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The intonation of declaratives, polar questions and *wh*-questions in two varieties of Faroese

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ABSTRACT

Based on map task data collected in the Faroe Islands in 2019, we report preliminary results on the intonation of declaratives (DECL), polar questions (PQ) and *wh*-questions (WHQ) in Faroese as spoken in Klaksvík (Borðoy) and Vestmanna (Streymoy) using an autosegmental approach. DECL are typically realized with nuclear peak accents (H*/!H*) and terminate in a fall (L-L%). In turn-medial position, they often rise (continuation rise; L-H%). PQ and WHQ typically have final rises (L-H%, H-H%). Generally, the same types of nuclear accents and edge tones occur across utterance types, and peak accents (!H*/H*) are most frequent across the board. However, !H*/H* are even more frequent in DECL than in questions, WHQ have L* nuclear accents more often than both DECL and PQ, and L+H* is more frequent in PQ and DECL than in WHQ. While (turn-final) DECL typically fall and questions typically rise, we find more L-H% in PQ than in WHQ. WHQ also end in falls more frequently than PQ. The main cross-linguistic comparison in this paper is between Faroese and its closest relative Icelandic, revealing notable differences between the two languages (e.g., final rise vs. fall in questions), although we include other languages in the discussion, as well.

Key words: Faroese, intonation, declaratives, polar questions, *wh*-questions, map task

1. Introduction

This paper reports preliminary results from a map task study designed to analyse the intonation of Faroese. We focus on declaratives (DECL), polar questions (PQ) and constituent (*wh*-) questions (WHQ) in the varieties of Faroese spoken in Klaksvík (Borðoy) and in Vestmanna (Streymoy).

We directly compare Faroese with its closest linguistic relative Modern Icelandic and we also discuss Faroese against a wider background in Section 4 (Discussion). Both insular Scandinavian languages, i.e., Faroese and Icelandic, are head-prominence intonation languages. Head-prominence languages are languages in which phrase-level prosodic prominence is marked by the phrase head using post-lexical (intonational) pitch accents associated with the head ([1], [2]). In intonation languages, fundamental frequency (f0) is used to convey meaning at a post-lexical level, to distinguish between illocution types (e.g., questions vs. statements), or to convey attitudinal or expressive meaning (e.g., surprise, anger) or information structure (e.g., focus, topic). Along with pitch accents, the pitch at the edge of a prosodic constituent, most prominently the right edge of an utterance or an intonational phrase, may be used to convey meaning, e.g., to distinguish between speech acts or express special connotations.

To date, there are only few accounts of Faroese intonation. According to [3], p. 25, assertions have "level intonation until the significant stress is reached, when the pitch falls abruptly", "[i]n longer assertions, the pitch rises at the first emphatic syllable, then descends gradually to fall abruptly at the last significant stress".

The two contours in Figure 1 are taken from [4], p. 325. Árnason notes that it is common for Faroese DECL to "start on a high pitch … and … move downward". In Figure 1a), the high beginning may be due to a prenuclear accent associated with *Dávur*. In Figure 1b), according to [4], p. 325, "there are two accentual peaks which can be interpreted as pitch accents involving a rise … and the latter one has a clear downstep". In other words, Faroese DECL may start high, and then move downward to a terminal L%. Later accentual pitch peaks are downstepped relative to earlier ones. Pitch accents may be monotonal peak accents (H*, !H*) or rising accents (L+H*, L+!H*).

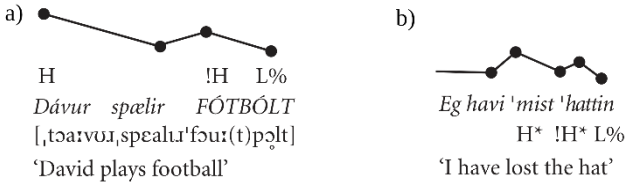
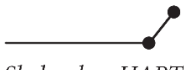


Figure 1: Faroese declarative intonation; from [4], p. 325.

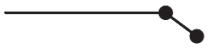
According to [3], p. 25, Faroese questions, including WHQ, have a rising intonation throughout. This is unlike Icelandic and Swedish, but since it holds for WHQ, too, it is also unlike, for example, English and German. Árnason ([4], p. 325), agrees that "the final rise in questions is more common than in Icelandic", but reports that "falling intonation can be heard in Wh-questions". Following [4], p. 325, a rise from a low nuclear accent (L* H%) may be most common in PQ (see Figure 2), and a fall from a peak accent (H* L%) may be observed in WHQ (see Figure 3).



Skal eg lesa HART ?

'Shall I read aloud'

Figure 2: Faroese PQ intonation, from [4], p. 325.



Hvar kemur tú frá?

'Where do you come from?'

Figure 3: Faroese WHQ intonation, from [4], p. 325.

Árnason ([4], p. 325–326) also mentions regional variation in the intonation of Faroese, but the two islands that reportedly stand out, Vágar and Suðuroy, have yet to be included in our research. Here, we compare speakers from Borðoy and Streymoy.

Compared with Faroese, Modern Icelandic intonation has received more attention in previous research, although it is also still understudied. Modern Icelandic DECL are typically produced with (a series of) L*+H prenuclear accents followed by an L+H* or H* nuclear accent and a low L% boundary tone. They exhibit downstep, i.e., later peaks are realized at lower pitch relative to preceding ones within the same Intonational Phrase ([4], [5], [6], and [7]).

Like DECL, Modern Icelandic PQ and WHQ also end in L% by default ([4], [8], and [9]). PQ and WHQ with rising intonation "have special connotations" (such as surprise or impatience) beyond being neutral and purely information seeking ([4], p. 323, [5], p. 477), while PQs with falling intonation (L%) are neutral. Falling question intonation sets Icelandic apart from, for example, English and German, which typically have H% at least in PQ (e.g., [10], [11], and [12] for German; [13], [14], [15], [16], and [17] for English). A fall to L% is much more frequent in WHQ than in PQ in these languages (e.g., [16], [18] for English). However, other languages that regularly have L% also in PQ include, for example, Swedish ([19], [20], [21], and [22]). While H% does occur in Swedish questions, and is more frequent in PQ than in WHQ, it is by far less frequent than L%. Instead of using rising terminals to mark questions, Swedish uses a higher and wider f0 register (mean f0) in questions than in statements ([19], [22]). Another language with falling PQ is Estonian. In this language, questions are characterised by "less declination in the prenuclear slope and a step-up on the nuclear accent" ([23], p. 4]).

According to Árnason, Modern Icelandic makes use of nuclear accents instead of boundary tones to distinguish between utterance types ([4], [8]). Specifically, he argues, L+H* is used in DECL, but L*+H in PQ, and H* in WHQ. This distinction, however, is not clear-cut. In a laboratory production experiment, [9] found that L*+H was indeed the most frequent nuclear accent in PQ (56.1% of produced PQ), and H* was indeed the most frequent nuclear accent in WHQ (62.3% of produced WHQ). However, they also identified L+H*, the accent typically found in DECL, as a runner-up in both PQ (41.9% of produced PQ) and WHQ (34.6% of produced WHQ). In Modern Icelandic map task data, [24] found an even higher percentage of nuclear L+H* in PQ (57.9%) than [9], i.e. L+H* was more frequent than L*+H. Using data from the same map task corpus as [24], [7] confirm the more frequent use of L+H* than L*+H in PQ. For DECL, [7] observe frequent use of H*/!H* (36.4% of their Modern Icelandic DECL set) along with L+H* (61.3%). (Note that in [7], results for Modern Icelandic were reported by age. Specifically, there were two age groups, aged 16-34 and 64+, respectively. Percentages provided here are combined figures for the two groups.)

Returning to Faroese, we formulate the following hypotheses for the intonation of Faroese DECL, PQ and WHQ, including a comparison with Icelandic, based on the literature sketched above:

1. Faroese DECL start high, have nuclear peak accents (H*) or nuclear rises to peak (L+H*), exhibit downstep (!H*), and end in a low terminus (L%).
2. Faroese PQ have a low nuclear accent followed by a rise (L* H%).
3. Faroese WHQ have a nuclear peak accent (H*). They may rise to H% or fall to L%.
4. We may not find differences between the varieties spoken in Borðoy and Streymoy, because these two islands have not previously been mentioned in the literature observing regional variation (unlike Vágar and Suðuroy).
5. Icelandic and Faroese compare as follows:
    a. In both languages, DECL have H* and L+H* nuclear accents, exhibit downstep and have an overall downward trend to L%.
    b. Icelandic PQ have rising nuclear accents (L*+H, L+H*), while Faroese has L*.
    c. WHQ have nuclear peak accents (H*, !H*) in both languages.
    d. While in Icelandic both PQ and WHQ generally fall to L%, Faroese questions are generally rising (H%), although WHQ may fall to L%.

