Time Course of Maintenance and Use of Gradient Acoustic Information During Pronoun Referent Interpretation

3pSC16

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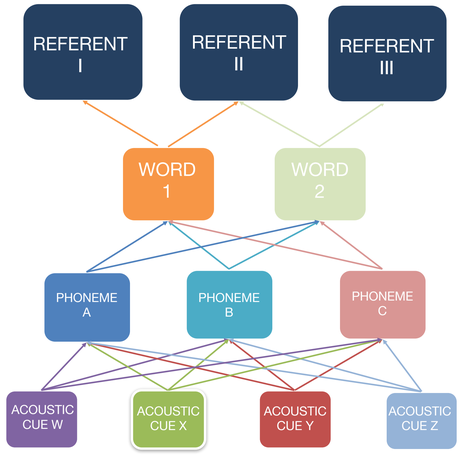
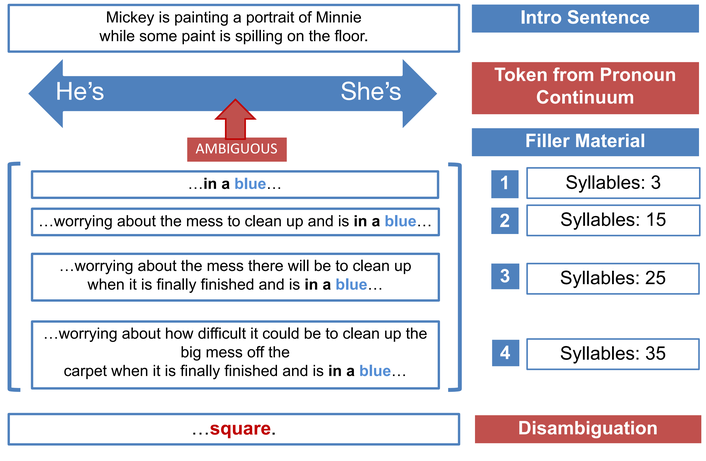
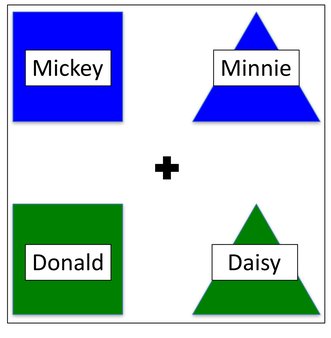
INTRODUCTION

- Recent studies show that gradient changes in acoustic cues result in gradient activation of **lexical candidates** [1] [4] [5] [6]
  - Listeners are sensitive to within-category variation in VOT and other cues
  - Detail is maintained across *at least* multiple phonemes, supporting revision of past interpretations [3]
- **Pronouns** are underspecified relative to lexical candidates [2] and interpretation is more reliant on discourse information
- **Questions:**
  - How is pronoun referent interpretation influenced by gradient acoustic differences?
  - How long is this information maintained?



METHOD





Subjects' Task:
DID THE STORY MATCH THE PICTURE?

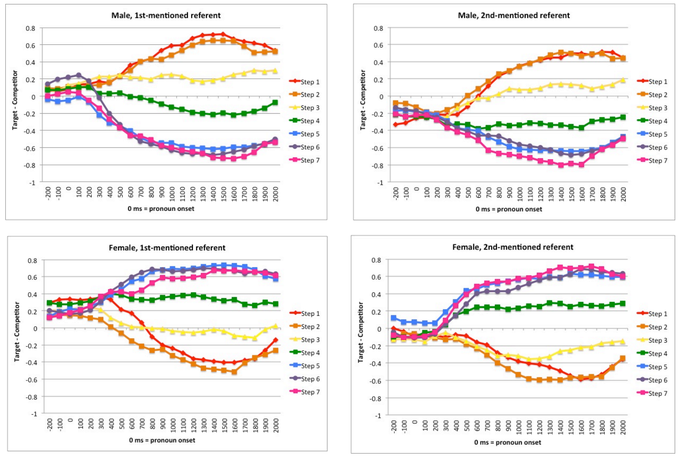
Three possible outcomes on each trial:

1. Subject interprets pronoun as X and sentence disambiguates to X MATCH
2. Subject interprets pronoun as X and sentence disambiguates to Y MISMATCH
3. **Subject interprets pronoun as X and sentence disambiguates to Y** MATCH

- Subjects **revise** interpretation
- Fixate competitor before disambiguation, then switch to target
- Revision process takes time
- **Does revision vary as a function of pronoun step?**

