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**The Phonetics and Phonology of the Intonation of
Irish Dialects**

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**Thesis submitted for the Degree of Doctor of Philosophy
Centre for Language and Communication Studies
University of Dublin
Trinity College**

2008



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Declaration

I hereby declare that this thesis, submitted in candidature for the degree of Doctor of Philosophy at Trinity College Dublin, has not been previously submitted for a degree at this, or any other, university.

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Summary

This study is concerned with describing the intonation of the major dialects of Irish, comprising the Donegal dialect of Gaoth Dobhair, the Connaught dialects of Cois Fhairrge, Inis Oírr and Mayo, and the Munster dialect of Baile an Fheirtéaraigh in West Kerry. The study is based on phonological and phonetic analysis of read speech, across three grammatically different sentence types: declaratives, wh-questions and yes/no-questions.

The first aim of the study is to provide a cross-dialect account of the tonal inventory of the major dialects of Irish. This analysis is carried out within the Autosegmental-Metrical (AM) framework of intonational analysis. To begin, a preliminary inventory of the pitch accents of each dialect is established. The findings indicate that the divide in the phonological structure of each of the dialects is, to some extent, linked to the geographical location of each of the dialects.

The second aim of the study is to provide a more detailed description of how the major tonal categories of the Irish dialects are timed, in relation to the segmental or syllabic string. The purpose here is to capture some of the finer phonetic differences in pitch accent realisation. The results from this peak timing analyses show major alignment differences between the major dialects of Irish, and more subtle differences in peak timing among structurally similar dialects. The timing differences among superficially more similar dialects provides an insight into how these phonologically similar dialects can be perceived as different by local listeners.

Within the study two hypotheses are tested. In the first of these, the alignment of nuclear and initial prenuclear accents is examined in each of the dialects, across conditions where the number of unstressed syllables, following the nuclear accent, and preceding the initial prenuclear accent, is varied. This *Variable Peak Hypothesis*, tests the expectation that increasing the number of syllables following the nuclear accent would yield a *rightwards* drift in the peak timing, while increasing the size of the anacrusis will yield a *leftwards* peak shift. Results indicate that the dialects of Donegal and Cois Fhairrge (one of the South Connaught dialects) demonstrate very “fixed” peaks in terms of tonal alignment with the segmental/syllabic string, while the other Irish dialects demonstrate more “variable” peaks.

The *Realignment Hypothesis* tests the hypothesis that accent differences across the dialects of Donegal and Cois Fhairrge might be treatable in terms of a possible realignment of the melodic and segmental tiers. Of particular interest here are questions surrounding the historical evolution of these dialect differences, and how they relate to the intonation of varieties of English. We conclude that the alignment data presented militates against this hypothesis, as any attempt to relate the different contours to a single underlying contour would have to invoke very complex phonetic realisation rules.

Acknowledgements

I would like to thank my supervisor Professor Ailbhe Ní Chasaide for her encouragement, wisdom and friendship throughout my postgraduate studies.

I would like to thank all of the members of the Phonetics and Speech Lab in Trinity College Dublin for their friendship and never-ending support. These include Michelle Tooher, Brian O'Raghallaigh, Irena Yanushevskaya, Maria O'Reilly and Christer Gobl. A special thanks to Brian for helping me edit particular sections of this work.

Thanks are also due to Francis Nolan from the University of Cambridge for his guidance throughout the research process, especially in the early days when I knew so little about intonation.

I would like to thank my examiners Bob Ladd and Máire Ní Chiosáin for their valuable comments and advice.

This research was made possible through various sources of funding. I would like to acknowledge receipt of a postgraduate scholarship from the Irish Research Council for the Humanities and Social Sciences. I am also very grateful for the financial support of Trinity College Dublin, from whom I received the Trinity College Postgraduate Award and the Trinity Trust Travel Grant. I am also grateful to all of the informants I recorded.

My friends all deserve a mention, I am lucky enough to have too many to name individually. Thank you girls for the many years of tears and laughter. I finally got there!

Thanks to Robert for providing me with vital editorial and emotional support towards the end of this process.

Finally, and most especially, I am eternally grateful to my parents and sisters for their support (both emotional and financial!) over a long process. Without their unending support I don't believe I would have reached this point. Thanks for keeping the faith.

"Nunc est bibendum, nunc pede libero pulsanda tellus"

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Chapter 1

Introduction and Background

1.1 Introduction

This study is concerned with describing the intonation of the major dialects of Irish, namely the Donegal dialect of Gaoth Dobhair, the Connaught dialects of Cois Fhairrge, Inis Oírr and Mayo, and the Munster dialect of Baile an Fheirtéaraigh.

The focus of this work is a cross-dialect comparison of the intonation categories of these major dialects of Irish, with two principal objectives. The first of these is to provide a phonological description of their intonation, using an Autosegmental-Metrical model (e.g. Ladd, 1996; Gussenhoven, 1984) of intonational analysis.

Using this approach, a preliminary tonal inventory of each of the dialects of Irish is drawn up. To achieve this, phonologically significant pitch patterns, across three grammatically different sentence types, are identified. These sentence types include declarative sentences and two question-types: wh-questions and yes/no-questions.

The second aim is to provide a more detailed description of how the major tonal categories of these dialects are timed in relation to the segmental or syllabic string. One of the difficulties arising with phonologically-based accounts of the intonation of any language is that, at the structural level, dialects can look very similar, and important differences belonging to the phonetic realisational level are necessarily obscured. In this way structurally focused descriptions fail to capture listeners' intuitions about dialect differences. In order to account for the audible differences that listeners are attuned to, we clearly need to have measures that capture the fine phonetic differences in realisation. This study, therefore, focuses not only on the gross differences/similarities in tonal inventories of a number of Irish dialects, but on the finer alignment of the tonal targets.

This work in Irish is part of a project on the Prosody of Irish Dialects (Ní Chasaide, 2003-2006), which is intended to provide to provide a global account of the prosodic systems of the major dialects of Irish, by encompassing the phonetic dimensions of pitch, voice quality and temporal features. The objective is to provide, not only the basis for a linguistic description of the prosody of Irish dialects, but also a quantitative characterisation required for use in future

technological applications, particularly text-to-speech development for Irish dialects.

The Irish Prosody project contributes to the growing pool of knowledge on intonational typology across and within languages. Research on intonational typology generally focuses more on cross-language variation than on cross-dialect variation. However, more recently, varieties within a particular language are being examined, see, for example, work by Grabe et al. (1998, 2000, 2005) for varieties of English, van Leyden (2004) for Orkney and Shetland Island dialects, Peters (2004) and Peters et al. (2002) for varieties of German, and Gussenhoven (1999b, 2000) for dialects of Dutch.

One motivation for this work on Irish intonation is the desire to bridge a major gap in our knowledge of the linguistic structure of Irish by providing a comprehensive description of the intonation of four major dialects of Irish. There is a long tradition of research on the phonetics of Irish dialects (see, for example, de Búrca, 1958; de Bhaldraithe, 1945; Ó Cuív, 1944; Mhac an Fhailigh, 1968, Ó Sé, 1995, 2000), but the focus of these works has been directed at the segmental level with very little coverage of prosodic aspects of Irish. There has also been a number of works on the metrical structure of Irish dialects, with a particular focus on stress shift in Munster Irish (see, for example, Doherty, 1991; Green, 1996, 1997; Gussmann, 1997, 2000; Ó Sé, 2000; Rowicka, 1996). Intonation however, has largely been overlooked with the exception of some short descriptions of the intonation of some dialects of Irish in Blankenhorn (1981, 1982), de Bhaldraithe (1945), Bondaruk (2004), and Ó Cuív (1944).

A further motivation for this study is the desire to provide novel insights into the likely historic evolution of the rather striking prosodic differences across the dialects of Irish. This is also important insofar as it considers the possible influences that Irish may have had on dialects of English in the British Isles. For example, the question of whether the occurrence of rising nuclei in the declaratives of a number of English dialects reflects the influence of Irish is one which has been raised in the past (see, Knowles, 1975; Cruttenden, 1997), but such discussions have generally been carried out in the absence of actual descriptions of Irish intonation. Having comparative data for Irish may well provide further insights into such questions and provides a basis for reconsidering the posited influences of Irish prosody on dialects of English, as well as possible influences in the other direction.

1.2 The dialects of Irish

Irish is spoken as a community language in pockets of Ireland, known as the *Gaeltachtaí*. The *Gaeltacht* areas are mainly along parts of the Western seaboard, although Irish is also spoken as a first language in parts of some inland counties.

There is no standard spoken dialect of Irish. Traditionally there are three major dialects of Irish associated with the provinces of Ulster, Connaught and Munster.

The Ulster dialect is spoken in West Donegal. According to the 2006 Census¹ the Donegal *Gaeltacht* has a population of 23,783 and represents 25 per cent of the total *Gaeltacht* population. Donegal is located in the northwest of Ireland, in the province of Ulster. The terms Ulster Irish and Donegal Irish are often used synonymously. The *Gaeltacht* area of Donegal includes areas such as Gaoth Dobhair (Gweedore), Gleann Cholm Cille (Glencolumbkille), and the Islands of Árainn Mhór (Aranmore) and Toraigh (Tory). The speakers of Donegal Irish recorded for this study all originate from Gaoth Dobhair. Some *Gaeltacht* areas of Donegal are considered to be the most rurally populated areas in Europe.

The Connaught dialects can be divided into two major dialects: North Connaught and South Connaught. Connemara, in South Connaught, is the largest *Gaeltacht* area of Connaught. The South Connaught *Gaeltacht* has a population of 40,052 and represents 47 per cent of total *Gaeltacht* population (Census 2006). The Oileáin Árann (Aran Islands), lying off the coast of Connemara, also form part of this *Gaeltacht* of South Connaught. The Islands comprise Inis Mór, Inis Meáin and Inis Oírr. The South Connaught speakers in this study all come from Cois Fhairrge and Inis Oírr. Cois Fhairrge is a coastal area of County Galway that forms part of Connemara. It covers an area from Galway City to Casla, incorporating the towns of Bearna (Barna), An Spidéal (Spiddal) and Indreabhán (Inverin). Of the three Aran islands, Inis Oírr is situated closest to the mainland and has an Irish speaking community of about 300 people. These two dialects of South Connaught were primarily chosen because they are geographically close to one another, and have been described by linguists as being effectively one dialect (Ó Murchú, 1991, 1998; Ó Dochartaigh, 1973).

When people speak of Connaught Irish, it is generally assumed that they are speaking of Connemara, rather than Mayo Irish. Mayo Irish can be sub-divided into

¹ http://www.cso.ie/census/Census2006_Principal_Demographic_Results.htm

two dialects: Iorras (Erris) in the north of County Mayo and Tuar Mhic Éadaigh (Tourmakeady) in the south of the county. The Mayo Gaeltacht has a total population of 10,868 (Census 2006) and represents 11.5 per cent of the total Gaeltacht population. The Mayo dialect closest to Connemara Irish is that of Tuar Mhic Éadaigh. This dialect is considered the living Irish dialect closest to classical Modern Irish (de Búrca, 1958). The survival of the Irish of Tuar Mhic Éadaigh, also termed Middle Connaught, has depended largely on the oral tradition. Although Mayo is part of Connaught, the Irish spoken in North Mayo (Iorras) is said to be segmentally and morphologically closer to Donegal Irish, rather than other Connaught dialects. This is thought to be due to large-scale migration of Ulster people following the Ulster Plantation (O'Rahilly, 1932; Mhac an Fhailigh, 1968). The Mayo informants for this study are from Ceathrú Thaidhg, a small village of approximately 500 people in Iorras. Results in this study indicate that despite historical links with Donegal, intonationally at least, this dialect of Mayo Irish is in fact closer to the other Connaught dialects.

Gaeltacht areas of Munster include Corca Dhuibhne (the Dingle peninsula) in West Kerry, Uíbh Ráthach (Iveragh) in South Kerry and Muscraí (Muskerry) in Cork. The speakers presented in this study are all speakers of Kerry Irish and come from Baile an Fheirtéaraigh (Ballyferriter), located in the extreme westerly corner of Corca Dhuibhne. The Kerry Gaeltacht has a population of 8,695 and represents 9 per cent of total Gaeltacht population (Census 2006).

The Gaeltacht areas of Ireland are indicated on the map in Figure 1.1. The shaded areas represent the official Gaeltacht areas within Ireland. The locations of the dialects, which form part of this study, are specifically indicated by the red dots. It should be pointed out that these official Gaeltacht boundaries have not been substantially reviewed since their establishment under the *Ministers and Secretaries (Amendment) Act, 1956*², and as a result do not necessarily offer an accurate representation of the current linguistic situation within Gaeltacht communities. Recently a comprehensive study of the contemporary linguistic situation in the Gaeltacht has been carried out for the Department of Community, Rural and Gaeltacht Affairs (see Ó Giollagáin et al., 2007). Within this there is a recommendation that the *Ministers and Secretaries (Amendment) Act, 1956* is

² <http://www.irishstatutebook.ie/1956/en/act/pub/0021/print.html>

amended to “provide a statutory mechanism to differentiate between the different types of language communities which exist within the statutory Gaeltacht boundaries (Ó Giollagáin et al 2007: 31). The “different types of language communities” are categorised as those where more than 67% of the total population (3 years+) are daily speakers of Irish (Category A), those where between 44%–66% of the total population (3 years+) are daily speakers of Irish (Category B), and those where less than 44% of the total population (3 years+) are daily speakers of Irish (Category C).³

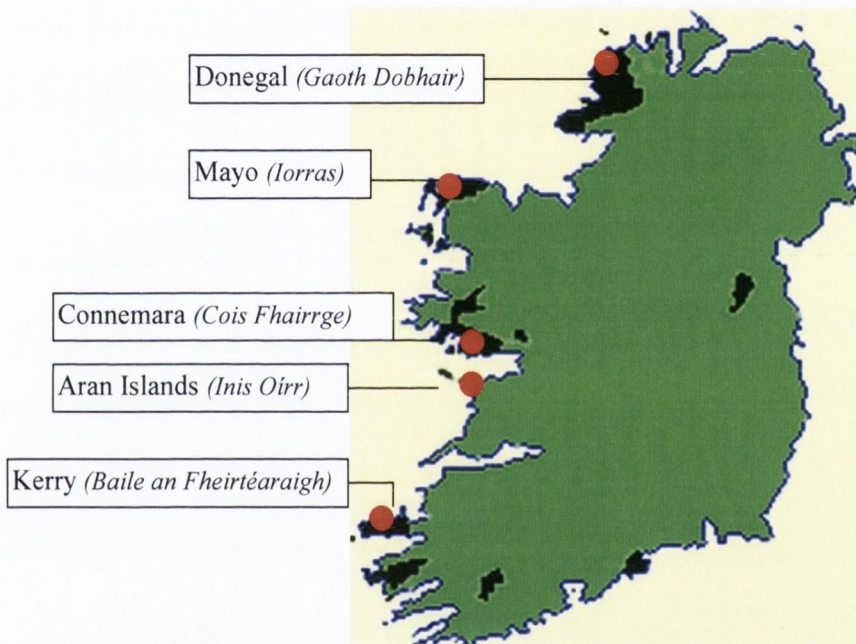


Figure 1.1. The Gaeltachtaí of Ireland indicated by the shaded areas. Red dots indicate informants' place of origin. Source: *Údarás na Gaeltachta (The Gaeltacht Authority)*⁴

1.3 Summary of main findings

This study on Irish intonation provides a phonological description of the intonation of each of the dialects indicated in Figure 1.1. Based on these descriptions, a tonal inventory for each of the dialects of Irish is drawn up. The

³ Ó Giollagáin et al (2007: 13)

⁴ *Údarás na Gaeltachta* is a state agency, responsible for the economic, social and cultural development of the Gaeltacht regions. Its stated purpose is to strengthen the Gaeltacht communities and facilitate the preservation and extension of the Irish language as the principal language of the Gaeltacht regions.

analysis is based on read speech of three grammatically different sentence types: declaratives, wh-questions and yes/no-questions. The findings show that the divide in the phonological structure of each of the dialects is, to some extent, linked to the geographical location of each of the dialects. There is a clear North-South divide in the intonational phonology of the country's dialects. The patterns of Donegal are clearly different to those of the Connaught dialects and the Munster dialect, which all have more similar tonal inventories. Donegal speakers show a preference for rising accents across all sentence types (declaratives, wh-questions and yes/no-questions), while speakers of the other dialects, for the most part, show a preference for falling accents.

The study also provides an account of how the tonal structure of each of the dialects examined is associated with the segmental structure. The results from the peak timing analyses show major alignment differences between the major dialects of Irish, and more subtle differences in peak timing among structurally similar dialects. The timing differences among superficially more similar dialects provide an insight into how these phonologically similar dialects can be perceived as different by local listeners.

1.4 Thesis Outline

This dissertation comprises 10 chapters. Chapter 1 is a brief chapter, introducing the motivation behind this particular study of Irish intonation and the dialects of Irish analysed herein.

The analysis employed in this study is conducted within the framework of autosegmental-metrical phonology. Autosegmental-metrical (AM) refers to descriptions of intonation developed after the seminal work of Pierrehumbert on American English intonation (1980). Chapter 2 introduces the main aspects of this model of intonational analysis, focussing specifically on Gussenhoven's (1984) approach to autosegmental-metrical analysis. Features of other significant intonational models, relevant to the Irish analysis, are also introduced. These include the British tradition of intonational analysis (e.g. O'Connor and Arnold, 1973) and the IPO approach (e.g. Cohen and 't Hart, 1967; 't Hart, Collier, and Cohen, 1990). There is also a review of work done on peak timing in various languages. In addition, there is some discussion on the phonetics/phonology divide in intonational analysis.

Chapter 3 provides a brief discussion on some of the linguistic characteristics of Irish, including the segmental and prosodic structure of the language. There has been virtually no work done to date on the intonation of Irish dialects other than the short descriptions mentioned above (see, for example, Blankenhorn, 1981; de Bhaldraithe, 1945, Bondaruk, 2004). These descriptions are reviewed in Chapter 3, along with a short description of the stress system of Irish. Reference is also made to work done on the intonation of Hiberno-English, as it is relevant to discussions in subsequent chapters.

In Chapter 4 the methods and materials employed in this study are outlined. This includes a description of the IViE labelling system (Grabe, Nolan and Farrar, 1998; Grabe, Post and Nolan, 2001; Grabe, 2004), the transcription system adopted for this study, as well as a detailed description of the corpora employed.

Chapters 5, 6, 7 and 8 provide a broad sketch of the intonation patterns of the dialects of Donegal (Gaoth Dobhair), South Connaught (Inis Oírr and Cois Fhairrge), Mayo and Kerry, respectively. These chapters are divided into various sections. In the earlier sections the tonal inventories for declarative and interrogative utterances in these dialects are drawn up. This is followed by an analysis of how the major pitch accents of each dialect are distributed across the main sentence types. Final sections of each chapter look more closely at how the major pitch accents of the dialects are timed in relation to the segmental string.

Chapter 9 introduces the *Realignment Hypothesis* by revisiting peak-timing in two of the Irish dialects. The chapter considers whether the major accent differences between the northern and southern dialects might be treatable in terms of a possible realignment of the melodic and segmental tiers. Of particular interest here are questions surrounding the historical evolution of these dialect differences, and how they relate to the intonation of varieties of English.

Finally, Chapter 10 summarises the main findings and proposes some suggestions for future work on Irish intonation.

Chapter 2

Intonational Analysis

2.1 Introduction to intonational analysis

This study on the intonation of Irish is carried out within the Autosegmental-Metrical (AM) framework of intonational analysis, which is based on the assumption that intonation is phonologically structured (e.g. Ladd, 1996). Phonological features of intonation are categorised according to the phonological structure of intonation tunes, an inventory of these tunes, and meanings associated with tunes. Phonetic effects on the structure of similar phonological tunes include such features as the timing of tunes in relation to the segmental string. These are all considered in following chapters.

Fox (2000: 274) describes the intonation of an utterance as “a continuous - and continuously varying - pitch pattern”. Intonational analysis is primarily concerned with variation in pitch, and intonational analysis has been carried out within different frameworks. This work on Irish is modelled on the IViE project (Grabe, Nolan and Farrar, 1998; Grabe, Post and Nolan, 2001), whose theoretical foundation is grounded in the work of Gussenhoven (1984, 2004) and Grabe (1998).

Gussenhoven's (1984) model of intonation is derived from the British tradition of nuclear tones. He largely reinterprets the British nuclear tone analyses and formally represents these through an Autosegmental-Metrical (AM) framework. This chapter gives an overview of these two approaches to intonational analysis. A more detailed account of the British model can be found in Cruttenden (1997), and the main concepts behind intonational phonology can be found in Ladd (1996). A short description of the IPO model is also provided.

Previous work on Irish intonation was modelled on the British tradition, therefore sections of this chapter focus on the mapping between this tradition and the AM frameworks of intonational analysis. The issue of the boundaries between phonetic and phonological levels of representation in intonation is also raised.

There is a short section on some of the functions of intonation, with particular attention to how different models focus on different aspects of the functions of intonation. The final section of the chapter reviews work done on peak timing in different languages.

2.2 Intonation Models

2.2.1 *The British School*

The British school of intonation has a long research tradition (Palmer, 1922; Halliday, 1967; O'Connor and Arnold, 1973). The O'Connor and Arnold (1973) system is seen as a reference point for much of the work on British English intonation, and has a pedagogical grounding.

A primary characteristic of the British model is that intonation is related to accentual features. Accent combines length, loudness, and pitch, and gives emphasis to important words. It gives the overall melodic shape to utterances. Most researchers on English intonation differentiate between a stressed syllable and an accented one (e.g. O'Connor and Arnold, 1973; Couper-Kuhlen, 1986; Ladd, 1996; Cruttenden, 1997). While a stressed syllable is rhythmically prominent, the option of an accent on this syllable is optional. The most important syllable within the O'Connor and Arnold system is the syllable on which the main accent falls. This is generally the stressed syllable of the last accented word (O'Connor and Arnold, 1973: 14), and is the *nucleus* of the system. Different pitch patterns can be associated with the nucleus and these are known as *nuclear tones*.

The entire contour of an utterance, or *tone-group*, is made up of several units: the *nucleus*, the *prehead*, the *head* and the *tail*. Syllables preceding the first accented syllable are known as the prehead. The head begins with the stressed syllable of the first accented word in an utterance preceding the nucleus and it ends with the syllable immediately preceding the nucleus. Syllables following the nucleus are known as the tail.

Within their system O'Connor and Arnold distinguish ten tone groups. A tone group is essentially the choice of intonation pattern of the speaker, used in conjunction with one of four sentence types: statement, question, command, and interjection. A tone group is unified and distinguished from all other tone groups by the attitude it conveys and by the pitch features of its tunes (O'Connor and Arnold, 1973: 39).

Within the O'Connor and Arnold system, intonation contours and tone-groups are described in terms of the movements of the contour e.g. using terms such as 'rise', 'fall' 'high-fall' etc. These are transcribed in the O'Connor and Arnold system through the use of tonetic stress marks. Their inventory of tonetic stress marks is outlined in Table 2.1.

Position in tune

Pitch

[J] { last syllable otherwise	Medium falling to very low. Medium falling to very low; <i>or</i> medium level with following tail syllable(s) very low level.
[^] { last syllable otherwise	High falling to very low. High falling to very low; <i>or</i> high level with following tail syllable(s) very low level.
[^] { last syllable last syllable but one otherwise	Medium rising to high, then falling to very low. Medium rising to high with following tail syllable very low level; <i>or</i> medium level with following tail syllable falling from high to very low. Medium rising to high with following tail syllables very low level; <i>or</i> medium level with first tail syllable high level and remaining tail syllable(s) very low level.
[.] { last syllable otherwise	Very low rising to medium. Very low level with following tail syllable(s) in an ascending pitch scale ending on medium pitch.
['] { last syllable otherwise	Medium rising to high. Medium level with following tail syllable(s) in an ascending pitch scale ending on high pitch.
[~] { last syllable otherwise	Moderately high falling to low, then rising to medium. Moderately high falling to low with the following tail syllable(s) carrying rise to medium; <i>or</i> moderately high level with first tail syllable low level and remaining tail syllable(s) carrying rise to medium.
[?] all positions	Medium level with any following tail syllable(s) on same level.
['] all positions	Relatively high level with any following pre-nuclear syllable(s) on same pitch.
[.] all positions	Very low level with any following pre-nuclear syllable(s) on same pitch.
[~] all positions	Relatively high level with any following pre-nuclear syllable(s) forming pitch scale descending to medium-low.
[.] all positions	Very low level with any following pre-nuclear syllable(s) forming pitch scale rising to pitch slightly lower than beginning of following [~].
[°] { after ['] after [~] [.] after [.] after ['] otherwise	Relatively high level, same pitch as preceding [']. Level, varying from relatively high to quite low and forming part of descending pitch scale indicated by [~] or of ascending pitch scale indicated by [.] Level, varying from quite low to medium and always higher than [.] or [~] immediately preceding. Level, varying from medium high to very high and always higher than ['] or [°] immediately preceding. Relatively high level.
[o] { last syllable after [~] before ['] [~] otherwise	Very low rising to medium. Level, varying from low to medium. Very low level.
[~]	All syllables following this tone-mark and preceding a head or, in its absence, a nuclear tone, have the same high level pitch.
[]	Indicates the end of a word group and its accompanying tune, after which there is little or no pause.
[]	Indicates the end of a word group and its accompanying tune, after which there is an appreciable pause.

Table 2.1. *Tonetic stress marks from O'Connor and Arnold (1973)*

A full transcription system for British English, based on tonetic stress marks (TSM), was developed for the transcription of the Spoken English Corpus (SEC) (Knowles et al., 1996; Williams, 1996a, 1996b). Within this transcription system every accented syllable is assigned one of a set of tonetic stress marks which indicates the pitch movement on the accented syllable up to the next accented one, or the boundary of the intonation unit.

2.2.2 Autosegmental-Metrical framework

Autosegmental-Metrical (AM) models of intonation are historically derived from the American structuralism approach to intonation (Pike, 1945; Wells, 1945; Trager and Smith, 1951), and more specifically from two frameworks of contemporary phonological theory - autosegmental analysis (Goldsmith, 1976) and metrical analysis (Liberman, 1975). Work in the American tradition created the basis for the 'phonemic' analysis of intonation. Pike (1945) and Wells (1945) both came to the conclusion that the intonation contour is combined of a string of level tones and established four distinctive pitch levels for American English. The concept of a tone analysis was developed in the late 1970s in the work of Liberman, for American English, (1975), and Bruce, for Swedish (1977). This level tone approach differs from the British tradition. Early work in this tradition came from Klinghardt (1920), Armstrong and Ward (1926) and Palmer (1922), who did not explicitly adopt any theoretical principles but described the intonation contour in terms of pitch movements, such as falling and rising. The difference between the American and the British approaches has been referred to as the 'levels versus configurations' debate, following Bolinger (1951). From the 1960s onwards the British tradition received a more theoretical treatment. See for example the work of Halliday (1967), O'Connor and Arnold (1973), Crystal (1969).

Within the current AM theory, the intonation contour or tune is made up of a series of two tones, one H(igh) and one L(ow) level tone, which then map onto f_0 targets, and which are associated with metrically strong syllables. There are separate tiers for tones and segments within an AM system. These tiers are linked by the *association* of tune and text.

The AM framework is now most commonly associated with the work of Pierrehumbert (1980), for American English. Pierrehumbert's work has given rise to a growing body of work, on intonation of languages, within the AM model (see,

for example, Ladd, 1996; Beckman and Pierrehumbert, 1986; Pierrehumbert and Beckman, 1988, Gussenhoven, 1984, 2004; Jun, 2005). The AM framework has become a standard for intonational analysis. As Ladd (1996: 113) observes “without a generally agreed framework for describing intonation it is difficult to compare intonation across languages and come to any reliable conclusion about the significance of the similarities, or the differences’. An account of Irish intonation within an AM framework is therefore broadly accessible and allows comparison with other studies on languages and dialects elsewhere.

The AM model provides a phonological approach to intonation. While it highlights phonological structure, it also accounts for the phonetic details of contours. Within the AM framework, H and L tones are organised into two categories. There are those associated with stressed syllables, which are termed *pitch accents*, and those associated with phrase edges, which are termed *boundary tones*. A pitch accent is a local pitch event associated with the prominent syllables in an utterance. The notion of the *pitch accent* was originally proposed by Bolinger (1958) to indicate that pitch change is a cue to the perception of stress (Ladd, 1996: 46). The term was employed again in the work of Pierrehumbert (1980). Pitch accents are starred tones, marked with an asterisk ‘*’, which give prominence to a syllable or word. Pitch accents are generally bitonal (H*+L) or monotonal (H*), although Gussenhoven (1984, 2004) allows for tritonal accents in British English (H*LH). The starred component of a bitonal/tritonal pitch accent is *associated* with the stressed syllable, though not necessarily *aligned*¹.

The unstarred element of a bitonal accent preceding the starred tone is said to be a leading tone. If it follows the bitonal accent it is called a trailing tone. One difference between different AM models is that some (e.g. Pierrehumbert, 1980; Beckman and Pierrehumbert, 1986) allow for bitonal accents with both leading tones (right-headed accents) and trailing tones (left-headed accents), while others, like Gussenhoven (1984, 2004), only allow for those with trailing tones.

Boundary tones are single H and L tones associated with the edges of phrases. They are marked with a percentage sign ‘%’, and their function is primarily one of

¹ Alignment deals with the timing of the fundamental frequency (f0) contours in speech with the segmental or syllabic string. This is a complex issue and studies in this area are increasingly popular (e.g. Arvaniti, Ladd and Mennen, 1998; 2000; 2006; Arvaniti and Ladd, 1995; Ishihara, 2003; Prieto, van Santen and Hirschberg, 1995). Tonal alignment will be dealt with more fully later in this chapter.

juncture. As part of the nuclear contour the boundary tone may also play a role in signalling the grammatical meaning of the contour, e.g. a high boundary in some languages may signal a question.

The pitch value of a tone in the AM model depends on its position in the phrase and on its function. For example, an H tone at the start of an unmarked utterance would be expected to be higher than one later in the phrase, due to downtrend effects of either declination or downstep.

The term ‘declination’ was initially introduced by Cohen and ‘t Hart (1967) in work on Dutch intonation. It refers to a lowering of pitch over the course of an utterance. Gussenhoven (2002: 274) describes it as “a time-dependent, gradual f_0 lowering, associated with one or more intonational phrases but otherwise context-independent”. Traditionally declination was treated as a universal principle of intonation, but it is now widely accepted that declination is more likely to be an artifact of various linguistic factors and certain local physiological constraints (Xu, 1997).

Downstep is another downtrend effect, and, according to Gussenhoven (2002: 274), it may be considered a “grammaticalization” of declination. It has been described as tone “terracing”, whereby successive H tones in a sequence appear to step down from one another, rather than gradually drift down as they would if only declination were involved. A downstepped H tone is the result of its relationship to a previous tone. Within the Pierrehumbert models the domain of downstep is the intermediate phrase (see below), triggered by a sequence of a H and L tone. One effect of downstepping a sequence of tones may be a final-lowering in the final syllable(s) of an utterance. Final-lowering (Lieberman and Pierrehumbert, 1984) occurs on the last accent in an utterance. It means there is a lower than expected scaling of the final peak in a series of downstepping H tones. Evidence for final lowering has been presented for a variety of languages with very different prosodic systems, such as Japanese (Pierrehumbert and Beckman, 1988), Danish (Thorsen, 1985), Dutch (Gussenhoven and Rietveld, 1988), and Spanish (Prieto, Shih and Nibert, 1996).²

² In a language variety such as Belfast English where a rising pitch is more common in statements than a falling pitch, such final-lowering does not occur, although there may still be a tendency towards downstep over the course of an utterance.

Different AM models postulate different levels of phrasing. Gussenhoven (1984) and Pierrehumbert (1980), among others, assume one level, the *intonational phrase* (IP). Others following Beckman and Pierrehumbert (1986) assume two levels: the intonational phrase and a level of phrasing below this called the *intermediate phrase*. The two levels are said to be associated with two different degrees of juncture or boundary strength. The view behind the interpretation of an intermediate phrase is that there is a phrase-like prosodic unit in some languages smaller than an intonation phrase, but which can still have more than one accent, and is merely 'intermediate' between the intonation phrase and the prosodic word. As Grabe (1998: 9) observes "it not always clear which criteria distinguish an intermediate phrase from an intonation phrase proper". An intonational phrase is demarcated by a phrase accent followed by a boundary tone, while an intermediate phrase is marked by a phrase accent only.

In the original Pierrehumbert work (1980), the notion of the phrase accent was introduced, along with the boundary tone. The phrase accent was said to account for the pitch on and following the last pitch accent of an intonational phrase up to the final boundary tone. The notion of the phrase accent was reinterpreted in Beckman and Pierrehumbert (1986) when they introduced the intermediate phrase. The phrase accent came to express this different level of phrasing. They suggest that a phrase tone actually marks an intermediate phrase, and that an intonation phrase is marked by both a phrase and a boundary tone. The phonetic correlates which differentiate the intermediate phrase from the intonational phrase, however, are not clearly specified.

Within an AM system there are rules which govern the phonetic realisation of a contour. Pierrehumbert assumes two types of rules: evaluation rules and interpolation rules. Tones are evaluated from left to right. A tone's f_0 depends on both its phonological specification (i.e. whether it is H or L) and on the phonetic value of the previous tone. Phonetic evaluation rules specify the f_0 of the tone, while interpolation rules "construct the f_0 contour between one target value and the next" (Pierrehumbert, 1980: 25). Interpolation is generally linear between two different tones (HL or LH) or between two low tones (LL) but there is a "sagging transition" between two successive H tones (H H). This sagging transition is argued by Gussenhoven (1984) to deserve a phonological status, which would correspond to *partial linking* between both accented words (see 2.2.2.1 below). Ladd and

Schepman (2003) also argue in favour of a phonological status of this sagging transition, and they analyse it as $H^* (L+H)^*$.

Pierrehumbert's analysis of American English has led to the formulation of a tonal grammar. Figure 2.1 outlines this tonal grammar of American English from Pierrehumbert (1980: 13), incorporating all of the features above: boundary tones, pitch accents and phrase accents.

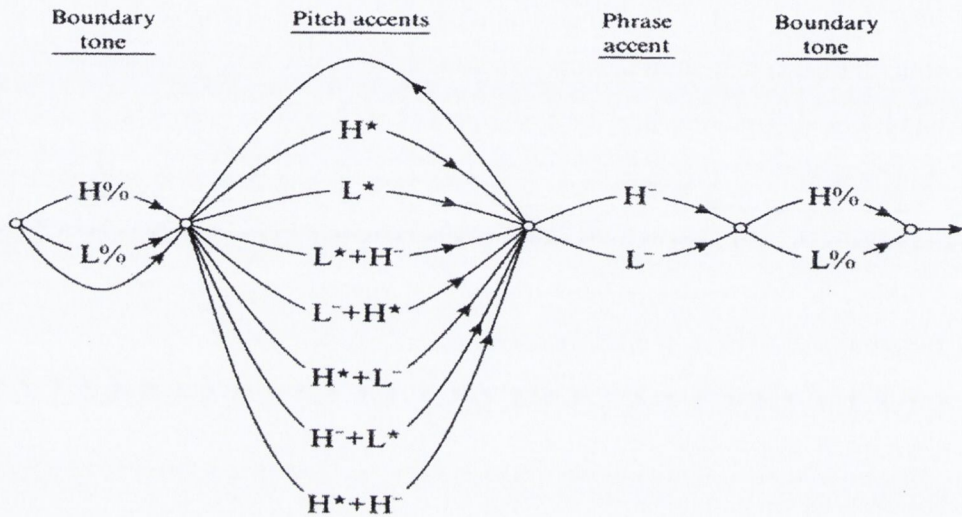


Figure 2.1. *Tonal grammar of American English from Pierrehumbert (1980: 13)*

2.2.2.1 Gussenhoven and Grabe

Gussenhoven's (1984) AM model of intonation is founded on the British tradition of nuclear tones. As in other AM models, starred tones in the Gussenhoven model are associated with accented syllables on the segmental tier. Unstarred tones are associated either with utterance-final pitch movements if the final accented syllable is mono-syllabic, or with syllables following the accented one, from left to right. In Gussenhoven's model pitch accents, like feet, are always left-headed, i.e. the pitch accent does not account for the pitch before the accented syllable to which it is associated. The unstarred tone can spread over a number of unstressed syllables following the accented syllable. This was referred to earlier, in terms of how different AM models allow for different pitch accents. Pierrehumbert's models allow for both leading and trailing tones, and Gussenhoven's model allows only for trailing tones.

Gussenhoven (1984) outlines three basic tones for British English, i.e. the fall H^*L , the fall-rise H^*LH and the rise L^*H . He posits rules which can modify these

basic tones so all other nuclear tones can be considered as *modifications* of these three basic ones. He also posits *linking rules* to apply to prenuclear tones.

Nuclear tones can be modified phonetically in four ways. The first of these is related to timing. There can be a *delay* in the association of the tone with the segments. A simple fall then could be turned into a rise fall if the peak is delayed relative to the accented syllable. He states that “while there may be an ‘ideal’ target for delay (say, one syllable after the nuclear one), delay is a gradual modification” and “contours with different degrees of delay are possible” (Gussenhoven, 1984: 218).

Secondly, there can be a stretching or *stylisation* (taken from Ladd, 1978) which results in a lengthening of the syllable with which the tone is associated. The tone can then be extended in time.

Thirdly, there may be a *half-completion* of the tone due to a clipping of the starred tone so the pitch does not go beyond mid-level. Half-completion has been defined by Gussenhoven as ‘the failure of the tone to cross the mid-line’ (1984:222). He observes that half-completion does not obviously apply to all nuclear tones as there is no evidence for half-completed rises, only falls.

Finally, there can be variation in the pitch *range* of the tone so for example, excursions of tones can be reduced.

These modifications mean that, in British English, there are three basic tones and nine modified ones, i.e. twelve nuclear tones in all. There may be other less frequent contours occurring that cannot be captured by Gussenhoven’s twelve nuclear tones, but these can be accounted for by combining modifications (Gussenhoven, 1988). An overview of these tones and their different phonetic realisations can be found in Gussenhoven (1984: 227).

According to the British tradition (e.g. Halliday, 1967; O’Connor and Arnold, 1973) nuclear tones occur on the last accented syllable in a tone group. Gussenhoven’s account of intonation does not differentiate prenuclear accents and nuclear accents in this way. Rather, the underlying nuclear tones can occur as either a final or non-final accent in a phrase. To account for differences in realisation of these in nuclear and prenuclear position Gussenhoven proposes *Tone Linking Rules* which apply to tones in prenuclear position. There are two kinds of linking rules proposed: *partial linking* and *complete linking*. The assumption is that the trailing tone in bitonal accents is not very precise either in timing or scaling so that

targets of bitonal pitch accents are not necessarily close together. According to Gussenhoven (1984, 1988, 1999a) and Grabe (1998), the timing of trailing tones in English is dependent on the distance to the next accent, rather than the distance from the starred tone with which it is associated. In Figures 2.2 below, Gussenhoven (1984) indicates two underlying H^*L pitch accents in the same sentence, but with a rightmost timing of the L target of the prenuclear H^*L tone. In the final H^*L accent the trailing tone comes immediately after the starred tone indicating that the timing of the trailing tone depends on the context. The argument, then, is that there is a lack of precision in the location of the trailing tone in terms of both timing and scaling which may be the case same for all three basic tones of English. The trailing H tone of a L^*H accent therefore can be subject to the same displacement as that of a trailing L tone in a H^*L accent. This rightward displacement he terms *partial linking*.

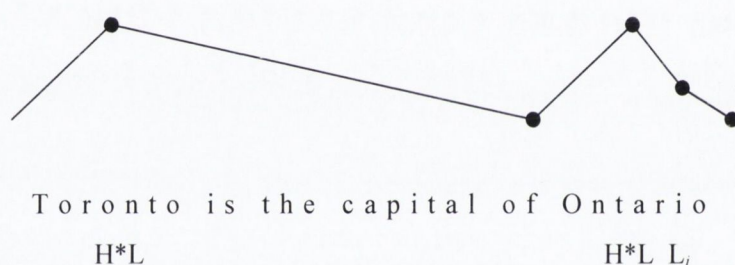


Figure 2.2. Illustration of a prenuclear H^*L accent undergoing partial linking (from Gussenhoven 2002)

Where there is partial linking the slope of the trailing tone is more gradual than in an unlinked nuclear tone. *Complete linking* allows for the deletion of the trailing tone. This would generate a H^* accent from a H^*L one as illustrated in Figure 2.3. Gussenhoven argues that both contours are underlyingly $HL HL$. In theory any tone can be linked to any following tone.

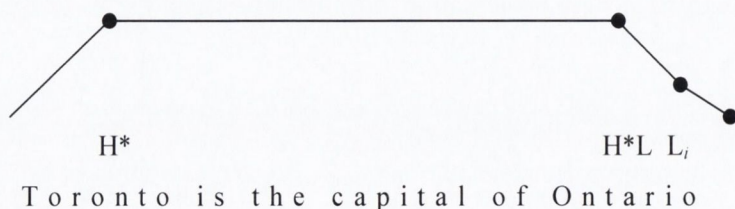


Figure 2.3. Illustration of a prenuclear H^*L undergoing complete linking resulting in a H^* realisation

While Gussenhoven applies modifications to nuclear tones and linking rules to prenuclear ones, Grabe (1998) suggests a set of unified rules (phonological adjustments) that can apply to all pitch accents, whether prenuclear or nuclear. They account for the modifications of basic H*+L and L*+H accents. Grabe's phonological adjustments incorporate categorical adjustments and include *deletion*, *displacement* and *downstep*.³ Deletion is similar to a completely linked contour in Gussenhoven's analysis and involves the deletion of a low trailing tone of a bitonal accent to give rise to an H* accent. It differs from Gussenhoven's complete linking in that it is also applicable to nuclear contours.

Displacement is a reanalysis of Gussenhoven's partial linking whereby the L tone of a bitonal H*+L is realised closer to the following tone. In Grabe's analysis the rightward displacement of the L tone is a phonological adjustment. In her study displacement appears to apply to prenuclear accents only. She acknowledges that permitted distance by which the L tone may be displaced requires further experimental investigation.

Downstep is defined by Grabe (1998: 89) as an accent that sounds equivalent to a non-downstepped accent when listened to in isolation, but is lower in f₀ than an immediately preceding accent than would be expected purely from declination effects. It may occur after a variety of accentual configurations.

The Gussenhoven and Grabe treatment of the intonation contour means that intonational analysis includes two levels in the representation of pitch contours, a surface level and an underlying level. For more on this see Section 2.4 below.

2.2.3 IPO model

The Institute for Perception Research, Eindhoven, (IPO) have developed a intonation model for Dutch (Cohen and 't Hart, 1967; 't Hart and Cohen, 1973, 't Hart, Collier, and Cohen, 1990), that has been extended to describe intonation in other languages (e.g. Odé, 1989, for Russian; de Pijper, 1983, for English). Some features of the model are presented here.

The IPO model is based on perception. The f₀ contour can show fluctuations which are not perceived as changes in pitch. The IPO model removes the perceptually irrelevant details by f₀ data reduction which involves the resynthesis of

³ She also includes Gussenhoven's *delay* and *half-completion* as described earlier

analysed intonation patterns. This is done by stylisation, which reduces the f_0 curve to its perceptually relevant pitch movements. A simplification of the f_0 curve is made so that the natural f_0 curve is replaced by a minimum number of straight lines in the f_0 versus time domain. "A close-copy stylisation is a synthetic approximation of the natural course of pitch, meeting two criteria: it should be perceptually indistinguishable from the original, and it should contain the smallest possible number of straight-line segments with which this perceptual equality can be achieved" (Nooteboom, 1997:646). Perceptual equivalence means that "two different courses of f_0 are perceptually equivalent when they are similar to such an extent that one is judged a successful (melodic) imitation of the other" (t Hart, Collier, and Cohen, 1990:47).

Within the IPO system the basic unit of intonation is the pitch movement, described as "the smallest unit of perceptual analysis" (t Hart, Collier, and Cohen, 1990: 72). Pitch movements combine into configurations and these in turn combine into contours. There is a combination of rules which allow for the establishment of different types of typical and recurring configurations of pitch movements. These all carry some linguistic function which constitute the grammar of intonation. For example, a 'pointed hat' marks a pitch accent or a 'flat hat' sounds like a sentence conclusion.

Within this model ten basic movements for Dutch are identified. There are five rises and five falls. Rises are assigned a number from 1-5 and falls are indicated by the letters A, B, C, D, E. Each rise or fall also has a (+) or (-) value to indicate various phonetic features, such as occurring [+early] vs. [-early] in the syllable. Rising and falling movements may be combined to form configurations such as '1&A' (a rise immediately followed by fall). Configurations may then be strung together to form full contours (t Hart, Collier, and Cohen, 1990:79). There is an IPO grammar which permits only certain combinations of movements and configurations. In addition to these movement and configurations, there are labels O and 0 corresponding to the pitch levels on the lower and upper declination lines. Within the model, the end point of the declination line represents the pitch level, and the excursion size of the pitch movements represents the pitch range.

The IPO model is said to be both phonetic and phonological: "the 'phonetics of pitch' is at the same time the 'phonology of intonation' " (Collier, 1989:256).

2.3 Autosegmental-Metrical Labelling systems

2.3.1 ToBI

The differences in the Pierrehumbert and Gussenhoven AM approaches to intonational analysis are reflected in two different labelling systems for transcribing intonation. The first of these, the ToBI labelling system (Silverman et al., 1992; Beckman & Ayers, 1997; Beckman et al., 2005), was initially developed for labelling intonation of American English. It has since been adapted for many languages, including German (Grice et al., 1996; Grice, Baumann and Benz Müller, 2005), Glasgow English (Mayo, Aylett and Ladd, 1997) and Japanese (Venditti, 1997).

A ToBI transcription consists of a speech signal and f₀ record, and time-aligned labels arranged in four parallel tiers: Tone tier; Break-index tier; Orthographic tier; and Miscellaneous tier. The tone and break-index tiers represent the prosodic analysis.

The tone tier is the part of the transcription that corresponds most closely to a phonological analysis of the utterance's intonation pattern. The tones on this tier are largely derived from the work of Pierrehumbert (1980) and Beckman and Pierrehumbert (1986), and are a sequence of (H)igh and (L)ow tones which mark the pitch accents in an intonational phrase. The treatment of downstep within the ToBI system largely comes from Ladd (1983). The treatment of juncture on the break-index tier is largely founded in Price et al. (1991) and Wightman et al. (1992). The break-index tier marks the prosodic grouping of the words in an utterance by labelling the end of each word for the subjective strength of its association with the next word, on a scale from 0 to 4.

The orthographic tier is simply used to label the orthographic words in an utterance, while the miscellaneous tier marks such events as coughing, disfluencies etc. An example of a ToBI transcription is indicated in Figure 2.4.

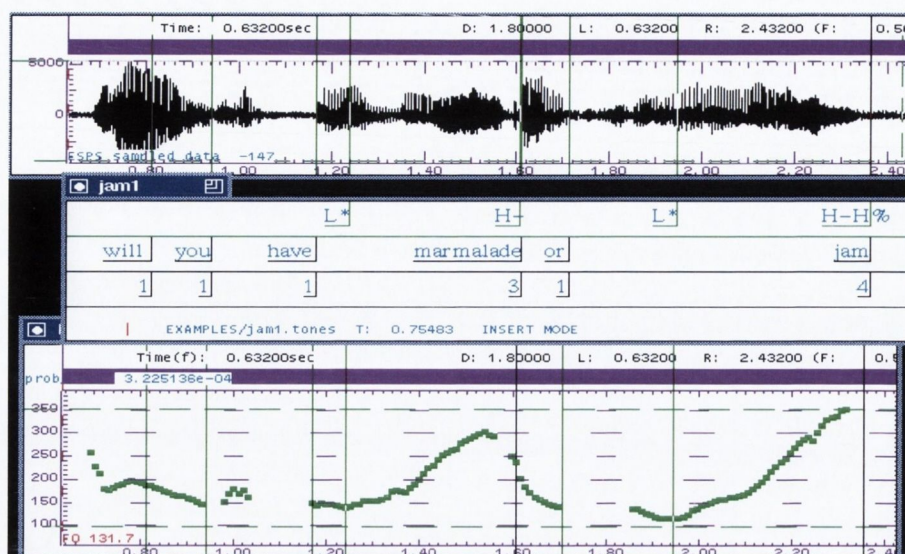


Figure 2.4. A ToBI labelled utterance from Beckman and Ayers (1997)

2.3.2 IViE

The IViE labelling system (Grabe, Nolan and Farrar, 1998; Grabe, 2001; Grabe, Post and Nolan, 2001) is the system employed for this study on Irish intonation and is an adaptation of the ToBI system. While ToBI was originally intended for the transcription of standard varieties of English, IViE was designed specifically with dialect variation in mind. The IViE labelling system is based on work by Gussenhoven (1984) and Grabe (1998). An example of an IViE labelled intonational phrase is given in Figure 2.5. A detailed description of this labelling system is provided in Section 4.4.1, Chapter 4.

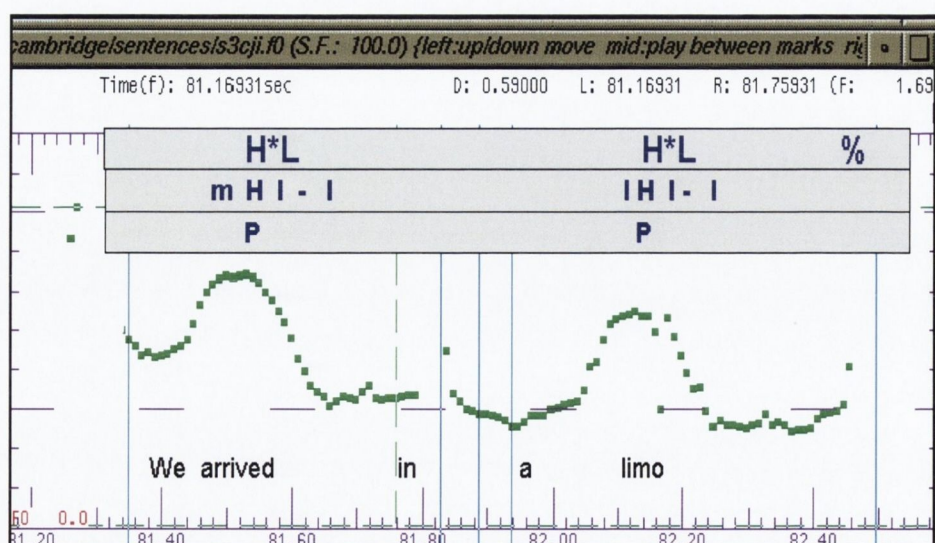


Figure 2.5. Example of an IViE labelled utterance Grabe (2001)

2.4 “Phonological” and “Phonetic” levels of representation

In intonation the boundaries between phonetics and phonology are not always clear. Decision-making in intonational analysis can sometimes be arbitrary. For example, it is not always easy to determine whether pitch accents are categorically different, or merely different at a realisational level. Various effects can change the surface form of accents without affecting the inventory of phonological contrasts. For example, languages can have different phonetic realisations of the same phonological tune, e.g. differences in peak alignment, downstep, upstep, etc. There are several difficulties in determining phonological categories and the minimal pair approach, used to determine phonological distinctions between segments, is not adequate in intonation, primarily because the contrasts in meaning are not as clear-cut as lexical contrasts.

A further concern in intonational analysis is the issue of determining the exact labelling of a category in terms of tonal composition, for instance whether we are dealing with a bitonal or a monotonal accent. In this study, such differences are considered as differences at the underlying vs. surface level. A clear example of this is in the difference between L^*+H vs. L^* in Donegal Irish, as described in Chapter 5. In order to determine the phonological status of these two patterns, we studied the distribution of those accents in prenuclear and nuclear positions. Results indicate that the difference between the two is predominantly context-specific. L^*+H accents occur when there are a number of unstressed syllables between successive accents, whereas L^* realisations occur where there is just one (or no) unstressed syllable between two unstressed syllables. This is less clear in nuclear position, where in similar contexts both L^*+H or L^* can occur. These two accents could be considered categorically different, but the evidence would suggest otherwise. It is not always clear whether differences between accents should be treated as categorical or realisation ones, but in this study we follow the Gussenhoven (1984) and Grabe (1998) approach, whereby following Tone Linking Rules a tone may be classified as bitonal at the underlying level, but take the form of a monotonal accent at the surface level.

In this study, tonal modifications of complete linking are expressed directly in the tonal inventory. For instance, in a bitonal H^*+L accent, where there is complete linking and the L is deleted, this L is not marked. The monotonal H^* is therefore used to transcribe the surface realisation of the tonally linked underlying H^*+L .

This approach is taken throughout the study, and applied to both H*+L and L*+H accents where complete linking has occurred. This approach makes the transcription more transparent. A similar treatment has been employed in tonal descriptions of other languages (see, for example, Grabe, 1998, for German and English; Asu, 2004, for Estonian).

One argument against this approach is that it leads to theoretical contradictions, the obvious issue being the difficulty of treating what is essentially a phonetic representation as a phonological category, at least at the labelling level. For obvious reasons it would be inappropriate to express all realisational differences at the level of the tonal inventory. We therefore take the view that, as a rule, differences in realisation should not be captured at the phonological level, with the exception of realisations that are a result of complete linking. An example from Irish of a realisational difference not captured in the inventory of phonological contrasts is the falling nuclear contour of Mayo Irish. In our analysis we find two realisations of this contour (see Section 7.2.2.1 and Figure 7.9). In the first of these falling accents the f₀ minimum following the peak is located immediately after the accented syllable and the f₀ then remains flat for the duration of the nuclear contour. In the second realisation the f₀ minimum is reached at the right-edge of the nuclear contour, even when there are a large number of unstressed syllables following the nuclear accent. Using the IViE labelling system we label both of these as H*+L 0% contours. The difficulty is that the realisational differences are therefore obscured. As the differences are realisational however, rather than categorical, and do not result from the process of complete linking, they should not be expressed at the level of the tonal inventory.

The approach taken in this study allows for a comparison of the choices different speakers make in identical contexts. Had this approach not been taken, this account of Irish intonation would not be comparable with cross-linguistic and cross-dialectal work on other languages, as relevant information at the level of labelling would be unnecessarily obscured.

2.5 Mapping two systems: the British School and the AM model

Although the AM framework of intonational analysis and the British model of intonation describe intonation in different terms, there have been attempts to directly reconcile the two models of intonational analysis. Two noted attempts have

been by Ladd (1996) and Roach (1994). These two attempts differ in one important respect in that they each started with opposing systems. Ladd started with Pierrehumbert's (1980) AM system and mapped her contours to a British style of analysis. Roach, on the other hand, started with a TSM tone description and mapped this onto an AM system (namely ToBI). Some of their difficulties are described below.

Ladd (1996) has proposed the following comparison between the Pierrehumbert analysis and the British-style nuclear tone approach to intonational analysis.

Pierrehumbert	British Style
H* L L%	Fall
H* L H%	Fall-rise
H* H L%	Stylised high-rise
H* H H%	High rise
L* L L%	Low fall
L* L H%	Low rise (narrow pitch range)
L* H L%	Stylised low rise
L* H H%	Low rise
L+H* L L%	Rise-fall
L+H* L H%	Rise-fall-rise
L+H* H L%	Stylised high rise (with low head)
L+H* H H%	High rise (with low head)
L*+H L L%	Rise-fall (emphatic)
L*+H L H%	Rise-fall-rise (emphatic)
L*+H H L%	Stylised low rise
L*+H H H%	Low rise
H+L* L L%	Low fall (with high head)
H+L* L H%	Low fall-rise (with high head)
H+L* H L%	Stylised high rise (low rise?) with high head
H+L* H H%	Low rise (high range)
H*+L H L%	Stylised fall-rise ('calling contour')
H*+L H H%	Fall-rise (high range)

Table 2.2 *Correspondence between Pierrehumbert and British Style nuclear tones.*
(Source: Ladd, 1996: 82)

Ladd takes twenty-two combinations of pitch accents from Pierrehumbert's thesis (1980), and compares them to a British style analysis. He points out that, "it is pointless to attempt to state a complete correspondence" (1996: 82) between Pierrehumbert's analysis (the model upon which ToBI is based) and the British school. As he observes, this complete mapping is not fully possible because certain

contours from the British tradition, such as 'high-fall' and 'low-fall', are not distinguished in a Pierrehumbert type analysis. He also states that in a British English style of analysis "there is no single agreed inventory of nuclear tones types that we can compare item by item against the Pierrehumbert analysis" (1996: 83).

Roach (1994) discusses attempts to automatically convert between the ToBI labelling system and the Tonetic Stress Marks (TSM) system, which is grounded in the British tradition of intonational analysis (see Table 2.1 above). A limited conversion between the two systems is possible but there are some problems. One problem in converting the two labelling systems has to do with phrasing, since the levels of phrasing in the two systems do not map onto each other in a straightforward manner. For example, there is no equivalent in the TSM system of the intermediate phrase boundary marking. This is not to say that there is only one level of phrasing assumed in the British School of intonational analysis. While the original system had just one level of intonational phrase, Trim (1959) distinguished between major tone groups and minor ones, whereby a combination of minor tones make up a major tone group. The TSM system developed for the transcription of the Spoken English Corpus (SEC) incorporated these two levels of minor unit and major unit (Williams, 1996a, 1996b). While in some cases it is possible to say that an intermediate phrase corresponds to a minor tone unit and the intonation phrase to a major tone group, in general there is no direct equivalence between the intermediate phrase and the minor tone unit.

Another issue is that the automatic conversion can only use the left-headed ToBI tones, i.e. those with the starred tone in initial position (i.e. H*, L*, and L*+H). House (1995) points out that left-headed accents are traditional in the British school of intonation analysis (e.g. O'Connor and Arnold, 1973, Crystal, 1969, Cruttenden, 1995). This is because nuclear tones in the British system capture the pitch from the beginning of the accented syllable up to the end of the tone group. ToBI, on the other hand, allows for both right-headed and left-headed accents. The difference between the two is theoretical in nature. For instance, in the British school the pitch accent is left-headed as it is associated with the head of a stress foot (Abercrombie, 1964), while in a mixed headed system an accent with a leading tone crosses a foot boundary. Grice (1995a; 1995b), for example, argues for a complex structure for pitch accents, whereby a pitch accent can have either a leading or a trailing tone. Grice's argument centres on question intonation in

Palermo Italian, whereby questions are marked with a H peak followed by a fall. Unlike statements in the same dialect however, the H peak must be preceded by a low tone, which in turn gives rise to an L H L tonal sequence. Grice argues that in the British tradition the preceding L tone would be assigned to the contour preceding the nucleus (i.e. the head) but that this L tone is, in fact, part of the nucleus. She argues for a complex pitch accent structure where leading tones may cross a foot boundary. Furthermore in her system all tones in a pitch accent must be bitonal and either right-or left-headed.

There are other problems found in Roaches attempt at converting between the two systems. For example, Roach specifically addresses the problem of fall-rises in tone-unit medial position. In the ToBI system the transcription of a fall-rise is not possible unless it is immediately followed by a boundary tone. As he points out, this non-final fall-rise may be specific to British English, but, nonetheless, it highlights the fact that there may be problems with the validity of an automatic conversion as a whole. Table 2.3 adapted from Roach (1994: 96) shows suggested ToBI equivalents for non-final and final TSMs.

TSM tone description	Pitch accent	Phrase Accent	Boundary Tone
IP Final Position			
Low level	L*	L-	L%
High level	H*	H-	L%
High (rise-fall)	L*+H	L-	L%
High fall-rise	H*	H-	H%
High fall	H*	L-	L%
Low fall	!H*	L-	L%
High rise	H*	H-	H%
Low rise	L*	L-	H%
Low fall-rise	!H*	L-	H%
IP Non-final Position			
High (rise-fall)	L*+H	L-	n/a
High fall-rise	?	?	n/a
High fall	H*	L-	n/a
Low fall	!H*	L-	n/a
High rise	!H*	H-	n/a
Low rise	L*	H-	n/a
Low fall-rise	?	?	n/a

Table 2.3. *Conversion between TSM and ToBI, (Roach, 1994: 96)*

Aside from the fact their different starting points, there are two major differences between the Ladd conversion and the Roach one. Firstly, Ladd makes use of leading unstarred tones, and gives more than one possible transcription of some British nuclear tones. For example, he has two possible transcriptions for a rise-fall: $L+H^* L-L\%$ and $L^*+H L-L\%$ (the latter is for a more emphatic one). Roach argues against the possibility of using $L+H^* L-L\%$ as a rise-fall because “perceptually the effect of rise-fall is of a pitch movement with strong prominence at the onset” (1994: 96).

The second difference is that Roach uses downstepped tones as equivalents to some low tones. A ToBI downstep, on the other hand, may only be used on a non-initial H tone in an IP. Ladd follows the ToBI rules by only employing an L^* for the start of a low nuclear tone.

These two attempts indicate that converting between the two systems is not necessarily straightforward.

2.6 Functions of intonation

Many discussions on intonation centre on the functions of intonation. In spoken language intonation may have both linguistic and paralinguistic functions. Crystal (1995) suggests intonation has a variety of functions such as emotional, grammatical, informational structure, textual, psychological and indexical. Describing all the possible functions of intonation is well beyond the scope of this work. In terms of this study the main interest is that intonation has a role in marking grammatical contrast. Through intonation in many languages it is possible to differentiate between questions and statements by the choice of tone on the nucleus. Fox (2000: 270) points out that in English “a falling intonation is often assigned meanings such as ‘statement’ or ‘complete’, while a rising intonation may be given meanings such as ‘question’ or ‘incomplete’”. In many languages simply changing the tone from a falling to a rising one can change a statement into a question. This work on Irish describes the intonation of the Irish dialects across three grammatically different sentence types, and the analyses indicate that intonation alone is not a signal to interrogativity in the dialects of Irish. In many of the dialects, the three sentence types (declaratives and two different question types) show very similar intonation structures, particularly in terms of the nuclear contour.

The British and AM approaches to intonational analysis treat intonation quite differently in terms of its function. A main focus of the work of the British tradition, particularly O'Connor and Arnold (1973), is the attitudinal meaning of intonation. They assume the tune conveys the speaker's attitude or emotion. Depending on the lexical content and the intonation contour ascribed to an utterance, a speaker may convey attitudes such as 'reluctance' or 'politeness', or express emotions such as 'hate' or 'anger', etc. The suggestion is that "the meaning of intonational units varies with sentence type and lexical content" (Gussenhoven, 1984: 194) and so they attribute different meanings to various pitch patterns in terms of attitude.

It is difficult to define which contours relate to which attitudes or emotions as intonation is not the only factor involved in conveying attitude. It has been shown that pitch range, pitch level and speech rate are important prosodic cues for the expression of emotions and attitudes in speech (e.g. Williams and Stevens, 1972). Knowles (1987: 205-6) points out that "it is extremely unlikely that there are any attitudes which are conveyed uniquely by intonation". Many other factors, such as loudness and voice quality, timing, and gestures, also contribute to conveying different attitudes.

While O'Connor and Arnold ascribe certain tones to different attitudes and emotions, Pierrehumbert & Hirschberg (1990: 284) argue a given attitude can be derived from different tunes, and a given tune can give rise to different attitudes. They argue that "though speaker attitude may sometimes be inferred from the choice of a particular tune, the many-to-one mapping between attitudes and tune suggests that attitude is better understood as derived from tune meaning interpreted in context than as representing that meaning itself".

Gussenhoven (2002) outlines a broad account of universal intonational meaning in terms of three biologically determined codes: the *frequency code* (after Ohala, 1983, 1994), the *effort code* and the *production code*. Speakers make use of these codes to control utterances phonetically in order to convey different intonational meanings, which may be either affective or informational.

The frequency code is based on the fact that the differences in larynx size mean there are differences in pitch between men and women, and between adults and children. This is exploited by speakers who may use a higher pitch to signal affects

such as politeness or friendliness, or a lower pitch to convey such affects as aggression or dominance. Informational meanings affected by the frequency code include uncertainty with a higher pitch vs. certainty with a lower pitch. In grammatical terms, the frequency code may be employed in rising contours for questions. In language varieties, such as Donegal Irish, and Belfast English, rising contours do not, of course, necessarily signal interrogatives (see later chapters).

The notion of the Production Code is that there is a higher pitch at the start of utterances, associated with higher subglottal air pressure required for the vibration of the vocal cords. Towards the end of an exhalation phase, there is a fall-off of the subglottal air pressure leading to the process of declination due to a fall-off in intensity and in f_0 . According to Gussenhoven the informational meaning associated with declination has to do with the beginning and the end of the phrase. Assuming there is a correlation between utterances and exhalation phases, the Production Code associates high pitch with utterance beginnings and low pitch with utterance endings. High beginnings signal new topics and low beginnings continuation of topics. In reverse 'high endings signal continuation, low endings finality and end of turn' (Gussenhoven, 2000: 51).

Finally the notion of the Effort Code is that the amount of energy expended on speech production may be varied. If more effort is used there is not just greater articulatory precision but there is also a wider excursion of the pitch movement. Speakers can use pitch range to signal meanings that can be derived from this effect (Gussenhoven, 2002). Informational interpretations of this include emphasis and significance. The speaker is being forceful because he considers his message important. Affective interpretations include 'surprised' and 'agitated'.

2.7 Studies on peak timing

One of the focuses of this work on Irish intonation is how the different dialects behave in terms of peak timing. The precise alignment or timing of f_0 high and low targets of certain prenuclear and nuclear accents in relation to the syllabic or segmental string is investigated.

The question of peak timing/tonal alignment is of particular interest to Irish for a variety of reasons. Firstly, the analysis in later Chapters shows a major difference emerging with regard to the tonal inventories in the Northern vs. Southern dialects. Gaoth Dobhair in Donegal exhibits low rising tones while the other dialects

predominantly show falling tones. In this context, one needs to consider whether the differences are truly phonological, categorical differences, as the different tonal inventories would imply, or whether they might alternatively be appropriately viewed as different surface phonetic realisations of the same underlying tonal primitives, differing rather in terms of the alignment of the tonal targets to the segmental string.

Such an analysis has provided an insightful account of cross-dialect differences in Swedish (Gårding and Lindblad, 1973; Gårding, 1977). In the case of Swedish, lexical contrasts occur on the basis of differing intonation contours, i.e. the meaning of certain segmentally identical disyllabic words may differ on the basis of having different tonal accents. Furthermore, there are striking cross-dialect differences in the precise intonational contours that affect these lexical contrasts. It has been convincingly argued that a unifying account of the dialects can be presented if one posits an underlying simple tonal contrast, with cross-dialect differentiation resulting from differences in the alignment of the melodic material relative to the segmental string. In later accounts of the intonation typology in Swedish the single-peaked/double-peaked dichotomy was reinterpreted as a distinction in focal accent realisation, so that double-peaked dialects have an extra pitch gesture added in focus, while single-peaked dialects have a wider pitch span as the reflex of a focal realization of an accented word (Bruce and Gårding, 1978; Bruce and Thelander, 2001; Bruce, 1987).

In the case of Irish we are not dealing with lexical contrasts involving different tonal contours but we are borrowing the concept that the apparently very different tones which occur for grammatically identical sentence types might be interpreted, not as a categorical difference in terms of the phonological inventories, but rather as a surface level realignment of the tonal peaks with the segmental material. This we term the *realignment hypothesis* and we elaborate on it further in Chapter 9.

The issue of tonal alignment is also highly relevant to a fundamental goal of understanding and being able to capture in our descriptions, some of the prosodic differences between the more similar dialects. While listeners are sensitive to prosodic differences among dialects, a broad phonological description is not fully adequate to capture these differences.

There is now a growing body of research that demonstrates that the time-alignment of otherwise similar “tunes” relative to the segmental string is an

important dimension of cross-dialect and cross-language differentiation. Such research means that in addition to time alignment data enabling finer comparisons among the Irish dialects, it also provides interesting points of comparison with the emerging typological body of evidence from other languages, and so allows us to compare the “tunes” of Irish with similar ones in other languages.

Peak timing studies in other languages have shown that the timing of the melody to the segmental string varies as a function of many different factors (House and Wichmann, 1996; Ladd et al., 1999; 2000). Bruce (1990: 107) summarises some of these. They include tonal composition (whether an accent is monotonal or bitonal), prosodic context (focus, pitch range), segmental context and speaking rate.

One frequent finding when investigating peak alignments in other languages is that the timing of tonal targets in both prenuclear and nuclear accents may be affected by the presence (and number of) preceding and following unstressed syllables. Silverman and Pierrehumbert (1990) investigated the timing of prenuclear high accents in English under a variety of prosodic conditions including speech rate and number of unstressed syllable followed the accent, and found that the alignment of the peak is subject to systematic shifts determined by these conditions. Similarly Steele (1986) found the peak in nuclear accents drifts rightwards with an increase in the number of following syllables. In British English, Farrar and Nolan (1999) found that the size of the anacrusis⁴ had an effect on the alignment of the peak in H* prenuclear accents, resulting in peak delay when there was no anacrusis.

