The Phonetics of Prosodic Marking of Focus in Sylheti

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ABSTRACT

This paper investigates the prosodic properties of the focus marking system in Sylheti. Sylheti exhibits two-way tonal contrasts. The prosodic means used for focus marking in tone languages include pitch register modification, durational changes, and phrasing. A production experiment was designed to examine the prosodic properties of focus. Results confirm that focus in Sylheti is indicated by pitch register modification of focused words with underlying L and H lexical tones. In-situ focus, the contrastive and corrective focus on the object, are consistently marked by a lowered f0 scaling on the target word. This marks a deviation from the 'effort code,' a phenomenon also observed in Akan. Additionally, significant modifications of pitch register in pre-focal words have also been observed on in-situ focus on the object and contrastive focus. An overall reduced duration on the focused constituents (including the pre-focal and post-focal constituents) is observed compared to their broad-focus counterparts.

Keywords: prosody, in-situ focus, contrastive focus, corrective focus, pitch register.

1. INTRODUCTION

In most languages of the world, intonation serves the function of conveying different post-lexical meanings. Apart from marking sentence types and dividing stretches of speech into smaller units, intonation also serves to encode focus or prominence in languages. However, many works on intonation in tonal languages indicate that tonal languages generally avoid complex intonation systems [1, 2, 3, 4]. It is crucial to examine whether they employ any prosodic means to mark focus to understand the extent to which intonation is used in tonal languages. Some of the prosodic cues that are reported to be employed in tonal languages include pitch register modification [5, 6, 7, 8, 9], lengthening or durational changes [8, 9], alteration of intensity, or post-focal compression [10, 11]. Mandarin uses register expansion for focus marking, leading to higher scaling of H and lower scaling of L tone [9]. Akan employs pitch register lowering as a prosodic means for marking focus [11]. Mandarin also uses post-focal compression (henceforth, PFC) for encoding focus. PFC is also present in Bodo, where it indicates in-situ focus. [7]. This paper addresses how the phonetic properties of focus are prosodically marked in Sylheti.

Some portions of an utterance can be focused on or highlighted to signal newness or contrastivity, which requires the hearer's special attention. A language may employ various phonological, lexical, morphological, and grammatical means for marking focus. The present paper examines the prosodic means used in Sylheti to encode different types of focus on words in the object positions. Analysis of in situ focus on the object (i.e., the focus that does not involve any syntactic movement of the object, often realized in wh- answers), contrastive focus, and corrective focus in Sylheti show that focus marking strategies differ from those primarily seen in other (tonal) languages. It involves lowering the pitch register on the target words in contrast to the general expectation of focus attracting a higher pitch. This can be interpreted as a deviation from one of the biological codes, 'the effort code,' a phenomenon also reported to be employed in Akan [6]. The pre-focal constituents exhibit some modifications in Sylheti, while no consistent changes were observed in the pitch levels of post-focal domains. Pre-focal words in sentences with in-situ focus and corrective focus on the object have lowered pitch, while in contrastive focus, they are realized with a higher pitch than their broad focus counterparts.

2. LANGUAGE UNDER STUDY: SYLHETI

Sylheti is generally considered to be one of the varieties of eastern Bangla [12]. It is typically spoken in the Sylheti district of northeastern Bangladesh. In India, Sylheti speakers inhabit two northeastern states- the Barack Valley region of Assam and northern Tripura (districts such as Kumarghat, Dharamnagar, and Kailashar). The distinct phonetic and phonological properties distinguish Sylheti from Standard colloquial Bangla [12, 13, 14, 15]. One such property is the application

of obstruent weakening, which has significantly reduced and restructured the language's phoneme inventory [14, 15]. Such a reduction has consequently created a two-way tonal contrast, high and low [12, 13, 16]. This reduction can be attributed primarily to the loss of (underlying) breathy voice contrasts among the consonants and partially to the processes of spirantization and deaffrication. In a recent study, Raychoudhury and Mahanta [17] reported that the loss of aspiration in the voiceless segments occurring in (different) onset positions, viz., the first or the second syllable of a disyllabic word, might trigger a three-way lexical contrast in Sylheti. Like most other Indo-Aryan languages, Sylheti follows an SOV word order.