2. Data and Methods

The data analyzed here was drawn from a Faroese map task designed for the study of Faroese intonation. To allow for a direct comparison between Icelandic and Faroese, Dehé's

Icelandic map task (e.g., [24], [25]) was translated into Faroese, thus the methodology was exactly the same for the two languages. One specific characteristic of this map task is that target words are written onto the maps. Target words are landmarks (e.g., *Múlaskúli, Landakirkja*) and street names (e.g., *Lómastræti, Mílugøta, Mangavegur*). They are morphological compounds consisting of two disyllabic components, where the second part is some landmark (*skúli* 'school', *kirkja* 'church') specified by the first part (e.g., *Múla*, *Landa*). To facilitate pitch tracking, at least the first two syllables of the target words were maximally sonorant. In native Faroese words, primary word stress falls on the first syllable, and there is alternating stress such that secondary stress falls on every other syllable. In morphological compounds, the first syllable of the second part of the compound has secondary stress (see [3], p. 8, [26], p 28, and [4], p. 275–276). In our target words, primary stress thus falls on the first syllable, e.g., *Mú* in *Múlaskúli*, and secondary stress falls on the first syllable of the second component, e.g., *skú* in *Múlaskúli*. According to [4], p. 277, "the stress pattern of many native [Faroese] compounds seems to vacillate, so that the same compound sometimes has the stress on the first part and sometimes on the second part". For example, in *Múlaskúli*, primary stress may fall on *Mú* and secondary stress on *skú,* or it may be the other way around.

The nature of the map task corpus allowed us to control for several factors in the present study; among them are the sonority patterns of target utterances, as well as the regional origin of participants. Nicole Dehé and Christiane Ulbrich carried out data collection in February 2019 in three locations in the Faroe Islands: Klaksvík (island of Borðoy), Vestmanna (island of Streymoy) and Tórshavn (island of Streymoy). For the current analysis, we include data from Klaksvík and Vestmanna.

2.1. Participants

Overall, 15 native speakers of Faroese were included in the present analysis. They were selected from a total of 32 native speakers who participated in the map task study (10 in Klaksvík, 12 in Vestmanna and 10 in Tórshavn). Of the 15 speakers included here, 8 speakers were from Klaksvík (6 female, 2 male; speaker identifier K) and 7 from Vestmanna (all female; speaker identifier V). They were selected using the following criteria:

1. The speakers were from two different islands (Streymoy and Borðoy).
2. They were aged between 20 and 40 at the time of recording: all speakers included here were born between 1980 and 1998 (mean age of the Klaksvík speakers is 26.0 years (sd=5.1), mean age of the Vestmanna speakers is 29.7 years (sd=6.6)).
3. All speakers are native speakers of Faroese and have the same or similar backgrounds in terms of other languages they speak and/or grew up with.

2.2. Procedure

The procedure was exactly the same as for the Icelandic map task ([24], [25]). Participants were tested in pairs in quiet closed rooms in public buildings, one room per location. The two speakers of each pair were seated in the same room at one big table facing each other in such a way that they were able to see each other and communicate normally but at the same time were not in a position to read their partner's maps. One experimenter was present during each session to explain the procedure and answer questions raised by participants. Within each pair, participants had chosen to take part together. They were close friends, siblings, or parent and child, i.e., they knew each other well, which allowed for spontaneous and informal speech. Speakers within a pair were of the same origin (location of recording) and spoke the same variety of Faroese.

The map task dialogues were recorded on two separate channels, one for each speaker within a pair, in order to avoid an overlap between them and to record two separate tracks when they were speaking simultaneously. Recording was done using two Microtrack II (M-Audio) recorders and two Rode NT-5 condenser microphones, one for each speaker of a pair. The microphones were placed in front of the speakers. Given the nature of the task and our intention to make speakers feel comfortable with the experimental setting to allow for natural, spontaneous speech, it was impossible to control for a specific speaker distance to the microphone at all times. The length of the map task dialogues used in the present analysis varied between 30:32 and 45:40 minutes in Klaksvík, and between 24:06 and 31:23 minutes in Vestmanna.

2.3. Data treatment and analysis

All map task dialogues were transcribed by native speakers of Faroese. The raw recordings were cut and edited into individual sound files and coded according to speaker origin (K, V) and utterance types (e.g., DECL, PQ, WHQ, question tags, repair initials, imperatives). For example, file K07-wh-Q15 is a WHQ produced by speaker K07 from Klaksvík. Due to technical issues, approximately 32 of 44 minutes of the recording of speaker K10 and 12 of 25 minutes of speaker V02 were unavailable for acoustic analysis. (The recordings of their interlocutors, K09 and V01, respectively, were complete and used for full transcriptions of the dialogues, but their quality did not allow for acoustic analysis of the utterances produced by K10 and V02 due to their distance from and angle to the microphone.) Note that it was impossible to compensate for the loss of the K10 and V01 recordings because the remaining speakers from the Klaksvík and Vestmanna sets did not comply with the speaker selection criteria specified in Section 2.1.

The DECL, PQ and WHQ used in the present analysis were selected using the following criteria. All DECL (but, due to numbers of occurrences, not all PQ and WHQ) contained target words, i.e., names of streets and landmarks given on the maps, e.g., *Múlaskúli, Mímirsgøta, Lundasavnið* in the target area, i.e. where the nuclear contour was realized. All utterances included here are main clauses in syntax. They are syntactically complete and fully grammatical. Following [7], only non-negated utterances were included at this stage. Utterances containing too much noise or laughter, especially when overlapping with relevant speech, were excluded. If there was more than one full syntactic clause in a sound file, we coded each clause separately for position within the turn (non-final (nf), final (f)). This was particularly relevant for DECL, which often occurred in sequences (e.g., *I am now standing in x. I have to go to y.*; or: *You have to go down x road. Then you come to y. If you walk up y, then you get to z.*). Three sentences were excluded because the two annotators could not resolve differences in annotation (see below, this section). In total, 394 DECL (248f, 146nf) entered the analysis, 247 from Klaksvík (152f, 95nf) and 147 from Vestmanna (96f,

51nf). Moreover, we analysed 146 PQ (121 from Klaksvík, 25 from Vestmanna), and 106 WHQ (Klaksvík: 68, Vestmanna: 38). The distribution of utterance types in our data is summarised in Table 1 for ease of reference.

Table 1: *Total N of utterances included in the analysis, by utterance type and location.*

	Klaksvík (Borðoy)	Vestmanna (Streymoy)	Overall
DECL	247	147	**394**
DECL-f	152	96	248
DECL-nf	95	51	146
PQ	121	25	**146**
WHQ	68	38	**106**

Individual sound files were annotated in Praat ([27]) on several tiers (e.g., word, syllable, tonal target (L, H), intonational analysis). The annotation of the data for intonational analysis was conducted by inspecting waveforms, fundamental frequency (f0) contours, and wideband spectrograms, as well as perception. To keep the analysis maximally comparable to previous work on Modern Icelandic, and given that there is no established system for the annotation of Faroese intonation, the annotation for intonation followed conventions in previous studies on the intonation of Icelandic ([6], [25], [24], and [9]). Annotated pitch accents included monotonal H* and its downstepped (!H*) and upstepped (^H*) variants, L*, and bitonal L+H* (and L+!H*, L+^H*). Following previous work on Icelandic intonation since [6], H* in L+H* is aligned within the stressed syllable, and L in L+H* is aligned around the beginning of the stressed syllable. We understand edge tones as combinations of phrase accents and boundary tones (e.g., L-H%). Phrase accents terminate intermediate phrases, while boundary tones terminate Intonational Phrases. Phrase accents may also have a secondary association with a stressed syllable or some specific tone-bearing unit ([28]). If this applies to Faroese, then a likely candidate for secondary association in our data will be the first syllable of the second part of the target compound words. For example, we would expect association of a phrase accent with the syllable *skú* in the target word *Múlaskúli* with native, non-vacillating word stress: *ˈMú.laˌskú.li*. Boundary tones were annotated as L% when utterances ended in a low terminus and H% when there was a rise to a high level in a given speaker's pitch range.

All utterances were annotated for intonation by the first author. The data of four speakers from Vestmanna were independently annotated by the third author. This corresponds to 22.9% of the total data set (121 DECL, 12 PQ, 15 WHQ, 754 words as potential positions for tonal targets). Overall, agreement for intonational events (pitch accents and edge tones) was 93.6%. For pitch accents, agreement was 95.5%, Cohen's weighted kappa was 0.91 ([29]). For edge tones, agreement was 97.7%, Cohen's weighted kappa 0.95. Following the division in [30], these kappa values indicate almost perfect agreement among the annotators. All disagreements except for three were resolved; the three sentences (3 DECL, 0.5% of the data of the four Vestmanna speakers) were excluded from the analysis.

