

Modeling Coreference in Contexts with Three Referents

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Coreference provides a measure of speakers' inferences and expectations about relationships that hold across sentences. Different approaches place different emphasis on the roles of meaning (Winograd 1972; Hobbs 1979) and form (Grosz et al. 1995)—two components which combine in the Bayesian Model put forward by Kehler et al. (2008). The Bayesian Model, in its strong form, posits the independence of a referent's predictability for re-mention and its likelihood of being mentioned with a pronoun. However, evidence regarding this independence is mixed. Here, we use a new context type to test (i) whether predictability influences pronominalization and (ii) whether Bayes Rule captures the relationship between pronoun interpretation and production.

A story continuation experiment (N=83) varied prompt type (pronoun vs. full-stop), to test participants' pronoun interpretations (1a), re-mention preferences (1b), and pronominalization rates (1b). We counterbalanced which referents were gender-matched (NP1&NP2, NP1&NP3, NP2&NP3).

- (1a) Adam scolded Diana for Russell. He _____ [pronoun-prompt condition]
(1b) Adam scolded Diana for Russell. _____ [full-stop condition]

We replicate two known patterns. First, the pronoun prompt yields more NP1 continuations than the full stop prompt ($\beta=1.52$, $p<.001$). Second, grammatical role influences pronominalization: the subject referent is preferentially re-mentioned with a pronoun. For question (i) on predictability~pronominalization independence, we compare referents' re-mention rates to the rates with which they are pronominalized. The re-mention rates of NP1 and NP2 do not differ ($\beta=0.22$, $p=.53$) but their pronominalization rates do ($\beta=-3.26$, $p<.001$); conversely, the re-mention rates of NP2 and NP3 differ ($\beta=1.12$, $p<.001$) but their pronominalization rates do not ($\beta=0.19$, $p<.42$). We thus find no evidence of any dependence between predictability and pronominalization.

For question (ii) on capturing the observed pronoun interpretation behavior, we follow Rohde and Kehler's (2014) methodology for computing interpretation estimates from the Bayesian Model and two alternative models. In contrast to prior work, the Bayesian Model is not the best fit for the observed pronoun interpretations. It is outperformed by the Mirror model, which posits that a speaker is licensed to use a pronoun to refer to a topical referent because the listener will interpret it to refer to that same topical referent. We are planning two follow-up studies to determine whether the difference between our result and previous work has more to do with the construction type or with the number of referents.

References

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