## Building a heavy syllable with strong aspiration in Hateruma Yaeyama

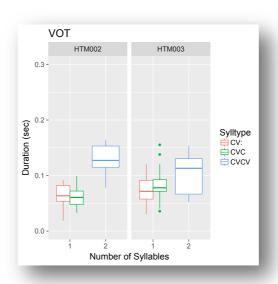
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**Introduction** Hateruma Yaeyama is an extremely endangered Ryukyuan language spoken by about 200 people in the Hateruma island, the southernmost of island of Japan (Aso 2015). Word-initial voiceless plosives in Hateruma have a strong aspiration that devoices even a following vowel. For example, /pana/ 'flower' is realized with [phana], in which even the sonorant following the aspirated plosive is devoiced. We propose that this unusually strong aspiration is how Hateruma speakers create heavy syllables with in turn satisfies a requirement for a prosodic word to contain at least a single heavy syllable in it.

**Data collection** Hateruma recordings were made from two female speakers (both over 70 years old) living in the Hateruma island in December 2017. The participants were presented with powerpoint slides that have pictures of an object or an action with a transliteration of Hateruma words in Hiragana, one of the Japanese scripts. Target words were read 3 times in a frame sentence: *kurja X ta enoo* "I call this X". The target words were composed of three different groups: 6 disyllabic words with two light syllables (CVCV), 6 monosyallabic words with a long vowel (CV:), and 6 monosyllabic words with a coda consonant (CVC). Acoustic landmarks were annotated and measurements were extracted using Praat.

Male speakers of Hateruma were excluded from this study because most of them lived outside of Hateruma for an extended period of time at a young age and mainly spoke Japanese that is not Hateruma Yaeyama.

**Results** We report VOT values of the initial plosive in three different groups. The monosyllabic words (CV: and CVC) have shorter VOT duration than the disyllabic words. Speaker HTM002 produced VOT in disyllabic words (avg = 140 ms) twice as long as the VOT in monosyllabic words (avg = 60 ms), suggesting strong aspiration. The other speaker (HTM003, over 80) produced longer VOT (avg = 100 ms) in disyllabic words than in monosyllabic words (avg = 79 ms).



**Proposal** We propose that Hateruma has a requirement that a prosodic word must have a heavy syllable and this requirement is satisfied by strong aspiration in word-initial plosives. In Hateruma, CVC and CV: mono-syllables are heavy and form a foot by themselves. We argue that two light syllables (CVCV) are not sufficient to form a foot, and the word requires a heavy syllable. This requirement is realized with a stronger aspiration of the voiceless plosive onset. Monosyllables do not trigger stronger aspiration because the requirement for a heavy syllable is already satisfied.

We could hypothesize that strong aspiration in CVCV words is associated with an initial syllable of a prosodic word. However, CV:CV (heavy-light) or CVC-CVC (heavy-heavy) words do not trigger strong aspiration in the initial plosive as shown in (1).

The strong aspiration pattern is also found in plosives when a word has three light syllables only (CVCVCV): /kipusï/ [ $k^h$ ipusï]'smoke', /katana/ [ $k^h$ atana] 'knife'

If strong aspiration in initial plosives were a mechanism how Hateruma speakers make initial syllables heavy, what would happen when a disyllabic word begins a nasal or a voiced plosive? Interestingly, our data show no CVCV word with an initial consonant that is a nasal or a voiced plosive. Most disyllabic words with these onsets in (2) show that the initial syllable has a long vowel or a coda consonant.

(2) Disyllabic Hateruma words other initials
a. nasal initial
/ma:su/ 'salt', /na:bi/ 'a pan', /niccï/ 'a chest'
b. voiced plosive initial
/gokka/ 'a hen', /ganzan/ 'a mosquito'

**Discussion** We have shown that Hateruma adopts three strategies in creating a heavy syllable; (a) a long vowel (CV:), (b) a coda consonant, and (c) an aspirated onset consonant. This pattern means that strong (and long) aspiration of a word-initial plosive in Hateruma behaves the same as introducing a mora. Assigning a mora to an initial consonant is not new since it has been argued in Topintzi (2008), in which Marshallese and Triqui have initial geminates that are moraic even though they are onsets. Topintzi & Davis (2018) also argue that Cypriot Greek has moraic geminates that are accompanied by aspiration. What unifies Topintzi (2008) and current study is that a language can have a moraic onset if such an onset is accompanied with longer duration: gemination in Marshallese, strong aspiration in Hateruma, and both gemination and aspiration in Cypriot Greek. In sum, onsets are moraic only when the closure in geminates is lengthened or when VOT is lengthened.

**Implication** The cross-linguistic implication of this study is that an additional mora can be realized not only with a long vowel or a coda consonant, but also by phonetically lengthening the initial plosive (longer aspiration in Hateruma). It also suggests that cross-linguistically onset without phonetic lengthening may not be assigned to a mora.

## **References:**

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