Sentence mode differentiation in four Donegal Irish varieties

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ABSTRACT

This paper discusses how sentence mode is marked in four local varieties (RF, BF, GCC, RG) of Donegal Irish. The analysis covers tunes (pre-nuclear and nuclear) as well as phonetic modality markers, distinguishing between statements (ST) and two question types (WHQ, YNQ). Results show that across the four varieties sentence mode can be signalled by intonation, but tune differences are optional and not obligatory. One variety (RG) stands out from the others by a preference in L*+H L% in nuclear and H* IP-initial pre-nuclear pitch accents across ST, WHQ and YNQ. RF, BF and GCC, on the other hand, group together in having L*+H % as their first choice in nuclear tunes. The same phonetic markers, however, are used by speakers of all varieties. The sentence mode differentiation includes a boosting of the pre-nuclear part of the phrase for WHQ and a boosting of the nucleus in YNQ.

Keywords: sentence mode, statements, questions, Irish, prosody.

1. INTRODUCTION

The distinction between statements and different question types in terms of prosody has been widely studied for a number of different languages [9, 14-16, 18]. Apart from prosodic characteristics, interrogativity can be marked syntactically or lexically, and a trade-off between these different markers has been noted [15]. In English, for example, as in various other languages, statements have been described as having typically falling tunes, whereas questions are rising [4,14]. The opposite has been observed for a small number of languages, e.g., Chickasaw [12]. Even varieties of the same language can differ in terms of sentence mode marking with regard to tunes. Where in Belfast English [10] both statements and questions (wh-, yes/no and declarative questions) have overall rising tunes, in Cambridge English [9,10] falling tunes are overall found in statements, in the majority of wh-questions and in a smaller number of yes/no questions. Rises only occurred in the majority of declarative questions.

In addition to tunes, interrogativity can also be signalled by more fine-detailed phonetic features, such as the relationship between nuclear and pre-nuclear pitch peak, higher register level, increased register span, or nuclear peak height [15-17], absence or reduction of the declination line [13] or nuclear peak timing [6]. Studies on within-language differences in the use of specific phonetic interrogativity markers, however, are scarce. As noted in [21] for Belfast English, nuclear peaks were higher in yes/no- than in wh-questions, but no such difference between these two question types emerged in Glasgow English.

In a previous study on sentence mode differentiation in a typically rising (Donegal) (L*+H L*+H L*+H 0%) and a typically falling (Inis Mór) (H*+L H*+L H*+L 0%) dialect of Irish [7], results showed that in addition to syntactic marking, the same phonetic features are used across three sentence modes (statements (ST), why-questions (WHQ) and yes/no questions (YNQ)), regardless of differences in tunes.

In this study we look more specifically at four local varieties of Donegal Irish (Rann na Feirste (RF), Baile na Finne (BF), Gleann Cholm Cille (GCC) and Ros Goill (RG)), see Figure 1.

Figure 1: Map of County Donegal with informant locations (in green).

This paper investigates if interrogativity in Donegal Irish is signalled in the same way across the four local varieties, looking at tunes (phonological level) and more fine-detailed phonetic features. In this context the analysis of sub-dialect variation in Donegal Irish is particularly interesting since alignment differences in what was believed to be one dialect were found in a southern variety of Irish (Connemara) [5]. As sentence mode in Irish is already marked syntactically, we are also interested in if the same intonational devices are used across the four local Donegal varieties.

2. METHODS & MATERIALS

2.1. Materials

The utterances analysed in this study are part of a larger data set collected for the prosodic analysis of Irish dialects, and the same material has been analysed in [7] and partly also in [8]. The target utterances were designed in three sentence modes (ST, WHQ, YNQ) with two different IP-lengths (two and three stress-groups respectively). The longer sentences were modelled on those shown in Table 1.

Table 1: Matched 2-accent ST, WHQ and YNQ.

ST	Bhuail mé le Dónall. *met me with Dónall* 'I met Dónall.'
WHQ	Cár bhuail tú le Dónall? *when met you with Dónall?* 'When did you meet Dónall?'
YNQ	Ar bhuail tú le Dónall? *q-part met you with Dónall?* 'Did you meet Dónall?'