3. EXPERIMENTAL PROCEDURE

Five native speakers of Sylheti from the Dharmanagar district of north Tripura were asked to produce scripted sentences. The recordings were digitized at a sampling frequency of 44.1 kHz and 32-bit resolution. In the experiment, the sequences of target words with underlying H and L lexical tones were embedded in carrier frames. Sentences with in-situ focus on objects were elicited as a response to a wh-question. An example of such a sentence frame is listed below-

Q: Subject QW Verb_J?

In-situ focus: Subject $[Y]_{\text{narrow foc}}\text{Verb}_J$

Sentences with contrastive focus were elicited as embedded sentences, in which the object of the matrix clause was in contrast with that of the embedded clause:

Subject [X] Verb_i BUT Subject $[Y]_{\textbf{contfoc}}\text{Verb}_J$

The corrective focus has been elicited by placing the target words as the answers to yes/no questions with the following sentence frame:

Q: Subject [X] Verb_J?

Corrective Focus: NO, Subject $[Y]_{\textbf{correfoc}}\text{Verb}_J$

Here, Verb_i and Verb_J are replaced with two different verbs. The target word replaces [Y] and is realized with any of three kinds of focus under consideration.

The individual sound files of each sentence are segmented at word leven using PRAAT (version 6.0.43) [18]. The acoustic components, viz., mean f0, duration, and intensity, are considered in this study. The values for all three parameters are extracted using the ProsodyPro [19]. The resulting values are compared between the sentences carrying in-situ focus, contrastive focus, and corrective focus with their broad focus counterparts. Each subject repeated the dataset containing different sentence types six times with a considerable pause between each repetition. The second author supplied questions on in-situ, contrastive, and corrective focus. The best five repetitions are considered for the analysis. A total of 1300 sentence tokens are considered in this study (13 sentences x 4 focus types x 5 repetitions x 5 speakers).

4. RESULTS

4.1. Focus and F0: In-situ focus on object

The results of the production experiment show that Sylheti's in-situ focus is prosodically marked through pitch register lowering. The target words specified with both (underlying) L and H lexical tones surfaced with a lower f0 than their broad focus counterparts. This recurs consistently in all the sequences of lexically H or L tone words that are examined in this study.

Apart from the pitch lowering of the target word, the f0 of the pre-focal words is also observed to be lowered in all the combinations examined in this study. On the other hand, the pitch in the post-focal domain remains neutral.

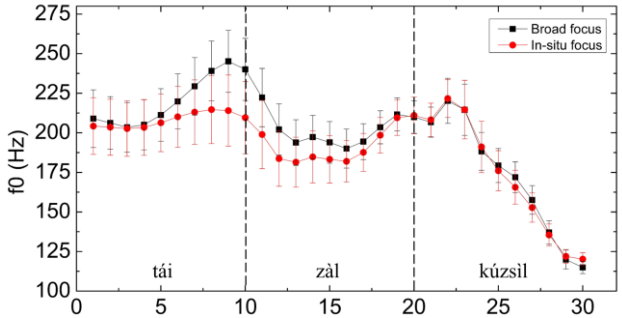

Figure 1: Time-normalized f0 contours averaged across all the tokens produced by all the speakers for the sentence [tái zàl kúzsìl] *she looked for a net*.

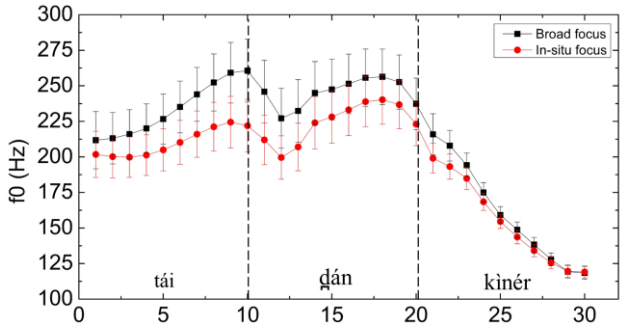

Figure 2: Time-normalized f0 contours averaged across all the tokens produced by all the speakers for the sentence [tái d̠án kìnér] *she is buying rice*.

Figures 1 – 2 show the representation of f0 contours of broad focus (black color) and in-situ focus (red color). The error bars depict the standard error of data post-aggregation. The target words that carry the in-situ focus, viz the objects [zàl] (in Figure 1) and [ḏán] (in Figure 2), are realized with lowered pitch. The pre-focal elements, the subject word [tái] in both cases undergo pitch lowering as well.

