Onset Effects on a Tautosyllabic Vowel: Implications for Weight

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INTRODUCTION
- It has been claimed that onsets, in addition to rimes, contribute to syllable weight [1, 2, 3].
  - Previous studies have examined the effects of onset size and/or voicing [2, 3].
  - Gordon [3] observed that syllables with less sonorant (voiceless) onsets are heavier than more sonorant (voiced) ones by calculating perceptual energy from changes in intensity over time.
- This study investigates the effect of onset sonority on acoustics of the tautosyllabic vowel, specifically pitch and duration.
- If vowels with less sonorant onsets have higher pitch and longer duration, this would imply that vowels with a low sonority onset may have heavier weight than those with a high sonority onset.
- Data from languages both with and without lexical stress systems—English and Korean—are examined to compare onset effect.

METHODS
Participants: 14 native English speakers & 20 native Korean speakers (balanced for gender)
Materials: 6 onsets for English and for Korean with different levels of sonority
English: /t, s, d, v, n, l/; Korean: /tʰ, t*, t, ç, s, n/ (lowest to highest)
- Target English onsets are placed initially in a bi-syllabic word with initial stress. For Korean, target onsets initiate a tri-syllabic word.
- Onsets occur in an open syllable and in syllables closed with a nasal codas and a stop codas.
- 3 tokens of each onset were recorded.

Measurements:
- Pitch: Mean pitch value during the tautosyllabic vowel
- Vowel duration:
  - For syllables with non-stop onsets, from the beginning of vocalic voicing to the end of vocalic voicing
  - For syllables with stop onsets, from the release of the stop closure to the end of vocalic voicing
  e.g. [tʰa]

RESULT I - PITCH
Figure 1. English female speakers (EF; left) and English male speakers’ (EM; right) mean F0 from lowest to highest onset sonority

RESULT II - VOWEL DURATION
Figure 3. Mean vowel duration for English speakers
Figure 4. Mean vowel duration for Korean speakers

DISCUSSION
- As predicted, syllables with less sonorant onsets have higher pitch and longer vowel duration in general.
- English pitch (high to low): voiceless stop onsets > voiceless fricatives > voiced stops > voiceless fricatives & sonorants
- Korean: tense & aspirated onsets > /s/ (high pitch) vs. lenis (low pitch) stop onsets (long vowel duration) vs. non-stop onsets (short)
- In English, onset /s/ had a longest tautosyllabic vowel followed by /d/, /v, n, l/, and /s/, respectively, in both open and closed syllables.
- Why does onset /s/ have an exceptionally short tautosyllabic vowel?

CONCLUSION
- Onset duration and vowel duration stand in a compensatory relationship.
  - This can be further explored with articulatory measurements of timing and duration of onsets and vowels.
- Although the rimes are traditionally the most important contributors to syllable weight, the results show that onset sonority can affect the nuclear vowel’s pitch and duration in a systematic way.
- The findings imply that phonological weight, and consequently processes sensitive to weight such as stress, may be influenced by the relation of onsets and their tautosyllabic vowels.

References