

- The distribution of allophones often depends on word, morpheme, or syllable boundaries, and thus encodes prosodic or morphological information
- English /l/ is one such case. Light [l] is often claimed to appear in onsets and dark [ɫ] in rimes (e.g. Halle & Mohanan, 1985) although Yuan & Liberman (2011) found word-internal /l/s to be dark, even in onset position. Hayes (2000) presents evidence that /l/ is obligatorily light word initially and dark before consonants and pauses, with a more variable distribution depending on other factors, e.g., dark [ɫ] is described as more likely intervocalically when followed by a morpheme boundary (*mail-er*) than following a morpheme boundary (*day-ly*)
- If [ɫ]-darkening is, in fact, conditioned by morpheme, word, and syllable boundaries, this allophonic variation may provide important cues to speech segmentation
- We report on a series of studies aimed at testing what speakers encode with their choice between [ɫ] and [l] in production and whether listeners use this information in speech segmentation

Perception

Methodology

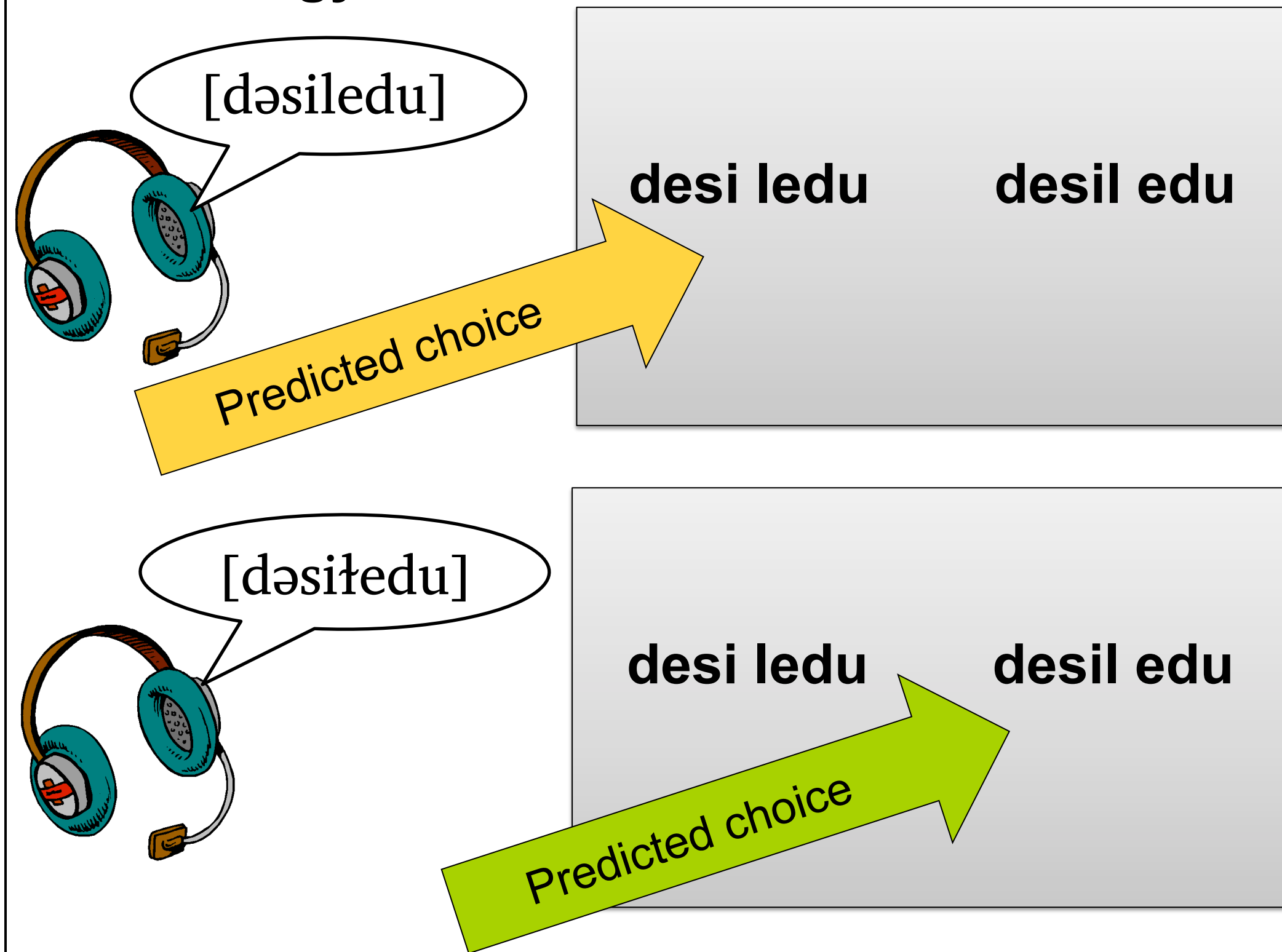
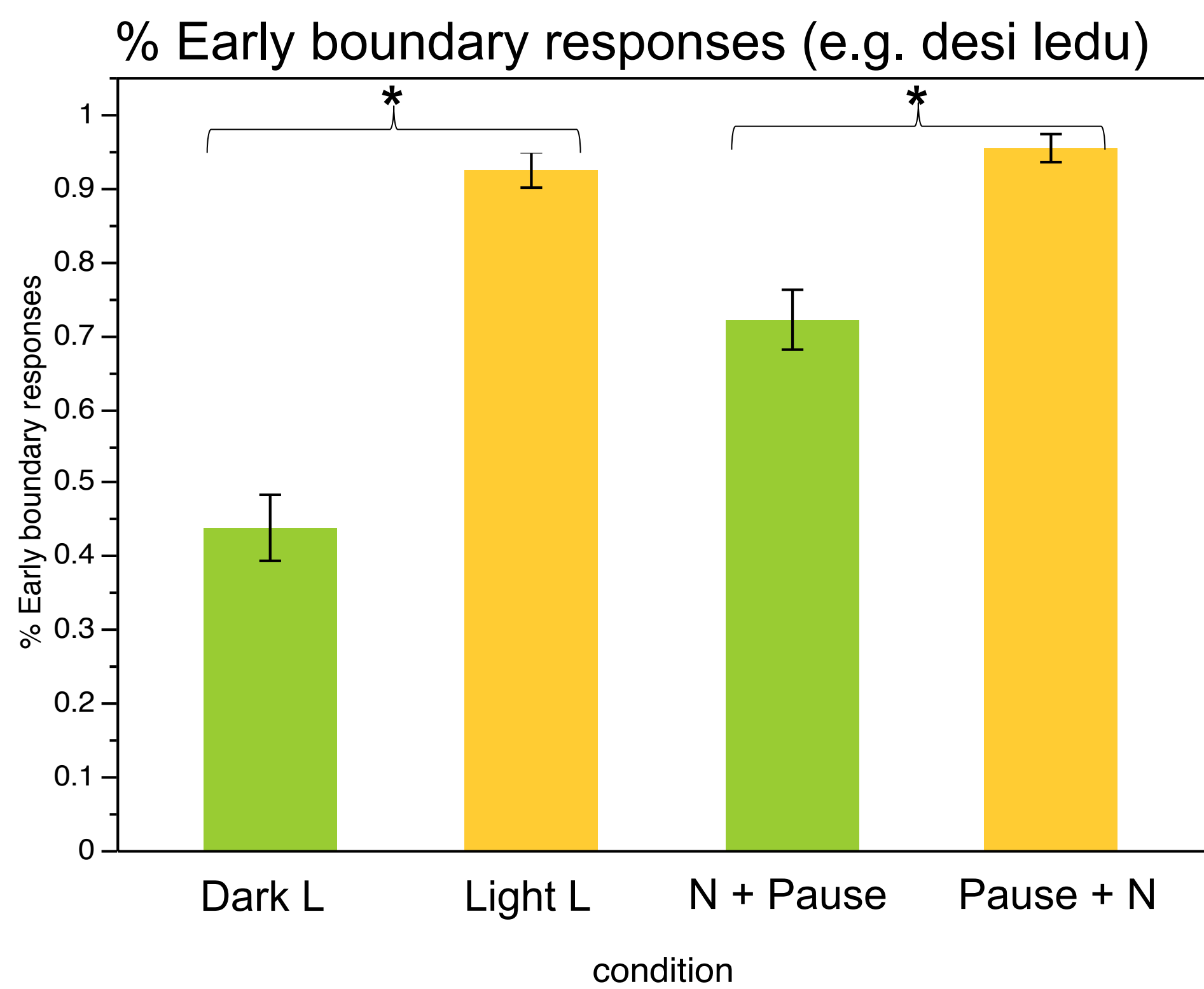