The segmental composition of the accented syllable, and particularly of the syllable rhyme, may also affect the precise location of L or H targets (Prieto, van Santen and Hirschberg, 1995; House, 1989; van Santen and Hirschberg, 1994).

In the present study, the alignment of nuclear and initial prenuclear accents is examined in each of the dialects across conditions where the number of unstressed syllables following the nuclear and preceding the initial prenuclear accents is varied. Given the tendencies reported for other languages such as English (Silverman and Pierrehumbert, 1990; Farrar and Nolan, 1999) our default expectation for the Irish dialects, which we term the *variable peak hypothesis* is that increasing the number of syllables following the nuclear accent will yield a

⁴ Anacrusis refers to the number of unstressed syllables preceding the first accented word in an IP.

rightwards drift in the peak timing, while increasing the size of the anacrusis will yield a *leftwards* peak shift. In focussing on the finer detail of the timing of the melodic tier, one further motivation is to provide detailed data to inform a model of Irish intonation that can be implemented in synthesis. A long-term aim is to provide an account of Irish prosody which can be incorporated into a text-to-speech system for Irish (see for example Ní Chasaide et al., 2006; Prys et al., 2004).

Fine alignment of the melodic tier is clearly not the only dimension relevant to the prosodic differentiation of languages or dialects. Other aspects of the melody are likely to be important, such as the dynamic range and the relative scaling of peaks, etc. The rhythmic dimension is also of interest, particularly in the context of the Munster stress-shift (see Section 3.3.2.3, Chapter 3). Additionally the rather neglected dimension of voice quality is crucial to capture prosodic differences across dialects. We would argue that each of these prosodic dimensions would need to be incorporated into a description of the prosodic system of Irish, if we are to provide a more holistic view of how prosody “works”. These are longer-term aspirations (see Ní Chasaide and Gobl, 2004; 2005), but as they are clearly beyond the scope of the present study they are not discussed further here.

2.8 Summary

In the present chapter different models of intonational analysis were introduced, including the British model and the IPO approach to intonation. There was particular focus on the autosegmental-metrical (AM) model, used in this analysis of Irish intonation, and a discussion on mapping between the AM system and the British model. The issue of “phonological” and “phonetic” levels of representation was raised, in the context of the labelling system employed in this study. Some of the functions of intonation were also introduced. There was also an introduction to work done on peak timing in various languages, which is dealt with more fully in later chapters.

Chapter 3

Structure of Irish

3.1 Introduction

The aim of this chapter is to provide a short description of some of the linguistic characteristics of Irish, including the segmental and prosodic structure of the language. A summary of previous accounts of Irish intonation is provided, as well as a short description of the stress system of Irish, with a particular focus on Munster Irish. There is also an outline of descriptions of the intonation of Hiberno-English.

3.2 The Irish Language

Irish belongs to the Celtic branch of the Indo-European family and is closely related to Scottish Gaelic and Manx. Historical linguists (see, for example, Jackson, 1953) date the arrival of Irish speakers at around 200 BC. As indicated in Chapter 1 there is no spoken standard of Modern Irish, rather there are three major dialects: Ulster Irish, Connaught Irish and Munster Irish. While there is no spoken standard of Irish in the 1940s and 1950s the *Caighdeán Oifigiúil*¹ (official standard) was introduced to standardise the spelling and grammatical system. In addition an artificially constructed central dialect, the *Lárchanúint*² (Ó Baoill, 1986b), has been proposed, the pronunciation of which is said to reflect the *Caighdeán*. The *Lárchanúint* is employed in the *Foclóir Póca* (Ó Baoill, 1986a), a pronunciation dictionary for Irish. Although the *Lárchanúint* is an artificial dialect, every aspect of it corresponds to some spoken dialect

In terms of spoken Irish Ó Siadhail (1989: 2) points out that “dialects cannot remain in watertight categories but rather merge imperceptibly, isogloss by isogloss, into each other”. He points out that Donegal (in the north) and Munster (in the south) can be seen as two ends of a spectrum and Connaught (in the mid-west) can be considered as more of a central point. In terms of dialect groupings within the major dialects, he indicates that dialects of Mayo (North Connaught) are more of a

¹ *Gramadach na gaeilge agus litriú na gaeilge: An caighdeán oifigiúil*. Published by Rannóg an Aistriúcháin, Dublin, 1958.

² The *Lárchanúint* was invented in the 1980s by Institiúid Teangeolaíochta Éireann (The Linguistics Institute of Ireland) on the instructions of An Roinn Oideachais (Department of Education).

halfway house between Donegal (Ulster) and Galway (South Connaught). According to the 2006 census of Ireland³ over 1.65 million people aged 3 years and over are now able to speak Irish, compared with 1.43 million in 1996. Almost a quarter of those who indicated that they could speak Irish were reported as speaking it on a daily basis. Most of these were in the school-going ages. Over two thirds of people who indicated they can speak Irish either never speak it, or speak it less frequently than weekly.

Native speakers of Irish today are concentrated mainly in the Gaeltachtaí (see Figure 1.1, Chapter 1).

3.3 The sound structure of Irish

As indicated in Chapter 1 there have been various monographs describing the sound systems of Irish dialects. Studies on sound systems of Ulster (Donegal) dialects include Quiggin (1906) for the dialect of Meenawannia in Na Gleannta (The Glenties), Sommerfelt (1922; 1965) for the dialect of Torr in Gaoth Dobhair (Gweedore), Wagner (1959) for the dialect of Teileann (Teelin), and Hamilton (1974) for the dialect of Toraigh (Tory). More recently, Ní Chasaide (1999) has provided a phonetic account the dialect of Gaoth Dobhair (Gweedore), the intonation of which is described in this study.

Studies of the sound system of Munster include Ó Cuív's (1944) study of Muscraí (West Muskerry) in Cork, Sjoestedt's (1931) study of Dún Chaoin (Dunquin) in Kerry and Ó Sé's (2000) account of the dialect of Corca Dhuibhne (the Dingle peninsula) in Kerry. The Munster speakers in this study come from Baile an Fheirtéaraigh in Corca Dhuibhne.

The South Connaught dialect of Cois Fhairrge has been described by De Bhaldraithe (1945). Three of the South Connaught speakers in this study come from Cois Fhairrge. The remaining speakers from South Connaught come from Inis Oírr on the Aran Islands (na hOileáin Árann). The first descriptive analysis of the phonology of an Irish dialect was an account of the phonology of the Aran Islands by Finck (1899).

³ www.cso.ie

Other descriptions of sound systems from Mayo include De Búrca (1958) for Tuar Mhic Éadaigh (Tourmakeady) and Mhac an Fhailigh (1968) for Iorras (Erris). The Mayo speakers analysed in this study all come from Iorras.

Accounts of the phonological system of Irish as a whole have been described by Ó Siadhail & Wigger (1975) and Ó Siadhail (1989) and an overview of the dialects can be found in Wagner (1958, 1964, 1966, 1969) and Ó Cuív (1951).

3.3.1 Consonant system

The sound system of Irish is rather complex and Irish has a large inventory of phonemes⁴. Consonants in Irish can be either palatalised or velarised, with the exception of the consonant /h/ which is neither palatalised nor velarised. In addition to the palatalised/velarised contrast, the consonants of Irish, like those of many other languages, show a distinction between voiced and unvoiced counterparts.

The palatalised/velarised distinction in Irish is phonemic, with broad consonants being velarised, and slender consonants being palatalised. This distinction is similar to the hard and soft consonants of Russian and other Slavic languages (Trager, 1934). While phonemic oppositions in Irish are usually represented as palatalised or velarised, the phonetic realisations vary according to place of articulation and environment (Ní Chiosáin and Padgett, 2007). The palatalised/velarised distinction plays a critical role not only in distinguishing the individual consonants themselves, but also in the pronunciation of the surrounding vowels. Furthermore, the palatalised/velarised opposition in Irish has both grammatical and lexical significance. For example, the substitution of palatalised and velarised segments may indicate case and/or number, as demonstrated in Jackson (1969), wherein the word *boat* in its singular nominative form in Irish is “bád”, transcribed /b^ʲa:d^j/. while in plural genitive form it becomes “báid”, transcribed /b^ʲa:d^ʲ/. The difference between the two is a clear example of substituting a palatalised segment for a velarised one. An example of a lexical contrast is in the minimal pair:

bí (imperative of ‘be’)	vs.	buí (yellow)
/b ^j i:/		/b ^ʲ i:/

⁴ It should be noted that there are some minor differences in the phonemic systems across the different dialects but this is not highly relevant in terms of the suprasegmentals and so will not be discussed here.

The phonemic inventory of (Donegal) Irish consonants is shown in Figure 3.1. Symbols appearing in the upper half of each row are velarised or "broad", while those in the bottom half are palatalised or "slender".

Consonant Phonemes	Labial			Coronal			Dorsal		
	Bilabial	Labio-dental	Labio-velar	Dental	Alveolar	Alveolo-palatal	Palatal	Velar	Glottal
Plosive	p ^ˠ b ^ˠ			t ^ˠ d ^ˠ		t ^ʲ d ^ʲ	c ɟ	k ɡ	
	p ^j b ^j								
Fricative/ Approximant		f ^ˠ	w		s ^ˠ	ʃ	ç ʝ	x ɣ	h
		f ^j v ^j							
Nasal	m ^ˠ			ɲ ^ˠ	n	ɲ ^j	ɲ	ŋ	
	m ^j								
Tap					r ^ˠ				
					r ^j				
Lateral approximant				l ^ˠ	l	ɭ ^j			

Figure 3.1. *Phonemic Inventory of Irish Consonants (Ní Chasaide, 1999). Velarised consonants are positioned in the upper half of each row and palatalised consonants are on the bottom.*

3.3.2 Vowel system

De Bhaldraithe (1945: 8) observes that the vowels of Irish are to a large extent dependent on the consonant system, and “are subject to variations in quality according to neighbouring sounds”. The secondary articulations of palatalisation and velarisation influence the adjacent vowels to such an extent that an almost diphthongal effect is perceived. As Ní Chasaide (1999: 114) observes, in her description of Donegal Irish, for all vowels there are clear audible glides when the frontness or backness of the vowel conflicts with a secondary articulation of the consonant with which it co-occurs. So, for example, vowels which follow palatalised consonants have strong onglides from a back quality. Vowels which follow velarised consonants have onglides from a high front quality.

There are both long and short vowels in Irish. The long vowels /i, e, æ, ɔ, o, u/ are typically shown in the orthography with an acute accent, known as a *fada*. The vowel chart of Donegal Irish is illustrated in Figure 3.2. These positions are only approximate, because, as indicated above, vowels are strongly influenced by the

palatalisation and velarisation of surrounding consonants. In addition, Donegal has the diphthongs /ia, ua, au/.

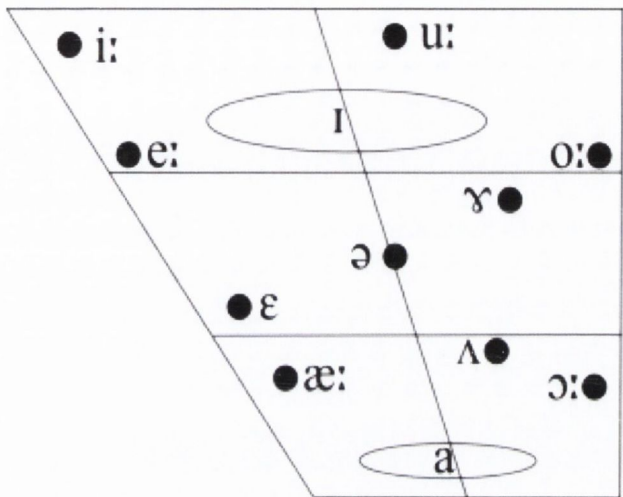
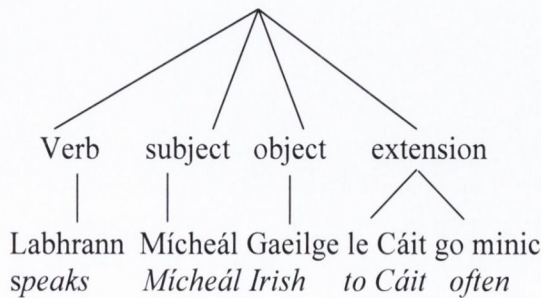


Figure 3.2. Vowel Chart of Irish (Ní Chasaide, 1999)

3.3.3 Aspects of Irish syntax

The following section describes some aspects of the syntax of Irish. It provides a brief account of the structure of the three sentence types analysed in this study: declaratives, wh-questions and yes/no-questions.

In terms of its word order, Irish is a VSO language. The verb and subject are obligatory and other constituents, such as adverbial phrases or prepositional phrases, are optional. In certain circumstances the verb and subject are united in a single word, so that one word sentences are possible, e.g. Tuigim “I understand”.



Mícheál often speaks Irish to Cáit

Figure 3.3. Sentence order in Irish (from Ó Siadhail, 1989: 205)

Questions in Irish generally contain morphosyntactic markers, although declarative questions would appear to be used in natural speech. The two main question types employed in Irish are *wh*-questions and *yes/no* questions. In English *wh*-questions begin with words such as 'who, what, when, where, how'. Irish has equivalent forms, e.g. *céard* (what), *cé* (who). *Wh*-questions are constructed as either direct or indirect relative clauses (McCloskey, 1979:52).

Cé a dhíol an domhan?

Who COMP sold the world

Who sold the world? [COMP = complementiser]

Cé aige a bhfuil an t-airgead

Who at him COMP is the money?

Who has the money? [COMP = complementiser]

The *wh*-word must always be fronted and it is ungrammatical to have more than one *wh*-word in an utterance.

Yes/no questions in Irish are formed with a clause-initial particle e.g. *an*, *ar*, *nach*. *Yes/no*-questions in Irish do not elicit *yes/no* answers in the way they do in English, rather the answer to the question contains a repetition of the verb. For example in the following example of a *yes/no*-question, the answer could be either: *Tá* = I am (Lit: yes), or *Níl* = I am not (Lit: no):

Nach bhfuil tú ag teacht?

not are you coming

Aren't you coming?

3.3.4 Prosodic Structure

Syllabic sequences such as V, VC, VCC, CV, CCV, CCCV, CVCC, CCVCC can be found in Irish. The syllable structure is superficially similar to English, however many phonological rules may alter the form of the syllable. One example of this is that certain consonant clusters are broken up by the introduction of an epenthetic vowel e.g. /gɔrʲəɲ/ 'blue' (Ó Siadhail, 1989; Ní Chiosáin, 1999).

Syllable division in Irish is open to different interpretations and there is lack of agreement among linguists as to which syllable an intervocalic consonant belongs to, particularly following a short vowel. Most linguists agree that when a single

consonant occurs between vowels it is difficult to define the exact point of syllable division. Different authors posit different rules with regard to syllable division. For example, Ó Cuív (1944), de Bhaldraithe (1945) and de Búrca (1958) have claimed that in Irish when a single consonant appears after a short stressed vowel the consonant is syllabified into the coda of the first syllable e.g. /'bat,ə/⁵. Others like Breatnach (1947) argue the consonant belongs to the second syllable as in /'ba,tə/.

There is general agreement on syllabification in other positions, for example most linguists agree that in cases where two consonants occur between vowels the point of division is between the two, while if three consonants come together syllable division comes at the point which is least sonorous.

More recently linguists like Ní Chiosáin (1991) and Green (1997) have attempted to reconcile the issue of syllable division following a short vowel, by arguing that consonants in this position are in fact ambisyllabic. Green (1997: 136) points out that ambisyllabicity in Irish is limited to the position after a short stressed vowel because of the general agreement on syllable division in other positions. He does however point out the fact that there is no concrete evidence for ambisyllabicity in Irish, rather the decision of positing ambisyllabicity is, to some degree, based on native speaker intuition of linguists such as Ní Chiosáin.

This discussion is relevant to the peak timing analyses in this study. The corpus designed for this part of the study contains a number of target syllables containing disyllabic words with short vowels in the first syllable (see Section 4.3.2.). We follow linguists such as Ó Cuív (1944), de Bhaldraithe (1945) and de Búrca (1958) in the assumption that the syllable boundary for syllables with a short vowel (as in our examples) is after the intervocalic consonant. This decision impacts on our overall assumptions that in Donegal and Cois Fhairrge Irish the starred tone is clearly associated with the accented syllable (see Sections 5.4 and 6.4).

3.3.4.1 Intonation

While there have been many detailed phonetic accounts of Irish dialects, there has been little work done to date on intonation of Irish dialects other than some short descriptions in Quiggin (1906) for a dialect of Donegal, Bhaldraithe (1945), Bondaruk (2004) and Blankenhorn (1982) for Connemara, de Búrca (1958) for a

⁵ *bata* (Lit: stick)

dialect of Mayo, and Ó Cuív (1944) and Blankenhorn (1981) for a dialect of Munster. The following section reviews these descriptions. There is also a short review of relevant work on the intonation of Hiberno-English dialects.

3.3.4.1.1 Donegal

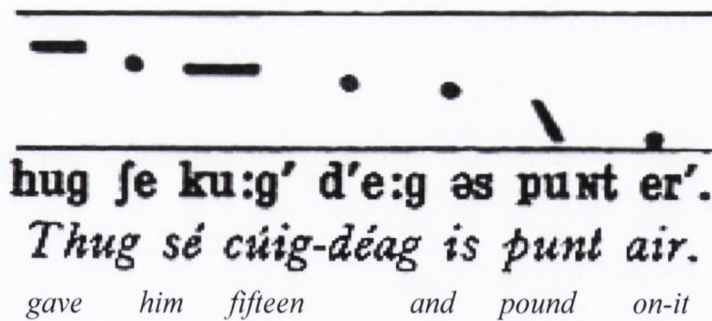
In his segmental study of the dialect of Tory in Donegal, Quiggin (1906: 156) offers just a few lines of description of the intonation of this dialect. According to Quiggin, stressed syllables have the highest pitch with a falling tone at the end of statements, and he describes the intonation as being similar to that of English and German.

Adams (1950) in his description of the English of South Donegal provides a brief account of the intonation of Donegal English. Again he offers just a few lines of description on the intonation of Donegal English. He describes the intonation contour most common to this dialect as a kind of “inverted circumflex” where the lowest pitch is on the stressed syllable, followed by a rise onto following unstressed syllables. Although his account is of an English dialect and is rather brief, it more closely reflects the intonation of the current Gaoth Dobhair dialect than does Quiggin’s account.

The intonation of Donegal Irish and Donegal English are impressionistically strikingly different from that of English and German. Furthermore, Donegal Irish differs melodically from the other dialects of Irish. In fact it is typically claimed that it is easy to identify a Donegal speaker by his or her intonation alone. While the other Irish dialects, more specifically the dialects of this study, seem at least intonationally not dissimilar to English, as is obvious from their analysis in upcoming chapters, Donegal Irish is noticeably different. Melodically it stands out as being characterised by a very distinctive rising intonation pattern, with the rise occurring after the accented syllable. Rising nuclei are the most common tones found in Donegal. The question of whether the occurrence of rising nuclei in the declaratives of a number of English dialects is likely to reflect the specific influence of Irish, is one which has been raised over the years (see Knowles, 1975; Cruttenden, 1997). As is clear in later chapters, the patterns of the Gaoth Dobhair dialect of Donegal in Ulster are highly relevant to this discussion.

3.3.4.1.2 Connemara

Descriptions of the intonation structure of Connemara Irish to date have been impressionistic commentaries carried out in the British tradition of intonational analysis. The earliest attempt at describing intonation in this dialect was in the work of de Bhaldraithe (1945), who described the intonation of Cois Fhairrge Irish. The main focus of his work is on the segmentals of the dialect and as such his account of intonation is brief. However, his observations are clearly reflected in the findings of this study. His main observation was that most declaratives and questions in this dialect are produced with a falling nuclear contour. More specifically de Bhaldraithe describes the most common tune in Cois Fhairrge as “one in which the first stressed syllable is on a relatively high level pitch, and the following syllables are on a descending scale” (1945: 67). The last stressed syllable has a falling pitch, and any unstressed syllables following this are “usually on the same pitch as the low level of the fall, but they may be lower”. Unstressed syllables at the start of an utterance are low and ascend towards the stressed syllable. This tune would be considered the ‘default’ tune for both statements, commands, and for questions. An example of a typical statement is indicated in Figure 3.4.



He gave one pound fifteen for it

Figure 3.4. Intonation contour of a declarative sentence in Cois Fhairrge Irish
 (from de Bhaldraithe, 1945: 68)

De Bhaldraithe describes emphatic words as having a falling pitch, and special emphasis is indicated by a widening of the pitch range and some vowel lengthening. In exclamations of surprise there is a rising pitch on the final stressed syllable, and there may also be a narrowing of the pitch range which can result in whispery voice (De Bhaldraithe, 1945: 71).

Questions tend to follow the same patterns as declaratives, with a falling pitch on the last stressed word. Figure 3.5 indicates the contours of a yes/no-question and a wh-question in this dialect.

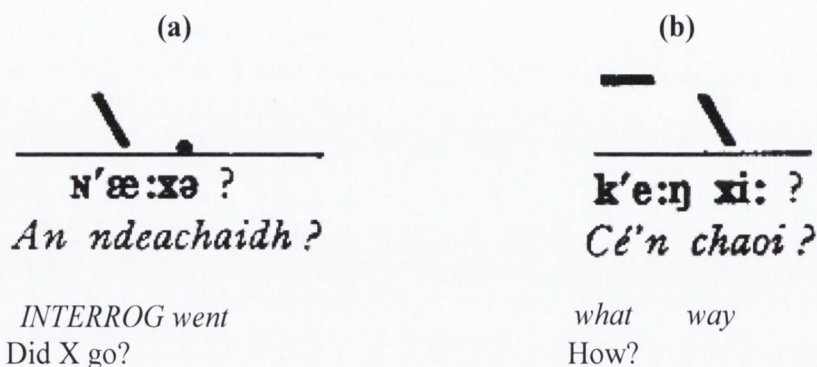


Figure 3.5. Intonation contours of (a) a yes/no-questions and (b) a wh-question in Cois Fhairrge Irish (from de Bhaldraithe, 1945: 69)

Other accounts of the intonation of Connemara Irish come from Blankenhorn (1982) and Bondaruk (2004). Both accounts are more detailed than that of de Bhaldraithe. Both authors adopt the notation and theoretical assumptions concerning the functions of intonation in O'Connor and Arnold's (1973) model of intonation.

Blankenhorn (1982) uses a kinetic model for describing the intonation of Connemara, analysing it in terms of various kinetic glides. The speakers used in her analysis are from an area west of Cois Fhairrge, known as Carna. According to Blankenhorn the discernible differences in the intonation patterns of the speakers of Carna and Cois Fhairrge speakers should be negligible.

She describes intonation patterns in terms of the contour shape (e.g. rising, falling and fall-rise), and the various start and end points of the contours (low-fall, high-fall). The unit of analysis in her description is the 'tone group' defined as a word or group of words, which carries a complete intonation contour. Her aim is to provide a structural analysis of the intonation patterns of Connemara focusing primarily on the attitudinal meaning of nuclear contours, following similar work on British English e.g. O'Connor and Arnold (1973). She justifies the choice of using an English model by pointing out that both English and Irish are strongly stress-isochronous unlike other Celtic languages such as Welsh. Recent studies on Welsh (e.g. Gibbon and Williams, 2007) have shown that Welsh duration patterns are

neither syllable-timed nor foot-timed, but have what may be called a “rallentando timing”. This is defined as timing in which “sequences of increasing length mark grammatically relevant prosodic units” (Gibbon and Williams, 2007: 1249).

Blankenhorn distinguishes the nuclear contour as the most significant element in the intonation of any utterance as this carries the greatest amount of semantic weight. She therefore focuses on the nuclear contour without paying any attention to the prenuclear one. She distinguishes various kinetic glides in the nuclear contour of an utterance. She observes three simple rises: the high-rise, half-rise and low-rise. The high-rise she describes as emphatic, with the half-rise indicating incompleteness. The low-rise is then interchangeable with the half-rise but also introduces elements of doubt by the speaker.

She further recognises three simple falling glides: the full-fall, the half-fall and the low-fall. The full-fall is employed to answer questions, and also in commands and in wh-questions. The full-fall may signal confirmation. The half-fall is used in requests, and implies hesitation. It may also be used in both yes/no- and wh-questions. The low-fall is used in answer to questions and she states that is it also the most common unmarked nuclear contour.

As well as these simple falls and rises Blankenhorn recognizes two compound falling-rising glides. An emphatic fall-rise is a full-fall followed by a low-rise and implies impatience. A non-emphatic one, on the other hand, is a combination of a half-fall and a half-rise. There is a suggestion of incredulity with this contour and it may indicate incompleteness.

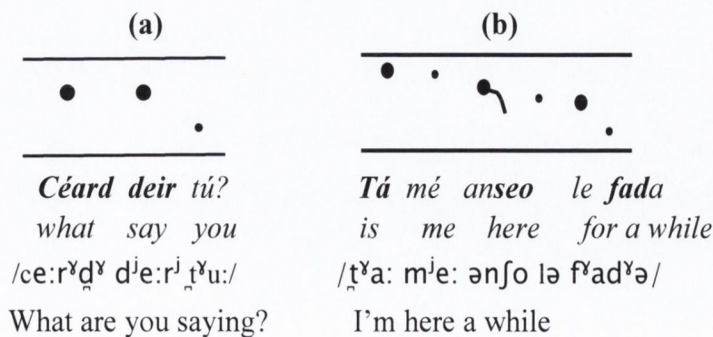


Figure 3.6. Intonation contours of (a) wh-question, (b) declarative in Connemara Irish (from Blankenhorn, 1982). IPA transcriptions provided by present author.

The work presented by Bondaruk (2004) is an attempt at establishing an exhaustive inventory of nuclear tones in Connemara Irish again using a British

model of intonation. For this purpose O'Connor and Arnold's (1973) model of analysis is employed. Her observation is that a widely accepted model, such as the O'Connor and Arnold one, makes the work more comparable with that of other languages and may raise some theoretical questions about her description of Irish.

Bondaruk bases her analysis on just one speaker of Rosmuc Irish. The analysis is based on read speech of individual sentences and short dialogues. No further information on the methodology employed is provided. In her analysis the nuclear tone is the minimal unit of analysis. Following the British tradition the nucleus is defined as the stressed syllable of the last accented word. In keeping with O'Connor and Arnold she recognises a tone group as a group of tones all conveying the same attitude of the speakers. In her analysis she postulates 11 nuclear tones: 3 falling (high, low and flat), 3 rising (high, low and flat), 1 mid-level, and 2 types of rise-fall (simple and complex) and 2 fall-rises. She observes that since her analysis does not include analysis of semantic effects of each individual tone in various contexts, or a detailed analysis of the attitudinal effects of each tone, she cannot reduce the number of tones in Connemara Irish⁶. "Any potential reductions of the number of tones must necessarily depend on semantic factors" which lie outside the scope of the paper (2004: 46).

The falling and rising tones Bondaruk proposes can either occur as a pitch movement within one syllable (in monosyllabic words) or as pitch jumps over consecutive syllables (polysyllabic words). Flat tones occur in a very narrow pitch range and infer incompleteness or non-finality. Her mid-level tone is a tone with no pitch movement which is somewhere in the middle of the speakers pitch range. This mid-level tone has what she refers to as the "central function" of intonation in this dialect and functions the same as Ladd's stylised contour (1980: 173) whose role is to "signal an element of predictability in the message". It can also signal non-finality.

For the intonation contour over the course of an utterance she observes that successive prenuclear accented syllables are a step lower than preceding accented ones. Nuclear tones however are raised, and as such receive more prominence. An exception to this is a low-rise in nuclear position which does not get raised and thus is a step lower than the preceding accented syllable. This stepping down of

⁶ She acknowledges for instance that rise-falls involved a lot of emphasis and a considerable amount of emotion.

prenuclear accents is the same as the O'Connor and Arnold 'Stepping Head' of British English however there is one significant difference. In British English the unstressed syllables are on the same level as the accented syllable but she observes that in Irish the unstressed syllables are lower in pitch.

According to Bondaruk (2004: 20) a characteristic of an unmarked falling tone in Connemara Irish is the flatness of the tone. The falling tone is completed within a narrow range. A wider range is used in emphatic tones.

3.3.4.1.3 Mayo

There are no previous accounts of the intonation of Mayo Irish other than a short description of the intonation of Tuar Mhic Éadaigh Irish in de Búrca (1958). While de Búrca's description was an impressionistic one, it serves as a useful starting point for a description of the intonation of Mayo Irish, particularly given the fact that de Búrca has taken a levels approach to describing intonation in this dialect, which is closer to the current AM system than accounts in other traditions. This differs to the descriptions of the other Connaught dialects mentioned above. Although this a different dialect to that of the Mayo dialect of Iorras, the dialect recorded for this study, the basic findings of De Búrca are summarised here.

De Búrca describes the intonation of Tuar Mhic Éadaigh Irish in terms of 5 pitch levels. The levels he employs are from 0-5, where 0 is the lowest tone and 5 the highest. He observes that for unmarked utterances the pitch range is generally not very wide. He then distinguishes between two types of contours: free contours and linked contours. The difference between the two is in the contour of the final syllable(s).

Free contours are those used as complete units in statements and in questions, as well as in final utterances of narratives. Within free contours the highest pitch occurs on the nucleus. The movement on the nucleus is a high-fall and final unstressed syllables fall towards 0. The range in short utterances tends to be quite narrow and widens for longer utterances.

Linked contours occur in incomplete or non-final utterances. There is a rising pitch in the final syllables of a linked contour so that the difference between the two contour types results in a difference in meaning.

The basic contours of a declarative and a yes/no-question is indicated in Figure 3.7.

1. **ta: s'e: 'g'im'uxt** II'20
2. **vil' s'e: 'g'im'uxt** II'20

1. Tá sé ag imeacht

is he at going

He is going

2. An bhfuil sé ag imeacht?

INTERROG is he at going

Is he going?

Figure 3.7. Notation of two declarative sentences of Tuar Mhic Éadaigh Irish (from *de Búrca*, 1958)

3.3.4.1.4 Munster

In his detailed segmental account of Muscraí Irish, Ó Cuív (1944) provides a brief sketch of the intonation of this Munster dialect. Blankenhorn (1981) also discusses the intonation of Muscraí Irish but, rather than providing a description of the intonation of the dialect, she takes Ó Cuív's account of the intonation patterns as a basis for a discussion of how the stress-shift of Munster Irish may have come about. This is elaborated on in Section 3.3.3.2 below.

Ó Cuív describes two distinct tunes for statements in Muscraí Irish. The first of these is a falling tune where the initial stressed syllable is high and subsequent stressed syllables descend until the last stressed syllable which is a falling tone (Ó Cuív, 1944: 75). This is outlined in Figure 3.8.

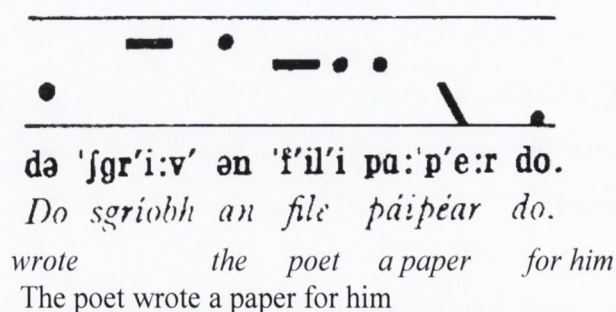


Figure 3.8. Intonation contour of a Muscraí Irish declarative (from Ó Cuív, 1944)

In the second type of tune described by Ó Cuív there is a low pitch on the stressed syllable and a higher pitch on following unstressed syllables. Preceding

unstressed syllable descend towards the pitch of the stressed syllable. He observes (1944: 77) that 'since the stress syllables are all on a fairly low pitch and the unstressed syllables on different higher pitches this tune produces a "wavy" or "sing-song" effect'. Such a tune is demonstrated in Figure 3.9.

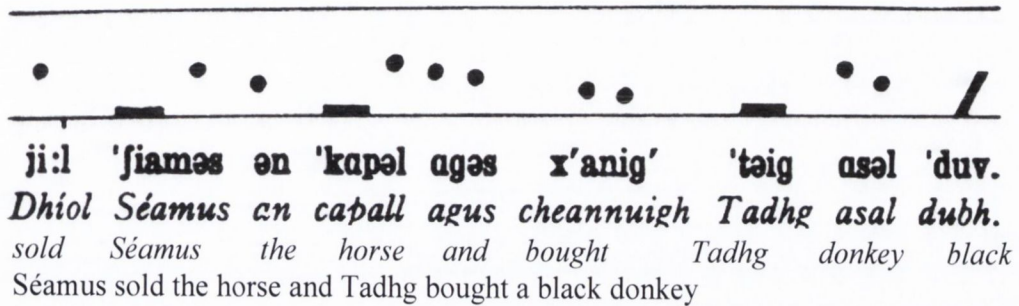


Figure 3.9. Intonation contour of a "sing-song" declarative in Muscraí Irish (from Ó Cuív, 1944)

For questions Ó Cuív describes a falling intonation pattern throughout the intonation contour until the nuclear syllable on which there is a rise. If there are unstressed syllable following the final stressed one, these too rise. Two question types are illustrated in Figure 3.10.

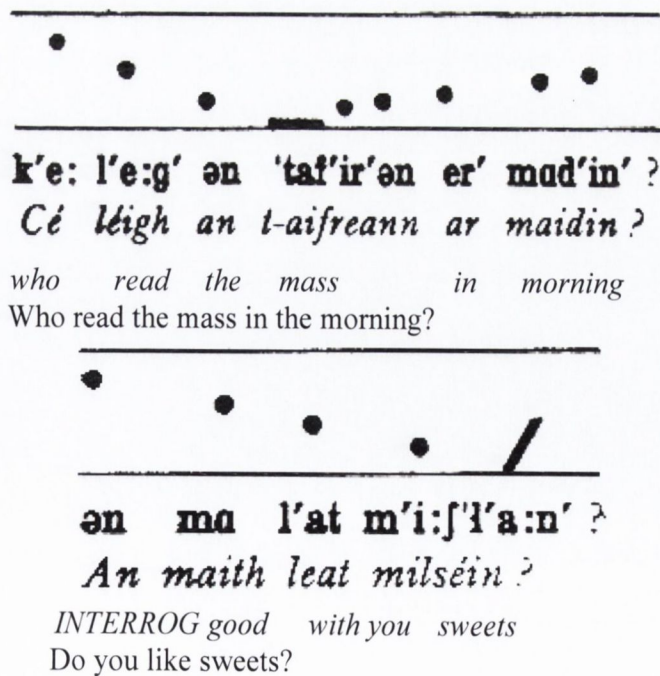


Figure 3.10. Intonation contours of (a) a *wh*-question and (b) a *yes/no*-question in Muscraí Irish (from Ó Cuív, 1944)

3.3.4.2 *Intonation of Hiberno-English*

Hiberno-English is substantially enriched by influences of the Irish language and this is reflected in its vocabulary, verbal system, syntax, and pronunciation. One example of this is the insertion of an epenthetic vowel in certain words such as 'film'. It is likely that this linguistic influence of the Irish language is also evident in the intonation system of Hiberno-English. There have been as few accounts of the intonation structure of Hiberno-English as there have been of the intonation of Irish, although there have been a number of accounts of characteristics of the intonation of Ulster English (e.g. Jarman and Cruttenden, 1976; Grabe and Post, 2002; Douglas-Cowie, Cowie and Rahilly, 1995). More recently Sullivan (2006) has looked at tonal alignment in three dialects of Hiberno-English: Dublin, Wexford and Belfast. Some of the observations and findings in studies of Hiberno-English are similar to the results found in this study for Donegal Irish. For instance, one prevalent feature of Ulster English mentioned in the literature is its tendency towards rising nuclei in declaratives, a feature which is not common in many dialects of English, but one which is also common to Donegal Irish. Similar rising tones are reported for Derry (McElholm, 1986), Glasgow (Cruttenden, 1995; Currie, 1979), Liverpool (Knowles, 1975) and Orkney (Van Leyden, 2004). As Van Leyden (2004: 6) observes what all these varieties have in common is that they have been influenced by a Celtic language.

Data from the IViE project (Grabe and Post, 2002) has indicated that Dublin English has predominantly falling intonation patterns in declaratives, wh-questions and yes/no-questions. Rising contours account for a small percentage of nuclear contours in the different question types⁷.

Wells (1982: 436) observes that the intonation of southern Hiberno-English is not very strikingly different from that of RP, but the two differ in the realisation of yes/no-questions. In RP yes/no-questions are produced with a low-rise, rather than the low-fall of Hiberno-English. This rise in the nuclear contour of British English yes/no-questions is said to be typical but Grabe (2004) found that some urban dialects of English, namely Newcastle and Leeds, may also produce yes/no-questions with a falling intonation. This is comparable to results found in the

⁷ 22% of nuclear contours in wh-questions are rising in Dublin English, and just over 31% in yes/no-questions are rising

Connaught dialects of Irish as indicated in Chapters 6 and 7, and in the Kerry dialect in Chapter 8.

3.3.4.3 *Stress system of Irish*

Irish has a stress-timed rhythm. In Old Irish stress fell on the first syllable. This is still the case in the dialects of Ulster and Connaught where stress tends to fall on the initial syllable of non-compound words. There are exceptions to this but mainly in loan words. These exceptions are not rule-governed and as a result are marked in the lexicon. In the Ulster and Connaught dialects word stress has a prosodic function in that it marks word boundaries.

O’Rahilly (1932:83) observes that “by far the most important difference between Irish dialects concerns accentuation”. This is particularly relevant to Munster Irish whose stress system is far more complex than the other dialects. There has been extensive focus on the stress system of Munster Irish in the literature on Irish prosody. There is not enough scope in this study to deal with all aspects of this, but since stress and intonation are intrinsically linked some of the general tendencies of the Munster stress system are reported on. The main descriptions of Munster stress drawn on here come from O’Rahilly (1932), Ó Sé (1989, 2000) and Blankenhorn (1981). These accounts are mostly in the context of the history of the language and dialect studies. Other studies disregard the historical context and concentrate more on a synchronic account of word stress. For more on this aspect of the Munster stress shift see, for example, Doherty (1991), Green (1996, 1997), Gussmann (1997, 2002) and Rowicka (1996).

In Modern Irish one of the general tendencies observed for the word stress system of Munster Irish is a shift of the stress to the second or final syllable of a word under certain conditions. As Blankenhorn (1981:234) observes, ‘Irish is, and has been throughout its history a regularly stress-initial language, and forward stress represents an aberration’. Blankenhorn’s hypothesis is that the stress-shift in Munster is directly linked to the intonation system of Munster Irish.

Below is a summary of the main contexts in which the stress-shift occurs (taken largely from Blankenhorn, 1981; O’Rahilly, 1932; Ó Sé, 1989, 2000). The list is by no means exhaustive.

Stress in Munster Irish is not demarcative but is associated with heavy syllables, i.e. those syllables with a long vowel or a diphthong. Stress-shift occurs in

disyllabic words where the second syllable is long, e.g. *cailín* /kalⁱi:n^j/ (girl). It also occurs in tri-syllabic words (including those which are tri-syllabic through epenthesis, a common feature of Irish) where the third syllable contains a long vowel and the previous two syllables are short. Another common context is in words whose second syllable consists of the syllable /axt/ (e-ach-t) but which have short vowels in the first syllables. Examples include *bacach* /b^ʲəkax/ (lame). It also comes about in all forms of the prepositional pronoun, e.g. /egum^ʲ/ *agam* (lit. at me). Finally, it occurs in a few disyllabic words where neither syllable is long but where they contain an intervocalic liquid (l, n, r). There are some other occurrences but as they are not rule-governed they are not covered here.

Language contact is generally considered a principal reason for language change and O’Rahilly (1932:87) believes the Munster stress-shift came about as a result of the Anglo-Norman invasion, which was more intense in Leinster and Munster than in other provinces. French was one of the languages of the Anglo-Normans and in French the stress falls on the last syllable of a word. Hundreds of Anglo-Norman oxytones⁸ became part of the vocabulary of Irish and according to O’Rahilly the stress-shift became permanently retained in Munster as a result of these borrowed words. Ó Sé (1989: 176) argues that there is no real evidence to support O’Rahilly’s argument yet states that “there is a strong case for language contact having contributed to the development of the stress system”. He concedes that the stress shift is at least earlier than the 16th century and that it occurred chiefly in the south and south-east of the country. He does however state that (1989: 175) “no firm conclusion can be drawn at this point as to the origin of southern Irish accentuation”.

Interestingly, from the point of view of this study at least, Blankenhorn suggests that stress shift in Munster Irish comes about as a consequence of its intonation system. As seen in Section 3.3.2.1.4 Ó Cuív (1944) describes two possible intonation patterns for declaratives in Munster Irish. In one of these tunes there is a low pitch on the stressed syllable and a rising pitch on subsequent unstressed syllables. Blankenhorn (1981) refers to this phenomenon as *pitch accent*. Her term pitch accent does not have the same meaning as the term as adopted in intonational phonology (Ladd, 1996). Rather, with her use of the term *pitch accent*, she is

⁸ words with stress or an acute accent on the last syllable

referring to the fact that the unstressed syllables which are spoken on a higher pitch than the preceding stressed syllable, are more “pitch prominent”.

Blankenhorn’s interpretation of the stress-shift in Munster is that it comes about as a consequence of this “pitch accent” phenomenon. She argues that there are three functional correlates of stress: syllable length, loudness and pitch height. If both length and pitch height were to occur on the same non-initial syllable, then the identification of the first syllable as the stressed one would be dependent on loudness alone. This could potentially lead the hearer to attribute stress to the syllable containing length and pitch. As a result of this, the second syllable would receive more prominence causing a de-stressing of the first syllable. If the high-pitch element was eliminated then loudness and length would be sufficient to identify the stressed syllable. This would mean if “pitch accent” is not present in a word it may still contain forward stress. This she claims would explain why stress-shift can operate in a dialect like West Kerry even though “pitch accent” is not a noticeable feature.

Blankenhorn compares this “pitch accent” phenomenon in Munster Irish to the Welsh language, and others agree. For Welsh, Williams (1985, 1999) has indicated that in monosyllabic content words in Welsh all features, such as pitch peak and length, occur on the single syllable, whereas in Welsh polysyllabic content words, the penultimate syllable is associated with the linguistic stress, while the final syllable is associated with a high pitch peak, and possibly a phonologically long vowel. The “delayed” pitch peak is possibly a residue of an earlier Welsh pitch accent. Wagner (1987:10) points out that “probably during the early Christian period, Brythonic developed... a new stress-system and also its characteristic intonation pattern which survives in modern Anglo-Welsh and which is most peculiar among Western European languages, with the exception – and probably not due to coincidence – of Cork Irish and Anglo-Irish”.

Blankenhorn also acknowledges that morphological factors, as well as phonological ones, have played a part in increasing the number of words to which forward stress can be applied, while at the same time limiting stress-shift to certain groups of words. She claims that in Connaught Irish there were some words which once may have had a stress-shift but eventually this shifted back to the initial syllable as the natural preference for initial stressing reasserted itself.

While this theory of the origin of stress-shift is certainly attractive, evidence for the Ulster dialects provides one argument against this. Blankenhorn (1981: 233-234) observes that “for no dialects north of Munster, does the rising intonation ...function as a basic conversational intonation contour”, and that rising intonation in Munster “may be regarded as an aberration in terms of the Irish language as a whole”. It is clear in Chapter 5 this is not in fact the case. Donegal Irish is striking in that it has predominantly rising intonation contours in both prenuclear and nuclear position, and stress-shift is not a feature of this dialect.

Ó Sé (1989) concludes that there can be no firm conclusion as to the origin of Irish stress-shifting and suggests that a detailed analysis of the intonation and rhythmic aspects of Irish may provide some insights into this feature of Irish.

3.4 Summary

This chapter has provided an introduction to some of the linguistic characteristics of Irish, including the segmental and prosodic structure of the language. Previous descriptions of Irish intonation have been outlined. There has been a short description of the stress system of Irish, with a particular focus on Munster Irish. A synopsis of the descriptions of the intonation of Hiberno-English has also been provided.

Chapter 4

Methods and Materials

4.1 Introduction

This study is based primarily on a corpus of read sentences, elicited for a number of informants in each dialect. The materials are taken from the corpora of the project on the Prosody of Irish Dialects (Ní Chasaide, 2003-2006). Analyses were carried out on a subset of the data recorded for this project. This chapter outlines the materials and methods employed for the study. The first section provides information on the informants used. This is followed by a description of the corpora employed for the analysis. There are two corpora analysed here: Corpus A (Basic Sentence Types) and Corpus B (Peak Alignment). All of the data was labelled using the IViE labelling system, which is described below. An additional set of labels was also established for the study of peak alignment (Corpus B) and this is also described in detail.

4.2 Informants

The speakers recorded for this study were all native speakers of each dialect as indicated in Figure 4.1.

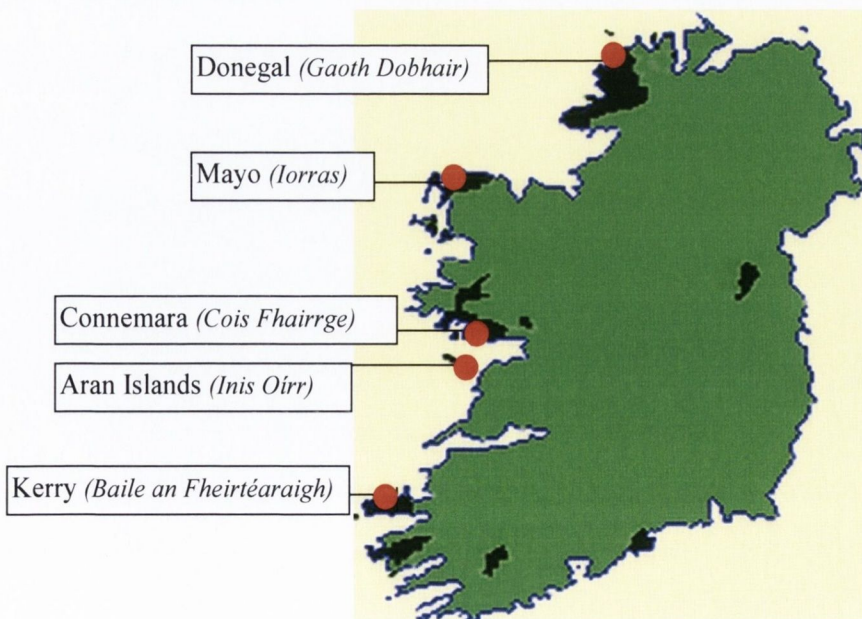


Figure 4.1. The *Gaeltachtaí* of Ireland indicated by the shaded areas. Red dots indicate informants' place of origin. (Source: *Údarás na Gaeltachta*)

As mentioned in Chapter 2 one long-term aim is to provide an account of Irish prosody which can be incorporated into a text-to-speech system for Irish (see for example Ní Chasaide et al., 2006; Prys et al., 2004). With this in mind, for the purpose of eliciting high-quality speech we chose to record all our informants in the semi-anechoic recording studio at the Phonetics Laboratory in Trinity College Dublin. This led to some difficulties sourcing suitable informants. The speakers chosen for this study were almost all living and working outside of Gaeltacht areas with the exception of two of the Donegal speakers and one of the male speakers from Mayo. To compensate for this we chose speakers who only speak Irish as their first language in the home, and, where possible, who speak Irish as their first language in their place of work. A majority of the informants either work in the Dublin office of Foras na Gaeilge¹, or they teach in GaelScoileanna². There were three speakers who speak English as their first language in the workplace, two of whom come from Mayo. Sourcing Mayo speakers proved the most difficult of all the dialects due to the increasing marginalisation of the use of Irish as a family and community language in the Mayo Gaeltacht (see Ó Giollagáin, 2007).

For Donegal Irish four female speakers of Gaoth Dobhair Irish were recorded and analysed. Gaoth Dobhair is located in northwest Donegal. The speakers range in age from 21-45.

The speakers of South Connaught Irish are all female. Three speakers of Cois Fhairrge Irish and three speakers of Inis Oírr Irish were recorded. The speakers range in age from 30-55.

The Mayo Irish speakers are all from Iorras in North Mayo. Two of the speakers are male and one speaker is female. The age of the speakers ranges from 25 to 65. Despite the difference in age, each of the three speakers of Mayo Irish produced similar pitch patterns. One speaker of Tuar Mhic Éadaigh Irish was recorded but it was decided to omit her from the study as Tuar Mhic Éadaigh, being a South Mayo dialect, is thought to share more characteristics with Connemara Irish than with the North Mayo dialect (O’Rahilly, 1932; Mhac an Fhailligh, 1968)³. Of the Mayo speakers used for the analyses, two of them come from the same family - one male and one female of similar age.

¹ Foras na Gaeilge is the governing body of the Irish language.

² GaelScoileanna are Irish medium schools

³ A preliminary analysis of this speaker from Tuar Mhic Éadaigh however would imply that, intonationally at least, the two dialects of Mayo are in fact more similar than might be expected.

Finally, three speakers of Kerry Irish were recorded. They are all female speakers from Baile an Fheirtéaraigh in West Kerry and are all of approximately the same age (35-40). Most of these speakers grew up together or attended the same secondary school.

None of the informants were professional speakers (actors, radio announcers etc.) and all of them speak Irish as their first language. A summary of information on the informants is presented in Table 4.1 below.

The recordings were all made in the semi-anechoic recording studio at the Phonetics Laboratory in Trinity College Dublin. A unidirectional microphone was used for optimum quality. In some cases a digital audio tape recorder (DAT) was used for the recordings but in the majority of cases the recordings were made directly onto the hard drive of the computer using the Kay Elemetrics Multispeech application, Version 2.3. For the analysis PRAAT (Boersma and Weenik, 2005) versions 4.2.20 to 4.3.27 were employed.

SPEAKERS			
	Sex, Initials, Approx. Age	Workplace Language	Variety/location
Donegal	Female, CNN, Age 40-45	Irish	Gaoth Dobhair
	Female, MNN, Age 35-40	Irish	Gaoth Dobhair
	Female, SNR, Age 20-25	Irish/English	Gaoth Dobhair
	Female, ED, Age 30-35	English	Gaoth Dobhair
Sth. Connaught	Female, NNC, Age 30-35	Irish	Inis Oírr
	Female, MNC, Age 30-35	Irish/English	Inis Oírr
	Female, MOF, Age 30-35	Irish	Inis Oírr
	Female, MNB, Age 50-55	Irish	Cois Fhairrge
	Female, CNM, Age 50-55	Irish	Cois Fhairrge
	Female, CNC, Age 45-50	Irish	Cois Fhairrge
Mayo	Female, MNS, Age 30-35	English	Iorras
	Male, POS, Age 25-30	English	Iorras
	Male, UM, Age 60-65	Irish	Iorras
Kerry	Female, C, Age 35-40	Irish/English	Baile an Fheirtéaraigh
	Female, ANB, Age 35-40	Irish	Baile an Fheirtéaraigh
	Female, M, Age 35-40	Irish	Baile an Fheirtéaraigh

Table 4.1. *Information about the informants*

4.3 Corpora

As mentioned, read speech, rather than spontaneous speech, was used in this study. Read speech is seen as a good starting point for a cross-dialect study as it provides controlled data which is directly comparable across the different speakers and across different dialects (Grabe, 2001). The study is based primarily on two corpora of simple sentence types, outlined below.

Eliciting natural speech in each specific dialect was of the utmost importance for this study. The subjects were instructed to read the sentences as naturally as possible and were merely informed that we were working on a cross-dialect study. Prior to each recording, the informants were given ample time to read through the sentences as many times as they wanted until they were sure they could read fluently to replicate natural speech as closely as possible. Where they made mistakes during the recording, they were allowed to repeat the reading.

As indicated in Chapter 3 there is considerable variation in pronunciation from dialect to dialect in Irish. When interacting with speakers of another dialect native speakers of Irish often accommodate and modify their pronunciations. To avoid this, two informants from the same dialect were recorded in each session. They were encouraged to converse with each other in their own dialect prior to being recorded. Furthermore the informants were presented with dialect specific orthographic representations of the corpora (see Tables 4.2a). In the case of wh-questions, dialect-specific forms of the wh- construction, which can differ substantially between dialects, were provided (Table 4.2b). Speakers were only presented with, and only read, the version that was specific to their own dialect.

As mentioned, the materials used in this study are a subset of the recordings elicited as part of the Prosody of Irish Dialects project (Ní Chasaide, 2003-2006). Further materials of a more spontaneous nature (e.g. map tasks) were also recorded for some of these informants but these are not analysed in this thesis.

4.3.1 *Corpus A: Basic Sentence Types*

The first step in the analysis was to establish a basic tonal inventory of the different accent types, across each of the dialects. The initial tonal inventory for the dialects was derived from analysis of Corpus A, a set of fifty-five context-free sentences, which included as much voiced material as possible and which was divided into declaratives and two different question types: wh-questions and yes-no

questions. The corpus included 30 declarative sentences, 15 wh-questions and 10 yes/no-questions. Corpus A is outlined in Table 4.2 a-c. It should be noted that the different dialects differ slightly in their use of initial mutations. The corpus for each dialect was modified accordingly with DI representing Donegal Irish, CI representing the Connaught dialects and KI representing Kerry Irish.

1.
Nuair a bhí mé óg, bhí mé i mo chónaí i nDún na nGall. (DI, CI, KI)
when was I young was I in my living in Donegal
When I was young I lived in Donegal.
2.
Bhí boladh breá nóiníní móra i mBaile an Mhuilinn (DI, CI, KI)
was smell fine daisies large in town the mill
There was a fine smell of large daisies in Milltown.
3.
Bhí lá álainn ann inné sa ghairdín úll (DI, KI)
Bhí lá álainn ann inné sa ngairdín úll (CI)
was day lovely there yesterday in the garden apple
It was a lovely day yesterday in the apple garden.
4.
Bhí Máire ar feadh dhá lá in Árann Mhór lena málaí (DI, CI, KI)
was Máire for two days in Aranmore with her bags
Máire was two days in Aranmore with her bags.
5.
Bhí mé sa bhialann agus sa halla mór inné. (DI)
Bhíos sa bhialann agus sa halla mór inné. (KI)
Bhí mé sa mbialann agus sa halla mór inné. (CI)
was I in the restaurant and in-the hall big yesterday
I was in the restaurant and the big hall yesterday.
6.
Tá 'n muileann ag meilt go moch is go mall (DI, CI, KI)
is the mill at grinding early and late
The mill is grinding early and late.
7.
Bhí muid inár luí ar an leaba. (DI, CI, KI)
were we in our lying on the bed
We were lying on the bed.
8.
Bhí mé i mo leaba álainn bándearg (DI, CI)
Bhíos i mo leaba álainn bándearg (KI)
was I in my bed lovely pink
I was in my lovely pink bed.
9.
Bhí Méabh ag bleán na mbó (DI, CI, KI)
was Méabh at milking the cows
Méabh was milking the cows.

10.

Bhí siad ag an oileán tamaillín. (DI, CI, KI)

were they at the island little while

They were at the island for a while.

11.

Bhí mé i mo luí ar an leaba. (DI, CI)

Bhíos i mo luí ar an leaba. (KI)

was I in my lying on the bed

I was lying on the bed.

12.

Bhuail mé le hEilín inné. (DI, CI: long initial vowel in Éilín)

Bhuail mé le hEilín inné. (KI: Stress shift to 2nd syllable in Éilín)*met I with Eilín yesterday*

I met Eilín yesterday.

13.

Bhuail mé le hEimear inné. (DI, CI, KI long initial vowel in Eimear in each dialect)

met I with Eimear yesterday

I met Eimear yesterday.

14.

Bíonn ealaí ag snámh in Árainn Mhór. (DI, CI, KI)

Be-HAB *swans at swimming in Aranmore*

Swans swim in Aranmore.

HAB = Habitual

15.

Bíonn nóiníní sa leabharlann. (DI, CI, KI)

is daisies in the library

There are daisies in the library.

16.

Chuala mé gur cailleadh do dhaideo. (DI, CI, KI)

heard I that lost your Granddad

I heard your granddad died.

17.

Geallaim go leanann muid é. (DI, CI, KI)

(I) promise that follow we it

I promise we follow him/it.

18.

Is cailín bocht í Nóirín. (DI, CI, KI)

COP *girl poor that Nóirín*

Nóirín is a poor girl.

COP = Copula

19.

Tá na héadaí ina luí i moll (DI, CI, KI)

is the clothes in their lying in heap

The clothes are lying in a heap.

20.

Luí mé ar an leaba. (DI, CI, KI)

lay I on the bed

I lay on the bed.

21.
 Luí mé sa leabharlann ar an urlár. (DI, CI, KI)
lay I in the library on the floor
 I lay in the library on the floor.
22.
 Is cailín bocht í Nóra. (DI, CI, KI)
 COP *girl poor that Nóra*
 Nora is a poor girl.
 COP = Copula
23.
 Is inné a bhí an fear ag péinteáil. (DI, CI, KI)
 COP *yesterday that was the man at painting*
 It was yesterday that the man was painting.
 COP = Copula
24.
 Ní maith le Nóirín an t-oileán. (DI, CI, KI)
 COP-NEG *good with Nóirín the island*
 Nóirín does not like the island.
 COP = Copula
 NEG = Negative
25.
 Rinne Máire málaí i mBaile an Mhuilinn. (DI, CI, KI)
made Máire bags in Milltown
 Máire made bags in Milltown
26.
 Sin í an obair a rinne mé. (DI, CI, KI)
that is the work that did I
 That is the work that I did.
27.
 Tá amhrán agam duit. (DI, CI, KI)
is song at me for you
 I have a song for you.
28.
 Luí Nóra agus Liam ar an urlár. (DI, CI, KI)
lay Nóra and Liam on the floor
 Nóra and Liam lay on the floor.
29.
 Ní maith le mamaí an muileann (DI, CI, KI)
not good with mammy the island
 Mammy does not like the mill.
30.
 Ní maith le Nóirín an muileann. (DI, CI, KI)
not good with Nóirín the mill
 Nóirín does not like the mill.

Table 4.2a. Corpus A: declaratives. DI = Donegal Irish, CI = Connaught Irish, KI = Kerry Irish.

1.

Caidé mar 'tá tú? (DI)
What is as is you

Cé' chaoi a bhfuil tú? (CI)
Who-the way are you

Cé' chaoi = cé+an chaoi

Conas taoí? (KI)
how are you

How are you?

2.

Cá bhfuil an margadh éadaí? (DI, CI, KI)
Where is the market clothes

Where is the clothes market?

3.

Cá dtáinig tú ar an chréatúr sin? (DI)

Cá dtáinig tú ar an gcréatúr sin? (CI, KI)
where came you on the creature that

Where did you find that creature (poor thing)?

4.

Cá bhfuil na leabhair sa leabharlann? (DI, CI, KI)
where are the books in library

Where are the books in the library?

5.

Cé aige a bhfuil an t-airgead? (CI, KI)

C' aige a bhfuil an t-airgead? (DI)

Who at him has The money

Who has the money?

6.

Cáidé na socraithe atá deánta? (DI)

Céard iad na socraithe atá deánta? (CI)

Cad iad na socraithe atá deánta? (KI)

what they the arrangements that are made

What arrangements have been made?

7.

Cén áit a bhfaca tú é? (DI, CI)

Cá háit a bhfaca tú é? (KI)

what place saw you him/it

Where did you see him/it?

8.

Cén dóigh a leanann muid é? (DI, CI, KI)

what way follow we him

How do we follow him?

9.

Cén fáth nach dtuigeann tú? (DI, CI, KI)

what reason not understand you

Why don't you understand?

10.

Cá bhfuil an halla? (DI, CI, KI)
where is the hall

Where is the hall?

11.

Caidé a tharla dhuit? (DI)
 Céard a tharla dhuit? (CI)
 Cad a tharla dhuit? (KI)
what happened to you

What happened to you?

12.

Cé a rinne é? (DI, CI, KI)
who did it

Who did it?

13.

Cén uair a bheas muid réidh? (DI, CI, KI)
 Cén uair bheidh muid réidh?
what time will be we ready

What time will we be ready?

14.

Caidé 'bhí ar bun ag Méabh sa leaba? (DI)
 Céard a bhí ar bun ag Méabh sa leaba? (CII)
 Cad a bhí ar bun ag Méabh sa leaba? (KI)
what was doing Méabh in bed

What was Méabh doing in the bed?

15.

Cá bhfuil an leabharlann? (DI, CI, KI)
where is the library

Where is the library?

Table 4.2b. *Corpus A: wh-questions. DI = Donegal Irish, CI = Connaught Irish, KI = Kerry Irish.*

1.	An	bhfuil	muid	inár	gcónaí	sa	Ghearmáin?	(DI, KI)
	An	bhfuil	muid	inár	gcónaí	sa	nGearmáin?	(CI)
	<i>INTERROG is we in our living in Germany</i>							
	Are we living in Germany?							
2.	Ar	iarr	muid	airgead	uathu?			(DI, CI, KI)
	<i>INTERROG- Past ask we money from them</i>							
	Did we ask them for money?							
3.	An	amhlaidh	go	bhfuil	muid	mall?		(DI, CI, KI)
	<i>INTERROG so that are we late</i>							
	Is it the case that we are late?							
4.	An	raibh	tú	sa	Ghaeltacht	ariamh?		(DI, KI)
	An	raibh	tú	sa	nGaeltacht	ariamh?		(CI)
	<i>INTERROG were you in the Gaeltacht ever</i>							
	Were you ever in the Gaeltacht?							
5.	Nach	bhfuil	duine	ar	bith	anseo?		(DI, CI, KI)
	<i>INTERROG not is person at all here</i>							
	Is there nobody here?							
6.	An	amhlaidh	go	leanann	muid	é?		(DI, CI, KI)
	<i>INTERROG so that follow we him</i>							
	Is it the case that we follow him?							
7.	An	bhfaca	tú	é?				(DI, CI, KI)
	<i>INTERROG-Past see you it</i>							
	Did you see him/it?							
8.	An	raibh	tú	sásta	ansin?			(DI, CI, KI)
	<i>INTERROG were you happy there</i>							
	Were you happy there?							
9.	An	bhfuil	na	healaí	ag	snámh?		(DI, CI, KI)
	<i>INTERROG is the swans at swimming</i>							
	Are the swans swimming?							
10.	Ar	nigh	sibh	na	braillíní?			(DI, CI, KI)
	<i>INTERROG - Past wash you the sheets</i>							
	Did you wash the sheets?							

Table 4.2c. *Corpus A: yes/no-questions. DI = Donegal Irish, CI = Connaught Irish, KI = Kerry Irish.*

We modelled much of our study on the IViE project and as a result attempted to elicit similar sentence types from our speakers, as those elicited in the IViE project. This was done to cover as wide a range as possible of grammatically different sentence types. Following the IViE corpus, we attempted to elicit declarative questions in addition to the sentence types listed above. Declarative questions have also been analysed in studies of other languages (see, for example Haan, 2002; van Heuven et al., 1999, for Dutch; Grabe, 2002; Liu and Xu, 2007, for English), and although declarative questions would appear to be used in natural speech in Irish each of the informants recorded for this study failed to produce them. For this reason they are not included in this study.

In all 5 randomised repetitions of each of the sentences in Corpus A were recorded by the speakers. Some files were omitted for various reasons including reading errors, hesitations etc.

In Corpus A the utterances are generally short and rather simple in structure. There are longer utterances but again these have a simple sentence structure. Since the sentences are short they tend to be uttered in a single phrase. Some longer utterances had more syntactic boundaries, and consequently contained multiple intonational phrases. This corpus was used for a first-pass phonological analysis of simple declaratives and questions (both wh-questions and yes/no-questions) across the different dialects.

4.3.2 Corpus B: Peak Alignment

Corpus B was designed to facilitate the measurement of tonal alignment across the different dialects and is divided into two subsets. In Subset i test sentences were designed to elicit prenuclear and nuclear accented syllables in a variety of conditioning environments where the peak location might be expected to vary. In these sentences the accented syllable /g^hob^h/ was elicited so that the number of unstressed syllables – preceding it, when in initial prenuclear position, and following it when in nuclear position – was systematically varied from 0 to 2. The recording included 8 randomised repetitions of each sentence. 5 representative utterances were chosen from the 8, which allowed for errors, hesitations etc.

Six speakers recorded Subset i: two speakers from Gaoth Dobhair and two from each of the two dialects of South Connaught. It transpired that for each of the

speakers the phonologically “voiced” stops in the test syllable were produced with extensive devoicing, so that they were effectively phonetically voiceless. Clearly the devoicing of the phonologically voiced consonants reduces the degree of precision with which we can locate peak timing, so that precise measurements of the target locations were not possible⁴. Further refinement was required here and for this purpose Subset ii was designed and analysed to refine the analysis. The words containing phonological stops were replaced by words containing fully voiced consonants. Subset ii was recorded for each of the dialects. This subset contains the stressed syllables /m^jɪʌ/, /v^jɪʌ/, /wɪl/, /m^ʏoɪʌ/ or /m^ʏɪl/ in similar prenuclear and nuclear positions.

It should be noted that we were not trying to elicit these sentences with any focus on the target words. To avoid this, the sentences were interspersed with a larger set of sentences and randomised to ensure that they did not occur in succession. The recording included 8 randomised repetitions of each sentence with 5 representative utterances chosen from the 8. The subsets of Corpus B are outlined in Table 4.3a-b. In these tables all of the accented syllables are in bold with the specially elicited syllable in red.

⁴ Segmental composition is known to have an effect on the precise location of H and L targets within the accented syllable (see for example Prieto, van Santen and Hirschberg, 1995; House, 1989; van Santen and Hirschberg, 1994; Rietveld and Gussenhoven, 1995).

Initial prenuclear position

PN0

Gob	ann	an	sceach	amach	thar	an	mballa
<i>Sticks</i>	<i>the</i>	<i>bush</i>	<i>out</i>	<i>over</i>	<i>the</i>	<i>wall</i>	

The bush sticks out over the wall.

PN1

Tá	gob	án	ag	teacht	amach	thar	an	mballa
<i>is</i>	<i>tradesman</i>	<i>at</i>	<i>coming</i>	<i>out</i>	<i>over</i>	<i>the</i>	<i>wall</i>	

A tradesman is coming out over the wall.

PN2

B'ag	a'	ngob	án	a	bhí	an	teach	a	b'fhearr
<i>COP-Past at</i>	<i>the</i>	<i>tradesman</i>	<i>that</i>	<i>was</i>	<i>the</i>	<i>house</i>	<i>the</i>	<i>best</i>	

The tradesman had the best house.

COP = Copula

Nuclear position

N0

Ní	maith	le	Daidí	an	gob				
<i>not</i>	<i>good</i>	<i>with</i>	<i>daddy</i>	<i>the</i>	<i>beak</i>				

Daddy doesn't like the beak.

N1

Ní	maith	le	Daidí	an	gob	án			
<i>not</i>	<i>good</i>	<i>with</i>	<i>daddy</i>	<i>the</i>	<i>tradesman</i>				

Daddy doesn't like the tradesman.

N2

Ní	maith	le	Daidí	an	gob	adán			
<i>Not</i>	<i>good</i>	<i>with</i>	<i>daddy</i>	<i>the</i>	<i>sandpiper</i>				

Daddy doesn't like the sandpiper.

Table 4.3a. Subset i of Corpus B. Sentences containing the test syllable /gʲobʲ/ in three different prenuclear and nuclear conditions.

Initial Prenuclear position

PN0

M illeann	an	bhean	na	madaí	sa	mbaile
<i>spoils</i>	<i>the</i>	<i>woman</i>	<i>the</i>	<i>dogs</i>	<i>at</i>	<i>home</i>

The woman spoils the dogs at home.

PN1

Ní	m hilleann	muid	ar	na	buachaillí	é.
<i>not</i>	<i>spoil/ruin</i>	<i>we</i>	<i>on</i>	<i>the</i>	<i>boys</i>	<i>it</i>

We don't spoil/ruin it on the boys.

PN2

B'	ag	an	m huileann	a casadh	ar	a chéile	muid
<i>COP-past</i>	<i>at</i>	<i>the</i>	<i>mill</i>	<i>that met</i>	<i>on</i>	<i>each other</i>	<i>we</i>

COP = Copula

We met each other at the mill.

Nuclear position

N0

Tá	na	héadaigh	ina	luí	i	m oll
<i>is</i>	<i>the</i>	<i>clothes</i>	<i>in their</i>	<i>lying</i>	<i>in</i>	<i>pile</i>

The clothes are lying in a pile.

N1

Ní	maith	le	Mamaí	an	m uileann.
<i>not</i>	<i>good</i>	<i>with</i>	<i>mammy</i>	<i>the</i>	<i>mill</i>

Mammy doesn't like the mill.

N2

Is	léir	go	bhfuil	abhainn	agus	m uileann	ann
<i>COP</i>	<i>apparent</i>	<i>that is</i>	<i>river</i>	<i>and</i>	<i>mill</i>	<i>there</i>	

It's apparent that there's a river and mill there.