Extraction of relevant information from the annotated files was done using Praat scripts. Extracted data was stored in CSV files that allowed for sorting according to different parameters and for applying descriptive and inferential statistics. The statistical analysis itself was done in R version 4.1.2 ([31]). The analysis included the distribution of pitch accent types, edge tones and nuclear contours for all three utterance types. We created dummy variables to establish significant differences in the distribution of nuclear pitch accent types, edge tones and nuclear contours across utterance types (DECL vs. PQ vs. WHQ) and variety (Klaksvík vs. Vestmanna). In the newly created variables, all occurrences of one specific pitch accent type, edge tone or nuclear contour (e.g. L*, H-H% or L* H-H%, respectively) were coded as 1 and all other pitch accent types, edge tones or nuclear contours were coded as 0. We then fitted logistic mixed effects regression models that included variety, utterance type and the interaction of the two as fixed factors and speaker as a random intercept, using the lme4 package ([32]). Random slopes were fitted for utterance type if this improved the fit of the model (model comparisons were conducted using the anova()-function from base R). If there was no significant interaction between variety and utterance type, we removed the interaction from the model and reran it to test for a main effect of utterance type. To account for multiple significance tests, all p-values were adjusted using the Benjamini-Hochberg correction ([33]).

In order to account for the uneven sample size between our groups (see Table 1), we reran all our models with a subset of our data. The subset included an equal number of observations for each sentence type (DECL-f, DECL-nf, PQ and WHQ) in both varieties. This was achieved by randomly sampling 67% of the data points from the variety with fewer observations in the original data (i.e., Vestmanna) and then randomly sampling the same number of data points for the other variety (i.e., Klaksvík). Only one of the models fitted on this subset of our data differed from the original models in terms of significance (see Section 3.4 below). For this case, we report coefficients for both models in Section 3 (Results).

3. Results

In this section, we report the results by utterance type (DECL, PQ, WHQ), followed by a comparison between utterance types. None of our models displayed a significant interaction between utterance type and variety (all $p > 0.1$), indicating that speakers of the two varieties do not differ in their use of nuclear pitch accents and edge tones in any of the three utterance types. In what follows, we therefore report results for all speakers from both locations in one analysis.

3.1. Declaratives

The most frequent nuclear pitch accent in Faroese DECL is the monotonal peak accent (66% of all DECL), comprising H* (28.4%) and !H* (37.6%), followed by rising to peak accents (L+H*, 19.8%). The most frequent edge tone in DECL is a fall to L-L% (62.7% of all DECL), followed by a final low rise L-H% (29.2%) and the high rise H-H% (4.3%). However, most of the rises were realised in DECL-nf. Specifically, 76.7% of DECL-nf terminated in a high boundary tone (65.1% L-H% and 11.6% H-

H%), whereas this was only the case for 7.7% of turn-final DECL (all L-H%). The comparison for rises (combined L-H% and H-H%) in DECL-f vs. DECL-nf was highly significant (ß=4.0, SE=0.4, z=11.0, p<0.0001). On the other hand, 87.4% of turn final DECL (DECL-f) ended in L-L%, whereas this edge tone only occurred in 21.2% of DECL-nf (ß=-3.5, SE=0.3, z=-10.8, p<0.0001).

Combining nuclear accents and edge tones, Figure 4 shows the nuclear contours occurring in Faroese DECL-nf (left-hand side) and DECL-f (right-hand side). The most frequent nuclear contour in DECL-nf is the one with a nuclear peak accent (H*/!H*), low phrase accent and high boundary tone: (!)H* L-H% (36.3%; 26% H* L-H% and 10.3% !H* L-H%). Another frequent nuclear contour has a rising to peak nuclear accent followed by a low phrase accent and high boundary tone: L+H* L-H% (20.5%). The by far most frequent nuclear contour in DECL-f has a nuclear peak accent (H*/!H*) followed by a fall to L-L% (66%; 44.5% !H* L-L% and 21.5% H* L-L%). (Note that nuclear contours that occurred in less than 5% of the respective data set were grouped into 'other falls' or 'other rises', depending on their boundary tone.)

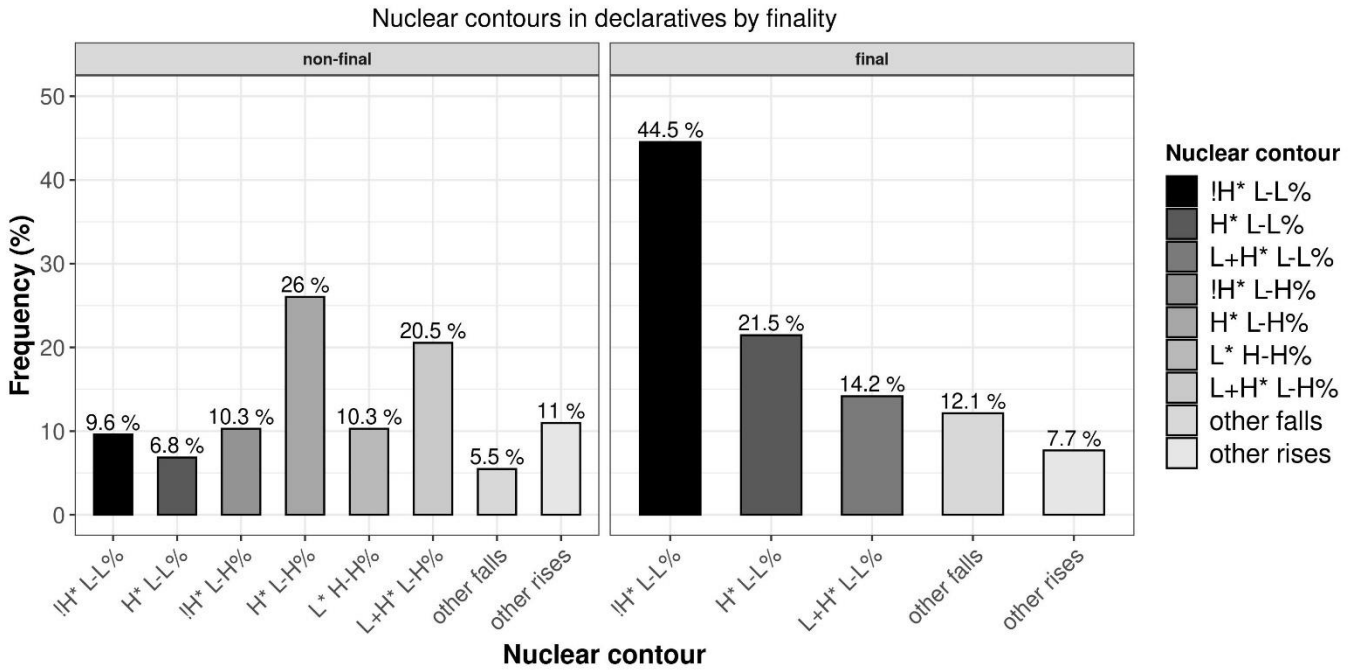


Figure 4: *Nuclear contours occurring in DECL-nf (N=146, on the left) and DECL-f (N=248, on the right).*

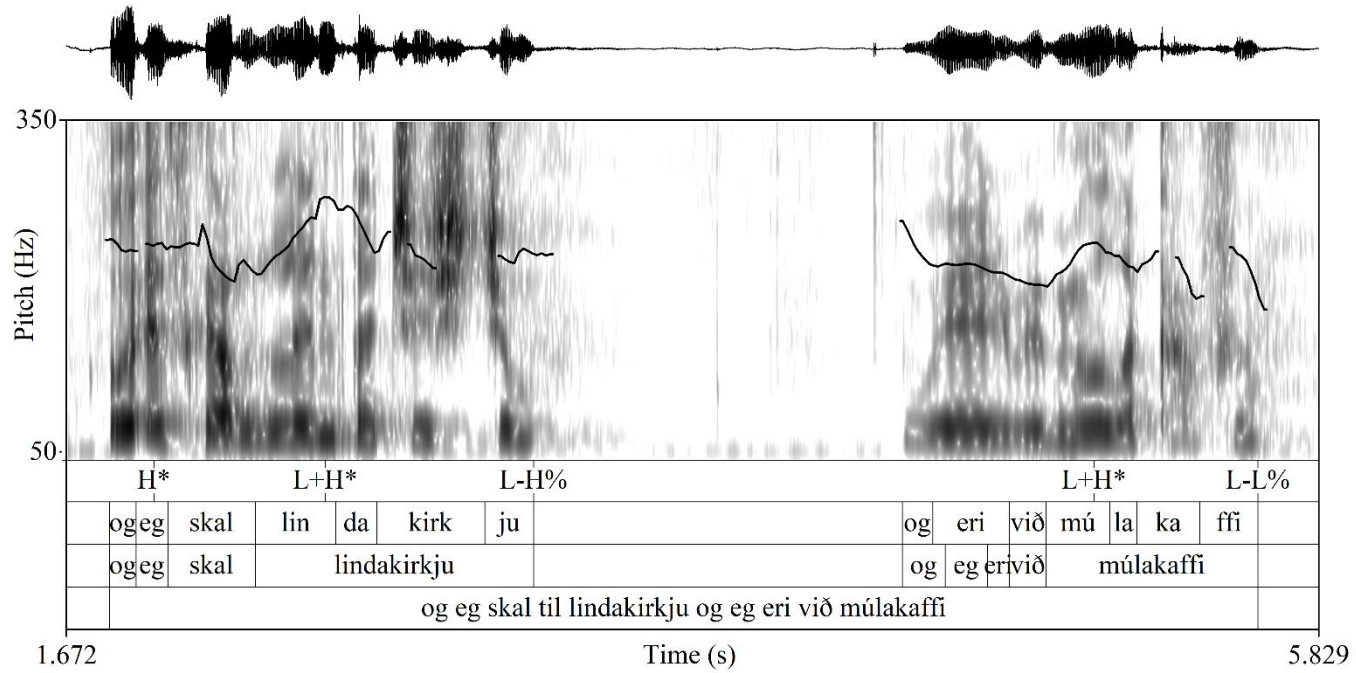


Figure 5: *Declarative ('And I shall to Landakirkja, and I am at Múlakaffi'), DECL-nf followed by DECL-f, speaker V09, female.*