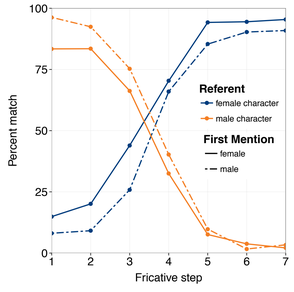
EXPERIMENT 1

Fixation time-course (on-line interpretation)



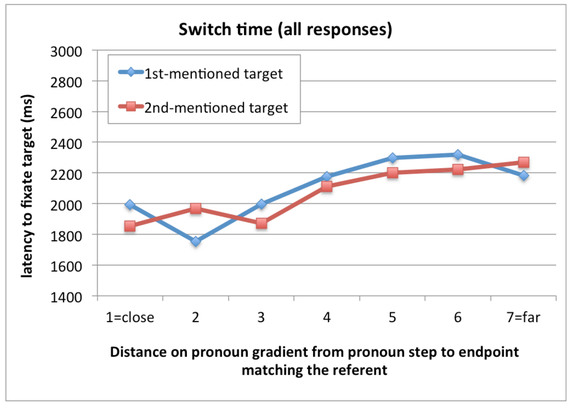
- Eye movements after pronoun onset reveal effects of **pronoun step** *and* **order-of-mention**
- Final interpretation shows similar effects

Mouse-click response (final interpretation)



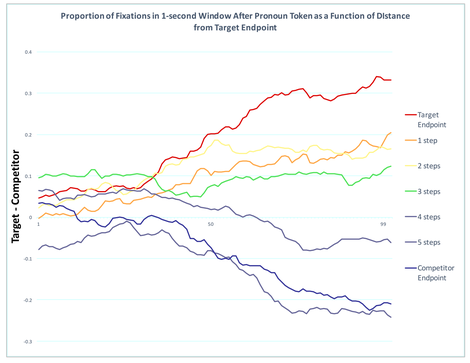
Recovery Time: Reinterpretation

- Computed recovery time for trials with revised interpretation
- Measured as latency to fixate target when initially fixating competitor at disambiguation point
- **Results:** Recovery time varies as a function of continuum step, showing that gradient acoustic information was maintained over the 5-syllable period before disambiguation
- Curvefitting analysis (linear vs. step functions) reveal that response is graded (better fit to linear function)

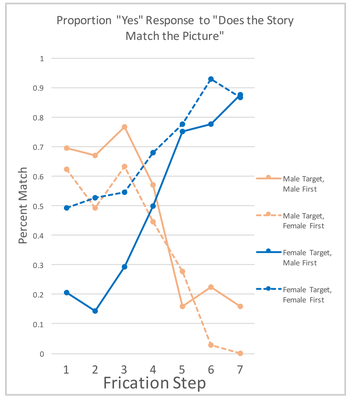


EXPERIMENT 2

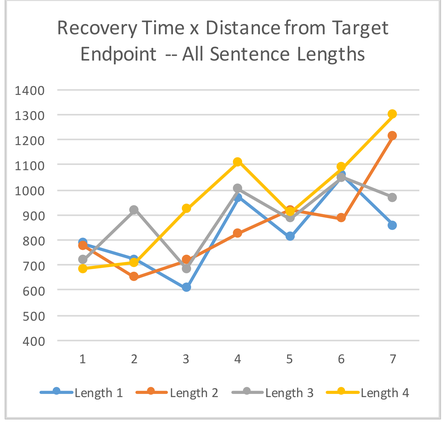
Fixation time-course (on-line interpretation)



Mouse-click response (final interpretation)



Recovery Time by Sentence Length



- Eye movements after pronoun onset reveal expected effect of step distance, validating continuum used
- Final interpretation data shows similar effects, though "He" endpoint was less convincing than in Experiment 1
- Preliminary results of recovery time data show gradient pattern of recovery time at *all* sentence lengths
- Subjects maintain and use gradient acoustic information to guide reinterpretation even after 8+ seconds (35 syllables) of intervening material

DISCUSSION

- Eye tracking methods can provide a measure of both **on-line interpretation** and **maintenance of information**
- **Experiment 1 conclusions:**
  - Gradient acoustic information integrates with discourse information during on-line interpretation of pronoun referent
  - Gradient acoustic information maintained over at least 5 syllables (>1 second)
- **Experiment 2 conclusions:**
  - Gradient information maintained over all sentence lengths (>8 seconds)
- **Significance:**
  - While higher-order representations such as referents are generally believed to be categorical, these results suggests that listeners may maintain gradient representations of referent candidates
  - If gradience was only maintained at lower levels, such as the acoustic cue, phoneme, or word level, it would decay over periods of this length

ACKNOWLEDGEMENTS & REFERENCES

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