4.2. Focus and F0: Contrastive Focus and Corrective Focus

Contrastive focus in Sylheti is marked with pitch register lowering on the target word with underlying L or H lexical tones. While the lexical tonal specifications of target words are retained, the effect of contrastive focus is manifested as changes in f0 scaling on the target words, which is lower than their broad focus counterparts. Interestingly, the words preceding the target words have a higher pitch compared to the corresponding broad-focus sentences (Figure 3). Pitch register compression is observed on the post-focal domains in all the sentences representing different tonal sequences.

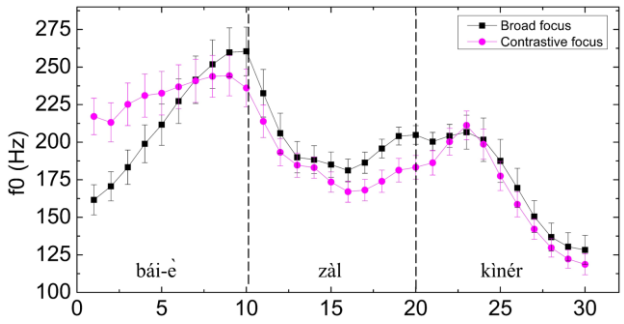

Figure 3: Time-normalized f0 contours representing broad focus (in black) and contrastive focus (in purple); the f0 contours are averaged across all the tokens produced by all the speakers for the sentence [bái-è zàl kìnér] *brother is buying a net*.

Corrective focus, too, is realized through pitch register lowering on the target words. However, pitch levels of both pre-focus and post-focal domains are realized with a lowered f0 compared to their broad-focus counterparts (Figure 4). This holds true for all the combinations of tonal sequences considered in this study.

4.3. Focus and Duration

We compared the duration of focused constituents featuring in the context of in-situ focus, contrastive focus, and corrective focus with their broad focus counterparts.

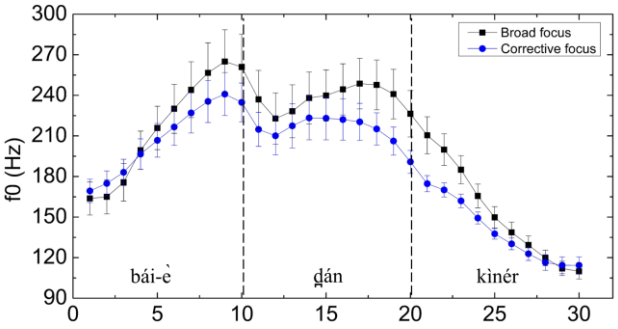

Figure 4: Time-normalized f0 contours representing broad focus (in black) and corrective focus (in blue); the f0 contours are averaged across all the tokens produced by all the speakers for the sentence [bái-è dán kìnér] *brother is buying rice*.

Results indicate that duration is considerably reduced on the pre-focal element compared to their broad focus counterparts (Figures 5 – 7). This pattern is consistently observed in all the sentences featuring different (underlying) tonal sequences (viz., HHH, HLH, LHL, LLL, and so on). A one-way *repeated measure ANOVA* (RM ANOVA) was conducted to examine the effect of the duration on the independent variable (focus types) for the pre-focal word (word occurring on the subject position), the focused word (word occurring on the *object* position), and post-focal word (word occurring on the *verb* position). Results indicate a significant reduction of the pre-focal words occurring in the in-situ context compared to their broad-focus counterparts $F[1, 300] = 11.648$, $p = 0.000731$. However, the durational reduction for the in-situ focus compared to the broad focus observed on the *object* ($F[1, 300] = 2.696$, $p = 0.102$) and the *verb* ($F[1, 300] = 0.449$, $p = 0.503$) is not statistically significant (Figure 5).

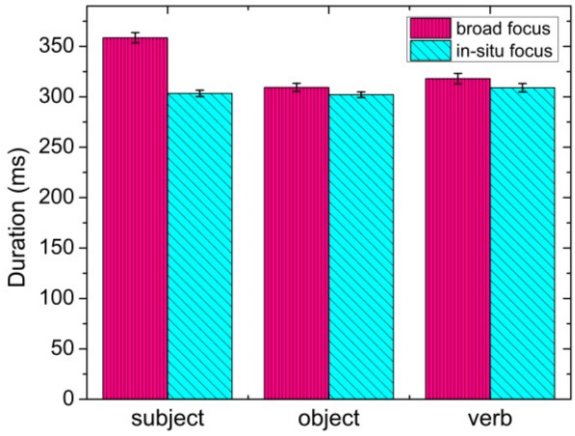

Figure 5: Represents the average duration of the constituent words of the sentence with HHH tonal sequences.