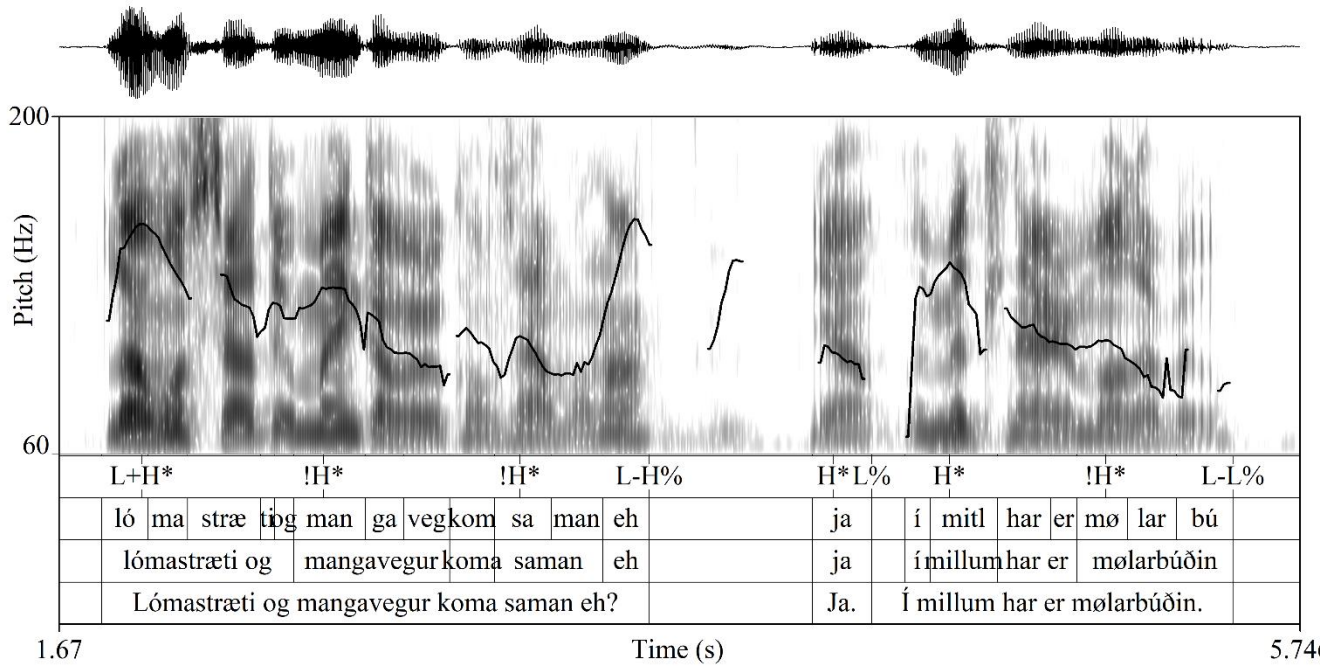


Figure 6: *Declarative ('Lómastræti and Mangavegur come together right? yeah – In the middle there is Mølarbúðin"), first part ending in tag, followed by ja and DECL-f, speaker K09, male.*

Two prototypical DECL productions are plotted in Figures 5 and 6, each of them consisting of two complete sentences. The utterance plotted in Figure 5 consists of a DECL-nf ending in L-H% and a DECL-f ending in L-L%; the nuclear pitch accent in both DECL is L+H*. This utterance nicely illustrates the difference between rising DECL-nf and falling DECL-f. Note that the DECL-nf has an H* prenuclear accent, which is in line with the observation in [4], p. 325 that DECL start at a high pitch level. The utterance shown in Figure 6 consists of a first part ending in a tag (*eh?*), which is associated with an L-H% edge tone, followed by *ja*, which forms an Intonational Phrase of its own, and then a DECL-f. DECL-f has a prenuclear peak accent H*, in relation to which the nuclear peak accent is downstepped (!H*), followed by a fall to L-L%. The nuclear contour in DECL-f is thus !H* L-L%, which is the most frequent nuclear contour in Faroese DECL-f. (Note incidentally that the first part was not categorized as DECL-nf, because it ends in a question tag.)

3.2. Polar questions

Like in DECL, the most frequent nuclear pitch accent in Faroese PQ (overall N=146) is the monotonal peak accent (53.4%; H* 35.6%, !H* 17.8%), although it is less frequent in PQ than in DECL (see Section 3.4. for direct comparison). Within peak accents, DECL have more !H* and PQ have more H*, although this may be due to the lengths of the relative utterances (and, correspondingly, space available for prenuclear peaks). 26% of PQ have a nuclear rising accent L+H*, and 17.1% have nuclear L*.

Regarding edge tones, 96.6% end in a final rise to a high boundary tone H%. Of these, 80.8% are realized with L-H%, and 15.8% have H-H%. Figure 7 plots the frequency of nuclear contours, i.e., combinations of nuclear accents and edge tones. It shows that Faroese PQs often have a low tonal target between an accentual peak and a high terminus (76%; first two and fourth column in Figure 7). This is unlike the continuous rise from a low (L* H-H%) or high (H* H-H%) accented syllable that we find, for example, in English PQ (e.g., [34]) or German (e.g., [12]), and which has been hypothesised for Faroese by [4]. Figure 8 represents the L+H* L-H% nuclear contour, which in our data is the second most frequent nuclear contour, nicely illustrating the low tonal target between accentual and terminal peak.

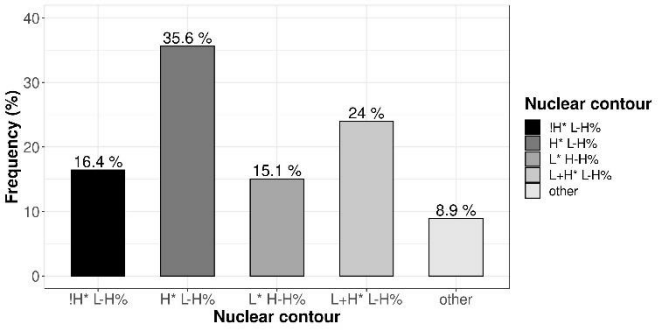


Figure 7: *Nuclear contours occurring in PQ (N=146).*

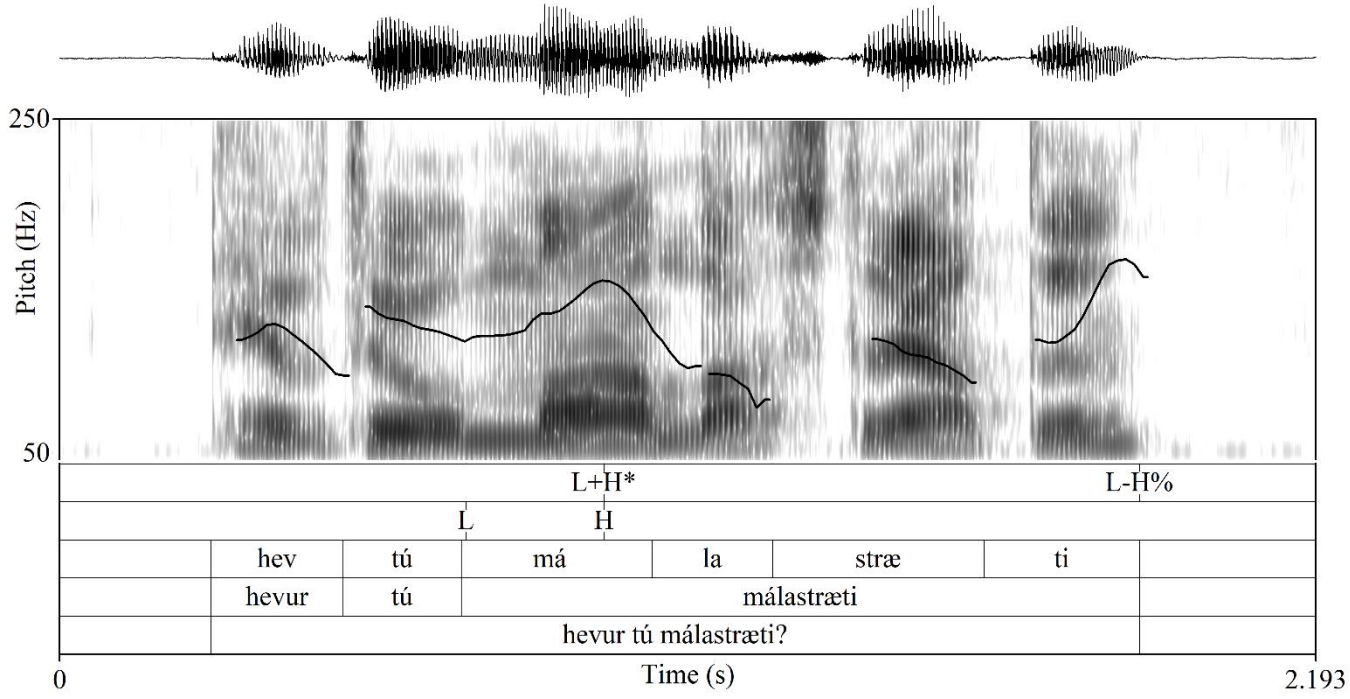


Figure 8: *Polar question ('Have you málastræti': 'Do you have Málastræti?'), L+H* L-H% nuclear contour, speaker K09, male.*