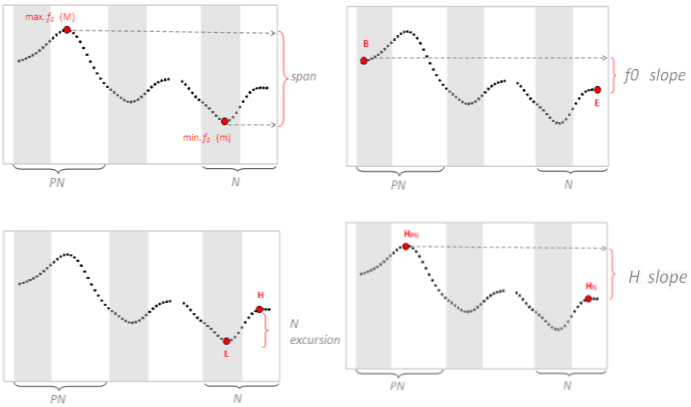
Target sentences were embedded in a series of randomised mini-dialogues and read five times in pairs. A total of 560 tokens were collected (ST:240, WHQ:160, YNQ:160). Utterances not suitable for analysis due to the production of narrow focus or disfluencies were excluded (around 20%).
For each variety four informants were recorded, yielding a total of sixteen informants. All informants were recorded locally in the Donegal Gaeltacht, using digital recording equipment ZOOM Handy Recorder H4, and Edirol 25 USB audio interface via Audacity sound recording software [1].

2.2. Methods and measurements

As a first step in the analysis, tonal contours of each utterance type were determined by careful auditory analysis. Then, all data was analysed and annotated using the Praat software [3] and IViE labelling [11]. Utterances were transcribed orthographically, stressed syllables were marked and tonal contours transcribed.

As a second step, four pitch points in the contour were annotated, as in [7] and [8]: 2 f_0 points corresponding to the H and L targets in the phrase-initial pre-nuclear (L_{PN}, H_{PN}) and 2 in the phrase-final accent (L_N, H_N). This was done to ensure uniform treatment of all data, which consists of phrases with differing lengths (2 and 3 accent-groups). The four target measurements were first converted to semitones and then served for deriving four further f_0 metrics: register span (*span*), topline declination slope (*H slope*), scaling of the nuclear pitch accent (N excursion) and pitch slope (f_0 *slope*), see Figure 2.

Figure 2: Illustrations of derived metrics (*span, H slope, N excursion and* f_0 *slope*) of phonetic features.



Declination slope values were obtained by calculating the difference between the corresponding targets in the IP-initial pre-nuclear and nuclear accent groups (*H slope*=H_{PN}-H_N). The global f_0 minimum and maximum were used for calculating *span* (M-m). These typically coincided with the L target of the nuclear accent group, and the H target of the IP-initial group, respectively. The exception was YNQ, where the f_0 maximum was in the IP-final accent group. F_0 *slope* was calculated as the difference between the IP-initial and the IP-final pitch points.

3. RESULTS

Results are presented for tune inventory analysis (Section 3.1), followed by the analysis of the specific f_0 metrics characterising each sentence mode (Section 3.2) across the four Donegal Irish varieties.

3.1. Tonal inventory

The analysis of the pre-nuclear (PN) and nuclear (N) tunes across the four Donegal Irish varieties (RF, BF, GCC and RG) showed that they are rising varieties, where the low rise L*+H 0% is the overall preferred nuclear tune.

As regards the tonal patterns in ST across the four varieties, there is a clear preference for certain tune types in PN and N. In N conditions, the rise L*+H 0% is the dominant tune for RF, BF and GCC. RG, however, is strikingly different with more than half of rise-falls L*+H L% and only about a third of nuclear L*+H %. As to the PN tunes, L*+H is again the preferred choice in RF, and BF, and to a lesser degree in GCC and RG (RF>BF>GCC>RG).

As to the tonal patterns for WHQ, there are clearly preferred patterns in PN and N accents. For N accents, the rise L*+H 0% is again the preferred choice in RF,

BF and GCC. RG again stands out by the relatively high frequency of L*+H L%. Overall, tune choices for N are very similar to those observed for ST. In PN accents, the patterns are again more varied. For WHQ, H* is the dominant PN tune in all varieties with the exception of BF. There, L*+H occurs most often, but is only a second option in the other varieties.

