Background
Is the notorious difficulty of center-embedded (CE) sentences pose a problem for sentence processing theories since they are grammatical, but become unacceptable after only one or two embeddings. It is possible that the only reason this structure is ever acceptable is due to prosodic chunking of its clauses, thus treating them as units in working memory, which allows more nodes to remain incomplete for longer. To test this, we have devised a two-part experiment in which (i) the canonical prosodic contours of CE sentences are described, as compared to right-branching (RB), and (ii) these canonical prosodies will be manipulated to assess their affect on acceptability. The first part of this study is presented here.

Prosody and Center-embedding
Our study: Production experiment
- Identify the canonical prosodic structure of CE sentences - Compare productions of CE and RB to identify the canonical prosodic structures, if they exist - Identify measurements or indices that are useful to differentiate the prosodic structure of CE and RB
- How can we reliably distinguish the prosodic structures?

Next step: Comprehension study
- We need to test whether prosody affects the difficulty of CE sentences - Latin square design: CE (Helpful vs. Unhelpful) x RB (Helpful vs. Unhelpful) - If the difficulty of CE is solely attributed to the structure, we expect the interaction:

\[ CE_{\text{Helpful}} \cdot RB_{\text{Helpful}} = CE_{\text{Unhelpful}} \cdot RB_{\text{Helpful}} \]

Discussion
Canonical production of CE, defined by:
- durational changes due to IP locations
- peak locations: on nouns in 1st, 2nd IPs

RB and CE sentences share contours where they share underlying structure.
- The consistency of the canonical contours might be a sign they are necessary for efficient processing.

Issues to address:
- Fillers contained clausal CE sentences
- Not enough target stimuli were visible
- Stories might have elicited a contrastive reading for some participants

Future Directions
Soon:
- Replicate these results with improved targets
- Consonants in key words: [v] vs. [d]
- Nasal vs. flap
- Shorter contexts to speed up recording

From these recordings, synthesize stimuli for:
- Part 2: Comprehension study
  - Will manipulating prosody affect the acceptability (processability) of CE (and will it be a different effect from RB)?
  - Different prosodic contours should affect processing in different ways.

Methodology
- 20 English monolingual undergrads
- 72 stories in recording booth
- 24 experimental story sets
- 4-sentence story read silently
- 1 target sentence read aloud

Targets were in a 2x2x(2^2) design:
- The extra dimension is due to reversing the order of the target numbers

* p < 0.05 or 0.01 refers to the syllable count of the first noun in the target

Conclusion
- Prosodic structure affects CE sentences
- CE sentences are harder to process
- Prosody reflects underlying structure

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References