3.3. *Wh*-questions

Like in DECL and PQ, the most frequent nuclear pitch accent in Faroese WHQ (overall N=106) is the monotonal peak accent (50.9%), with more H* (28.3%) than !H* (22.6%), like in PQ. Another frequent nuclear accent in WHQ is L* (38.7%). Bitonal rising accents are less frequent in WHQ (9.4% L+(!)H*). Like in PQ, the most frequent boundary tone is H%, i.e., most WHQ end high (84.9%). More specifically, 48.1% of WHQ end in L-H%, and 36.8% end in H-H%. WHQ fall to L-L% in 13.2% of all instances in our data.

Figure 9 shows the distribution of nuclear contours in WHQ. The most frequent nuclear contour is L* H-H% (36.8%). In our data, H-H% only occurs with the L* nuclear accent, while L-H% and L-L% are typically preceded by peak accents (H*/!H*). "Other falls" include L+H* L-L% and H* L-L% contours. "Other rises" include L* L-H%, as well as L+H*/L+!H*/L+^H* combined with L-H%.

The most frequent nuclear contour, L* H-H%, is illustrated in Figure 10. Note incidentally that the utterance starts at a low level and there is no prenuclear accent associated with the *wh*-word *hvat* ('what'). The WHQ plotted in Figure 11, on the other hand, has a prenuclear peak accent associated with the *wh*-word *hvar* ('where'), followed by a downstepped nuclear peak accent (!H*) and a falling-rising terminus (L-H%).

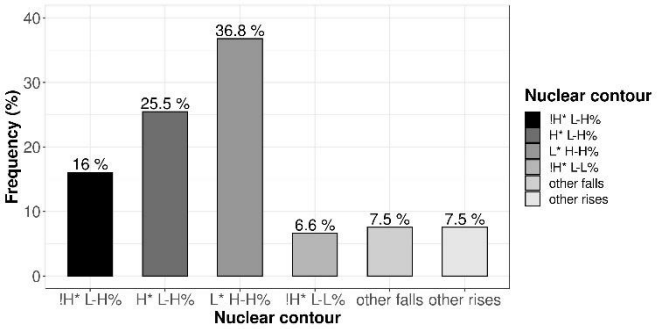


Figure 9: *Nuclear contours in WHQ (N=106).*

3.4. Comparison between utterance types

Figure 12 illustrates the differences between utterance types for nuclear accents. The nuclear peak accent (H*/!H*) is most frequent in all three utterance types. However, there are also important differences between the utterance types. Specifically, there are even more peak accents in DECL than in both question types (DECL vs. PQ: ß=0.7, SE=0.2, z=3.2, p<0.01; DECL vs. WHQ: ß=0.9, SE=0.3, z=3.5, p<0.001). Moreover, there are fewer rising nuclear accents (L+H*) in WHQ than in both DECL and PQ (WHQ vs. DECL: ß=-1.5, SE=0.4, z=-4.0, p<0.001; WHQ vs. PQ: ß=-1.7, SE=0.4, z=-4.0, p<0.001). Finally, there are more L* in WHQ than in both DECL and in PQ and more L* in PQ than in DECL (WHQ vs. DECL: ß=3.6, SE=0.4, z=8.3, p<0.0001; WHQ vs. PQ: ß=1.8, SE=0.4, z=4.8, p<0.0001; PQ vs. DECL: ß=1.8, SE=0.4, z=4.6, p<0.0001).

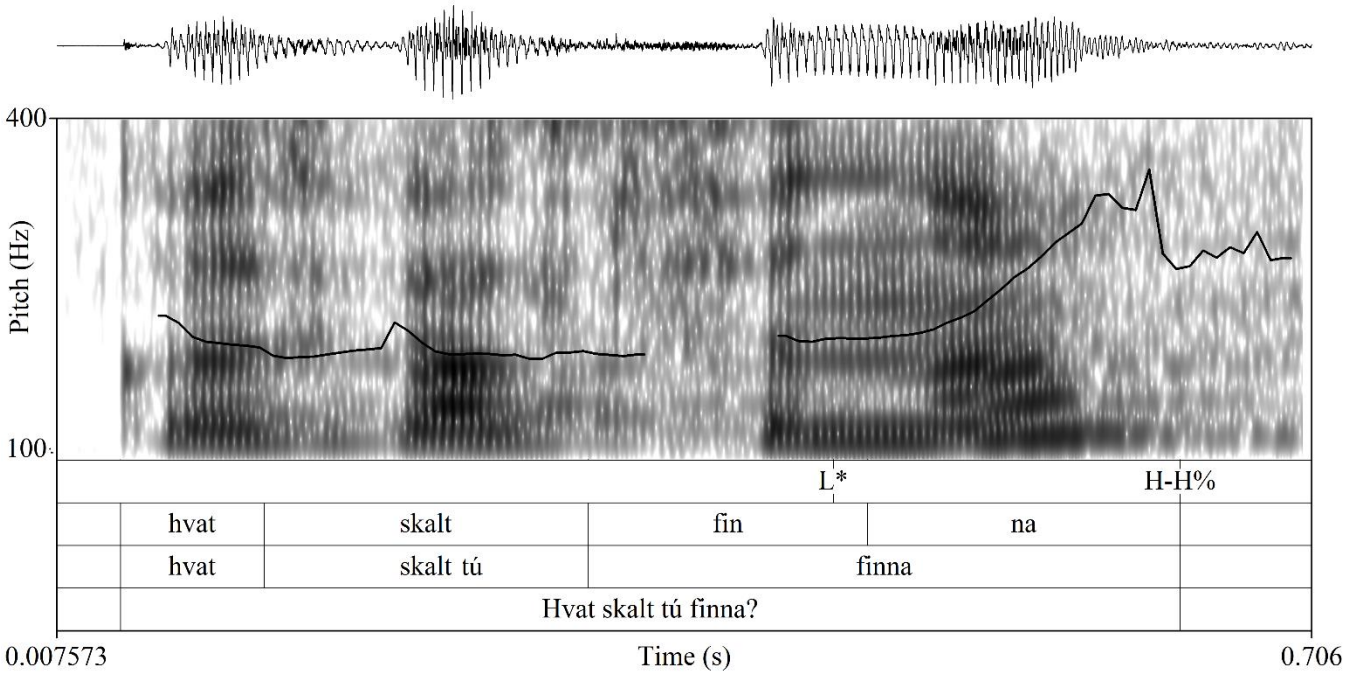


Figure 10: *WHQ ('What should you find?'), L* H-H% nuclear contour, speaker V05, female.*