COP = Copula

Table 4.3b. *Subset ii of Corpus B. Sentences containing the test syllables //mⁱɪʌ/, /vⁱɪʌ/, /wɪl/, /m^ʷoɪ^ʷ/ or /m^ʷɪl/ in three different prenuclear and nuclear conditions.*

4.4 Labelling

Many studies within the AM framework use the ToBI system (Silverman et al. 1992; Beckman and Ayers-Elam, 1997), the labelling system derived from the work by Pierrehumbert (1980). This study employs the IViE labelling system (Grabe, Nolan and Farrar, 1998; Grabe, Post and Nolan, 2001), which is an adaptation of the

Theoretically these two labelling systems differ. ToBI was primarily based on the Pierrehumbert model of intonation, while the IViE system is based on work by Gussenhoven (1984) and Grabe (1998).

4.4.1 IViE Labelling

In the IViE system there is a five tier labelling system:

(i) *The orthographic tier.*

On this tier transcriptions of the words spoken and their location in the acoustic signal are labelled.

(ii) *The prominence/rhythmic tier.*

On this tier the locations of the stressed and/or accented syllables are marked.

(iii) *The phonological/tone tier.*

Within the phonological tier there is a two-tone AM description of intonation patterns where accented syllables and intonational phrase boundaries are labelled (see below)

(iv) *The phonetic tier*

The Phonetic tier within IViE offers ‘phonetic’ labels for accents which may be phonologically similar. This tier essentially marks differences in the phonetic implementation of intonation. This tier was omitted from this study on Irish intonation, and replaced by what we term the Timing Tier (see Section 4.4.2 below).

(v) *The miscellaneous tier*

Hesitations, errors, disfluencies etc. are marked on the miscellaneous tier.

4.4.1.1 Pitch accents

All pitch accents in IViE are labelled on the phonological tier. Pitch accents in the IViE system are left-headed. The tones may be either monotonal, bitonal or tritonal. The first tone in a bitonal or tritonal accent is the starred tone and this is associated with the accented syllable. Trailing tones are associated with following unstressed syllables. Table 4.4 from Grabe (2004) shows the IViE tone labels. A similar inventory for Irish is drawn up in later Chapters. The notion behind the IViE tonal inventory is that the labels for all varieties of a language are taken from this pool. Not all varieties necessarily use the same labels or label combinations.

Label	One commonly observed implementation
H*L	High target on prominent syllable followed by low target
H*	High target, common in initial position
!H*L	downstepped high target, low target
L*HL	low target on prominent syllable, high target on next syllable followed by low target
L*H	low target on prominent syllable followed by high target
L*	low target
H*LH	High target on strong syllable, low, high

Table 4.4. *IViE Tone labels (from Grabe 2004)*

4.4.1.2 Boundary tones

Within the IViE system one level of phrasing, the intonational phrase (IP) is assumed, with three options at the IP boundary. An IP boundary can be associated with a high boundary tone (H%), a low boundary tone (L%) or no tone (0%). These features are essentially the same as those proposed by Gussenhoven (1984, 2002, 2004), although it should be noted that the 0% is plain % in Gussenhoven's work. The "no tone" option 0% was demonstrated in the IViE project to be necessary to cover the range of possibilities at the phrase boundary for Belfast English (see Grabe, 1998; Fletcher, Grabe and Warren, 2005). Belfast English has three options at the boundary following a low rise L*+H pitch accent. It has a rise-plateau, a rise-plateau-rise, a, and a rise-plateau fall (see Figure 4.2).

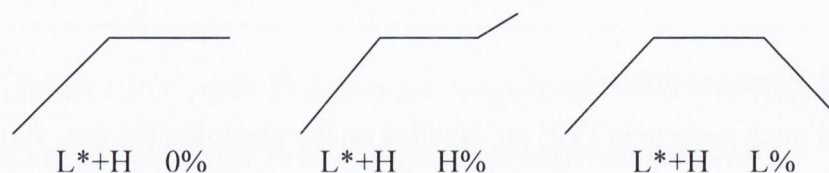


Figure 4.2. *Schematic figure of boundary options available to speakers of Belfast English (adapted from Grabe, 2004: 17)*

4.4.2 The Timing Tier

In our study an extra level of labelling, the *Timing Tier*, was employed to extract the highest and lowest targets surrounding different pitch accents, in relation to the segmental string. In the Timing Tier specific high and low points in the vicinity of

the pitch accents are located and the timepoint and f_0 measured. They are then labelled accordingly. For example, in an L^*+H accent the labels L^* and H , represent the f_0 minima and maxima associated with the targets of the L^*+H accent. To capture other important aspects of the intonational contour a number of further points were also identified. For these, lower case letters were used, along with an indication of their relationship to the main tonal landmarks (by showing the landmark in brackets, before or after, as appropriate). For example, in a H^* accent the highest point in a H^* pitch accent would be marked as H^* , the lowest point preceding a H^* accent would be labelled $l(H^*)$. Where a peak or valley was realised as a plateau, the label p was used, preceded or followed in brackets by the tonal target symbol as in $(H)p$, which would mark the end of the high plateau in L^*+H accents.

One of the labels requires, $p(L^*)$, requires further explanation. Initially we considered whether the L^* of the L^*+H accent in Donegal Irish should be treated as a plateau or as a trough. Although there was typically an identifiable minimum at the end of the accented vowel, the extent of the drop during the vowel of the accented syllable was not extensive and for one speaker there were some instances where the L^* appeared to be plateau-like. Overall however, a plateau analysis did not seem the most appropriate for two reasons. Firstly, because the f_0 dropped over the duration of the vowel in the majority of cases, and a plateau analysis would lose this generalisation, and secondly, because informal listening tests suggested that it was the final part of the vowel that corresponded to our perception of the f_0 minimum. Thus our analysis treats the f_0 minimum as the timepoint corresponding to L^* . However the f_0 value in the early part of the vowel was also labelled $p(L^*)$ and measured.

This tier was established after the tonal inventory of each dialect was drawn up. The Timing tier was extracted semi-automatically using PRAAT scripts designed by Welby⁵ and adapted specifically with our analyses in mind. Table 4.5 indicates all of the labels available for this tier. Different labels are then chosen from this pool of labels, depending on the dialect in question.

⁵ Welby's scripting tutorials are available at www.icp.inpg.fr/~welby/praat.html

Label	Implementation
L*	corresponds to the f0 minimum in L*+H accents
H	corresponds to the trailing tone in the L*+H accents.
H*	corresponds to the peak in the H* accents (or the onset of the peak in a H* plateau)
L	corresponds to the f0 minimum in a trailing L tone of H*+L accents.
(H*)p	Denotes end of the high plateau in H* prenuclear accents.
(H)p	notes the end of the high plateau L*+H accents.
p(L*)	corresponds to the start of a low plateau in some L*+H accents
l(H*)	corresponds to the f0 minimum which precedes H* in accents CF-C. For the nuclear condition, this is the minimum between the nuclear H*+L and the preceding H* accent. In the case of the prenuclear accent, this minimum always occurred at the beginning of the phrase.
h(L*)	corresponds to the f0 at the start of the utterance preceding prenuclear L*+H accents

Table 4.5. *Timing tier labels for Irish*

These labels are demonstrated schematically in Figure 4.3.

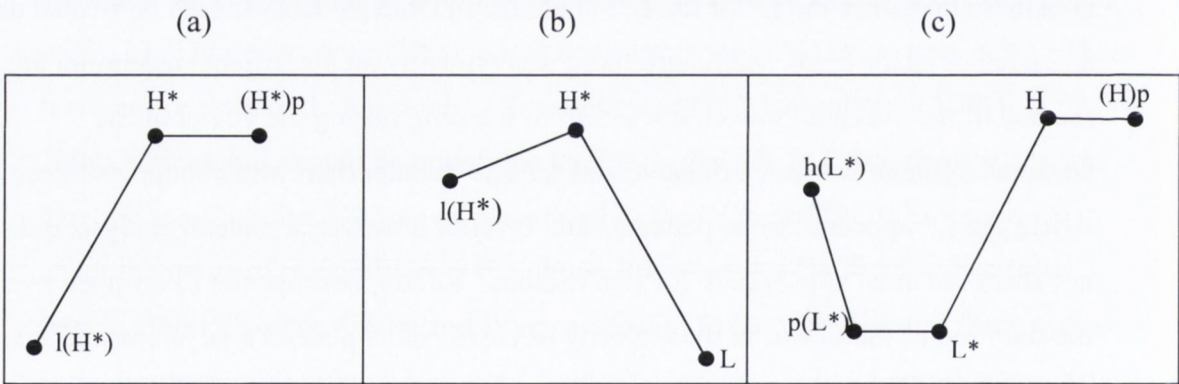


Figure 4.3. *Schematic figure illustrating the labels associated with the timepoints measured in (a) H* accents, (b) H*+L accents, and (c) L*+H accents*

4.5 Summary

This chapter has described the methods and materials used in this study. This includes information on the speakers and the dialects they speak. The two main Corpora used in this study have been outlined and a more detailed description of the labelling system employed has been provided. The following chapters outline the results of the analyses of these corpora.

Chapter 5

Donegal Irish

5.1 Introduction

This chapter presents the results of the auditory and acoustic analyses of the Donegal corpora as outlined in Sections 4.3.1 and 4.3.2 in Chapter 4. The analysis is carried out at two levels. At the phonological level, the tonal inventory of Donegal Irish pitch accents is presented for grammatically different sentence types of Corpus A, thereby providing a preliminary phonological account of the intonation of Donegal Irish. Subsequently, a careful analysis at the phonetic level looks closely at how f0 targets in certain prenuclear and nuclear accents are timed, relative to the segmental tier.

The first section of the chapter outlines the tonal inventory of prenuclear and nuclear accents in Donegal Irish, across three grammatically different sentence types: declaratives, wh-questions and yes/no-questions. The pitch accents are labelled according to the IViE labelling system as outlined in Section 4.4.1, Chapter 4.

The second section of the chapter looks at the distribution of accents within the three grammatically different sentence types. The final section focuses on peak timing in this dialect.



Figure 5.1. Map of Donegal Gaeltacht. Arrow points towards informants' place of origin. (Source: Údarás na Gaeltachta.)

Information on the Donegal Gaeltacht is provided in Section 1.2, Chapter 1, and information on the informants is provided in Section 4.2, Chapter 4. Their place of origin is indicated in Figure 5.1 above.

5.2 Tonal Inventory of Donegal Irish

In following sections a preliminary tonal inventory for Donegal Irish is drawn up. The inventory of accents is based on careful auditory and acoustic analysis of the f_0 contour. The transcription and analysis was performed using Praat (Boersma and Weenik, 2005), a tool for phonetics. This corpus was labelled using the IViE labelling system (Grabe, Nolan and Farrar, 1998), on three IViE levels: Orthographic, Rhythmic and Phonological, as outlined in Chapter 4.

Following IViE conventions, the first step in the prosodic analysis of Donegal Irish was to label the corpus orthographically. The next step was to mark the rhythmically strong syllables, which was done on the rhythmic tier. The final step in the analysis was to label the pitch movement on each accented syllable (up to the next accented syllable or boundary tone) using the IViE tone labels. The IViE tone labels are outlined in Table 4.4. For the second part of the analysis on peak timing a further tier of labels was incorporated into the analysis. These labels of this timing tier are described in Section 4.4.1, Chapter 4, and summarised in Table 4.5.

What is initially apparent with Donegal Irish intonation is that there is a striking similarity between the contours found in declarative sentences and those found in the two interrogative types (wh- and yes/no-questions). There is also a similarity between prenuclear and nuclear contours in each of the sentence types. The most common recurring pattern in the corpus is a sequence of rising accents, labelled L^*+H . Figure 5.3 summarises the tonal inventory of Donegal Irish in percentages.

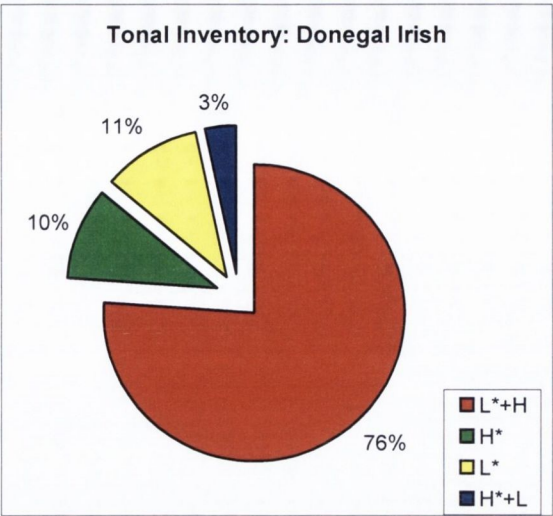


Figure 5.2. Tonal inventory of Donegal Irish

Rising accents make up 76% of pitch accents found in the Donegal corpus. High accents (H*) make up 10% of accents. Low accents (L*) accents make up 11% of accents and the remaining accents (3%) found in the corpus are falling accents, labelled H*+L.

Figure 5.3 shows a fundamental frequency trace for a typical simple declarative utterance produced by a speaker of Donegal Irish and labelled with IViE tone labels. Figure 5.4 shows an f0 trace for a typical wh-question in Donegal Irish, again labelled with IViE tone labels. Accented syllables are outlined in red.

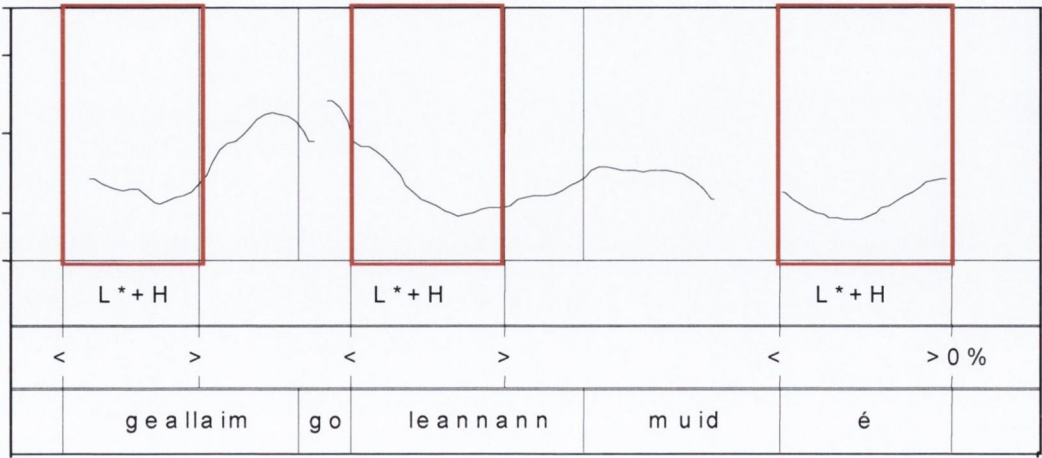


Figure 5.3. Pitch trace of typical Donegal Irish declarative with 3 pitch accents.

Accented syllables are outlined in red. /ʃaɫʲəmʲ ɡə ʎanənʲ mʲɪdʲ eː/

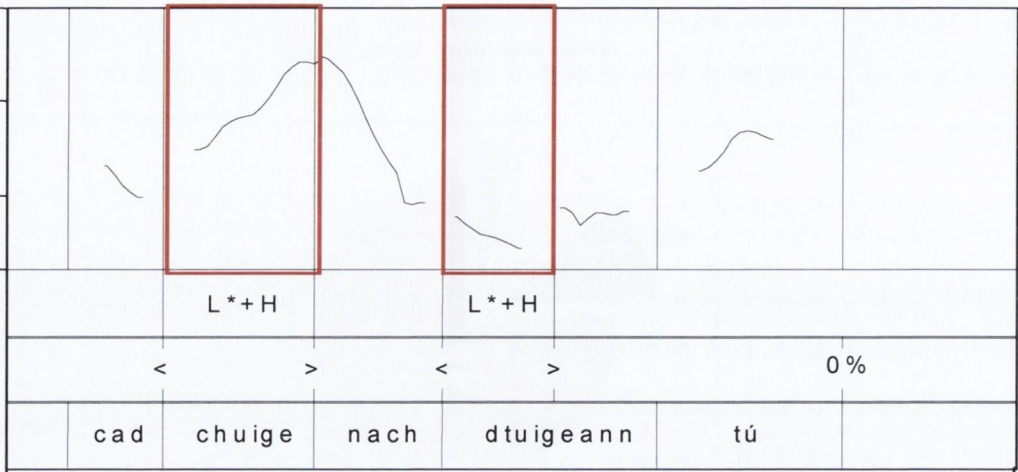


Figure 5.4. *Pitch trace of typical Donegal Irish wh-question with 2 pitch accents. Accented syllables are outlined in red. /kadʲ hɪʃə n̪ˠax d̪ˠɪʃəɲˠ t̪ˠuː/*

From the Figures it can be observed that the speaker produces low f0 targets on the accented syllables followed by a rise into the following unstressed syllables. The high target in unstressed syllables is commonly, although not always, realised as a plateau.

Based the analysis of Corpus A the first-pass phonological analysis suggested for both declaratives and questions in Donegal Irish is a sequence of rising pitch accents.

The following sections investigate pitch patterns more fully and outline the tonal inventory of prenuclear¹ and nuclear pitch accents available to speakers of Donegal Irish. The initial analysis is based on all sentence types. Later sections look at the distribution of accents across these three different sentence types.

5.2.1 Prenuclear accents

Figure 5.5 below outlines the overall occurrence (in percentages) of prenuclear accents in the corpus across the three different sentence types. The dominant prenuclear accent employed by speakers is a low rising pitch accent. This we label as an L*+H accent. This accent is the primary prenuclear accent found in both declaratives and questions.

¹ By prenuclear accents we mean all accents which occur in an utterance before the nuclear accent which we consider to be the last accent in an unmarked sentence.

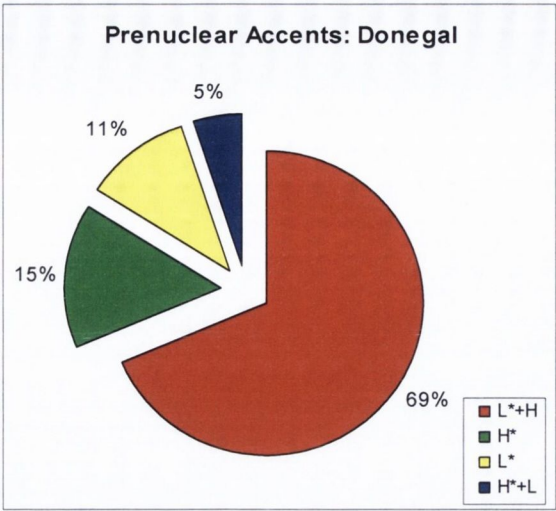


Figure 5.5. Inventory of prenuclear accents (in percentages) found in Donegal Irish

Prenuclear rising accents are illustrated in Figures 5.3 and 5.4 above. The remaining prenuclear accents found in the corpus are made up of falling accents (H*+L), high accents (H*) and low accents (L*). Examples of these three prenuclear options are outlined in Figures 5.6 and 5.7 below.

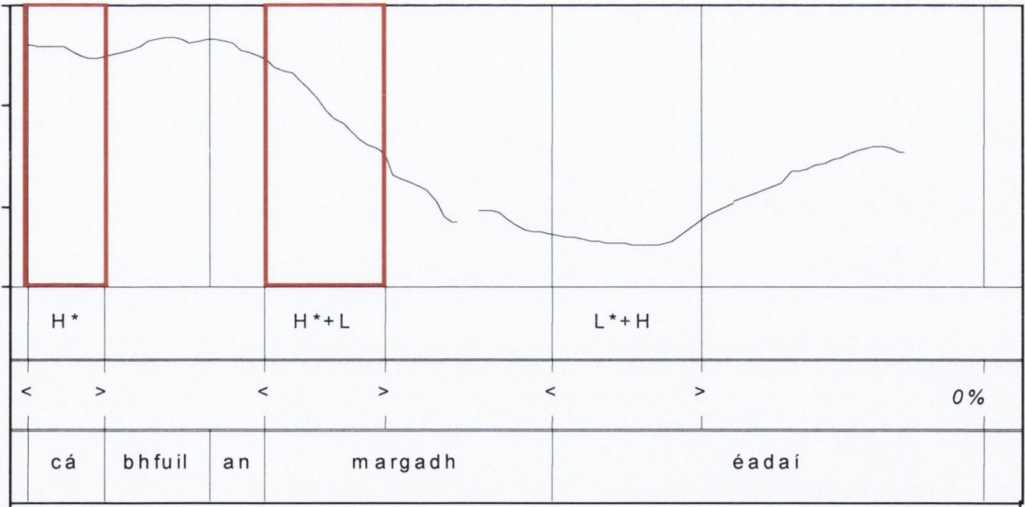


Figure 5.6. Pitch trace of Donegal Irish *wh*-question for prenuclear H* and H*+L accented syllables, outlined in red. /kə wɪl ən mʲarʲəgu: e:ɟʲi:/

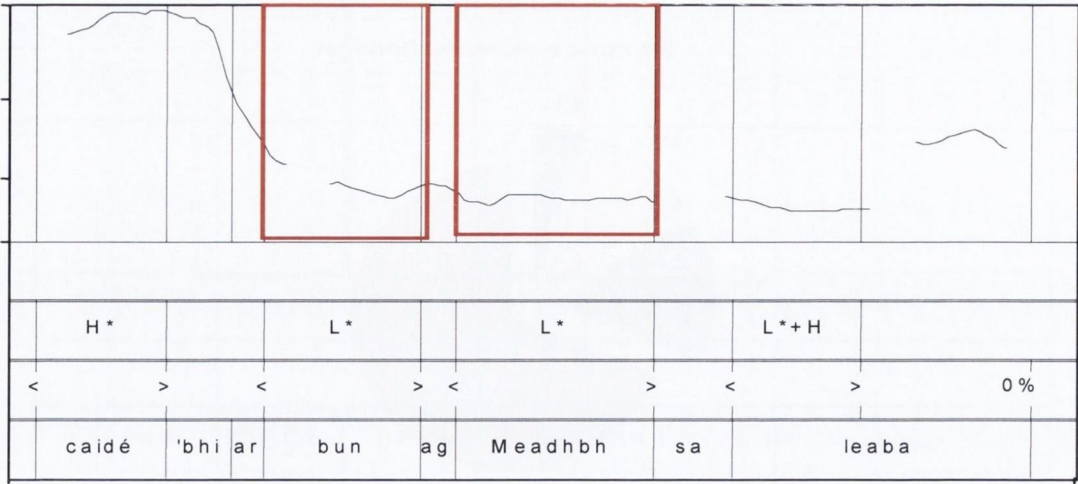


Figure 5.7. Pitch trace of Donegal Irish *wh*-question. *L** are accents highlighted in red. /kadʲeː vʲiː əɾʲ bʲun əɟ mʲeːvʲ sʲə ʎabʲə/

The following sections examine each of the four different tones employed in prenuclear position: rising, falling, high and low tones.

5.2.1.1 *Rising accents*

This section presents evidence for the occurrence of low-rising prenuclear tones, labelled L*+H, which is the predominant prenuclear accent choice of each of the speakers. The succession of rising pitch accents over the course of an utterance gives a Donegal utterance the typical “sing-song” effect observed in Donegal Irish. Phonetically the tones are realised as follows:

- i. The accentual tonal target is low throughout the most of the accented syllable and is characterised by a dip from a preceding higher pitch level, even in initial prenuclear position where an initial high boundary is common.
- ii. The f0 minimum of this tone is always located in the accented vowel, and generally towards the right-edge of the vowel
- iii. The f0 maximum of the trailing tone occurs in the unstressed syllables following the accented one. Results from the peak timing analysis as outlined in Section 5.5 suggest that the peak of the trailing tone is generally reached two syllables after the accented vowel. We cannot, however, say with absolute certainty that this is the optimal location of the trailing target due to the fact that there are not many sentences in our corpus containing

long stretches of unstressed syllables between pitch accents. Furthermore, there are instances where the trailing tone occurs in the syllable following the accented one. We conclude that the peak is *typically* located two syllables after the accented one but is not necessarily fixed in its alignment.

- iv. Once the f_0 target of the trailing H tone is reached it is generally realised as plateau, particularly when the following unstressed portion of the foot is more than one syllable. When there is only a single short unstressed syllable between accents (not quite a stress clash²), the plateau of the trailing tone of the bitonal accent may be truncated so the plateau is not realised. Additionally when there is only one unstressed syllable available, the H is not just truncated, but the trailing H is also lower in f_0 than would be expected if there more unstressed material available. This is indicated schematically in Figure 5.8 below.
- v. The f_0 of the trailing tone begins to drop in the syllable immediately before the next accented syllable and again reaches its trough in the accented vowel of the syllable. This is elaborated on in section 5.6 on the peak timing of Donegal pitch accents.
- vi. Perceptually the low tone of the bitonal accent is more prominent than the high tone.

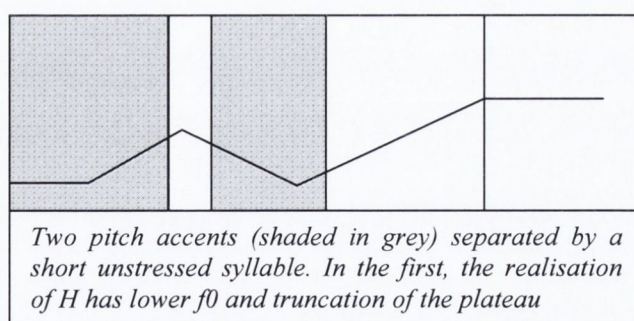


Figure 5.8. Schematised contour outlining truncation of the plateau of the trailing tone in an L^*+H pitch accent when followed closely by a second L^*+H pitch accent

In successive rising pitch accents both the trough and the peak of each subsequent L and H tone is lower than the preceding one. This leads to the establishment of a rather smooth declination in the f_0 throughout the utterance. The longer the intonation phrase the better the declination can be depicted. Declination

² Stress clash is where two accented syllable occur immediately adjacent to one another

over the course of an utterance means that successive tones are lower in f_0 for both elements of the bitonal accent. However the actual alignment with the segmental string does not vary depending on its position in the utterance. Again the precise timing of the f_0 minima and maxima of L^*+H prenuclear accents is discussed in greater detail in Section 5.6.1 below.

5.2.1.2 *Falling accents*

Falling prenuclear accents account for just 5% of prenuclear accents in Donegal Irish. Because there are just a few instances of these found in the corpus it is difficult to describe absolute patterns in their realisation. It was observed, however, that they are generally found in initial prenuclear position, or following an initial high accent. In these falling accents there is a sharp peak which is aligned with the accented vowel and the pitch of the trailing tone starts to drop off within the accented syllable. Falling prenuclear accents were only found in *wh*-questions.

5.2.1.3 *Low accents*

In Corpus A, low prenuclear pitch accents occur only as non-initial prenuclear accents, and are labelled L^* . In all, they account for just 11% of prenuclear pitch accents in the corpus. On closer inspection, L^* accents typically occur in conditions where there is just one short unstressed syllable, or no unstressed syllables, between accents, as indicated in Figure 5.7 above. It was pointed out earlier that typically the H of a bitonal accent needs two syllables to be fully realised. If this is the case then it is likely that this low tone is merely a phonetic variant of an L^*+H accent which is realised under certain contexts, namely tonal crowding. The full tone is not realised due to timing constraints which leads to either deletion or truncation (see Section 5.2.1.1 iv) of the trailing tone. Since the occurrence of this L^* is predictable in that it only occurs under certain stress clash conditions, it is likely to be merely a different surface realisation of an underlying L^*+H tone. This follows Gussenhoven's (1984) and Grabe's (1998) treatment of monotonal accents as outlined in Section 2.2.2.1, Chapter 2.

In the case of Donegal Irish, phonological adjustments such as those proposed by Gussenhoven and Grabe would allow for the deletion of the H element of the L^*+H accent, if we are correct in assuming that an L^* accent is a modification of an underlying L^*+H accent. Following on from the discussion in Chapter 2 (Section

2.4) on the transparency of labelling, we label this L* in order to differentiate between the rising L*+H accent and this modified version of it. The large percentage of L*+H prenuclear accents in the corpus would imply that L*+H is the prototypical prenuclear pitch accent in this dialect.

It should also be noted that there was no auditory or acoustic evidence for a trailing H tone in these L* accent realisations, and the low target spreads up as far as the following pitch accent. The shape of a rising accent following a low tone in Donegal Irish is affected by the previous L* tone. There is no dip or drop in f0 onto the L of the following bitonal accent. Figure 5.9 shows an idealized f0 contour of a prenuclear L* accent which occurs in stress clash conditions.

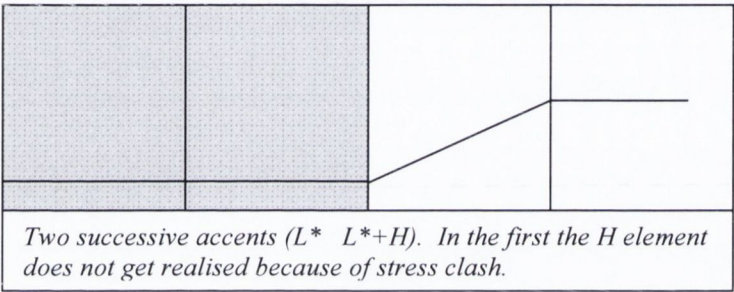


Figure 5.9. *Idealized f0 contour of an L* pitch accent occurring in a tonal crowding condition where the trailing tone of an L*+H accent undergoes ‘deletion’*

5.2.1.4 High accents

High tones (H*) in Donegal Irish only occur in phrase-initial position. In fact no H* tones were found in utterances other than in initial prenuclear position. These were found in both declarative sentences and in wh-questions but not in yes/no-questions (see 5.3 below). Figure 5.10 below indicates the percentage of H* tones found as an initial prenuclear accent.

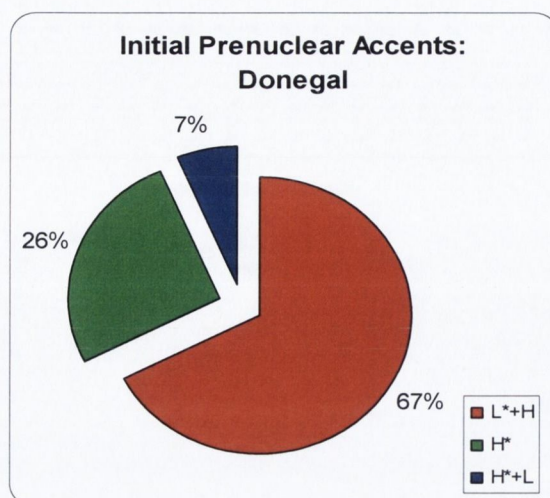


Figure 5.10. *Percentages of initial prenuclear accents found in Donegal Irish*

These H* accents account for approximately one-quarter of all initial prenuclear accents. The fact that these accents only occur in initial position raised some interesting questions about whether they are in fact categorically distinct from other tones found in Donegal Irish.

There are two possible ways of characterising these high tones. The first is that we are in fact dealing with a rising accent, rather than a high accent, i.e. one with truncated L. The second option is that the tone is treatable as a phonetic variant of an underlying H*+L tone. We deal first with the issue of whether the high accent is treatable as a rise.

The “default” tone in Donegal Irish is a rising one and one suggestion is to consider that this high tone is a variant of this rise. In most realisations of this high accent it is difficult to see how it could be considered an underlying rise. There are however, certain ambiguous realisations of this accent where it might be argued that it is in fact a variant of a rising tone.

The first point to note is that these high accents are only found in initial position, and only in utterances with no anacrusis or with a very small anacrusis³. It was observed earlier that it is common for utterances in Donegal Irish to have a high initial boundary tone at their onset. Because of this initial high, the prehead in utterances with an anacrusis is higher than the pitch of the first accent. This is particularly obvious when the initial accent is a low rising tone. This initial f₀ maximum is perceptually as important as the initial accent, as it allows for the low

³ Anacrusis refers to the number of unstressed syllables preceding the initial accent

element of the bitonal L^*+H initial accent to be more salient. Although initial L^*+H accents are generally higher in the speaker's pitch range than subsequent rising accents, even without an anacrusis, there is a fall in pitch within the accented syllable, followed by a clear rise after the accent. In those accents we consider as possible high accents there is no such dip, and it appears that in all respects that they should be treated as being categorically differently to rising accents. These high accents are typically realised as a high plateau, the duration of which lasts throughout the accented syllable and beyond. There is with no fall in pitch on the accented syllable, nor is there a subsequent rise in following unstressed syllables.

A problem arises in a small percentage of these accent types where there is a slight dip in f_0 within the accented syllable, followed by an almost imperceptible rise. This is evident in the initial prenuclear accent in Figure 5.6 above which could be considered a possible L^*+H accent. The main concern here is whether this slight movement in f_0 is enough to warrant treating the accent as a rising one. Careful auditory analysis of these tones has indicated that this slight dip in f_0 is not perceivable, in the same way that the subsequent rise is not. The likelihood is that these minor dips are a result of microprosodic effects which affect the visual contour but which in fact are not auditorily perceptible. In auditory terms these tones are identical to those high accents with no dip in f_0 and there is not enough clear visual or auditory evidence to support treating these high accent types as rising ones. As Ladd (1996: 83) points out in an L^*+H accent the f_0 is "low for a good portion of the accented syllable, and then rises sharply, often into the following syllable if there is one". This description does not hold for those ambiguous accents and so the decision is to treat them as high accents labelled H^* . Figure 5.11 schematically outlines the difference between (a) an initial L^*+H accent with no anacrusis, (b) an L^*+H accent with an anacrusis of two (plus an initial high boundary) and (c) an H^* accent with no anacrusis.

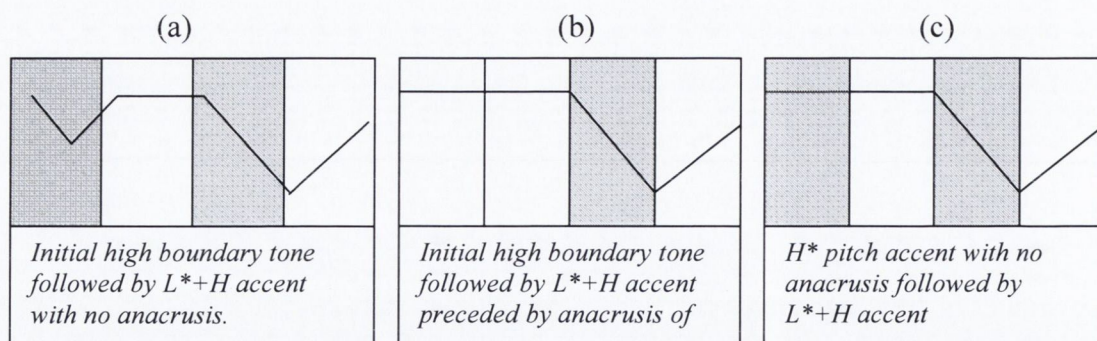


Figure 5.11. Three schematised initial prenuclear contours. (a) L^*+H accent with no anacrusis but preceded by an initial high boundary, (b) L^*+H accent with anacrusis of two: (c) H^* pitch accent with no anacrusis followed by L^*+H accent. The shaded grey boxes represent accented syllables and the unshaded boxes represent unaccented syllables.

Once it is established that these accents are not variants of the L^*+H rising one, the second issue is whether these high tones are treatable as a phonetic variant of an underlying H^*+L tone. This is more likely to be the case. These high accents are only found in wh-questions. Similarly falling accents, as described in Section 5.2.1.2, were only found in wh-questions, in both initial and non-initial prenuclear position. High tones are likely to be falling tones which have undergone complete linking, similar to the linking rules which applied to rising accents as described in Section 5.2.1.3, resulting in the deletion of the trailing tone.

5.2.2 Nuclear Accents

It is generally assumed that declaratives in most languages have a falling nuclear accent⁴. The use of rising intonation in statements is considered exceptional (Bolinger, 1978). There are some exceptions, for instance, the native American language of Chickasaw (Gordon, 1999). There are also exceptions within some varieties of English (see, for example, Fletcher, J., Grabe, E., and Warren, 2005; Warren, 2005; Jarman and Cruttenden, 1976; Grabe, 2004; Guy et al., 1986). The most common nuclear contour observed in Donegal Irish in this study for declarative statements, for wh-questions and yes/no-questions is a rising tone, more specifically a low rising tone. However, in nuclear position there are also instances of low tones. Figure 5.12 indicates the percentages of the two accents found as

⁴ The nuclear accent is classified here as the last pitch accent in an intonational phrase.

nuclear accents in the corpus while Figure 5.13 illustrates examples of each of these two tonal options employed by Donegal Irish speakers in this study.

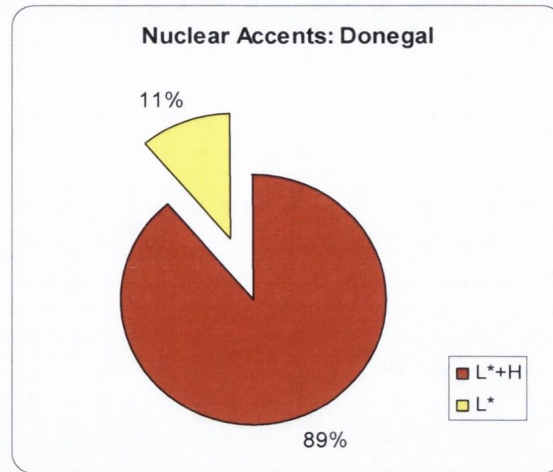


Figure 5.12. Percentages of nuclear accents found in Donegal Irish

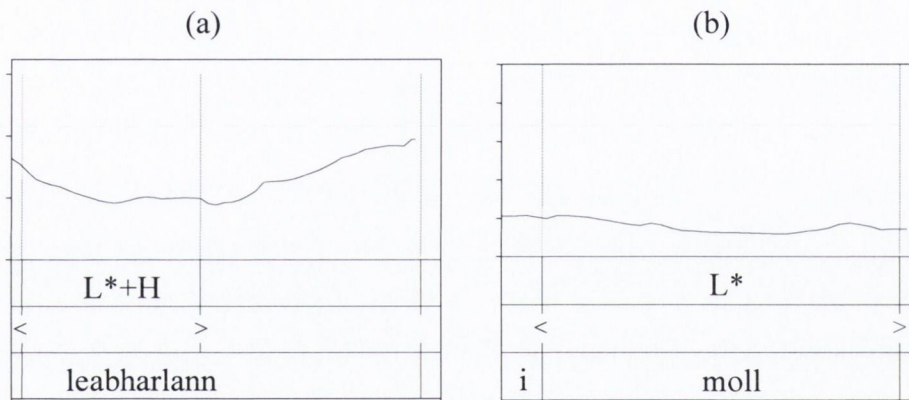


Figure 5.13. Two nuclear pitch accents produced by speakers of Donegal Irish: (a) L^*+H / $\lambda o:r^{\text{H}}l^{\text{H}}a^{\text{H}}n^{\text{H}}/$ and (b) L^* / $i m^{\text{H}}o^{\text{H}}l^{\text{H}}/$

While it is clear that the overall tendency is for speakers to employ low-rising accents in nuclear position, the following sections investigate both pitch accents.

5.2.2.1 Rising accents

In Donegal Irish there is clear evidence for low rising nuclear tones in all sentence types, labelled here as L^*+H . Precise alignment of the f_0 targets is looked at more closely in Section 5.6.2 but it can be stated generally that the L^* aligns to the accented syllable and is low for a good portion of this syllable. In this way the f_0 patterning of nuclear L^*+H is not observably different from that of prenuclear L^*+H . In fact the phonetic realisation of nuclear L^*+H is essentially the same as

that of prenuclear L*+H. The rise from the low pitch occurs after the stressed syllable. The f0 maxima is generally realised in following unstressed syllables, usually two syllables following the accent. If there is enough unstressed material following the nuclear accent there is a resultant plateau following the rise. In all, L*+H accents account for almost 90% of nuclear accents in Donegal Irish. Grabe and Post (2002) have reported similar results for Belfast English. What both dialects have in common is that they are dialects of Ulster. The precise timing of these rising tones in Donegal Irish is investigated in Section 5.6.2.

5.2.2.2 *Low accents*

The initial analysis of the corpora indicates the occurrence of a small number of low tones in nuclear position. Low tones account for approximately 10% of nuclear accents in the corpus. On closer examination these low nuclear tones tend to occur only in positions where there are no unstressed syllables following the nuclear syllable. As observed earlier, in prenuclear L*+H tones that occur in conditions of tonal crowding there was ‘deletion’ of the trailing tone, resulting in an L* realisation. L*+H tones in nuclear positions are similarly subject to phonological adjustments. In the nuclear case, the adjustment of the H tone is not a result of a tonal clash, rather it is a timing realisation issue. The adjustment occurs in accented words of one syllable, where there is not unstressed material following the accented syllable. When there is not enough unstressed material to fully realize the full rising gesture, the rising element of the bitonal accent is truncated resulting in a low spreading tone. This truncation or ‘deletion’ of the H element of the pitch rise was common across all of the speakers. The findings indicate that truncation is more likely to occur on phrase final monosyllabic words which have less voiced material in the segments, although instances of truncation were also found in fully voiced monosyllables.

Other monosyllabic final rises indicate that compression is also a feature of Donegal Irish⁵. In these instances, the rising gesture occurs within the one syllable available. The gesture is not merely compressed in time but also in range. The resultant pitch accent is a considerably flatter one than those found in nuclear conditions where there is more unstressed material following. Final rising accents

⁵ Compression is essentially the speeding up of the realisation of the pitch accent so that the full shape of the accent is produced on the small amount of material available.

thus can be either truncated or compressed. These accents are discussed in more detail in Section 5.6.2 on peak timing of nuclear accents.

To account for these two realisations of the nuclear accent on phrase final monosyllables it is necessary to have two pitch accent labels to account for the differences. The L^*+H accent with H deletion is labelled L^* and the compressed rising accent is labelled L^*+H . Without two distinct labels we fail to capture what are clearly two different realisations of an underlying L^*+H accent.

5.2.3 Boundary tones

There are essentially four boundary tone options employed by speakers of Donegal Irish in nuclear position. It was observed in Section 5.2.1.1 that an initial high boundary tone (%H) is common at the start of the intonational phrase in Donegal Irish. 77% of all sentence types in Donegal Irish begin with a initial high. In the remaining utterances there is more of a mid-level tone and this is not labelled. This is indicated in Figure 5.14.⁶

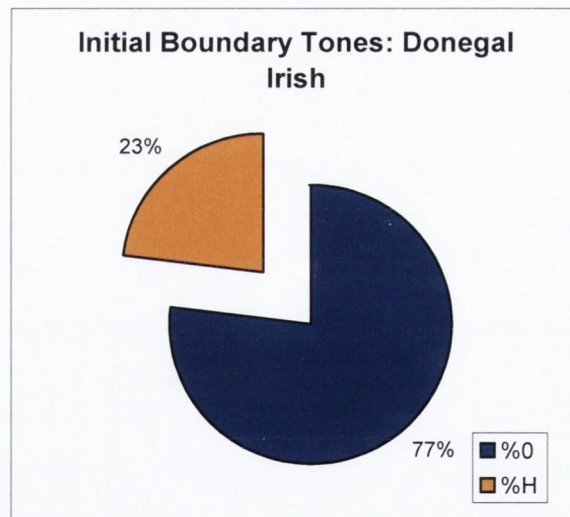


Figure 5.14. Percentages of initial boundary tones found in Donegal Irish

In phrase final position there are three boundary tone options. The choice of final boundary tone is mostly determined by the sentence type (whether question or statement). This is elaborated on in Section 5.3 below. As stated above the most common nuclear contour in Donegal Irish is a rising accent, L^*+H . This high element of this bitonal accent in nuclear position is generally realised as a high

⁶ For the purpose of distinguishing between the high tone and the mid-level tone in Figure 5.14, the mid-level tone is given a label of %0.

plateau, effectively yielding a final rise in declaratives and questions. There is no final pitch movement at the IP boundary and so the most frequent boundary tone in both questions and statements is a “zero” boundary tone. This “zero tone” option, 0%, as described in Section 4.4.1 was employed in the IViE project, and was needed to cover the three phrase boundary specifications in Belfast English (Fletcher, Grabe and Warren 2005). This feature also turns out to be necessary to account for the possible boundary conditions in Donegal Irish. It is essentially the same as plain % in Gussenhoven’s work (1984, 2002, 2004). The low-rise plateau in Donegal Irish we label L^*+H 0%. Following an L^*+H accent there is also the possibility of a final low boundary $L\%$. This latter pattern would yield an overall low-rise plateau with fall.

When there is an additional rise at the edge of the IP in Donegal Irish which cannot be accounted for by means of the trailing tone alone, it is labelled $H\%$. This is most common in yes/no-questions and virtually never occurs in declaratives or wh-questions. Figure 5.15 demonstrates the nuclear contour options as found in Corpus A, and the percentages in which they occur.

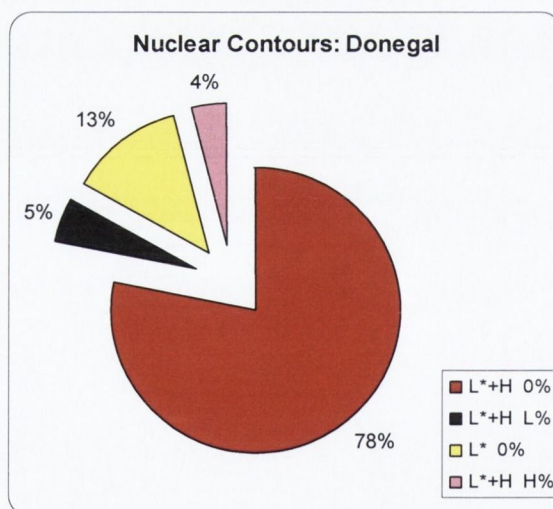


Figure 5.15. *Nuclear contours found in Donegal Irish*

Almost 80% of nuclear contours are low-rising plateaus, with low level nuclei making up 13% of nuclear contours. The remaining contours have either a final rise or a final fall, this is usually determined by the function of the contours. Final rises were generally found in yes-no questions and final falls in some declaratives. Final falls were never found in questions.

5.3 Distribution of Accents

The analysis in earlier sections has outlined the tonal structure of Donegal Irish. There are two underlying pitch accents in this dialect, and rising accent and a falling accent. There are phonetic variants of these which give rise to high (H*) and low (L*) realisations of these accents. L*+H is clearly the most common pitch accent, occurring in both prenuclear and nuclear contours. In prenuclear position speakers also employ falling accents, high accents and low accents. In nuclear position they also employ a low accent, labelled L*.

There are four boundary tone options available to speakers of Donegal Irish. There is the option of a high initial boundary tone at the start of the intonational phrase, %H, which allows the low tone in an initial rising accent to be more salient. In phrase-final position there are three boundary tone options: an L% boundary, a H% boundary tone or the choice of no-tone at the IP boundary, 0%. Table 5.1 below outlines the tonal inventory established for Donegal Irish.

<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Pitch movement</i>
L*+H	L*+H	Low target followed by a rise
	L*	Low target
H*+L	H*+L	High target followed by a fall
	H*	High target, realised as a plateau
%H		Initial high boundary
0%		No tone at the final boundary
L%		Final low boundary
H%		Final high boundary

Table 5.1. *The tonal inventory for Donegal Irish*

This initial sketch of the tonal inventory of Donegal Irish was carried out across the three grammatically different utterance types: declaratives, wh-questions and yes/no-questions. In following sections the distribution of accents across these three utterance types is focussed on. The overall contour shape of Donegal Irish declaratives and interrogatives is generally strikingly similar. However, there is some variation in pitch accent and boundary tone distribution across the different sentence types. The variation is more apparent in prenuclear accents, but some

variation also occurs in nuclear contours, particularly where boundary tones are concerned. Once again this is based on analysis of Corpus A, the data set containing repetitions of 30 declaratives, 15 wh-questions and 10 yes/no questions.

5.3.1 *Accent distribution in declaratives*

As indicated earlier there is a large propensity for Donegal Irish speakers to employ a rising L*+H accent in both prenuclear and nuclear position, thus the underlying phonological specification for a Donegal Irish declarative appears to be L*+H L*+H 0%.

Prenuclear accents

L*+H accents make up approximately 80% of both prenuclear and nuclear accents in Donegal Irish. The remaining 20% is made up of L* and H* accents. Of these, the L* tones only occur in non-initial position (never in initial prenuclear position). Earlier it was established that this pitch accent is a truncated version of L*+H as it only occurs under certain stress clash conditions, or on phrase final monosyllabic words. However, a separate label was deemed necessary to account for its perceptually different realisation, particularly in nuclear position where rising nuclear contours are more common in this dialect.

Similarly, H* tones only occur in initial prenuclear position. This was discussed in Section 5.2.1.4. It occurs only when there is no unstressed material preceding the initial accented syllable, but differs from an L*+H accent under the same condition. H* accents account for approximately 15% of initial prenuclear accents.

Figure 5.16 indicates the percentage of prenuclear accents found in the corpus for declarative sentences. Figure 5.17 breaks these down into initial prenuclear and non-initial prenuclear accents.

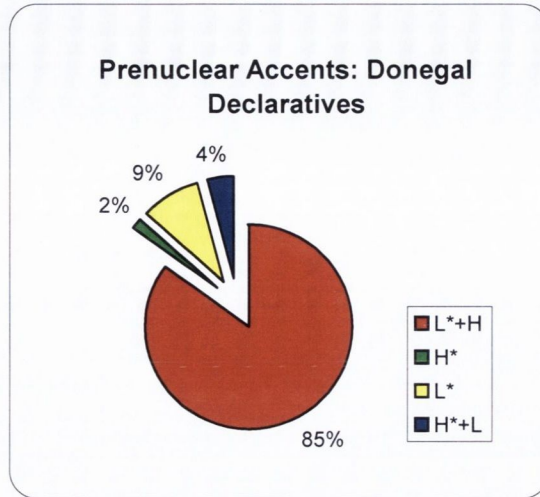


Figure 5.16. *Prenuclear accents found in declaratives of Donegal Irish*

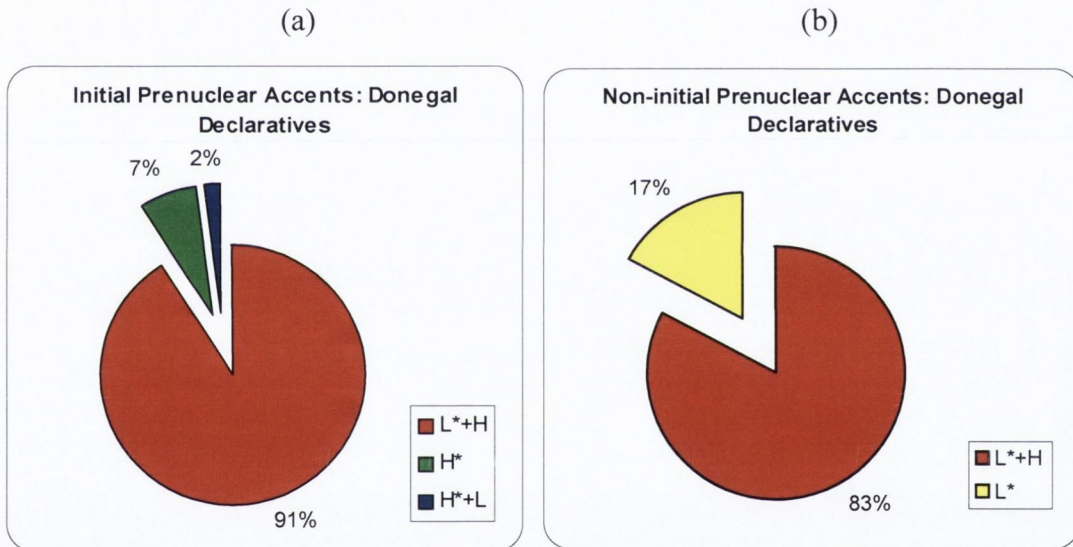


Figure 5.17. (a) *Initial prenuclear accents* and (b) *non-initial prenuclear accents* found in declaratives of Donegal Irish

Nuclear

In nuclear position approximately 80% of pitch accents are rising L*+H accents. Grabe and Post (2002) describe similar findings for Ulster (Belfast) English. 70% of Donegal low accents end with a plateau. The remaining 10% are low rises followed by a fall at the intonational phrase boundary. The remaining one fifth of accents are low tones which primarily occur when there is no unstressed material following the nuclear accent. Figure 5.18 indicates the percentages of nuclear contours in Donegal Irish declaratives.

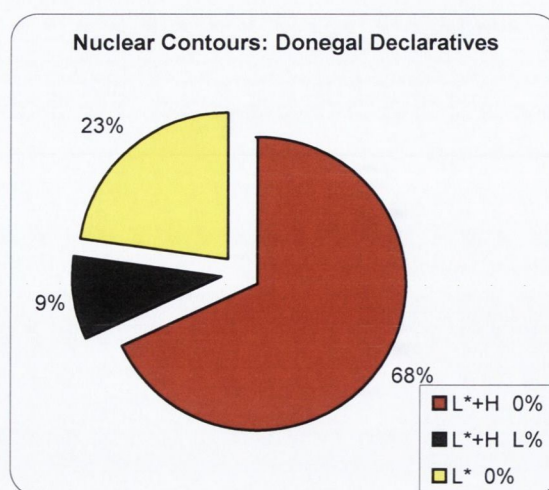


Figure 5.18. *Nuclear contours of Donegal Irish (in percentages)*

5.3.2 Accent distribution in *Wh*-questions

Intonation contours of *wh*-questions in Donegal Irish are strikingly similar to declaratives. One difference that is observed with *wh*-questions, and which differentiates them from declaratives, is the pitch accent type employed by speakers on the initial prenuclear accent of the IP.

Prenuclear

Speakers generally employ a H^* accent at the start of the IP for Donegal Irish *wh*-questions. In fact almost three-quarters of initial accents in *wh*-questions of Donegal Irish are high pitch accents. This would imply that the cue to a *wh*-question in Donegal Irish is an initial high accent followed by low-rising accents (or in a small percentage of cases by L^* accents). This initial high is categorically different to an initial high boundary tone as it is clearly associated with the first accented syllable.

Figure 5.19 indicates the percentages of different prenuclear accents found in *wh*-questions in this corpus, while Figure 5.20 indicates the percentages in terms of initial and non-initial prenuclear accents.

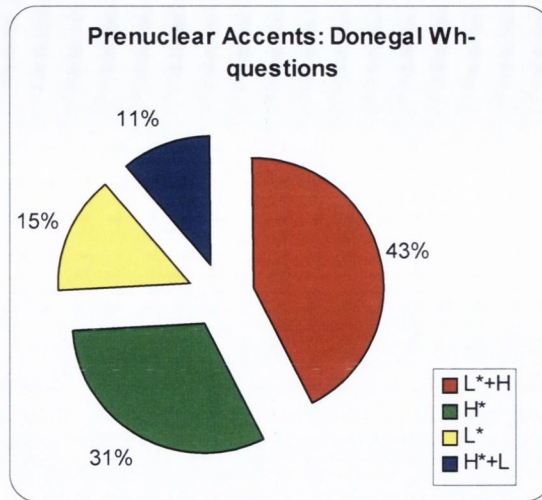


Figure 5.19. *Prenuclear accents found in wh-questions of Donegal Irish*

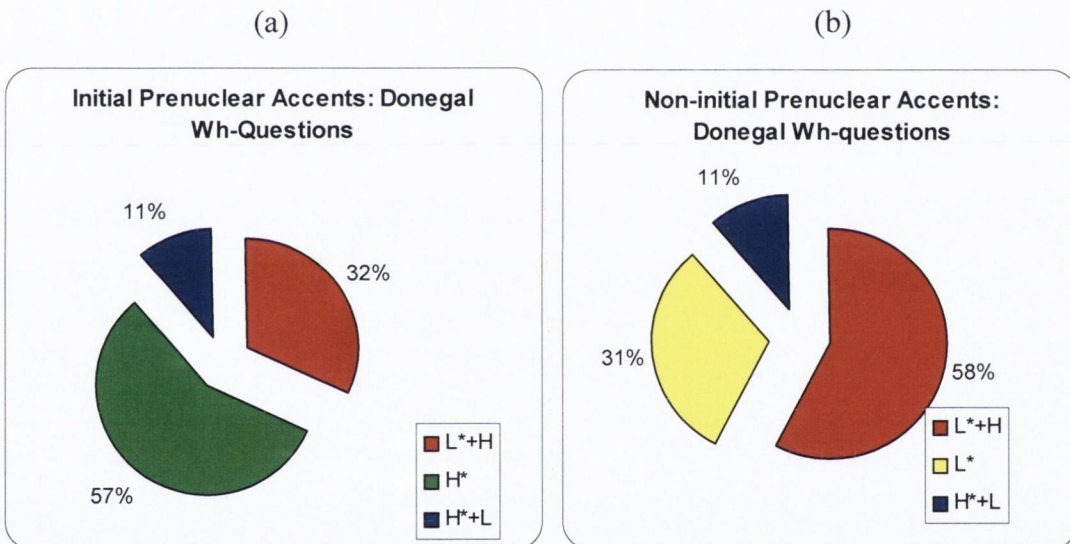


Figure 5.20. *Percentages of (a) initial prenuclear and (b) non-initial prenuclear accent finds in Donegal Irish wh-questions*

Nuclear

Figure 5.21 demonstrates the percentages of nuclear contours for wh-questions found in the corpus. By far the most common nuclear contour in wh-questions is the low-rise plateau (L*+H). Wh-questions virtually always exhibit a 0% boundary tone, and in most cases present identical nuclear tonal patterns to the declaratives: a rise plateau nuclear contour. The remaining contours are low-level nuclei (2%) and, a low-rise followed by a high boundary tone (2%).

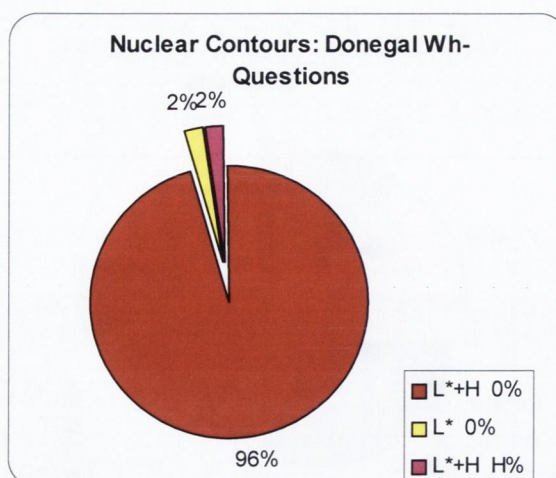


Figure 5.21. Nuclear contours accents found in *wh*-questions of Donegal Irish

5.3.3 Accent distribution in yes/no-questions

Prenuclear

In yes/no-questions initial pre-nuclear accents were consistently produced with a low rising accent and these rises are realised in the same way those found in declaratives and *wh*-questions, i.e. the starred element of the accent is aligned with the accented vowel and the H element occurs in following unstressed syllables. L* accents account for just 17% of pre-nuclear accents in yes/no-questions and similarly to the other sentence types only occur in conditions of tonal crowding. These are presented in Figure 5.22 and 5.23.

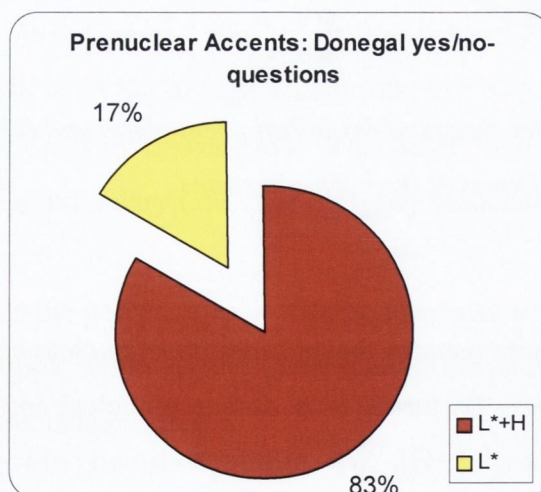


Figure 5.22. Prenuclear accents found in yes/no-questions of Donegal Irish

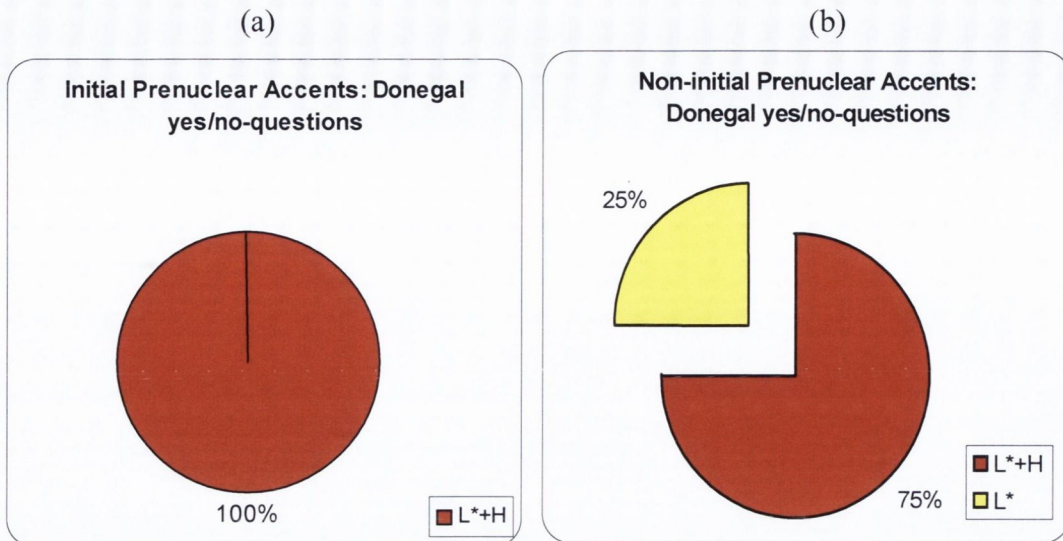


Figure 5.23. (a) *Prenuclear* and (b) *initial prenuclear accents* found in *yes/no-questions* of *Donegal Irish*

Nuclear

Figure 5.24 indicates the nuclear contours found in Donegal Irish yes/no-questions. The findings indicate that yes/no-questions are mainly differentiated from declaratives and wh-questions in terms of their final boundary tone. Almost two-thirds of yes/no-questions were produced with a final rise at the edge of the intonational phrases (H%). The remaining one-third of nuclear contours in yes/no-questions were produced as plateaux. Grabe and Post (2002) found that in Belfast English L^*H H% signalled interrogativity more clearly than L^*H 0%. In their data L^*H H% was only observed in yes/no and declarative questions. Our data show similar findings, where the H% is common in yes/no-questions. Declarative questions do not occur in Irish. Grabe and Post point out that H% does not occur in wh-questions as the need for intonational interrogativity is weaker.

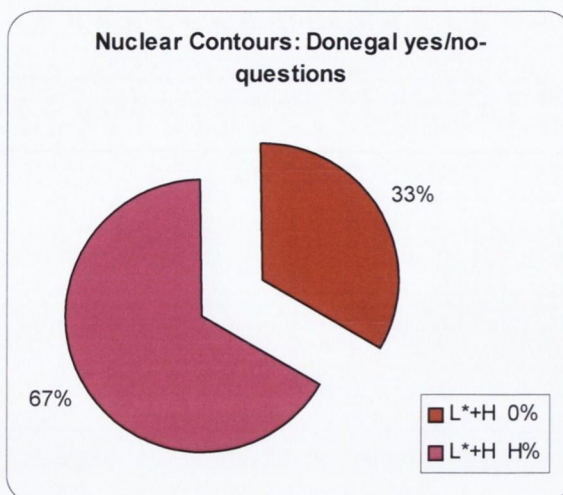


Figure 5.24. Nuclear contours accents found Donegal Irish yes/no questions

Table 5.2 summarises the distribution of accent types for Donegal found in Corpus A, for both prenuclear and nuclear accents across each of the sentence types.

<i>Sentence type</i>	<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Prenuclear (%)</i>	<i>Nuclear (%)</i>
Declarative	H*+L	H*+L	4	0
Wh-Question		H*+L	11	0
Yes/no-question		H*+L	0	0
Declarative	H*+L	H*	2	0
Wh-Question		H*	31	0
Yes/no-question		H*	0	0
Declarative	L*+H	L*+H	85	77
Wh-Question		L*+H	43	98
Yes/no-question		L*+H	83	100
Declarative	L*+H	L*	9	23
Wh-Question		L*	15	2
Yes/no-question		L*	17	0

Table 5.2. Summary of pitch accent distribution for prenuclear and nuclear accents across the three grammatically different sentence types (declaratives, wh-questions and yes/no-questions)

5.4 Peak timing in Donegal Irish declaratives

To investigate peak timing in Donegal Irish declaratives, Corpus B, as outlined in Tables 4.3a (Subset i) and Table 4.3b (Subset ii) in Chapter 4, was labelled and analysed. To recap, Corpus B was designed to elicit specific prenuclear and nuclear accented syllables in a variety of conditioning environments where the peak location might be expected to vary. In these sentences a specific accented syllable was elicited so that the number of unstressed syllables preceding it, when in initial prenuclear position, and following it when in nuclear position, was varied from 0 to 2. This part of the analysis was done after the primary tonal inventory was established. The earlier analysis shows that the most common pitch accent employed by Gaoth Dobhair speakers is an L*+H rising accent. With this in mind, peak timing in rising accents across three prenuclear conditions and three nuclear conditions is the focus of the following sections. Preliminary results from this analysis were initially presented in Dalton and Ní Chasaide (2005b). The expectation based on data from evidence from other languages (see Section 2.6, Chapter 2) is that increasing the number of syllables following the nuclear accent will yield a *rightwards* drift in the peak timing, while increasing the size of the anacrusis will yield a *leftwards* peak shift. This we term the *variable peak hypothesis*.

As indicated in Chapter 4, there was extensive devoicing of some phonological voiced stops of the test syllables in Subset i (Table 4.3a), which complicated the findings somewhat. It meant there could be no precision in the timing measurements taken, as many of the high and low turning points appeared to be located at the vowel/consonant boundaries. Subset ii (Table 4.3b) was designed to refine the analysis. The test syllables in this Subset contains fully voiced consonants.

The test sentences for the analysis were interspersed with a larger set of sentences. The recording included 8 randomised repetitions of each sentence. 5 representative utterances were chosen from the 8, which allowed for occasional errors, hesitations etc. The same four speakers of Gaoth Dobhair Irish employed in the earlier analysis were recorded and analysed. Only sentences which employed the L*+H accents in initial prenuclear position and nuclear position were chosen for the analysis. Those containing H*+L, H* or L* realisations were omitted. Results from both subsets of Corpus B are reported on in the following sections.

As a starting point for the analysis, the accented syllable and all of the unstressed syllables following the (nuclear and prenuclear) accent and preceding the (prenuclear) accent in each utterance were segmented. The duration of each segment was measured and averaged. A number of points in the contour were then labelled, and their time location measured relative to the nearest segmental boundary. Values were averaged as there was little interspeaker variation. The labels used for the time points are glossed in Table 4.5 in Chapter 4 and adapted for Gaoth Dobhair in Table 5.3 below.

L*	corresponds to the f0 minimum in L*+H accents
H	corresponds to the trailing tone in the L*+H accents.
(H)p	denotes the end of the high plateau in L*+H accents.
p(L*)	corresponds to the start of a low plateau in some L*+H accents ⁷
h(L*)	corresponds to the f0 at the start of the utterance preceding prenuclear L*+H accents

Table 5.3. *Timing tier labels for Donegal Irish*

A schematic representation of the measured timepoints is given in Figure 5.25.

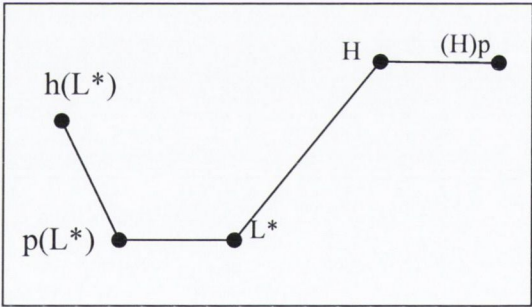


Figure 5.25. *Schematic figure illustrating the labels associated with the timepoints measured in L*+H prenuclear and nuclear accent.*

The following sections present data on the alignment of the peaks and troughs associated with the initial prenuclear and nuclear accented syllables in L*+H pitch accents of Donegal Irish.

5.4.1 Peak timing in L*+H prenuclear accents

Results for the prenuclear accents of Donegal Irish are shown in Figures 5.26 – 5.28. The figures represent the averages of the two speakers. It should be noted

⁷ See Section 4.4.2, Chapter 4 for an elaboration on this label

that there was little or no variation in the speakers realisations of the target syllables. The upper part of the figures indicate the results for Subset ii of the corpus, i.e. the syllables /m^jɪɹ/, /v^jɪɹ/, /wɪɹ/, /m^ɔɔɹ/ or /m^ɪɪ ɹ/, while the lower half of the figure represents the results from Subset i, the syllable /g^ɔob^ɔ/. Note that in each prenuclear (PN) condition, the number indicates the size of the anacrusis: in PN0 there are no preceding unstressed syllables, in PN1 there is one, and in PN2 there are two preceding unstressed syllables. It is also worth noting that differences in overall f0 level between subset i and subset ii of Corpus B may be due to the fact that each of the subsets were recorded on different days and at different times of the day. It has been demonstrated that F0 may vary during the day, most likely reflecting changes in physiological activity over the course of the day (see, for example, Cooper and Yanagihara, 1971; Garrett and Healey, 1987).

