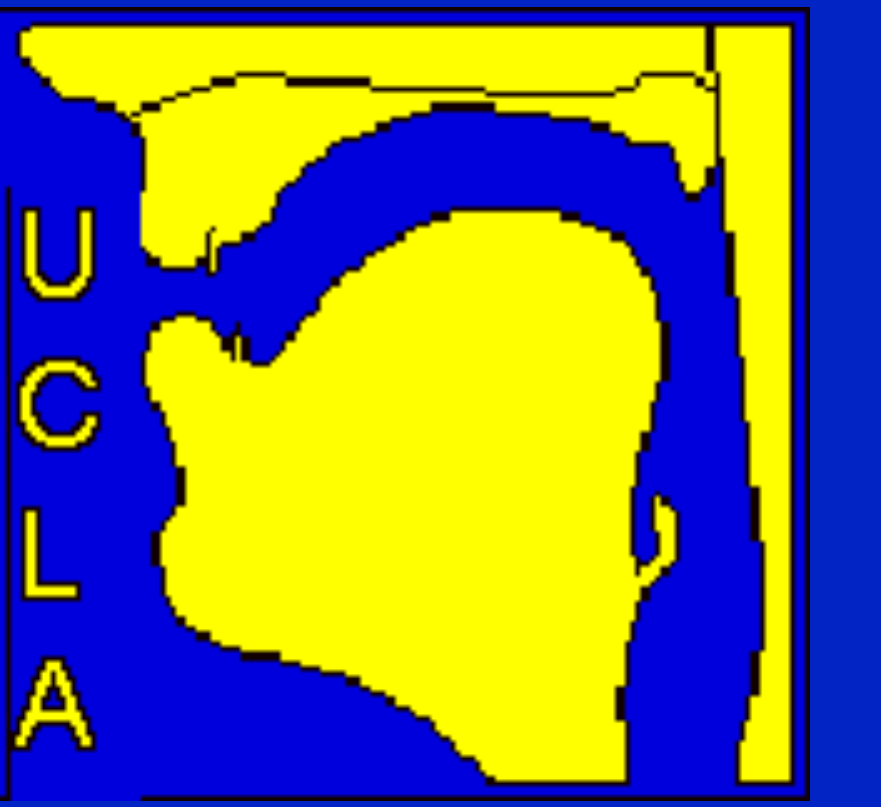


A reanalysis of glottal stops and glottalization in English

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Background

- Glottal stops in North American English occur in 3 environments:
 1. As an allophone of /t/, e.g. 'button' [bʌʔn].
 2. With simultaneous coda stop closure, e.g. 'cat' [kʰæʔt].
 3. Optionally before vowel-initial words, e.g. 'apple' [ʔæpl].
 - **This is the only position studied here.**
- Many factors influence the occurrence of glottal stops:
 - Prosodic, lexical, segmental, sociolinguistic factors.¹
 - It is still unclear which factors are most important in predicting where glottal stops occur.
- Most studies on glottal stop distribution rely on visual inspection of voicing:
 - Irregularity = 'glottalization'.
 - The irregularity is often assumed to be a lenited glottal stop.
 - But is every case of irregularity a glottal stop?