As to tonal patterns in YNQ, nuclear tunes are more varied than in WHQ and ST. The dominant tune in RF, BF and GCC is again L*+H 0%. Predominant L*+H L% realisations are found in RG. Rises with raised H trailing peaks L*+H^ 0% occurred in YNQ among the secondary choices in BF, GCC and RG, but not in RF. This pattern did not occur in ST or WHQ. In PN, the tune distribution is similar to ST for each of the varieties. Again, RF, BF and GCC mainly use the rise, while H* is the preferred pre-nuclear tune in RG and a second choice in the other varieties.

3.2. Effect of sentence mode on f_0 metrics

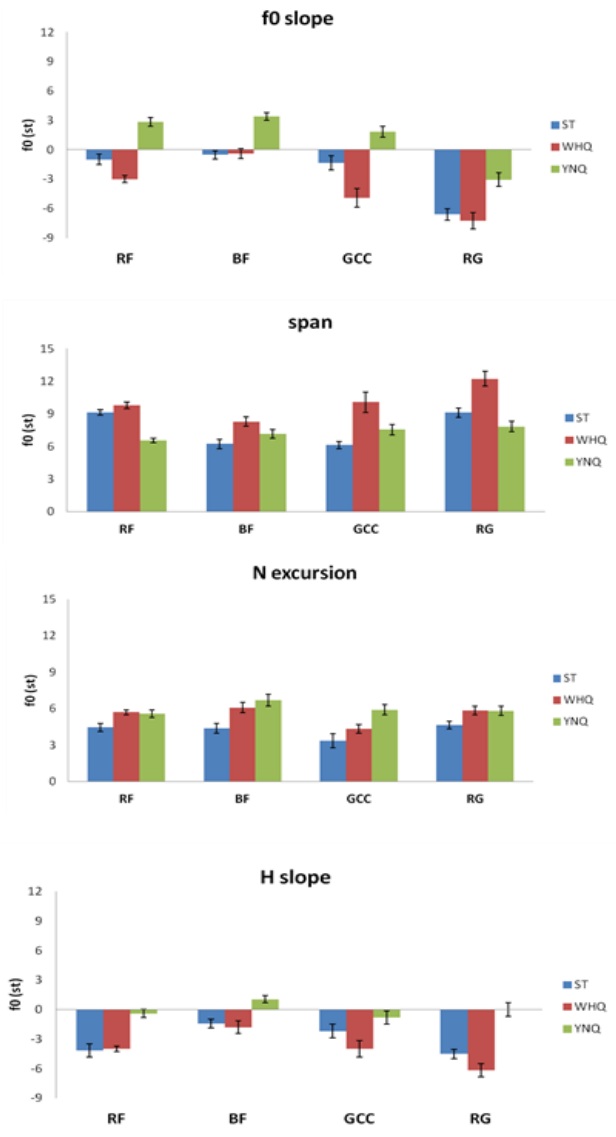
In Figure 3, the pooled data for each of the phonetic markers is presented for each variety (RF, BF, GCC and RG) separately, as also shown in [7]. Despite differences in preferred tonal patterns, the four varieties are rather similar in the use of specific phonetic sentence mode markers, and only minor differences can be observed.

A series of statistical analyses [19, 20] were carried out to test the effect of the independent variables (i.e. *sentence mode* and *dialect*) on the dependent variables (i.e. *N excursion*, *f_0 slope*, *span* and *H slope*). The p-values were calculated using the method of Monte Carlo sampling by Markov chain [2]. Significance is set at a pMCMC $\alpha < 0.01$.

Across the four Donegal varieties, the excursion of the nuclear accent (*N excursion*) is significantly wider in WHQ (t=0, pMCMC=0.0001) and YNQ (t=0, pMCMC=0.0001) in comparison to ST. Whereas the varieties differ in the degree of the excursion of WHQ and YNQ, both these question types have, on average, a wider excursion than declaratives and this is a phenomenon commonly reported for marking interrogatives.

As to pitch slope (*f_0 slope)*, results show that ST and WHQ are realised with a falling slope, whereas it is raised for YNQ in all dialects except for RG where it is also falling. Note, however, that despite the falling slope for YNQ in RG it is noticeably reduced compared to ST and WHQ, and so the relative slope differences among sentence modes is also present here. Overall, the differences in *f_0* slope across the four varieties were significantly different between ST and WHQ (t=0, pMCMC=0.0001), between ST and YNQ (t=0, pMCMC=0.0001) and also between WHQ and YNQ (t=0, pMCMC=0.0001).