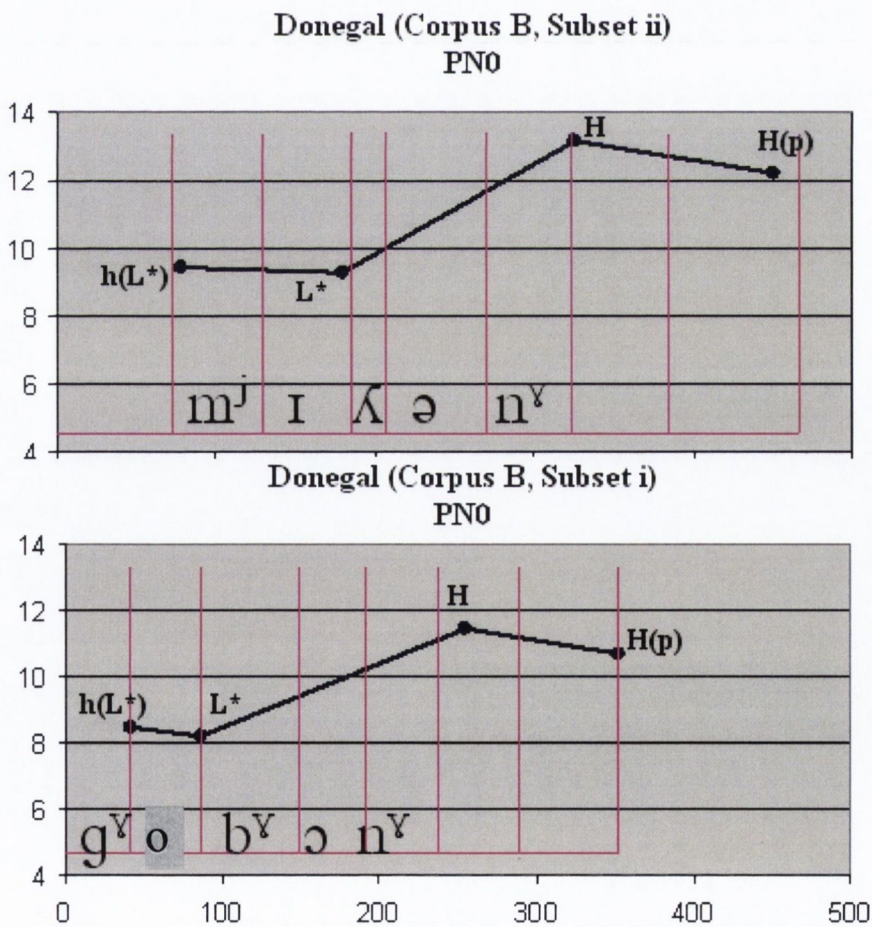


Figure 5.26. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) (reference value 150Hz) and x-axis in ms. PN0= no anacrusis.

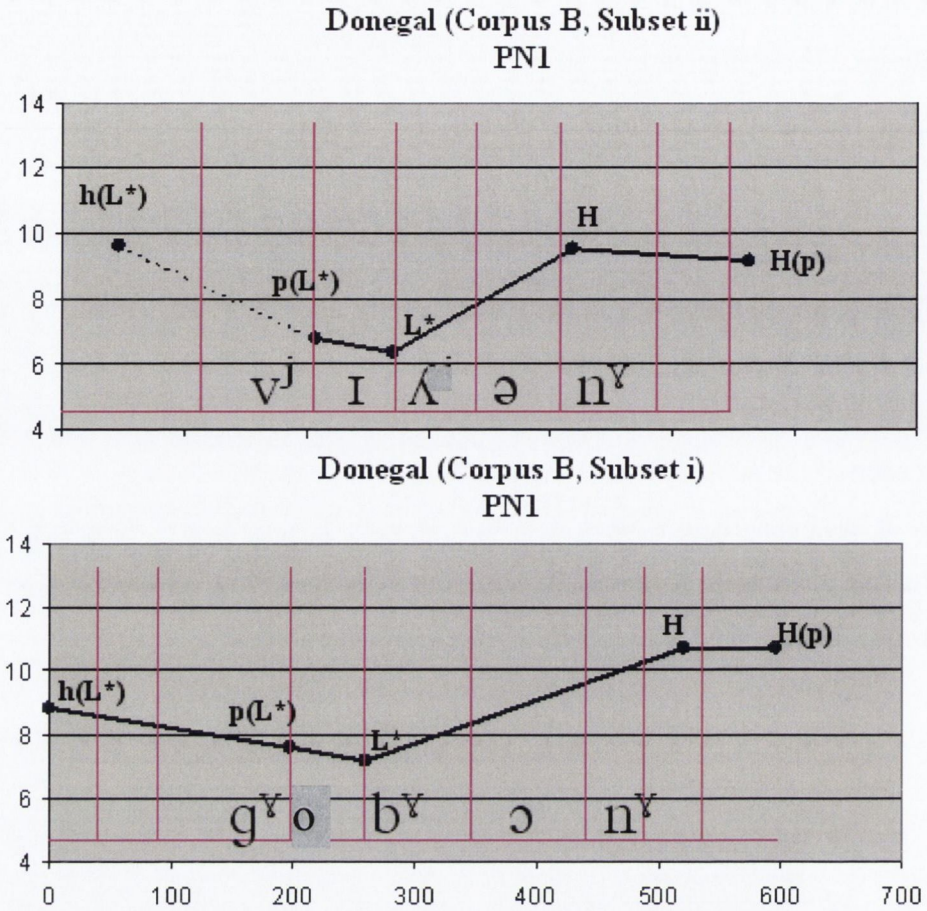


Figure 5.27. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1= anacrusis of one

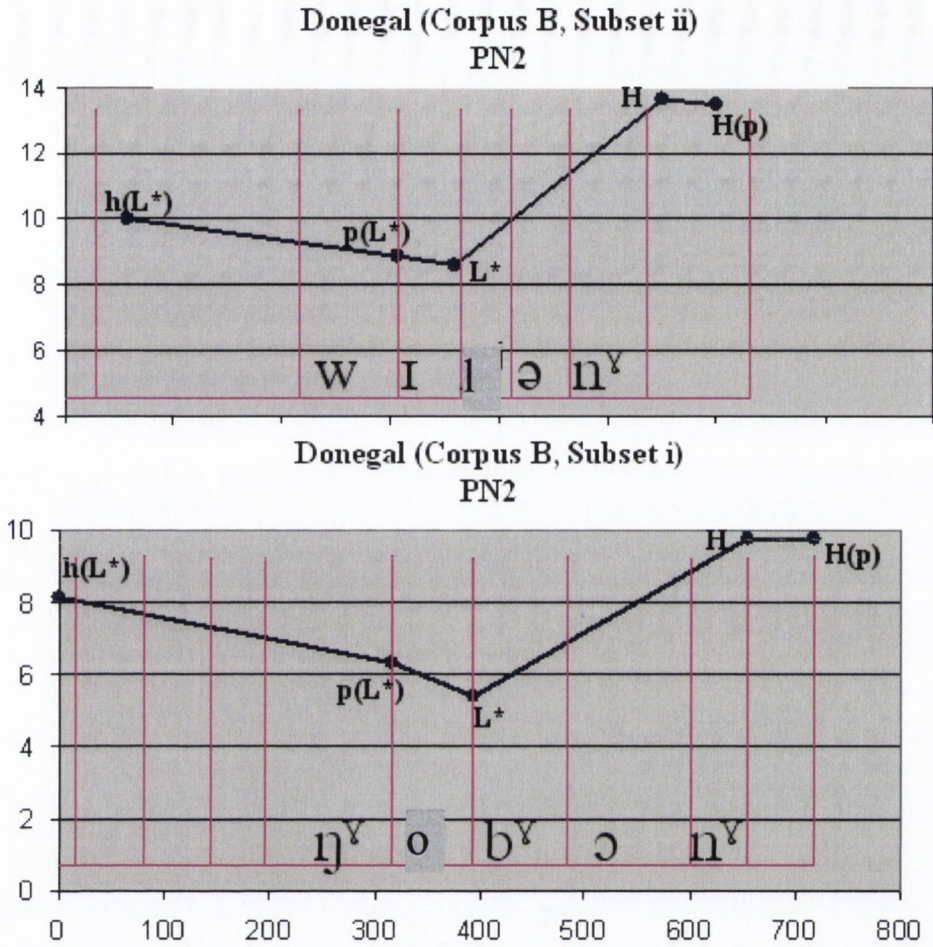


Figure 5.28. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two

The results indicate similar findings for both the voiced and devoiced data sets. There is little variation in the alignments of the both tones of the bitonal accent across each of the prenuclear conditions. The size of the anacrusis has no effect on the locations of the both the L target and the target of the trailing H tone. The lack of shift in either H or L is quite striking, and differs to findings reported for other languages where the number of preceding unstressed syllables has an effect on the timing of the peaks in relation to the segments (e.g. Farrar and Nolan, 1999; Arvaniti and Ladd, 1995).

For the L tone the associated trough is consistently realised at the right-edge of the accented vowel, or more specifically at the boundary of the accented vowel and the following consonant. Because of the devoicing of the final consonant /b/ in

Subset i the possibility that the minimum might occur somewhat later, during the consonant had to be considered. If this were the case it would mean that the f_0 minimum was anchored to the syllable edge rather than to the accented vowel. The refined analysis of Subset ii clarifies that the L^* is firmly associated with the right-edge of the accented vowel and its location is invariant across each of the anacrusis conditions.

Additionally the range of the pitch drop to the L^* in Donegal increases with the size of the anacrusis. As mentioned earlier in Section 5.3.1.2 utterances in Donegal Irish typically have an initial %H boundary tone at their onset. This initial f_0 measurement, labelled here as $h(L^*)$ in the prenuclear measurements, is quite consistent across the three anacrusis conditions for both data sets. As the anacrusis increases the range of pitch drop to the L^* increases. The dip to the L^* in PN0 is quite shallow. This dip in f_0 , however, is enough to categorise the accent as a rising one because the timing of the targets in the PN0 conditions are consistent with those of PN1 and PN2. Additionally there is clear auditory evidence here to indicate that in these cases we are dealing with a rising, rather than a high, accent. Analysis of Corpus A earlier indicated that certain accents in this prenuclear condition should be labelled H^* . These H^* accents had no dip, or merely had an insignificant, imperceptible dip in f_0 on the accented vowel. Additionally, the H^* accents showed no significant rise in f_0 on subsequent unstressed syllables.

The findings show that in the majority of cases the f_0 minimum of the bitonal accent is located towards the end of the accented vowel. The findings show that there is a very shallow slope in f_0 within the accented vowel. Indeed one speaker sometimes produced a plateau on this L tone. However, given the tendency for most of the targets to dip, the most satisfactory interpretation of this is that L^* is anchored to the right edge of the accented vowel. The conclusion based on this analysis is that the L^* in Donegal prenuclear accents is essentially the endpoint of a fall which begins at the onset of the phrase.

In this dataset the H target of the trailing tone of the L^*+H prenuclear Donegal accent is consistently located in the second unstressed syllable following the accented syllable. A further point worth noting is that the high element of the trailing tone in the L^*+H accent is generally realized as a plateau. The onset of the plateau is labelled H in the above Figures, and the end of the plateau is labelled $H(p)$. According to Grice (1995a), in a bitonal L^*+H accent the H should exhibit

stable alignments, predictable from the bitonality of the accent. In other words the trailing tone should follow the starred tone by a fixed interval. While this contradicts Gussenhoven's tone linking rules, Grice's theory holds for these prenuclear accents in the Donegal data. Although there is no consistency in terms of absolute time (the interval between L* and H is approximately 130 ms in PN0 and 250 ms in PN1), it is stable in terms of syllable numbers. It should also be clarified that the H occurs in the unstressed vowel each time, even when segments surrounding the vowel are fully voiced. While the location of the H tone is consistent insofar as it is located in the vowel of the unstressed syllable, there is no precise alignment within the vowel. However, the slight shift in the location of the H element is unrelated to the size of the anacrusis: it does not shift in a systematic way with an increase in the size of the anacrusis. For example, the H is earlier in PN2 than PN1, but it is later in PN1 than in PN0. These results militate against the *variable peak hypothesis* where it was expected that increasing the size of the anacrusis would yield a leftwards peak shift.

5.4.2 *Peak timing in L*+H nuclear accents*

This section presents data on the alignment of the peaks and troughs associated with the nuclear accented syllables in the declarative utterances of Corpus B for Donegal. Figures 5.29 – 5.31 illustrate the alignment and pitch measurements for the nuclear accents.

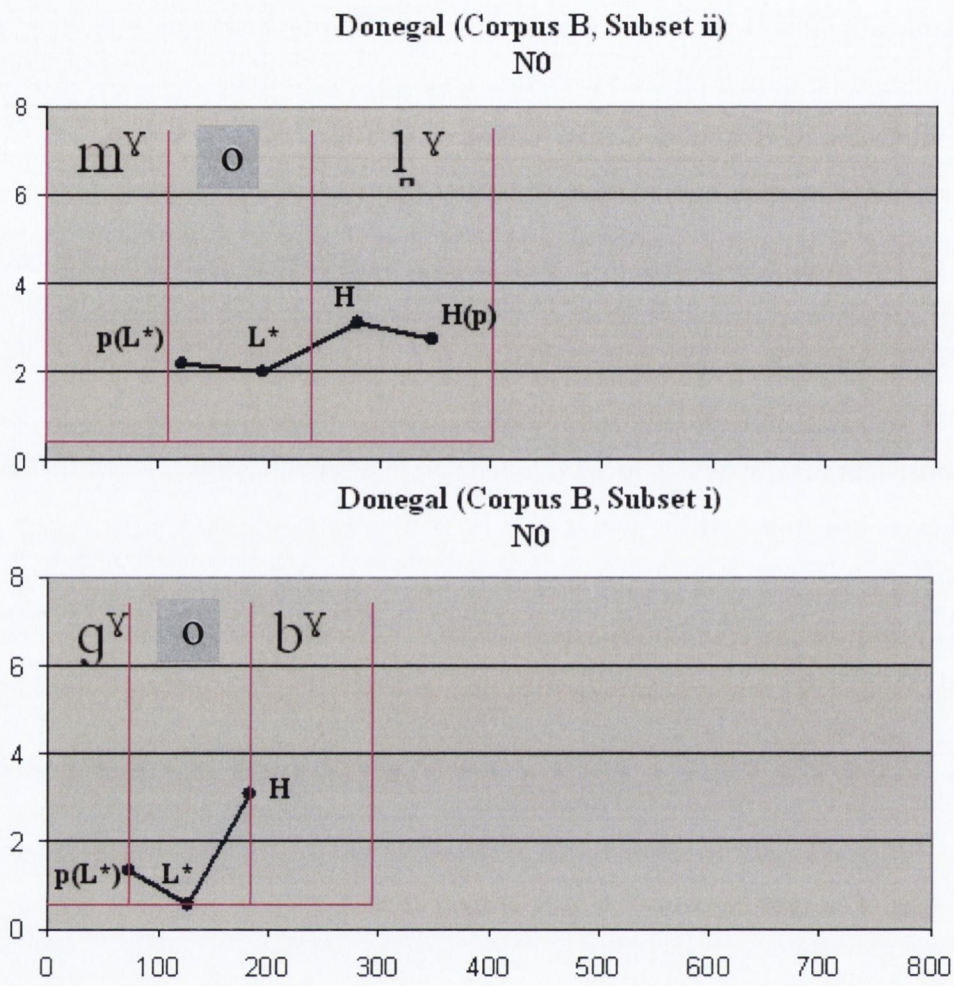


Figure 5.29. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0=no unstressed syllables following the nuclear accent

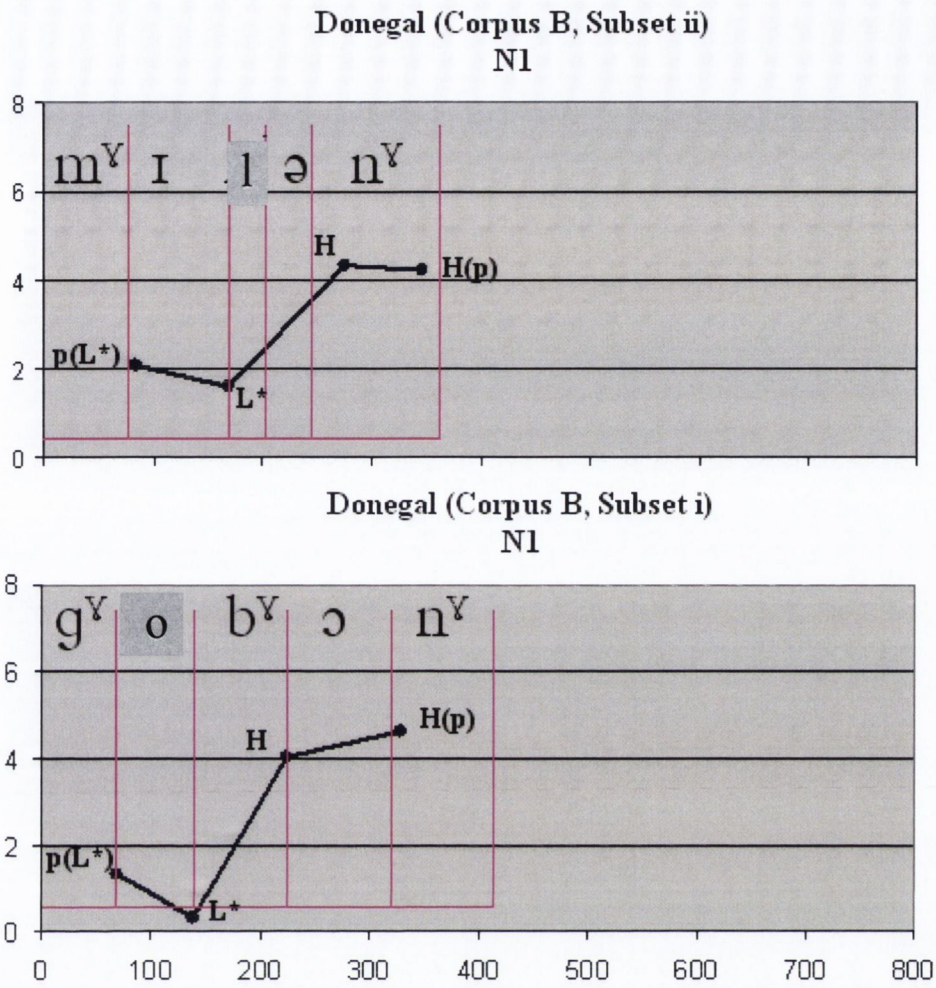


Figure 5.30. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1 = one unstressed syllable following the nuclear accent

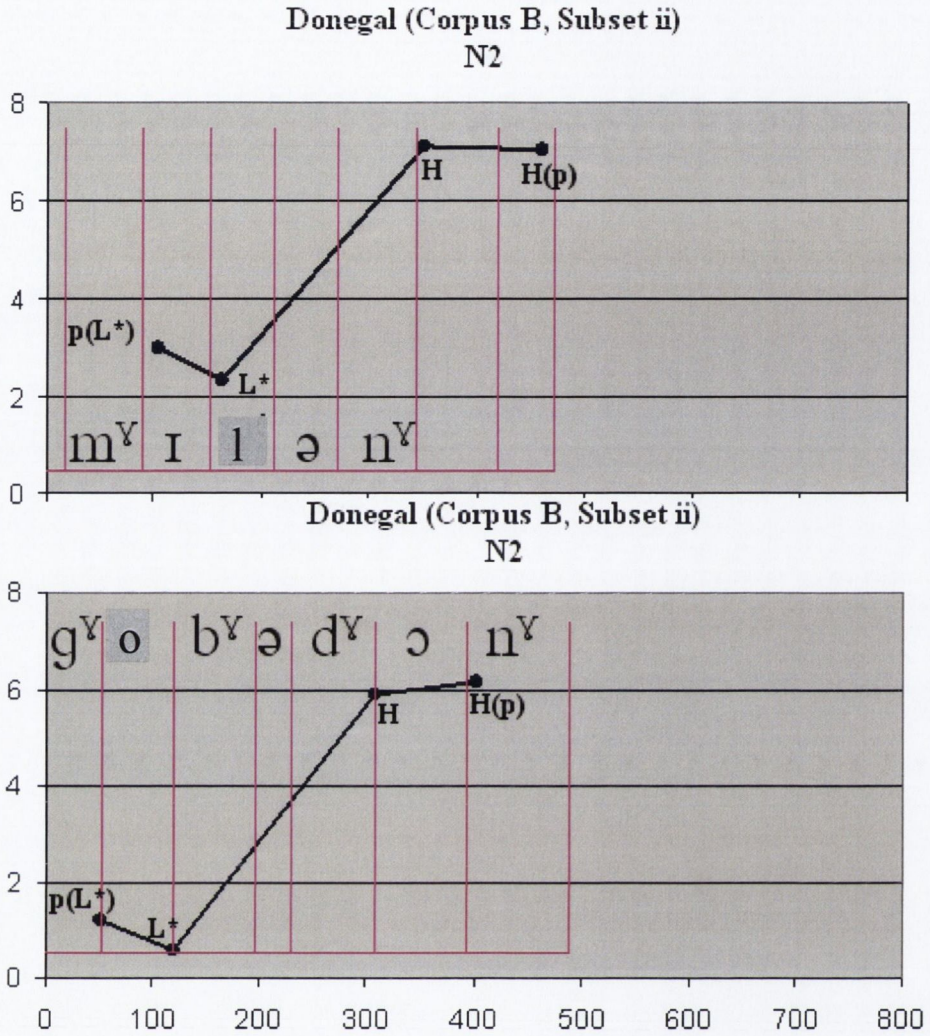


Figure 5.31. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2= two unstressed syllables following the nuclear accent

The first observation is the alignment of the L target of the bitonal L*+H accent. In nuclear conditions N1 and N2 the L* is anchored to the right edge of the accented vowel, as it was each of the prenuclear cases. There is some variation in its location in the N0 condition: there is an earlier timing of the L* in the accented vowel which occurs in both subsets of Corpus B. There seems to be a simple explanation for this: if the fully rising gesture is to be carried out within the one available syllable, then the earlier timing of L* in N0 is necessary given that there are no unstressed syllables following the nuclear accent. The earlier alignment of the L* in this condition suggests that that we are dealing with compression of the contour, where the L* has shifted to an earlier point in the accented vowel,

presumably under the “pressure” of the fact that there is only a single syllable available for realisation of the entire rising accent. Similar compression occurs in the H element of the accent, resulting in overall compression of the entire pitch accent. This was referred to earlier in Section 5.2.2.2 when data from Corpus A indicate that monosyllabic words in nuclear position, and with no following unstressed material, may be subject to both truncation and compression (for more on truncation see below).

The location of the H element varies across the three nuclear conditions, but the variation that occurs would be an expected surface realisational difference if we are correct in assuming that the underlying anchoring of H is to the second unstressed syllable following the accented one. This was observed in the prenuclear conditions and is supported in the nuclear data set by the location of H in N2 where it is again located two syllables after the accented one. If we assume that the L*+H tone of Donegal Irish has an intrinsic time requirement for its realisation which is two syllables, then this requirement is likely to be violated in nuclear conditions where there are not enough post-accented syllables. The compression in N0 demonstrates this and it is also the case to a lesser extent in N1. The fact that H occurs earlier going from N2 to N0 can be taken to simply reflect the successive decrease in the number of unstressed syllables available for its full realisation. Compression in terms of the range of f0 is also suggested by the reduced height of H, going from N2 to N1 to N0, where the scale of the rise for H reduces from approximately 5.5 semitones in N2, to 3.75 in N1 and 2.5 in N0. This compression, hinted at in Section 5.2.2.2, is most likely to be a result of constraints on the rate of pitch variation due to the reduced time available for the realisation of the contour.

There is also a degree of truncation in this H tone which is most obvious in the dataset containing the syllable /ɣ[Φb]/. In the N0 condition for this dataset the plateau of the H tone following the rise is completely truncated and is not realised. Interestingly in the fully voiced N0 dataset the plateau does not get truncated, but rather gets compressed. Earlier sections have already shown evidence for truncation in the dialect of Donegal when the H tone of L*+H accents was deleted under certain conditions. In prenuclear conditions it was truncated because of tonal crowding, and in nuclear conditions because of timing restraints. Grabe (1998) has shown evidence that compression is a feature of English nuclear accents under

certain conditions, and truncation is a feature of German nuclear accents under similar conditions. Donegal Irish appears to feature both truncation and compression.

Grønnum (1989) and Ladd (1996) have suggested that truncation and compression may be language-specific typological parameters in intonation. Fox (1999), on the other hand, has examined the evidence for a claim that the intonation systems of English and German differ typologically and argues that the evidence which suggests truncation and compression are language-specific typological parameters is unconvincing. Others have argued that rather than being language-specific, differences in the application of truncation and compression may be dialect specific (see, for example, Bannert and Bredvad, 1975, for Swedish; Grabe and Post, 2002, for English). The data for Donegal would suggest that both truncation and compression occur on this dialect, however, further analysis of these phenomena may be required in future work for each of the Irish dialects.

The results of peak timing in the nuclear accents again militate against the *variable peak hypothesis* where it was expected that increasing the number of syllables following the nuclear accent will yield a rightwards drift in the peak timing,

5.5 Summary

In this chapter a preliminary tonal inventory was established for Donegal Irish based on auditory and acoustic analysis of read speech corpora for four speakers of Gaith Dobhair Irish. The most common pitch accent in Donegal Irish is a pitch rise associated with the accented syllable. In Autosegmental-Metrical terms this is an L*+H pitch accent. Sequences of these L*+H accents make up the most common intonational contour for declarative statements and the two different question types analysed here. A sequence of L*+H accents with no tonal specification at the IP boundary may be considered the 'default' tune for Donegal Irish. In initial prenuclear position this rising accent is often preceded by an initial high boundary tone, %H.

The prenuclear accent inventory of Donegal Irish is richer than the nuclear inventory. In addition to rising accents the inventory includes H*+L accents, H* accents and L* accents. It is likely that the H* accent is a result of modifications or phonological adjustments made to the underlying H*+L accent, meaning H* is a

phonetic variant of H^*+L . Similarly L^* is likely to be a variant of an underlying L^*+H accent. L^* accents only occur in non-initial prenuclear position and most commonly occur when there is tonal crowding, i.e. when followed closely by another pitch accent. H^* accents, on the other hand, only occur in initial position.

Falling tones and low tone can both spread over several syllables. The optimal time required for a rising accent appears to be three syllables: the low target occurs in the accented syllable, while the high accent occurs two syllables following the accented ones. This is typical of a rising tone, but there may be variation in the location of the H element.

In nuclear position two types of pitch accents are produced by Donegal Irish speakers. The most common pitch accent in this position is a rising L^*+H accent. Again given enough material the peak is realised two syllables after the accented syllable. The low portion of the bitonal accent is optimally aligned with the right edge of the accented vowel.

Low accents (L^*) in nuclear position occur only on accented syllables with no following unstressed material. Our analysis suggests that this is an underlying L^*+H accent where the H element is truncated, leading to its deletion. Examples of complete rises were also found on monosyllabic words in nuclear position. In such cases the rise was compressed rather than truncated so that the entire rising gesture was realised within the monosyllable. There appears to be evidence for both truncation and compression in Donegal Irish which raises questions about whether to categorise it as a truncating or a compressing dialect.

The distribution of the different pitch accent types across the grammatically different sentence types displayed only minor differences. Declaratives and both question types (wh-questions and yes/no-questions) in Donegal Irish tend to employ the same overall pitch pattern, i.e. sequences of rising accents. Wh-questions differ from the other sentence types in that they often employ high or falling accents in initial prenuclear position. This initial high peak appears to be a marker of wh-question intonation for Donegal Irish. Yes/no-questions are mainly differentiated from the declaratives and wh-questions in terms of their boundary tone. A final high boundary tone is a common marker of yes/no-questions in this dialect. The nuclear rise with a plateau is common to both declaratives and questions, and this makes the intonation of Donegal distinctive from other languages/language varieties where a falling intonation is generally expected in declaratives.

Finally, in Donegal Irish, peak timing analyses showed that rising prenuclear and nuclear accents generally align with the segmental string in the same manner. The low tone is aligned with the accented vowel, more specifically with the right-edge of this vowel, and the high tone target is generally aligned with the vowel of the second unstressed syllable following the accented one, providing there is enough unstressed material to allow for this.

This chapter presents the findings of the analyses of two dialects of South Connaught: Cois Fhairrge and Inis Óirr as indicated in Figure 6.1. The dialects are described in more detail in Section 1.2, Chapter 1.



In the first section of this chapter the tonal inventory of South Connaught is drawn up based on three speakers of each of these two dialects. As indicated in earlier chapters, the two dialects are considered by linguists to be one dialect (Ó Murchú, 1991, 1998; Ó Dochartaigh, 1973). Analysis of the tonal inventories and the distribution of tones carried out in this study has shown that the two dialects are intonationally very similar, at least at the phonological level. The phonological analysis, therefore, provides a unified account of the tonal inventory of the two dialects based on acoustic and auditory examination of the pitch contours. This part of the analysis is carried out on the corpus of grammatically different sentence types

as outlined in Section 4.3.1 and is done using the IViE labelling system as described in previous chapters.

Informal analysis has suggested that there are subtle differences in the phonetic realisation of the contours in these superficially similar dialects and, therefore, in the second part of the chapter on peak timing, the two dialects are treated separately. This more detailed phonetic analysis, investigates how f0 targets in the most common prenuclear and nuclear accents are timed with the segmental/syllabic tier and this is carried out on the peak-timing corpus as described in Section 4.3.2.

6.2 Tonal Inventory of South Connaught Irish

Section 3.3.2.1.2, Chapter 3 outlined some of the previous work done on the intonation of South Connaught, more specifically on Connemara Irish. While these analyses provide a useful starting point for a description of nuclear contours in Connemara Irish there is still a need for a more detailed analysis of the intonation contours of South Connaught dialects as a whole. The principal aim of the following sections is to draw up an underlying tonal inventory of both prenuclear and nuclear accents found in South Connaught Irish, from which other tones may then be derived. The analysis is based on auditory and acoustic analyses of Corpus A (Section 4.3.1), the set of 55 read sentences.

Firstly, the tonal inventory of prenuclear accents is looked at in detail. This is followed by an analysis of the nuclear contours of South Connaught Irish. The methodologies are as in the previous chapter for Donegal Irish. The transcription and analysis of the utterances follows the methodology laid out in Chapter 4.

The first observation in South Connaught Irish is that two typical contour types were produced by the speakers. There was free variation in the choice of contour employed. Each speaker of each of the dialects produced both contour types, so that the choice of contour is neither speaker-specific, nor dependent on whether the speaker is from Cois Fhairrge or from Inis Oírr. Additionally, the choice of contour is not dependent on the sentence type – both contours were found in both declaratives and questions. Findings for Donegal Irish in Chapter 5 also indicate there is a striking similarity in contours found in declaratives and those found in questions. A further observation for South Connaught is that there are more phonological adjustments to contours in prenuclear position than in nuclear position. This is elaborated on in later sections.

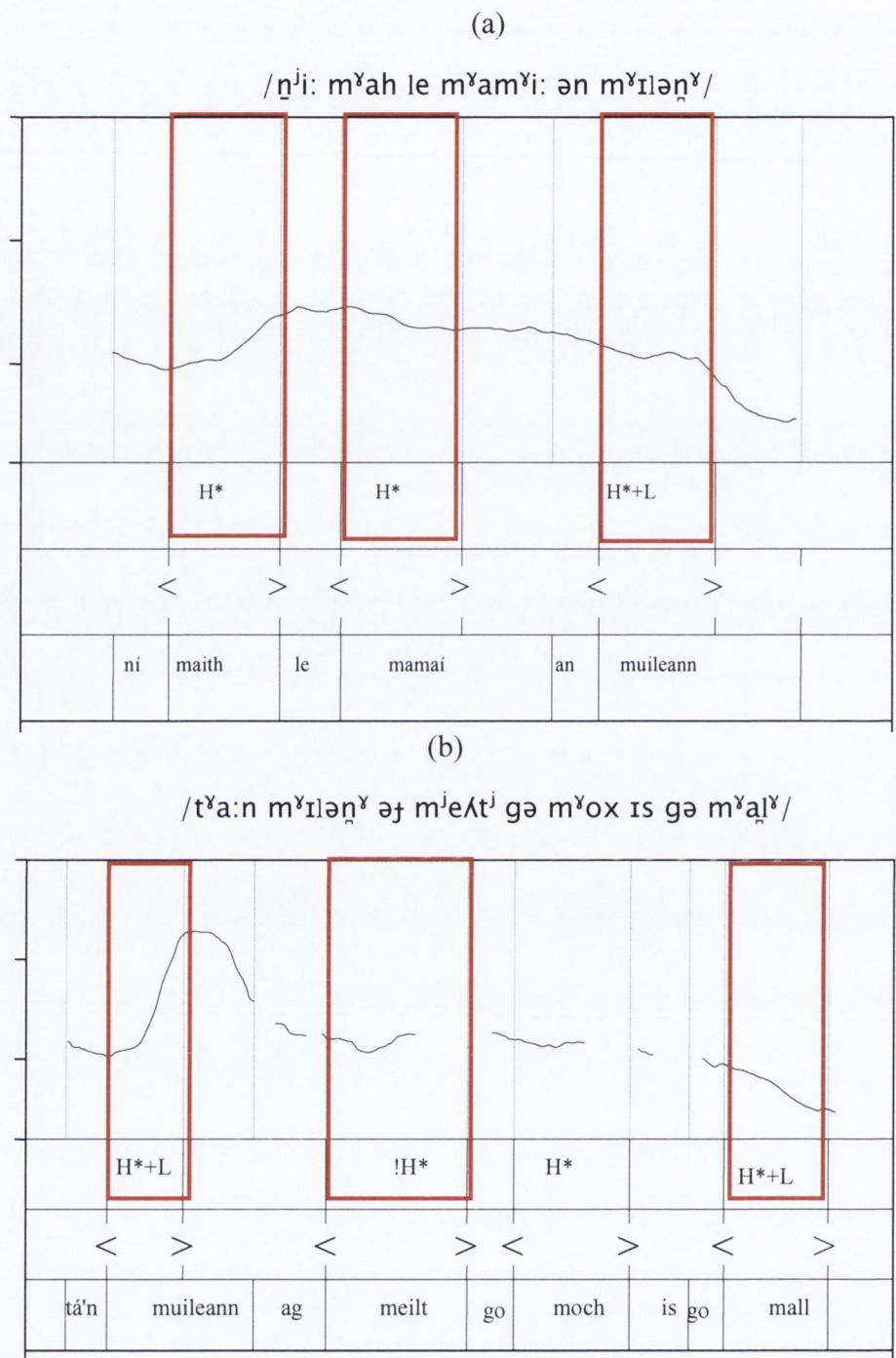


Figure 6.3. Pitch traces of typical South Connaught declaratives with (a) ‘flat hat’ contour and (b) ‘pointed hat’ contour. Accented syllables are highlighted in red.

In the second contour type (Figure 6.3b) the initial prenuclear accent is more like the “pointed hat” of ‘t Hart, Collier and Cohen (1990) whereby there is a rise to the f0 maximum followed by a sharp fall within the same syllable. The remaining prenuclear contour is then flat. The initial accent in this contour type is labelled

H*+L and subsequent accents are labelled H*. From visual analysis alone, it could be argued that the “pointed-hat” contour in this dialect is a result of some kind of narrow focus produced by the speaker, and followed by deaccenting, which results in this distinctively sharp peak. However, based on the auditory analysis this would not seem to be the case. A tentative suggestion here is that this particular contour is more of a “halfway house” between the two other contours produced in Figures 6.2 and 6.3a. It starts off with a typical falling prenuclear accent H*+L and rather than continuing with a series of H*+L accents as expected from Figure 6.2, the contour flattens to produce a succession of H* accents so that the remaining contour is more similar to that of Figure 6.3a. Further investigation is required here to come to a firm conclusion of its status. In any case, the phonetic realization of pitch accents found in these typical South Connaught intonation contours is elaborated on in the following sections.

6.2.1 Prenuclear accents

In South Connaught Irish the dominant prenuclear accent employed by speakers is a high accent labelled in IViE as H*. H* accents account for two-thirds of the accents found in prenuclear position for speakers of South Connaught Irish. Just less than one third of prenuclear accents are falling accents, labelled H*+L. There was both inter- and intra speaker variation in terms of the choice between H* and H*+L in prenuclear accents. It should be noted that since the utterances were affectively rather neutral the choice of accent does not appear to be determined by a preference to produce a given affect. We would conclude that the accents occur in free variation, although this would obviously need to be reconsidered if the H*+L of the “pointed-hat” contour is in fact an indicator of focus.

The remaining prenuclear accents found in the corpus are low accents, labelled in IViE as L*, although only 4% of prenuclear accents are produced as low accents. Figure 6.4 outlines the overall occurrence (in percentages) of prenuclear accents in the corpus across the three different sentence types. Their actual distribution across the different sentence types is discussed in Section 6.3.

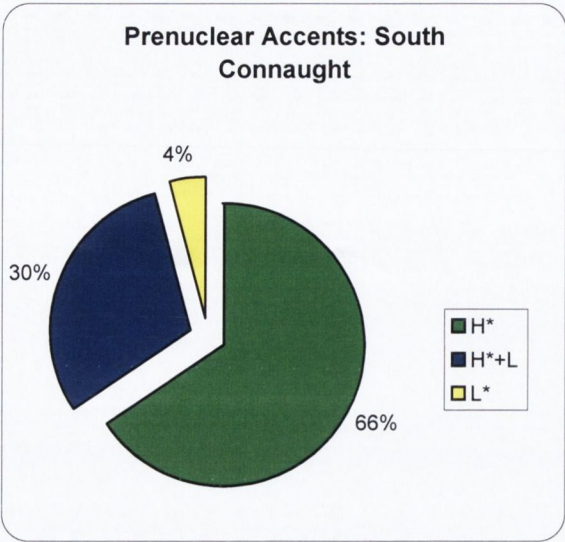


Figure 6.4. Percentages of prenuclear accents found in South Connaught Irish

Examples of the three prenuclear options are indicated in Figure 6.5. The following sections examine each of the different accent-types found in prenuclear position: high accents, falling accents and low accents.

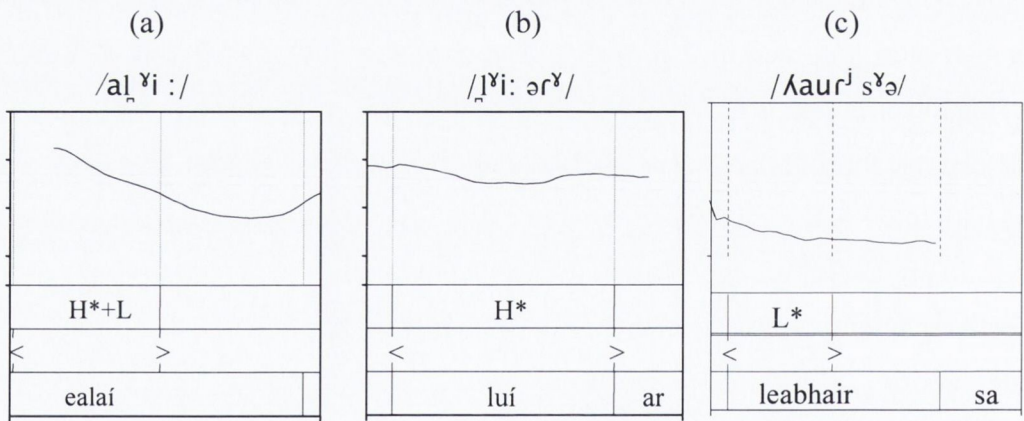


Figure 6.5. The three prenuclear accent types employed by South Connaught speakers. (a) a falling (H^*+L) pitch accent (b) a high (H^*) accent and (c) a low (L^*) pitch accent

6.2.1.1 Falling accents

This section provides evidence for the occurrence of falling tones in prenuclear contours. Falling tones can be realised in several ways. As subsequent sections show, their exact realisation largely depends on whether we are dealing with speakers of Cois Fhairrge or Inis Oírr, particularly in relation to where the peak is located. This is elaborated on more fully in Section 6.6. but, as a rule, for speakers

of Cois Fhairrge Irish the onset of the peak is consistently located at the boundary between the accented and the following unaccented syllables, while for Inis Oírr speakers the onset of the peak is prone to drift depending on the context.

In addition to these observations, other general characteristics have been noted. For example, falling accents across both dialects mainly differ in terms of the location of the low target. Examples of different falling accent realizations are illustrated in Figure 6.6 below, and shown schematically in Figure 6.7.

Phonetically, tones are realised in the following ways:

- i. In the first realisation (Figure 6.6a), the entire pitch gesture of the falling accent may be fully realised within the accented syllable (even when there are following unstressed syllables in the accent unit) so that the high and low targets of the bitonal accent occur within one syllable. The range of the slope is not compressed in any way so that the result is a steep slope.
- ii. In the second realisation (Figure 6.6b) the low target may occur in the unstressed syllable immediately following the accented one, or it may be *right-displaced* (Grabe, 1998) so that it occurs even later than this. This realisation of the falling accent is the most common type. The distance of the displacement of the L tone is in no way contingent on the amount of unstressed material available between accents. In Donegal Irish it was shown that the trailing tone was predictable in its location given the optimal amount of material for its full realisation. There is no such predictability in South Connaught Irish. This is reiterated with the next point.
- iii. In the last realisation observed (Figure 6.6c), the trailing tone of a H*+L accent may be *deleted* in accordance with Grabe's (1998) phonological adjustments and Gussenhoven's (1984) *linking rules*. In this case the high tone is allowed to spread up to the following pitch accent. this results in the 'flat hat' pattern mentioned above (this is elaborated on below). H*+L tones in which the trailing tone is deleted in such a manner are labelled H*. There is an argument for treating such accents as underlying H*+L ones and this is supported by the fact the in the other aforementioned realisations the low target is unstable in its realisation and is allowed to drift considerably. This is discussed in more detail in Section 6.2.1.2.

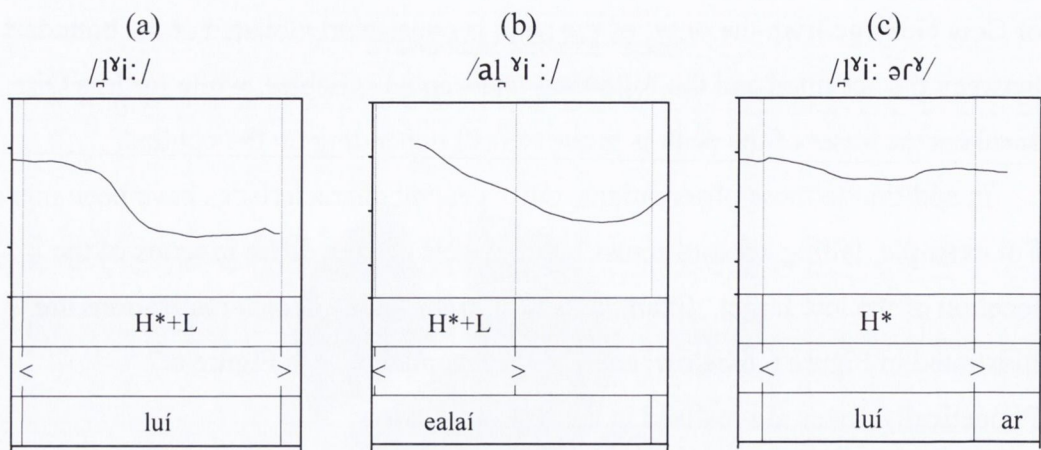


Figure 6.6. Three realisations of underlying H^*+L accents. (a) Falling within one syllable, (b) low target occurs one syllable after accented one (c) trailing tone is right-displaced resulting in its deletion

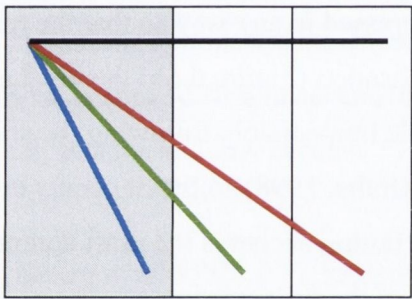


Figure 6.7. Idealised f_0 contours of the different realisations of the prenuclear falls. The grey box represents the stressed syllable and the white boxes represent unstressed syllables. The range of full falling gesture is from the stressed syllable, to a right-displacement with deletion.

Figures 6.6 and 6.7 summarise the points illustrated above, namely that in a H^*+L accent the right-context of the accent unit has no bearing on where the L might be located.

The drift of the low target in South Connaught is unsystematic and unpredictable from the context, a finding that is consistent across each of the speakers. As mentioned above, this differs from the rather stable bitonal target found in prenuclear accents of Donegal Irish (Section 2.6.1) where the trailing tone (H) is at a more-or-less fixed distance from the starred tone (in terms of syllables). Interestingly a close examination of the *starred* tone of a South Connaught H^*+L accent, on the other hand, illustrates that the H element of this bitonal accent can be

very fixed, although this largely depends on the precise dialect of the speaker. A full analysis of the peak timing of these accents is discussed in Section 6.6. which shows some interesting findings in terms of differentiating between phonologically similar dialects.

The final point worth noting about H*+L accents is that in successive falling prenuclear accents the peak and trough of each successive H and L tone is lower than the preceding one, due to declination¹ effects. Declination refers to “a gradual modification (over the course of a phrase or utterance) of the phonetic backdrop against which the phonologically specified F0 targets are scaled” (Connell & Ladd, 1990: 2). It is generally agreed to be a phonetic effect, and one which is universal, at least in declarative sentences. Thus any lowering in pitch over the course of an utterance is attributed to the phonetic effect of declination, without regard to the tonal configuration of an utterance. Downstep² is also evident in South Connaught Irish but there is more likely to occur with successive H* accents and this is elaborated on in the following section.

6.2.1.2 High accents

High prenuclear accents in South Connaught Irish occur in both initial prenuclear position or as successive prenuclear accents. Phonetically they are realised as follows:

- i. When found in initial prenuclear position this high accent in Cois Fhairrge is generally realised as a plateau whose onset varies depending on which dialect of South Connaught we are dealing with.
 - o In our study of Corpus B (elaborated on in Section 6.4.) we observe that for speakers of Cois Fhairrge Irish the peak is consistently located at the boundary between the accented and the following unaccented syllables. The plateau is realised on the post-accentual syllable and may continue up until the next accented syllable, even when there is a large number of unstressed syllables between accents.

¹ The term ‘declination’ was introduced by Cohen & ’t Hart (1967) in work on Dutch intonation. Since then it is commonly used in work on intonation.

² Downstep is “the stepwise lowering of pitch (or of the tonal space) at specific pitch accents” (Ladd, 1996:74).

- For Inis Oírr speakers, the peak is prone to drift depending on the context. In our study of Corpus B the size of the anacrusis was systematically varied and this caused a change in the location of the peak. Additionally, there are fewer H* accents in Inis Oírr, but they may also continue throughout the accentual unit. The frequency of the different accents in each of these dialects is shown in Table 6.2 below.
- ii. Non-initial high prenuclear accents are also realised as plateaus. When there is a succession of these the overall shape of the prenuclear contour is quite flat, as illustrated in Figure 6.3 above. As observed in Section 6.4.1.1 the assumption here, following Gussenhoven (1984), is that these prenuclear high accents are underlying H*+L accents which have undergone *complete linking*. As Gussenhoven hypothesises, targets of bitonal accents do not need to occur close together. We observed in the previous section that the L of the bitonal H*+L accent can drift considerably in South Connaught Irish. Its location may range from within the accented syllable to a right-displacement of one or more syllables after the accented one. With this in mind, it is postulated that an H* accent in South Connaught Irish comes about as a result of complete linking whereby the L target is completely deleted rather than right-displaced. This deletion gives rise to a high accent rather than a falling one. This deletion of the trailing tone follows on from the analysis of Donegal Irish in the previous chapter, whereby the trailing tone of a L*+H rising accent was deleted under certain conditions thus giving rise to L* accents.
- iii. The final point worth noting is that in these high accents there is neither visual evidence nor auditory evidence of a falling trailing tone.

Ladd (1996) argues that successive prenuclear accents are the result of a single prenuclear accent choice. In South Connaught Irish that single prenuclear choice is underlyingly a H*+L accent.

For Donegal Irish it was argued that the deletion of the trailing tone in prenuclear L*+H accents of Donegal Irish is largely predictable from the context, e.g. in conditions of tonal clash. In South Connaught the drift of the L in South Connaught cannot be predicted, and nor can the deletion of the trailing tone. High

tones can be realised over the entire accent unit, regardless of the number of unstressed syllables in this unit. As observed earlier a succession of these high tones when followed by a nuclear fall gives rise to an overall “flat hat” pattern in South Connaught Irish. This contour is a result of a series of two or more H*+L pitch accents which are subject to complete linking.

It was also observed in the data that when there are successive H* accents that there may be a tendency towards downstep where the high elements of a pitch accent are lowered in the pitch range in relation to the preceding high tone. Of course pitch generally declines over the course of an utterance through declination. Downstep is treatable as a phonological adjustment (Grabe, 1998). Grabe describes a downstepped accent as being lower in f0 than the immediately preceding accent, and lower than can be expected purely from effects of declination, and there is evidence of this in South Connaught Irish. Figure 6.8 indicates a South Connaught Irish declarative where there is a clear step-down onto the second accent of the IP. The declination slope alone would not lower the f0 on this second accent to the same degree.

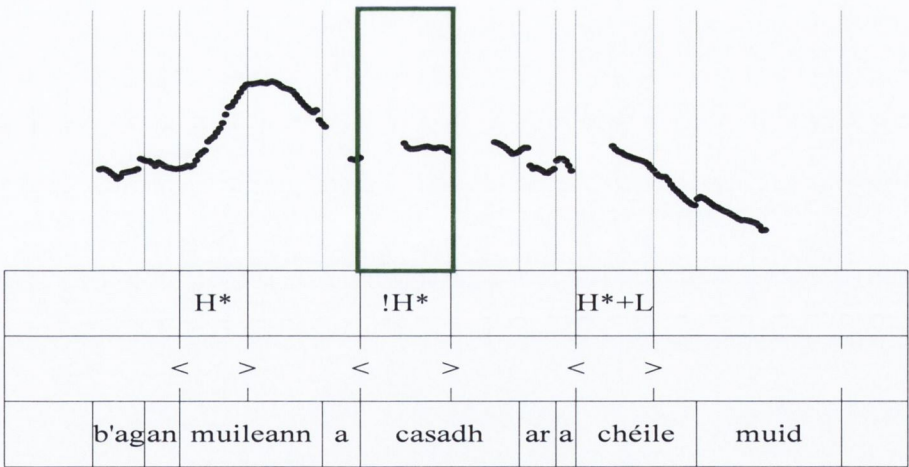


Figure 6.8. Declarative utterance in which second pitch accent (green box) is downstepped. /bʲəɟ ən mʲɪlən̪ˠ ə kasʲuː əɾʲ ə ʧeːlə mʲɪdʲ/

6.2.1.3 Low accents

Low tones in South Connaught Irish account for just 4% of prenuclear accents in the entire corpus. Just two of the six speakers, one from Cois Fhairrge and one from Inis Oírr, produced them. Both speakers produced a low prenuclear pitch accent in questions only. This prenuclear low accent was always the second pitch

accent in an intonational phrase and was always preceded by a very high initial prenuclear accent. As indicated above, in declarative sentences a second pitch accent following a very high initial prenuclear accent is often produced as a downstepped high, but in questions this accent is lower. It is transcribed in this corpus as L*.

The contrast of a low pitch accent following an initial high accent may be one of the signals to interrogativity in this dialect. There are not enough occurrences of this L* accent in the present corpus - just 2% of the entire tonal inventory - to investigate this hypothesis more fully, and indeed clearly in the majority of cases, no such signal to interrogativity is required.

6.2.2 Nuclear Accents

The only nuclear accent found in the South Connaught corpus is a falling one. Approximately one fifth of these falling nuclear accents in South Connaught Irish were produced with downstep, but in the majority of cases the lowering in pitch of the nuclear accent is due to the effects of declination. At times the nuclear accent does not follow the general declination trend and may be subject to upstep.³ The judgement of an accent being upstepped was based on both perceptual and visual analysis of the f0 contour. The upstep modification to the H*+L accent only occurred on the final nuclear accent in an IP, and never on prenuclear accents.

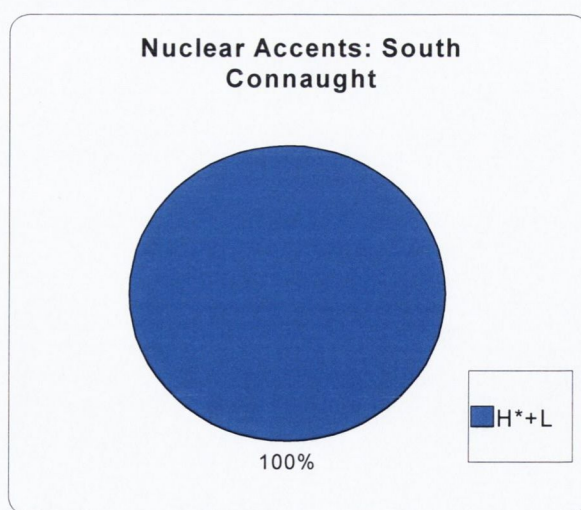


Figure 6.9. Percentages of nuclear accents found in South Connaught corpus

6.2.2.1 Falling accents

³ Haan (2001) classifies a peak as upstepped when its f0 value exceeds that of the preceding peak.

This section describes the falling nuclear accents of this dialect. By nuclear we refer to the last accent in an IP. There is clear evidence for nuclear falling pitch accents (H^*+L) in sentence final position, across the three sentence types. In declaratives, and in both interrogative sentences the speakers all produce a falling nuclear accent. This is not to say all nuclear contours are falling. Any rises however, are accounted for by the boundary tone (see Section 6.2.3).

The data analysed contained both monosyllabic and polysyllabic words in sentence final position. Examples of falling nuclear accents on a monosyllabic and a polysyllabic word are demonstrated in Figure 6.10.

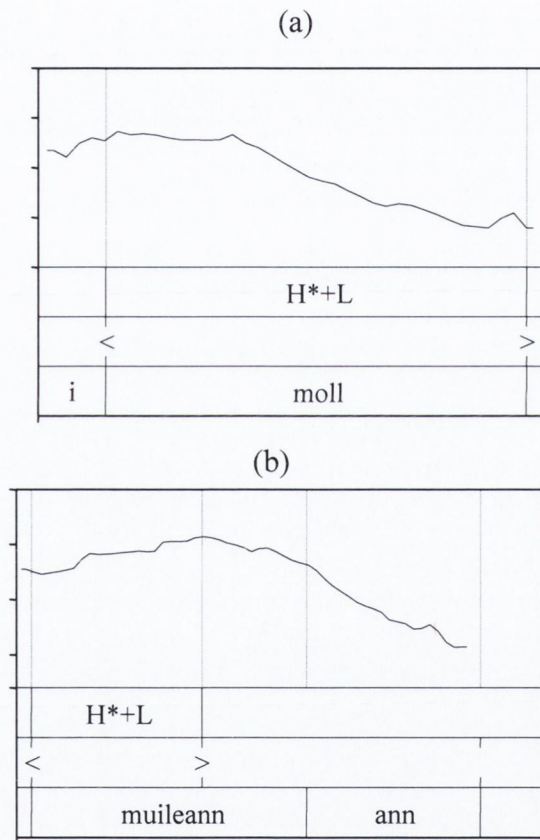


Figure 6.10. H^*+L nuclear accents on (a) a monosyllable $/m^{\text{v}}o\text{ɹ}^{\text{v}}/$ and (b) polysyllables $/m^{\text{i}}\text{ɪ}\text{ɹ}\text{ə}\text{n}^{\text{v}} \text{ə}\text{n}/$

In the corpus of South Connaught Irish, the majority of nuclear falls were produced as a fall, starting in the accented syllable and continuing over the entire accent-unit. Speakers of Cois Fhairrge Irish and Inir Oírr Irish demonstrated differences in the timing of the nuclear peak with the segmental string. Section 6.6 deals more fully with the exact alignment of this starred element of the bitonal accent with the segmental string. The low tone in nuclear accents was not subject to

the same phonological adjustments as those of prenuclear accents. The low target of the nuclear accent was generally displaced to the right-edge of the accent unit or foot, regardless of the number of unstressed syllables following the accented one. In monosyllabic words in nuclear position, the low target of the trailing tone was located at the right-edge of the accented syllable. When the number of unstressed syllable increased there was still a right-edge location of the low target within the accent unit.

There is no evidence of any other type of nuclear pitch accents in the present data. The data set may be too limited to exclude the possibility that other pitch accents may occur in this dialect. For example, affective speech could result in the production of a wider variety of accents.

6.2.3 *Boundary tones*

This section deals with tonal specification of intonational phrase boundaries in South Connaught Irish. There is no initial boundary tone in these South Connaught dialects. Rather the default tone at the start of the IP is a mid-level tone which is unmarked. Therefore the following section deals specifically with IP-final phrase boundaries. As observed above the nuclear accent in South Connaught Irish is a H*+L accent, but the shape of the overall nuclear contour varies depending on the boundary tone employed by the speaker. There is evidence for two final boundary tone specifications in this corpus: a high boundary tone and no boundary tone, the percentages of which are indicated in Figure 6.11.

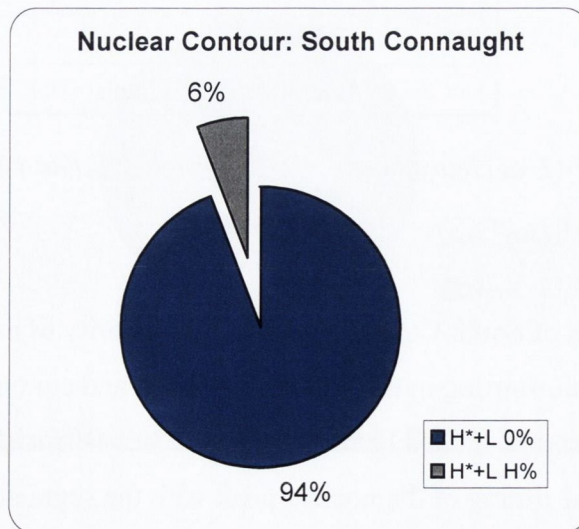


Figure 6.11. *Nuclear Contours of South Connaught Irish*

94% of nuclear contours in the Corpus were falling. In these nuclear contours the tonal targets of the final H*+L pitch accent accounted for the overall contour shape. There was no further tonal specification at the IP boundary. As Grabe (1998) observes boundaries should only be specified if they introduce a new tonal target, different to that accounted for by the tone immediately before the boundary. In South Connaught Irish the L target of the H*+L nuclear accent accounts for the lowest target in the nuclear contour of the IP. There is no final lowering and thus no boundary tone is required. These nuclear contours are labelled: H*+L 0%

Fall-rise contours were also found in the corpus. The rise in this contour type is accounted for with a high boundary tone, transcribed as H%.

Figure 6.12 illustrates the two nuclear contours of South Connaught. It is clear from the contour in Figure 6.12b that the rise in this nuclear contour occurs at the IP edge and so may only be accounted for with a boundary tone specification.

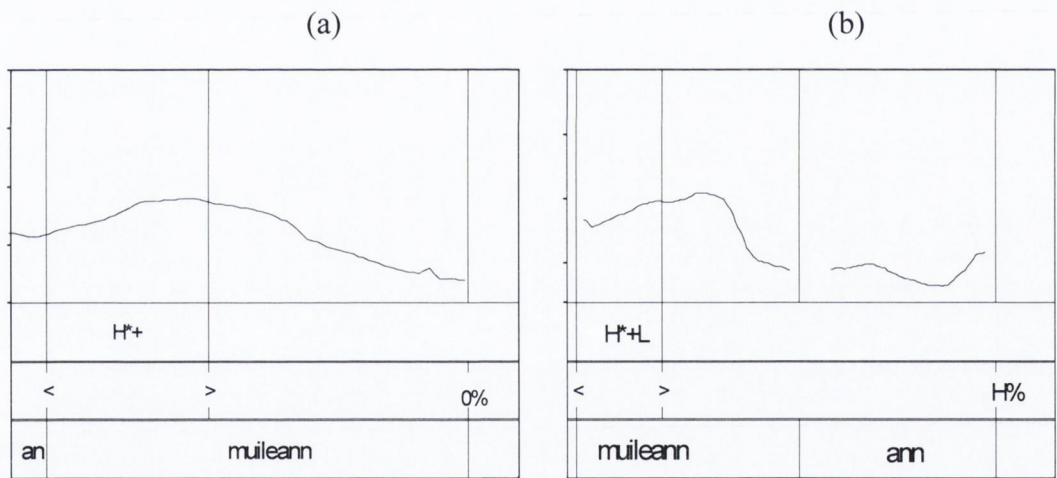


Figure 6.12. (a) falling nuclear contour of South Connaught Irish /ən mʲɪlənʲ/ and (b) Fall-rise of South Connaught Irish /mʲɪlənʲ ən/

6.3 Distribution of accents

The examination of the contours found in South Connaught Irish in previous sections has established a preliminary tonal structure of South Connaught Irish. The H*+L accent has been proposed as being the underlying phonological tone of this dialect. It is argued that this can be modified through phonological adjustments to allow for a high tone, transcribed H*. Following similar treatment of monotonal accents in Donegal Irish, this label is included in the inventory of tones in the

dialect to allow for transparency of labelling. A further low tone, labelled L^* , was also found in the dialect but incidences of this tone were very low. The occurrence of the difference accents is demonstrated in percentages in Figure 6.13.

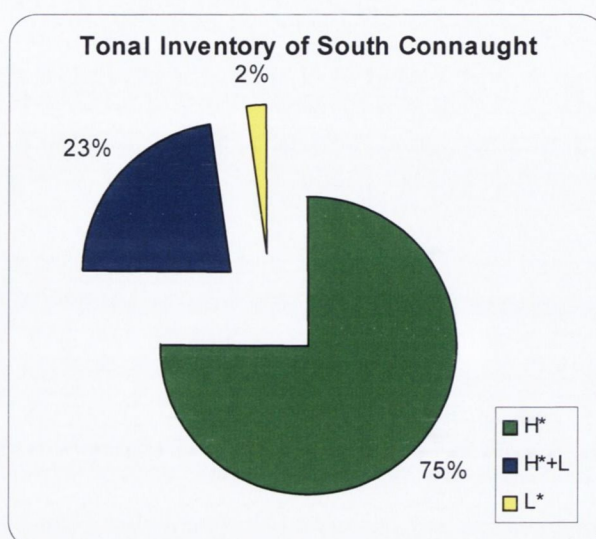


Figure 6.13. *Tonal inventory of South Connaught Irish*

H^*+L is the clear choice of accent in nuclear position. H^* is the dominant choice in prenuclear position. H^* and H^*+L occur in free variation in the prenuclear contour giving rise to two typical contour types in this dialect.

In phrase-final position there are two boundary tone specifications transcribed $H\%$, for a final rise, and 0% when there is no additional tone at the IP boundary. The default pitch at the start of an utterance is a mid-level one which is not transcribed. Table 6.1 below outlines the tonal inventory proposed for South Connaught Irish.

Underlying tone	Surface realisation	Pitch movement
H^*+L	H^*+L	Falling accent
	H^*	High accent, modified prenuclear H^*+L
$(L^*)^4$	L^*	Low accent
0%		No tone at the final boundary
$H\%$		Final high boundary

Table 6.1. *The tonal inventory for South Connaught Irish*

⁴ More evidence of this accent type is required to determine what the underlying tone is

This outline of the tonal inventory of South Connaught Irish was carried out across the three grammatically different utterance types. The focus of the following sections is the distribution of the accents across the three sentence types: declaratives, *wh*-questions and yes/no-questions. There is some variation in accent distribution across the three sentences types but the overall finding is that intonation does not play a very large role in signalling interrogativity in South Connaught Irish. The first section looks at declaratives, the second at *wh*-questions and the third at yes/no-questions.

6.3.1 *Accent distribution in declaratives*

Most content words of South Connaught Irish have their primary stress on the first syllable of the word and in declaratives the pitch accent is in agreement with the lexical stress pattern insofar as left-headed pitch accents are in accordance with this. Investigation of declarative sentences in the corpora suggests that in the majority of South Connaught declaratives the *f*₀ starts in the middle of the speakers pitch range and reaches its highest point in the first pitch accent. The first accent may be considerably higher than following accents or it may be on a similar level to successive accents. Nearly all declaratives are combinations of high (H*) and high-falling (H*+L) accents. Three typical contours of a South Connaught declarative with three pitch accents would be labelled:

- | | | | |
|----|------|------|---------|
| a) | H*+L | H*+L | H*+L 0% |
| b) | H*+L | H* | H*+L 0% |
| c) | H* | H* | H*+L 0% |

Prenuclear accents

There is free variation in the choice of a H* or H*+L prenuclear accent. Overall, there is a propensity for the speaker to modify the H*+L prenuclear accent through complete linking and so that it is most commonly realised as H* in prenuclear position. However the underlying H*+L accent may also be fully realised in prenuclear position. Figure 6.14 indicates percentages of prenuclear accents found in the corpus for declarative sentences, while Figure 6.15 indicates initial prenuclear and non-initial prenuclear accents. As the figures indicate, in declaratives 72% of all prenuclear accents are realized as H* accents. In initial

prenuclear position 77% of accents are H*, while in non-initial position the percentage is slightly less, 67%. The remaining accents are all falling.

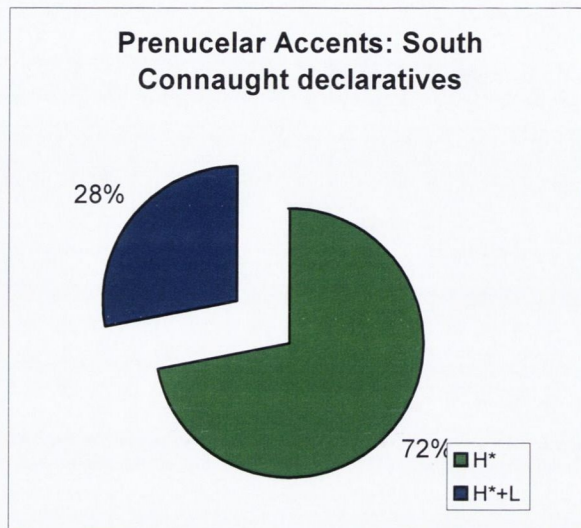


Figure 6.14. *Prenuclear accents in South Connaught Irish declaratives*

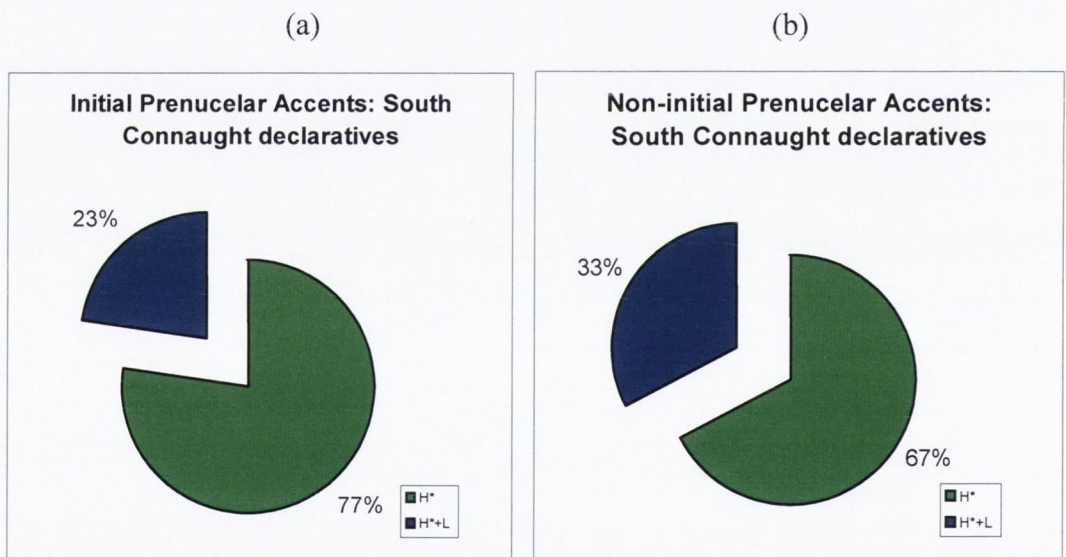


Figure 6.15. (a) *Initial prenuclear accents* and (b) *non-initial prenuclear accents* found in declaratives of South Connaught Irish

Nuclear

The H*+L accent in nuclear position is always fully realised as H*+L but may be subject to some phonological adjustment: downstep or upstep. 3% of nuclear accents are followed by a high boundary tone, giving rise to a fall-rise (see Figure 6.16). Nuclear falls in most languages are said to signal completion or finality (e.g. Bolinger, 1978) and so it is possible that in spontaneous speech that there would be

more variation in the type of nuclear accent employed by speakers, e.g. more rises at the phrase final IP in conversation mode especially to signal incompleteness or in providing turn-taking cues to the listener etc.