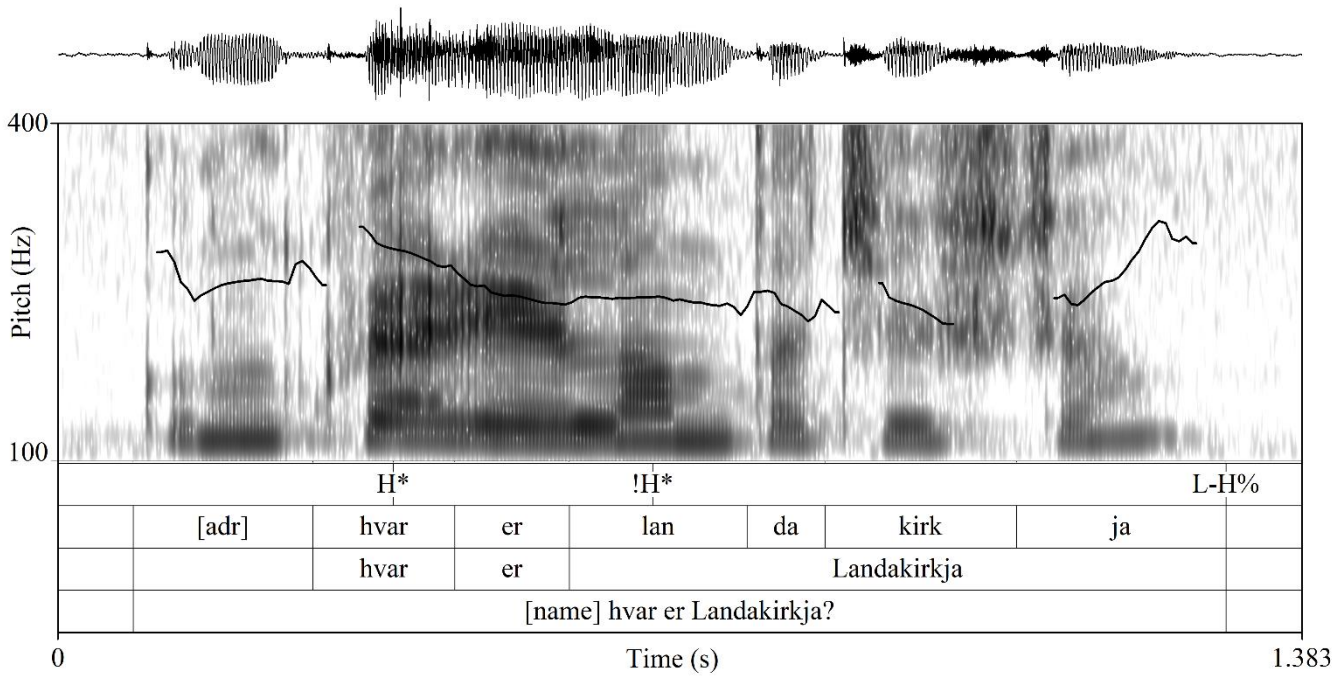


Figure 11: *WHQ ('Where is Landakirkja?'), prenuclear H* followed by !H* L-H% nuclear contour, speaker K02, female.*

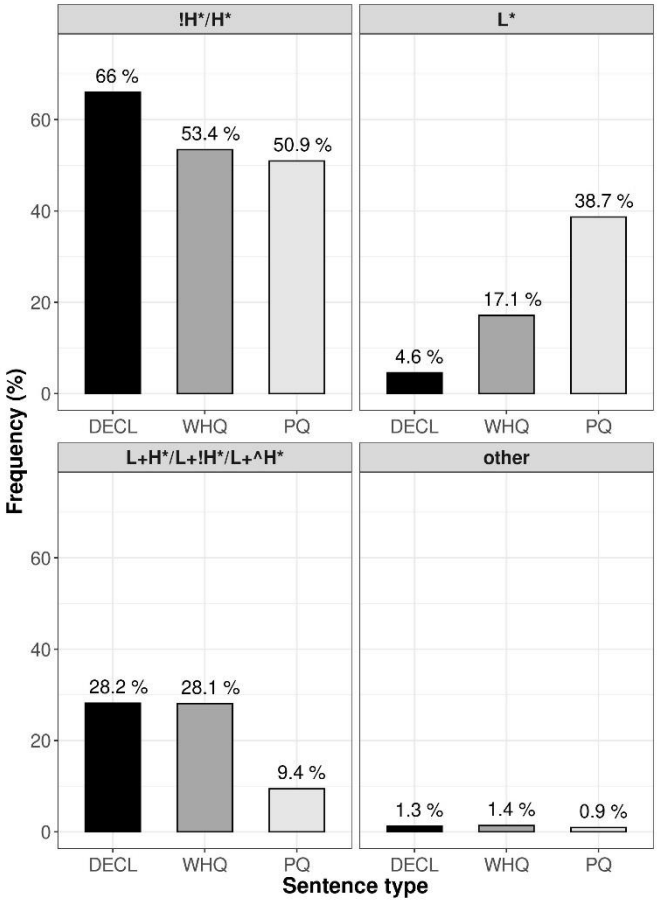


Figure 12: *Distribution of nuclear pitch accents by utterance type.*

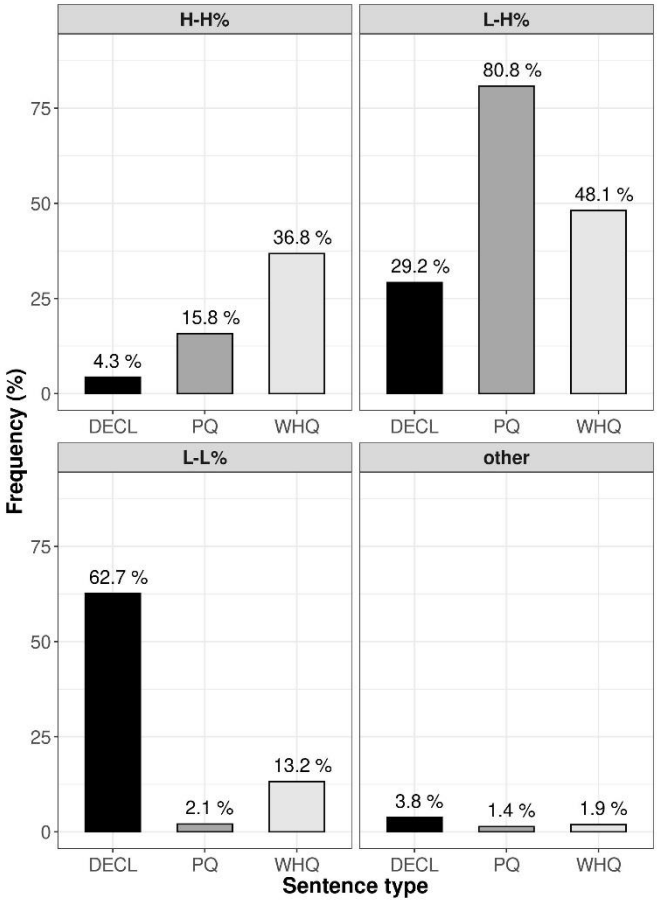


Figure 13: *Distribution of edge tones by utterance type.*

There are also differences between utterance types regarding edge tones (see Figure 13). First, DECL typically end in L-L% (62.7% combined DECL-f and DECL-nf; 87.4% DECL-f alone) while this edge tone only occurs in 13.2% of WHQ and 2.1% of PQ (DECL vs. WHQ: ß=2.7, SE=0.3, z=7.9, p<0.0001; DECL vs. PQ: ß=4.4, SE=0.6, z=7.3, p<0.0001). On the other hand, questions, both PQ and WHQ, are mostly rising. Specifically, 96.6% of PQ and 84.9% of WHQ as opposed to only 33.5% of DECL end in an H% boundary tone (WHQ vs. DECL: ß=2.7, SE=0.3, z=8.3, p<0.0001; PQ vs. DECL: ß=4.0, SE=0.5, z=8.5, p<0.0001; combining L-H% and H-H%). Comparing the two question types, WHQ end in L-L% more often than PQ (ß=1.8, SE=0.7, z=2.7, p<0.05). Looking more closely at rises (H%) in questions, the L-H% edge tone is more frequent than H-H% in both PQ and WHQ. However, while L-H% is clearly predominant in PQ (80.8%), only 48.1% of WHQ have L-H%, while more than a third of WHQ (36.8%) have H-H%. The result is statistically significant. There are more L-H% in PQ than in WHQ (ß=1.6, SE=0.3, z=5.1, p<0.0001), and PQ have fewer H-H% than WHQ (ß=-1.8, SE=0.4, z=-4.6, p<0.0001).

It follows from the results reported in Sections 3.1 through 3.3 that the three utterance types also differ in the most frequently occurring nuclear contour. This is (!)H* L-L% for DECL-f (66%), and (!)H* L-H% for PQ (52%) and WHQ (41.5%). Within questions, L* H-H% is more frequent in WHQ than in PQ (ß=2.0, SE=0.4, z=4.9, p<0.0001).

All three utterance types may start high, i.e., either with an initial high boundary tone %H or early prenuclear peak accent. We found most high beginnings with DECL (42.8%; compare PQ: 29.4%, WHQ: 39.6%), although the difference between DECL and WHQ was not significant. The comparison between DECL and PQ just reached significance (more high beginnings in DECL than in PQ; ß=0.6, SE=0.2, z=2.8, p<0.05). This effect failed to reach significance in the randomly drawn subset of our data (ß=-0.7, SD=0.4, z=-1.5, p = 0.12). However, high beginnings still occurred most frequently in DECL (41.5%) followed by WHQ (32.7%) and PQ (26.5%) in the subset. The comparison between WHQ and PQ failed to reach significance in both the model fitted with the full data set and the model fitted with the randomly drawn subset of our data.

4. Discussion

We begin the discussion by addressing the hypotheses formulated in Section 1 above regarding the intonation of Faroese DECL, PQ and WHQ, as well as the direct comparison with Modern Icelandic. We then move on to a more general discussion of the results.