Research Goals

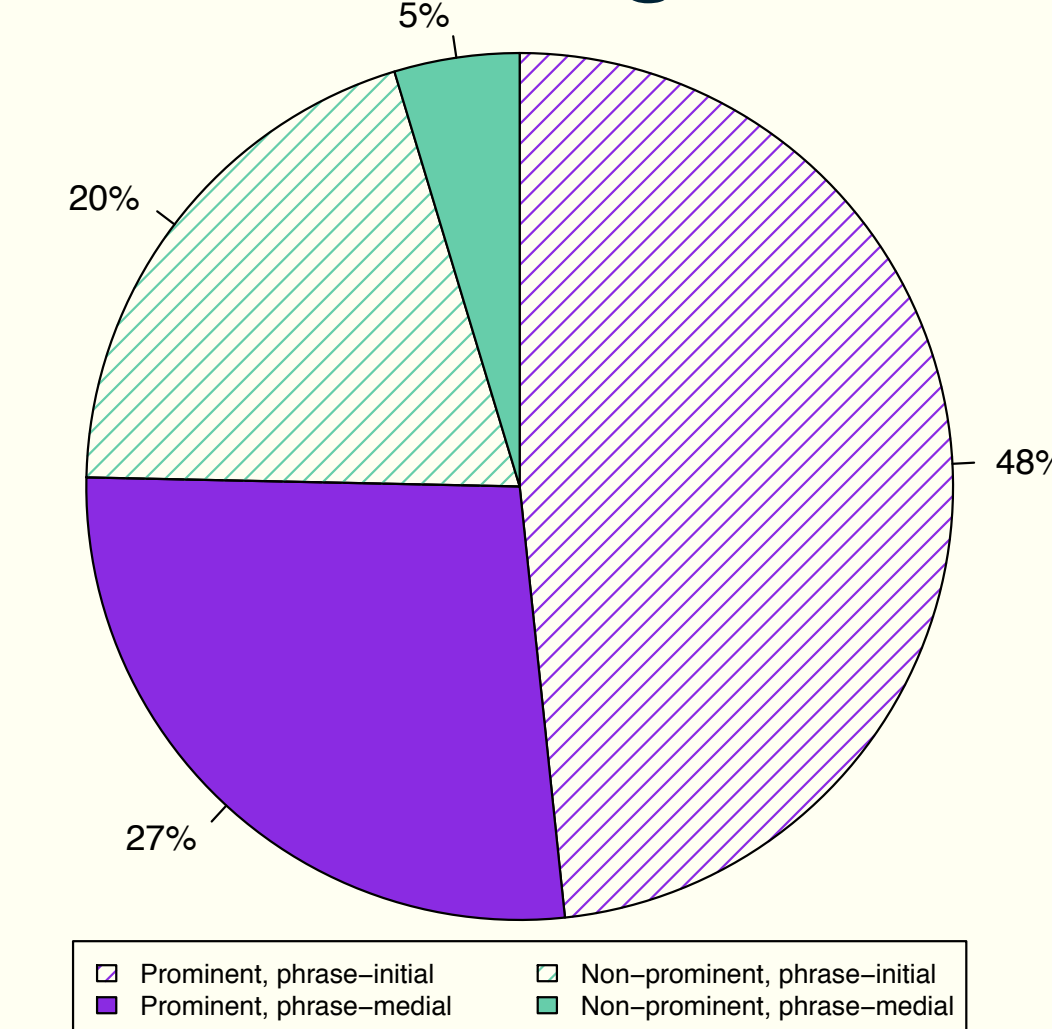
- To determine which factors are most important in predicting glottal stop occurrence.
- To test which cases of voicing irregularity are in fact due to glottal stops.

Method

- Word-initial vowels and sonorants [m, n, ɹ, l, w, j] were extracted from Boston University Radio News Corpus.²
 - For sonorant-initial words, the following vowel was also extracted (*Massachusetts*).
- Analyzed 2658 tokens from 2 female and 2 male newscasters.
- Two transcribers coded for presence of a *full* glottal stop [ʔ]:
 - [ʔ] = period of silence followed by a burst and onset of phonation.
 - Disagreements between transcribers were resolved by the author.
- Transcribers also coded for a variety of factors:
 - Segment type, vowel height, vowel backness, vowel tenseness.
 - Lexical frequency, content vs. function word, previous and following words.
 - Whether target segment was prominent, preceding and following break index, preceding pause, preceding irregularity.
 - Break index '5' = Breath group.
- All initial vowels and sonorants were extracted and voice quality measures were obtained using VoiceSauce².
 - H1*-H2* = acoustic correlate of glottal constriction.
 - Lower values for increased constriction.
 - CPP = noise measure.
 - Lower values when signal is noisier and/or less periodic.

