



# Contextual Effects on Prosody: Focus Antecedence vs. Accessibility

Experimental and Theoretical Advances in Prosody 2

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Jeffrey Klassen & Michael Wagner

McGill University  
www.prosodylab.org

## Some Factors Affecting Prominence

- **Repetition:** Words are realized as less prominent the more often they are repeated (Watson 2010)
- **Thematic Accessibility:** Certain thematic roles are more accessible than others; e.g. THEME > GOAL (Gordon et al. 1993, Dahan et al. 2002)
- **Focus Antecedence:** Prosodic prominence shifts depending on whether or not there is an appropriate antecedent to mark linguistic focus (Rooth 1985 et seq.)

## Watson et al. 2005: Repetition and Accessibility

Reported in Watson 2010

➤ Several factors are said to affect sentence prosody; for example:

- **Repetition**
- **Thematic accessibility**

➤ **The experiment:**

A: 2-Theme condition	B: 1-Theme condition
Put the <b>bed</b> above the flag.	Put the piano above the flag.
Put the <b>bed</b> above the house.	Put the <b>bed</b> above the house.
Put the <b>bed</b> above the pineapple.	Put the <b>bed</b> above the pineapple.
C: 1-Goal condition	D: New condition
Put the piano above the flag.	Put the piano above the flag.
Put the house above the <b>bed</b> .	Put the house above the bell.
Put the <b>bed</b> above the pineapple	Put the <b>bed</b> above the pineapple.

### Results

- **Repetition:** more repetitions, lower intensity, duration and prominence ratings  
A < B, C < D
- **Thematic accessibility:** more reduction with THEME antecedents than GOAL antecedents  
A, B < C

## A Potential Confound: Focus Antecedence

➤ **The thematic accessibility effect might actually be due to different focus antecedents:**

### "THEME antecedent": Single Contrast

**CONTEXT:** Put the bed above the house      Antecedent of form: [put the bed above the x]

**TARGET:** Put the bed above the [pineapple]<sub>F</sub>

### "GOAL antecedent": Double Contrast

**CONTEXT:** Put the house above the bed.      Antecedent of form: [put the x above the y]

**TARGET:** Put the [bed]<sub>F</sub> above the [pineapple]<sub>F</sub>

**In both conditions, an antecedent of the appropriate form is found within the context, with potential effects on sentence prosody**

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## 1 Experiment 1: Focus Antecedence vs. Accessibility

- Experiment 1 uses stimuli similar to Watson et al. 2005, but switches the word order, such that accessibility and focus antecedence are de-correlated
- The goal is to find out which of the two factors have an effect: It could be that we find two independent effects, or that only one is responsible
- In addition, we manipulated repetition, to see how repetition and focus antecedence interact

### Predictions for Watson 2010:

Condition:	Shift	No Shift
Accessibility	Not reduced	Reduced
Focus Antecedence	Not reduced	Reduced

### Predictions for Experiment 1:

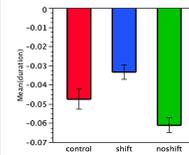
Condition:	Shift	No Shift
Accessibility	Reduced	Not reduced
Focus Antecedence	Not reduced	Reduced

## Stimuli & Methods

Repetitions	Shift	No Shift
2	Move the <b>bed</b> above the flag. Now, move the <b>bed</b> above the house. Now, move the pineapple above the <b>bed</b> .	Move the piano above the <b>bed</b> . Now, move the house above the <b>bed</b> . Now, move the pineapple above the <b>bed</b> .
1	Move the piano above the flag. Now, move the <b>bed</b> above the house. Now, move the pineapple above the <b>bed</b> .	Move the piano above the flag. Now, move the house above the <b>bed</b> . Now, move the pineapple above the <b>bed</b> .
<b>CONTROL:</b>	Move the piano above the flag. Now, move the house above the bell. Now, move the pineapple above the <b>bed</b> .	