In Sylheti, contrary to the general expectation, the duration of words carrying both contrastive ($F[1, 299] = 9.77$, $p = 0.002$) and corrective focus ($F[1, 299] = 20.693$, $p < 0.0001$) is observed to be significantly lowered compared to their broad focus counterparts. Furthermore, this duration reduction is not limited to the constituent in focus. In sentences where the object receives contrastive focus, both pre-focal ($F[1, 299] = 8.033$ $p = 0.005$) and post-focal ($F[1, 329] = 1.653$, $p = 0.009$) elements are realized with a significantly shorter duration. Durational changes induced by corrective focus are similar to those of contrastive focus. The pre-focus ($F[1, 299] = 12.097$, $p = 0.00058$) and post-focus positions ($F[1, 300] = 11.248$, $p < 0.0001$) undergo an overall reduction when they occur in corrective focus context compared to their broad focus counterparts.

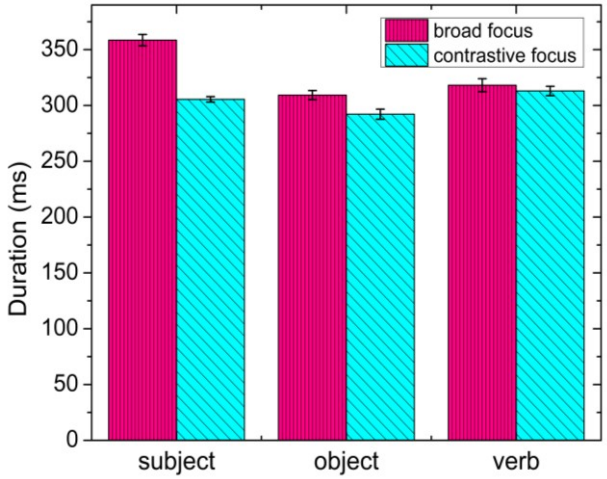

Figure 6: Represents the average duration of the constituent words of the sentence with LHL tonal sequences.

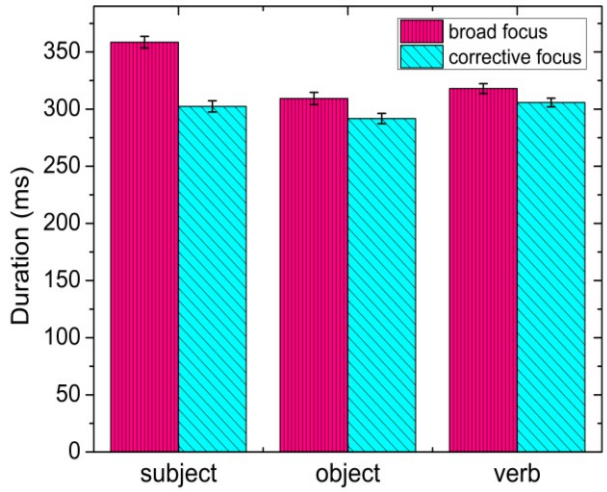

Figure 7: Represents the average duration of the constituent words of the sentence with LLL tonal sequences.

5. DISCUSSION

Results from the experiments conducted for this paper show that Sylheti speakers do employ prosodic means to mark prominence. Pitch register modification is a primary means for prosodic marking of focus in the language. This allows encoding prominence in utterances while preserving the underlying lexical tones of the constituent words. On the other hand, the duration of the pre-focal elements in sentences carrying focused constituents is considerably reduced for both in-situ, corrective, and contrastive focus.

The lowering of the pitch on the target word and reduction of the duration of the target word as well as post and pre-focal elements for encoding focus, suggests a deviation from the expected effects of focus as suggested by the effort code, one of the three biological codes of intonation [8]. The effort code assumes that parts of utterances are made more prominent by increased effort in production by the speaker. This entails that the pitch register on the constituent will be raised when it receives focus. However, Sylheti shows a pattern quite the opposite to it. Instead of a raised pitch register, constituents in focus exhibit a lowering of f0. Moreover, focus-induced lengthening is also not seen in the language. This further exemplifies Kügler & Genzel's [10] observation that the prosodic marking of focus does not involve deviation from the neutral register only in a particular direction.

