Discrete and continuous-valued prosodic cues to prominence perception in Albanian

Enkeleida Kapia[1,2], Felicitas Kleber[1], Alejna Brugos[3]

[1]Institute for Phonetics and Speech Processing, LMU, Munich; [2]Institute of Linguistics, ASA, Tirana, [3]MIT, Boston

Prominence as a perceptual phenomenon is influenced by many factors [1], but little is known about how these factors interact in the course of communication [2,3]. This study explores prominence/boundary perception using Rapid Prosody Transcription [4], by looking at how naïve Albanian speakers perceive prosodic prominences/boundaries. [5,6] have suggested that prominence in Albanian is marked both by the head (mainly L* for non-focused and L+H* for focused items) and the edge of the phrase, which is either an accentual (Ha, La) or an intonation phrase. [7] has shown that some morpho-syntactic factors affect listeners' prominence/boundary perception. Following this, the present study expands our knowledge by investigating whether listeners' perceptions are affected by: a) the presence/absence of discrete intonational categories (pitch accents/boundary tones) and b) syllable, vowel, and word duration.

Similar to [7], the analysis for this study used productions from two male and two female speakers. Twenty short (~20-second) sound files were taken from longer interviews wherein speakers described 2-picture story sequences (from QUIS [8]). 26 naïve listeners participated in the RPT experiment via Percy [9]. Following RPT methods, a text transcript of each file was displayed, with words separated by spaces, but no punctuation. Participants listened and clicked on words a) if they perceived them as highlighted in relation to surrounding words or b) if they perceived a boundary after them. For each word, two continuous-valued prosody features were calculated: the proportion of transcribers who marked the word (the p-score) and/or a boundary (the b-score) as prominent.

This study tested whether listeners' perceptions a) were affected by the presence/absence of pitch accents and boundary tones present in AlbToBI [5,6] provided by two trained annotators and b) whether syllable, vowel, and word duration played a role in listeners' prominence perceptions. Fleiss' K scores were calculated and showed that agreement was higher for b-scores (kappa = 0.62) than p-scores (kappa = 0.32), a result found in many RPT studies so far [10]. With respect to the role of prosodic factors in prominence perception, this study found that mean p-scores increase as a function of accent type, starting with no accent, L* and L+H* pitch accent (Fig. 1). Similarly, b-scores increase as a function of boundary type, starting with no boundary, L%, Ha, La and H% (Fig. 2). The low b-scores for L% is related to the fact that listeners almost never marked the end of an utterance, given instructions to detect boundaries in the utterance. Importantly, this study found that word/syllable/vowel duration did not affect the choice of the word either a) having been labelled as prominent by a trained annotator (Fig. 3) or b) having been perceived as prominent by the 26 participating subjects (Fig. 4). In conclusion, this study shows 1) that prominence perception in Albanian is affected primarily through differences in F0 as in Tamil [11], and not by means of duration, and 2) that pitch accent and boundary tone distinctions in the AlbToBI annotation system [5,6] relate to the categories perceived by naïve listeners.
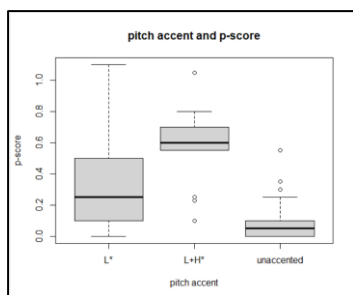
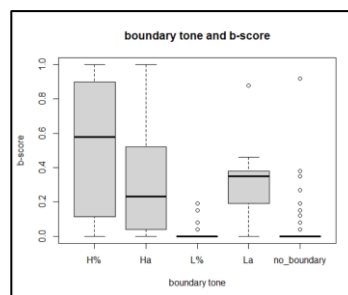Fig. 1: p-scores as a function of pitch accent type.
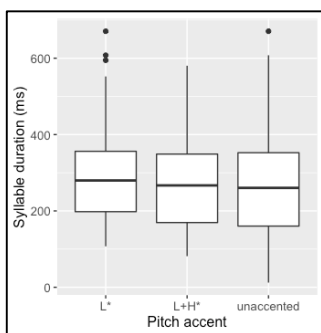
Fig. 2: b-score as a function of boundary tone.

Fig. 3: Syllable duration as a function of pitch-accent type.

Bibliography

[1] Riesberg, S., Kalbertodt, J., Baumann, S., & Himmelmann, N. P. (2020). Using Rapid Prosody Transcription to probe little-known prosodic systems: The case of Papuan Malay. *Laboratory Phonology: Journal of the Association for Laboratory Phonology*, *11*(1), 8. DOI: http://doi.org/10.5334/labphon.192

[2] Arnold, D., Wagner, P., & Baayen, H. (2013). Using generalized additive models and random forests to model German prosodic prominence. Proceedings of Interspeech, 2013, 272–276.

[3] Wagner, P., Origlia, A., Avesani, C., Christodoulides, G., Cutugno, F., D'Imperio, M., et al. (2015). Different parts of the same elephant: A roadmap to disentangle and connect different perspectives on prosodic prominence. In The Scottish Consortium for ICPhS 2015 (Ed.), Proceedings of the 18th International Congress of Phonetic Sciences (paper number 0202.1-5). Glasgow, UK: The University of Glasgow.

[4] Cole, J., Mo, Y., & Baek, S. (2010). The role of syntactic structure in guiding prosody perception with ordinary listeners and everyday speech. Language and Cognitive Processes, 25, 1141–1177.

[5] Kapia, E., Kleber, F., & Harrington, J. (2020). An Autosegmental-Metrical Analysis of Rising Contours in Standard Albanian. *10th International Conference on Speech Prosody 2020*, 171–175. https://doi.org/10.21437/SpeechProsody.2020-35.

[6] Kapia, E., Harrington, J., Kleber, F. (forthcoming). An Autosegmental Metrical Analysis of Albanian Prosody. *Prosodic Typology III*, eds. Jun, S. A. Oxford University Press.

[7] Brugos, A. & Kapia, E. (2021). *Prosodic and non-prosodic cues to prominence and boundaries: evidence from an RPT study in Albanian*. 1st International Conference on Tone and Intonation. Sonderborg, Denmark, December 6-9.

[8] Skopeteas, S., Fiedler, I., Hellmuth, S., Schwarz, A., Stoel, R., Fanselow, G., & Krifka, M. (2006). *Questionnaire on information structure (QUIS): reference manual* (Vol. 4). Universitätsverlag Potsdam.

[9] Draxler, C. (2011). Percy – an HTML5 Framework for Media Rich Web Experiments on Mobile Devices. *Interspeech 2011*, 3339–40, Florence, Italy.

[10] Cole, J., & Shattuck-Hufnagel, S. (2016). New methods for prosodic transcription: Capturing variability as a source of information. *Laboratory Phonology*, 7(1): 8, 1–29. DOI: https://doi.org/10.5334/labphon.29

[11] Keane, E. (2003). Prominece in Tamil. *Journal of the International Phonetic Association, 36*, 1, pg. 1-20. Cambridge University Press.