# Perception of the prosodic boundary markers in a left-headed language

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Previous research regarding different kinds of languages analyzed how differently coordinated words (names or numbers) are realized prosodically in speech production (for example Ladd [1] and Wagner for English [2], Féry and Kentner for German and Hindi [3], and Féry and Truckenbrodt for German [4] as well). Firstly, Wagner [2] presented a research method that was later adapted by many other experiments. In this procedure, the production of the speech units embedded in different positions were compared to the equally enumerated ones (Name1 and Name2 and Name3 and Name4) vs. ((Name1 and Name2) or Name3 and Name4) or (((Name1 and Name2) and Name3) or Name4). Reading aloud these structures forces the speakers to label the boundaries after the detached names by using various prosodic boundary cues. According to the latest model of the prosodic structure of the speech boundaries, the connection or the separation of the speech units are raised from the principles of 'Proximity' and 'Similarity'. The interplay between the syntactic structure of the utterances and the prosodic planning has been investigated mostly for English and German, but not for Hungarian. However, it is expected that speech production in terms of prosodic planning is different in these typologically distinct languages. For example in Hungarian the position of the focus is defined syntactically, while prosodic prominence marking plays only a secondary role and is partly optional [5]. Besides, in Hungarian, phrase-initial pitch accents mark the left edge of an accentual (minor) phrase simply by their position. Earlier research examining speech production [6] found that syntactical boundaries can be marked by a number of prosodic features, primarily with the alteration of the f0 values and the timing characteristics of the utterances. The realization of the boundary marking is determined, among other things, by the position and type of the embeddedness.

Therefore, the aim of the present study is to examine how the boundaries with different strengths and position based on the variously coordinated names are perceived in Hungarian. The main question of the examination is that which prosodic boundary marking patterns allow of the identification the most regarding the structure of the embeddedness.

The construction of the recordings included different name grouping consisting of 3 or 4 words conjunct with 'és' (and) and 'vagy' (or) linking words (based on Wagner [2]) in altogether 20 monolingual Hungarian speakers' reading. They were instructed to read aloud the structures to indicate which elements belong together. The duration of the words and pauses, mean and range of the fundamental frequency, the appearance of creaky voice and intensity were measured. Then in a framework of an online experiment, 40 differently implemented word combinations were played to the listeners participated in the research. The selection was based on how and with what prosodic patterns the speakers signaled the boundaries in the chosen structures. The participants' task was to sign, which elements belong together.

The results showed that the listeners were able to judge the boundaries marked by different prosody features in different combinations in various ratios. The listeners were primarily able to identify the boundaries where one of the cues was silent pause. Secondly, they relied on the boundaries that were signed by phrase final lengthening and, in a smaller ratio, the change in the fundamental frequency. Realization and identification of glottalization showed remarkable individual differences.

In conclusion, the strength of embeddedness and the position also turned to be decisive in terms of identification, although, despite the universal tendencies, there were significant individual differences, as well.

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