Effects of information structure on prosody: Comparing production and perception in Bangla
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This paper investigates the prosodic distinctions available in Bangla/Bengali to differentiate focus types. Bangla has canonical SOV order. The immediately preverbal position is the default focus position (Choudhury 2011). To broaden our understanding of the relationship between information-structure/prosody/syntax, we conducted an elicitation study (N=5) followed by a perception study (N=12) to investigate (i) whether Bangla speakers distinguish new-information vs. contrastive focus prosodically and (ii) whether the position of the focused constituent matters. Bangla has a default focus position, so we wanted to test whether prosodic distinctions between focus-types would be amplified in that position.

We manipulated focus type (new-information/contrastive focus) and grammatical role of the focused constituent (subject/object). In the elicitation phase, wh-questions were used to elicit new-information focus (ex.1a,b) and yes/no questions to elicit contrastive focus (1c,d).

1) Elicitation phase (Question and answers were presented to speakers in writing, in Bangla)
(a) Subj wh (new-info focus) Who bought a car? *baba gaRi kinlo* ‘Father bought a car’
(b) Obj wh (new-info focus) What did father buy? *baba gaRi* kinlo ‘Father bought a *car’
(c) Subj y/n (corrective foc) Did neighbor buy a car? *baba gaRi* kinlo ‘Father bought a car’
(d) Obj y/n (corr foc) Did father buy a computer? *baba gaRi* kinlo ‘Father bought a *car’

Perception study: Sentences from the elicitation phase were used as stimuli. For each grammatical role (subject/object), listeners saw a wh-question and a yes-no question (left/right positions were balanced) and heard a sound file elicited by a wh-question or a yes/no question of the same grammatical role (ex.2a,2b). They were told to choose the question that the sound file was the most appropriate answer for.

If listeners distinguish focus types, we can attribute this to differences in the intonation/prosody, as the sentences were otherwise identical (ex.1).

(2a) Screen showed: What did father buy? Did father buy a computer? [object condition]
People hear: *baba gaRi kinlo* ‘Father bought a *car’ (elicited by obj wh-Q or obj y/n Q)

(2b) Screen showed: Who bought a car? Did neighbor buy a car? [subject condition]
People hear: *baba gaRi kinlo* ‘Father bought a *car’ (elicited by sub wh-Q or sub y/n Q)

Results: Overall, we find a wh-question preference (p’s<.05). However, in object conditions, this preference was lower with sound-files elicited by yes/no-questions than wh-questions (p’s<.05). In contrast, subject conditions showed no significant differences, triggering mostly wh-choices. Thus, listeners are prosodically distinguishing between focus-types only when the focused constituent is an object, in the default focus position.
**Acoustic analysis/Elicitation study:** We conducted **acoustic analyses** to see what cues signal focus type. Crosslinguistically, pitch and duration can signal focus (Ladd 1996), so we focused on them. (Due to an initial low pitch accent (Hayes/Lahiri 1991), mean F0 analyses were conducted on 10 time-normalized segments centered at noun offset, with **Prosody Pro**).

**Results:** As shown in Fig.1, **new-information objects have lower mean F0 than contrastively-focused objects** (p’s<.05). In addition, focused objects have higher F0 than unaccented objects (as in Hayes/Lahiri 1991). Like objects, **new-information subjects have lower F0 than contrastively-focused subjects** (p’s<.05). Crucially, unaccented subjects do not differ significantly from contrastively-focused or new-information subjects. In general, subjects have high F0, unlike objects, presumably due to initial prominence/F0 declination. This suggests the asymmetrical perceptibility of focus type on subjects/objects may be due to ‘crowding’: High F0 on subjects is not a reliable cue to focus type since unfocused subjects also have high F0. (We found no clear effects of pitch excursion or duration.)

**As a whole,** our findings indicate that Bangla, which has positional as well as morphological focus marking, also uses prosodic cues to differentiate new-information vs. contrastive focus, but that the availability of prosodic cues interacts with syntactic position such that prosodic differences between the focus-types are most apparent when the focused constituent is located in the default focus position.

Selected References


Xu 2011. [www.phon.ucl.ac.uk/home/yi/ProsodyPro/](http://www.phon.ucl.ac.uk/home/yi/ProsodyPro/)

**Figure 1.**

![Plot of F0 in Normalized Time](image-url)

[Normalized time: Time segments 1-10: *subject*, segments 10-20: *object*; segments 20-30: *verb*]