Table 1	Nonce string	Predicted Parse	Predicted Choice
Light [l]	dəsiledu	Early Boundary	desi ledu
Dark [ɫ]	dəsɪɫedu	Late Boundary	desil edu
pause + n	dəsɪnedu	Early Boundary	desi nedu
n + pause	dəsɪnedu	Late Boundary	desin edu

- 58 subjects heard a nonce string and chose between two orthographies
- Stimuli were produced by one of the authors reading aloud without a pause
- Sound files were cross-spliced; the dark [ɫ] condition consists of a C₁VC₂VC₃ string containing a dark [ɫ] followed by a VC₄V originally produced following a light [l] and vice versa
- Latin square design, 8 items per condition heard by each subject

Results



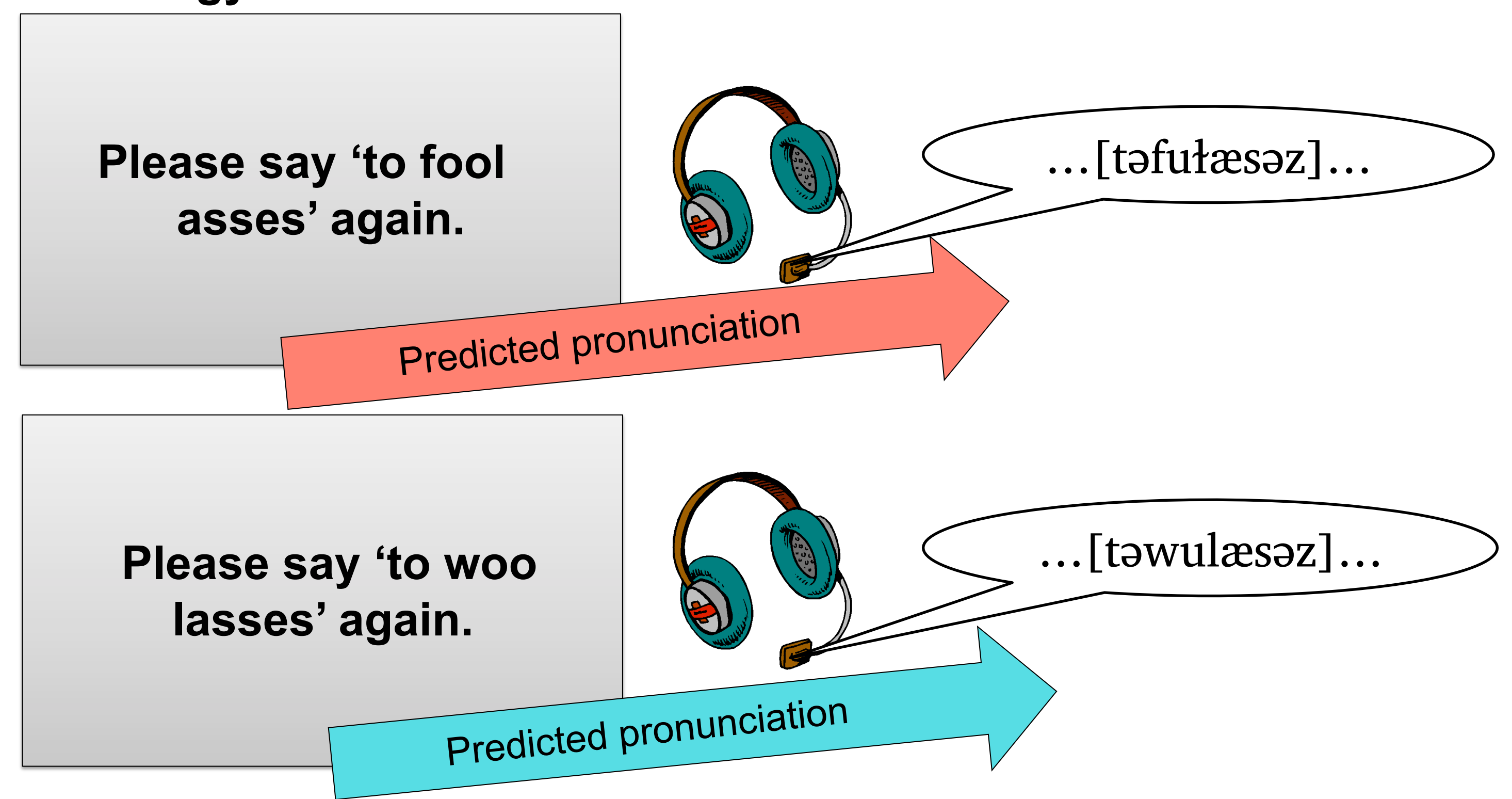
- Mixed model logistic regression found a significant effect of dark vs. light /l/
- Error bars indicate 95% confidence intervals
- Light /l/ was a particularly strong cue to word-initial position with subjects choosing early boundary orthography at a rate of over 90% when presented with light /l/