Figure 3: Summary of the phonetic sentence mode markers *H slope*, *f_0 slope*, *span* and *N excursion* for ST (blue bars), WHQ (red bars) and YNQ (green bars) on a semi-tone scale (st) (y-axis) for each variety (RF, BF, GCC and RG).



Looking next at pitch span (*span*), a similar trend across all varieties can be observed: WHQ has the widest pitch span across the three modes and is also significantly larger compared to ST (t=0, pMCMC=0.0001) and YNQ (t=0, pMCMC=0.0001). The relative span in YNQ compared to ST varies across the dialects and is not significantly different (t=0.3891, pMCMC=0.3736). We can attribute the wider register span in WHQ to the raised PN peak (H*).

Lastly, *H slope* is on average falling in all modes across the varieties, with the exception of YNQ in the BF variety where the N peak is raised higher than the

PN peak. Note, however, that despite down-drifting *H slopes* in YNQ, they are noticeably reduced compared to ST and WHQ. This indicates that the N peak is considerably raised compared to that in ST and WHQ, even if the peak does not exceed that in the IP-initial PN accent. This suggests that raising the nuclear peak in YNQ compared to ST is a typical feature in distinguishing the two modes, and in this parameter YNQ is significantly different from ST (t=0, pMCMC=0.0001) and also from WHQ (t=0, pMCMC=0.0001). The differences between *H slope* in ST and WHQ are not significantly different (t=0.0117, pMCMC=0.0102)

4. DISCUSSION

Results from this study showed that in the Donegal Irish varieties, sentence modality can also be signalled by intonation, in addition to syntactic markers. The differentiation by tune is optional, and there is overlap, so that one can, in each dialect, find instances of the same tune type being used for all the sentence modes. We could therefore conclude that differences in tonal patterns are optional and not obligatory.

Apart from the preferred tunes in each mode, other options are available to speakers to express the same concept. As to the tonal patterns, a higher number of instances of high tones (H*) can be observed in WHQ compared to ST. The rise L*+H, however, is also a second choice. YNQ have an overall similar nuclear tonal pattern to ST and WHQ (L*+H 0%), but there are more of instances of rise-falls (L*+H L%) and rises with extra high raised peaks (L*+H^ 0%) than in the other two modes which suggests that there are more choices with regard to the tune type.

As to the phonetic markers, both WHQ and YNQ have a significantly wider nuclear (N) rise excursion than ST. WHQ is further characterised by the widest pitch span among the three modes. And as regards pitch (f_0) slope, YNQ has overall a considerably reduced pitch slope compared to ST, and WHQ.

The same phonetic sentence mode markers are used by speakers of all varieties, but to varying degrees. The sentence mode differentiation includes a boosting of the pre-nuclear part of the phrase for WHQ and a boosting of the nucleus in YNQ.

Findings from this study also largely support the findings of [8]. In both studies, register span (*span*) is widest in WHQ compared to ST. The nuclear rise excursion (*N excursion*) is also the parameter distinguishing both WHQ and YNQ from ST. As regards *H slope*, however, results from this study showed that both WHQ and YNQ were differentiated from ST by this parameter. In earlier study, *H slope* was only significantly different for YNQ compared to ST, but not for WHQ and ST. This difference may be due to the smaller sample size in the other study.

5. CONCLUSION

Results from this study showed that across the four Donegal Irish varieties analysed, the same tunes can be used to express different sentence modes, while the relative frequency of particular pre-nuclear accents can vary with sentence mode. The trends were not uniform across dialects. However, the major prosodic markers of interrogativity appear to be in adjustments to the relative pitch (regardless of tune) in the initial or final accent of the utterance.

Similar phonetic markers of sentence mode have been reported for other languages [15-17] and it is clear that raising of the *f0* level at either the beginning of the phrase or the end of the phrase - e.g., by extending the range of the nuclear peak, as in Dutch [15]; Belfast and Glasgow English [21], Drogheda English [17] – or by suspending/reducing declination, as in Danish [13] are widespread mechanisms for signalling questions, in languages with rather different intonation systems.

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