**Two sides of different coins: Implicit Causality and Explicit Consequentiality**

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In the study of sentence processing, *Implicit Causality* (IC) and *Consequentiality* (ICons) biases have enjoyed significant attention as expectation-based phenomena (a.o. [1-8]). Language production research has found a 'mirror bias' for a number of the involved verb classes, e.g. stimulus-experiencer (*annoy*) and experiencer-stimulus (*admire*) verbs. Thus, causality prompts (*because*) display a stimulus bias, whereas consequentiality prompts (*so (that)*) display an experiencer bias ([3]/[9],[10]; cf. Exp. 1 stimuli). Consequently, [9,10,11] argued for a *Contingency Mirror Hypothesis*: What triggers the IC bias, should also be responsible for ICons, causes and consequences being part of one relation. Although [9,10] are 'verb-based accounts' and [11] is based on world knowledge, they both predict causes and consequences to be equally available.

We propose the *Causal Asymmetry Hypothesis*, contending that different mechanisms apply to IC and ICons. For IC, verb semantics triggers causal specifications, involving a contingency relation with an underspecified cause (i.e., *what is it about John that annoys Mary?*;[12,13]). We assume no parallel mechanism for consequences, as the effect is already specified in the verb (i.e., *annoying* causes *being annoyed*).

We conducted three story continuation experiments in German. All experiments employed the same set of 20 stim(ulus)-exp(eriencer) plus 20 exp(eriencer)-stim(ulus) verbs in *name verbed name* sentence frames with two referents of different gender, and gender order counterbalanced in a within-participants and items design. **Exp. 1** (N=32) established IC vs. ICons bias with *weil* 'because' and *sodass* 'so that' prompts, respectively. As expected, exp-stim verbs were strongly IC biased towards the object (96% object bias), but showed the opposite ICons bias (74% subject bias). Stim-exp verbs showed the reverse pattern (IC: 86% subject bias; ICons: 93% object bias). GLMER analyses revealed a significant crossover interaction, but also a significant difference in bias strength with an overall weaker bias for ICons than IC. **Exp. 2** (N=32) investigated preferred patterns for continuations in terms of discourse relations and bias in free production after a full stop, following [14] for discourse annotation, but using more uniform verb classes. The experiment revealed a clear asymmetry between the probabilities to continue with an explanation (exp-stim verbs: 68%; stim-exp verbs: 65%) rather than with a consequence (exp-stim verbs: 10%; stim-exp verbs: 22%). In a GLMER analysis this general asymmetry was reflected by a significant intercept. However, within explanations and consequences the same coreference biases as in Exp. 1 were found (as opposed to the more heterogeneous verb classes in [14]). The asymmetry between discourse relations in Exp. 2 is clearly consistent with *Causal Asymmetry*. However, Exp. 2 only shows that the need for an explanation is stronger than the need to elaborate on the consequences of an eventuality. In **Exp. 3** (N=32) participants provided continuations after a full stop about one highlighted referent ([16]) in a within design. The *Contingency Mirror Hypothesis* would predict continuations about the ICons-biased referent to also trigger consequences rather than causes. Discourse relations were coded as in Exp. 2. Forced continuations for NP1 with stim-exp verbs and for NP2 with exp-stim verbs were consistent with IC but inconsistent with ICons. Accordingly, participants overwhelmingly produced explanations (exp-stim: 77%; stim-exp: 86%) but almost no consequences (exp-stim: 2%; stim-exp: 1%). However, the crucial result was that even in ICons-consistent conditions, continuations were still mostly explanations rather than consequences (exp-stim NP1: 53% explanations vs. 25% consequences; stim-exp NP2: 48% explanations vs. 41% consequences). Inferential statistics revealed that except for the latter condition, all conditions triggered significantly more explanations than consequences. This finding is clear evidence in favour of *Causal Asymmetry*: The preference to provide explanations for these verbs is strong enough to show up in conditions consistent only with ICons.

**Conclusions:** We follow [12,13], assuming that IC can be grounded in verb semantics triggered by semantic underspecification. ICons, however, is assumed to rely on world-knowledge driven inferences and ICons bias to be triggered only by explicit marking in discourse.

## Materials

### Experiment 1

1. *IC, NP1 bias*
   Peter störte Maria, weil . . .
   'Peter annoyed Mary because . . . '
2. *ICons, NP2 bias*
   Peter störte Maria, sodass . . .
   'Peter annoyed Mary so . . . '
3. *IC, NP2 bias*
   Peter bewunderte Maria, weil . . .
   'Peter admired Mary because . . . '
4. *ICons, NP1 bias*
   Peter bewunderte Maria, sodass . . .
   'Peter admired Mary so . . . '

### Experiment 2

1. Peter störte Maria. . . .
   'Peter annoyed Mary. . . . '
2. Peter bewunderte Maria. . . .
   'Peter admired Mary. . . . '

### Experiment 3

1. *Subject focus, IC NP1/ICons NP2*
   Peter störte Maria. . . .
   'Peter annoyed Mary.'
2. *Object focus, IC NP1/ICons NP2*
   Peter störte Maria. . . .
   'Peter annoyed Mary.'
3. *Subject focus, IC NP2/ICons NP1*
   Peter bewunderte Maria. . . .
   'Peter admired Mary'
4. *Object focus, IC NP2/Icons NP1*
   Peter bewunderte Maria. . . .
   'Peter admired Mary'

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