

Tonal Complexity in Phonetics and Phonology: A Mixtecan Perspective

Mixtecan languages are well-known for their complex tonal inventories and the intricate way that tone interacts with the prosodic and morphological structure of words. In this talk, I examine two types of interactions between tone and prosodic structure in Yoloxóchtli Mixtec (YM): (1) the phonetic alignment of tone to moras and (2) the interaction of tone and stress in the realization of focus.

In YM, tonal targets are aligned to moras, resulting in contrastive contour types even within a single syllable, e.g. /ta¹a³/ ‘man’ vs. /nda¹³a³/ ‘went up.’ In the first study, I examine the alignment of tonal targets using original field data from 10 speakers. The F0 trajectories for bimoraic monosyllables closely match those of bimoraic disyllables. Moreover, in both word types, F0 movement is restricted to only the mora with the associated target. Thus, a rising /1.3/ tone shows a marked delay in F0 rise compared to the earlier rise observed with a /13.3/ tone. These findings support the notion that moras act as anchors for F0 targets and trajectories within tone production. Such patterns stand in contrast to studies on tone languages for which the syllable is the unit of tonal alignment (Prom-on et al. 2009, Xu 1998, Xu & Prom-on 2014).

In addition to moraic structure, Mixtec also has word-final prominence. In non-tonal languages, stressed syllables are the anchor for the alignment of intonational pitch accents (Ladd 2008). To what extent is the realization of focus aligned with stress in a tone language? In the second study, I use experimental data from ten speakers in the field to investigate how sentence position, stress, and focus type influence the realization of F0 and duration in different tonal melodies. The findings show an overall expansion of the F0 space and F0 raising on words produced with contrastive focus, a smaller effect on words produced with narrow focus, and the smallest effect on words produced under broad, sentential focus. Focus-related lengthening asymmetrically affected stressed syllables in the language more than unstressed syllables, in agreement with the focus-to-accent principle (Gussenhoven, 1983). This resulted in an overall increase in tonal hyperarticulation. Taken together, these experiments illustrate both the phonetic relationships between prosodic structures (syllable prominence, moraic structure) and tone; and the importance of careful phonetic fieldwork in addressing analytical issues in prosodic structure (c.f. Grice et al, forthcoming).

References

- Grice, M., Ritter, S., Niemann, H. and Roettger, T.B. (forthcoming) Integrating the discreteness and continuity of intonational categories. *Journal of Phonetics*.
- Gussenhoven, C. (1983). Focus, Mode, and the Nucleus. *Journal of Linguistics*, 19(2):377–417.
- Ladd, D. R. (2008). *Intonational Phonology*. Cambridge Studies in Linguistics 119. Cambridge University Press, 2nd edition.
- Prom-on, S., Xu, Y., and Thipakorn, B. (2009). Modeling tone and intonation in Mandarin and English as a process of target approximation. *Journal of the Acoustical Society of America*, 125(1):405–424.
- Xu, Y. (1998). Consistency of tone-syllable alignment across different syllable structures and speaking rates. *Phonetica*, 55:179–203.

Xu, Y. and Prom-on, S. (2014). Toward invariant functional representations of variable surface fundamental frequency contours: Synthesizing speech melody via model-based stochastic learning. *Speech Communication*, 57:181–208.