

Icelandic question intonation
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This presentation reports on the first experimental study investigating question intonation in Modern Icelandic. Specifically, we carried out a production experiment to investigate the intonation of polar questions and constituent questions (henceforth *wh*-questions). In Icelandic, polar questions are verb-initial (V1) (see (1)). *Wh*-questions (see (2)) are formed with *wh*-interrogative pronouns (Icelandic *hv*-pronouns). The canonical position of the *hv*-pronoun or *hv*-phrase is sentence-initial, i.e. in the position preceding the finite verb.

According to previous literature based mostly on introspective data, the default boundary tone for all sentence types is L%. Icelandic neutral declaratives are typically realized with a nuclear L+H* pitch accent, followed by a fall to L%. If the nuclear tune is preceded by prenuclear prominence, the typical accent is a late rise (L*+H) (see [1], [2]). According to [2], the typical nuclear pitch accent in Icelandic polar questions is a rise from a low target on the accented syllable (late rise; L*+H), the peak being reached after the end of the nuclear syllable. Combined with the low boundary tone, the typical nuclear contour is thus a rising-falling one (L*+H L%). The intonation of Icelandic polar questions thus differs crucially from polar questions in related languages, which often end in a rise to H%, e.g. in English ([3-6]). According to [7], the typical contour associated with a *wh*-question starts high, followed by a H* nuclear accent and an L% boundary tone. Nuclear pitch accent types, but not boundary tones, thus distinguish between sentence types in Icelandic.

We carried out a controlled production experiment testing the following hypotheses: (a) Both polar and *wh*-questions are typically produced with an intonational contour falling to L%. (b) The two question types differ in nuclear pitch accent type. Specifically, polar questions are typically realised with a late rise (L*+H), while *wh*-questions are typically realised with a monotonal H* pitch accent. (c) The typical contour associated with *wh*-questions starts high.

155 polar questions and 162 *wh*-questions, produced by 17 speakers (aged 22-32; average 26.9; 6 male), entered the analysis. The data were annotated by the first author. A sample of 15% of the data was additionally annotated by the second author; disagreements were resolved. The results largely confirm the observations made in previous literature, but they also add important insights.

(a) The default boundary tone is indeed L% across question types (96.1% in polar questions, 87% in *wh*-questions).

(b) The two question types differ in nuclear pitch accent type. While polar questions are mostly realized with bitonal rising nuclear accents (late rise: 56.1%; L*+H: 44.5%, L*+^H: 11.6%), *wh*-questions typically have monotonal peak accents (62.3% overall, combining H*, !H*, ^H*). Monotonal pitch accents are very rare in polar questions (2%). Both question types are also frequently realised with an early rise nuclear accent (L+H*, L+^H*, L+!H*), which suggests that the late rise is a kind of neutral accent in Icelandic. It is typical in declaratives, but it also has the capacity to mark questionhood, even though in questions it is not the most frequent one.

(c) *Wh*-questions indeed often start high (71% in *wh*-questions vs. 12% in polar questions). The high start in *wh*-questions is due to either an initial %H boundary tone, which has not previously been identified as part of the Icelandic tonal inventory, or to a H* prenuclear accent associated with the *wh*-pronoun.

To summarize, the most important results are that (a) the boundary tone does not distinguish between sentence types anywhere, (b) sentence types are distinguished by nuclear accent types, although the early rise (L+H*) is possible across the board, and (c) the prenuclear area contributes to the intonational distinction between question types.

- (1) Át álfur-inn ost-inn?
ate elf-DEF.NOM cheese.ACC-DEF.ACC
'Did the elf eat the cheese?'
- (2) *Hver* hefur gefið Maríu þennan hring?
Who has given Mary this ring

[1]N. Dehé, "The nature and use of Icelandic prenuclear and nuclear pitch accents: Evidence from F0 alignment and syllable/segment duration.," *Nordic Journal of Linguistics*, vol. 33, pp. 31-65, 2010.

[2]K. Árnason, *The Phonology of Icelandic and Faroese*. Oxford: Oxford University Press, 2011.

[3]C. Bartels, *The Intonation of English Statements and Questions. A Compositional Interpretation*. New York & London: Garland Publishing, 1999.

[4]N. Hedberg, J. M. Sosa, and E. Görgülü, "Early and Late Nuclei in Yes-No Questions: Tails or High Rises?," *Proceedings of Speech Prosody 2008, Campinas, Brazil, May 6-9, 2008*, pp. 229-232, 2008.

[5]N. Hedberg and J. M. Sosa, "The prosody of questions in natural discourse," in *Proceedings of the First International Conference on Speech Prosody (Speech Prosody 2002), Aix-en-Provence, France.*, 2002, pp. 375-378.

[6]J. Pierrehumbert and J. Hirschberg, "The meaning of intonational contours in the interpretation of discourse," in *Intentions in Communication*, P. R. Cohen, J. Morgan, and M. E. Pollack, Eds., ed Cambridge, MA: MIT Press, 1990, pp. 271-311.

[7]K. Árnason, *Hljóð. Handbók um hljóðfræði og hljóðkerfisfræði*. vol. 1. Bindi. Reykjavík: Almenna bókafélagið, 2005.