Child and Adult Use of Prosodic Cues in Syntactic Disambiguation

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Background
- Prosody is the linguistic feature that governs aspects of speech such as intonation, pitch, stress, pauses, and word duration. Prosodic cues reflect syntactic structure and can be used to determine the correct meaning of an ambiguous phrase.

Research Questions
- Are naive adults able to produce disambiguating prosodic cues?
- Are adults and children able to perceive these prosodic cues and use them to determine the correct meaning of an ambiguous phrase?

Hypothesis
The Comprehension-Production Asymmetry Hypothesis
In comprehension, prosodic structure may be ignored by the listener because the listener may impose his/her own preferences on a string.

Predictions
- Adult listeners may not be able to disambiguate phrases using prosodic cues.
- Because the integration of different levels of linguistic representation is difficult, young children will not be able to accurately match prosodic cues to the intended meaning of an ambiguous phrase, and may exclusively choose one interpretation, regardless of the prosody given to the phrase.

Previous Study
This study improves on an exploratory study, (Sutton et al., 2008) regardless of the prosody given to the phrase.

Methods
Experiment 1: Adult Production Task
Participants: 12 native English speakers with normal vision.

Experiment 2: Adult Perception Task
Participants: 5 members of the MSU Language Acquisition Lab
Stimuli: 96 experimental condition sound files collected in Experiment 1.
Procedures: Participants listened to randomized orders of 96 sound files, and were asked to code whether the sentence picked out the small or large set, and whether the wording was a strong exemplar of that set. (Sound files judged to be particularly exemplary of the correct prosody were selected for use as stimuli in Experiments 3 and 4.)

Experiment 3: Adult Comprehension Task
Participants: 30 MSU students - native English speakers with normal vision.
Stimuli: Audio sound files of commands recorded in Experiment 1.
Procedures: participants were presented with an array and the corresponding recorded command. Participants were asked to mark on a worksheet which items in the array the command referred to. Each sentence was played twice.

Results
Figure 1: Experiment 3A: Order 1 (Small Set First)

Experiment 4: Child Comprehension Task
Participants: 8 children (M: 5:0, range 4:01-5:11, 4 boys 4 girls) - native English speakers
Stimuli:
- Same as Experiment 3, except instead of arrays presented in PowerPoint, 2.5"x2.5" pictures attached to 3"x3"x4" cubes of craft foam were used.
- Accompanying story presented through PowerPoint slides.
Procedures: children were presented with a story asking them to help the experimenter sort items from arrays into piles to keep and throw away. Children were played the recorded command and asked to choose items in an act-out task. Each sentence was played as many times as necessary.

Discussion
Comparison of results in Figures 1 and 2 clearly show several important trends:
1. There is an effect of ordering--the first set presented primes for this set and carries through, even for control items, which should be unambiguous.
2. There is a bias toward the intersection set of two adjectives, and this bias is in fact stronger than the ordering effect.
In Order 1, the difference between the two Experimental blocks is significant (t (19) = 5.638, p < .000).
Although data collection is currently ongoing for Experiment 4, preliminary results (Figure 3) show that a small set bias and an ordering effect are most likely present. The low results for the Control 1 block are likely a result of a learning curve to adjust to the demands of the task.

Conclusions
The Comprehension-Production Asymmetry Hypothesis is supported. Adults are strongly affected by previously presented prosodies in comprehension tasks, and also seem to have biases for simpler syntactic structures. Children seem to show similar preferences, but due to the difficulty of matching prosodic cues to multiple syntactic structures, seem to be less accurate in matching the correct meaning to these ambiguous phrases. Prosody is costly to produce and to use in comprehension and does not seem to be as automatically a reflex of syntax as the linguistic models suggest.

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