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### **The perception of prominence by Polish native speakers: a crowdsourcing study**

Primary lexical stress in Polish is fixed on the penultimate syllable with well-defined exceptions and is robustly perceived by native listeners ([4], [9]). However, secondary stress shows unsystematic category perception, see [9], and weak acoustic cues ([3], [7], [8]), potentially providing support to phonological analyses disputing its status in Polish, like [8].

Large perceptual studies paired with analyses of the exponents of stress and accent in the acoustic signal could decisively contribute to the debate [7], however these are lacking. Moreover, the percept of relative syllable prominence is in fact a complex function of lexical stress, focus, as well as contextual and psychoacoustic effects. It is unknown how overall prominence is judged by Polish listeners in their native language.

We investigate the perception of phrase and word level stress, as well as overall prosodic prominence, by naïve Polish listeners in a large perception study using crowdsourcing methods. Crowdsourcing was shown to be useful and, under certain constraints, robust in rating prominence levels ([1], [5], [6]). The participants are presented with quasi-randomised stimuli sets. The stimuli include designed speech samples, previously elicited from native speakers of Polish in a production task. The stimuli differentiate focus and stress positions of CV syllables starting with stop phonemes contrasting in voicing (/p, t, k, b, d, g/). We present some examples of designed stimuli sentences below, target syllables are in bold (F=focus, IP=intonational boundary):

- (1) Kamila kupiła tulipany]<sub>+F</sub>; <sub>+IP</sub>, a nie róże.  
‘Kamila has bought tulips, not roses’
- (2) Nie, to Kamila kupiła organizator]<sub>-F</sub>; <sub>-IP</sub> w supermarketie, a nie Małgosia.  
‘No, it was Kamila who bought a folder in the supermarket, not Małgosia.’
- (3) Kamila kupiła tapicerki]<sub>+F</sub>; <sub>-IP</sub> w supermarketie, a nie ogumienie.  
‘Kamila has bought upholstery in the supermarket, not tyres.’
- (4) Nie, to Kamila kupiła medaliki]<sub>-F</sub>; <sub>+IP</sub>, a nie Małgosia.  
‘No, it was Kamila who bought the medallions, not Małgosia.’

All stimuli sentences are presented vertically, divided into syllables with a matching audio of the whole sentence. Participants are able to play the audio file as many times as needed. Participants are asked to rate each syllable by its strength on a horizontal 11-point-scale, like reported by [2], marked from min. (leftmost) to max. (rightmost). We calculate inter-rater agreement, compare the performance of naïve and expert annotators, following [5], and report on the individual differences among raters in prominence judgments. We also discuss the advantages and caveats concerning gathering ratings online from large, unsupervised groups of raters. The following presentation was held by Zofia Malisz, PhD, at the 45th Poznań Linguistics Meeting in Poznań, Poland on the 17th September 2015. Follow-up studies have been planned and are being discussed at the point of submission of this abstract. Both the finished study described above and planned follow-up experiment are going to be presented in the talk. The goal is to gather opinions from young scientists which will be considered while developing a new design and present an interesting way of obtaining ratings online using crowdsourcing methods.

## References

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