Bayesian Pronoun Interpretation (Kehler et al. 2008; Kehler & Rohde 2013, Rohde & Kehler 2014):

\[ P(\text{referent} | \text{pronoun}) = \frac{P(\text{pronoun} | \text{referent})P(\text{referent})}{\sum P(\text{pronoun} | \text{referent})P(\text{referent})} \]

Two terms in numerator are conditioned on different factors:
- Production bias \( P(\text{pronoun} | \text{referent}) \): topicality (often manifested as an effect of grammatical role)
- Next-mention bias \( P(\text{referent}) \): semantic factors, e.g. coherence relations:
  - The boss fired the employee.
    → He was always late. [Explanation]
    → He re-advertised the position. [Occasion]

Experiment: Design

- Participants (\(n=40\)) completed passages containing object-biased IC verbs on Mechanical Turk
- 2x2 (RC type x prompt type); 24 stimulus sets and 36 fillers
- Clip art indicated gender (always same for both event participants)
  a. The boss fired the employee who was hired in 2002.
  b. The boss fired the employee who was embezzling money.
  c. The boss fired the employee who was hired in 2002. He
  d. The boss fired the employee who was embezzling money. He

Analyse:
- Coherence relations (Explanation or Other)
- Next-mentioned referent (Subject or Object)
- Form of reference in FreePrompt condition (Pronoun or Other)

Acknowledgments

Presented at the 27th CUNY meeting at Ohio State. We thank Melodie Yen and Ksenia Kozhukhovskaya for their work in annotating the data.

Comparison with Competing Models

Comparison of Actual Rates of Pronominal Reference to Object (PronounPrompt condition) to the predicted rates for three competing models (using estimates from FreePrompt condition)

Conclusions

- Predictions of the Bayesian analysis confirmed:
  - Predict a greater percentage of object mentions in the No-ExplanationRC condition than ExplanationRC condition
    Confirmed (\(\beta=1.17; p<.005\))
  - ...and in the FreePrompt condition than the Pronoun-Prompt condition
    Confirmed (\(\beta=-1.27; p<.001\))
  - Marginal interaction (\(\beta=0.85; p=.078\))
  - Effect in PronounPrompt subset only (\(\beta=1.46; p<.005\))

Selected References