Conclusions

- Evidence from speech segmentation and production suggests that **light /l/ cues morpheme-initialness**
- Perception:** listeners make use of the allophonic distribution in segmenting speech with light /l/ being a strong cue to **word initial position**
- Production: Word-initial /l/s** are lighter than word-final ones; word-internal /l/s are lighter **morpheme-initially** than finally and morpheme-internally
- These differences cannot be reduced to stress placement, vowel length, vowel quality, or syllabification, which were controlled for
- Contrary to Hayes (2000), we found no difference in /l/ darkness between morpheme final /l/s (*kneel-ing*) and morpheme-internal ones (*ceiling*)
- The data is compatible with Standard North American English being a dark-l language with initial clearing (Lehiste 1964, Recasens, 2012).

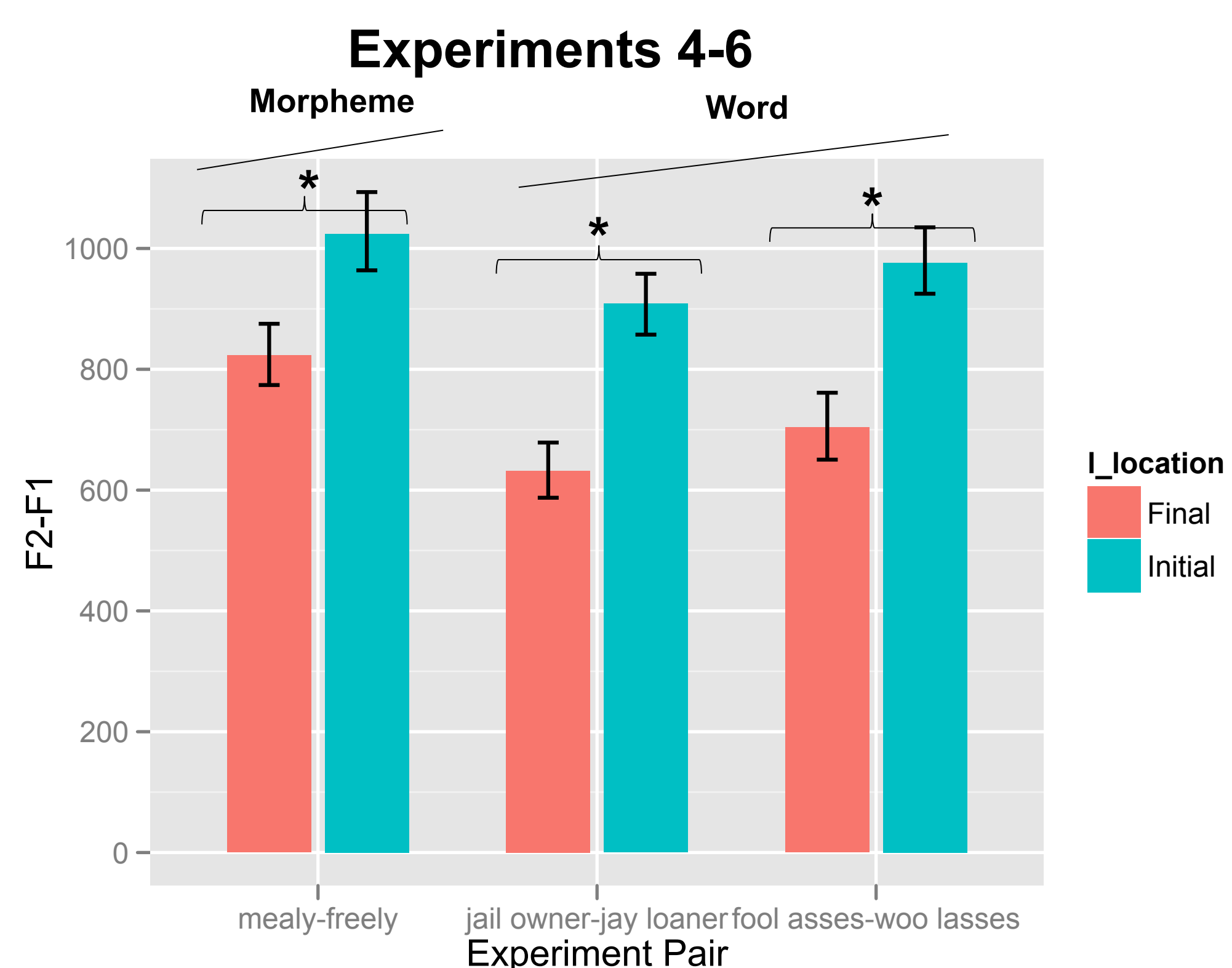
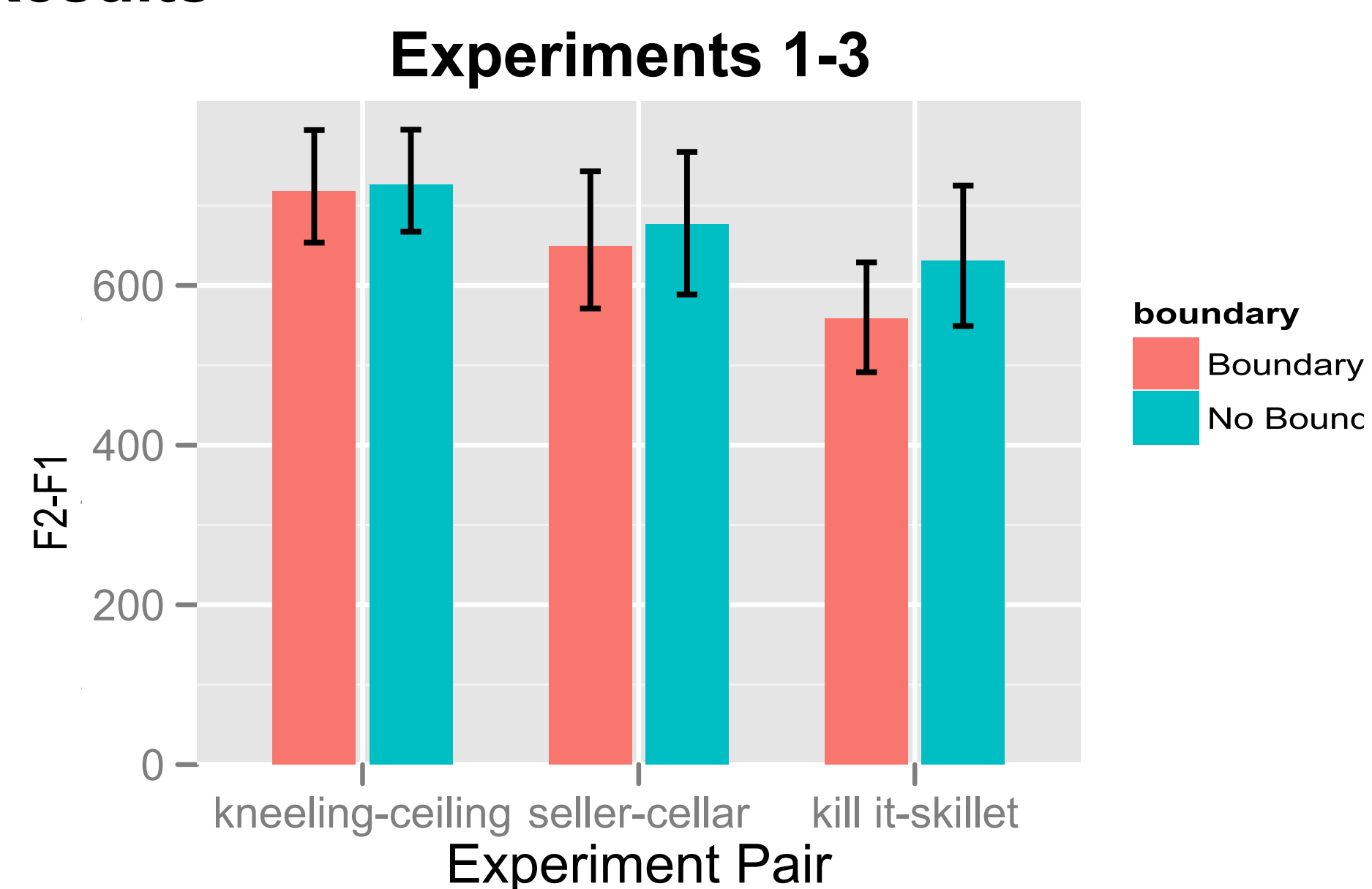
Production