6. CONCLUSION

Our experimental study has thus identified two primary prosodic markers of focus in Sylheti- pitch register modification and changes in terms of duration. Pitch register lowering on the target words is consistently used to encode focus in the language. Focus-induced pitch modification is limited to the focused word and extends to pre-focal and post-focal domains. Durational changes also serve as cues to focus; the in-situ, contrastive, and corrective focus induce a reduction in duration on the pre-focal element as well as the focus constituents. One of the significant findings of this paper is the observed deviation from the effort code of intonation, which is exhibited through the lowering of f0 and a reduction in duration values of focused constituents. While this study involved the investigation of prosodic properties of focus on object constituents, future research on focus prosody on other locations and morphological focus markers will be required to understand further the scope of prosodic focus marking in the language.

7. REFERENCES

[1] Gussenhoven, C.2004. *The Phonology of Tone and Intonation*. Cambridge: Cambridge University Press.

[2] Yip, M. 2002. *Tone*. Cambridge: CambridgeUniversity Press.

[3] Cruttenden, A.1997. *Intonation*. 2nd edition. Cambridge: Cambridge University Press

[4]Ladd, R. 1996. *Intonational Phonology*. Cambridge: Cambridge University Press.

[5] Inkelas, S, Leben, W. 1990. Where phonology and phonetics intersect: the case of Hausa intonation. Papers in Laboratory Phonology I: Between the grammar and the physics of speech:17-34.

[6] Kügler, F, Genzel, S.2012. On the prosodic expression of pragmatic prominence–The case of pitch register lowering in Akan. *Language and Speech 55(3):331-359.*

[7] Mahanta, S. Das, K., Gope, A. 2016. On the Phonetics and Phonology of Focus marking in Boro. Proceedings of the Annual Meetings on Phonology. 3. 10.3765/amp.v3i0.3668

[8] Pan, H. 2007. Focus and Taiwanese unchecked tones. In C. Lee, M. Gordon, & D. Buring (Eds.), *Topic and focus: Cross-linguistic perspectives on meaning and intonation (pp. 195–213). Dordrecht: Springer.*

[9] Xu, Yi. 1999. Effects of tone and focus on the formation and alignment of f0 contours. *Journal of phonetics* 27(1): 55-105.

[10] Downing, L. 2008. Focus and prominence in Chichewa, Chitumbuka, and Durban Zulu. ZAS Papers in Linguistics 49, 47–65.

[11] Kügler, F. 2017. Tone and intonation in Akan. In L. J. Downing, & A. Rialland (Eds) *Intonation in African Tone Languages*(pp 24:89). De Gruyter Mouton

[12] Gope, A. 2016. The Phonetics and Phonology of Sylheti Tonogenesis. Ph.D. Dissertation. Indian Institue of Technology, Guwahati.

[13] Gope, A, and Mahanta, S. 2014. Lexical Tone in Sylheti. Paper presented at 4th International Symposium on Tonal Aspects of Languages, Nijmegen, The Netherlands, May 13–16; pp. 10–14.

[14] Gope, A, Mahanta, S. 2015. An Acoustic Analysis of Sylheti Phonemes. Paper presented at 18th International Congress of Phonetic Sciences, Glasgow, UK, August 10–14.

[15] Gope, A. 2018. The Phoneme Inventory of Sylheti: Acoustic Evidences. Journal of Advanced Linguistic Studies 7: 7–37. Bahri Publications.

[16] Gope, A. 2021. The Phonetics of Tone and Voice Quality Interactions in Sylheti. Languages 6: 154.

[17] Raychoudhury, P, Mahanta S. 2020. The Three Way Tonal System of Sylheti. Paper presented at 10th International Conference on Speech Prosody, Tokyo, Japan, May 25–28; pp. 503–7.

[18] Boersma. P., Weenik D 2012. Praat: doing phonetics by computer (Version 5.3.04_win64) [Computer programme].

[19] Xu, Yi. 2013. ProsodyPro - A tool for large-scale systematic prosody analysis. Proceedings of the TRASP Conference. 7-10.