

## Is there stress in Bengali?

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Word-level prominence (i.e. stress) in Bengali has been described (primarily based on impressionistic assessment) as word-initial [1,2,3] but phonetically weak [4]. There is, however, little acoustic evidence of the presence of word-initial stress, or whether other phenomena (e.g., focus) may enhance it. In this paper, we examine acoustic properties typically associated with prominence (i.e., F0, intensity, duration) to determine the location and manifestation of stress in Bengali. These properties are analyzed from words in both focus and non-focus contexts to determine further whether focus enhances the manifestation of stress. Our results indicate potential weak initial stress, but do not provide evidence of enhancement under focus.

This study of Bengali, part of a larger cross-linguistic analysis of the properties of prominence, uses carrier dialogues designed to distinguish between the acoustic properties of stress and focus. Bengali speakers (5F, 18-19 years old) were recorded reading short dialogues on PowerPoint slides which contained target three-syllable real words in either a focus or prefocal (i.e. non-focus) context. In each context, we examined 10 instances of [i, a] in each of the three syllables of the targets. We considered only CV syllables with a voiceless unaspirated stop onset to avoid overlapping properties of aspiration, and the frequent allophonic spirantization of the voiced stops. Data from 5 speakers were analyzed (analysis of the remaining speakers is underway). We measured the duration and mean intensity and F0 of each vowel, and the F0 means in the four quarters of each vowels to capture their F0 contours. Stress was expected to be realized by increased acoustic properties on the initial syllable, and further enhancement of these properties in the focus context. The data were normalized for speaker and vowel using z-scores. In the non-focus context (Figure 1), the initial syllable has the longest duration and a distinct falling F0 contour in comparison to the other syllables. Focus (Figure 2) increased the duration across all three syllables, but we found no preferential enhancement of the initial (stressed) syllable. Instead, the final syllable showed the most increase in length. Also, focus primarily affected the F0 of the final syllable, introducing a falling F0 contour; it did not alter the falling contour of the initial syllable. The combination of lengthening and falling F0 on the final syllable are consistent with a right-edge prosodic boundary, independently of the stress on the initial syllable. The mean intensity and F0 measurements did not yield consistent patterns.

In sum, our results support claims of initial stress in Bengali since we found increased duration and a falling F0 contour on the initial syllable in the context without focus. We found, however, no enhancement of the initial (stressed) syllable under focus, although focus often has such an effect. The description of “weak” initial stress may, thus, reflect the lack of enhancement in focus context, a property of prominence frequently reported for typical stress languages.

Figure 1: Non-Focus context

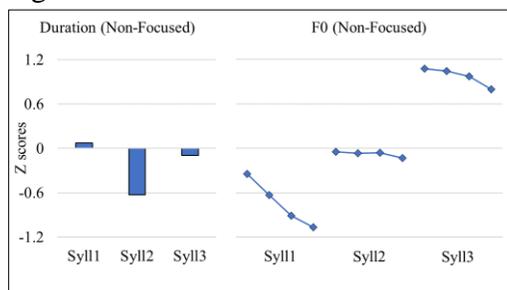
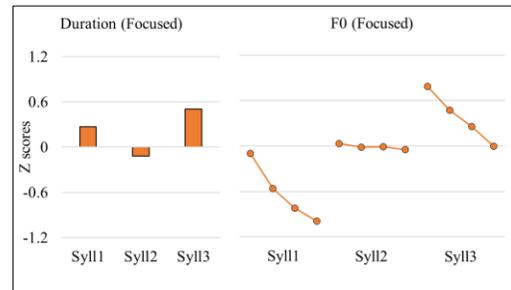


Figure 2: Focus context



## References

- [1] Anderson, J. D. (1962). *A manual of the Bengali language*. Cambridge: Cambridge University Press.
- [2] Ferguson, C. A. & Chowdhury, M. (1960). The Phonemes of Bengali. *Language*, 36:1, pt. 1,(Jan-Mar, 1960), 22- 59.
- [3] Khan, S. u. D. (2014). The intonational phonology of Bangladeshi Standard Bengali. *Prosodic typology II: The phonology of intonation and phrasing* (Sun-ah Jun, ed.), 81-117.
- [4] Khan, S. u. D. (2010). Bengali (Bangladeshi standard). *JIPA* 40:2, 221-225.

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- [3] Khan, S. u. D. (2014). The intonational phonology of Bangladeshi Standard Bengali. *Prosodic typology II: The phonology of intonation and phrasing* (Sun-ah Jun, ed.), pp 81-117.
- [4] Khan, Khan, S. u. D. (2010). Bengali (Bangladeshi standard). *JIPA* 40 (2), pp 221-225.