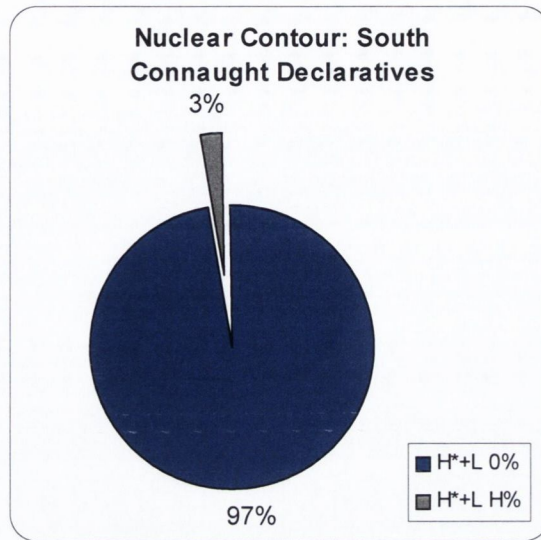


Figure 6.16. *Nuclear accents in South Connaught Irish declaratives*

6.3.2 Accent distribution in *wh*-questions

Questions and declaratives in South Connaught Irish share the same underlying phonological specification

H*+L H*+L 0%.

There is some evidence that the distribution of accents however differs in questions and statements.

Prenuclear

The overall contour shape of *wh*-questions is the same as that of declaratives, although there is less of a tendency to employ the “flat-hat” contour in *wh*-questions. This is because in *wh*-questions 67% of initial pre-nuclear accents are not linked and are labelled H*+L.

In *wh*-questions the highest f_0 corresponds to the first accented word, after which there is a gradual descent terminating in a fall in the nuclear accent. This is the same for declaratives and yes/no-questions but in Irish the *wh*-word at the beginning of the utterance is generally accented. This means in *wh*-questions there does not tend to be any anacrusis and so the highest peak of the utterance is associated with the *wh*-word.

It was observed earlier that two speakers produced a low tone on the second pitch accent of a wh-questions. These low accents account for 7% of non-initial prenuclear accents. Note, however, that this was not the typical wh-contour produced by these two speakers. In most cases they followed the same overall contour pattern of the other speakers by employing H* and H*+L accents.

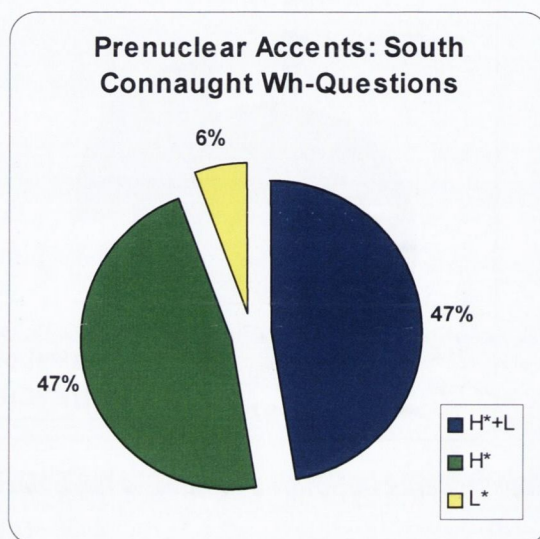


Figure 6.17. *Prenuclear accents in South Connaught Irish wh-questions*

Figure 6.17 indicates percentages of prenuclear accents found in the corpus for wh-question questions, while Figure 6.18 indicates initial prenuclear and non-initial prenuclear accents.

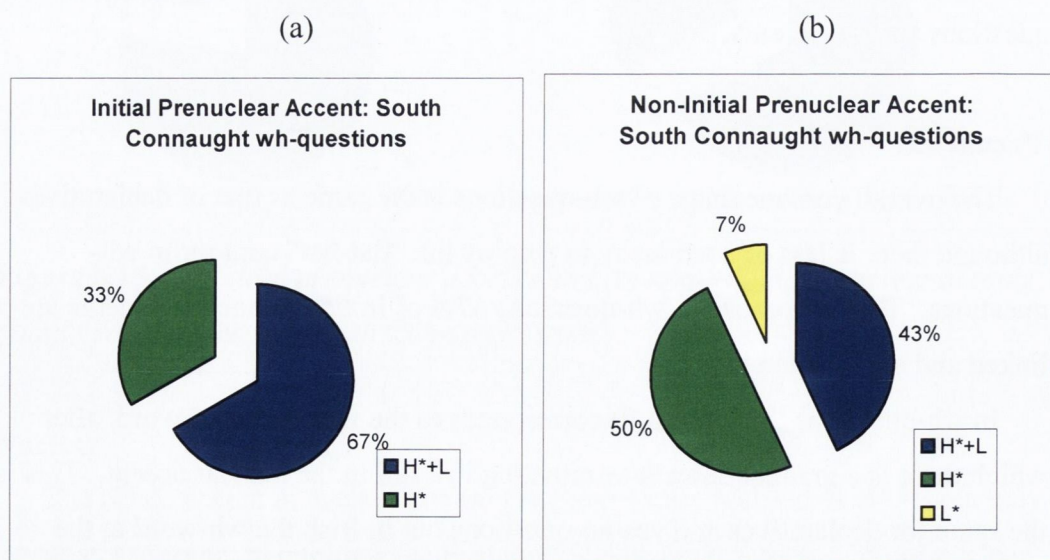
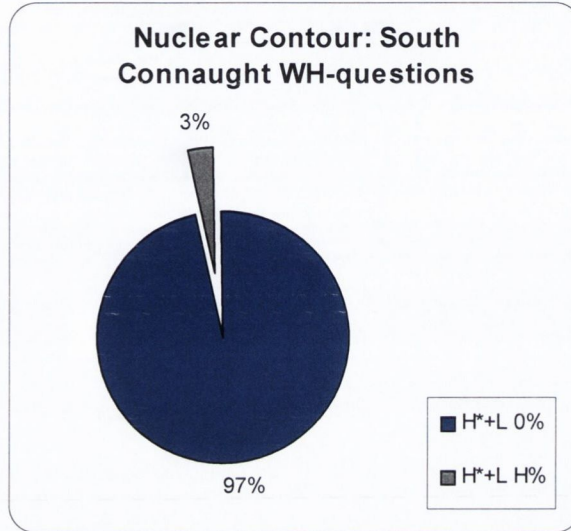


Figure 6.18 (a) *Initial prenuclear accents* and (b) *non-initial prenuclear accents* found in wh-questions of South Connaught Irish

Nuclear

The distribution of nuclear tones in wh-questions is similar to declaratives. The dominant nuclear contour is falling. Some incidences of fall-rises were also found in the data. Figure 6.19 shows the distribution of nuclear contours found in wh-questions for the South Connaught speakers.



Figures 6.19. *Nuclear contours found in wh-questions of South Connaught Irish*

6.3.3 Accent distribution in yes/no-questions

The overall contour shape of yes/no-questions in the South Connaught dialects is similar to that of the other sentence types. Again the underlying contour is

H*+L H*+L 0%

with evidence of linking to produce H* accents.

Prenuclear

The prenuclear contour is largely made up of either high (H*) or falling (H*+L) pitch accents. In these questions there is again some occurrences of L* accents and they account for just 4% of prenuclear accents. Figure 6.20 indicates percentages of prenuclear accents found in the corpus for yes/no-questions, while Figure 6.21 indicates initial prenuclear and non-initial prenuclear accents.

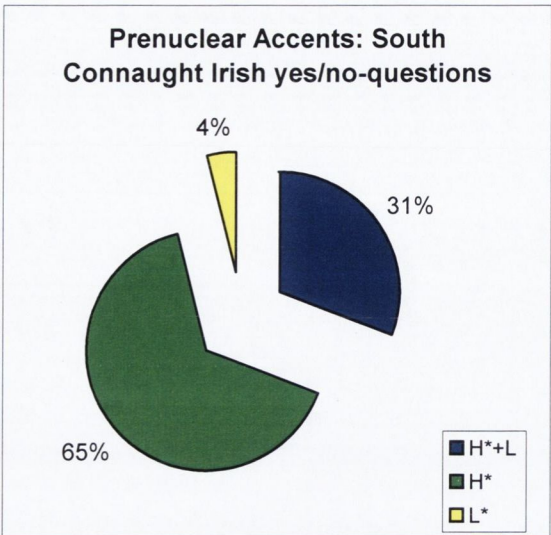


Figure 6.20. Prenuclear accents in South Connaught Irish yes/no-questions

(a)

(b)

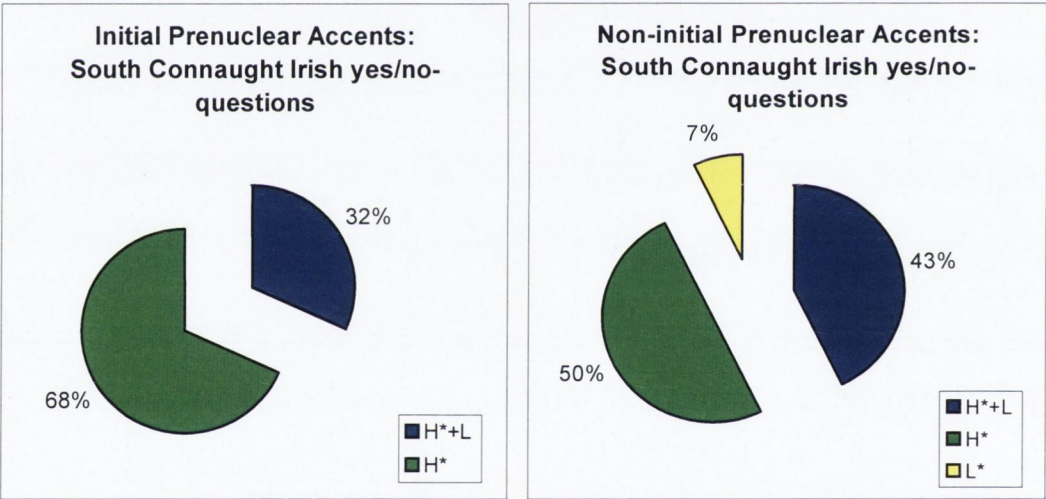


Figure 6.21 (a) Initial prenuclear accents and (b) non-initial prenuclear accents found in South Connaught Irish yes/no-questions

Nuclear

South Connaught speakers produce a large percentage of their yes/no-questions with a falling contour. This is typical of all sentence types in South Connaught but is different from many other languages, where yes/no-questions typically involve a rising nuclear contour (Bolinger, 1978). The remaining nuclear contours in yes/no-questions of this dialect are fall-rises. These number of fall-rises are higher in yes/no-questions than other sentence types but still account for just 17% of nuclear contours yes/no-questions of this dialect. As indicated in Section 3.3.2.2, a falling

intonation is said to be typical of yes/no-questions in Hiberno-English (Grabe and Post, 2002). The fact that yes/no-question in Hiberno-English generally having a falling nuclear contour is hardly surprising if the typical pattern for Irish yes/no-questions is also falling⁵. Irish has influenced, among other things, the syntax and lexicon of Hiberno-English (Kallen, 1997) and so it is expected that it would also have a direct influence on the intonation of Hiberno-English. There has been no comprehensive account of the intonation of southern Hiberno-English dialects and so we cannot make any real claims about the similarity of the two systems. It does raise some interesting questions for future work on Hiberno-English and Irish dialects. The percentages of nuclear contours of yes/no-questions in South Connaught Irish are indicated in Figure 6.22.

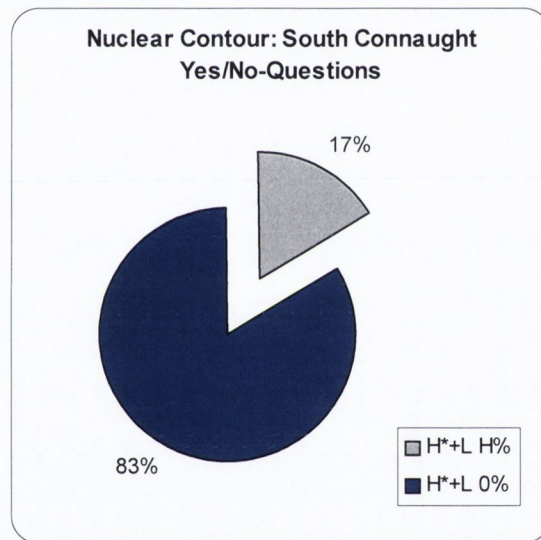


Figure 6.22. *Nuclear contours found in yes/no-questions of South Connaught Irish*

6.3.4 *Accent distribution across the two dialects of South Connaught*

Although the two dialects of South Connaught are phonologically similar, there are some differences in how they distribute their tones. While both dialects employ the same pitch accents Table 6.2 indicates that Inir Oírr speakers are less prone to modifying the underlying H*+L pitch accent than Cois Fhairrge speakers, particularly in declaratives. For example, in declaratives Cois Fhairrge speakers are more likely to produce H* accents (64%) than H*+L accents (46%), whereas Inis

⁵ Falling nuclear contours are also common in yes/no-questions in the Mayo and Kerry dialects. This is discussed in later chapters.

Oírr speakers are more likely to employ H*+L accents (69%) than H* accents (31%).

In both wh-questions and yes/no-questions Inis Oírr speakers are more like to produce H*+L accents than H* accents (79% in wh-questions and 52% in yes/no-questions). Cois Fhairrge speakers are also likely to produce more falling accents in interrogatives (59% in wh-questions and 65% in yes/no-questions). Both dialects show a similar use of the L* accent. It accounts for approximately 6% of accents in both question types for both dialects

<i>Sentence type</i>	<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Cois Fhairrge (%)</i>	<i>Inis Oírr (%)</i>
Declarative	H*+L	H*+L	46	69
Wh-Question		H*+L	59	79
Yes/no-question		H*+L	65	52
Declarative	H*+L	H*	54	31
Wh-Question		H*	35	15
Yes/no-question		H*	28	42
Declarative	(L*)	L*	0	0
Wh-Question		L*	6	6
Yes/no-question		L*	7	6

Table 6.2. *Indicates how pitch accents are distributed in Cois Fhairrge Irish and Inis Oírr Irish across the three sentences types: declaratives, wh-questions and yes/no-questions*

6.4 Peak timing in South Connaught Irish declaratives

The following section considers one of the factors which can effect peak timing by observing how the peaks of the most commonly occurring initial prenuclear (H*) and nuclear accents (H*+L) of South Connaught Irish declaratives are aligned with the segmental string. Results of peak timing analysis in the previous chapter on Donegal Irish showed that the tonal targets of bitonal L*+H accents in this dialect of Ulster are anchored to a particular position in the accented syllable, and that these targets are relatively stable in their alignment. The results from Donegal contradict the peak drift expected in relation to the size of the anacrusis preceding initial prenuclear accents and the number of unstressed syllables following the nuclear

accent, which we term the *variable peak hypothesis*. This prompted questions about how peaks are aligned in the dialects of South Connaught. Preliminary results from this analysis were first presented in Dalton and Ní Chasaide (2005a; 2005b; 2007) and Ní Chasaide and Dalton (2006).

Although both dialects of South Connaught use the same tonal inventory and are considered phonologically similar, the analyses in earlier sections have shown that the distribution of the accents in the Cois Fhairrge and Inis Oírr dialects varies to a degree between them. Additionally an informal preliminary inspection of some narrative materials prompted the hypothesis that, though very closely related, the dialects are systematically different in terms of how the melodic peak is aligned to the segmental string. If this is the case, this would add to the growing evidence that fine alignment differences present an important potential dimension of differentiation – even among very similar dialects. This has prompted us to treat these dialects as separate ones in the following section.

To investigate peak timing in these dialects, Corpus B, as outlined in Table 4.3 in Chapter 4, was labelled and analysed. As with the Donegal corpus, the test sentences for the analysis were interspersed with a larger set of sentences. The recording included 8 randomised repetitions of each sentence. 5 representative utterances were chosen from the 8, which allowed for errors, hesitations etc.

To start with, the accented syllable and each of the unstressed syllables following the (nuclear and prenuclear) accent and preceding the (prenuclear) accent in each utterance were segmented. The duration of each segment was measured and averaged. A number of points in the contour were then labelled, and their time location measured relative to the nearest segmental boundary. Values were averaged as there was little interspeaker variation.

The labels used for the time points are glossed in Table 4.5 in Chapter 4 and adapted for South Connaught in Table 6.3 below.

A schematic representation of the measured timepoints is given in Figure 6.23.

H*	corresponds to the peak in the H* accents (or the onset of the peak in a H* plateau).
L	corresponding to the f0 minimum in a trailing L tone of H*+L accents.
(H*)p	Denotes end of the high plateau in H* prenuclear accents.
l(H*)	corresponds to the f0 minimum which precedes H* in accents. For the nuclear condition, this is the minimum between the nuclear H*+L and the preceding H* accent. In the case of the prenuclear accent, this minimum always occurred at the beginning of the phrase.

Table 6.3. Timing tier labels for South Connaught Irish

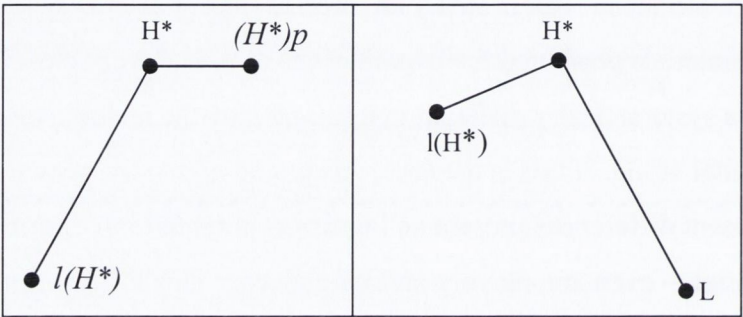


Figure 6.23. Schematic figure illustrating the labels associated with the timepoints measured in H* prenuclear accents and H*+L nuclear accents

The first section deals specifically with peak timing of H* initial prenuclear accents in Cois Fhairrge Irish, one of the dialects of South Connaught. This is followed by the results of analyses of initial H* prenuclear accents in Inis Oírr Irish, the other dialect of South Connaught. Subsequent sections look at a similar analysis of H*+L nuclear accents in each of these dialects.

6.4.1 Peak timing in H* prenuclear accents

The most common prenuclear accent in both Cois Fhairrge Irish and Inis Oírr Irish is a modified H*+L accent, phonetically realised as a H* accent. The following section, therefore looks at how the peak of H* accents in prenuclear position are aligned with the segmental string. Average values for the timepoints l(H*), H* and (H*)p are shown. The part of the contour corresponding to the H* accent (a plateau) is drawn as a solid line, the pitch rise preceding H* is drawn as a dashed line.

6.4.1.1 Cois Fhairrge

Figures 6.24-6.26 presents the results for the prenuclear conditions PN0 (no anacrusis), PN1 (anacrusis of one), and PN2 (anacrusis of two). The upper half of each Figure represents the results of Subset ii, the fully voiced syllables, while the lower half indicates the results of Subset i, the set containing devoiced consonants. As in the previous chapter on Donegal Irish, any differences in overall f₀ level between the two subsets may be a result of the recording times, which differed for each subset (again see, for example, Cooper and Yanagihara, 1971; Garrett and Healey, 1987).

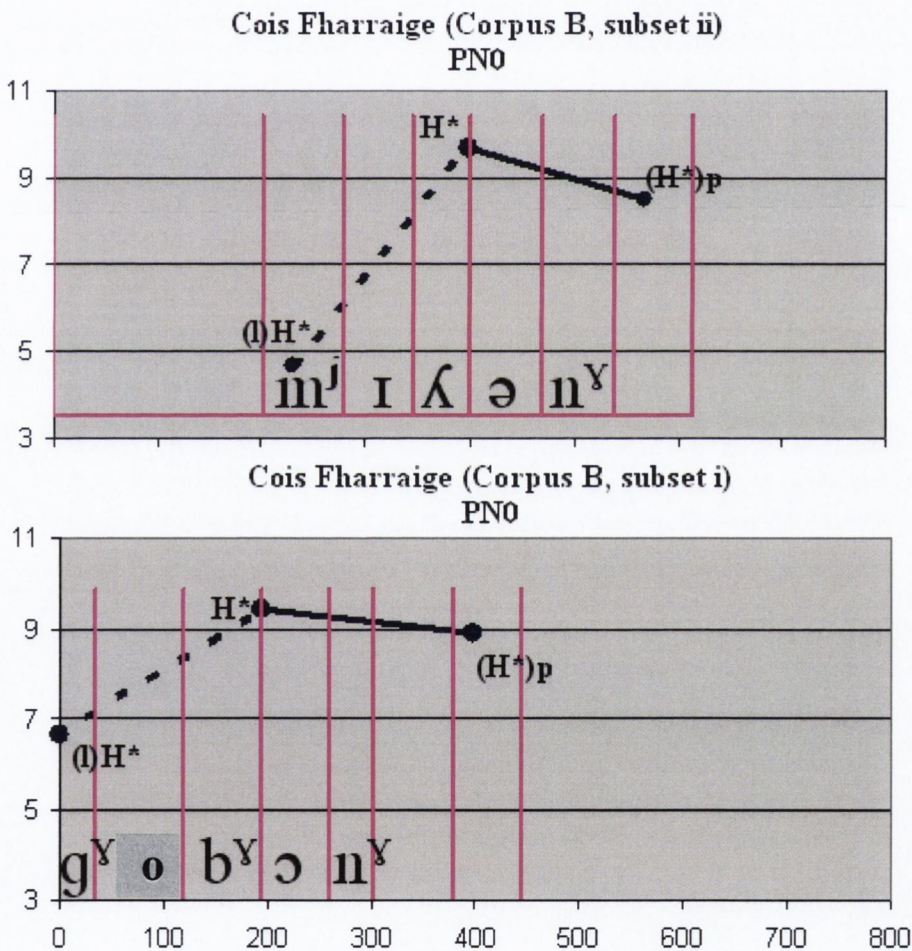


Figure 6.24. Tonal contours for prenuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN0= no anacrusis.

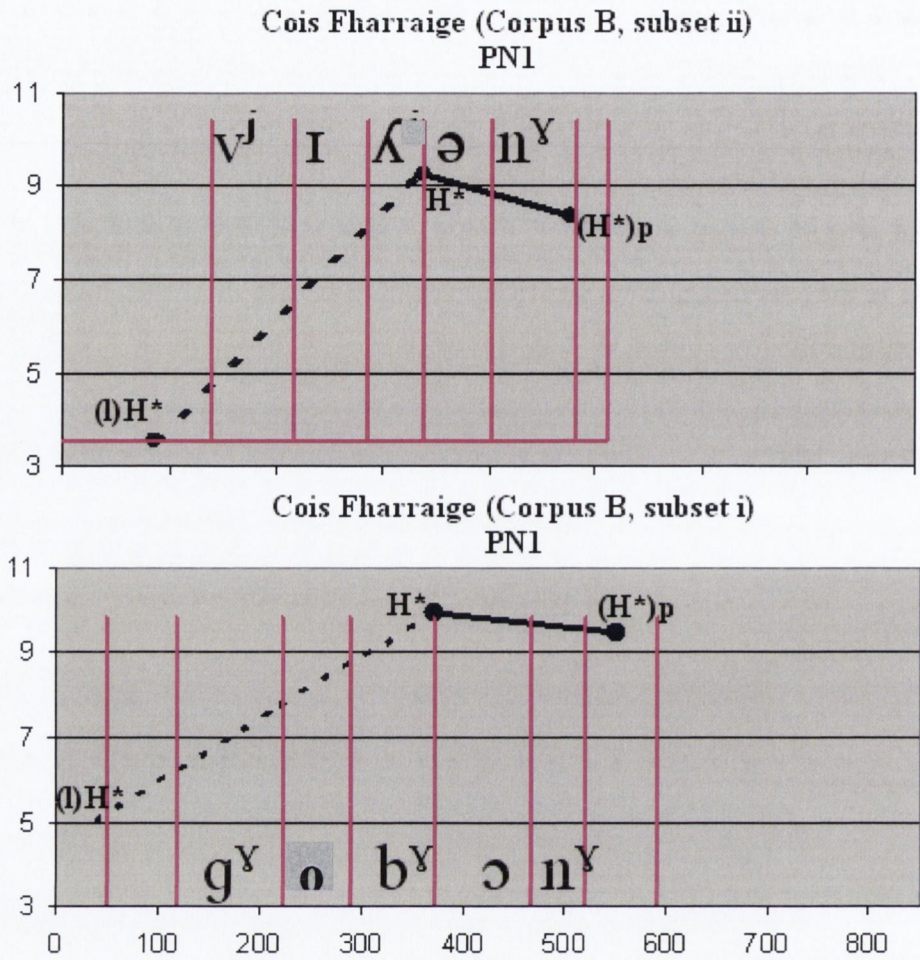


Figure 6.25. Tonal contours for prenuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1 = anacrusis of one.

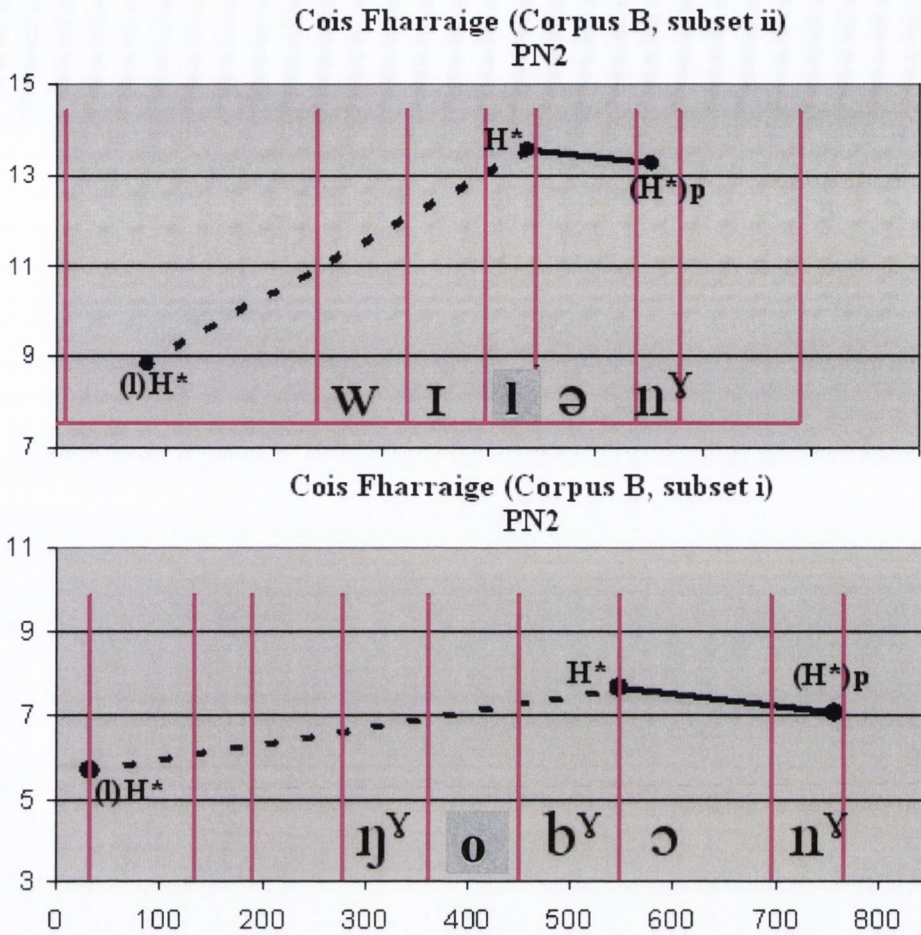


Figure 6.26. Tonal contours for prenuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two.

The results indicate similar findings for both the voiced and devoiced data sets. The results show that there is absolutely no variation in the location of the peak across each of the prenuclear conditions. In the devoiced set (lower half of figures) the results indicate that the peak may be associated with the CV transition. Because of the devoiced coda consonants, it is unclear from this data whether the peak is associated with the syllable boundary, or might occur at an earlier point in the coda consonant. It is also unclear whether there may be minor peak drift within this consonant, effects of which may be invisible due to the voiceless nature of these stops. Given more voiced material the expectation was that the peak would remain anchored to the right edge of the syllable, regardless of the size of the anacrusis. Results from the fully voiced set (upper half of Figures) support this expectation.

The results clarify the precise location of the peak by unambiguously showing that the association of the peak is with the syllable boundary at the right edge of the

accented syllable⁶. The lack of apparent shifts in the peak timing is quite striking, in comparison to results for peaks in other languages, where the number of preceding unstressed syllables does seem to have an effect (for data on English, see Farrar and Nolan, 1999; for Greek, see Arvaniti and Ladd, 1995). This stability in the Cois Fhairrge data is somewhat similar to the fixed starred tone in the Donegal Irish data from the previous chapter.

6.4.1.2 *Inis Oírr*

Results of the Inis Oírr analysis are demonstrated in Figures 6.27-6.29. The results for this dialect show that peak timing is more variable across the three prenuclear conditions than it is in Cois Fhairrge.

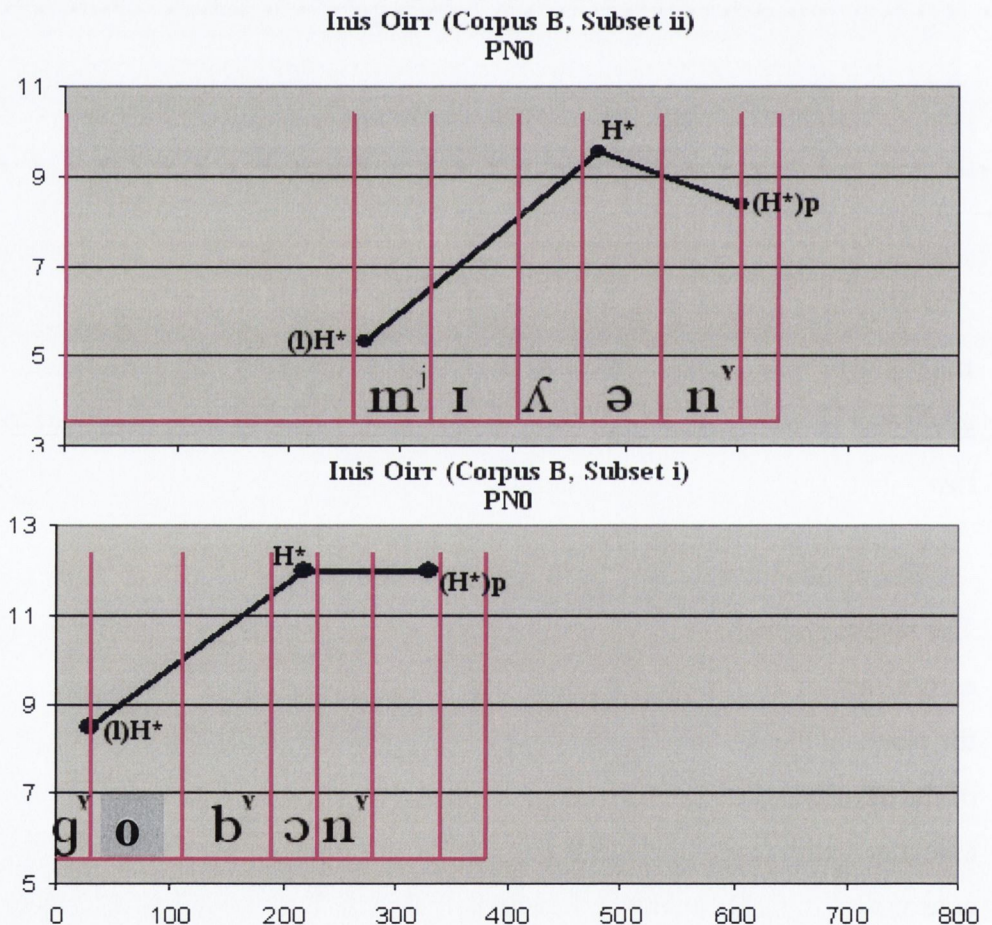


Figure 6.27. Tonal contours for prenuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PNO= no anacrusis.

⁶ See discussion in Section 3.3.4 on syllabification in Irish

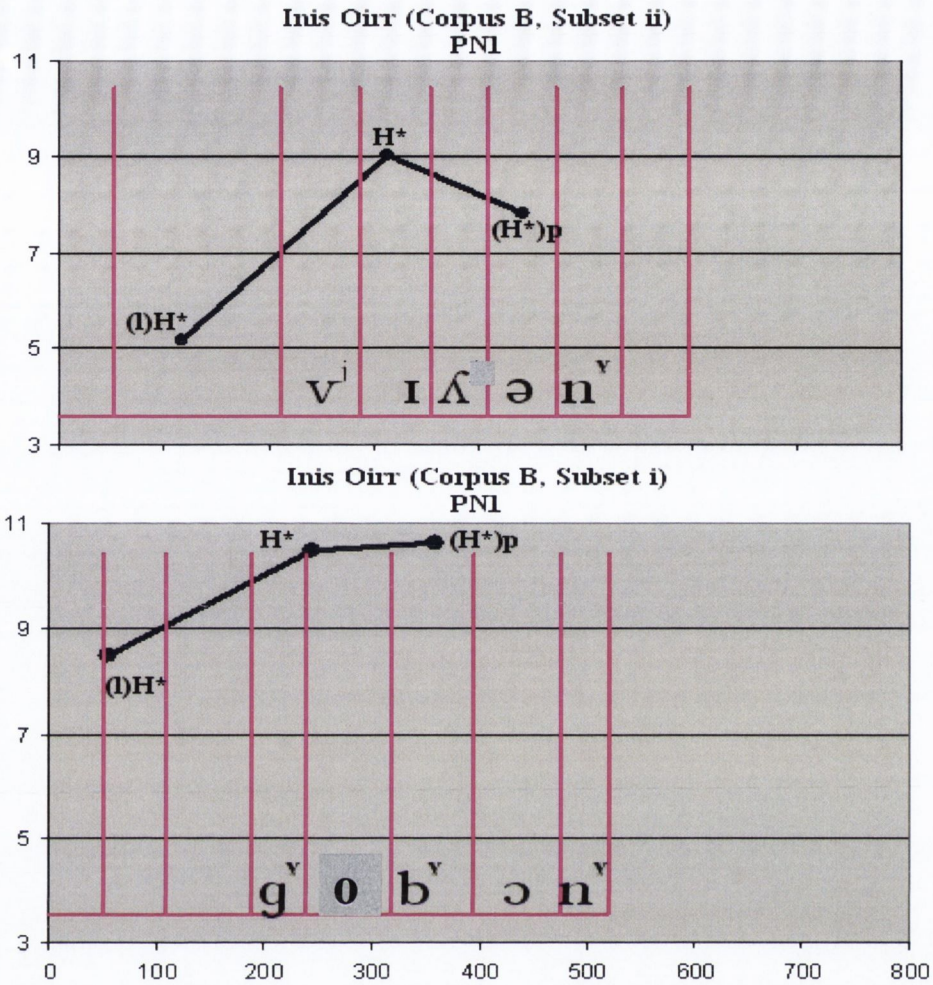


Figure 6.28. Tonal contours for pre-nuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1= anacrusis of one

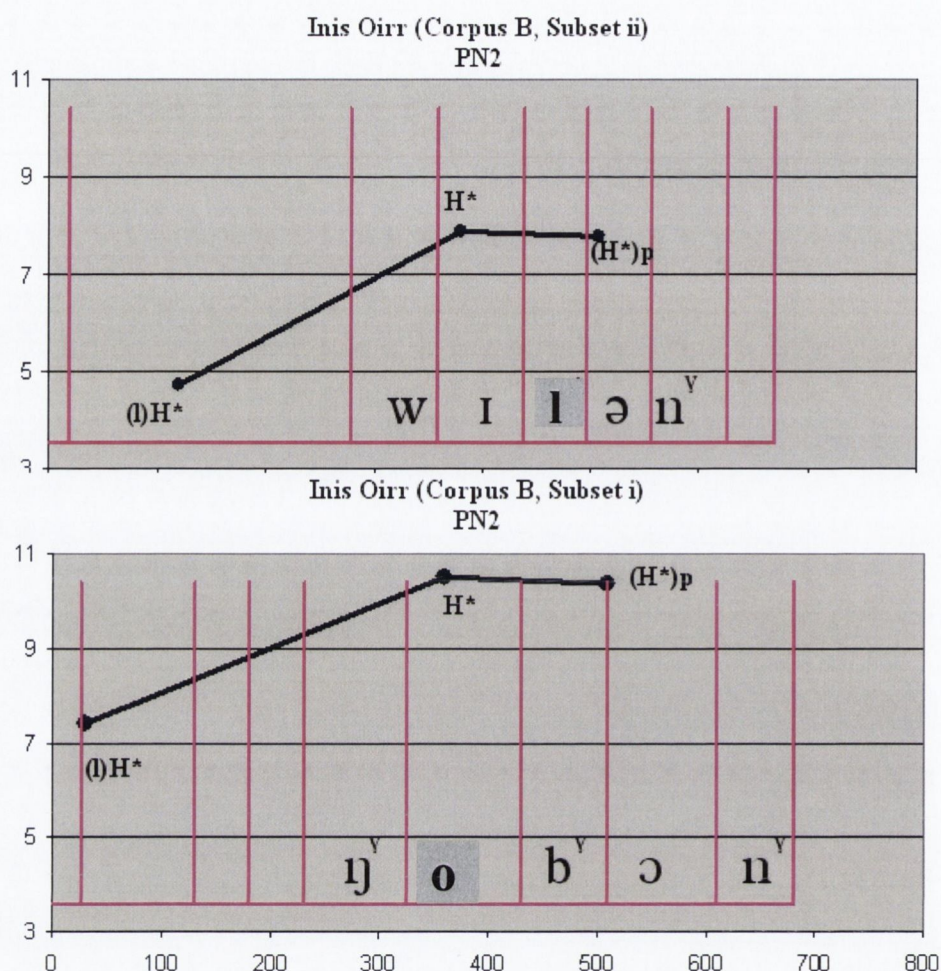


Figure 6.29. Tonal contours for prenuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two

There is very little variation in the results for each dataset. In PN0 the peak occurs in the vowel of the post-accented syllable. This is consistent for each speaker and as Figure 6.20 indicates the voicelessness of the /b/ in the lower half of the Figure does not have an effect on the timing of the peak.

In the other prenuclear conditions, PN1 and PN2, the peak occurs earlier. In both datasets of each of the anacrusis conditions the peak is located within the accented vowel. The leftwards peak drift caused by the presence of preceding unstressed syllables is not fully correlated with the size of the anacrusis. For example in the devoiced data set of PN1 (lower half of Figure 6.28) the peak occurs earlier than it does in the devoiced set of PN2. Also the results indicate that it is unlikely that the peak will drift beyond the left boundary of the accented vowel with an even greater anacrusis. It is likely that the delayed peak in PN0 is simply

reflecting an f0 rise-time requirement when this syllable occurs in absolute sentence-initial position and has a short vowel. If this is the case there is insufficient time to reach the peak early in the accented syllable which results in this delayed peak. The assumption based on this data is that the H* prenuclear accent in Inis Oírr is anchored to the onset of the accented vowel, when the anacrusis is greater than zero.

6.4.2 Peak timing in H*+L nuclear accents

This section presents data on the alignment of the starred tone associated with the H*+L nuclear accent in both South Connaught dialects. Results from earlier sections indicate that the most common nuclear accent in South Connaught Irish is clearly a falling H*+L accent.

6.4.2.1 Cois Fhairrge

Figures 6.30-6.32 indicate the results of the peak timing analysis for Cois Fhairrge. Note that N0 refers to the condition where there are no syllables following the nuclear accent, N1 is the condition where there is a single unstressed syllable following the nuclear accent, and N2 is the condition where there are two unstressed syllables following the nuclear accent. Average values are shown for the three timepoints measured: l(H*), H*, and L. The part of the contour corresponding to the H*+L is drawn as a solid line, the pitch rise preceding H* is drawn as a dashed line.

Unlike the prenuclear case, the H* element is not realised as a plateau, rather it is realised as a clear fall. The analyses of nuclear accents in Cois Fhairrge across the three different nuclear conditions indicate that the start of this fall, which corresponds to the starred element of the H*+L accent, is consistent over the three conditions. The H* peak in Cois Fhairrge always corresponds to the onset of the fall and the location is unaffected by the number of following unstressed syllables. In the three conditions for Subset i (the lower half of the Figures) H* appears to be firmly anchored to the CV transition, i.e. to the beginning of the accented vowel in the syllable /ɣ[Φb[/. As the initial /ɣ[is devoiced, this is effectively the onset of voicing in the syllable carrying the nuclear accent. Given the voiceless nature of the onset consonant, the possibility that the H* target might

be located within the consonant could not be ruled out, and consequently slight shifts occasioned by the number of following syllables could not be ruled out either.

The analysis of further materials with voiced sonorants allowed for a more precise location of the peak within the syllable. Results from the analysis of Subset ii indicate quite clearly that the peak is firmly anchored to the left-edge of the accented syllable, i.e. to the syllable onset. The number of following unstressed syllables had no effect on the timing of the starred element of the H*+L accent. This differs from the situation reported for English (Steele, 1986; Silverman and Pierrehumbert, 1990) where a rightward drift of the peak timing was found with an increase in the number of following syllables. The Cois Fhairrge data is rather more similar to data reported for Northern Standard German (Grabe, 1998) where the number of following unstressed syllables does not affect the peak location. However, unlike the left-aligned Cois Fhairrge peak, the H* in the German data was invariably aligned with the right-edge of the accented syllable.

The low target of the bitonal accent in Cois Fhairrge tends to be located in the final consonant of the accent unit. The L element is not a fixed distance in terms of timing of number of syllables however its timing is constant in relation to the foot. Thus both targets in the bitonal accent are stable in their location. In an earlier section (6.4.1.1) it was noted that the low target of prenuclear H*+L accents is unstable and may drift considerably. It would appear that nuclear accents are not as prone to such adjustments and so are generally more predictable in their realisation.

The difference between prenuclear and nuclear peaks in Cois Fhairrge appears to be a matter of a right-edge vs. a left-edge alignment to the accented syllable. The H alignment in the nuclear accent (left-aligned) is earlier than in the prenuclear (right-aligned). A difference in peak phasing between nuclear and prenuclear accents has been reported in other languages. For instance, Silverman and Pierrehumbert (1990) found that the peak tends to be earlier for the nuclear than prenuclear case in American English.

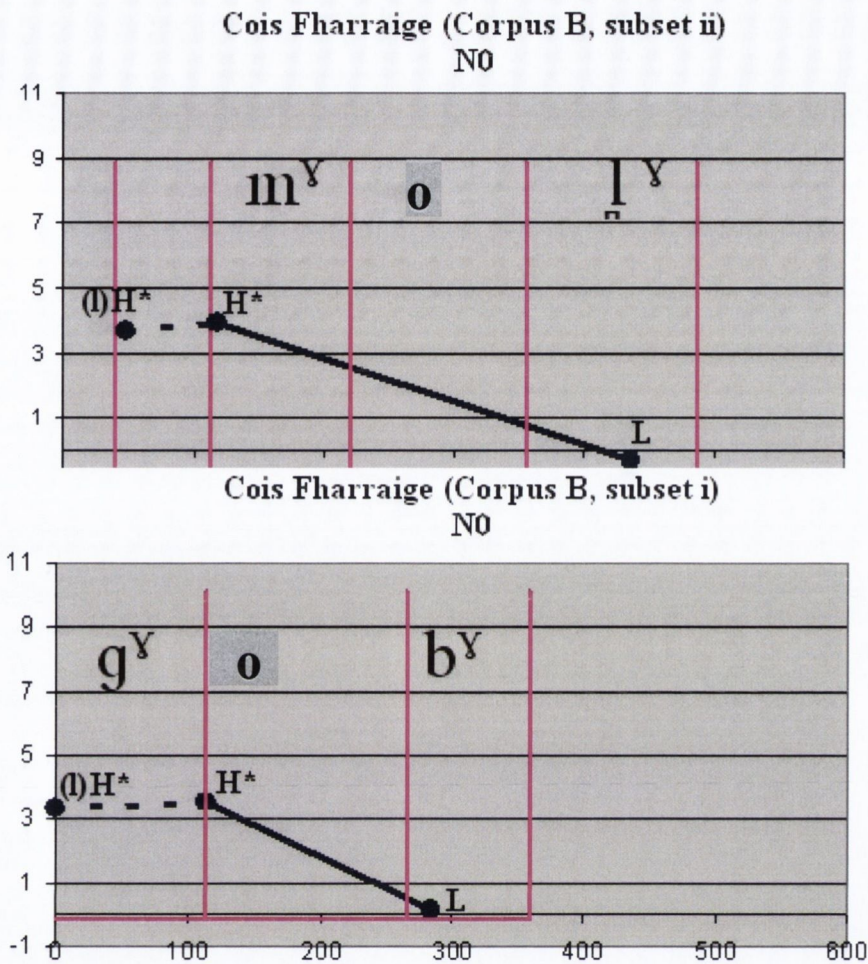


Figure 6.30. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0=no unstressed syllables following the nuclear accent

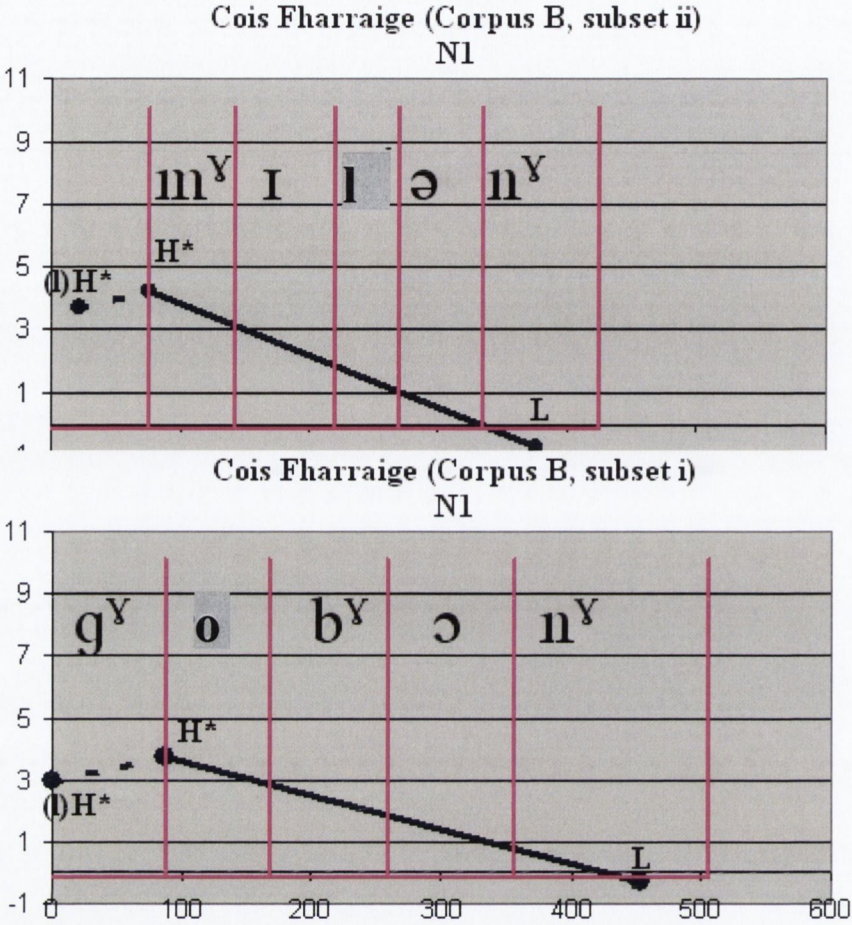


Figure 6.31. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1= one unstressed syllable following the nuclear accent

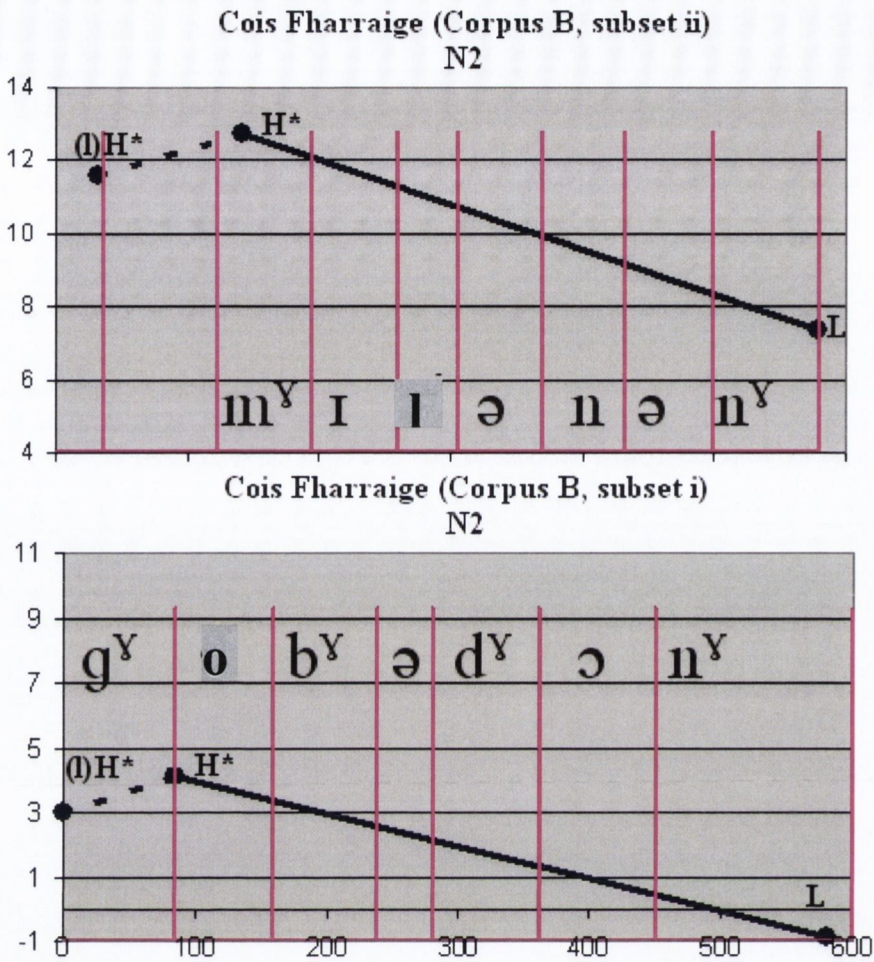


Figure 6.32. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2= two unstressed syllables following the nuclear accent

6.4.2.2 Inis Oírr

In the same way the prenuclear accents of Inis Oírr are variable in their relations, so too are nuclear accents. While the peak in Cois Fhairrge is firmly located at the syllable onset, in Inis Oírr the timing of the peak varies in relation to the segmental string. The peak generally migrates rightwards (i.e. is increasingly delayed) as the number of postnuclear syllables increase. Figure 6.33-6.35 illustrate the findings of the peak analysis for Inis Oírr Irish.

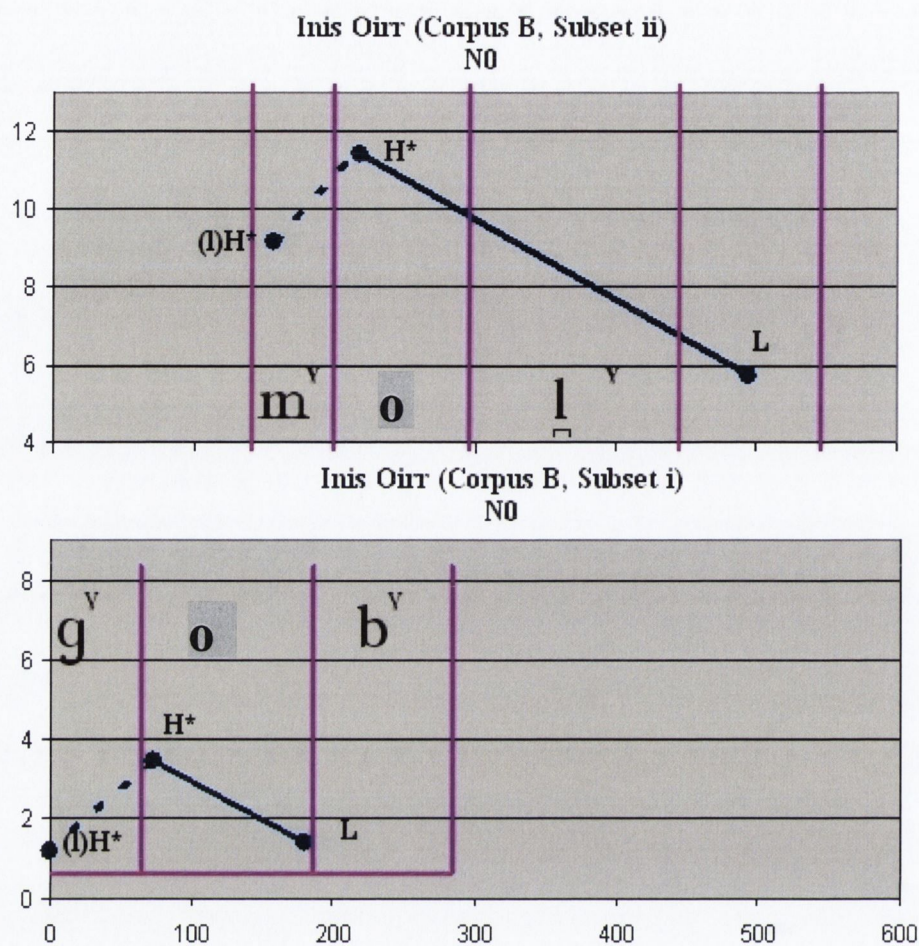


Figure 6.33. Tonal contours for nuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0=no unstressed syllables following the nuclear accent

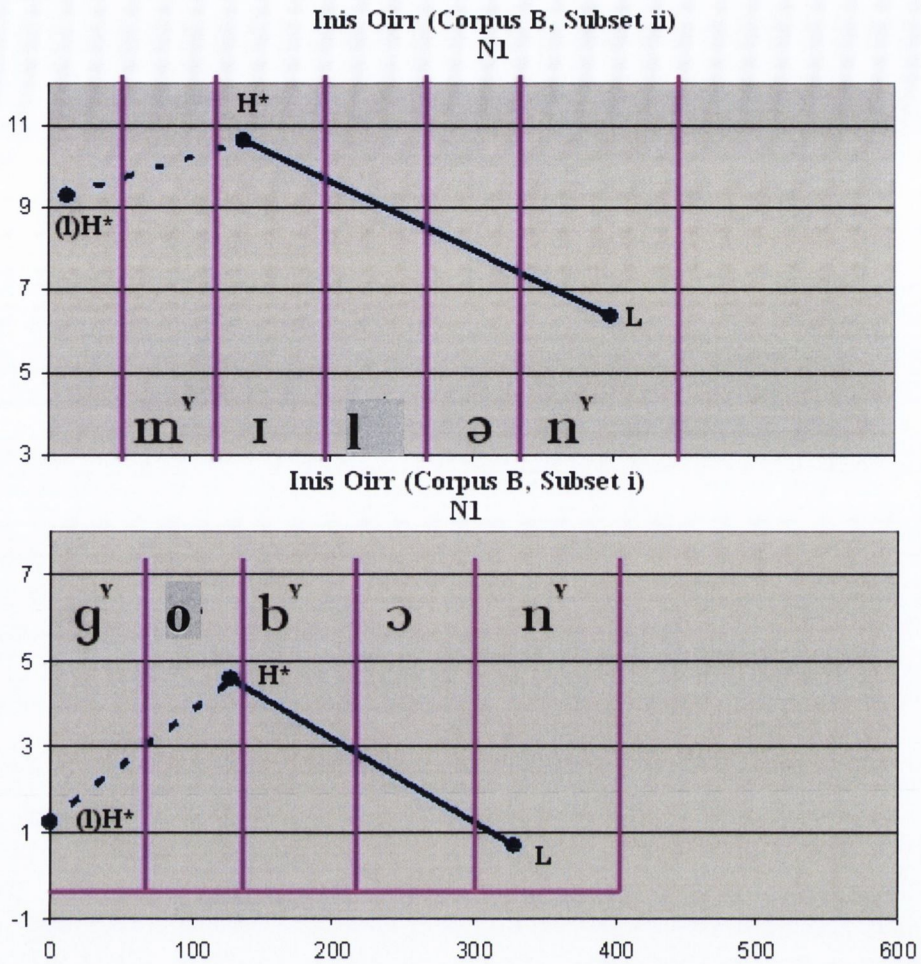


Figure 6.34. Tonal contours for nuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1 = one unstressed syllables following the nuclear accent

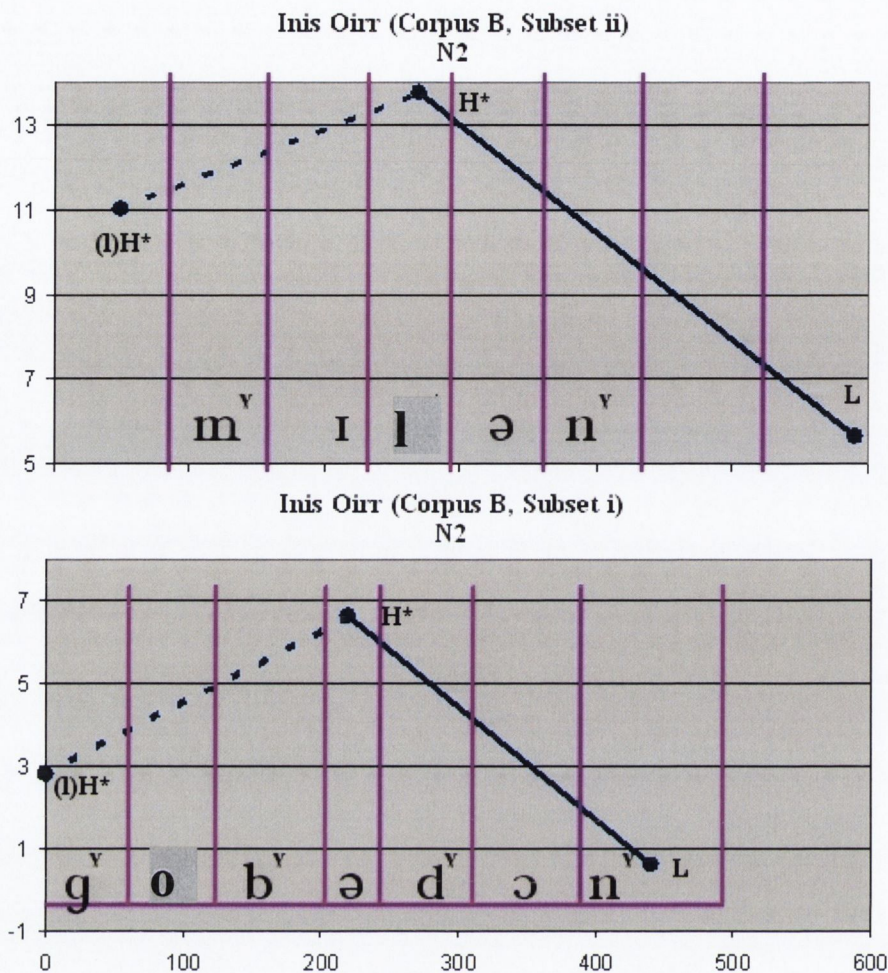


Figure 6.35. Tonal contours for nuclear accents in Inis Oírr Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2=two unstressed syllables following the nuclear accent

There were some differences in the results of the devoiced and fully voiced datasets and so the results are presented separately. Those of the devoiced set (lower part of figures) are presented first. This is followed by commentary on the second dataset (upper part of figures).

In the first of the nuclear conditions (N0) for the devoiced dataset, (Figure 6.33), when there are no unstressed syllables following the accented syllable the peak is located at the CV transition of the nuclear syllable. This is similar to findings for Cois Fhairrge. When the number of following unstressed syllables increases (N1 and N2), the peak drifts rightwards. Thus in N1, where there is a single following unstressed syllable, the peak is later than for N0. In this condition there is a greater degree of variability in realisations: not only are the speaker averages more divergent, but the realisations of one of the speakers fluctuated between the

beginning and the end of the /bʲ/ consonant. Given that this stop is effectively voiceless, it was thought that the true location of the peak might lie somewhere within the /bʲ/ segment, and that the true variability is less. Nonetheless, for the N1 condition the peak lies still within the accented syllable, although phased later relative to the N0 case. Results from the fully voiced set clarify the peak position (see below).

In the N2 condition the peak has drifted somewhat further rightwards for each of the speakers, and is located in the post-tonic unaccented vowel (bearing in mind again that the voiceless consonants surrounding this vowel militate against an over precise specification).

Similar results were found when the fully voiced data set was analysed although some slight differences were found. For the N0 condition it was found the peak is associated with the accented vowel rather than with the CV transition. There is indeed a rightward drift the peak location but this only manifests itself in the N2 condition. In the N1 condition the peak is still associated with the accented vowel but drifts into the accented consonant in N2. From the results of the devoiced dataset we had hypothesised that the inter-speaker variability in the N1 condition would be lessened in a fully voiced dataset. This proved to be the case. However, we had expected the peak to be somewhere towards the right-edge of the syllable. In fact the peak was consistently located within the accented vowel for each of the speakers. Similarly for N2 we had expected that the peak would drift out of the accented syllable, possibly into the post accentual vowel. Rather we found that the peak was still located in the accented syllable, albeit later than in the vowel. The results show that while there is a drift in peak timing in this dialect, under optimally voiced conditions the peak does not in fact drift outside of the accented syllable but rather has the freedom to drift within it.

6.4.3 Discussion of timing results

The present study is preliminary in that it is limited to three speakers per sub-dialect. Conclusions therefore are tentative. However, these data do nonetheless lend support to the initial hypothesis that the two dialects are differentiated in terms of peak location. The results indicate that this peak timing is at least one important parameter to capture the phonetic realisation differences among structurally

identical dialects. Cois Fhairrge dialect is clearly a “fixed” dialect in terms of how peaks are aligned, while the data from Inis Oírr lends more support for the *variable peak hypothesis*, although this is more evident in its nuclear accents.

As the data show peak timing for Cois Fhairrge is noticeably fixed for both prenuclear and nuclear accents. In the case of the “fixed” dialect of Cois Fhairrge, the peak is timed differently in the nuclear and prenuclear accents, even though for both accents its timing remains unaffected by the presence and/or number of adjacent unstressed syllables. So although we have characterised Cois Fhairrge as a fixed-peak dialect, there is in fact variability in peak timing, and this variability is associated with the accent position. Peak timing for the nuclear accent appears to be anchored to the CV transition at the beginning of the syllable, while for the prenuclear accent it would appear to be anchored to the CV transition at the end. This feature is of course not unusual: a difference in peak timing for nuclear and prenuclear accents has been reported for English by Silverman & Pierrehumbert (1990). However, Cois Fhairrge differs from English in having a fixed peak for each of those accents.

As we observed Inis Oírr shows more peak drift in both accent types. In nuclear position Inis Oírr realisations range from the left edge of the accented vowel to the post accented vowel. In prenuclear position realisations range from the left-edge of the accented vowel as far as the right edge of the post accented syllable. For the Inis Oírr dialect, although variability in peak timing is found in both prenuclear and nuclear positions, there are differences between the two positions and perhaps different factors governing their variability. In the case of Inis Oírr our intuition is that, while the nuclear peak drifts in a way that correlates with the number of post-nuclear syllables, the prenuclear accent may involve more of a binary choice between a peak associated with the accented syllable, and a late peak which is associated with the post-accented syllable, which only occurs when the accented syllable is in absolute initial position. When discussing differences between prenuclear and nuclear accents, it should of course also be mentioned that the distribution of tonal accents tends to be different for the two. As indicated in earlier sections the nuclear accent is generally H*+L, and the prenuclear is more typically H*. Furthermore, as can be seen in the Figures in section 6.5 the nuclear accent virtually always yields a sharply defined peak, while the prenuclear peak is almost invariably realised as a plateau. These features suggest that nuclear and prenuclear

accents are “different”. This was always an assumption within the British tradition of intonational analysis, and this perspective is retained in some, though not all, AM treatments, and this is the view to which present results dispose us. They behave differently in terms of how basic pitch accents are realised and also in terms of peak alignment.

This investigation has only looked at some of the known causes of peak variability. For example, we would hope to extend the study not only to include more subjects/materials, but also to look at the right context in the prenuclear condition, which has been shown in other studies to be a potentially large influence on peak timing. Notwithstanding the need for further elaboration and testing of these findings, the present data do strongly suggest that the precise alignment of peak timing is likely to be a useful measure for capturing prosodic differences among even very closely related dialects, such as the two Connaught dialects analysed here. This study adds therefore to the body of evidence that suggests that melodic alignment factors are likely to be of paramount importance in dialect differentiation.

Our results prompt questions concerning the perceptual correlates of the differences described in this Chapter. Given that at the segmental level these dialects are considered to be almost identical, it would be interesting to explore how strong a cueing role these peak timing differences might play.

6.5 Brief comparison of previous studies and current analysis

Earlier studies on Connemara dialects, as described in Section 3.3.2.1.2 Chapter 3, use a more traditional approach to describe the intonation of a South Connaught dialect by employing a kinetic style of analysis. Blankenhorn (1982) outlines 8 nuclear tones in her analysis of Connemara Irish, while Bondaruk (2004) outlines 11. In the previous studies the authors were concerned with describing all possible nuclear contours found in the dialect of Connemara. In contrast to that, the focus of this study is to describe the basic underlying prenuclear and nuclear tones found in unmarked sentences of each dialect and to focus on how these work across three grammatically different sentence types. Therefore it is difficult to make a sensible comparison with their results. It is likely that were we to consider factors such as the attitudinal meaning, emotive effects and focus effects of contours we would in fact have a much wider inventory of contours to describe as the expectation is that

the basic nuclear accents and boundary tones would combine to produce a richer inventory of nuclear contours. Describing attitudinal/emotive effects, as well as the basic distribution of accents across different sentences types is unfortunately well beyond the scope of this study.

Furthermore, an AM approach does not necessarily differentiate between different types of rises and falls and as a result different degrees of falling and rising contours are obscured. For example with a labelling system such as IViE high-falls and low falls are transcribed in the same way at the phonological level. As a results an analysis in AM terms is somewhat constrained and as such attempt to compare the two descriptions sensibly is not necessarily a useful exercise. Nonetheless in Table 6.4 a preliminary comparison of our results with those of Blankenhorn (1982) and Bondaruk (2004) is outlined. Because of the nature of the previous studies, where only the nuclear contour was dealt with, the table is restricted to the nuclear contour so prenuclear accents are not included. This limits the comparison somewhat as certain contours are not included, such as rising contours and high contours.

<i>.Blankenhorn</i>	<i>AM analysis: Nuclear contour</i>
High-rise	n/a
Half-rise	n/a
Low-rise	n/a
full fall	H*+L 0%
half-fall	H*+L 0%
low-fall	H*+L 0%
emphatic fall-rise	H*+L H%
non-emphatic fall-rise	H*+L H%

<i>Bondaruk</i>	
high-fall	H*+L 0%
low-fall	H*+L 0%
flat-fall	H*+L 0%
high-rise	n/a
low-rise	n/a
flat-rise	n/a
mid-level	n/a
simple rise-fall	n/a
complex rise-fall	n/a
simple fall-rise	H*+L H%
complex fall-rise	H*+L H%

Table 6.4. *Correspondence between phrase final nuclear tones found in previous studies vs. those found in our AM analysis*

6.6 Summary

This chapter provides a preliminary tonal inventory of South Connaught Irish based on auditory and acoustic analysis of read speech corpora for six speakers of the dialect. It is proposed that the principle underlying tone of this dialect is a falling accent, transcribed H^*+L . In prenuclear position this can be modified through tonal linking to yield a H^* accent.

Some incidences of a low accent have been found in interrogatives, but overall there is very little evidence of this accent type.

It was found that speaker's generally employ the same contour in both questions and statements. The "flat-hat" contour common in South Connaught declaratives is not as common in interrogatives, as speakers do not link prenuclear contours to the same degree in questions. Slightly more rises were found in the nuclear contour for yes/no-questions than for the other sentence types, although Yes/no-questions generally employ the same contour as wh-questions and declaratives.

The results of the peak timing analysis show that pitch accents in Cois Fhairrge have a very fixed peak location in both prenuclear and nuclear accents. In prenuclear position the peak is clearly aligned with the right-edge of the accented syllable. There is a rise onto the peak within the accented syllable but perceptually the peak is the most salient part of the accent. In nuclear position the peak is left-aligned with the accented syllable.

Inis Oírr demonstrates more variability in the location of its peak. In prenuclear position the optimal peak location is within the accented vowel but this can be subject to variability unrelated to the size of the anacrusis. The nuclear peak tends to drift rightwards when the number of syllables following the nuclear accent is increased.

