Coreference and Discourse Focus in Broad-Coverage Stimuli

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Overview

• Prominence facilitates anaphor resolution [1, 6].
• Problem: Focus, as defined by syntactic clitics and observed in human reading times of constructed stimuli, is potentially confounded with frequency.
• Observation: Results from naturally-occurring stimuli can complement results from constructed stimuli [4].
• Question: Do focus effects on reading times observed using constructed stimuli generalize to naturalistic stimuli?
• Approach: Predict self-paced reading times using coreference-based predictors designed to generalize focus definition to naturalistic stimuli

Background

• Multiple syntactic, semantic, pragmatic, and discourse factors affect referent focus when modeling anaphor resolution [10].
• Prior context can effectively model focus [14].
• Thematization [13] defined as count of referent occurrences in a discourse, and used to focus a referent prior to presentation of a target stimulus

Data

• Natural Stories Corpus [7] consists of 10 constructed-natural stories, with self-paced reading (SPR) times for 181 subjects.
• Stories augmented with more memory-taxing syntactic constructions, rare lexical items, and idioms than in naturally-occurring text.
• Total items: 768,023 from 485 sentences.
• Data partitioned into exploratory (1/3) and confirmatory (2/3) subsets.
• Coreference annotation largely follows OntoNotes guidelines [16], but adds anaphoric determiners like its, her, etc.

Methods

• Ablative likelihood ratio testing of linear mixed effects models [2] using by-subject random slopes and by-subject random intercepts for all predictors.
• Filter RTs less than 100ms, exceeding 3000 ms, or exceeding 2 standard deviations from mean.
• All predictors z-transformed.
• Box-Cox [3] power transform of reading times to match LMER assumptions of normality.

Predicators

• Baseline
  • Word Length - measured in characters.
  • Story Position - percent completion of story, scaled to [0,1].
• Predictors of Interest
  • Mention Count - running total count of mentions for the referent.
  • Antecedent Distance Word - distance to most recent mention measured in words [8].
  • Antecedent Distance Referent - distance to most recent mention measured in referents, operationalized as nouns or verbs.
  • Spillover
    • To account for delay in the time-course of processing, spill over position [5] was optimized for predictors using ordinary least squares on exploratory data.
  • Mention Count and Syntactic Surprisal were stronger predictors in exploratory data when spilled over by one word position, and were selected for confirmatory tests.

Example Predictor Values

Conclusion

• Focus facilitation effect for broad-coverage stimuli observed for coreference-based measures of discourse prominence, Mention Count.
• Antecedent distance-based predictors were not significant on exploratory partition and not run on confirmatory.
• Strong effect of Story Position evidence of importance of controlling for order effects in SPR.

References


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