# Towards a tonal system of Hungarian intonation: the expression of pragmatic contents in polar questions

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**Introduction.** Hungarian polar questions are characterised by a rising-falling contour, intonation being the only means to mark sentence type, while word order is identical to that of declaratives. In canonical information-seeking polar questions, the rise begins on an accented syllable, and f0 reaches its maximum on the penultima, followed by a final fall on the last syllable. If the contour spans over a syllable sequence where the accented syllable is the penultima, the f0 maximum and the final fall are both realised on the phrase-final syllable (compression). In phrases in which the accented and the phrase-final syllable coincide, there is only a rise (truncation). This pattern is called the Hungarian question intonation (Ladd 2008).

The neutral polar question intonation can be modified when additional or non-canonical content is available. In questions that express surprise, the neutral contour can be repeated several times even in relatively short utterances. Although Varga (2010) claims that the contours that constitute polar question expressing incredulity are multiple rise-falls, it seems that in non-final contours, only the fall preceding the next low accent is produced consistently, while the rise is substituted by a high plateau.

In order to capture the phonological relevance of intonational variation in polar questions on the long term, an attempt was made to adapt the DIMA system (German intonation: modelling and annotation, Kügler et al. 2019) to Hungarian intonation. DIMA is based on tonal events, but unlike ToBI, it allows associating tone labels with syllables in which a change of f0 is present, but with which neither a pitch accent nor a boundary tone is associated. Furthermore, DIMA introduces phrase-initial boundary tones that are absent in the German ToBI system. By applying DIMA to polar questions, we have a tool at hand that allows to mark phonetic variation in intonation that might or might not contribute to the abstract tonal representations of f0, as would be expected in ToBI.

**Methods.** For the initial steps, the Akaka Maptask Corpus was used (Molnár et al. 2023). Tonal events in each polar question were labelled by three experienced researchers independently, serving as a basis for further refinements of the label system. Additionally, grammatical and pragmatic categories were defined based on contextual information. Since both label systems are under development, we will exemplify the proposed analysis by polar questions that resemble our previous analysis of surprise (Mády et al. 2023).

**Results.** Figure 1a shows an example of a neutral polar question with rising-falling intonation that contains a single contour with a grammatically complete sentence ('can I ask something?' verb + accusative noun). The label sequence is given as %L L* H L%, reflecting the rise starting at the initial accented syllable, the f0 maximum on the penultimate syllable and a final low boundary tone. Figure 1b represents an incredulous polar question in which there is positive contextual evidence for the content of the question ('Akaka castle?' proper name + noun) which contradicts the speaker's previous expectation. The mismatch between contextual evidence and speaker expectation is reflected by the presence of a pitch accent on each content word both initiating a pitch contour on their own. The resulting tone sequence is %L H* L* H%, since the last pitch-accented word is monosyllabic, in which the rise-fall is truncated to a rise.

**Discussion.** Attempts for the automatic prediction of tones based on deep neural networks are not satisfactory yet but will hopefully improve based on more data.
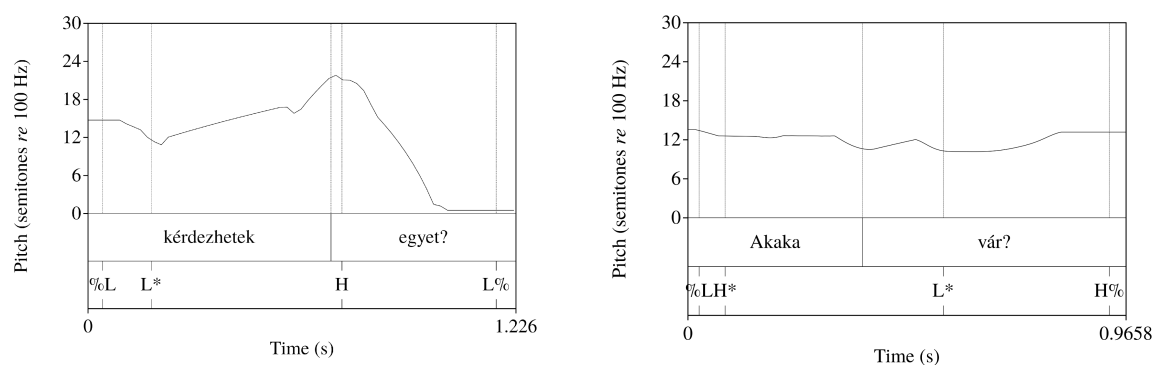


*Figure 1a, b: neutral intonation with one pitch accent in a polar question (left) and with two f0 pitch accents signalling surprise (smoothed f0 contours in semitones).*

**References**

Kügler, Frank et al. (2019): Annotation of German intonation: DIMA compared with other annotation systems. In: *Proc. ICPhS Melbourne, Australia*, 1297–1301.

Ladd, Robert D. (2008): *Intonational phonology, 2nd ed*. Cambridge: University Press.

Mády, Katalin et al. (2023): Prosodic cues of distinguishing neutral and non-neutral yes/no questions in Hungarian: the acoustics of surprise. In: *Proc. ICPhS,* Prague, 1608–1612.

Molnár, Cecília Sarolta et al. (2023): The Akaka Maptask Corpus. In: *Proc. Beszédkutatás – Speech Research, Budapest, Hungary*, 81–83.

Varga, László (2010): Boundary tones and the lack of intermediate phrase in Hungarian. *The Even Yearbook*, vol. 9, 1–27.