

Explanations over Consequences: Explaining Implicit Causality and Consequentiality Biases

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In psycholinguistics, the phenomena of *Implicit Causality* (I-CAUS) and *Consequentiality* (I-CONS) have received much attention for their *coreference* properties, that is, whether the sequence *Peter VERB-ED Mary because/and so...* is biased towards subject- or object-coreferent continuations ([1-11]). For instance, Stimulus-Experiencer (*fascinate*) and Experiencer-Stimulus (*admire*) verbs display strong I-CAUS biases (*because...*) to Stimulus arguments and I-CONS biases (*and so...*) to Experiencers. Consequently, lexical/verb-based accounts ([10-11]) have provided unified accounts of I-CAUS and I-CONS based on shared argument structure. On these *One-Mechanism Accounts*, explanations and consequences specify entities introduced by the verb. More precisely, explanations typically specify the sub-lexical causing eventuality (a property of or event associated with the Stimulus): *Peter admired Mary because she* Conversely, consequences target the caused eventuality (a property of the Experiencer): *Peter admired Mary and so he*

Besides coreference, however, [12] showed that I-CAUS/I-CONS verbs are also *coherence*-biased: Prompts without a connective (*Peter VERB-ED Mary. . . .*) lead to the production of explanations over consequences ([12]). Thus, there is a discrepancy between strong coreference biases for both *because* and *and so* versus an overall coherence bias towards explanations. Based on this, we propose the *Two-Mechanism-Account*: Whereas I-CAUS coreference and the coherence bias are both driven by underspecified, explanation-triggering slots in these verbs, I-CONS is governed by the Contiguity Principle ([13]). This principle involves general discourse mechanisms from which we infer a subsequent eventuality, separate from the lexically specified state of the I-CAUS/I-CONS verb ([13-14]). It comes into play whenever an explicit *and so* overrides the preference to fill underspecified explanatory slots.

Four written production experiments in German each employed 20 Stimulus-Experiencer and 20 Experiencer-Stimulus verbs in different *name₁ verb-ed name₂* sentence frames (see Materials). These verbs display strong I-CAUS and I-CONS bias and trigger explanations without connectives ([3,10,12,15]). First, **Exp. 1** confirmed the mirror I-CAUS and I-CONS biases from previous research. **Exp. 2 and 3** investigated continuations after full stops (with more uniform verb classes than [12]). **Exp. 2** found a clear preference for explanations over consequences after *Name₁ verb-ed Name₂* prompts. **Exp. 3** expanded this design by enforcing continuations about either Stimulus or Experiencer ([16]). *One Mechanism Accounts* predict continuations about the Experiencer to trigger consequences, as I-CONS is inherently tied to Experiencer arguments on that account. Still, continuations focusing on the Experiencer were mostly explanations. Exp. 2 and 3 thus confirmed *Two Mechanisms*: There is a strong preference for explanations over consequences – even in conditions consistent only with I-CONS. Finally, **Exp. 4** provided more direct evidence for *Two Mechanisms*. Prompts enforced bias-congruent or -incongruent continuations for I-CAUS and I-CONS, respectively: *Peter annoyed Mary because/and so he/she....* We annotated whether continuations specified semantic properties of the Stimulus or Experiencer ([15]). On *One-Mechanism* accounts, bias-congruent I-CAUS prompts should lead to specifications of Stimulus properties and I-CONS prompts should specify the psychological state of the Experiencer. However, participants only provided such specifications in *because* continuations. For I-CONS, end-state specifications were almost never provided (<1%). Instead, consequences disjoint from and subsequent to the experiencer end-state were provided, in line with the Contiguity Principle. What is more, only for *because* prompts a difference in continuation strategy between bias-congruent and -incongruent conditions could be observed.

Conclusions: I-CAUS is grounded in verb semantics triggered by semantic underspecification ([11,15]). I-CONS, however, relies on a general Contiguity Principle. I-CONS bias is found

because experiencers are holders of end-point states from which discourse continues in the case of consequences. However, it is only found for explicit marking, which overrides explanatory preferences in the verb. The results have intriguing implications for real-time comprehension ([17]).

Materials and descriptive statistics (GLMER analyses not reported here)

Experiment 1 (N=52)

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| <p>1. <i>Stim-Exp, IC, NP1 bias: 87% NP1</i>
Peter störte Maria, weil ...
'Peter annoyed Mary because ...'</p> <p>2. <i>Stim-Exp, ICons, NP2 bias: 95% NP2</i>
Peter störte Maria, sodass ...
'Peter annoyed Mary so ...'</p> | <p>3. <i>Exp-Stim, IC, NP2 bias: 96% NP2</i>
Peter bewunderte Maria, weil ...
'Peter admired Mary because ...'</p> <p>4. <i>Exp-Stim, ICons, NP1 bias: 78% NP1</i>
Peter bewunderte Maria, sodass ...
'Peter admired Mary so ...'</p> |
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Experiment 2 (N=52)

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| <p>1. <i>Stim-Exp: 58% Expl.; 21% Cons.; 6% Contrast</i>
Peter störte Maria. ...</p> | <p>2. <i>Exp-Stim: 60% Expl.; 15% Contr.; 10% Cons.</i>
Peter bewunderte Maria. ...</p> |
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Experiment 3 (N=52)

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| <p>1. <i>Stim-Exp, Subject focus, IC congruent: 84% Expl(anations), 4% Cons(equences)</i>
Peter störte Maria. ...</p> <p>2. <i>Stim-Exp, Object focus, ICons congruent: 43% Expl., 44% Cons.</i>
Peter störte Maria. ...</p> | <p>3. <i>Exp-Stim, Subject focus, ICons congruent: 49% Expl., 32% Cons.</i>
Peter bewunderte Maria. ...</p> <p>4. <i>Exp-Stim, Object focus, IC congruent: 77% Expl., 3% Cons.</i>
Peter bewunderte Maria. ...</p> |
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Experiment 4 (N=56); Proportions of verb-semantically triggered specifications

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| <p>1. <i>Stim-Exp, IC bias congruent: 97%</i>
Peter störte Maria, weil er ('he') ...</p> <p>2. <i>Stim-Exp, IC bias incongruent: 4%</i>
Peter störte Maria, weil sie ('she') ...</p> <p>3. <i>Stim-Exp, ICons bias incongruent: 1%</i>
Peter störte Maria, sodass er ('he') ...</p> <p>4. <i>Stim-Exp, ICons bias congruent: 1%</i>
Peter störte Maria, sodass sie ('she') ...</p> | <p>5. <i>Exp-Stim, IC bias congruent: 98%</i>
Peter bewunderte Maria, weil sie ('she') ...</p> <p>6. <i>Exp-Stim, IC bias incongruent: 9%</i>
Peter bewunderte Maria, weil er ('he') ...</p> <p>7. <i>Exp-Stim, ICons bias congruent: 0.4%</i>
Peter bewunderte Maria, sodass er ('he') ...</p> <p>8. <i>Exp-Stim, ICons bias incongruent: 0%</i>
Peter bewunderte Maria, sodass sie ('she') ...</p> |
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References

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