On the interaction of implicit verb causality and topic continuation

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We investigate the interaction of two factors, each of which is known to affect discourse coherence: (i) sentence transitions distinguished within Centering theory and (ii) the continuation bias induced by processing an implicit causality verb. As regards (i), we consider two out of four sentence transitions distinguished within Centering Theory, center continuation (C-CONTINUATION) versus (smooth) center shift (C-SHIFT). We take these two transitions to correspond to topic continuation versus topic shift, respectively. We assume that after a C-CONTINUATION from U_{i-1} to U_i, a C-CONTINUATION from U_i to U_{i+1} is more likely to occur (Grosz et al., 1995; completion studies) and is easier to process than a C-SHIFT (reading times studies). Here, we address completion studies. As regards (ii), we consider implicit causality verbs involving a stimulus s and an experiencer e. Sentences with implicit causality verbs, especially if continued with a connector like *because*, trigger explanations in term of s and hence continuations with s rather than e. Since there are *se*-verbs (s is subject) as well as *es*-verbs (s is object), preferred continuations with s involve an anaphoric relation to either the subject antecedent in case of *se*-verbs, cf. (1a), or to the object antecedent in case of *es*-verbs, cf. (1b).

1 a. *Nina$_s$ bothered Ferdinand$_e$ because she$_s$ constantly practiced the bagpipes.*
   b. *Nina$_e$ hated Ferdinand$_s$ because he$_s$ constantly practiced the bagpipes.*

Both continuations in (1) are CONGRUENT with the verb bias, as s is the subject of the explanation and e is not mentioned. With respect to our stimulus material we derive INCONGRUENT continuations from CONGRUENT continuations by subordinating CONGRUENT continuations under a matrix clause with e as subject, as in (2).

2 a. *Nina$_s$ bothered Ferdinand$_e$ because he$_e$ was annoyed that Nina constantly practiced the bagpipes.*
   b. *Nina$_e$ hated Ferdinand$_s$ because she$_e$ was annoyed that Ferdinand constantly practiced the bagpipes.*

INCONGRUENT continuations meet the verb bias as such, because they provide an explanation in terms of s; yet they violate the more general expectation that s figures as the topic or Cb of the target sentence. INCONGRUENT continuations of this type are frequently provided by participants when prompted to continue a sentence fragment with e (Bott & Solstad, 2014).

Material

We constructed 32 German experimental items to be used in a series of experiments. The basic design crosses the two factors *verb bias* (CONGRUENT vs. INCONGRUENT) and *transition* (C-CONTINUATION vs. C-SHIFT). The variation of the implicit causality verb in the pretarget sentence (*se*-verb vs. *es*-verb) and the gender of the subject pronoun in the target sentence (*she* or *he*) yielded the four conditions for each item, exemplified in (4) below. 32 implicit causality verbs, 16 *se*-verbs and 16 *es*-verbs, were selected from the inventory of Bott & Solstad (2014). *Se*-verbs were paired with *es*-verbs to implement the factor *verb bias* in the items. Verb pairs were used in two items each. Different from the examples in (1) and (2), pretarget and target sentence were realized as two consecutive sentences instead of subordinating the target with *because*. This was done to ensure that pretarget and target sentences instantiate the Centering transitions C-CONTINUATION and C-SHIFT. Due to the pronominalization rule of Centering (Grosz et al., 1995: 214), the pronominalized subjects in the pretarget and target sentence are determined as $Cb(U_i)$ and $Cb(U_{i+1})$.

The context was the same for all four variants of an item. It established one of two protagonists introduced in the first context sentence as the topic (or centre) of the discourse. The context of the sample item in (4), shown in (3), established Nina as the topic of the context discourse. In particular, Nina is the backward looking centre of the last context

sentence $Cb(U_{i-1})$. Thus the transition from the last context sentence U_{i-1} to the pretarget sentence U_i is a continuation since Nina is at the same time the most prominent forward looking centre $Cp(U_i)$.

3   *Weil weder Nina noch Ferdinand genug Geld für die Miete hatten, beschlossen sie, sich die Wohnung zu teilen. Nina fiel es nicht leicht, sich mit der Situation anzufreunden. Immerhin konnte sie die meiste Zeit tun, wonach ihr der Sinn stand. Nichts schätzte sie mehr als diese Freiheit.*

    'Since neither Nina nor Ferdinand had enough money to pay the rent on their own, they decided to share the apartment. It wasn't easy for Nina to get used to the situation. At least she could do whatever she wanted most of the time. She didn't appreciate anything more than this freedom.'

4   **Pretarget sentence U_i**   **Target sentence U_{i+1}**

a. C-CONTINUATION / CONGRUENT

    Sie störte Ferdinand immer mehr.   *Sie hatte nämlich damit begonnen, unentwegt Dudelsack zu üben.*
    'She bothered F. more and more.   For she had begun to constantly practice the bagpipes.'

b. C-SHIFT / CONGRUENT

    Sie hasste Ferdinand immer mehr.   *Er hatte nämlich damit begonnen, unentwegt Dudelsack zu üben.*
    'She hated F. more and more.   For he had begun to constantly practice the bagpipes.'

c. C-CONTINUATION / INCONGRUENT

    Sie störte Ferdinand immer mehr.   *Er hatte nämlich die Nase voll davon, dass Nina unentwegt Dudelsack übte.*
    'She bothered F. more and more.   For he was annoyed that Nina constantly practiced the bagpipes.'

d. C-SHIFT / INCONGRUENT

    Sie hasste Ferdinand immer mehr.   *Sie hatte nämlich die Nase voll davon, dass Ferdinand unentwegt Dudelsack übte.*
    'She hated F. more and more.   For she was annoyed that Ferdinand constantly practiced the bagpipes.'

Completion Studies

• **Control study A** w/o contexts: Pts complete the 32 pretargets (+ 48 fillers); pretargets are presented without contexts and targets. Completions are prompted with *weil* 'because'. The study determines the baseline of the proportion of CONGRUENT completions dependent on verb type (*se*-verb vs. *es*-verb) without context and with the most often used prompt.

• **Control study B** w/o contexts: as control study A except that completions are prompted with *Es war nämlich so, dass …* 'For it so happened that …'. The wording of the prompt differs from the wording in the stimuli in (4) in order to avoid prompts with a gap for the pronoun. The study aims at providing a second baseline with a prompt close to the stimuli in (4) for comparison to the baseline obtained in control study A and the main study.

• **Main study** with contexts: as control study B, except that the stimuli are presented together with the context. The study examines the interaction of topichood with implicit causality as it allows us to compare the relative amount of CONGRUENT completions when coincident with a C-CONTINUATION (*se*-verb) vs. a C-SHIFT (*es*-verb). If both factors induce some effect, the two factors *transition* and *verb bias* should interact. Condition 4a yields the most CONGRUENT completions because they coincide with C-CONTINUATIONs; condition 4d yields the fewest CONGRUENT completions because they coincide with C-SHIFTs. The amount of CONGRUENT completions should be intermediate in Conditions 4b and 4c. Whether 4b or 4c delivers more CONGRUENT completions depends on which of the two factors induces the stronger influence.

• **Persistence study with contexts and targets**. Pts provide a continuation for the complete stimuli exemplified in (3) + (4). The study examines the question whether the C-SHIFTs obtained in the main study are a local phenomenon with a subsequent re-shift to the previous topic or a global one with the shifted topic being continued afterwards.