Hypothesis 1 stated that DECL start high, have nuclear peak accents (H*) or nuclear rises to peak (L+H*), exhibit downstep (!H*), and end in a low terminus (L%). All of this was confirmed by our data. We found 42.8% high beginnings in DECL, which was significantly higher than in PQ. High beginnings may be linked to prenuclear accents early in the utterance (e.g., first part of Figure 5), or to an initial unstressed stretch, realized at a high level (e.g., second part of Figure 5), possibly analysable as a high left boundary tone (%H). This is in line with [4], p. 325, who noted that it is common for Faroese DECL to start on a high pitch. The second part of Hypothesis 1, stating that Faroese DECL have H* or L+H* nuclear accents and exhibit downstep (!H*), was also confirmed. The peak accent (H*/!H*) is indeed the most frequent nuclear accent in our DECL data, with L+H* as a runner-up. We do not have evidence for a meaningful difference between H* and !H* (or: L+H*/L+!H*), thus we treat them as one accent type. As far as we can see, we often have nuclear (L+)!H* in utterances with prenuclear rising or peak accents, relative to which the nuclear peak is downstepped. In Figure 6, for example, both the first and the last Intonational Phrase begin with rising or high prenuclear accents, and the nuclear accent is downstepped relative to the prenuclear peaks. Note that this can also be observed in other utterance types. For example, the WHQ in Figure 11 has a nuclear !H* accent, which is downstepped relative to the prenuclear H* realised on the *wh*-word. Future research will have to reveal potential contrasts between (L+)H* and (L+)!H*.

Faroese DECL regularly end in L-L%, confirming the third part of Hypothesis 1. This holds in particular for turn-final DECL (DECL-f). The majority of non-turn-final DECL (DECL-nf) end in a rise (65.1% L-H%). We interpret this final rise as a continuation rise, i.e. the speaker signals their intention to continue and to add more information. Compare the utterance plotted in Figure 5. In the first part of the utterance, the speaker V09 is asking for directions to *Landakirkja*. The second part adds information about the current location of V09, which the interlocutor can then use to give directions. The rise at the end of the first part thus indicates the speaker's intention to provide additional relevant information for the interlocutor, thus her intention to continue her turn. The preferred contour to signal non-turn-final continuation in Faroese DECL is clearly H* L-H% or L+H* L-H%, i.e. a low target after the last peak accent followed by a rise to H%. This is noteworthy, because while languages often use rises to signal continuation, they differ in the precise contour that is used. For example, comparing German and British English continuation intonation, [35] shows that German prefers L*H H%, i.e. the continuous rise from a low pitch accent, and British English prefers H* L H%, i.e. a domain-final fall-rise, for sentence-internal continuation.

Hypothesis 2 concerned PQ and stated, mainly based on [4], p. 325, that Faroese PQ have a low nuclear accent followed by a rise (L* H%; see Figure 2 in Section 1 above). This contour is also the default contour in PQ in related head-prominence intonation languages, among them German ([12], [36]) and English ([34]). For Faroese, this hypothesis was not confirmed. The L* H-H% nuclear contour was found in our data in only 15.1% of PQ. Most frequently, PQ ended in L-H% and had peak accents or rising-to-peak accents (H* L-H%, !H* L-H%, L+H* L-H%).

Hypothesis 3 stated that Faroese WHQ have a peak nuclear accent (H*) and may rise to H% or fall to L%. First, our data confirm that the peak accent (H*/!H*) is the most frequent nuclear accent in Faroese WHQ, with just over 50% in our data. It is striking that L* is also very frequent in WHQ. It occurs in more than one third of WHQ in our data set. [4] predicted this accent to be more frequent in PQ, and as already noted above, L* is also a frequent accent in PQ in related languages, e.g. German ([12], [36]). Moreover, Faroese WHQ that have H*/!H* do not terminate in a continuous rise but typically exhibit a fall from the last accentual peak followed by a final rise ((!)H* L-H%). On the other hand, a continuous rise is observed after L* (L* H-H%) in WHQ, a contour, which is often found with PQ in other languages (see above). Finally, our results confirm the observation that WHQ may fall to L%, in line with [4], but they do so in only 13.2% of our data. The predominance of rises in WHQ sets Faroese apart from numerous other intonation languages that regularly have L% in WHQ, including Icelandic ([4], [5], and [9]), English ([16], [18]), German ([36]), European Portuguese ([37]), Catalan ([38]), and French ([39]), to name but a few. To be sure, other languages have rising WHQ, too, but not by default and not at the same rate of frequency as Faroese (e.g., [20] for Swedish, [12] for German). Another language with default rising WHQ is Greek ([40]).

Hypothesis 4 speculated that we may not find regional differences in intonation because reports on regional variation are silent on the islands studied here, Borðoy and Streymoy, and the two islands specifically mentioned in the literature, Vágar and Suðuroy, were not part of our study. Indeed, we did not find differences between the two islands tested here. In the future, the same task will have to be taken to the remaining islands to further investigate regional aspects of Faroese intonation.

Hypothesis 5 addressed the comparison between Faroese and its close linguistic relative Modern Icelandic. First, our results support the hypothesis (Hypothesis 5a) that like in Icelandic, DECL in Faroese have H* and L+H* nuclear accents, exhibit downstep and fall to L%. However, there is also a difference between DECL in the two languages concerning the use of the nuclear pitch accents. Based on data taken from the Icelandic version of the same map task as reported here for Faroese, [7] shows that the most frequent nuclear accent in Modern Icelandic DECL is the rising accent L+H* (61.3% in their data), while H*/!H* only occurs in 36.4% of their Modern Icelandic DECL data. In our Faroese data, by comparison, peak accents are more frequent in DECL (66%) than rising accents (28.2%).

Second, mainly based on [4], we hypothesised that Faroese PQ have L* nuclear accents, while Icelandic PQ have rising nuclear accents (L*+H, L+H*) (Hypothesis 5b). This was not confirmed by our data. Faroese PQ mostly have peak accents or rising-to peak (L+H*) accents, and L+H* has also been shown to be frequent in Modern Icelandic PQ (see Section 1 above).

Third, we hypothesised that WHQ have nuclear peak accents (H*/!H*) in both languages (Hypothesis 5c). We indeed found that the peak accent was the most frequent nuclear accent in Faroese WHQ, with just over 50% of the data. However, another frequent nuclear accent in Faroese WHQ is L* (38.7%). This is the accent that [4] suggested might be most common in Faroese PQ, which, in turn, we did not find.

Fourth, a striking difference between Modern Icelandic and Faroese is question intonation. In line with [3] and [4], we found that both PQ and WHQ in Faroese generally terminate in H%, while Icelandic PQ and WHQ fall to L% by default ([4], [5], and [9]). Also in line with [4], Faroese WHQ have falling intonation more often than PQ, but in our data, only 13.2% of Faroese WHQ end in L%. A comparison between PQ in the Modern

Icelandic map task data reported in [7] and [24] on the one hand, and PQ in our present Faroese map task data on the other illustrates the difference for PQ between the two languages very clearly. While 96.6% of Faroese PQ end in a final rise to H% (80.8% L-H%, 15.8% H-H%), [24] reports 86.8% falling contours in Modern Icelandic PQ (82.4% in [7]).

Moving away from the hypotheses, some further points are in order. We begin by establishing the Faroese tonal inventory. Based on our data, we have shown that the Faroese tonal inventory has two boundary tones, low L% and high H%, and two phrase accents, low L- and high H-. Three edge tones, L-L%, L-H% and H-H%, are frequently attested. The fourth combination, H-L%, does occur in the data but is very infrequent: only 9 DECL and one PQ end in H-L%, all comprised in the relevant figures above under "other". Regarding pitch accents, we have shown that Faroese has monotonal peak accents (H*/!H*) and bitonal rising accents (L+H*/L+!H*), as well as the monotonal low accent L*. We also have a few cases which we annotated as upstepped H* (^H*, L+^H*) in our data, where H is higher relative to a preceding peak. We did not specifically report the occurrences in the results sections above because of very low frequency. The most common pitch accent in Faroese is the monotonal peak accent (H*/!H*). Based on our data, we have no evidence that H* and !H* are phonologically distinct (nor do we have any evidence that the far less frequent ^H* is phonologically distinct). As [1], p. 438, notes, the diacritic "!" marks a contrast in some languages but not others. For example, "!" is distinctive in German and English H+!H*, but not in Greek and Chickasaw H* vs. !H*. Also according to [1], H* is the most common pitch accent in languages that have post-lexical pitch accents. Jun observes that "high or rising tones (a sequence of L and H) are more common than falling tones" and that "L* is the least common" ([1], p. 438). In our Faroese data, L* frequently occurs in WHQ.

Note that regarding rising accents, we have no reliable evidence for the occurrence of the L*+H pitch accent in Faroese, i.e. a rising accent with L aligned in the stressed syllable and H aligned in the syllable immediately following the stressed one. This holds for PQ, WHQ and DECL alike. In fact, there is only one utterance in our present data set for which L*+H was annotated. It is a prenuclear accent realised on the disyllabic *wh*-pronoun (*hvussu* 'how') in a WHQ. Comparing Faroese with Icelandic, this finding is particularly striking. In Modern Icelandic, L*+H is frequently used as a prenuclear accent in DECL ([6]), and as a nuclear accent in PQ ([4], [7], [9], and [24]). L*+H also frequently occurs as a nuclear accent in North American moribund heritage Icelandic DECL and PQ ([7], [24]).