The analysis shows that there is some variation in the how speakers of each dialect modify the underlying H^*+L accent. Cois Fhairrge speakers modify the underlying H^*+L prenuclear accent through tonal linking to a greater extent than Inis Oírr speakers, particularly in declarative sentences. Inis Oírr speakers tend to employ both H^* and H^*+L accents in more equal proportion.

Finally, evidence from other descriptions of the intonation of South Connaught Irish (outlined in Chapter 3) suggest that we could expect to find more variation in the intonational contours if we were to consider the attitudinal meaning of tones, among other factors. Affective speech for example, would be likely to yield a more

diverse employment of nuclear tones and boundary tones. Our corpus of speech is limited in that it focuses on unmarked, context-free utterances. Therefore, there are limitations on the realisations of tones we would expect to encounter.

Chapter 7

Mayo Irish

7.1 Introduction

This chapter presents the results of the auditory and acoustic analyses of the Mayo corpus. Firstly a preliminary tonal inventory of the dialect of Mayo is drawn up based on Corpus A (Section 4.3.1). This is followed by a closer look at the distribution of the different pitch accents across declaratives, wh-questions and yes/no-questions. Final sections focus on the alignment of pitch targets of Mayo Irish with the segmental or syllabic string. This part of the study is based on analysis of Corpus B as described in Section 4.3.2.

Information on the informants is presented in Section 4.2, Chapter 4. Their place of origin is indicated in Figure 7.1. For more information on the Mayo Gaeltacht see Section 1.2, Chapter 1.



Figure 7.1. Map of Mayo Gaeltacht. The arrows outline informants' place of origin. (Source: Údarás na Gaeltachta)

7.2 Tonal Inventory of Mayo Irish

In following sections a preliminary tonal inventory of Mayo Irish is drawn up, based on auditory and acoustic analysis of the f0 contour. Following previous chapters, the transcription and analysis is performed using Praat (Boersma and Weenik, 2005). The tonal inventory is drawn from the IViE labelled data of Corpus A, as outlined in Section 4.3.1, Chapter 4. Firstly, the tonal inventory of prenuclear accents is looked at and this is followed by an analysis of the nuclear contours of Mayo Irish.

The first observation of the intonation of Mayo Irish is that the contours are characterised by one overall typical contour shape, which may be considered the ‘default’ contour for Mayo Irish. This contour consists of a series of falling pitch accents labelled in IViE as H*+L. An example of this typical contour is outlined in Figure 7.2. This is the “default” contour for all three sentence types analysed in this study. Similar prenuclear and nuclear contours are employed by the speakers across both declaratives and interrogatives. Later sections look at the distribution of accents across the three different sentence types.

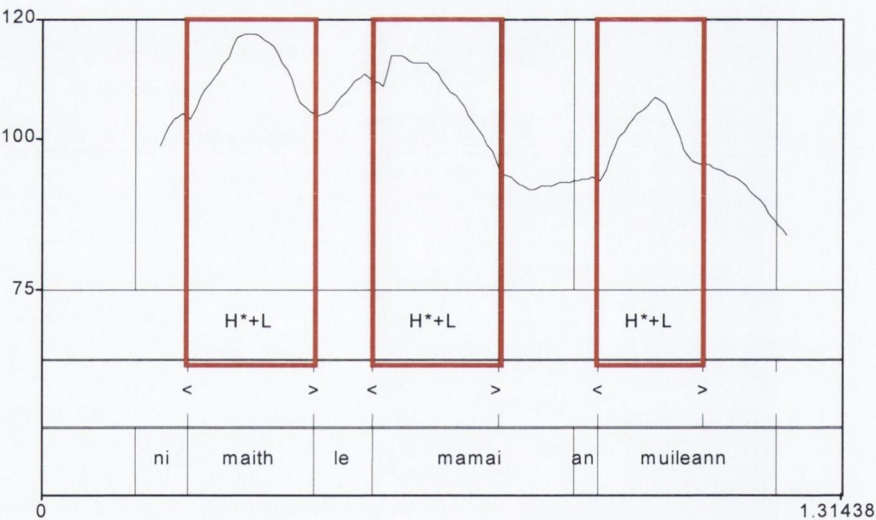


Figure 7.2. Pitch trace of ‘default’ Mayo Irish declarative with 3 pitch accents. Accented syllables are highlighted in red. /*n̪iː m̪ˠah le m̪ˠam̪ˠiː ən m̪ˠiːlən̪ˠ/*

In successive H*+L pitch accents both the peak and the trough of each subsequent H and L tone are generally lower in f0 than the preceding ones, giving rise to a declination in f0 throughout the utterance. There may be adjustments to this contour resulting in changes to the declination line. For example, non-initial prenuclear accents may be downstepped and nuclear accents may be upstepped.

Additionally, there may be modifications to the underlying H*+L accent, as well as the employment of other pitch accents.

It is clear from the analysis of both Corpora in Mayo Irish that the most common pitch accent found in all sentence types in this dialect is a falling accent, labelled in IViE as H*+L. The overall inventory of pitch accents in percentages is shown in Figure 7.3. In Corpus A 66% of pitch accents found are falling. Of the remaining accents, high accents (H*) predominate, making up 23% of the total and the rest are made up of rising (7%) and low accents (4%). Evidence for the different prenuclear and nuclear accents is provided in the following sections.

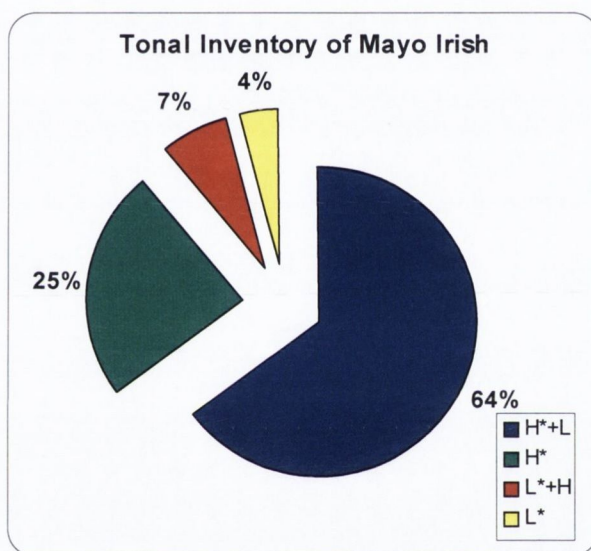


Figure 7.3. *Tonal inventory of pitch accents (in percentages) found in Mayo Irish*

7.2.1 *Prenuclear accents*

In Mayo Irish the two most common prenuclear accents are falling accents, labelled H*+L (53%), and high accents, labelled H* (37%). Low accents (4%) and rising accents (6%) make up the remaining prenuclear accents.

Of the two most common accents (H*+L and H* accents) the choice of accent employed by the speaker was not dependent on the grammatical function of the sentence. The occurrence of rising prenuclear accents (6%), however, was found to be contingent on the grammatical function of the sentence: these accents were only found in yes/no questions. This prenuclear rising accent was only found in initial position in this interrogative type and, as such, could be considered one of the prosodic markers for a yes/no question in this dialect. Figure 7.4 indicates the percentages of prenuclear accents found in Mayo Irish and examples of each of the

four accent types are illustrated in Figure 7.5 (a-d) below. The distribution of these accents across the different sentences types is outlined in more detail in Section 7.3.

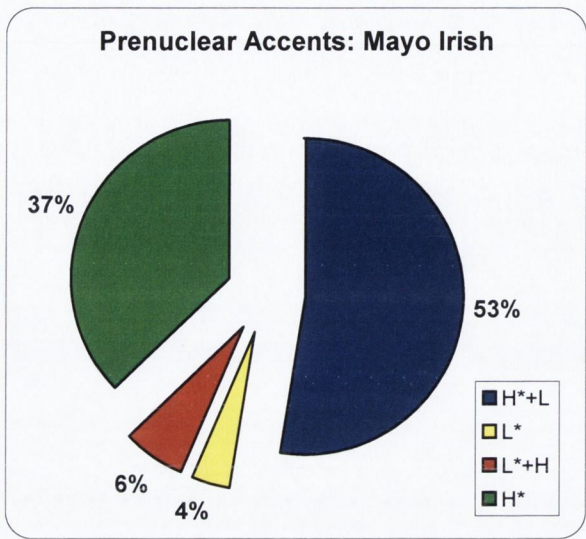


Figure 7.4. Inventory of prenuclear accents (in percentages) found in Mayo Irish

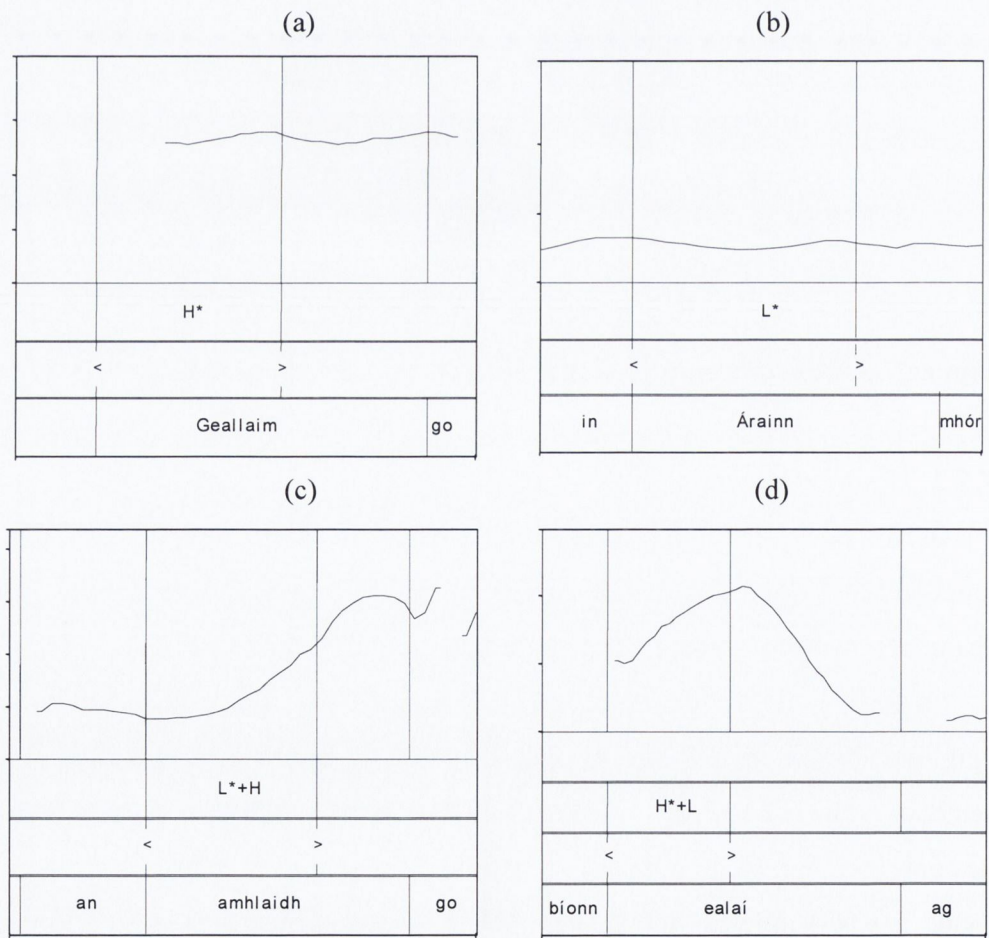


Figure 7.5. The four prenuclear accent types employed by Mayo speakers. (a) an H^* pitch accent / $\text{ʃal}^{\text{H}}\text{ə}^{\text{H}}\text{m}^{\text{H}}\text{gə}$ /, (b) an L^* accent / $\text{ɪn a}^{\text{L}}\text{r}^{\text{L}}\text{ə}^{\text{L}}\text{w}^{\text{L}}\text{or}^{\text{L}}$ / (c) an L^*+H pitch accent / $\text{ə}^{\text{L}}\text{n a}^{\text{L}}\text{u}^{\text{L}}\text{ɪ}^{\text{H}}\text{i}^{\text{H}}\text{gə}$ /, (d) a H^*+L accent / $\text{b}^{\text{H}}\text{i}^{\text{H}}\text{:n}^{\text{H}}\text{ə}^{\text{L}}\text{ɪ}^{\text{L}}\text{ə}^{\text{L}}\text{ɟ}$ /

7.2.1.1 *Falling accents*

This section presents evidence for the occurrence of H*+L falling prenuclear accents.

As mentioned earlier the ‘default’ contour in Mayo Irish is a sequence of falling pitch accents. Phonetically falling tones can be realised in several ways. In fact there is more variation in the realisation of the pitch accents in Mayo Irish than in any of the other Irish dialects examined thus far. The precise location of f0 peaks is focussed on in later sections but some general observations can be made:

- i. In a falling accent there is generally a rise to the accentual target beginning in the syllable preceding the accent.
- ii. In this study where the size of the anacrusis was varied, the location of the peak was found to vary. The location of this peak is generally systematic in its variability. In initial position its location depends largely on the number of unstressed syllables preceding the accented one. A larger anacrusis (more than two syllables) gives rise to early peaks, whereas when there is no anacrusis there may be late peaks. For more on this see section 7.4 below. In non-initial position the optimal location of the peak tends to be within the accented syllable.
- iii. The low target of the trailing tone is also subject to variation, and the location of this f0 minimum is quite unpredictable from the context. At times it was found to be located in the syllable immediately following the accented one and, at other times, it was found to be right-displaced (Grabe, 1998) so that it is located a number of syllables following the accented one. The location of the low target is not contingent on the number of syllables following the accent so that even under the same stress context (e.g. three unstressed syllables following an accent) the location of the low target was subject to variation. The location of this f0 minimum may significantly alter the shape of the pitch accent in terms of the slope. For instance, when the low target occurs in the syllable following the accented syllable the slope of the drop is steep, to allow the full pitch accent to be realised quickly. When the low target is right-displaced and occurs a number of syllables later the slope of the fall is much more shallow (see Figure 7.6. for examples of each type).

- iv. A further observation is that the low tone in H*+L accents can be deleted through the process of complete linking (Gussenhoven, 1984) and this gives rise to a high accent. The resultant shape of this high accent is a flat plateau as indicated in Figure 7.5 (a) above. The deletion of the trailing tone is not predictable from the context, unlike the deletion of trailing tones in Donegal Irish, which happens under stress clash conditions (see Section 5.2.1.3). Considering we observed earlier that trailing tones in Mayo Irish appear to be subject to much variability, it is feasible to treat these high tones in Mayo Irish as underlying falling tones. This also lends to a more unified approach across the dialects as it follows similar treatment of monotonal accents in the Donegal and South Connaught dialects examined in previous chapters. The description of these high tones is elaborated on in section 7.2.2.2 below.

Examples of three different falling accents are indicated below in Figure 7.6. The three options do not appear to be contrastive.

In this first of these falling accents (Figure 7.6a) the peak is realised within the accented syllable and the low target following the peak is realised in the unstressed syllable following the accented one. This is the most common realization of a H*+L accent found in Corpus A for Mayo Irish.

In the second realisation (Figure 7.6b) the peak occurs before the accented syllable, giving rise to an early peak. This is common in initial accents in Mayo Irish when there is a larger anacrusis (see Section 7.4 below). In this particular example the low element of the tone in this H*+L accent is rightward moving or displaced (Grabe, 1998) so that it occurs two syllables after the accented syllable.

Finally, in the third realisation (Figure 7.6c) the peak is delayed so that the f0 maximum is located in the syllable following the accented one. Although there is a rise in pitch within the accented syllable in this realisation, the onglide is not perceptually salient and consequently to the listener the pitch on this accent unit is perceived as falling.

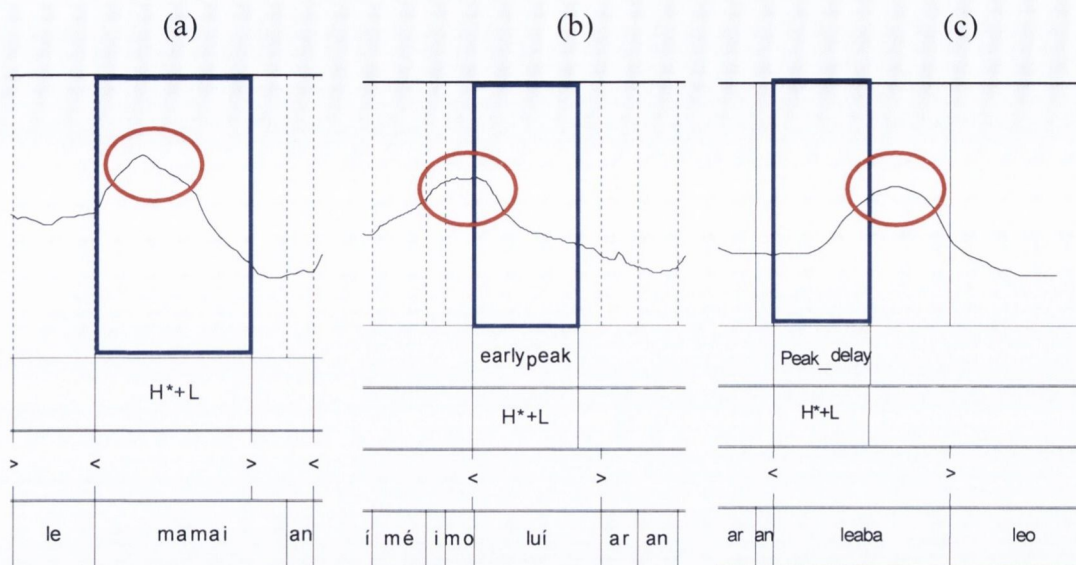


Figure 7.6. Examples of three falling accents of Mayo Irish. The accented syllable is marked with a blue rectangle and the peak is indicated by a red circle. (a) A falling accent where the peak is located within the accented syllable and the low target is located immediately following this /le mʲamʲi: ən/ (b) an early peak followed by a right-displaced low target /ɪ mʲə ɲi: ɛrʲ ən/ (c) a delayed peak with a rising onglide to the target /ərʲ ən ɲabə lo:/

The variability in the locations of both the f0 maxima and minima in falling accents of Mayo Irish was observed across all three speakers.

7.2.1.2 High accents

Over one third (37%) of prenuclear accents in Mayo Irish are realised as high tones labelled H*. High prenuclear accents in Mayo Irish occur in both initial prenuclear position or as successive prenuclear accents. Phonetically there are some clear observations to be made:

- i. When found in initial prenuclear position this high accent is typically realised as a plateau whose onset varies depending on certain prosodic contexts. For instance, in the study outlined in Section 7.4. on peak timing in this dialect, the size of the anacrusis was systematically varied and this caused a change in the location of the peak. As a general observation a large anacrusis results in an early peak of the prenuclear high while no anacrusis may give rise to a late peak. It was considered whether the late peaks might in fact be treatable as rising accents but on closer examination it was found that the late peak was correlated with the size of the anacrusis, or rather with

the lack of one. (Rising accents were also found in the corpus and are considered below.)

- ii. The plateau of an initial H* accent generally continues for the duration of the accent unit leading to a prenuclear 'flat-hat' contour in some utterances of Mayo Irish.
- iii. Non-initial high prenuclear accents are also realised as plateaus, although these accents are found much less often in non-initial position. Non-initial prenuclear H* accents typically occur as a result of a tonal clash and tend to be downstepped, labelled !H*. The exact distribution of these tones across the different sentence types is outlined in Section 7.3.

As suggested above, it is considered here that H* accents may be treatable as underlying H*+L accents with a complete deletion of the trailing rightward tone, resulting in a H* pitch accent. This follows Gussenhoven's (1984) *complete linking* of prenuclear accents. Additionally it follows the treatment of similar tones in the other Connaught dialects of Cois Fhairrge and Inis Oirr, as described in Chapter 6. In these dialects of South Connaught Irish it was observed that the drift of the L tone in bitonal H*+L accents is not predictable from the context. Similarly, the location and/or deletion of the trailing tone in Mayo Irish is unpredictable from the context particularly in initial position. As observed above, non-initial prenuclear H* accents typically occur as a result of a tonal clash.

Initial prenuclear H* accents may occur in free variation with H*+L accents, although much less frequently. This would suggest that Mayo Irish is less subject to pitch accent modifications than the other Connaught dialects observed in this study.

7.2.1.3 *Rising accents*

Prenuclear rising tones were only found in initial prenuclear conditions in this corpus. They account for just 6% of all prenuclear accents produced by Mayo speakers. In addition to this they were only found in yes/no-questions, which implies that they act as a marker to interrogativity in this dialect of Connaught. Their precise distribution is discussed in Section 7.3. Rising tones are differentiated from high tones with peak delay in two ways.:

- i. Firstly, rising tones are perceptually distinct from falling tones (+ delay) insofar as a clear rise can be distinguished on an auditory as well as a visual

basis. In those falling accents with peak delay the rise attributed to the onglide towards the peak is not auditorily distinct.

- ii. The second distinction is that the size of the anacrusis has no bearing on the location of the high f0 target in the rising accent. Even with a large anacrusis there is a perceptible dip in these rising pitch accents which is consistently aligned with the accented syllable. Similarly the peak of the trailing tone is stable in its alignment. It is aligned in the syllable following the accented one. This is demonstrated in Figure 7.7 which illustrates the initial rising accent in two yes/no-questions. In the first (on the left) there is an anacrusis of three syllables, and in the second (on the right) there is an anacrusis of just one syllable. In both, the f0 minimum is located within the accented syllable and the f0 maximum is located in the syllable following this. This is interesting given the variability in peak and trailing tone location in the falling accents of this dialect.

Given that there are so few rising accents found in the corpus (just 6%) we cannot not categorically say that this is how all rising accents in Mayo Irish are realised but rather these are tentative conclusions we make from the data available to us.

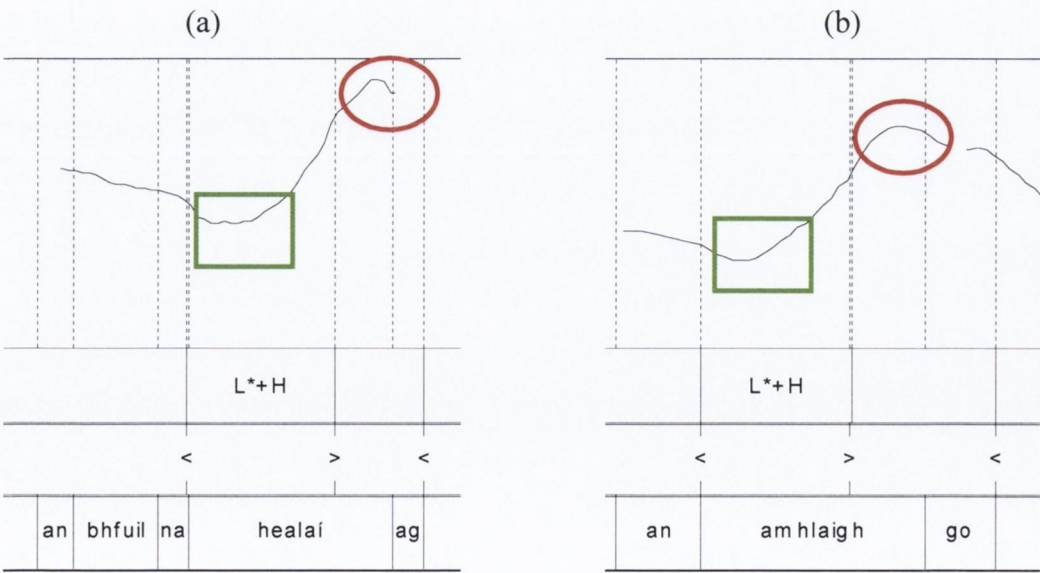


Figure 7.7. Pitch traces of initial prenuclear rising accents in two Mayo Irish yes/no-questions. (a) yes/no-question with anacrusis of three /ən wɪl n̪ʲə h̪al̪ʲi: əʃ/, and (b) yes/no-question with anacrusis of one /ən au̯l̪ʲi: gə/. Green box indicates the location of the f0 dip in the accented syllable and the red circle indicates the f0 maximum of the trailing tone.

7.2.1.4 *Low accents*

Low tones account for just 4% of prenuclear pitch accents found in this corpus of Mayo Irish. L* prenuclear accents are only found in non-initial position and are realised as very flat f0 minima preceded by a fall from a preceding H*+L tone. Additionally, in prenuclear position L* tones are only found in declaratives. In these low tones the f0 remains low for the duration of the accent unit, so that the tone is realised as a low plateau. Given that rising tones are only found in initial prenuclear position and in one particular sentence type (i.e. yes/no-questions) it is difficult to argue that these non-initial low tones are underlying L*+H tones, as has been argued for other monotonal accents found in each of the dialects examined so far. We must therefore consider a different argument for the occurrence of these low tones.

Having closely examined those sentences containing an L* accent we concluded that these accents only occur in sentences where there is a certain amount of narrow focus on the accented word preceding the L* accent. It was expected that the sentences recorded in this corpus would all be produced with broad focus but on closer examination it was decided that a small percentage of these were produced with some degree of narrow focus on certain words. It is following these ambiguous cases that L* tones were found in this dialect. Given that there are so few of them, and also the fact that they only occur under particular conditions, we would conclude that prenuclear L* tones are a direct result of narrow focus. This contrast between the narrow-focused high-fall and the flat low tone is likely to be a marker of focus in this dialect, an aspect not covered in the present study. Investigating how sentences with narrow focus behave in dialects of Irish is something which will need to be investigated in future work. In the other Connaught dialects (Section 6.2.1.3) L* tones were also found but were only employed by speakers in wh-questions. In both dialects there are too few examples of these tones to come to a definite conclusion in terms of classifying them. This may need to be revisited in future work where a more varied corpus is analysed to include more varied speech styles such as spontaneous speech and in speech with more affective content, etc.

7.2.2 Nuclear Accents

In terms of its nuclear accents Mayo Irish appears to have the richest inventory of any of the Irish dialects studied here. There were three different pitch accent categories found in nuclear contours of Mayo Irish as indicated in Figure 7.8. The most common of these is the H^*+L falling accent which was found in 87% of utterances in the corpus. The remaining accents were made up of rising nuclei (8%) and low-level nuclei (5%). Evidence for each of these different nuclear accents is provided in the following sections.

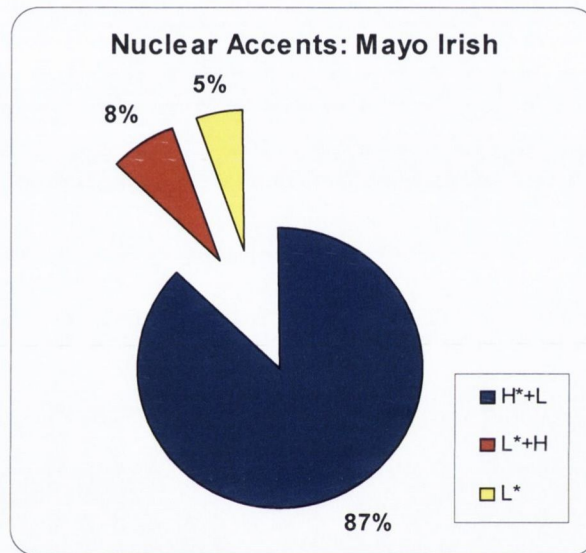


Figure 7.8. Percentages of nuclear accents found in Mayo Irish

7.2.2.1 Falling accents

87% of nuclear pitch accents in Mayo Irish are falling accents labelled H^*+L . The location of the peak of this nuclear H^*+L accent is subject to variation. This variation is largely contingent on the right-context of the nuclear contours. As a general rule it can be stated that the peak associated with the starred tone of H^*+L nuclear accents drifts rightwards as the number of unstressed material following the nuclear syllable increases. This is elaborated on more fully in Section 7.4 below.

We observed earlier that the location of the f_0 minimum of trailing tones in H^*+L prenuclear accents may vary unsystematically. Similarly the trailing tone of nuclear accents is subject to variation in its location. Two types of realisations were found. In the first of these the f_0 minimum is located immediately after the accented syllable and then the f_0 remains flat for the duration of the nuclear contour. In the second realisation the f_0 minimum is reached much closer to the

right-edge of the nuclear contour, even when there are a large number of unstressed syllables following the nuclear accent. These two realisations yield two H*+L nuclear accent shapes. In the first of these the accent is realised as a sharp fall which allows for a quicker realisation of the falling accent so that the low target is reached quickly. In the second of these the overall shape of the fall is shallower because there is more time given to allow the f0 to reach its minimum target. It is worth noting that the number of unstressed syllables following the nuclear accent has no bearing on where this low target might be realised. This is demonstrated in Figure 7.9 which shows pitch traces from two H*+L nuclear accents in Mayo Irish, both with just one unstressed syllable following the nuclear accent. In the first contour the overall falling gesture is realised quickly to ensure a sharp fall, but in the second one there is a shallower fall and the f0 minimum is located closer to the right-edge of the nuclear accent. It should be noted that the two realisations are not contrastive in any way, rather they are different realisations of an underlying falling accent. One difficulty with the labelling system is that such realisational differences cannot be adequately captured. This issue is addressed in Section 2.4, Chapter 2.

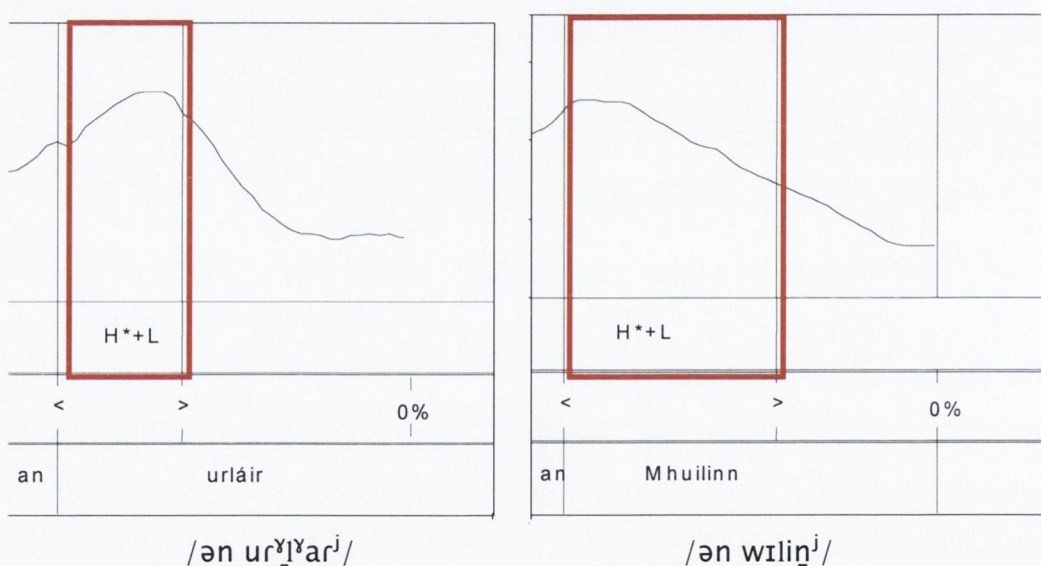


Figure 7.9. Two nuclear falls in Mayo Irish. In the first (on the left) there is a sharper fall following the f0 peak and the f0 minimum is reached before the edge of the IP. In the second realisation there is a shallower slope in f0 with the minimum being reached towards the edge of the IP.

7.2.2.2 *Rising accents*

The Mayo corpus contains a very small number of nuclear rising accents. L*+H accents account for just 8% of nuclear accents found in this dialect. As with prenuclear L*+H accents, these rising pitch accents were only found in questions. However, in prenuclear position these rising accents were restricted to yes/no-questions. Nuclear rising accents, on the other hand, were found in both question types: yes/no- and wh-questions. The distribution of these is outlined in more detail in Section 7.3.

Nuclear rises are realised in the same way as prenuclear rises in Mayo. The f0 minimum is aligned with the accented syllable and the rise begins within the same syllable. Where there is unstressed material following the nuclear accent, the peak of the rise is typically realised in the following unstressed syllable. If the nuclear contour is monosyllabic, on the other hand, the entire rising gesture is compressed so that the rise fully happens within the monosyllable. Following the rise there are two boundary tone options and these are discussed below (Section 7.2.3).

7.2.2.3 *Low accents*

Low-level nuclei (L*) account for just 5% of nuclear accents produced by the Mayo speakers. In nuclear position L* accents were only found in wh-questions. The question of whether these low accents are treatable as underlying L*+H accents or as a separate category of pitch accent is one which is difficult to answer, primarily due to the low occurrence of these tones. In order to provide a unified account of the Irish dialects whereby monotonal accents are generally treated as underlying bitonal ones, the preferred choice here is to treat these L* accents as underlying L*+H accents. The fact that L*+H accents and L* accents are both found in the same category of sentence types supports this. The difficulty with this however lies in the fact that the H tone of the L*+H accent appears to be quite stable in its alignment. If we wish to consider L* accents as underlying L*+H accents we would expect more variation in the location of the trailing tone which could lead to partial or complete linking. Unfortunately there is not enough examples of either prenuclear or nuclear L*+H accents or L* accents in this dialect to be more conclusive. The fact that these tones are so infrequent in Mayo and elsewhere leads us to tentatively suggest that the L* accent of Mayo Irish is a phonetic variant of an underlying L*+H accent.

7.2.3 *Boundary tones*

The default pitch at the start of the majority of sentences in this study on Mayo Irish is a mid-level tone and is not labelled. Only a few instances of a differing initial boundary tone were found in the corpus and these were only found in wh-questions. In all, just 10% of utterances, across the three sentence types, in Mayo Irish begin with this high boundary tone (see Figure 7.10). Declaratives and yes/no-questions showed no evidence of initial boundary tones, even preceding initial L*+H accents in yes/no-questions¹.

The occurrence of the initial high boundary tone in wh-questions is elaborated on in Section 7.3 and it is labelled %H.

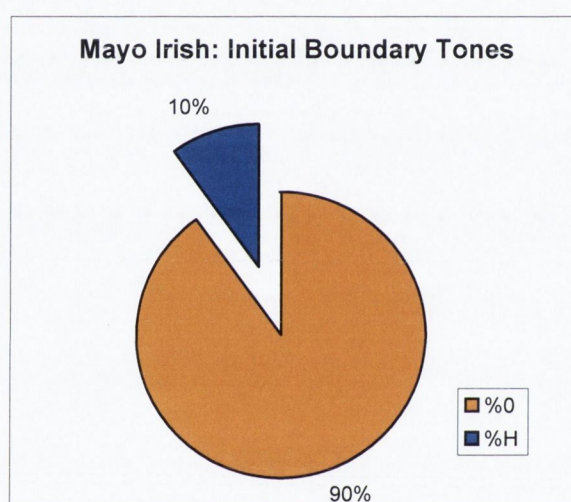


Figure 7.10. *Initial boundary tones in Mayo Irish*

Five nuclear contours were found in the corpus for Mayo Irish giving rise to three boundary tone specifications in nuclear position. These are indicated in Figure 7.11.

¹ In Donegal Irish initial L*+H accents tended to be preceded by %H (see Section 5.2.3)

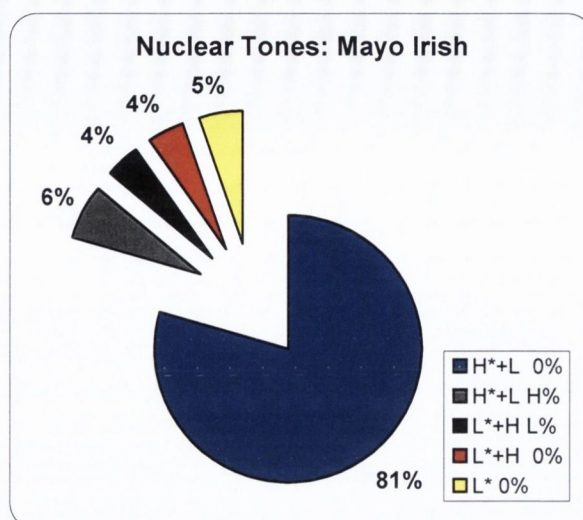


Figure 7.11. *Nuclear contours of Mayo Irish*

It was observed in the earlier sections that the most common nuclear accent in Mayo Irish is a falling accent labelled as H*+L. This fall may be accompanied by one of two boundary tone specifications. The most common of these is where there is no additional tone observed at the boundary. 81% of contours in the corpus were realised as a falling accent with no final boundary tone. This lack of a boundary tone is labelled as 0% in the corpus.

Some H*+L (6%) accents were followed by a rise at the edge of the IP and this is labelled with a H% boundary tone. This nuclear contour is perceived as a fall-rise. Fall-rises were only found in wh-questions.

Rising nuclear pitch accents in Mayo are also followed by two boundary tone specifications. If there is a rising L*+H pitch accent with no additional tone at the IP boundary the boundary tone is labelled 0%. The overall nuclear shape is rising. Just 4% of nuclear contours were realised in this way. Alternatively the rising pitch accent might be followed by a fall at the edge of the IP and this is labelled with a L% boundary tone. This is perceived as a rise-fall and 4% of nuclear contours were realised in this way. These nuclear contours were only found in yes/no-questions.

L* nuclear accents were never followed by boundary tone and in all account for 5% of nuclear accents. The nuclear contours and their labels are shown schematically in Figure 7.12.

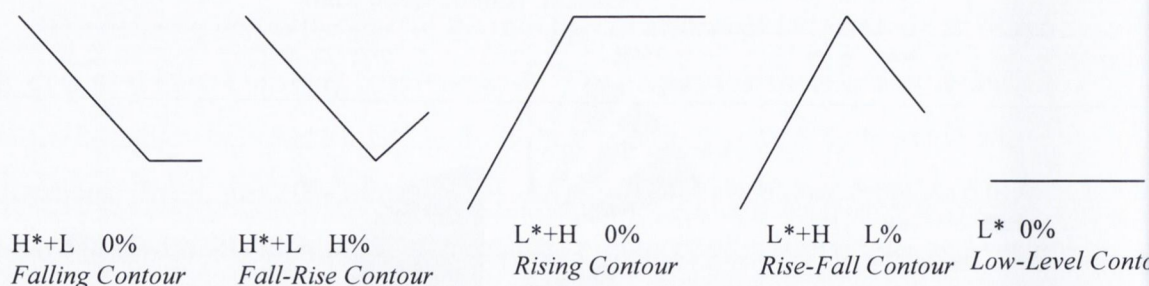


Figure 7.12. Nuclear contours of Mayo Irish and their labels

7.3 Distribution of Accents

This analysis of Mayo Irish as outlined in previous sections has led to the establishment of a preliminary tonal structure for Mayo Irish. H*+L is the most commonly recurring pitch accent in Mayo Irish across each of the grammatically different sentence types, and it is suggested that this is the most common underlying tone employed by speakers of Mayo Irish. Rising L*+H accents were also found in the corpus, although these are restricted to questions, rather than statements. There were few occurrences of these tones. Finally some low accents, labelled L*, were found. In non-initial prenuclear position it is suggested that these L* pitch accents only occur in sentences containing a preceding narrow focus. In nuclear position L* occurs in questions and as such is considered as a phonetic variant of an underlying L*+H accent. Again, there are few incidents of these accents. The overall inventory for Mayo Irish was outlined in Figure 7.3 above and is shown here in Table 7.1.

<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Pitch movement</i>
H*+L	H*+L	High target followed by a fall
	H*	High target, realised as a plateau
L*+H	L*+H	Low target followed by a rise
	L*	Low target
0%		No tone at the boundary
H%		Final high boundary tone
L%		Final low boundary tone
%H		Initial high boundary tone

Table 7.1. Tonal Inventory of Mayo Irish

The following sections look more closely at how these different pitch accents are distributed throughout the three different sentence types recorded and analysed.

The first section looks at declaratives, the second at *wh*-questions and the third at yes/no-questions.

7.3.1 *Accent distribution in declaratives*

Investigation of declarative sentences in the corpora suggests that in Mayo Irish speakers employ three of the four pitch accents available to them. Additionally analysis shows that in declaratives the *f*₀ starts in the middle of the speakers pitch range. This mid-level tone is unmarked. The *f*₀ maximum of the IP is reached in the first pitch accent. Nearly all declaratives are combinations of high (H*) and high-falling (H*+L) accents, although L* accents are found infrequently. A typical contour of a Mayo declarative with three pitch accents would be labelled:

H*+L H*+L H*+L 0%

Both the initial and non-initial prenuclear accent may be modified and realised as H*.

Prenuclear

The prenuclear tonal inventory of Mayo Irish is richer than that of the nuclear inventory, where speakers only employ falling H*+L accents. The prenuclear tonal inventory is outlined in Figure 7.13. Figure 7.14 indicates initial prenuclear and non-initial prenuclear accents.

In prenuclear accents 63% of pitch accents are falling and 31% are high accents, labelled H*, with no particular preference for either in initial prenuclear position (49% vs. 51%). In non-initial position the most common pitch accent is H*+L (73%).

The remaining prenuclear accents are low L* accents (6%) but it was observed earlier there is little evidence to support the use of L* accents in unmarked sentences. It is thought that these may be part of a wider inventory of Mayo Irish where pitch accents might be modified under conditions of focus etc. Prenuclear rises are not found in Mayo declaratives.

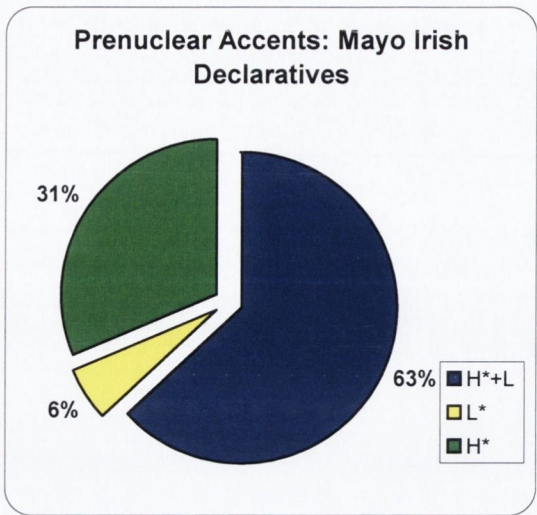


Figure 7.13. Prenuclear accents of Mayo Irish declaratives

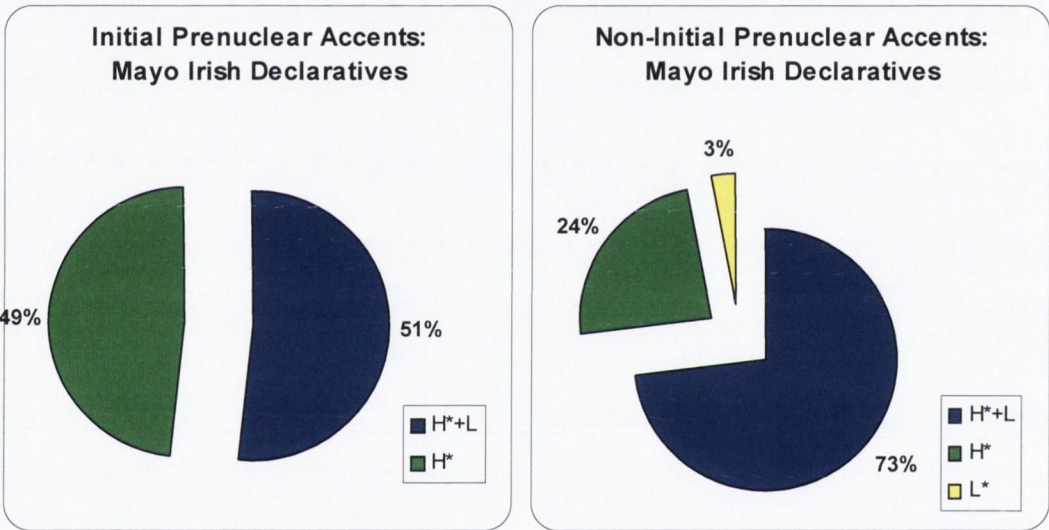


Figure 7.14. (a) Initial pre-nuclear accents and (b) non-initial pre-nuclear accents found in declaratives of Mayo Irish declaratives

Nuclear

H*+L is the only accent which occurs in nuclear position in Mayo Irish declaratives. None of these nuclear accents are followed by a boundary tone (see Figure 7.15). These nuclear contours are labelled H*+L 0%.

It is likely that in spontaneous speech that there would be more variation in the type of nuclear contour employed by speakers.

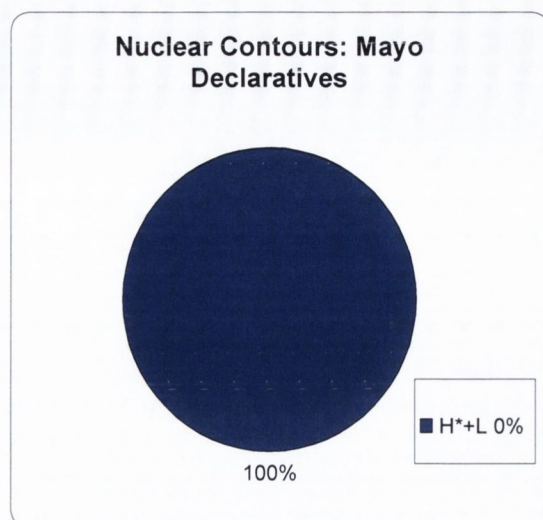


Figure 7.15. *Nuclear accents in Mayo Irish declaratives*

7.3.2 Accent distribution in *wh*-questions

Wh-questions and declaratives in Mayo Irish are very similar in their use of underlying tones. The overall contour shape in both sentence types tends to be a H*+L H*+L 0% sequence, or a modified version of this. They differ however in respect of the f₀ at the start of the IP and in the choice of some final boundary tones. This is discussed below.

Prenuclear

In prenuclear position Mayo Irish speakers make more use of the H* accent than they do in declaratives (40% vs. 31%). In initial position (see Figure 7.17) the most common accent is H* (57%). In non-initial position the preference is for a H*+L accent (78%).

In Mayo Irish accenting the *wh*-word appears to be optional. In approximately half of the *wh*-questions in the corpus the *wh*-word is accented. The option to accent the word is not dependent on the actual *wh*-word. When the *wh*-word is accented the f₀ maximum occurs on the *wh*-word. Rather significantly, when the *wh*-word is not accented there is still an initial high at the start of the IP and this is marked with an initial high boundary tone, labelled %H. This would imply that there is a preference for an initial high in *wh*-questions in Mayo Irish and this may be one differentiating feature between declaratives and *wh*-questions in this dialect. In all other respects the prenuclear patterns are phonologically the same as those of declaratives.

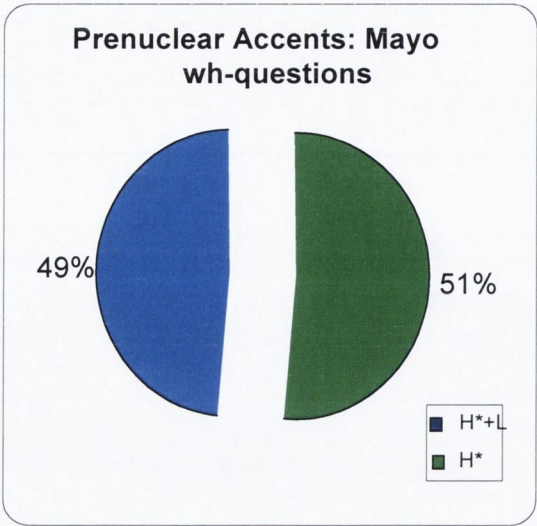


Figure 7.16. Prenuclear accents of Mayo Irish wh-questions

(a) (b)

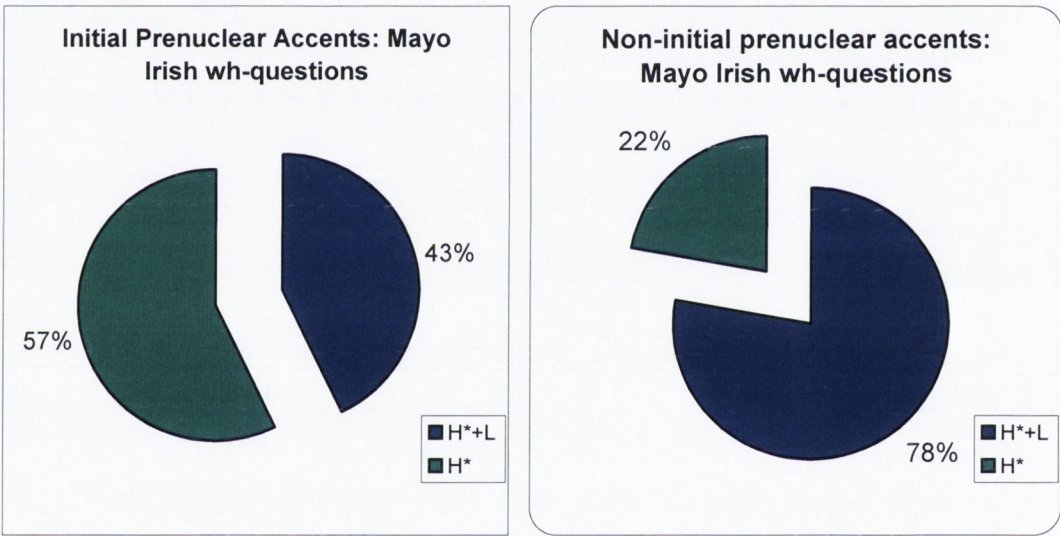


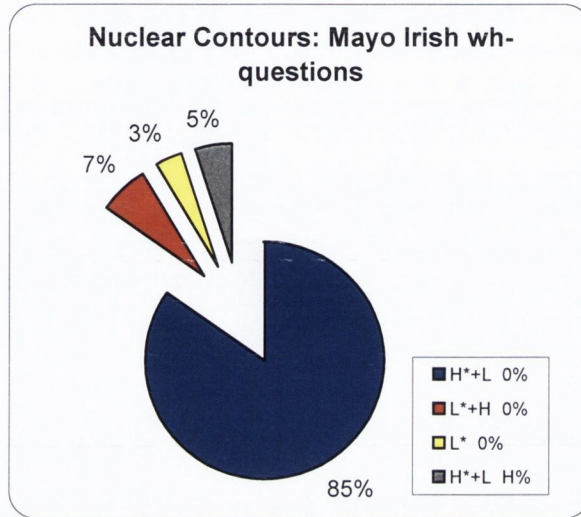
Figure 7.17. (a) Initial prenuclear accents and (b) non-initial prenuclear accents found in declaratives of Mayo Irish wh-questions

Nuclear

A further difference between the declarative contour and the wh-question contour in Mayo occurs in the choice of nuclear contour. The most common nuclear contour in wh-questions is a falling one labelled H*+L 0%, and this is produced in the same way as a fall in declaratives. These make up 85% of nuclear contours in Mayo Irish wh-questions. There are three other nuclear contours found in wh-questions that were not found in declaratives and these are made up of rises

(7%), low-level contours (3%), and fall-rises (5%). In this respect the nuclear contour of wh-questions is more variable than that of declaratives in this dialect.

Figure 7.18 shows the distribution of nuclear contours found in wh-questions for the Mayo speakers.



Figures 7.18. *Nuclear contours found in wh-questions of Mayo Irish*

7.3.3 Accent distribution in yes/no-questions

The overall contour shape of yes/no-questions in Mayo Irish is similar to that of the other sentence types. A typical contour is

H*+L H*+L 0%

although there is also evidence of

L*+H H*+L 0%

Prenuclear

Yes/no-questions in Mayo Irish are generally differentiated from declaratives and wh-questions in terms of the initial pre-nuclear accent which is often realised as a low-rising L*+H accent. It was found that 24% of initial pre-nuclear accents in yes/no-questions of Mayo Irish are L*+H accents (See Figure 7.18). This rising pre-nuclear contour is one marker of interrogativity in this sentence type. The remaining pre-nuclear accent types are either H* or H*+L ones (Figure 7.19). When these high and falling accents are employed the overall contour shape is the same as that of the other sentence types in this corpus.

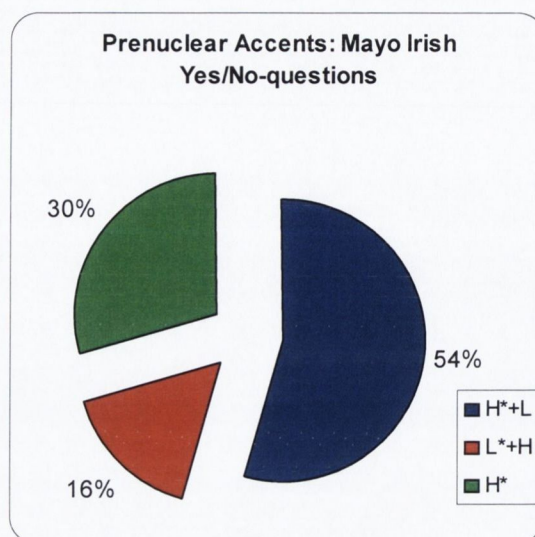


Figure 7.19. *Prenuclear accents in Mayo Irish yes/no-questions*

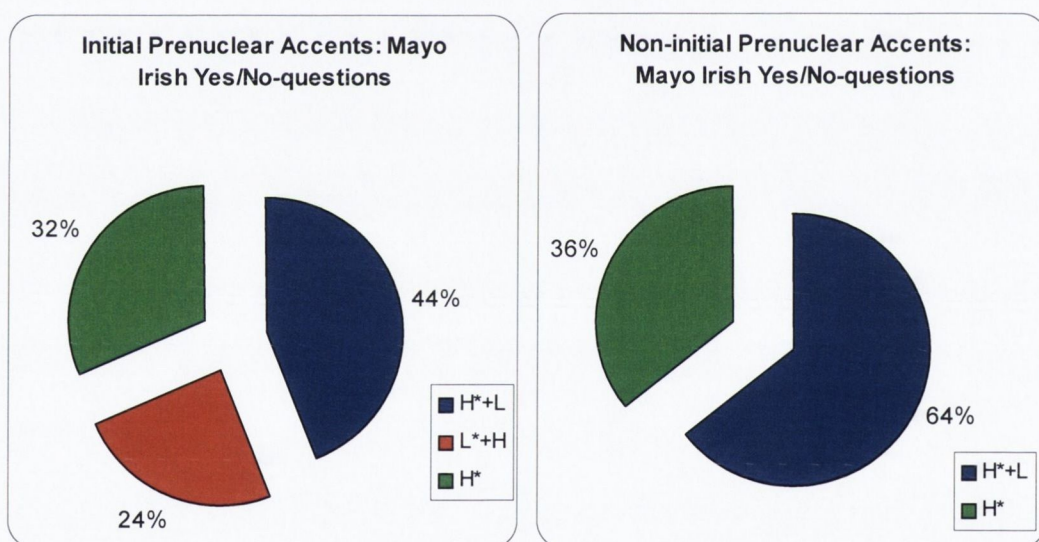


Figure 7.20. (a) *Initial prenuclear accents and (b) non-initial prenuclear accents found in yes/no-questions of Mayo Irish*

Nuclear

The nuclear contour of yes/no-questions is generally falling. This is typical of other dialects of Irish studied here, with the exception of Donegal Irish. It is also typical of dialects of Hiberno-English (see Section 3.3.2.2, Chapter 3). Rises in nuclear position account for just 4% of accents in yes/no-questions. Rise-falls account for (7%) of accents (see Figure 7.21).

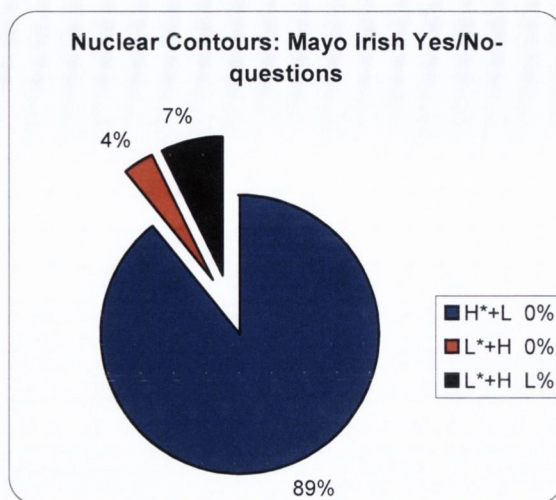


Figure 7.21. Nuclear contours found in yes/no-questions of Mayo Irish

Although overall, we describe the sentence types as being fundamentally similar in terms of their phonological structure, there are some clear differences in the distribution of tones across the sentence types. These differences are summarised in Table 7.2.

<i>Sentence type</i>	<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Prenuclear (%)</i>	<i>Nuclear (%)</i>
Declarative	H*+L	H*+L	63%	100%
Wh-Question		H*+L	49%	90%
Yes/no-question		H*+L	54%	89%
Declarative	H*+L	H*	31%	0%
Wh-Question		H*	51%	0%
Yes/no-question		H*	30%	0%
Declarative	L*+H	L*+H	0%	0%
Wh-Question		L*+H	0%	7%
Yes/no-question		L*+H	16%	11%
Declarative	L*+H	L*	6%	0%
Wh-Question		L*	0%	3%
Yes/no-question		L*	0%	0%

Table 7.2. Prenuclear and nuclear pitch accent distribution in Mayo Irish across the three sentences types: declaratives, wh-questions and yes/no-questions

7.4 Peak timing in Mayo Irish declaratives

Having established a tonal inventory for Mayo Irish the next step in the analysis is to provide a more detailed account of how these tones are realised. The results of the peak timing analysis in the other Connaught dialects (Section 6.4) indicate that the peak of the primary pitch accents in the dialect of Cois Fhairrge are very fixed, while those of Inis Oirr demonstrate more variability in their peak location. The expectation for Mayo Irish is that it will support a *variable peak hypothesis*, given its richer tonal inventory and the fact that early and late peaks were often observed in prenuclear contours.

The following section considers the location of peaks in initial prenuclear (H*) and nuclear accents (H*+L) of Mayo Irish declaratives. The first section deals with initial prenuclear accents and the second section deals with nuclear accents. These tones are chosen to allow for easy comparison with similar analysis of tones in the South Connaught dialects.

To investigate peak timing in Mayo Irish, Subset ii of Corpus B as described in Section 4.3 was labelled and analysed. Subset ii comprises the set of sonorant materials which allow for as much voiced material as possible. It was decided to omit Subset i from this part of the analysis as in this dialect the phonologically voiced stops are again devoiced. Analysis from the previous chapters have indicated that this dataset containing the devoiced consonants does not enhance the analysis in any way.

Following the Donegal and South Connaught recordings, the test sentences for the analysis were interspersed with a larger set of sentences. The same three speakers of Mayo as those employed for the establishment of the tonal inventory in earlier sections were recorded. The recording included 8 randomised repetitions of each sentence with 5 representative utterances chosen from the 8. As a starting point in the analysis, the accented syllable and each of the unstressed syllables following the (nuclear and prenuclear) accent and preceding the (prenuclear) accent in each utterance were segmented. The duration of each segment was measured and averaged. A number of points in the contour were then labelled, and their time location measured relative to the nearest segmental boundary. The labels used for the time points are glossed in Table 4.5 in Chapter 4 and adapted for Mayo Irish in Table 7.3 below. A schematic representation of the measured timepoints is given in Figure 7.22.

H*	corresponds to the peak in the H* accents (or the onset of the peak in a H* plateau).
L	corresponding to the f0 minimum in a trailing L tone of H*+L accents.
(H*)p	Denotes end of the high plateau in H* prenuclear accents.
l(H*)	corresponds to the f0 minimum which precedes the peak in H* in accents. For the nuclear condition, this is the minimum between the nuclear H*+L and the preceding H* accent. In the case of the prenuclear accent, this minimum always occurred at the beginning of the phrase.

Table 7.3. *Timing tier labels for Mayo Irish*

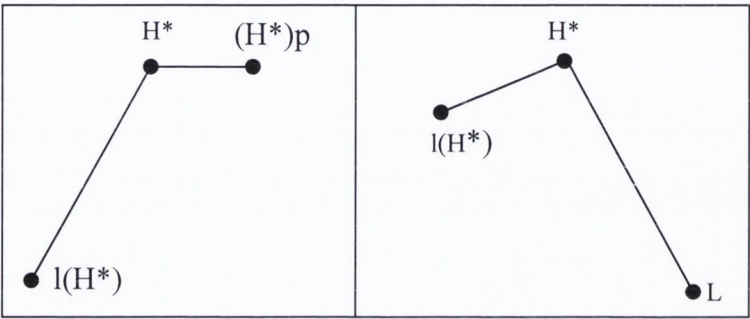


Figure 7.22. *Schematic figure illustrating the labels associated with the timepoints measured in H* prenuclear accents and H*+L nuclear accents of Mayo Irish*

7.4.1 Peak timing in H* prenuclear accents

Preliminary results from the analysis of prenuclear accents were initially presented in Ní Chasaide and Dalton (2006). Figures 7.23 – 7.25 indicate the results for the prenuclear conditions PN0 (no anacrusis), PN1 (anacrusis of one), and PN2 (anacrusis of two). Average values are shown for the three time points measured: (l)H*, H*, and H*(p). (l)H* corresponds to the f0 minimum preceding the starred tone, H* refers to the f0 maximum corresponding to the starred tone and H*(p) refers to the end of the plateau in a H* accent.

This dialect emerged as having a highly variable peak location. Given a change in the size of the anacrusis the peak of the initial accent is allowed to drift considerably. An anacrusis of one (PN1) seems to be the optimal condition for the peak location of Mayo, in that the target is located directly within the accented vowel. In the two other conditions, the peak shifts from the accented syllable to adjacent unstressed syllables. In the case of PN0 (Figure 7.23), where there is no anacrusis (PN0) there is a delay in the realisation of the prenuclear peak, which tends to occur late in the following unstressed syllable, if not later. In the case of PN2 (Figure 7.25), with a larger anacrusis the peak drifts leftward of the accented

syllable, sometimes resulting in an early peak which can be sustained as a lengthy plateau up until the end of the accented word.

These results indicate that Mayo Irish is subject to much more variability in its peak location than those of the South Connaught dialects as described in the previous chapter. A greater variability in peak location appears to be a characteristic of this dialect, both within the production of a single speaker and across speakers. While the drift in peak is systematic in that it is dependent on the size of the anacrusis, the precise location of the peak within individual segments is subject to some variation.

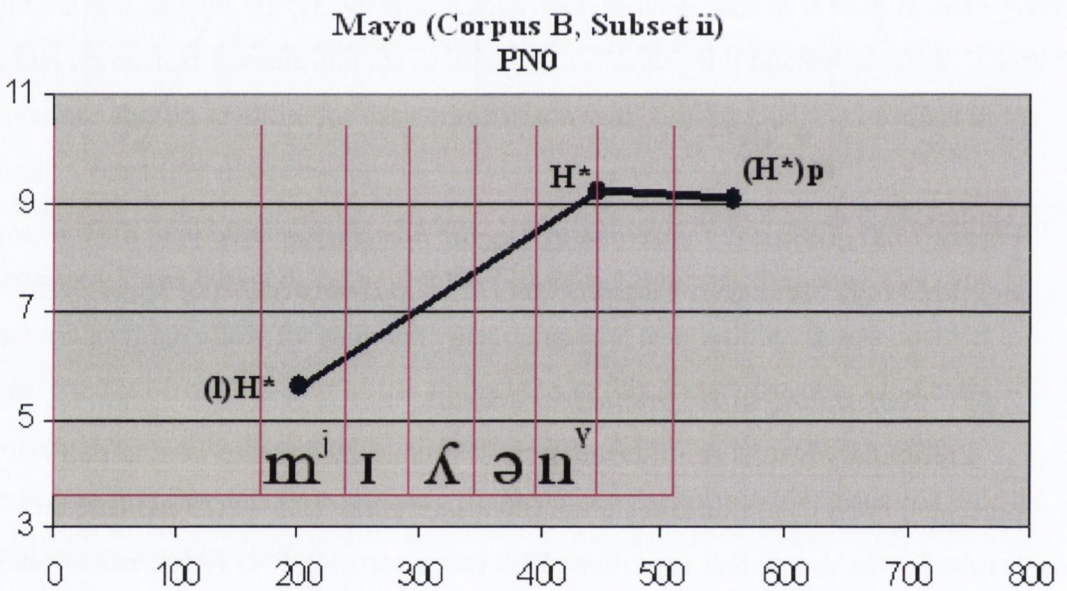


Figure 7.23. Tonal contours for prenuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. PN0= no anacrusis.

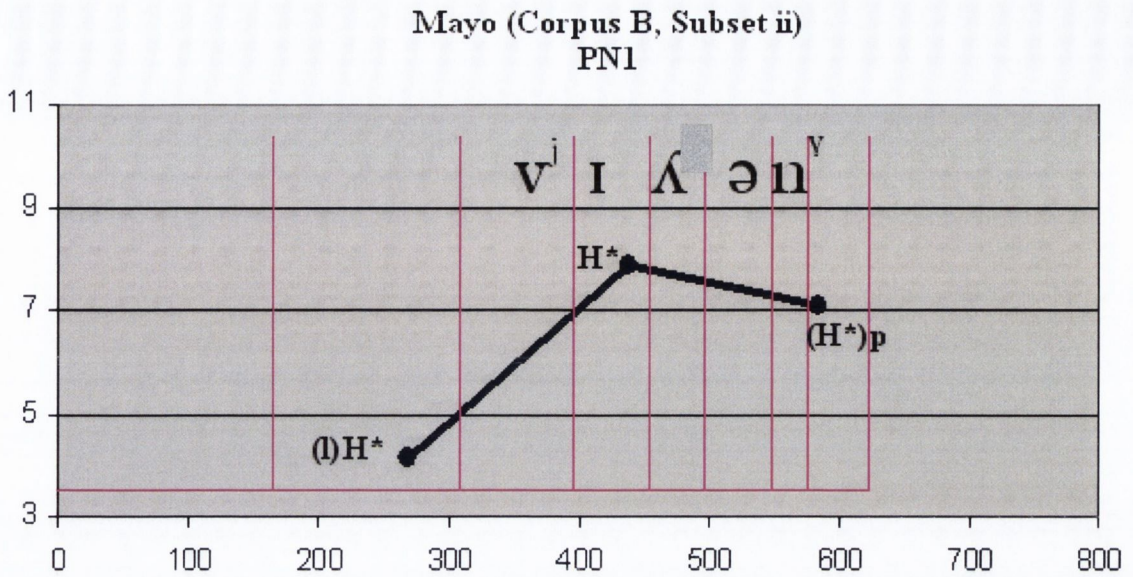


Figure 7.24. Tonal contours for prenuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. PN1= anacrusis of one.

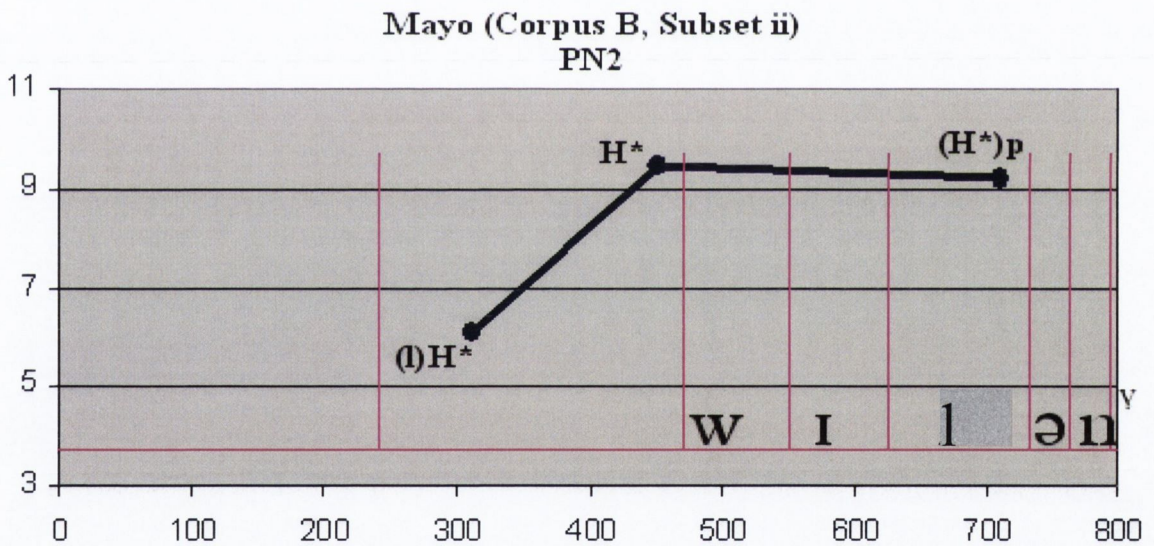


Figure 7.25. Tonal contours for prenuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. PN2= anacrusis of two.

A preliminary observation of initial prenuclear H*+L from Corpus A accents indicates similar findings. The peak in these accent types is also allowed to drift considerably with a change in the size of the anacrusis. The one major difference between the two accent types is that the H* prenuclear accent has a considerable plateau, while an initial H*+L accent has no such plateau, rather the peak drops into one of the following unstressed syllables. As mentioned in section 7.2.2.1 this drop can be shallow or quite sharp. It was already observed in earlier sections that the L

target is rather unpredictable in its location, and it would appear that the size of the anacrusis has no bearing on where precisely the f0 minimum might occur.

