Non-IC) \times \text{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

5. 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)

Because
Exp Res Elab
P(subject) 85 85 66

6. 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)

Because
Exp Res Elab
P(subject) 56 37 24

7. Non-IC Results

Prompt: ‘because’

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

8. 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

9. 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(CR = 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.

References

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