One possible explanation for why L*+H is frequent in Icelandic PQ but does not occur in Faroese PQ is related to the observation that Icelandic utterance types are distinguished by pitch accent types ([4], [5]), and not by type of boundary tone, which is L% across the board. If the boundary tone does not tell utterance types apart, perhaps it is more likely that other events in the intonational contour take over. In Faroese, boundary tones distinguish between statements (L%) and questions (H%), and within rises in questions, PQ have more L-H% than WHQ, and WHQ have more H-H%. If the edge tone tells question types apart, the role of the pitch accent is perhaps not so important. Thus, while Icelandic has L*+H as one cue to PQ, Faroese does not need to make use of an extra pitch accent.

In other words, comparing strategies of marking utterance types (DECL, PQ, WHQ) in the prosody, we observe that languages generally make use of properties of the f0 contour, but in different ways. Faroese uses edge tones for disambiguation, while Icelandic does not. Instead, Icelandic uses pitch accent types (although there is no clear-cut distinction). Swedish and Estonian employ more global properties of the f0 contour: a higher and wider f0 register (mean f0) in Swedish questions than statements ([19], [22]), and less declination in the prenuclear area and a step-up in the nuclear area in Estonian ([23]). The prenuclear area plays an important role for disambiguation of utterance types in other languages, too. For example, [41] identify the relevance of height, shape and alignment differences in prenuclear accents in German for the distinction between questions and statements. In Dutch, prenuclear pitch patterns help to disambiguate between declarative questions and string-identical declarative statements ([42]). Note, however, that these properties of the f0 contour as a whole (e.g., register) have yet to be studied for both Icelandic and Faroese. It is therefore possible (and conceivable) that Faroese also employs f0 properties other than edge tones, and Icelandic uses properties other than nuclear pitch accent types, to distinguish between utterance types. For Modern Icelandic, [9] has already shown that PQ and WHQ differ in the prenuclear region of their f0 contour. Specifically, Icelandic WHQ had more high beginnings (%H or prenuclear H*) than PQ. This area is relevant in Faroese, too. We found most high beginnings in Faroese DECL, followed by WHQ and PQ in this order, although only the comparison between DECL and PQ reached significance.

The two phrase accents, L- and H-, terminate intermediate phrases and combine with boundary tones to edge tones. We noted in Section 2.3 above that if phrase accents have a secondary association with a stressed syllable or some specific tone-bearing unit ([28]), then a likely candidate for secondary association will be the first syllable of the second part of the target compound words. For example, a phrase accent would associate with the syllable *skú* in the target word *Múlaskúli* if realized with native, non-vacillating word stress: *'Mú.la,skú.li*. We do not have strong evidence for secondary association of phrase accents, but we do have some cases that suggest that further research is in order. Specifically, these are the DECL ending in an H-L% edge tone. In these cases, the tonal contour reaches a high target between the nuclear accent and the L% boundary tone, and this high target is associated with a stressed syllable. Consider the example in Figure 14, DECL *Eg skal hava Lindakirkja 'I shall have Lindakirkja'*. A rising nuclear accent (L+H*) is realized on the first syllable of the compound *Lindakirkja*, followed by a fall-rise-fall. The peak within the post-nuclear fall-rise-fall is aligned with the third syllable of the compound, *kirk*, which is the first syllable of the second part of the compound and has secondary stress. One important point to keep in mind, however, is that according to [4], compounds in Faroese may have vacillating stress. It is therefore conceivable that the first syllable of the second component may be strong for this reason rather than because of its association with a stress-seeking phrase accent. In future research, target words will have to be used with a different morphological structure. In particular, words will have to be included that have more than one stress position (ideally at least 4 syllables), but are not morphological compounds. If peaks between the last nuclear accent and L% can still be shown to be associated with third (or fifth) syllables, i.e., with secondary stress positions, this will be much stronger evidence in favour of stress-seeking phrase accents than our data can provide.

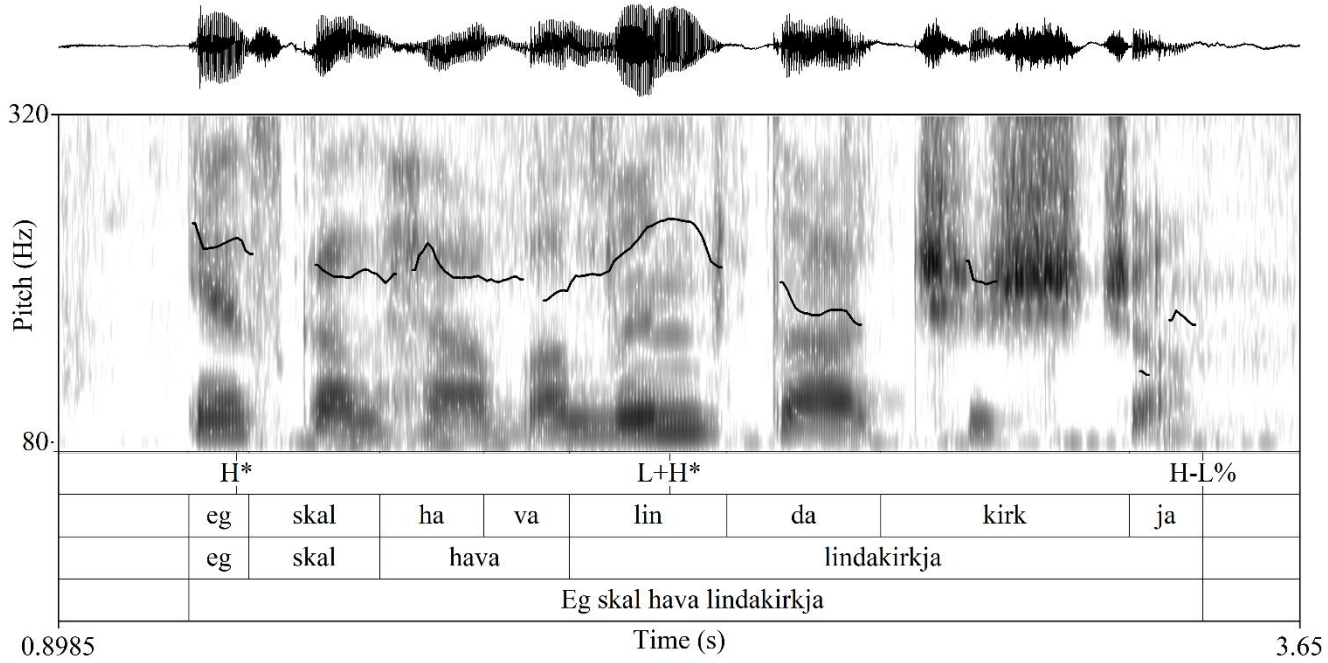


Figure 14: *Declarative (Eg skal hava Lindakirkja. 'I shall have Lindakirkja') with H-L% edge tone; H- is associated with the third syllable (kirk), which has secondary stress as first syllable of the second component of the compound (Lindakirkja). Speaker K07, female.*

5. Conclusion

This paper makes a novel contribution to our knowledge of Faroese intonation, which, to date, has not received much attention. We provided analyses of the intonation of three main utterance types in Faroese: DECL, PQ and WHQ, as well as a comparison between utterance types, showing that Faroese uses edge tones to distinguish between utterance types. The paper also offers a comparison with Modern Icelandic and shows that despite their close linguistic relationship, there are important differences between the two languages. These differences include, for example, question intonation and, more generally, the way prosody marks different utterance types. Moreover, we identified differences in the tonal inventory, in particular, the absence of the L*+H pitch accent in Faroese, which is frequent in Icelandic and serves an important function in that language. In the future, data from more locations in the Faroe Islands will have to be collected in order for us to be in a position to address regional variation in the intonation of Faroese. Moreover, the results from the map task study will have to be corroborated using other experimental designs in language production, as well as perception experiments, to add to our knowledge of the tonal inventory of Faroese, and to validate phonological categories. For example, future research will have to address the questions of whether or not variants of peak and rising accents are distinct (e.g., H* vs. !H*, L+H* vs. L+!H*), and whether phrase accents in Faroese are stress-seeking or not. Moreover, other aspects of the f0 contour will have to be studied more closely, e.g., the role of the prenuclear area and the role of pitch register. Also, other utterance types will have to be included in the research on Faroese intonation, e.g., imperatives, exclamatives, further question types (alternative questions, tag questions, etc.). Furthermore, the ways in which Faroese uses intonation to convey attitudinal or expressive meaning or information structure have yet to be investigated. Naturally, given that we are only at the very beginning of research on Faroese intonation, many questions remain open for future research.

6. Acknowledgments

We thank Hjalmar Petersen for translating the map task from Icelandic into Faroese, Ingilín D. Strøm for indispensable help on-site, Annika Simonsen for orthographically transcribing the bulk of the map task dialogues and for linguistic advice, and our Konstanz student assistants for cutting sound files and preparing Praat TextGrids. Thanks also to the audience at Nordic Prosody 13 for comments and discussion.

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