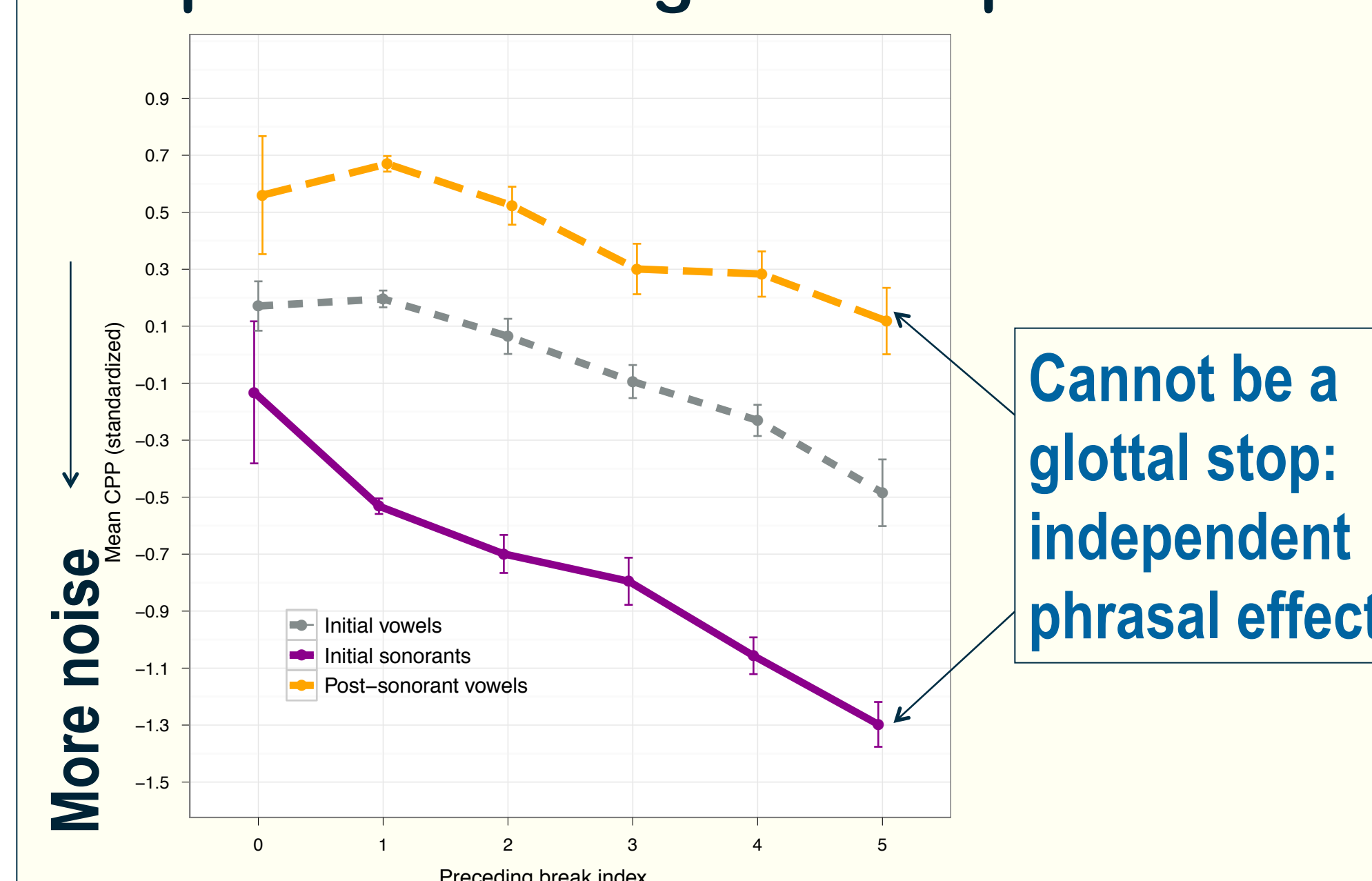
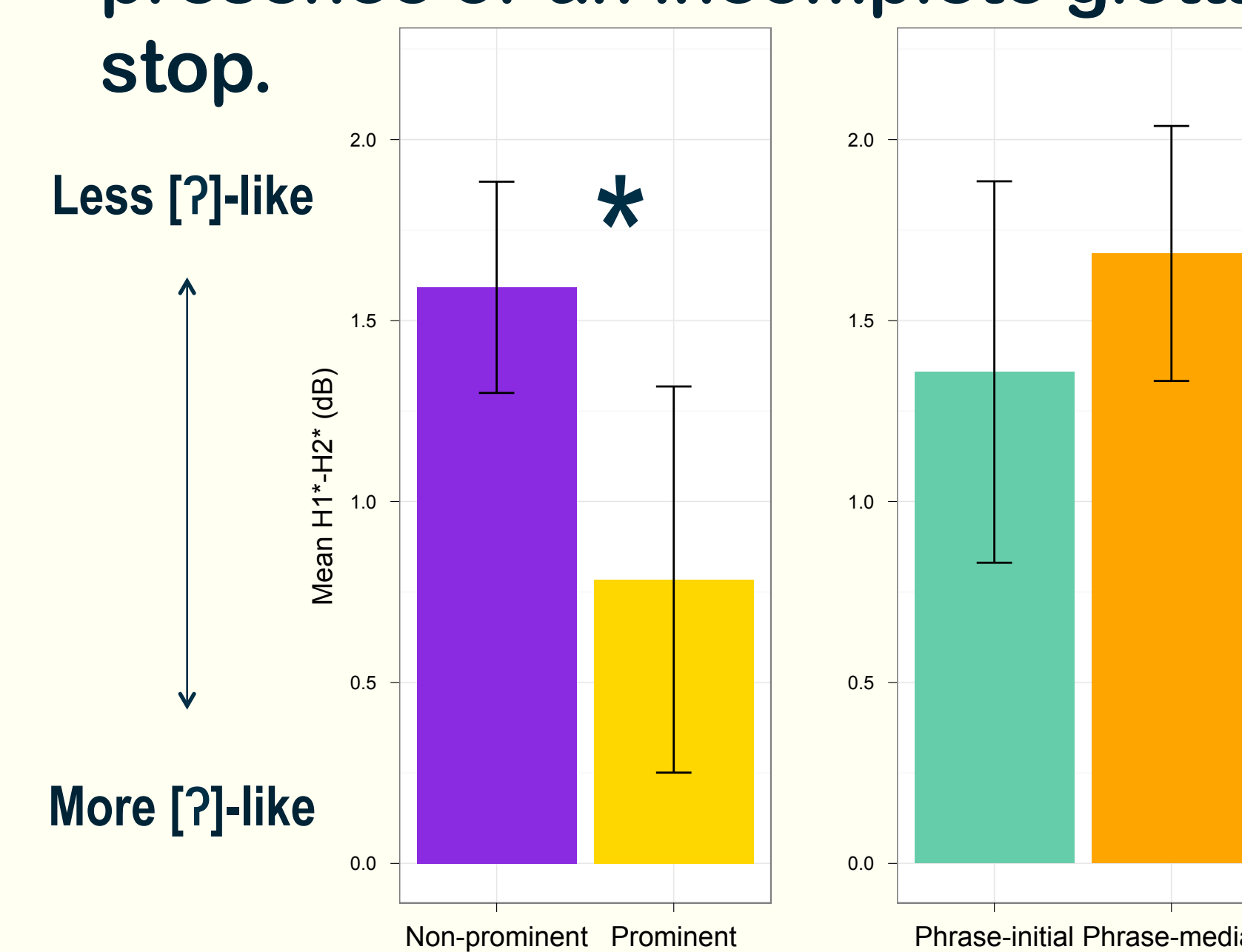
Results

- The most important predictors of [ʔ] are preceding break index and prominence.
 - Prominence alone accounts for 75% of instances of full glottal stops.



What about incomplete glottal stops?

- In the same contexts, prominent initial vowels also have lower H1*-H2*:
 - Acoustic support for glottal constriction, consistent with the presence of an incomplete glottal stop.
- **But for all segments, phrase-initial voicing is less periodic.**
 - Even for those that are never preceded by [ʔ]: inconsistent with presence of a glottal stop.



Discussion

- Glottal stops in English are dependent on prosody.
 - Prominence is responsible for most glottal stop gestures.
 - Higher domains mostly ensure that the gesture is fully realized.
- Higher prosodic domains are also responsible for irregular voicing that is inconsistent with a glottal stop gesture.
 - Decrease in periodicity.
 - Ongoing study shows decrease in vocal fold contact using electroglottography.
- Voicing irregularity at phrase onsets looks similar to phrase-final creak:
 - Phrase-final creak also shows decrease in periodicity and vocal fold contact.⁴
 - So phrase-initial voicing irregularity might be another type of creak.

Conclusions

- Glottal stops before vowel-initial words are mostly predicted by prosody.
- Not all irregular voicing during word-initial vowels should be treated as a realization of a glottal stop.

References

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