Methodology

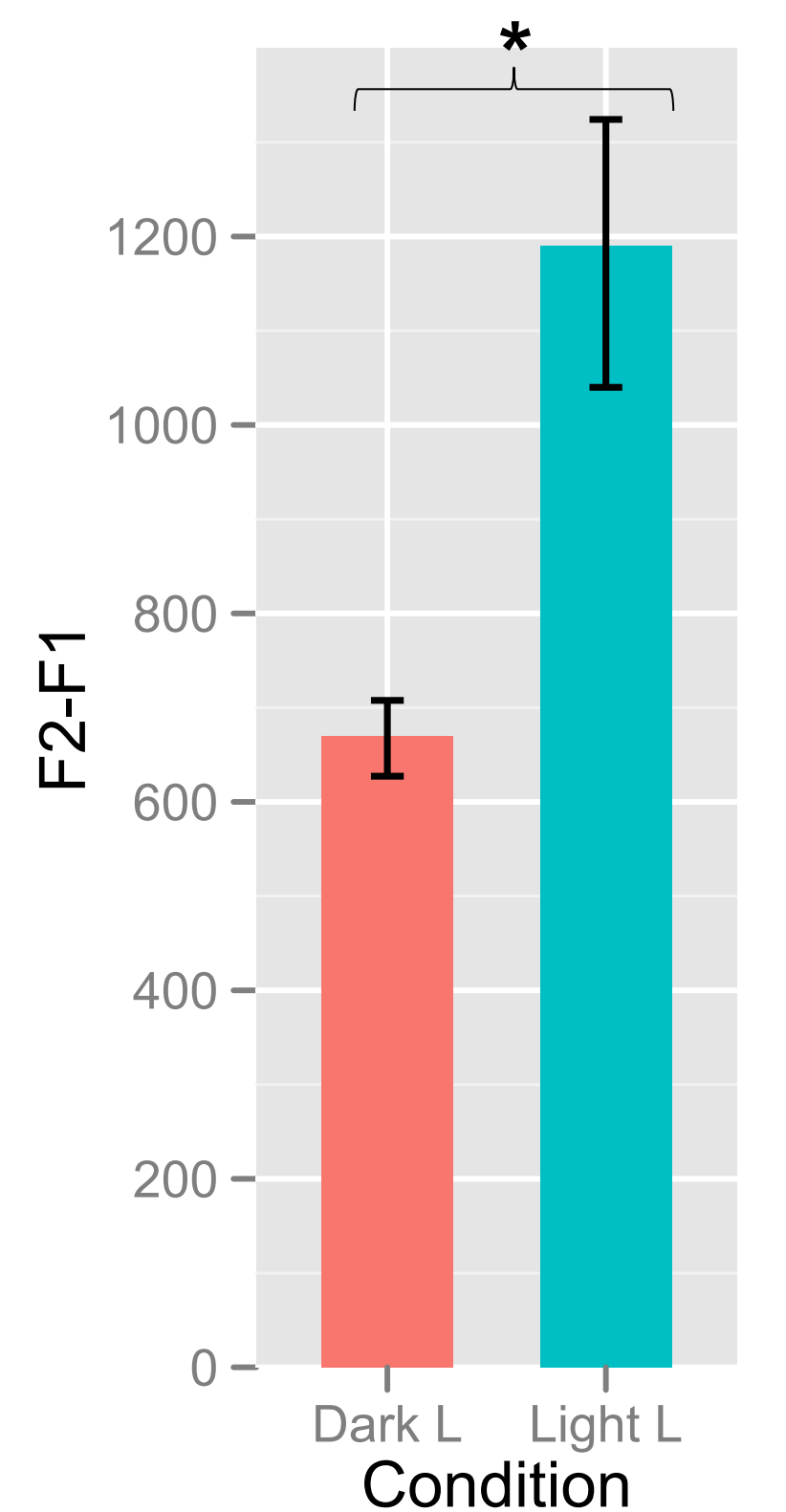


- A minimum of 16 subjects per experiment, all native speakers of North American English, read aloud English phrases with /l/ occurring in differing locations relative to a variety of morpho-syntactic boundaries
- At least four items per experiment
- F2-F1 values were calculated for all /l/s, a relevant measure of /l/ darkness (e.g. Sproat & Fujimura, 1993).

Results



Perception Experiment Stimuli



- Does location relative to a morphological boundary affect /l/ darkness?**
- Word-internal /l/s**
Experiments 1-3 (*kneel-ing* vs. *ceiling*) preceding a morpheme-boundary vs. in monomorphemic forms
 NO – no significant difference in F2-F1
Experiment 4 (*meal-y* vs. *free-ly*) morpheme-final vs. morpheme-initial
 YES – significant difference in F2-F1
- Word-boundary /l/s**
Experiment 5-6 (*jail owner* vs. *jay loaner* and *fool asses* vs. *woo lasses*)
 YES - significant difference in F2-F1
- Perceptual experiment stimuli have a larger F2-F1 difference than production results due to selection of lightest and darkest tokens for use in stimuli