

# Acoustic Prominence Perceived Differently for Fluent and Distracted Speakers



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## Background

- Variation between acoustically prominent and reduced words can signal two things, and listeners are sensitive to both:
- **Discourse Status Information:** REDUCED words are preferentially linked to given information, and PROMINENT words to new information (Arnold, 2008; Dahan et al., 2002).
- **Speaker's Processing Load:** Disfluent speech leads listeners to expect a new, difficult, or unexpected referent (Arnold et al., 2004; Arnold et al., 2007; Corley et al. 2007).
- **These effects are related:** Disfluency shares features with acoustic prominence (lengthening, pausing, pitch movement)

**Do listeners interpret acoustic prominence as evidence of the speaker's meaning (e.g., a new referent), or evidence of speech difficulty? Test case: Distracted vs. Fluent speech.**

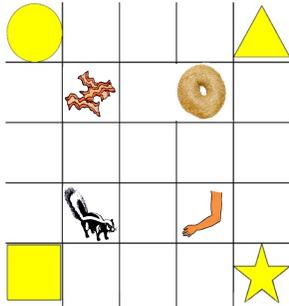
**The Relative prominence hypothesis:** The primary function of acoustic prominence is to mark discourse status, and listeners use the surrounding speech context to identify *relatively* reduced tokens, which signal discourse-given referents. → Predicts a given bias for reduced targets in both fluent & distracted contexts.

**The Mixed-signal hypothesis:** Listeners are sensitive to both pragmatic and processing functions of prosody. → Predicts a given bias for reduced targets only in a fluent context, and a general expectation for distracted-sounding speech to refer to discourse-new information, due to the perceived difficulty of production.

## Method

- Eyetracking: participants follow instructions to move objects
- Two blocks: ATTENTIVE and DISTRACTED
- Prominent (BAGEL) vs. Reduced (bagel) targets
- Given vs. New discourse contexts

<b>Distracted/ given</b> Put...thee..bacon..on..the..star. Now...put...the... BACON/ bacon...	<b>Distracted/ new</b> Put...thee..bagel..on..the..star. Now...put...the... BACON/ bacon...
<b>Fluent/given</b> Put the bacon on the star. Now put the BACON/bacon...	<b>Fluent/new</b> Put the bagel on the star. Now put the BACON/bacon...



## References

Arnold, J. E. (2008). THE BACON not the bacon: how children and adults understand accented and unaccented noun phrases. *Cognition*, 108(1), 69-99.  
 Arnold, J. E., Kam, C. L. H., & Tanenhaus, M. K. (2007). If you say thee uh you are describing something hard... *JEP-LMC*, 33(5), 914-30.  
 Arnold, J. E., Tanenhaus, M. K., Altrams, E. J., & Fragano, M. (2004). The old and the uh: new disfluency and reference resolution. *Psych. science*, 15(9), 578-82.  
 Corley, M., MacGregor, L. J., & Donaldson, D. I. (2007). It's the way that you, er, say it: Hesitations in speech affect language comprehension. *Cognition*, 105, 658-668.  
 Dahan, D., Tanenhaus, M. K., & Chambers, C. G. (2002). Memory and Language Accent and reference resolution. *Journal of Memory and Language*, 47, 292-314.

## Stimuli

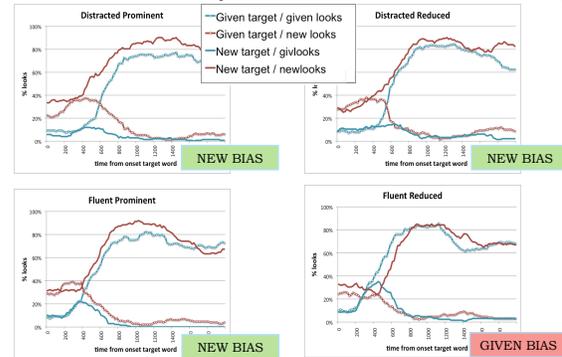
**Experiment 1:** Fluent and Distracted stimuli recorded naturally; tokens cross-spliced into given and new contexts.

	Avg. dur	Resid. dur	Avg pitch	pitch mvt.
Distracted / prominent	661	93	239	104
Distracted / reduced	697	130	215	52
Fluent / prominent	483	-84	250	57
Fluent / reduced	428	-139	206	52

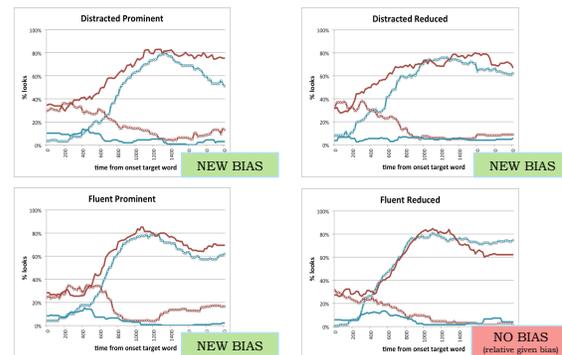
**Experiment 2:** Fluent and Distracted stimuli matched on pitch. Distracted stimuli created by modifying Fluent stimuli in Praat.

	Avg. dur	Avg pitch	pitch mvt.
Distracted / prominent	686	251	118
Distracted / reduced	645	203	40
Fluent / prominent	481	251	114
Fluent / reduced	428	206	48

## Exp. 1 Results



## Exp. 2 Preliminary Results (21 subjects)



## Conclusions

The given bias for acoustically reduced targets is restricted to fluent contexts. ♦ Categorization as "reduced" is not purely a function of relative prominence. ♦ Lengthening signals difficulty, even when the pitch is reduced. ♦ Prosodic signals of discourse status and production difficulty are intertwined.

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