Implicit Causality Influences the Choice of Anaphoric Expression
Torgrim Solstad\textsuperscript{1}, Oliver Bott\textsuperscript{2} & Anna Pryslopska\textsuperscript{2}

\textsuperscript{1}Centre for General Linguistics (ZAS), Berlin; \textsuperscript{2}University of Tübingen
solstad@zas.gwz-berlin.de, \{oliver.bott,anna.pryslopska\}@uni-tuebingen.de

In psycholinguistic research on (linguistic) cues for discourse expectations, Implicit Causality (IC) verbs have repeatedly been shown to increase the expectancy for and the likelihood of rementioning one of its two arguments in subsequent explanations (cf. Brown & Fish 1983, Ferstl et al. 2011). However, recently Fukumura & van Gompel (2010) and Rohde & Kehler (2014) have argued that this semantic-pragmatic property must be dissociated from the factors that influence how we refer to the preferred referent (e.g. pronoun vs. proper name). Rather, the choice of anaphoric expression is claimed to be influenced by structural properties such as subjecthood. Our paper contributes to this line of research by showing that IC does indeed influence the choice of anaphoric expression.

\textbf{Methods.} We employed the same methods and a similar design as Fukumura & van Gompel (2010) in their Exp. 1 (see the example items in (1)-(2)). Additionally, we included conditions in which the referents were of the same gender (Kaiser & Cherqaoui 2013; Rohde & Kehler 2014). Consequently, our experiment employed a $2 \times 2 \times 2 \times 2$ design with the factors (i) verb type (NP1 vs. NP2 bias), (ii) focus (subject- vs. object-continuations prompted), (iii) same- vs. different-gender referents and (iv) NP1 gender (female vs. male). The German items included 20 NP1-biased stimulus-experiencer (SE), and 20 NP2-biased experiencer-stimulus (ES) verbs in addition to 40 filler sentences. 32 German participants completed the experiment.

\textbf{Results.} A pretest established that both verb classes had clear biases above 90\%. In the main experiment there was a clear difference between continuations rementioning the subject and continuations rementioning the object referent (see Fig. 1). Coreference to the subject was almost always established with a personal pronoun: 100\% in the different-gender conditions irrespective of whether the verb was an SE- or an ES-verb and 97.4\% in the same-gender SE- and 94.9\% in the same-gender ES-conditions, respectively. Coreference to the object was often made with more complex anaphoric expressions than personal pronouns, and there was a difference between verb types. In a logit mixed effects model analysis, this pattern of effects was reflected by significant main effects of \textit{focus}, \textit{gender-sameness} and the interaction between \textit{verb type} and \textit{focus} (Wald’s $z = 2.4$, $p < .05$). To break down this interaction, we computed two models that analyzed the subject and the object focus conditions separately.

In the subject focus conditions, the only significant difference between conditions was a fixed effect of \textit{gender-sameness} which was due to the fact that only the same gender conditions triggered other forms than personal pronouns at all.

In the object focus conditions, the analysis revealed a significant interaction between \textit{verb type} and \textit{gender-sameness} (Wald’s $z = 2.7$, $p < .01$). Whereas there was no significant difference between SE- and ES-verbs in the different-gender conditions (SE: 93.5\% personal pronouns; ES: 89.5\% personal pronouns), the same-gender conditions showed a reliable \textit{verb type} effect (Wald’s $z = 2.9$, $p < .01$): After SE-verbs anaphoric forms other than personal pronouns were more likely than after ES-verbs (SE-verbs: 51.7\% personal pronouns; ES-verbs: 66.4\% personal pronouns). This is what would be expected if IC-bias bears an influence on anaphoric choice. In those cases where object reference has to be established working against the bias (SE-verbs), complex anaphoric forms are more likely than after verbs where reference and bias point in the same direction (ES-verbs). Interestingly, this effect was limited to cases of object reference with same-gender referents – a case not investigated in the studies mentioned above.

\textbf{Conclusions.} IC influences not only the likelihood of rementioning a particular referent, but also the choice of anaphoric expression. Our study thus suggests that models of reference...
should include semantic properties of the referents in predicting the choice of anaphoric expression, cf. the two different approaches suggested by Arnold (2008) and Kehler & Rohde (2014; see also the commentaries on their paper in the same volume).

**Figure 1.** Proportions of anaphoric expressions in the main experiment for es-verbs (panel (a)) and se-verbs (panel (b)); abbreviations: pers. pro. = personal pronoun, dem. pro. = (proximal) demonstrative pronoun, other = other anaphoric forms, same-gend. = same gender; diff.-gend. = different gender.

Sample ES and SE items (shown only for female NP1, bold face indicates which referent the continuation had to be about (= ‘focus’); materials translated from German):

**Experiencer-stimulus (ES) verb:**

1. a. Subject focus, different gender: Mary admired John, because . . .
   b. Object focus, different gender: Mary admired John, because . . .
   c. Subject focus, same gender: Mary admired Anne, because . . .
   d. Object focus, same gender: Mary admired Anne, because . . .

**Stimulus-experiencer (SE) verb:**

2. a. Subject focus, different gender: Mary amused John, because . . .
   b. Object focus, different gender: Mary amused John, because . . .
   c. Subject focus, same gender: Mary amused Anne, because . . .
   d. Object focus, same gender: Mary amused Anne, because . . .

**References**