7.4.2 Peak timing in H*+L nuclear accents

This section presents data on the alignment of the starred tone associated with the H*+L nuclear accent in Mayo Irish. Results from earlier sections indicate that the most common nuclear accent in Mayo is a falling H*+L accent. In Corpus B, only these falling accents were found in nuclear position.

The results of the analysis are indicated in Figures 7.26-7.28. N0 means there are no unstressed syllable following the nuclear accent, N1 means there is one unstressed syllable following the nuclear, and N2 indicated that there are two unstressed syllable following the nuclear. Average values are shown for the three timepoints measured: (l)H*, H*, and L. Again (l)H* corresponds to the f0 minimum preceding the starred tone, H* refers to the f0 maximum associated with the starred tone and L refers to the f0 minimum of the trailing tone.

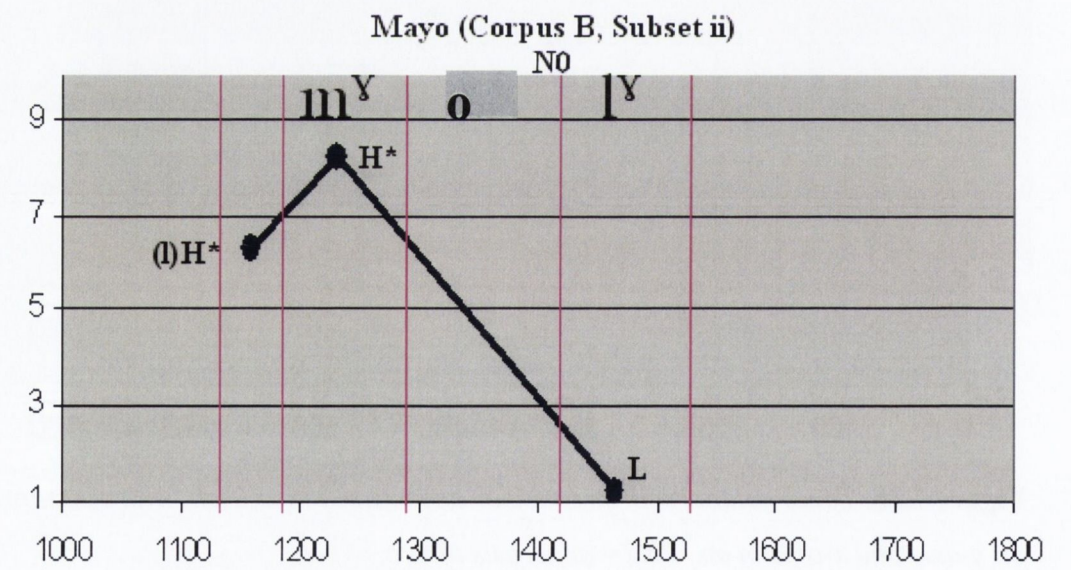


Figure 7.26. Tonal contours for nuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. N0=no unstressed syllables following the nuclear accent

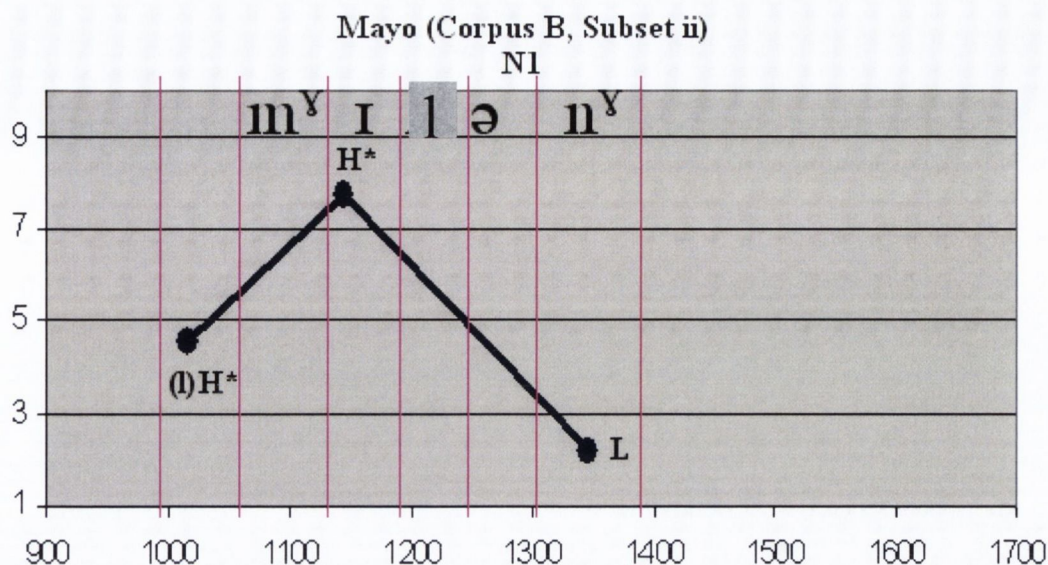


Figure 7.27. Tonal contours for nuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. N1 = one unstressed syllable following the nuclear accent

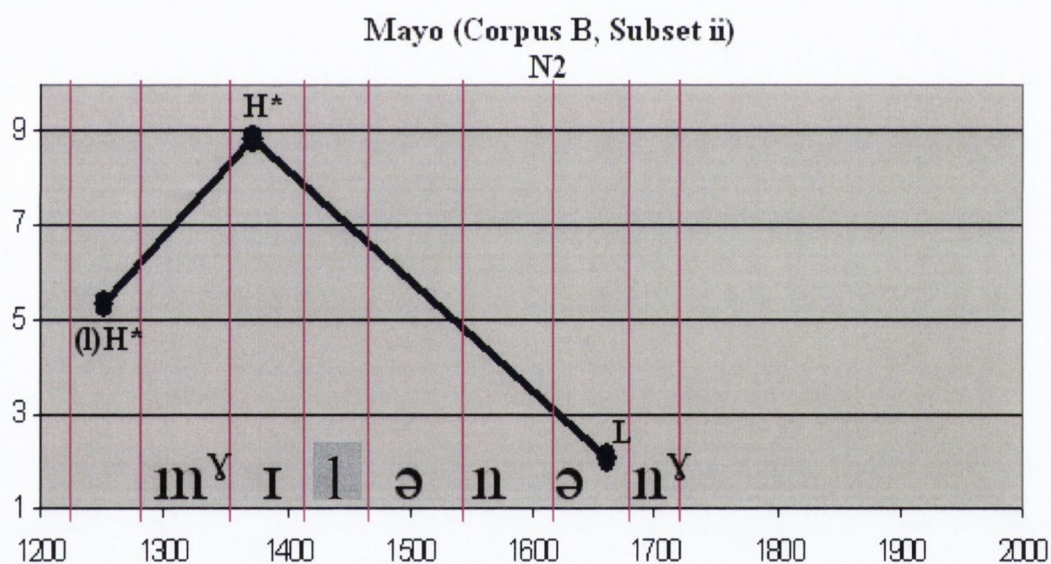


Figure 7.28. Tonal contours for nuclear accents in Mayo Irish, with semitones on y-axis and x-axis in ms. N2 = two unstressed syllable following the nuclear accent

The H* element of nuclear accents of Mayo Irish tends to be realised as a sharp peak. This peak is preceded by a rise from preceding unstressed syllables and followed by a clear fall towards the L target of the trailing tone. As indicated earlier this may be a shallow fall, or a more steep fall, as the location of the L target is prone to considerable unsystematic drift.

The results indicate that there is a certain amount of rightward peak drift in Mayo Irish when the number of unstressed syllables following the nuclear syllable

is increased, although the degree of drift is minimal. When there are no unstressed syllables following the nuclear accent (N0), the peak of the accent is located close to the left-edge of the accented syllable. In the other stress conditions (N1 and N2) the peak is attracted to the nuclear vowel. It would appear that the optimal location for peaks in Mayo Irish nuclear conditions is within the accented vowel, given enough unstressed material in which to fully realise the accent. Since there is no truncation of the L target in N0, the early timing of the H* in the N0 condition may be necessary for the full realisation of the accent, given that there are no unstressed syllables following the nuclear accent. This means the entire falling gesture is somewhat compressed. The compression allows the peak to shift to an earlier point in the accented syllable, under the pressure of the fact that there is only a single syllable available for realisation of the entire accent.

7.4.3 *Discussion of timing results*

The results of this analysis indicate that Mayo Irish emerges as having a highly variable peak location for both prenuclear accents, although it shows much less variation in its nuclear accents. There was some inter- and intra-speaker variability in the peak locations of Mayo Irish, but despite this, clear patterns have emerged from the data. Since the present study is preliminary, being limited to three speakers of Mayo Irish, the conclusions are tentative.

The most interesting facet of this analysis is that prenuclear and nuclear accents behave quite differently with a much greater peak drift in prenuclear accents than in nuclear accents. The drift in prenuclear accents is leftward with a increase in unstressed syllables, while any peak drift in nuclear accents is rightwards. There is considerable variability in prenuclear peaks insofar as the peak can be realised early, or it can be delayed, depending on the number of unstressed syllables preceding the accented syllable. There is less variability in nuclear accents. The data support a view of non-equivalence of prenuclear and nuclear accents something and this is additionally supported by the richer inventory of prenuclear accents as compared to nuclear ones as observed earlier sections.

The results of these analysis of peak timing in Mayo are somewhat contradictory. The prenuclear data clearly support the variable peak hypothesis given the clear tendency towards peak drift in these prenuclear accents. The nuclear data, on the other hand, show considerably more fixed peaks. Looking at the data

from Mayo holistically, we would conclude that the data support a *variable peak hypothesis*.

7.5 Summary

This chapter provides a preliminary tonal inventory of Mayo Irish based on auditory and acoustic analysis of read speech corpora for three speakers of the dialect. Of the dialects of Irish studied here so far Mayo has the richest tonal inventory based on the materials analysed in this study. While Mayo Irish has traditionally been considered, at least segmentally, to be closer to Donegal Irish than to the other Connaught dialects (see discussion in Ó Dochartaigh, 1978), the results from the phonological analysis indicate that intonationally it is more similar to the South Connaught dialects described in Chapter 6.

The most common pitch accent employed by speakers of Mayo Irish is a falling H^*+L accent. Other accents employed by speakers are high accents (H^*), rising accents (L^*+H) and low accents (L^*). Rising accents are restricted to prenuclear position in yes/no-questions, and it is suggested that prenuclear L^* accents are likely to be a consequence of narrow focus.

The results from peak timing in Mayo Irish indicate that the peak is quite variable prenuclear accents, but rather stable in the nuclear. As indicated in earlier chapters peak timing is just one important parameter which captures the phonetic realisation differences among structurally similar dialects.

Chapter 8

Kerry Irish

8.1 Introduction

This chapter presents the results of the auditory and acoustic analyses of the Kerry corpus. Following previous chapters firstly a tonal inventory of prenuclear and nuclear accents in Kerry Irish is described. This is followed by an examination of how the pitch accents of Kerry Irish are distributed across declaratives, wh-questions and yes/no-questions. Finally, there is an analysis of how some of the major pitch accents of this dialect are timed in relation to the segmental tier.



Figure 8.1. Map of Kerry Gaeltacht. Arrow points towards informants' place of origin.

8.2 Tonal Inventory of Kerry Irish

In this section a preliminary analysis of the pitch accents of Kerry Irish is presented. Firstly, the tonal inventory of prenuclear accents is looked at in detail. This is followed by an analysis of the nuclear contours Kerry Irish. The methodologies follow those of previous chapters. The transcription and analysis of

the utterances was performed in Praat (Boersma and Weenik, 2005) and labelled using IViE labelling conventions (Grabe, Nolan and Farrar, 1998). The corpus is first labelled on the orthographic level, then on the rhythmic one and finally the tone labels are transcribed. One level of phrasing, the intonational phrase, is assumed.

Kerry Irish has a distinctive prosodic system. It is different from the other dialects studied here in terms of its stress system, as outlined in Section 3.3.2.3. It exemplifies the Munster tendency towards stress-shift in certain words under particular conditions, which has often been attributed to influences from the Norman-French (e.g. O’Rahilly, 1932). Additionally, and perhaps as a consequence of this, Kerry Irish also has distinctive intonation system. While the tonal inventory of Kerry is not that different to that of the Connaught dialects in terms of tonal structure, speakers of Kerry Irish distribute their accents in a way that is less predictable than in the other dialects. As a result of this, some accent types are more difficult to categorise, e.g. the difference between rises and falls is not always unambiguous.

A further striking element of the intonation system of Kerry Irish is that it is less prone to modification of its underlying pitch accents than any of the other dialects. Complete linking is less likely to occur in the prenuclear contour and as a result of this the highest percentage of pitch accents found in the corpus are fully realised bitonal accents. This differs from the other dialects studied here which all make frequent use of monotonal accents. This tendency towards full realisation of the bitonal accents gives the dialect a more dynamic sounding intonation system, and this combined with its distinctive stress system may be contributor to the distinctive melody of Kerry Irish, evident to the naïve listener.

There are three pitch accents found in Kerry Irish are falling (H^*+L), rising (L^*+H) and high (H^*) accents. The percentages of these as they occur in the corpus are indicated in Figure 8.2.

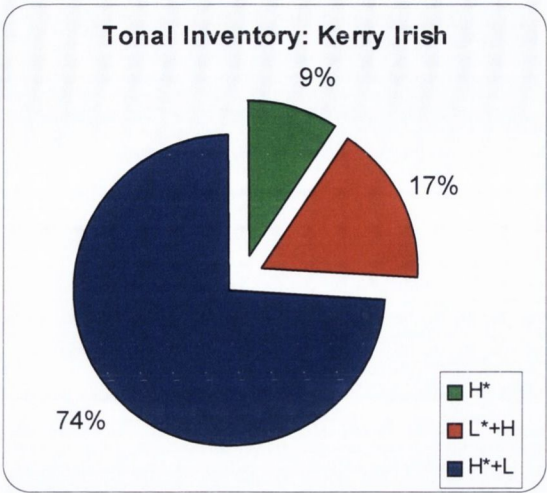


Figure 8.2. *Tonal inventory of Kerry Irish*

The most common pitch accent found in across each of the sentence types in Kerry Irish is the falling accent, labelled H*+L. These make up 74% of the pitch accents in the Kerry corpus. Rising accents make up 17% of pitch accents. The remaining 9% of accents are the high accents (H*). Of these, all three pitch accents are found in prenuclear position, with just falling accents found in nuclear position.

Overall, the speakers in this study produce two typical contours, although there are also variations of these to be found. In the first typical contour of Kerry Irish there is a succession of falling accents, labelled H*+L as demonstrated in Figure 8.3. The high element of these accents is associated with the stressed syllable and the low element realised as a trough between successive pitch accents. The precise shape of these falling pitch accents is commented on in more detail below.

Evidence for the occurrence of each of the accents found in Kerry Irish is provided in the following sections. This preliminary analysis is based on all three sentence types: declaratives, wh-questions and yes/no-questions.

8.2.1 Prenuclear accents

As in the other dialects described in earlier chapters the prenuclear tonal inventory of Kerry Irish is richer than its nuclear inventory. Falling accents make up 61% of the prenuclear accents found in Corpus A. Rising accents account for 25% of pitch accents found in the corpus, while the remaining 14% of accents are high accents. This is indicated in Figure 8.5. A description of the three prenuclear accents is provided in the following sections.

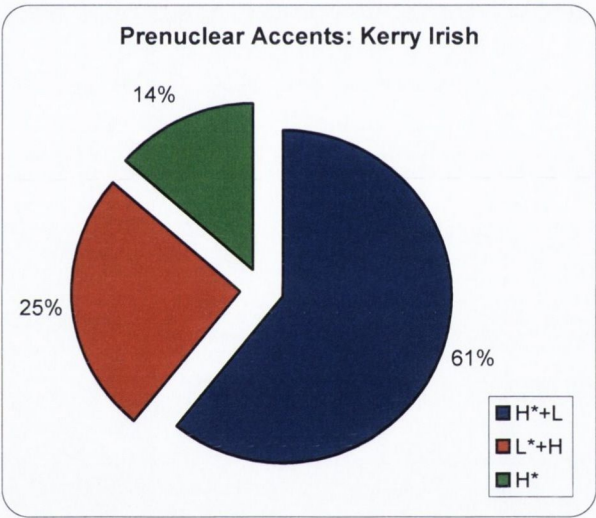


Figure 8.5. Prenuclear accents of Kerry Irish

8.2.1.1 Falling accents

Falling accents are the most common prenuclear pitch accents in Kerry Irish. Figure 8.3 demonstrates a sequence of three falling pitch accents (2 prenuclear and 1 nuclear), while examples of four falling accents are illustrated in Figure 8.6. There is a certain amount of variation in terms of how these H*+L accents are realised in Kerry Irish (see Section 8.4 on peak timing) but falling accents may be categorised in several ways.

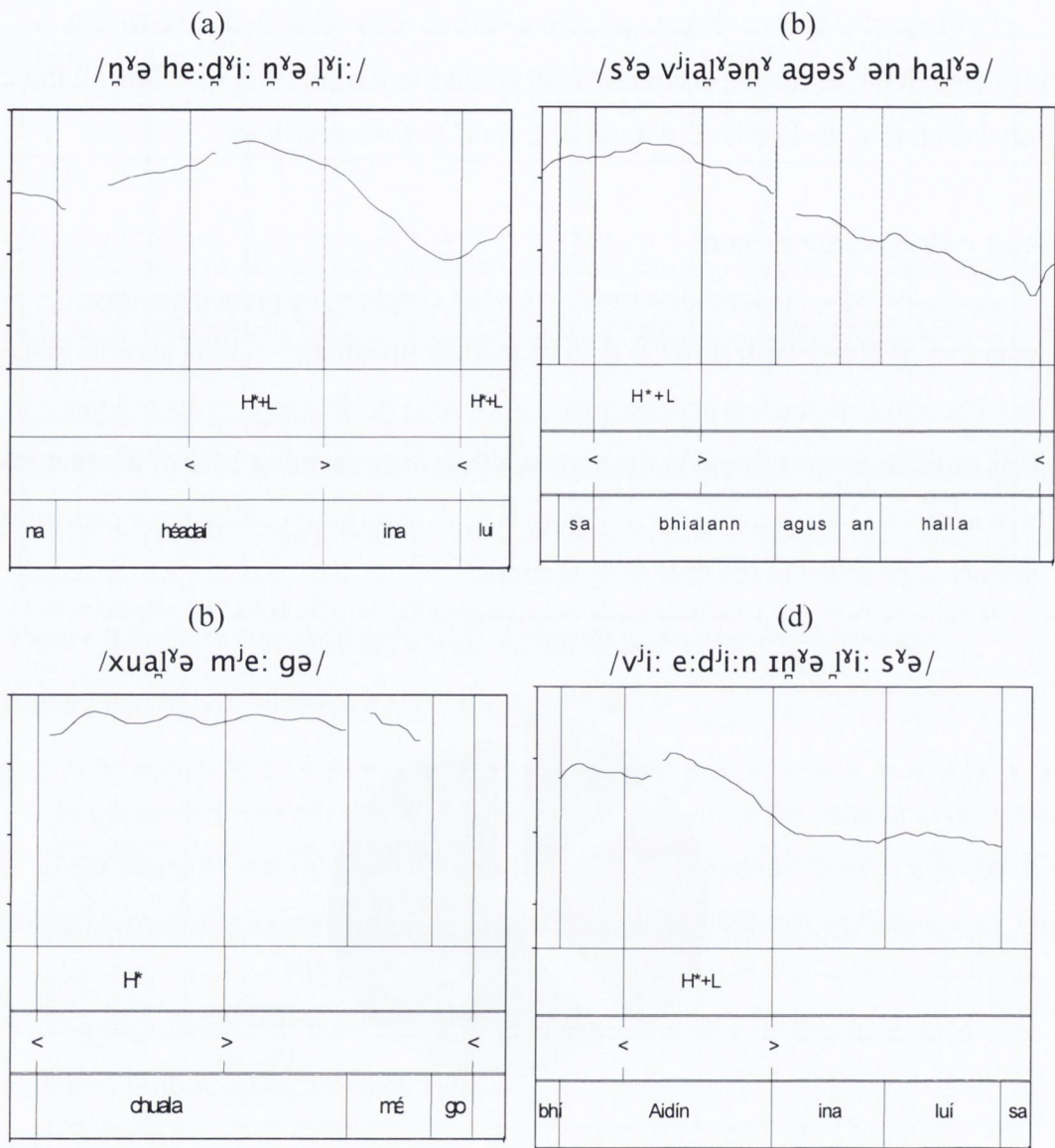


Figure 8.6. Four different realisations of the underlying H^*+L accent of Kerry Irish. In (a) the L target occurs one syllable following the accented syllable, in (b) the trailing tone is right-displaced, in (c) the trailing tone is deleted giving rise to a H^* accent and in (d) the trough of the trailing tone is located one syllable following the accented syllable and, in addition, is realised as a plateau.

- A falling pitch accent tends to be preceded by a gradual slope up to the peak beginning in the syllable(s) preceding the accented one.
- The peak is generally located within the accented syllable although under certain anacrusis conditions the peak in prenuclear accents may drift outside the accented syllable. This is dealt with more fully in Section 8.4.
- The fall in a H^*+L accent begins within the accented syllable.

- iv. The f_0 target of the trailing tone is subject to variation in terms of its location.
 - The L target may be located in the syllable following the accented one (Figure 8.6a and 8.6d)
 - The L target may be right-displaced so that it is located several syllables later (Figure 8.6b).
 - The trailing L tone may be deleted giving rise to some H^* accents in the corpus (Figure 8.6c). These tones are discussed further in Section 8.2.1.3.
 - Finally, when the trailing L tone is realised and it reaches its lowest point it can plateau over a long stretch (Figure 8.6d). This is particularly evident in sequences where there is more than one unstressed syllable following the accented syllable.
- v. In H^*+L accents, dips between successive prenuclear falling accents are sometimes quite shallow and not easily perceived as dips. As a general rule, the greater the stretch of unstressed syllable between accents, the lower the f_0 of the trough. This suggests that there is undershooting of the L tone when there is little unstressed material between accents. This is common across each of the speakers. We considered the possibility that in such instances we are in fact dealing with a succession of H^* accents where the shallow dip can be attributed to the effects of declination. For two separate reasons it was decided to treat these as H^*+L accents. Firstly, following careful auditory analysis it was decided to treat these accents as H^*+L accents as they do not appear to be categorically distinct from those accents with a lower f_0 trough. Secondly, there is an auditory difference between these tones and those accents found in the corpus that were labelled H^* (Section 8.2.1.3). Examples of each of these are illustrated in Figures 8.7 (a contour with a sequence of H^* accents) and 8.8 (a sequence of H^*+L accents, some with more shallow troughs)
- vi. Finally, there is often (but not always) a high initial boundary at the start of the intonational phrase in Kerry Irish (see Section 8.2.3). In cases where there is an initial high tone, the pitch then remains high until the initial accent is realised so there is no onglide to the initial high. In sentences with a large anacrusis the result is a high prehead at the start of the utterance and

a fall in f_0 begins within the accented syllable. The f_0 maximum is then reached within the first accented syllable. More frequently, however, the initial high boundary is associated with those sentences beginning with a rising accent in initial prenuclear position. Initial rising pitch accents are described in the next section.

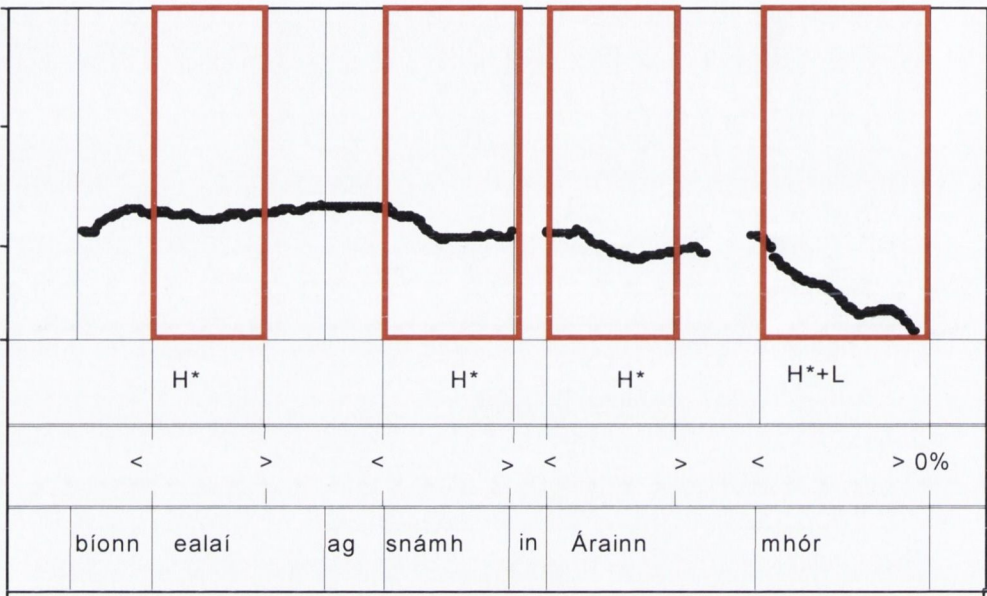


Figure 8.7. An f_0 contour with a sequence of H^* accents. Accented syllables are highlighted in red. /bʲi:ŋʲ aʲʲi: əʲ sʲŋʲa:vʲ in a:rʲəŋʲ vʲorʲ/

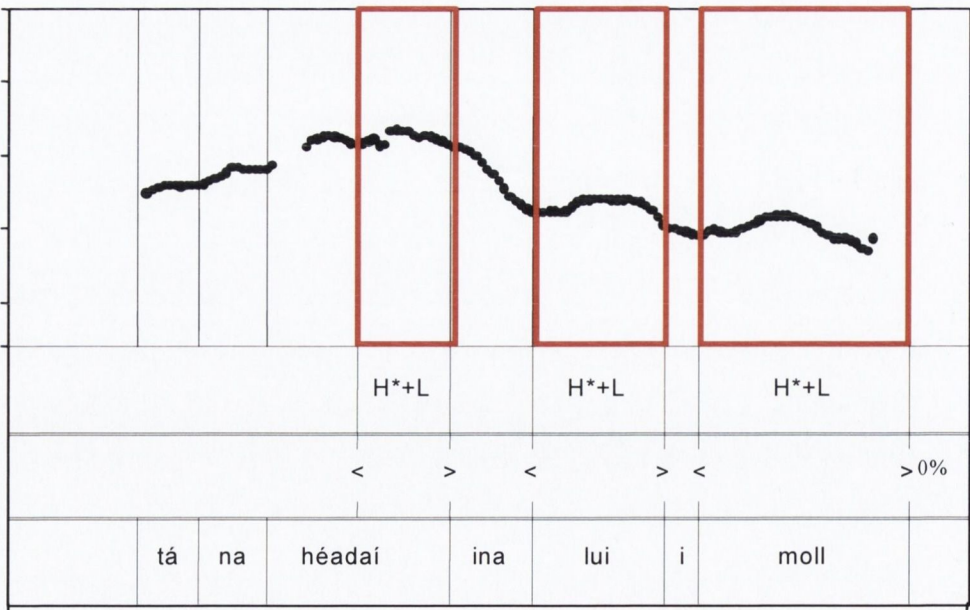


Figure 8.8. An f_0 contour with a sequence of H^*+L accents. The second prenuclear fall is an example of one with a shallow trough. Accented syllables are highlighted in red. /tʲa: ŋʲə he:dʲi: iŋʲə ʲʲi: i mʲoʲʲ/

In Kerry Irish the stress-shift which is common under the conditions described in section 3.3.2.3 has no effect on the tonal inventory of this dialect. The possibility was anticipated that in words containing a stress-shift the peak might be located on the syllable preceding the accented one, i.e. on the historically accented syllable. Had this been the case, it might have created problems with a left-headed analysis. Results demonstrated that in words which were subject to a stress-shift onto the second syllable, the f_0 peak was also located on this syllable. The H^* , therefore, was still aligned with the accented syllable and the rhythmic differences created by the stress-shift could be amply accounted for in the rhythmic tier. This is demonstrated in Figure 8.3 (above) on the word ‘Eilín’, and in Figure 8.6a in the word ‘héadaí’¹. In the other dialects of this study the stress on these words would be on the first syllable. In this dialect of Kerry the stress in both words is on the last syllable and the figures demonstrate that peak is also clearly located within this syllable

Work on the IViE project has shown that varieties of British English can differ in the location of rhythmic prominences, resulting in similar stress-shifts to those which occur in Munster Irish, e.g. British Punjabi English (Grabe, Post and Nolan, 2001). There are also similar effects in Singapore English (Low and Grabe, 1998; 1999). For instance, in Singapore English the last syllable is more prominent in certain words which in British English would normally be stressed on the first syllable. Such differences are noted on the rhythmic tier. Marking such differences in stress on given words on the rhythmic tier allows us to maintain the left-headed analysis.

8.2.1.2 Rising accents

One quarter of all prenuclear accents found in the Kerry Corpus are rising accents, labelled L^*+H . L^*+H accents are typically preceded by an initial high boundary. This initial high boundary is perceptually important as it allows for the low element of the bitonal L^*+H initial accent to be more salient. The low target of the bitonal accent always occurs within the accented syllable and the rise to the H target also begins within this syllable. The high target is unstable in its alignment

¹ Eilín /aili:n/ is a woman’s name and éadaí /e:ɔ̃ːi:/ means *clothes*

with the segmental/syllabic string and may occur late in the accented syllable or in following unstressed syllables. The drift in the peak location is unsystematic.

In initial prenuclear position there was some difficulty distinguishing between a prenuclear L^*+H accent and a prenuclear H^*+L accent, particularly in cases where there is no anacrusis. This is primarily due to two reasons. Firstly, there is often a distinct rising onglide to an initial H^*+L accent which could be mistaken for the rise of an L^*+H accent. Secondly, when there is no anacrusis there is typically a peak delay in H^*+L accents. Given this peak delay it was difficult in certain utterances to make a decision as to whether a given accent was an H^*+L accent [+delay], or an L^*+H accent. The confusion is compounded by the fact in this initial position it is difficult to make a judgement based on auditory analysis alone.

On closer visual examination of the f_0 contour it was established that the primary difference between the two accents is related to the preceding boundary tone. There is evidence to show that L^*+H accents are preceded by a high boundary tone (%H), while H^*+L accents are not. There is clearer evidence of this boundary tone when there is a greater anacrusis. In such cases there is a more substantial dip in f_0 from the initial high of the %H tone, to the trough of the L^*+H tone. H^*+L prenuclear accents in initial position have no such boundary tone preceding them and consequently there is no such dip in f_0 . Rather, there is a more gradual rise towards the f_0 peak of the H^*+L accent. This would indicate that the existence of an L^*+H accent in initial prenuclear position is dependent on the existence of a preceding %H boundary tone.

Figure 8.9 compares realisations of an initial prenuclear H^*+L accent and an initial prenuclear L^*+H accent, produced by the same speaker, both without anacrusis. The figure represents two repetitions of the same sentence. The figure shows that the f_0 patterns accompanying prenuclear rises and falls can be rather similar, but that their alignment with segmental structure differs, particularly in relation to the dip on the accented syllable.

In non-initial prenuclear accents differentiating between an H^*+L and an L^*+H accent is less problematic, not just due to the existence (or lack) of a boundary tone but also because there is no peak delay in non-initial H^*+L accents. Furthermore, there is no auditory equivalence between these two accents in non-initial position. The auditory characteristic all prenuclear rises share is that the postaccentual syllable is higher in pitch than the accented syllable.

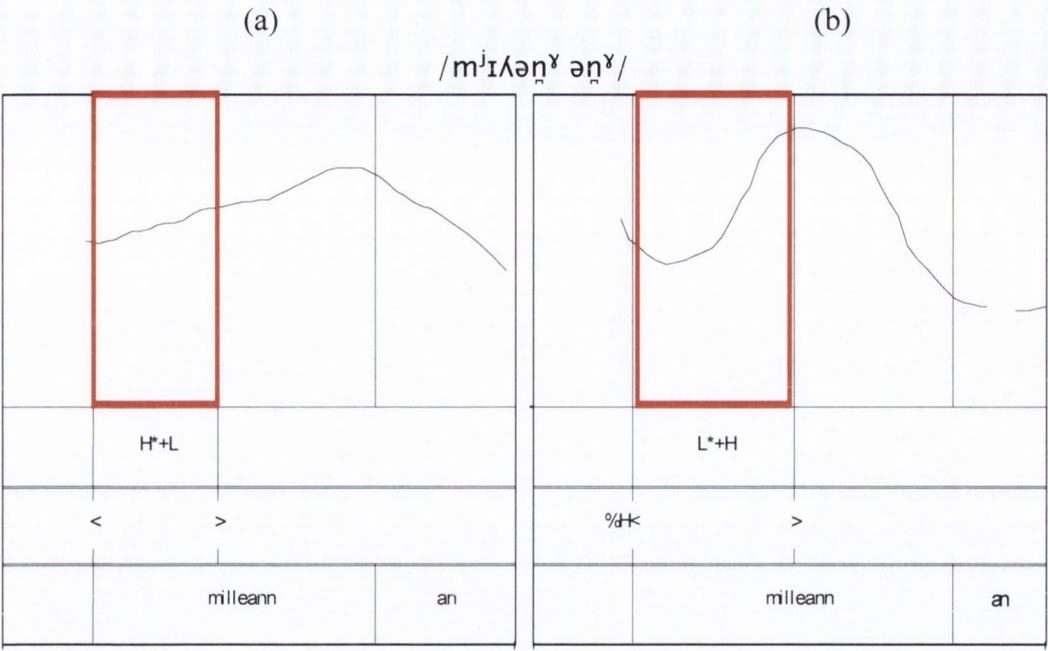


Figure 8.9. (a) a falling H^*+L accent and (b) a rising L^*+H accent in Kerry Irish. Both accents are produced by the same speaker in initial prenuclear position with no preceding anacrusis. (a) and (b) represent repetitions of the same sentence.

8.2.1.3 High accents

In some instances it was observed that a prenuclear H^*+L accent can be realised as an high accent, as shown in Figure 8.6(c) above. In this example the pitch remains high in any unstressed syllables following the accented one and the resultant pitch shape is a rather lengthy plateau. Following the analyses of similar accents in the other dialects of Irish we are treating this accent as a surface realisation of an underlying H^*+L accent, which has undergone complete linking resulting in deletion of the trailing tone. Therefore to maintain a treatment common across all the dialects of this study the label H^* is used to transcribe this accent.

Such high accents are mostly found in initial prenuclear position. A succession of these H^* accents in prenuclear position leads to the appearance of a flat hat contour in some utterances of Kerry Irish, particularly when there is a rising onglide onto the initial H^* accent in this dialect. A typical f_0 contour of this shape is demonstrated in Figure 8.7 above. These contour types are not particularly common in Kerry Irish as generally speakers tend to produce more bitonal, than monotonal, accents in this dialect. In fact, it is worth noting that that one of the speakers of Kerry Irish did not produce any H^* accents. She produced only fully realised, or partially linked L^*+H and H^*+L accents.

Generally the choice of prenuclear accent was not dependent on the grammatical function of the sentence although no rising prenuclear accents were found in wh-questions. The distribution of accents is more fully outlined in Section 8.3 below.

8.2.2 Nuclear Accents

There was just one pitch accent category found in nuclear contours of Kerry Irish. A falling accent was found in each of the three sentence types of Corpus A and was produced by each of the speakers in 100% of cases. As a general observation the peak target of H*+L accents in nuclear position is typically located early in the accented syllable. The precise location may vary to a degree depending on the right-context of the nuclear contours. This is elaborated on in Section 8.4.

There are two types of realisation of the nuclear fall in Kerry Irish. Often the fall is produced as more of a half-completed fall and the overall accent shape is very shallow as demonstrated in Figure 8.10a. In other cases there is a lower f0 target in the trailing tone as in Figure 8.10b. The two options do not appear to be contrastive. The rather shallow trough observed Figure 8.10a is similar to those prenuclear falling accents with shallow troughs described in Section 8.2.1.1.v and illustrated in Figure 8.8. These nuclear accents with a half-completed fall tend to occur on accents with little unstressed material following them. This suggested there is truncation of the L target in nuclear accents in this dialect, under specific circumstances.

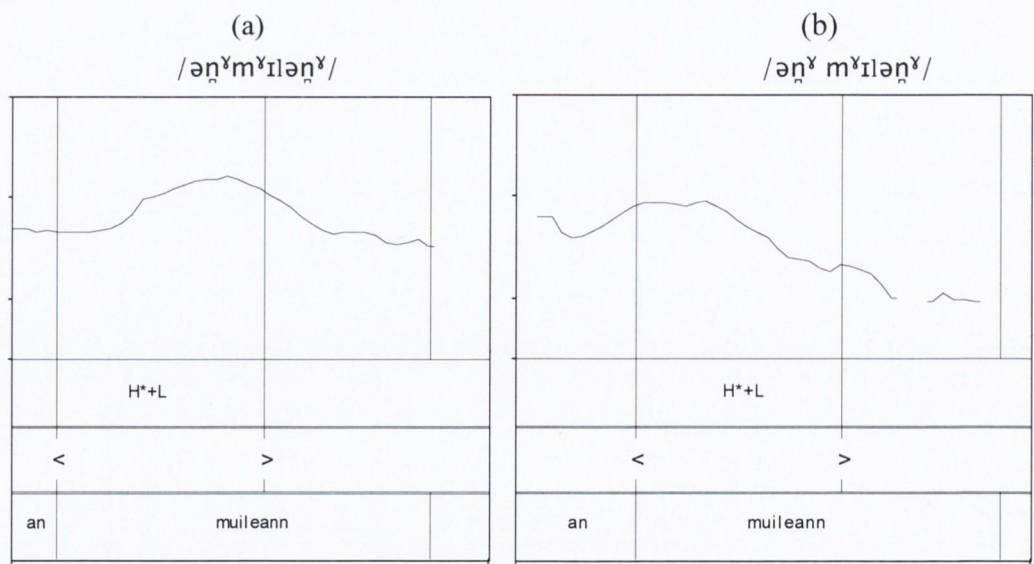


Figure 8.10. (a) half-completed nuclear fall, (b) fully realised nuclear fall. (a) and (b) represent repetitions of the same sentence, by the same speaker.

8.2.3 *Boundary tones*

This section deals with the tonal specification of intonational phrase boundaries in Kerry Irish. Investigation of sentences in the corpora suggests that in the majority of utterances the f0 starts in the middle of the speaker’s pitch range. This “default” mid-level tone is not labelled. A high boundary tone is typical at the start of an IP in Kerry Irish when the initial prenuclear accent is a rising one. This initial high boundary tone is labelled as %H and occurs in both questions and statements. Initial high boundaries also precede the initial prenuclear accent of wh-questions. Initial prenuclear accents in wh-questions are generally H*+L accents (see Section 8.3.2.) 20% of utterances in this corpus began with this initial high boundary tone (Figure 8.11).

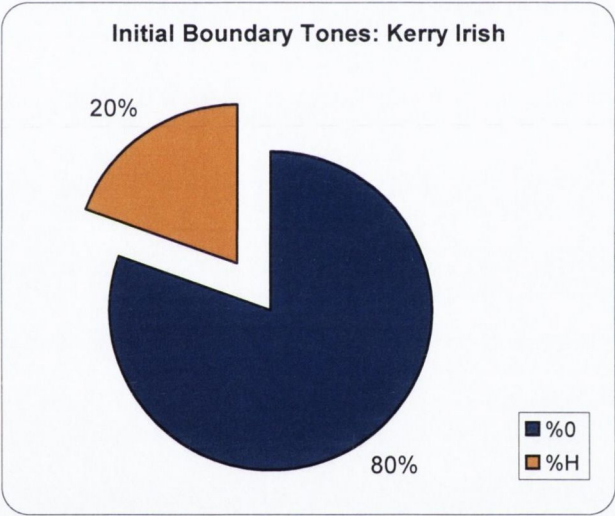


Figure 8.11. *Occurrence of initial boundary tones in Kerry Irish*

Each of the other dialects of Irish examined in this study demonstrate a range of possibilities at the end of the IP. Kerry Irish is unique in that in terms of final IP phrase boundaries one tonal specification dominates, i.e. no tone at the edge of the IP. As indicated in Figure 8.12 below, 98% of nuclear contours have no additional tone at the boundary. 0% is the label used to describe the lack of a final boundary tone in nuclear position. In the remaining 2% of nuclear contours there is a rise at the boundary resulting in a fall-rise nuclear contour.

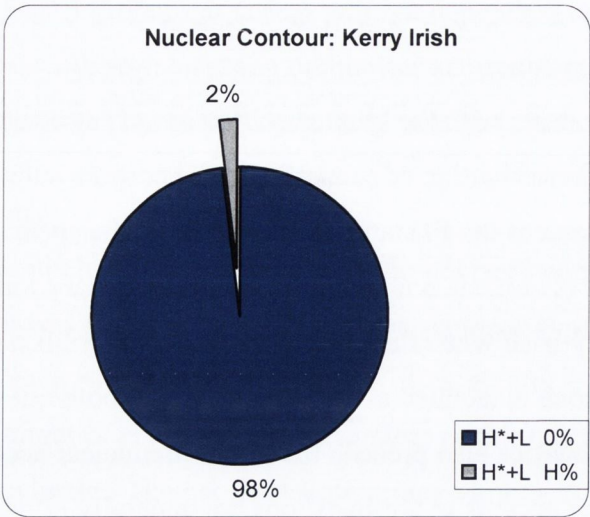


Figure 8.12. *Nuclear contours of Kerry Irish.*

8.3 Distribution of Accents

A preliminary tonal inventory for Kerry Irish has now been established. To recap, the most common accent in both prenuclear and nuclear position is the falling accent, labelled H*+L. In prenuclear position this may be realised as a completely linked contour to produce a H* accent, although this occurs less frequently than it does in other dialects with similar H* accents. L*+H accents are also common in prenuclear position but never occur in nuclear position. The inventory of Kerry Irish is outlined in Table 8.1.

<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Pitch movement</i>
H*+L	H*+L	Falling accent
	H*	High accent
L*+H	L*+H	Rising Accent
%H		High boundary at start of IP
0%		No tone at phrase-final boundary
H%		High phrase-final boundary

Table 8.1. *The tonal inventory of Kerry Irish*

The next section and subsections investigates how the tonal inventory is distributed across the three different sentences types of declaratives, wh-questions and yes/no-questions.

8.3.1 Accent distribution in declaratives

Kerry Irish has two typical declarative contours. The first is a prenuclear contour with a succession of falling accents, followed by a nuclear fall. In the second type there is a succession of prenuclear rises, followed by a nuclear fall.

- a) H*+L H*+L H*+L 0%
- b) L*+H L*+H H*+L 0%

The first of these contours may also be modified to produce a contour with high prenuclear accents.

Prenuclear

Speakers of Kerry Irish use each of the three pitch accents available to them in prenuclear position of declarative sentences. The most common prenuclear accent in declaratives is a H*+L accent. 63% of prenuclear accents in declaratives are falling. Rising L*+H accents are also quite common. 26% of prenuclear accents in declaratives are rising. H* accents make up just 11% of prenuclear accents in declaratives and these are primarily found in initial prenuclear position

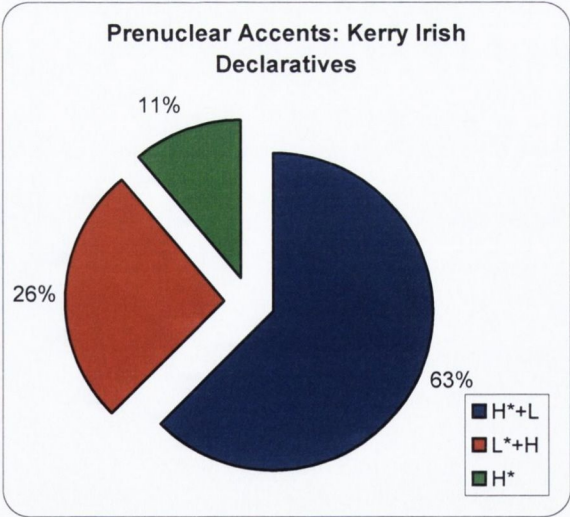


Figure 8.13. Prenuclear accents in Kerry Irish declaratives

Figure 8.13 indicates the percentage of prenuclear accents in Kerry Irish declaratives. Figure 8.14 breaks this percentages into initial prenuclear accents and non-initial prenuclear accents. In initial position rising accents are common, making up 39% of accents found in this position. Falling accents are the most common in both positions (51% in initial position vs. 74% in non-initial position).

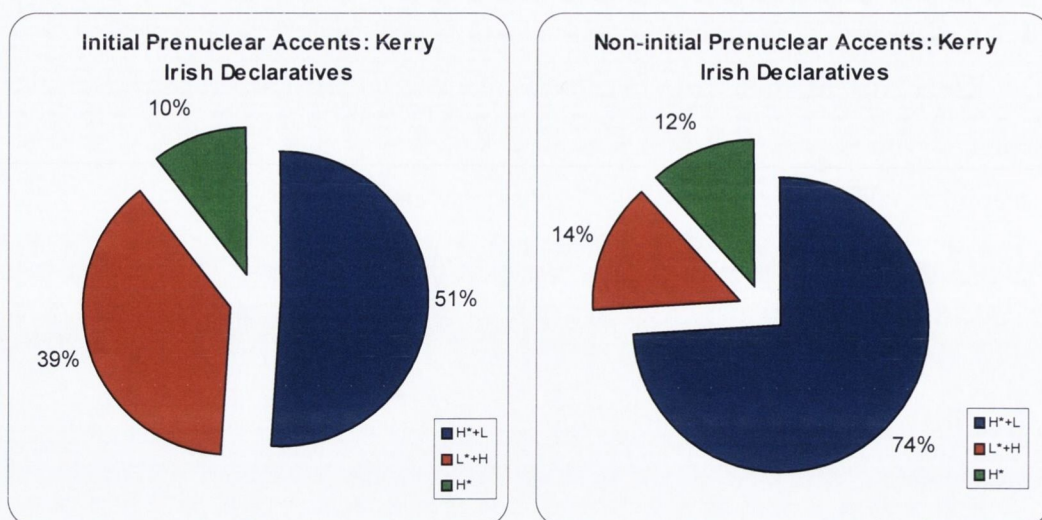


Figure 8.14. (a) initial prenuclear accents found in Kerry Irish declaratives, and (b) non-initial prenuclear accents in Kerry Irish declaratives

Nuclear

The H*+L accent in nuclear position is always a falling accent, labelled H*+L. Nuclear contours in declaratives have no tonal specification at the boundary. This is labelled 0%.

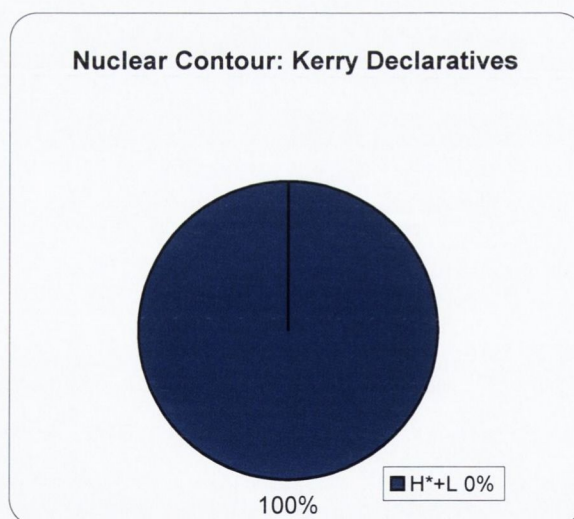


Figure 8.15. Nuclear contours of Kerry Irish declaratives

8.3.2 Accent distribution in Wh-questions

The predominant tone used in wh-questions in Kerry Irish is a falling tone, labelled H*+L. Wh-questions in Kerry Irish are interesting in terms of how tones are distributed. In wh-questions in Kerry Irish speakers are less likely to place an

accent on the wh-word than speakers of the other dialects studied here. When the wh-word is not accented there is an initial high boundary at the start of the IP and this is labelled %H. This is similar to the findings of the other dialects of Irish studied here.

Prenuclear

In the corpus examined here only H* and H*+L accents are employed by the speakers in prenuclear position. The overall contour shape in wh-questions is generally a sequence of

%H H*+L H*+L 0%

As indicated in Figure 8.16, prenuclear accents are mainly H*+L accents (73%) and the remainder are H* accents (27%). 92% of non-initial prenuclear accents are falling and the remainder are high accents. No rising accents were observed in wh-questions. It was observed that one speaker only produced H*+L accents in prenuclear position.

The lack of rising accents in wh-question would suggest than a higher pitch in the initial prenuclear contour is some indicator of interrogativity in this dialect.

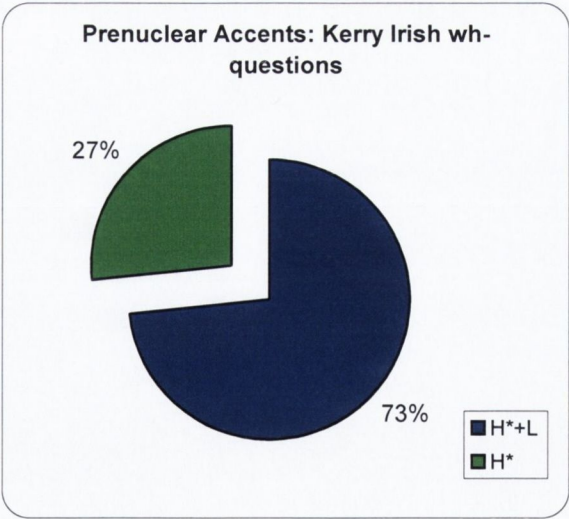


Figure 8.16. *Prenuclear accents in Kerry Irish wh-questions*

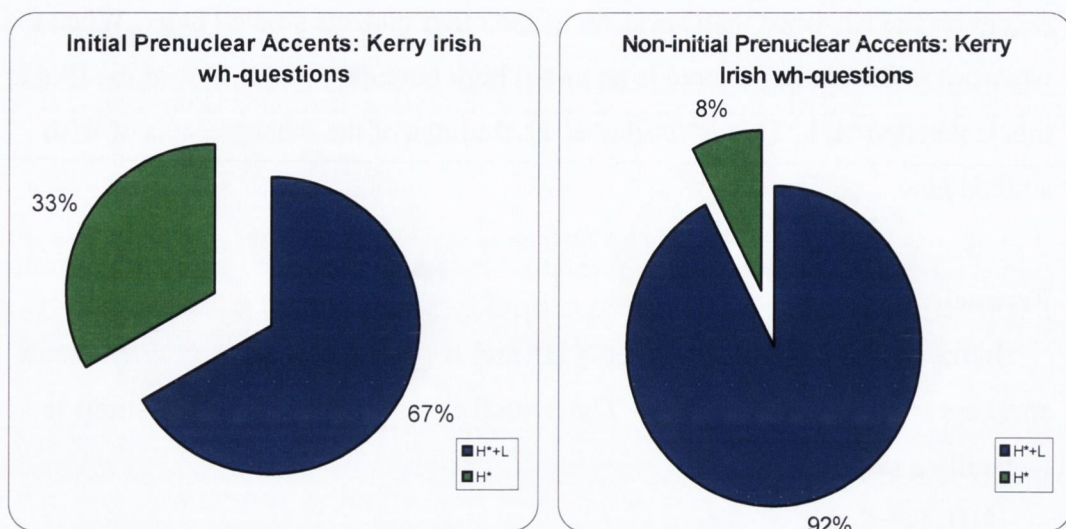


Figure 8.17. (a) initial prenuclear accents and (b) non-initial prenuclear accents in Kerry Irish wh-questions

Nuclear

Nuclear accents are the same as those found in declaratives. They are all falling accents with no boundary tone specification at the IP boundary. The nuclear contour is labelled

H*+L 0%.

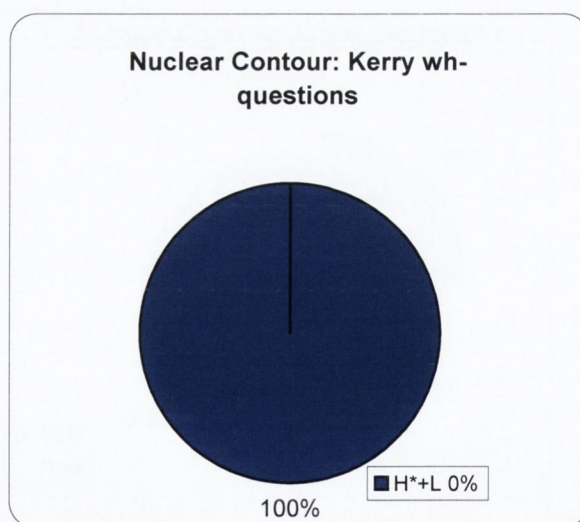


Figure 8.18. Nuclear contours of Kerry Irish wh-questions

8.3.3 Accent distribution in Yes-no questions

Yes/no-questions in Kerry Irish follow the general pattern that declaratives follow. There may be sequences of falling or rising accents.

Prenuclear

Although the tonal inventory of accents in yes/no questions is similar to declaratives in Kerry Irish, there is more of a tendency towards rising accents in prenuclear position (38%) than in the other sentence types. Other prenuclear accents are either high accents (15%) or falling accents (47%), as indicated in Figure 8.19. No high accents were found in non-initial position in yes/no questions. 58% of accents in non-initial position were falling and the remaining rising. Percentages are illustrated in Figure 8.20.

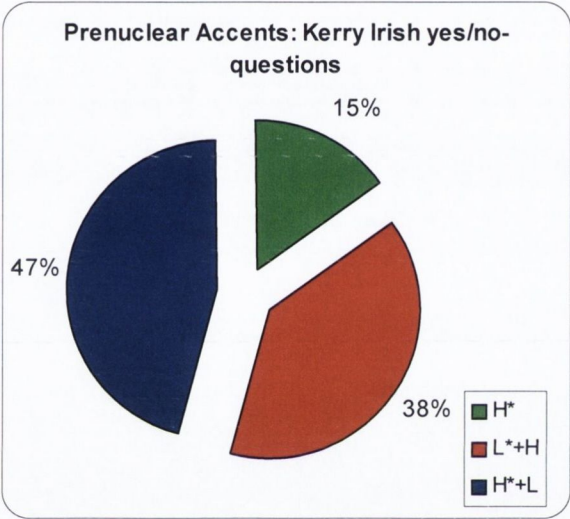


Figure 8.19. Prenuclear accents in Kerry Irish yes/no-questions

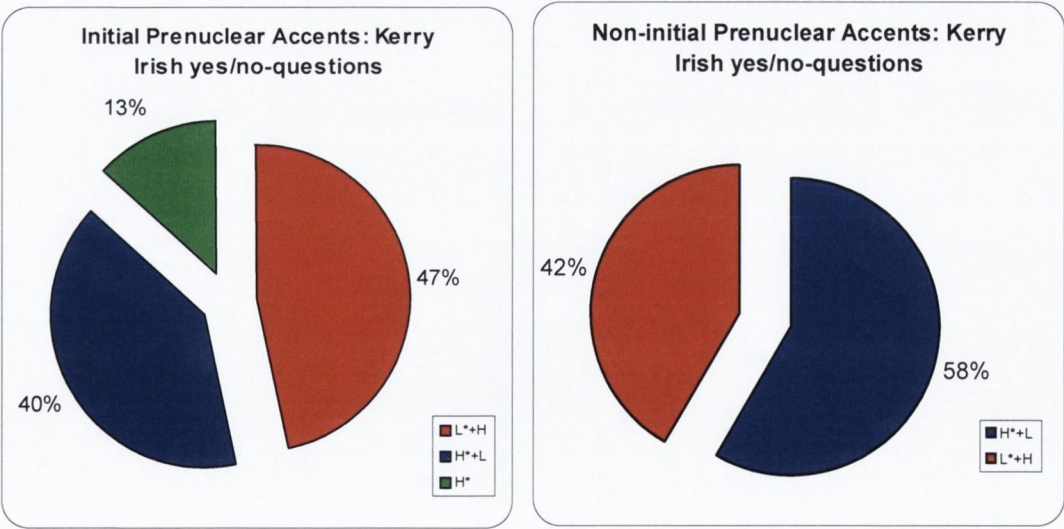


Figure 8.20. (a) initial prenuclear accents and (b) non-initial prenuclear accents in Kerry Irish yes/no-questions

Nuclear

The nuclear contour in yes/no-questions again is predominantly a falling one (88%). Fall-rises were also found in nuclear positions and these were labelled H*+L H%. These make up 12% of nuclear contours observed in yes/no-questions.

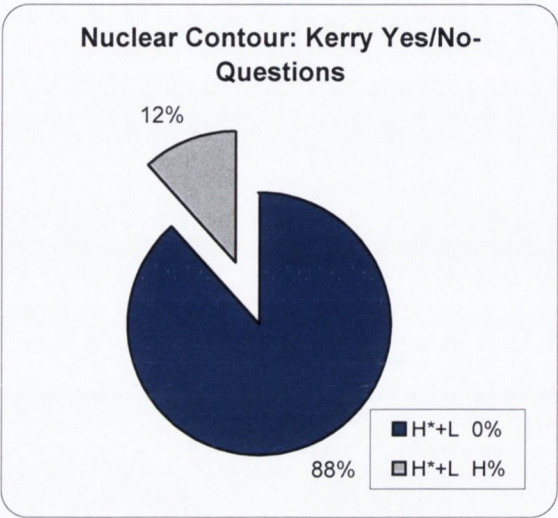


Figure 8.21 Nuclear contours of Kerry Irish wh-questions

Table 8.2 summarises the distribution of prenuclear and nuclear pitch accents in Kerry Irish across the three sentences types.

<i>Sentence type</i>	<i>Underlying tone</i>	<i>Surface Realisation</i>	<i>Prenuclear (%)</i>	<i>Nuclear (%)</i>
Declarative	H*+L	H*+L	63	100
Wh-Question		H*+L	73	100
Yes/no-question		H*+L	47	100
Declarative	H*+L	H*	11	0
Wh-Question		H*	27	0
Yes/no-question		H*	15	0
Declarative	L*+H	L*+H	26	0
Wh-Question		L*+H	0	0
Yes/no-question		L*+H	38	0
Declarative	L*+H	L*	0	0
Wh-Question		L*	0	0
Yes/no-question		L*	0	0

Table 8.2. Prenuclear and nuclear pitch accent distribution in Kerry Irish across the three sentences types: declaratives, wh-questions and yes/no-questions

8.4 Peak timing in Kerry Irish declaratives

The following sections look more closely at how some pitch accents of Kerry Irish are realised in relation to the segmental string. The focus is on falling accents (H*+L) in both initial prenuclear position and in nuclear position. Results from peak timing analysis in previous chapters indicate that each of the Irish dialects examined so far differ in terms of how the f0 targets of those pitch accents examined are timed in relation to the segmental string. The f0 targets of Donegal Irish and Cois Fharraige Irish pitch accents were shown to be fixed in their timing in relation to the segmental/syllabic tier. Inis Oirr Irish and Mayo Irish, on the other hand, demonstrated more variability in terms of their peak timing. The aim of this section is to determine if the *variable peak hypothesis* is supported in Kerry Irish. To recap, this hypothesis states that the timing of the peaks in relation to the segmental/syllabic string drift as a direct result of the size of the anacrusis preceding initial prenuclear accents, and as a result of the number of unstressed syllables following the nuclear accent. The Corpus used for analysis of peak timing is Subset ii of Corpus B as described in Chapter 4, Section 4.3.2. Subset i was not included in this part of the analysis as phonologically voiced stops were devoiced in Kerry Irish². The same three speakers of Kerry Irish were recorded and analysed.

Following previous Chapters, as a starting point in the analysis the accented syllable and each of the unstressed syllables following the (nuclear and prenuclear) accent and preceding the (prenuclear) accent in each utterance were segmented. The duration of each segment was measured and averaged and a number of points in the contour were then labeled. The labels used for the time points are glossed in Table 8.3 and a schematic representation of the measured timepoints is given in Figure 8.22.

H*	corresponds to the peak in the H* accents (or the onset of the peak in a H* plateau).
L	corresponding to the f0 minimum in a trailing L tone of H*+L accents.
(H*)p	Denotes end of the high plateau in H* prenuclear accents.
l(H*)	corresponds to the f0 minimum which precedes H* in accents. For the nuclear condition, this is the minimum between the nuclear H*+L and the preceding H* accent. In the case of the prenuclear accent, this minimum always occurred at the beginning of the phrase.

Table 8.3. *Timing tier labels Kerry Irish*

² It was established in previous Chapters that results from the datasets containing the devoiced consonants does not contribute towards the analysis in any way.

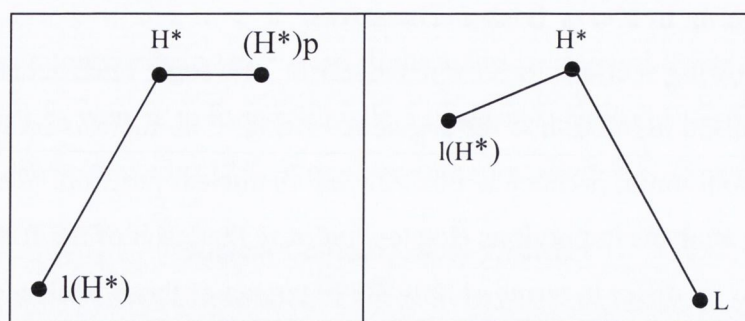


Figure 8.22 Schematic figure illustrating the labels associated with the timepoints measured in H^* prenuclear accents and H^*+L nuclear accents

In the following sections initial H^*+L prenuclear accents of Kerry Irish are looked at first. This is followed by the results of analyses of H^*+L nuclear accents in Kerry Irish. Earlier it was observed that it is sometimes difficult in Kerry Irish to judge if an initial prenuclear accent is a H^*+L accent with a delayed peak, or if it is in fact a rising L^*+H accent. In recording this corpus 8 randomised repetitions of each sentence were recorded. Some utterances were ambiguous in terms of their initial pitch accent and 5 utterances containing clear falling initial prenuclear accents were chosen from the 8. None of the 5 utterances employed had any dip in f_0 on the initial prenuclear contour.

8.4.1 Peak timing in H^*+L prenuclear accents

Figures 8.23-8.25 indicate the results for the prenuclear conditions PN0 (no anacrusis), PN1 (anacrusis of one), and PN2 (anacrusis of two). Average values are shown for the three time points measured: $(l)H^*$, H^* , and L (for gloss, see Table 8.3). The results indicate that the f_0 target in initial prenuclear H^*+L accents is subject to change, relative to the size of the anacrusis. Given an increase in the size of the anacrusis the peak of the initial accent drifts leftwards.

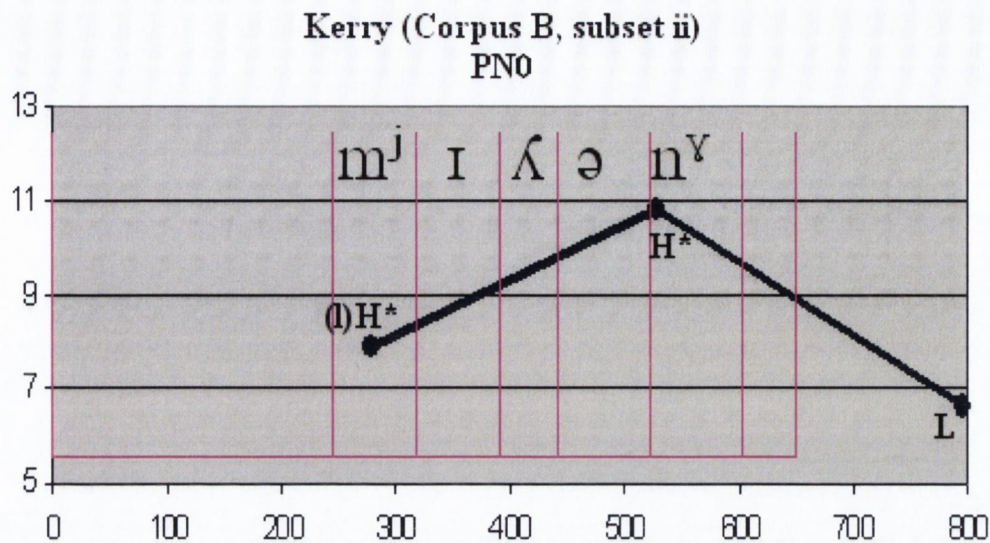


Figure 8.23. Tonal contours for prenuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN0= no anacrusis.

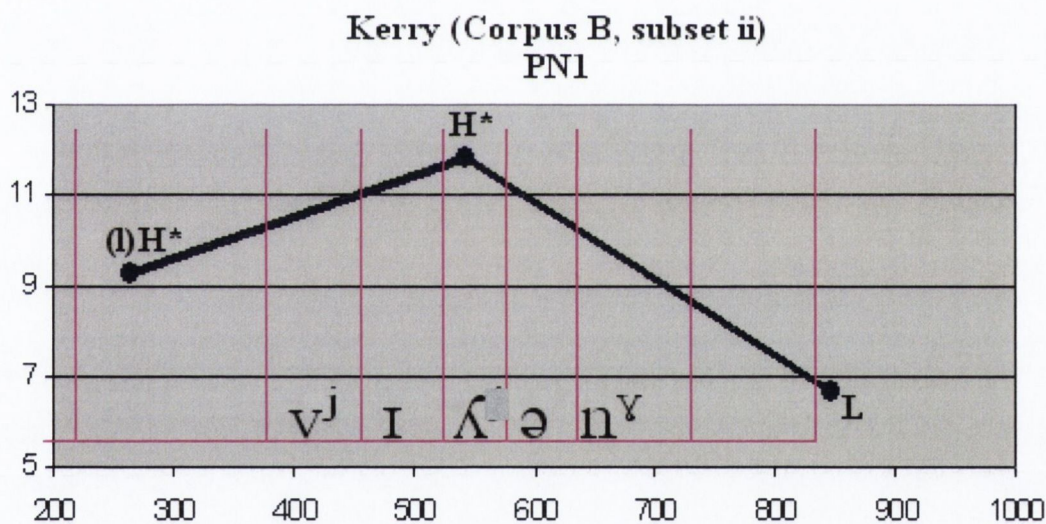


Figure 8.24. Tonal contours for prenuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1= anacrusis of one.

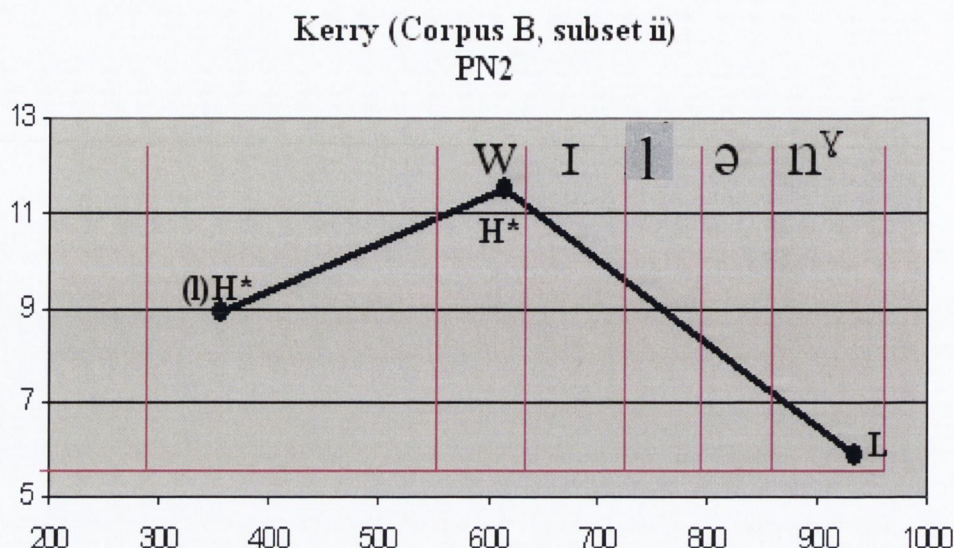


Figure 8.25. Tonal contours for prenuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two.

The Figures indicate that in conditions where there is no anacrusis (Figure 8.23) the peak is typically located in the unstressed syllable following the accented one. There was, however, a certain amount of variability in its location which is not adequately reflected in the Figures which indicate averages across the three speakers. For instance, under the same conditions (PN0), there were some instances where the peak was located within the accented syllable. In fact, one of the speakers did not generally produce pitch accents with delayed peaks even when there was no anacrusis.

With an anacrusis of one (PN1) and an anacrusis of two (PN2) the peak is typically located within the accented syllable, although its precise location is affected by the size of the anacrusis. The peak drifts leftwards as the size of the anacrusis increases. In PN1 the peak is located late in the accented syllable, typically in the consonant following the accented vowel. In the PN2 condition the peak is located early in the syllable, typically in the consonant preceding the accented vowel. It would appear that given enough unstressed material preceding the initial prenuclear accent, the optimal location of the peak is somewhere within the accented syllable but its precise location is subject to a certain amount of variation.