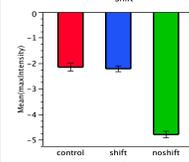
- 90 participants, Latin-square design
- 35 items modeled after those in Table 1
- Production experiment: participants were recorded reading each sentence aloud
- Results analyzed in a mixed model regression (random effect: item & participants, fixed effect: SHIFT); p-values estimated through MCMC sampling

## Results



### NORMALIZED LOG DURATION

- "Bed" in **Shift** condition **not** significantly smaller than control ( $t=-0.22$ ,  $p<0.82$ )
- Contrary to predictions of accessibility view
- "Bed" in **No Shift** condition significantly smaller than control ( $t=-6.22$ ,  $p<0.0001$ )
- As predicted by focus antecedence, contrary to prediction of accessibility view



### NORMALIZED MAXIMUM INTENSITY

- "Bed" in **Shift** condition **not** significantly smaller than control ( $t=0.40$ ,  $p<0.69$ )
- "Bed" in **No Shift** condition significantly smaller than control ( $t=-13.91$ ,  $p<0.0001$ )

**REFERENCES**  
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Gordon, P., & Gilman, S. L. (1993). Prosodic cues and the ordering of attention in discourse. *Cognitive Science*, 17(1), 101-124.  
Rooth, M. (1986). Accessibility theory. In J. H. Greenberg, A. A. Dixon, & A. A. Dixon (Eds.), *Universals of human language* (Vol. 3, pp. 111-138). Cambridge, MA: MIT Press.  
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Watson, D., & Sproll, L. A. (2010). Not just pitch and rate: The effects of discourse and task-based constraints on acoustic prominence. Poster at the 2010 CLIN Human Sentence Processing Conference, Tucson, AZ.  
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## 2 Experiment 2: Replication of Watson et. al 2005

- To directly compare the data from Experiment 1 with the paradigm elicited in Watson et al. 2010, we collected data using similar stimuli (42 participants)
- In this case, focus antecedence and accessibility are correlated
- Once again, we manipulated repetition

## Experiment 2: Stimuli

Repetitions	Shift	No shift
2	Move the piano above the <b>bed</b> . Now, move the house above the <b>bed</b> . Now, move the <b>bed</b> above the pineapple.	Move the <b>bed</b> above the flag. Now, move the <b>bed</b> above the house. Now, move the <b>bed</b> above the pineapple.
1	Move the piano above the flag. Now, move the house above the <b>bed</b> . Now, move the <b>bed</b> above the pineapple.	Move the piano above the flag. Now, move the <b>bed</b> above the house. Now, move the <b>bed</b> above the pineapple.
<b>CONTROL:</b>	Move the piano above the flag. Now, move the house above the bell. Now, move the <b>bed</b> above the pineapple.	

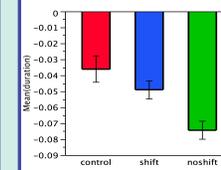
### Predictions:

Condition:	Shift	No Shift
Accessibility	Not reduced	Reduced
Focus Antecedence	Not reduced	Reduced

## Results Experiment 2

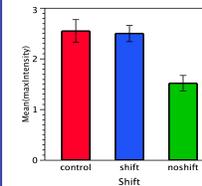
### NORMALIZED LOG DURATION

- Word 2 in **Shift** condition is significantly smaller than control, but approached significance ( $t=-2.04$ ,  $p<0.05$ )
- This could be due to repetition or accessibility
- Word 2 in **No Shift** condition significantly smaller than control ( $t=-6.16$ ,  $p<0.0001$ )



### NORMALIZED MAXIMUM INTENSITY

- Word 2 in **Shift** condition **not** significantly smaller than control ( $t=-0.37$ ,  $p<0.71$ )
- Word 2 in **No Shift** condition significantly smaller than control ( $t=-4.54$ ,  $p<0.0001$ )



## Conclusion

### FOCUS ANTECEDENCE AND THEMATIC ACCESSIBILITY

- The results show evidence for the effect of focus antecedence:
  - Focus antecedent needed to license focus
- The results fail to show evidence for the theory of thematic accessibility:
  - Thematic roles did not affect focus antecedence

### THE ROLE OF REPETITION

- Number of repetitions did not reach significance in these experiments, except: In experiment 1, word 2 ("pineapple") was shorter in duration when word 4 was shifted and repeated twice than if it was shifted and repeated once