Minimalist Parsing of Heavy NP Shift
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1. Heavy NP Shift: structure and processing

- HNPS: when “heavy”, move!
  1. Max put [PP his car] [IN all the boxes of home furnishings].
  2. Cf. Max put [IN all the boxes of home furnishings] [PP in his car].
- Processing preference
  - when NP is “heavy”,
  - when NP and PP are “heavy”,
  - when PP is “heavy”,
  - when NP and PP are not “heavy”,
- Syntactic Analyses
  3. Rightward movement (Ross 1986)
     \[ \text{Max put } f \text{ in his car} < \text{put} > \text{all furnishing} \]
  4. PP movement (Kayne 1994)
     \[ \text{Max put all furnishing} < \text{put} > \text{in his car} \]
  5. Remnant movement (Rochemont and Culicover 1997)
     \[ \text{Max put all furnishing} < \text{put} > \text{in his car} \]
- Questions: Can a parsing model...
  - replicate human processing preferences?
  - offer insights into syntactic theories?
- Method
  - Parsing model: Minimalist Grammar parsing
  - Preference: memory usage

2. Minimalist Parsing

- Minimalist Grammar
  - merge: combines lexical items and/or phrases
  - move: displaces lexical items and/or phrases
- MG parser: recursive descent parser
  - Input: sentence represented as string of words
  - Output: tree encoding of sentence structure
- Procedure (Kobele et al. 2013, Graf et al. 2017)
  i. Hypothesize top of structure and add nodes downward & left-to-right.
  ii. Move prediction triggers search for mover
     - build the shortest path towards predicted mover
  iii. When the mover is confirmed, continue from where it was conjectured.

3. Derivation Trees

(7) Canonical order

(8) Rightward movement

4. Results and discussion

- Can MG parsing replicate human processing preferences? - Yes
  - 8 out of 10 tenure based metrics were able to predict processing biases for rightward movement analysis.
  - 7 out of 10 and 8 out of 10 tenure-based filtered metrics predict processing biases for the PP movement and remnant movement analyses respectively, when unpronounced nodes are ignored.
  - Ranked complexity metrics that are successful in predicting processing biases for other syntactic structures,
    - MaxT, SumS and
    - MaxT, MaxS9,
    - also make correct predictions for HNPS when a rightward movement structure is assumed.

- Can MG parsing offer insights into syntactic theories? - Yes
  - Complexity metrics favor rightward movement analysis over the rest.
- Next step
  - why rightward movement?
  - Information structure
  - syntactic architecture
  - Japanese long-before-short bias
- Example metrics: a structure p is harder to parse than q if: MaxT, SumS

References