Computation of Agreement is Not Predictive Regardless of Word Order
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Motivating Question:
What are the conditions under which the parser can make use of phi-features during online processing, and what are the ways in which it does so? Are phi-features predicted and if so when?

Prediction Processes are Available to the Parser at Multiple Linguistic Levels
- Lexical/Semantic Prediction - Activation of the N400 based on predictability of a word in context (Federmeier & Kutas, 1999; DeLong, Urbach & Kutas, 2005)
- Syntactic Prediction - Gap is prioritized over lexical material following a Wh-Filler (Stowe, 1986; Frazier & Clifton, 1989)

Why Target Phi-feature Prediction?
Phi-features (person, number, & gender) are used in abstract morphological and lexical dependencies, e.g. subject-verb agreement in (1)

(1) a. The key isFEM herMASC... 
   b. The keys areFEM herMASC...

→ If prediction occurs at all linguistic levels then it would be expected for phi-features as well

Mixed Evidence for Phi-Feature Prediction

No phi-feature prediction (Nevins et al. 2007)
No modulation of P000 for violating both [NUMBER + GENDER] over [NUMBER] or [GENDER] violations in Hindi agreement

Phi-feature prediction (Wiha et al., 2003/2004)
(2) Caperucita Roja llevaba la comida para su abuela en una canasta deFEM/masc coronada muy bonita.
   Red Riding Hood carried the food for her grandmother in a basket
canastaFEM/masc coronadaFEM very pretty.

- N400 for incongruent gender on the target determiner indicating prediction of the gender feature
- Would Wiha et al predict phi-features via lexical prediction

Does phi-feature prediction require lexical prediction?
A test: Subject-verb agreement and both each enforce a grammatical requirement for a number feature but:
- Agreement is an abstract morphological dependency
- Both forms a lexical/semantic dependency with the phrase realizing the number feature

Alternate Hypotheses and Predictions

Hypothesis 1: Both abstract morphological and lexical dependencies can generate predictions for phi-features.
Predictions:
- Agreement and Both: Slow down at the NP\text{SG} and facilitation at coordination

Hypothesis 2: Phi-feature prediction requires lexical prediction. Instead, agreement is evaluated once the parser has encountered the verb and the subject.
Predictions:
- Both: No facilitation at coordination
- Agreement: Facilitation at coordination when the prediction for [+PL] is confirmed

Experiment: Eyetracking

Significant Effects

Table 1: Model coefficients for RTs. Effect Significant at |β|>2

Cloze Task Follow Up

Motivation: Eyetracking results confirmed ability to predict and preference to predict NP\text{PL} or coordination

40 participants from Mechanical Turk

Table 2: Cloze Continuations of Aux+-(both)+NP adapted from (3)

Table 3: Cloze Continuations for Would both...

Summary of Results

Consistent with Hypothesis 2, only lexical/semantic dependencies show clear evidence of prediction. No evidence for prediction of number features in agreement.

- Both predicts NP\text{PL} then coordination
- (Potential) Lack of Prediction from a number marked Auxiliary
  - Slow down at NPs and two possible explanations:
    - Non-Prediction: inability to resolve to a grammatical parse
    - Prediction: Delay of the prediction for an NPs

Conclusions

- No evidence for phi-feature prediction independent of lexical/semantic prediction
- Lexical/semantic dependency headed by both does predict

References

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