8.4.2 Peak timing in H*+L nuclear accents

This section presents data on the alignment of the starred tone associated with the H*+L nuclear accent in Kerry Irish. Figures 8.26-8.28 indicate the results for these nuclear conditions: N0 (no unstressed syllable followed nuclear accent), N1 (one unstressed syllable following nuclear accent), and N2 (two unstressed syllables following nuclear accent). As in prenuclear conditions the average values are shown for the three time points measured: (l)H*, H*, and L.

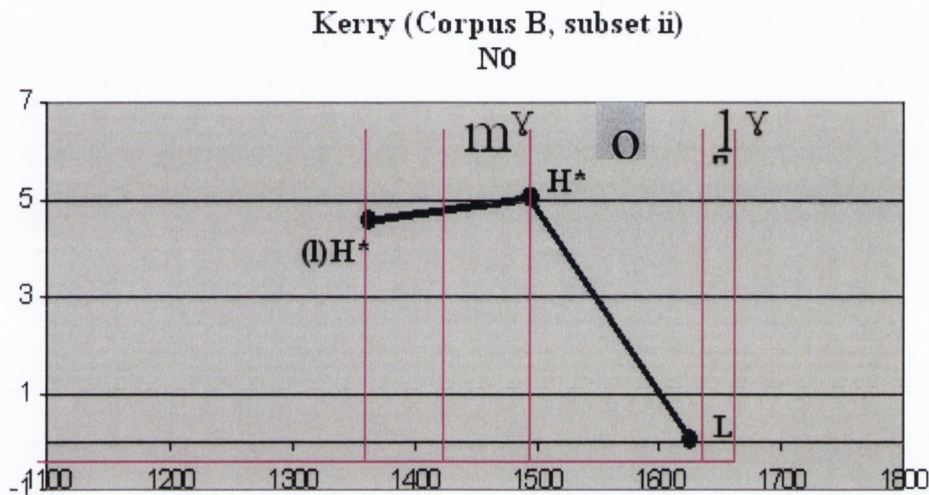


Figure 8.26 Tonal contours for nuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0= no unstressed syllables following the nuclear accent.

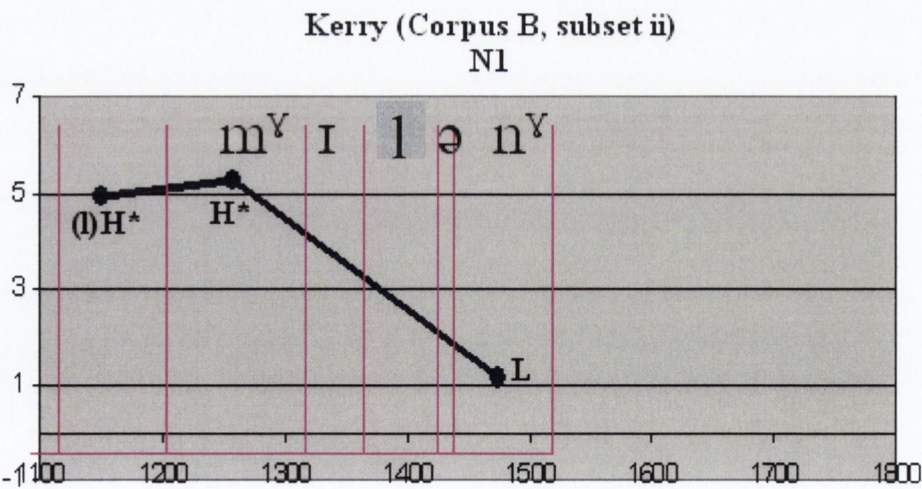


Figure 8.27. Tonal contours for nuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1= one unstressed syllable following the nuclear accent.

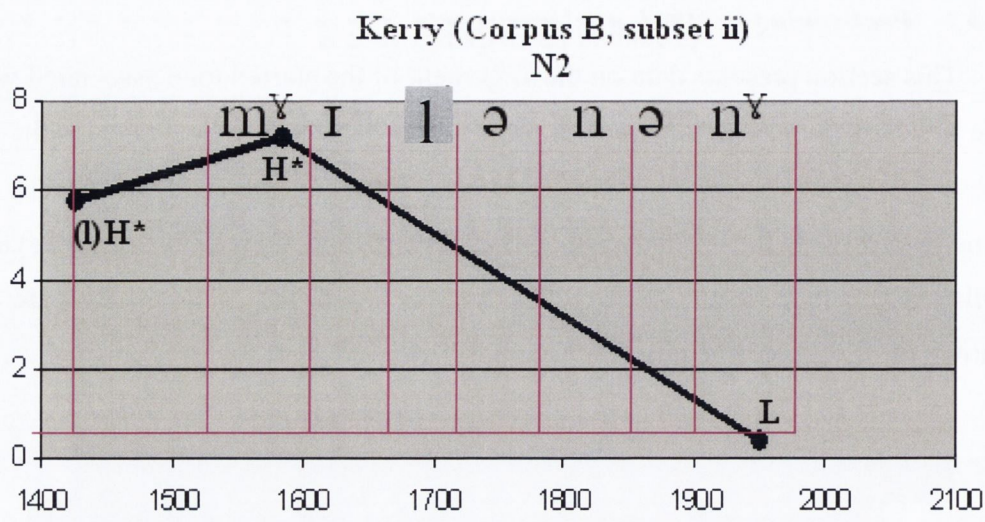


Figure 8.28. Tonal contours for nuclear accents in Kerry Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2= two unstressed syllables following the nuclear accent.

It was observed earlier that the H*+L nuclear accent of Kerry may be realised in two ways: as a shallow fall or as a sharp fall. In both types, the peak is typically preceded by a rise from preceding unstressed syllables (unless the penultimate pitch accent is rising as in Figure 8.4 above). Additionally both falls behave the same way in terms of their peak location.

The results of the peak timing analysis indicate that the peak of nuclear H*+L accents is quite stable in its realisation. In this corpus it was found that the peak was typically located in the consonant at the start of the accented syllable. It is not firmly anchored to any one point in the consonant such as the offset or onset and the variations observed here appear not to be related to the amount of unstressed material following the nuclear accent. For example in N0 the peak is located at a later point than N2, but the peak in N1 is earlier than that of N2. It would seem that the optimal location of the peak is somewhere at the start of the accented syllable, within the initial consonant.

8.4.3 Discussion of timing results

The main findings indicate that there is more variability in the timing of prenuclear accents, than nuclear accents. Given the difficulty earlier in distinguishing between prenuclear rising and falling accents such conclusions must be regarded as tentative. The results indicate that there is a considerable leftward

drift in the timing of the prenuclear peaks as the size of the anacrusis increases, and there is no such systematic variability in the peaks associated with nuclear syllables. In the nuclear contour the peak seems to be attracted to the initial consonant of the nuclear syllable. This is similar to findings for Mayo Irish. Mayo Irish demonstrated much more variability in the location of peaks in prenuclear position than in nuclear position. What is interesting here in terms of comparing the dialects is that both of these dialects have a more varied prenuclear tonal inventory than the other Irish dialects examined so far. Both have the option of three accents in initial prenuclear position: H^* , H^*+L or L^*+H . The choice of three accents in this position may contribute to the speakers tendency towards a variable peaks in initial position.

In addition to this, Kerry Irish is, to the naive listener, considered melodically more dynamic than the other dialects. It is likely that peak timing alone does not capture this distinction and so it is more likely that other factors are contributing to this perception of the dialect as being more melodic than others. One of the factors which may contribute to this is its unique stress system. Another factor may be the fact that there is less complete linking found in this dialect than in the other dialects. If there is more use of bitonal accents across the dialect as a whole, then the resultant movement within pitch accents in terms of rises and falls must sound somehow more “melodic” to a listener and this may be one contributing factor to the unique melody of Kerry Irish. Additionally, the relatively more frequent occurrence of the L^*+H accents, in addition to the other accents, throughout the Corpora might contribute to its more distinctive melody.

8.5 Summary

This chapter provides a preliminary tonal inventory of Kerry Irish based on careful auditory and acoustic analysis of read speech corpora. Three speakers of the dialect were recorded and analysed.

There are two underlying tones in this dialect, a falling tone (H^*+L) and a rising tone (L^*+H). Speakers also modify the H^*+L accent by completing linking to realise a high accent labelled H^* . Speakers of Kerry Irish do not tend to modify the underlying accents in the same way that other dialects do. There is a certain amount of truncation of trailing tones in both prenuclear and nuclear accents there is much

less complete linking of the prenuclear contour. As a result there are more bitonal accents found in this dialect than monotonal accents.

In prenuclear position speakers of Kerry Irish employ all three accent types available to them, while in nuclear position speakers only employ the falling H^*+L accent. It was observed that in initial prenuclear position it can be difficult to distinguish between a H^*+L accent and a L^*+H accent. The two are largely distinguished by visual analysis of the f_0 contour: there is a dip in the accented syllable in L^*+H accents.

Speakers distribute accents differently depending on the grammatical function of the sentence. Declaratives and yes/no-questions are the most similar. In prenuclear positions they both employ the three available accents from the tonal inventory: H^*+L , H^* and L^*+H . In both of these sentence types H^*+L is the most common pitch accent in prenuclear position, although in initial prenuclear position there is a preference for a rising L^*+H accent in yes/no-questions. Wh-questions differ from declaratives and yes/no-questions in that they never employ rising accents in prenuclear position. A further observation is that initial high boundaries ($\%H$) were typically found preceding rising accents in both declaratives and yes/no-questions. They were also found in wh-questions preceding H^* or H^*+L accents if the wh-word at the start of the utterance was not accented. It would seem that a high prenuclear contour is a signal to interrogativity in Kerry Irish.

One of the most interesting findings was that only falling nuclear contours were found in nuclear position in this dialect, with the exception of some small numbers of fall-rises ($H^*+L \ H\%$). These fall-rises made up just 2% of nuclear contours in this study and were only produced in yes/no-questions. The remaining nuclear contour across all sentence types was falling: $H^*+L \ 0\%$. This was unexpected. Earlier descriptions of the Munster dialect of Muscraí have shown that speakers often show a preference for rising nuclear contours even in declaratives (see Ó Cuív, 1944; Blankenhorn, 1981). The difference between this study and previous studies is that the Munster dialect in the earlier studies is a dialect of Cork Irish whereas in this study the speakers all come from West Kerry. In fact Blankenhorn (1981) does observe that rising nuclear contours are more a characteristic of the Cork dialects of Munster than those of West Kerry.

The results of the peak timing analysis show that Kerry Irish treats prenuclear and nuclear accents differently in terms of peak timing. The prenuclear accents

show more variation in peak timing than the nuclear accents. In prenuclear accents the peak may drift rightwards as the size of the anacrusis decreases. In nuclear accents on the other hand, there is considerably less peak drift to the extent that we could say that peaks in nuclear accents are fixed. Any shifts in the location of the peak happen within the first consonant of the accented syllable and does not appear to be related to the number of unstressed syllables following the nuclear syllable. The findings on peak timing were particularly interesting as they indicate that Kerry Irish can not be classified as either a “variable” dialect or a “fixed” one in terms of tonal alignment.

Chapter 9

The Realignment Hypothesis

9.1 Introduction

The aim of this study was to provide a phonetic and phonological description of the intonation of some of the major dialects of Irish, within the framework of autosegmental-metrical phonology. In previous chapters a tonal inventory for declaratives, *wh*-questions and *yes/no*-questions in four major dialects of Irish was established through analysis of read speech.

The findings indicate differences between the major dialects in terms of the basic tonal structure the dialects. The Irish dialect landscape is regarded as a continuum where the dialects merge into one another. As indicated in Chapter 3, O'Siadhail (1989) has argued that the dialects of Donegal and Munster can be considered as two ends of a spectrum. While the findings of this study support this by indicating that there are clear differences between the Northern and Southern dialects in terms of the basic tonal structure, there is, however, a more gradual transition in terms of the dialect continuum with respect to the southern dialects of Connaught and Munster. While at the phonological level Donegal speakers show a preference for rising accents across each of the three sentence types analysed, the more southern dialects of Mayo, South Connaught and Munster indicate a preference for falling accents.

One question which arises from this study on Irish dialects is whether these differences between the Northern and Southern dialects are truly phonological, categorical differences, as the different tonal inventories would imply, or whether they might alternatively be viewed as different surface phonetic realisations of the same basic underlying tone, which differ in terms of the alignment of the tonal targets to the segmental string. Such an analysis has provided an insightful account of cross-dialect differences in Swedish (Bruce and Gårding, 1978; Bruce and Thelander, 2001; Bruce, 1987) as introduced in Section 2.6, Chapter 2.

9.2 The Hypothesis

The main focus of this chapter is to revisit the results on peak timing analyses in previous chapters by comparing the Donegal results with Cois Fhairrge in South

Connaught, in order to test whether the accent differences in these dialects might be treatable in terms of a possible realignment of the melodic and segmental tiers. Speakers of Donegal Irish show a propensity for rising accents (L^*+H) in both prenuclear and nuclear position and those from Cois Fhairrge show a preference for falling accents (H^*+L), frequently realised as an H^* in prenuclear position and realised as a fall in nuclear position. The issue is whether the L^*+H of Donegal and the H^*+L of Cois Fhairrge could simply be regarded as different surface realisations of the same underlying pitch accent type (H^*+L) but with different timing alignment of the tonal and segmental content.

As illustrated schematically in Figure 9.1 the L^*+H of Donegal could conceivably be viewed as a relatively later phasing of the tonal material, so that the H peak is delayed relative to the accented syllable, with the consequence that the rising pitch towards the H peak gains prominence and becomes L^* , while the H becomes a trailing tone. This we term the *realignment hypothesis*.

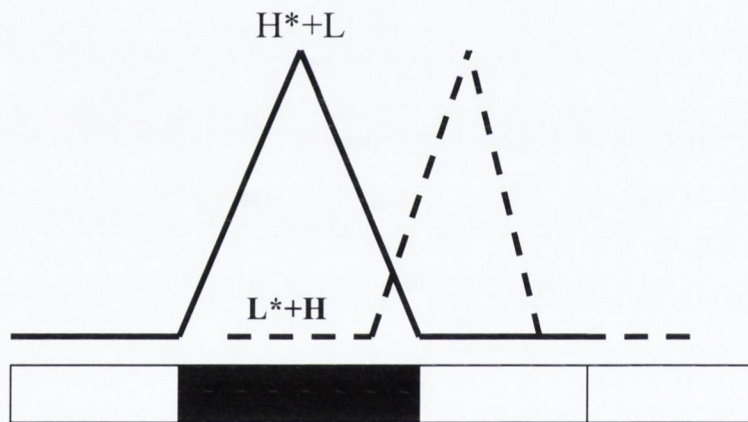


Figure 9.1. Schematised representation of how the rising accent of Donegal (dashed-line) might be derived as a later phasing of an underlying peak, essentially similar to that of Cois Fhairrge (solid-line). Note that the schematised time grid is in syllables, with the accented syllable shown in black.

The dialects of Donegal and Cois Fhairrge were chosen, not only because they represent the North-South divide, but also because both dialects demonstrate rather fixed peaks across each of the conditions tested and as a result were seen as being more easily comparable. Additionally, the materials analysed for both dialects are rhythmically similar, and so dialect differences in rhythm would not be an influence on the findings presented here regarding peak alignment.

If the results support the *realignment hypothesis* this would provide a unifying account of the cross-dialect differences, along similar lines as was proposed by Bruce and Thelander (2001) to account for the different realisations of the word Accent I and II across the four main Swedish dialects that maintain an Accent I vs. Accent II distinction. An attraction of this kind of approach is that it lends itself to a possible explanation of a historical derivation for such large divergences in intonation. If one assumes that the tonal contours in these dialects have evolved from a common origin, one is confronted with the task of explaining the divergence of the current forms. The phonological interpretation - that the difference involves a phase shift between the segmental and melodic strands - can also serve as a hypothesis that this is what has happened historically. Thus for example, as is illustrated by the lighter dotted lines in Figure 9.2 (which is an elaboration of Figure 9.1) it could be argued that the Donegal pattern arose out of a gradual rightwards shift over time in the realisation of the peak. This type of explanation has been explored by Engstrand & Nyström (2002) in relation to the differences referred to above among the Swedish dialects.

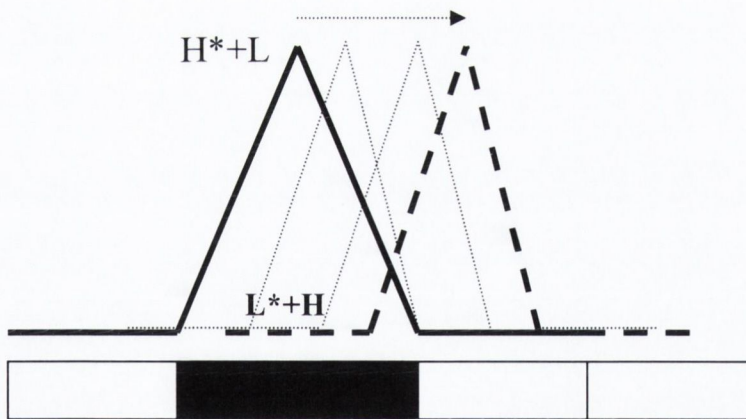


Figure 9.2. Schematised representation of how the rising accent of Donegal (heavy dashed-line) might be historically derived as a successively later phasing (lighter dotted lines) of the melodic contour, which is essentially similar to that of Cois Fhairrge (heavy solid-line).

Preliminary results from this analysis were initially presented in Dalton and Ní Chasaide (2005b).

9.3 Review of Peak Timing Results in Donegal and Cois Fhairrge dialects

The following sections revisit the results of peak timing analyses in the dialects of Donegal and Cois Fhairrge. The results of each of these sections have already been presented in Sections 5.5 and 6.5 and are merely reiterated here. Prenuclear accents are looked at first and this is followed by a look at the nuclear accents.

9.3.1 Prenuclear accents

Figures for the prenuclear accents of Donegal and Cois Fhairrge were presented in Sections 5.5.1 and 6.5.1, respectively and are presented here once again. Figures 9.3-9.5 represent the results from prenuclear accents in Donegal Irish, while Figures 9.6-9.8 represent those from Cois Fhairrge.

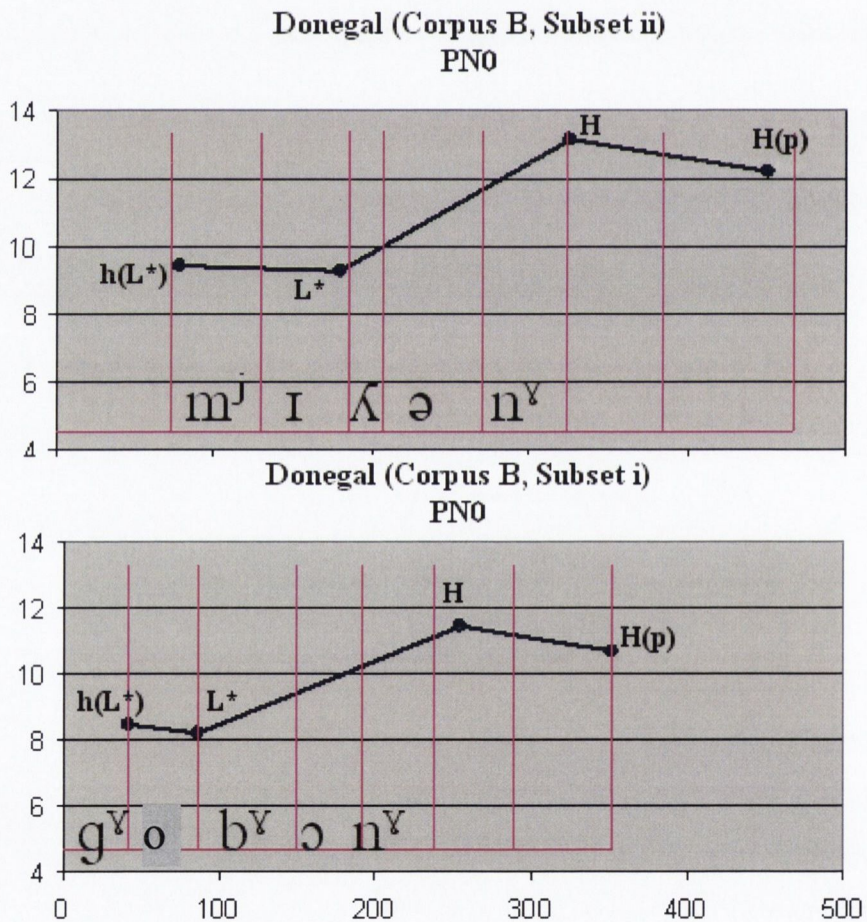


Figure 9.3. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PNO= no anacrusis.

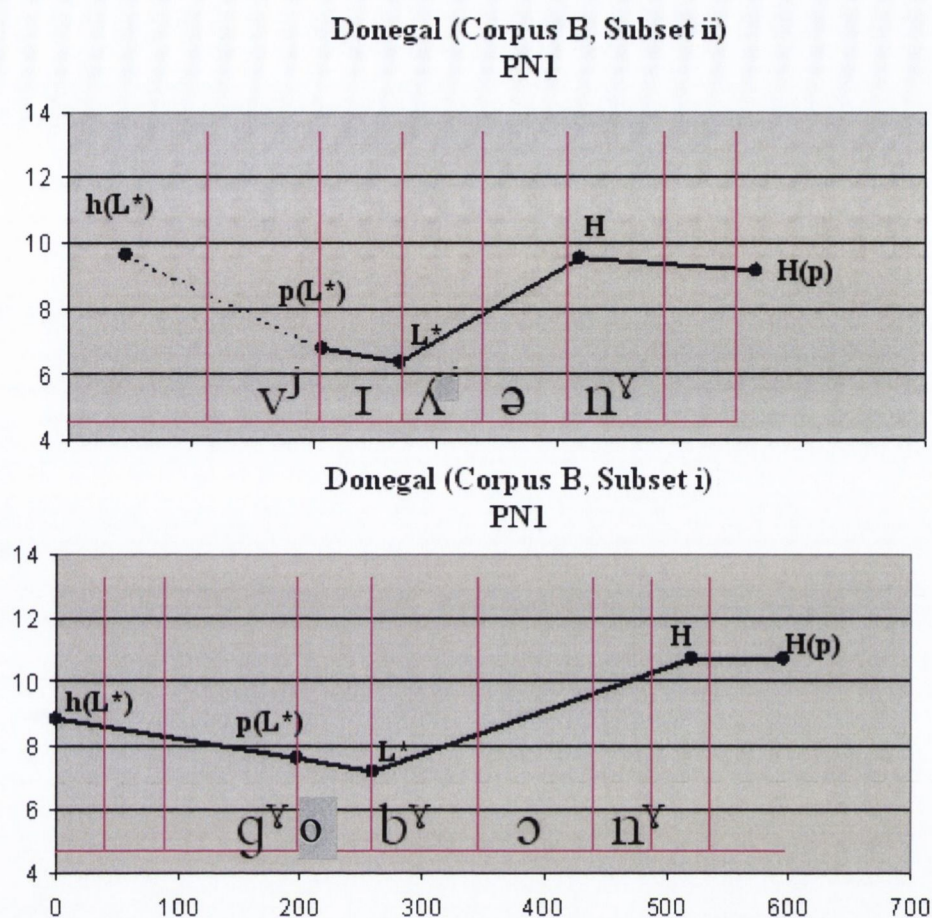


Figure 9.4. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1= anacrusis of one

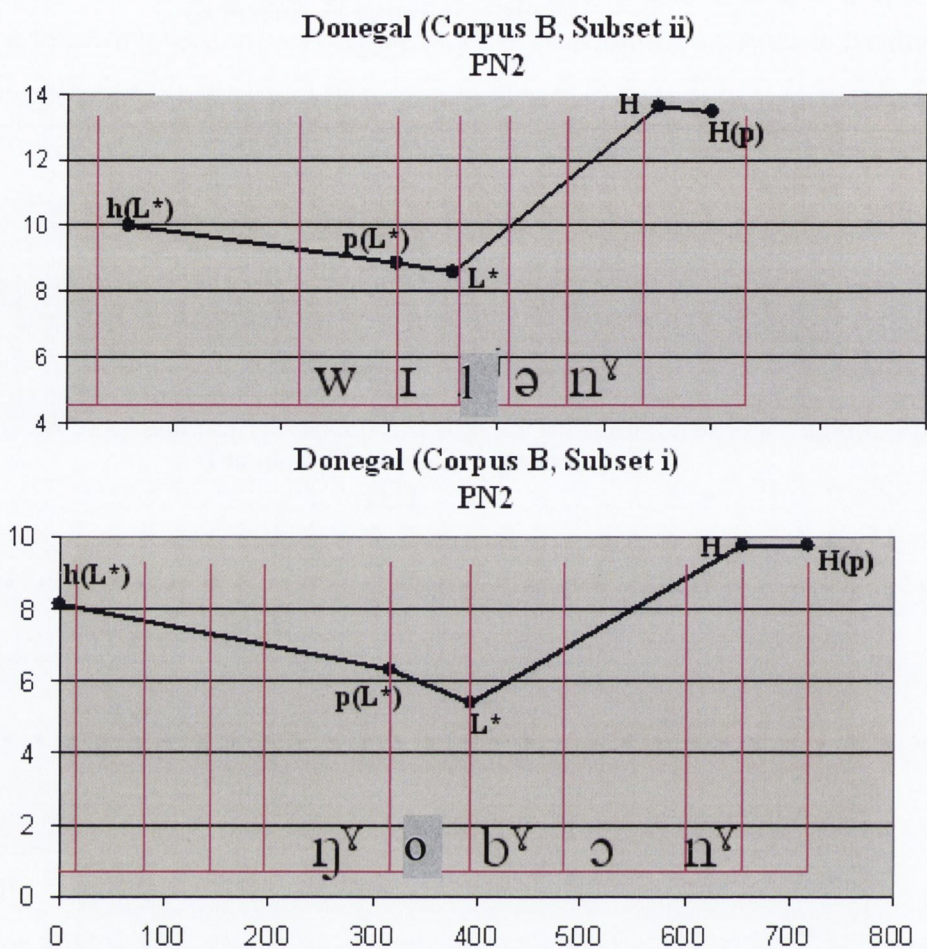


Figure 9.5. Tonal contours for prenuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two

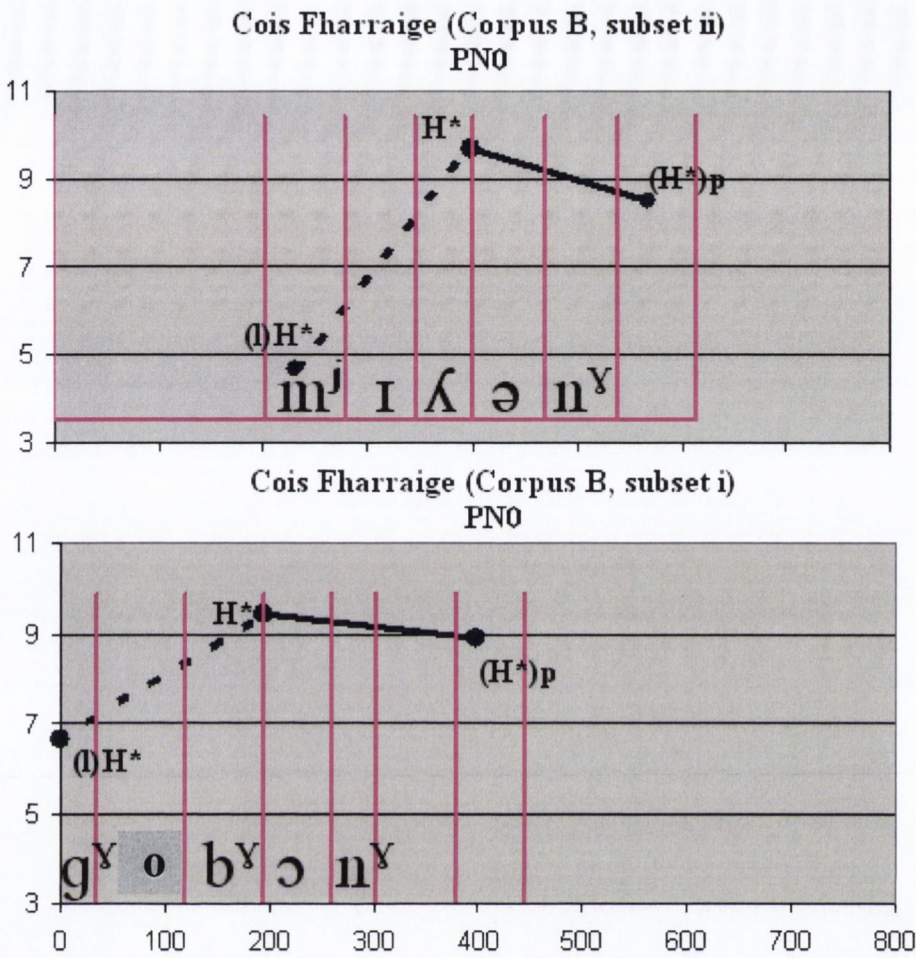


Figure 9.6. Tonal contours for prenuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN0= no anacrusis.

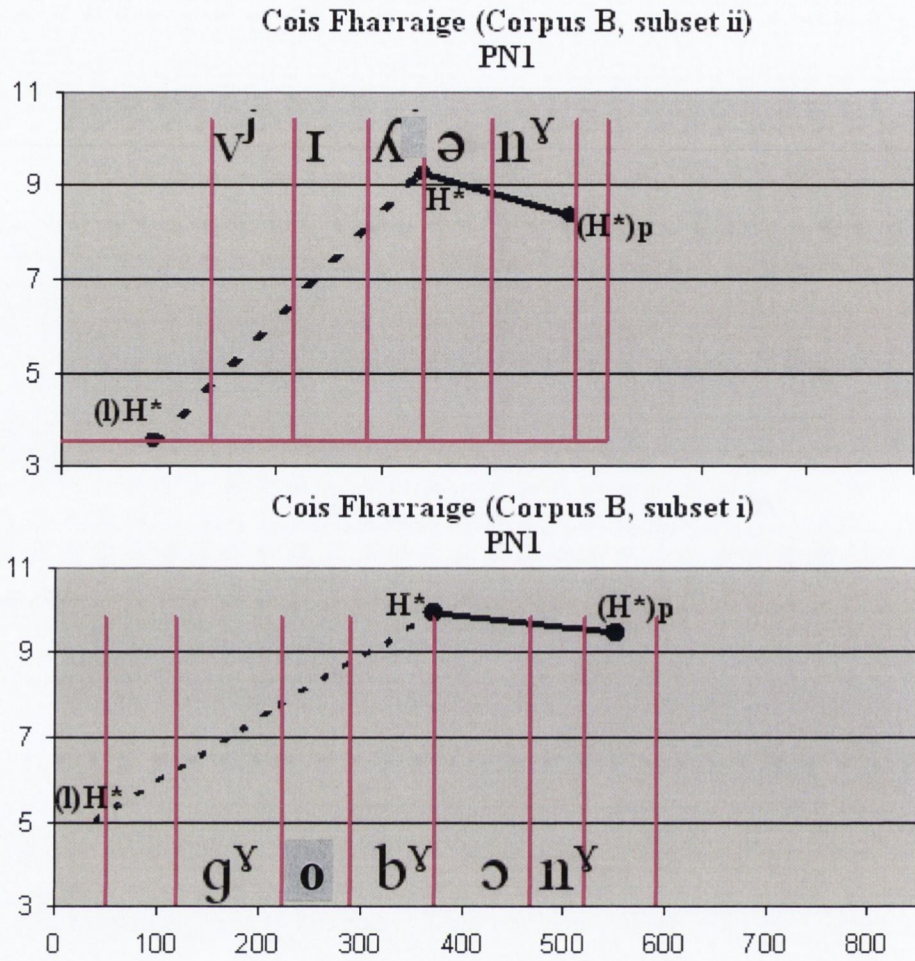


Figure 9.7. Tonal contours for pre-nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN1= anacrusis of one

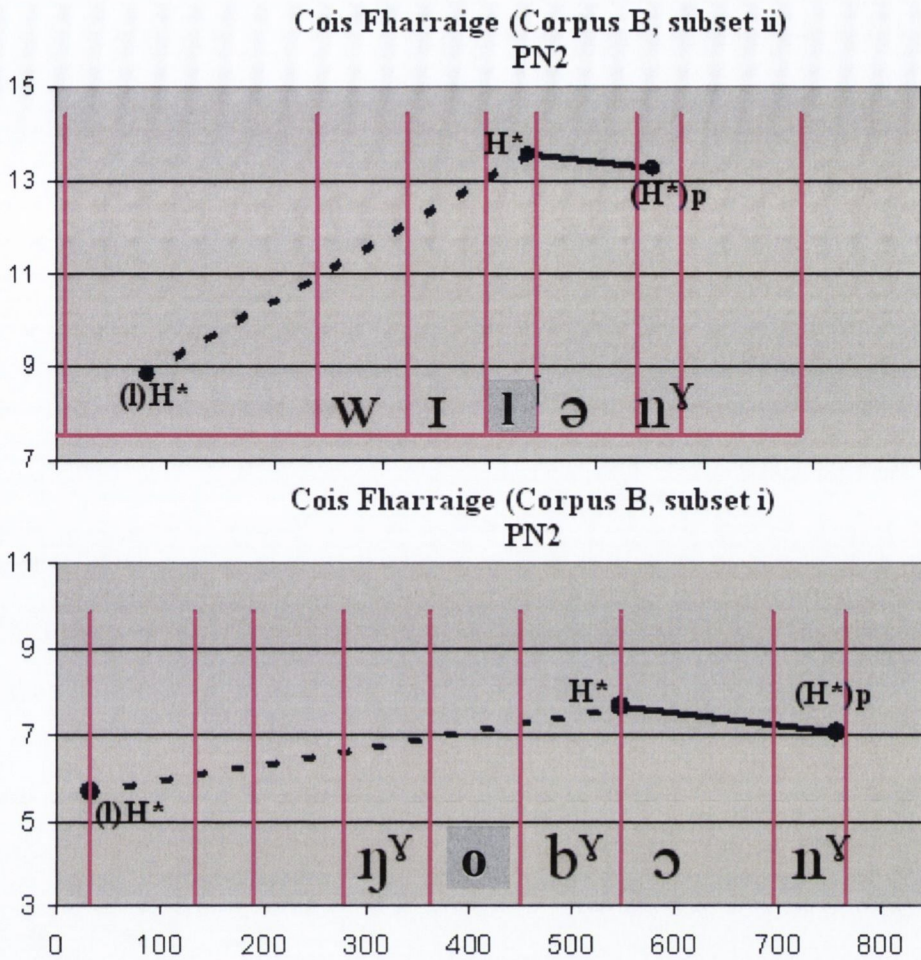


Figure 9.8. Tonal contours for prenuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. PN2= anacrusis of two

Although the overall prenuclear contour shape for the two dialects are clearly different, what is rather striking is how little variation there is in tonal alignments across the three prenuclear conditions for either dialect. The size of the anacrusis appears to have little or no effect. In Cois Fhairrge Irish the peak is realised as a plateau, whose onset point H^* is consistently located at the right edge of the accented syllable. The plateau is realised on the post accented syllable and may continue beyond that. This was consistent across all speakers.

In Donegal both tones of the L^*+H sequence are stable in terms of their location across the different anacrusis conditions. L^* is always anchored to the right edge of the accented vowel. The H target of the trailing tone of the L^*+H prenuclear Donegal accent in this data is always located on the vowel of the second unstressed syllable following the accented syllable, and is then realised as a plateau. There is

some slight variation in the timing of H within the vowel across the three prenuclear conditions, unrelated to the size of the anacrusis. In Donegal Irish the distance from the L* to the H is consistently a gap of two syllables (i.e. the H is always two syllables later than L*) but there is no consistency in terms of absolute time (the interval between L* and H is approximately 130 ms in PN0 and 250 ms in PN1). Our basic intuition is that the important points in the melodic tier are aligned with the syllables, assuming that the syllable boundary for syllables with a short vowel (as in our examples) is after the intervocalic consonant. This is discussed in more detail in Section 3.3.4, Chapter 3.

In this prenuclear environment, the starred tone in either dialect appears to remain invariant across differences in anacrusis size. The H* of Cois Fhairrge and the L* of Donegal both appear to be aligned towards the right edge of the accented syllable, with the H* alignment of Cois Fhairrge being slightly later than the L* of Donegal. The dialects differ in that the anacrusis is produced with a rise towards the H* peak in Cois Fhairrge, and with a fall towards the L* in Donegal. The range of the pitch drop to the L* in Donegal increases with the size of the anacrusis, something that does not hold for the rise in Cois Fhairrge.

9.3.2 Nuclear accents

Results for the nuclear accents of Donegal and Cois Fhairrge were presented in Sections 5.5.2 and 6.5.2, respectively. The Figures are presented here once again. Figures 9.9-9.11 represent the results from prenuclear accents in Donegal Irish, while Figures 9.12-9.14 represent those from Cois Fhairrge.

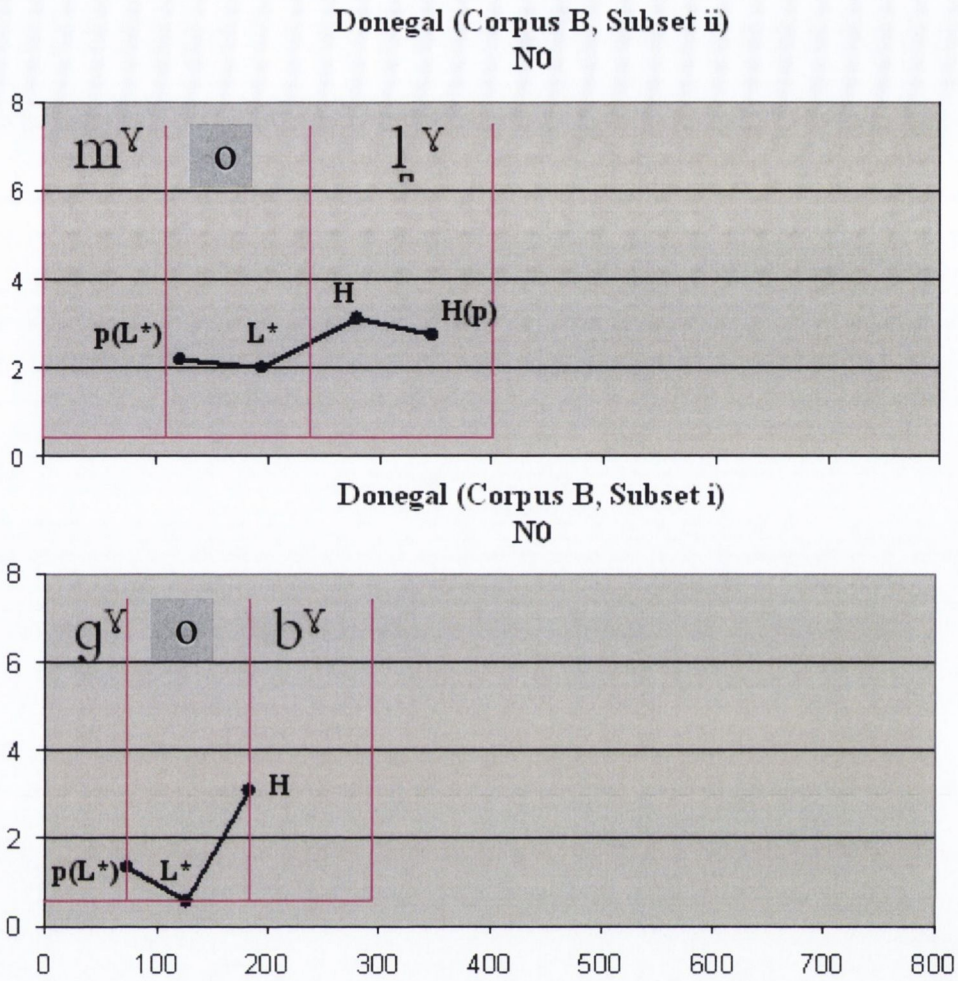


Figure 9.9. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0=no unstressed syllables following the nuclear accent

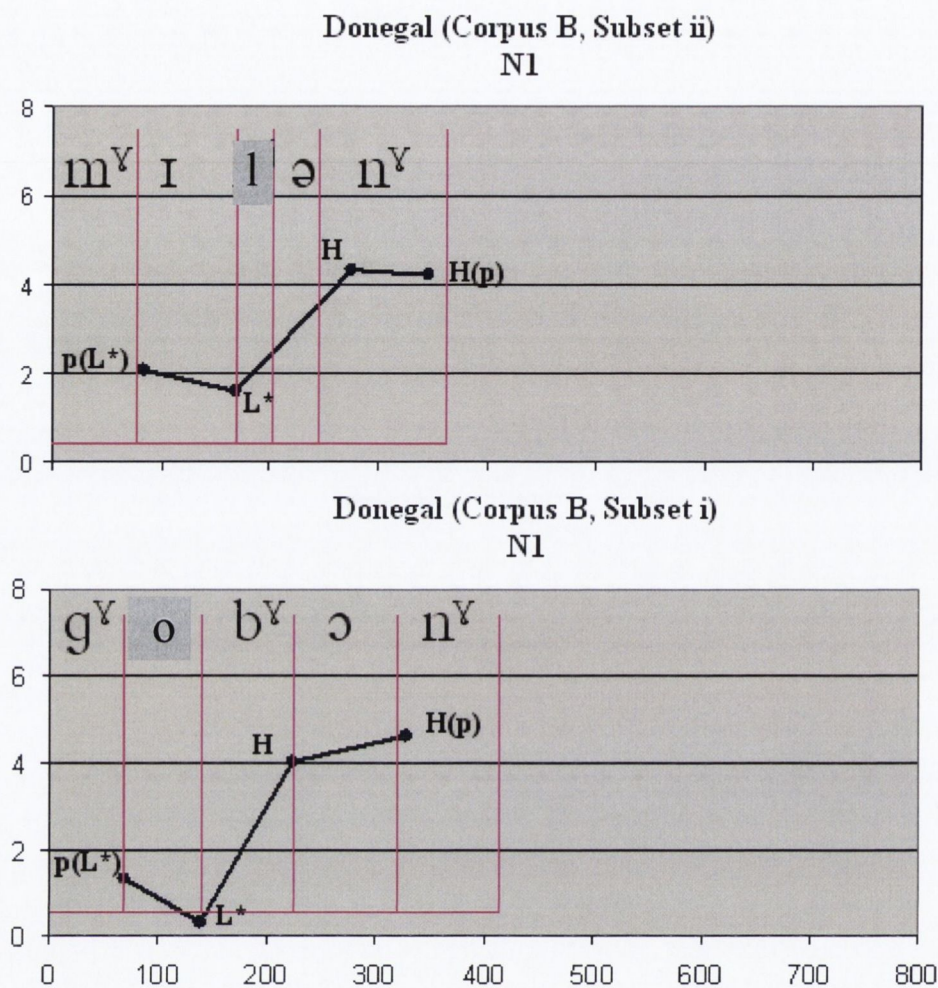


Figure 9.10. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1= one unstressed syllable following the nuclear accent

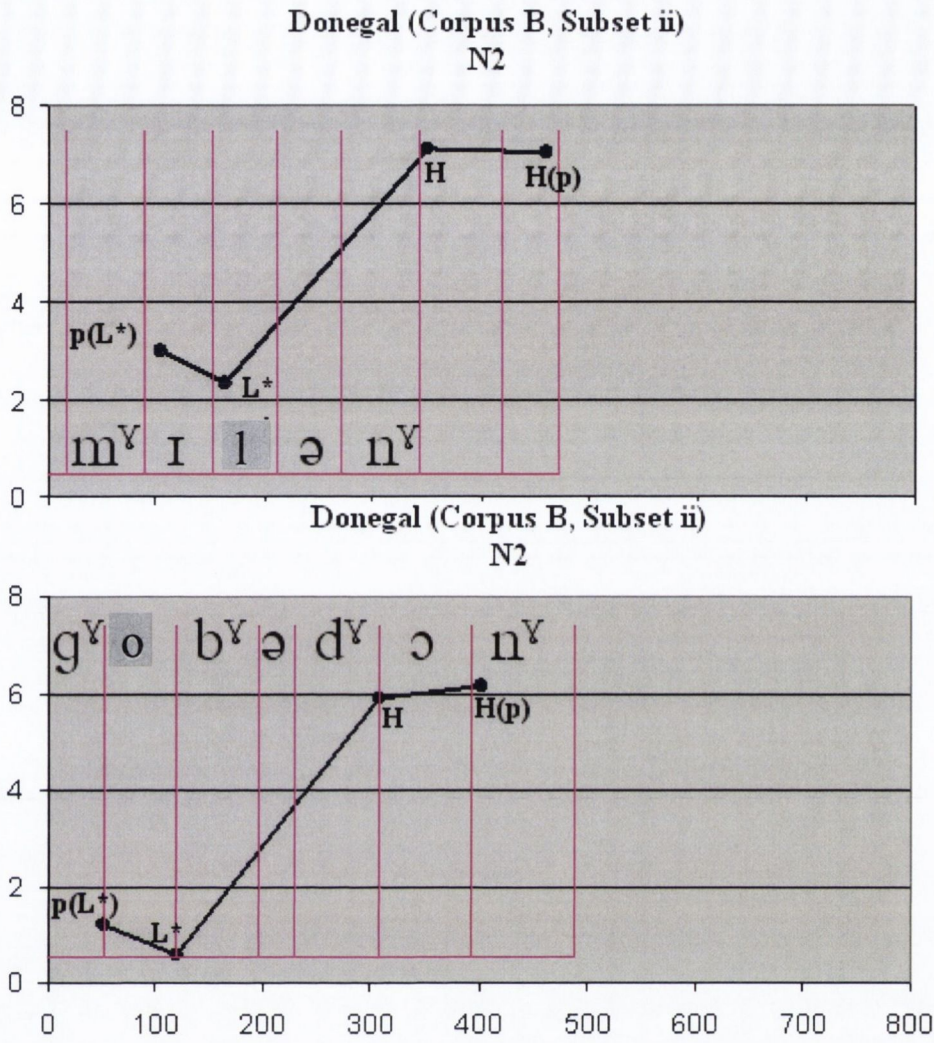


Figure 9.11. Tonal contours for nuclear accents in Donegal Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2= two unstressed syllables following the nuclear accent

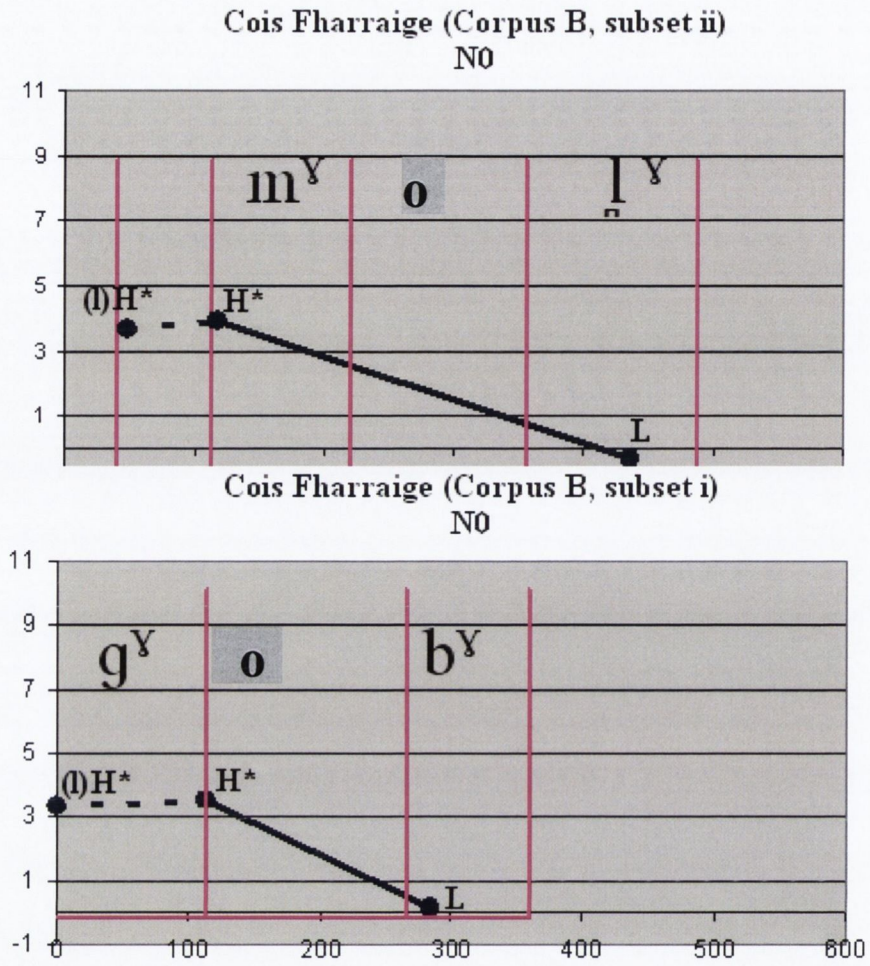


Figure 9.12. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N0=no unstressed syllables following the nuclear accent

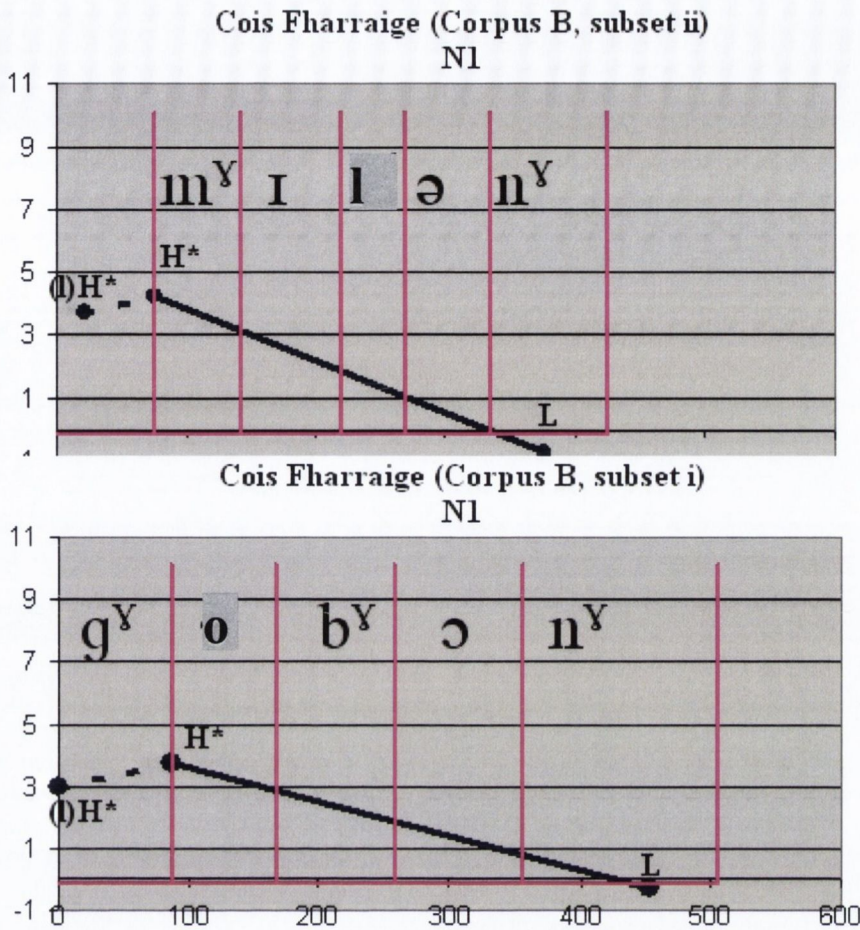


Figure 9.13. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N1= one unstressed syllable following the nuclear accent

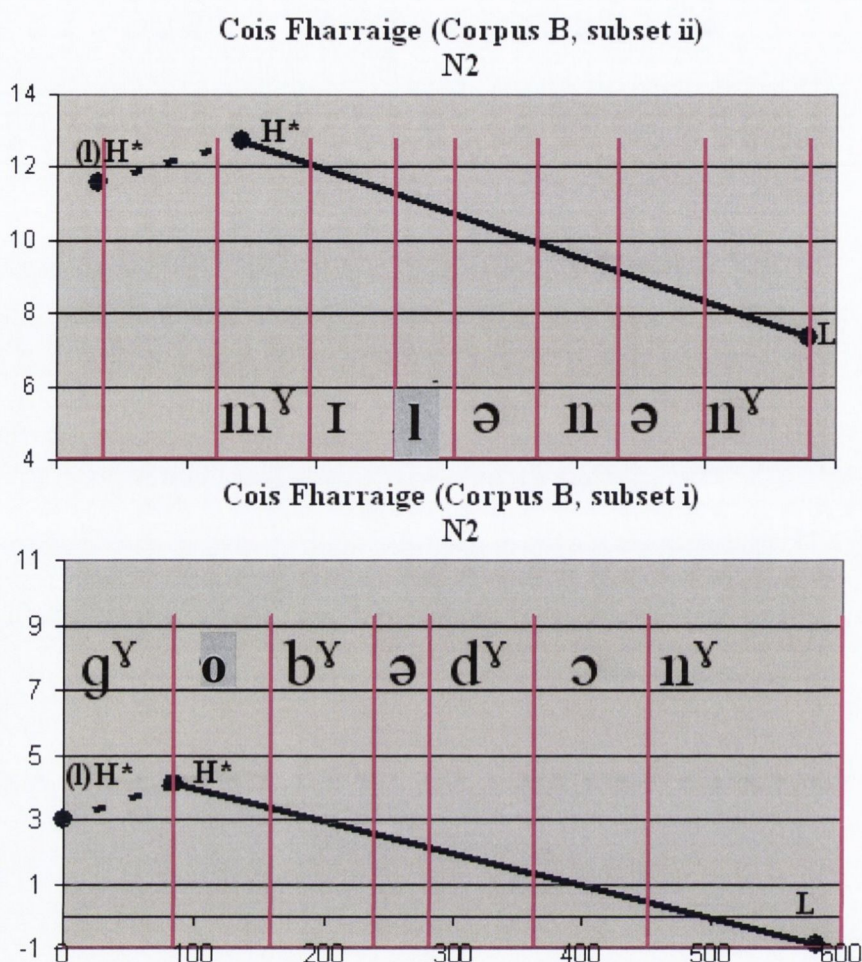


Figure 9.14. Tonal contours for nuclear accents in Cois Fhairrge Irish, with semitones on y-axis (reference value 150Hz) and x-axis in ms. N2= two unstressed syllables following the nuclear accent

In Cois Fhairrge, the final, nuclear accent is realised as an H*+L accent. Unlike the prenuclear case, the H* element is not realised as a plateau, rather the pitch movement is realised as a sharp fall. The H* element of this accent is consistently aligned with the left-edge of the accented syllable and the timing of the H* is unaffected by the number of following unstressed syllables.

The Donegal realisation of the nuclear L*+H accent is essentially similar to that of the prenuclear accent. The location of the H element does vary in timing, but this variation would be an expected surface realisational difference if we are correct in assuming that the underlying anchoring of H is to the second unstressed vowel following the accented syllable. Our interpretation of the Donegal data is that the L*+H tone has an intrinsic time requirement for its realisation (measured in syllables), and that this requirement is most likely to be violated in certain nuclear

conditions, e.g. when the accented vowel is short and there are not enough post-accented syllables. These conditions arise in N0 and to a lesser extent in N1. In other words, these look like instances of truncation rather than a planned realignment of the peak timing.

Further evidence of this is in the f_0 level of the H element across each of the conditions. In each of the prenuclear conditions of Donegal Irish there is enough material for the full accent to be realised and consequently the f_0 level of the H element is quite stable. In nuclear conditions on the other hand, the pitch range is more compressed in the N0 condition than in the N1 condition, and less so again in the N2 condition. This supports our interpretation that the L^*+H accent has an intrinsic time requirement for its full realisation.

9.4 Discussion

The results from the peak timing analyses in these dialects show, not only the striking differences between them, but also point to some common features, particularly in the prenuclear accent.

The first point worth noting is that in initial prenuclear position the starred tone in each dialect appears to be aligned towards the right edge of the accented syllable, occurring somewhat later in Cois Fhairrge than in Donegal. In Cois Fhairrge it is aligned with the right edge of the accented syllable, while in Donegal it is aligned with the right edge of the accented vowel. A second observation is that both dialects have in common the fact that the size of the anacrusis, which affects target alignment in the other Irish dialects, does not appear to affect alignment in these dialects of Irish.

The alignment differences between the dialects are greater in the nuclear position. While the accent of Donegal retains in nuclear position (where possible) the essential characteristics of the prenuclear accent, in Cois Fhairrge, there is a shift in alignment of the peak from the right-edge of the accented syllable (prenuclear) to a left-edge alignment (nuclear).

Although the two dialects differ in terms of the location of the starred tone, they have in common that the peak does *not* drift, either in prenuclear environments, when the size of the anacrusis varies, or in the nuclear environment, with varying numbers of unstressed syllables following the accented syllable. Thus, the patterns

of peak drift for these conditions, reported to a degree in the other dialects do not appear to hold for these dialects at least.

The fundamental question here is whether the differences in these tonal sequences in the Ulster vs. South Connaught dialects might be regarded as a realignment of the (same) tonal targets relative to the segmental string. Could the L*+H of Donegal be just a later realisation of an underlying H, with the L simply a manifestation of the trough between successive H accents, a product of declination, which in the case of Donegal becomes associated with the stressed syllable in the foot?

Some of the findings for the prenuclear accent could be seen as possible support for such a realignment hypothesis. Firstly, there is the fact that the target H in both Cois Fhairrge and Donegal is realised as a plateau and secondly, the fact that the H in Cois Fhairrge is, in any case, realised rather late relative to the stressed vowel could be taken to indicate a general tendency to peak delay in Irish. However, a careful comparison of the alignment results leads us to conclude for a variety of reasons that the data do not in fact support the *realignment hypothesis*.

First of all, considering only the relative timing of the peaks in prenuclear and nuclear positions, it is clear that a single realignment factor will not work for both environments. In the prenuclear cases, shifting the Donegal peak leftwards by one syllable could be argued to generate an approximate match to the Cois Fhairrge data. However, in the nuclear condition the distance between the peaks is potentially two syllables. Thus the realignment argument would have to be rather complex to allow for the considerable variability in these timing differences. Further possible objections to the realignment hypothesis can be illustrated in terms of Figures 9.15 and 9.16, where the pitch contours for Cois Fhairrge and Donegal are superimposed for the prenuclear and the nuclear data respectively, but realigned so that the H timepoints coincide.

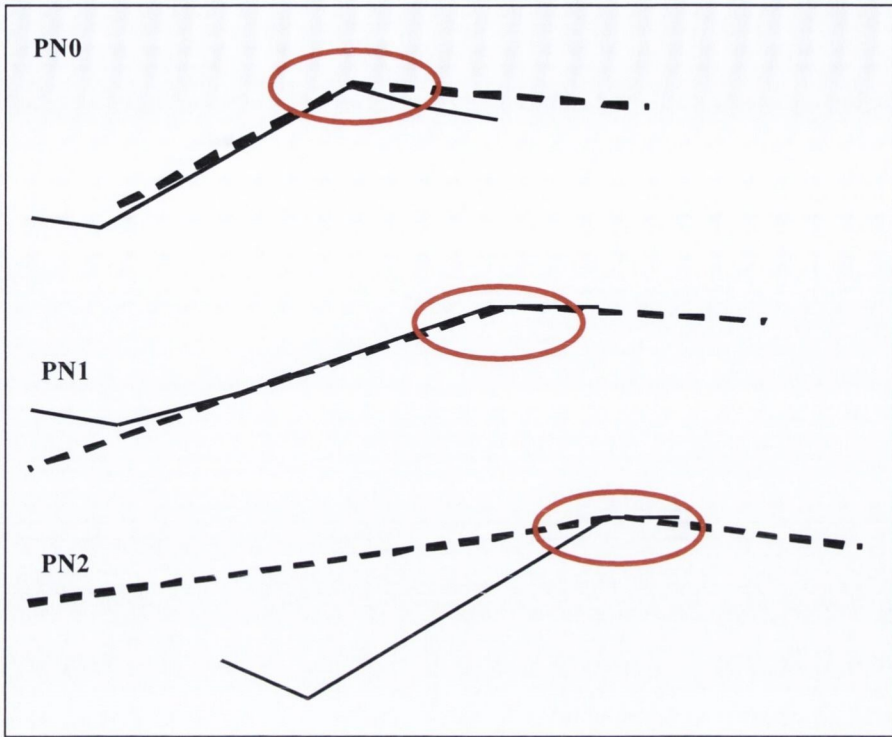


Figure 9.15. Prenuclear tonal contour of Donegal (solid-line) superimposed on Cois Fhairrge (dashed-line) aligned to the H peaks (encircled) of either dialect.

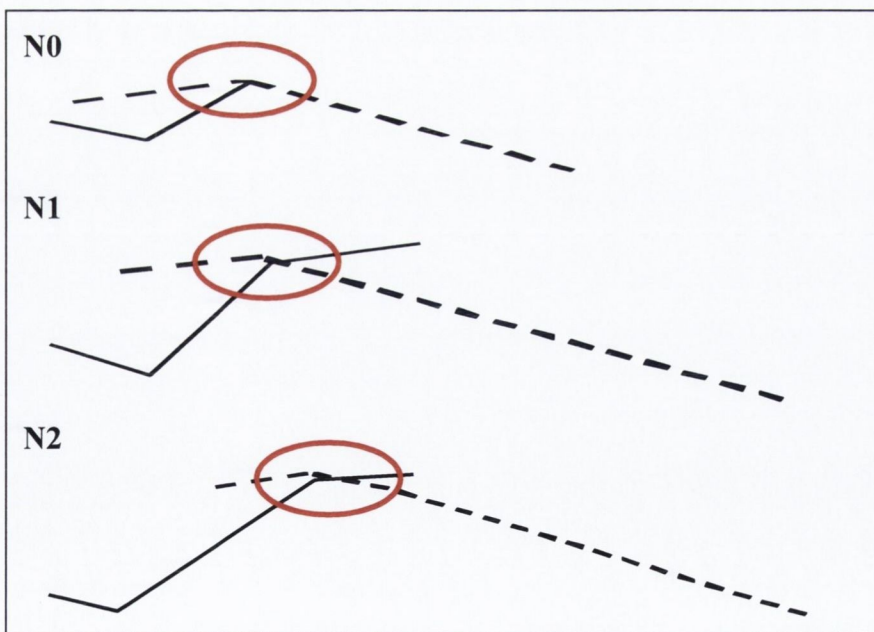


Figure 9.16. Nuclear tonal contour of Donegal (solid-line) superimposed on that of Cois Fhairrge (dashed-line), aligned to the H peaks (encircled) of either dialect.

Looking first at the prenuclear accents in Figure 9.15, it is conceivable that the realignment hypothesis might be supported. The H peak is a plateau in both dialects

and in PN0 and PN1 the shape of the accents in each dialect almost fit when superimposed on one another. Even so, the scaling of the peak relative to the preceding minimum is a problem in the case of PN2, where there is a long anacrusis. Additionally, the falling vs. rising anacrusis of the Donegal vs. Cois Fhairrge contour does not fall into place if we simply realign the peaks. This highlights the fact that the L* of Donegal is not simply the onset of a rise, but a turning point in the contour.

If we consider the superimposed nuclear accents in Figure 9.16., there is little evidence to support the hypothesis. Here we find that even when the Cois Fhairrge accent is shifted to coincide with the H of Donegal, it simply does not generate the appropriate Donegal contour. The sharp peak in Cois Fhairrge does not match the plateau in Donegal. Perhaps more problematic is the mismatch in the f0 minimum preceding the peak. While in Donegal the trough associated with the L* is substantial, in Cois Fhairrge the trough is shallow, when indeed it is present. Consequently, the scaling of the peak relative to the preceding f0 minimum emerges as being quite different for the two dialects, as is illustrated in Table 9.1 for the nuclear accents.

Trough to peak distance in semitones		
	Donegal	Cois Fhairrge
N0	2.5	0.25
N1	4.5	1.0
N2	6.25	1.25

Table 9.1. *Scale of peaks, relative to preceding f0 minima for nuclear accents in Donegal and Cois Fhairrge. Values in semitones*

There are other reasons why the realignment hypothesis is counterintuitive for Donegal. The fact that L* is always within the accented vowel militates for it being regarded as the primary tonal target of this dialect, more of a mirror image of the H* in Cois Fhairrge than a fallout of H realignment. Furthermore, the time-locking (in terms of syllables) of the L* and H in Donegal is also striking, and suggests that we are dealing with a bi-tonal target where *both* targets have crucial alignment properties, are closely linked to the syllabic tier and define the dominant “tune” of this dialect.

The rising $L^* + H$ tone of Donegal can be compared to similar rising tones in other languages for which alignment data is available. In Figure 9.17 a schematic representation of the prenuclear Donegal rising tone is superimposed on illustrations presented for comparable data of English, as well as of Northern and Southern German in Atterer and Ladd (2004).

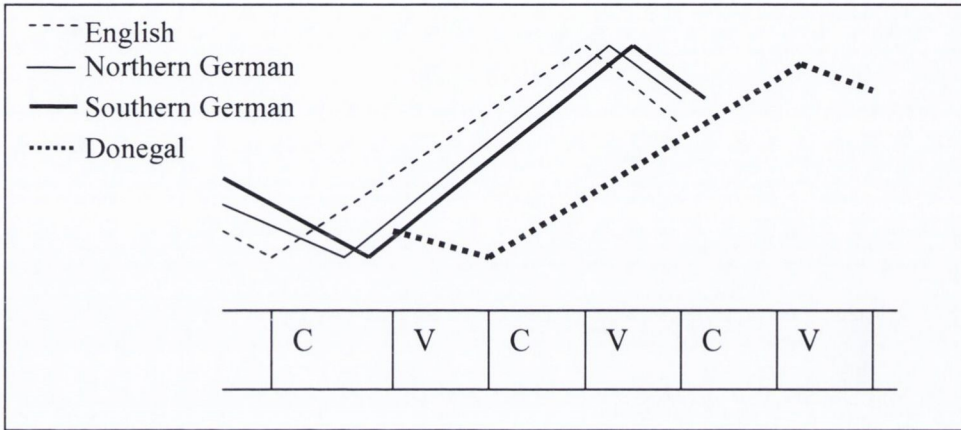


Figure 9.17. Schematic illustration of the L^*+H of Donegal illustrated in comparison to rising tones in other languages as presented in Atterer & Ladd (2004).

Whereas the data in these other languages look like the same accent with very fine time shifts differentiating among languages/dialects, the Donegal rise differs from say, the L^*+H of the German dialects in having a longer trough-to-peak interval as well as a later anchoring of the L^* in the accented syllable.

If we wish to extend our realignment hypothesis to the other dialects of Irish, one point worth noting, which militates against the hypothesis, is the fact that the other Irish dialects do not demonstrate fixed peaks across the different stress conditions. In Mayo Irish, Inis Oirr Irish and Kerry Irish there is considerable peak drift which correlates with the different stress conditions. The amount of peak drift is dependent on the dialect. Inis Oirr demonstrates peak drift in both prenuclear and nuclear conditions. Mayo shows considerable peak drift in prenuclear position and less drift in nuclear position. Kerry demonstrates peak drift in prenuclear position, but none in nuclear. So while the Donegal and Cois Fhairrge dialects are both fixed in their tonal alignment, the other dialects all demonstrate variable peak timing. Table 9.2. summarises these findings.

		Prenuclear	Nuclear
Ulster	Donegal	Fixed	Fixed
South Connaught	Cois Fhairrge	Fixed	Fixed
	Inis Oirr	Variable	Variable
North Connaught	Mayo	Variable	Variable
Munster	Kerry	Variable	Fixed

Table 9.2. *Categorisation of dialects: fixed vs. variable*

9.5 Conclusions

The alignment data presented here militate against the realignment hypothesis, and suggest that it would be impossible to derive the Donegal accents by simple time-shifting of an underlying peak. Any attempt to relate the different contours to a single underlying contour would have to invoke very complex phonetic realisation rules, and this removes the potential attraction of the hypothesis in any case. We therefore conclude that the best treatment of the Ulster vs. Connaught dialect differences is in terms of different underlying categories.

This conclusion and the data presented raise numerous new questions. One is prompted to speculate on the origins of the differences. The fact that the synchronic account cannot be simply framed in a unifying framework does not of course mean that a diachronic derivation of the differences could not invoke realignment as the major triggering of dialect differentiation. As these data show however, a diachronic realignment account will need to be very complex to account for the kinds of differences that are illustrated here.

These data also raise questions concerning intonational variation in different accents of English. In particular there are striking similarities between our Donegal patterns and the pitch contours described by Grabe and Post (2002) for Belfast English in both declaratives and interrogatives. Note that the pitch contours for Belfast English differed dramatically from those of the other English dialects reported in the IViE project (Grabe and Post, 2002). For instance, in declaratives the predominant nuclear contour in the varieties of Cambridge, Leeds, Newcastle and London was a falling contour. Rising nuclei in declaratives have been described by Knowles (1975) for Liverpool English and feature also in Glaswegian,

Birmingham and Newcastle (but see Grabe and Post, 2002 on the latter). As mentioned earlier the question of these rising nuclei reflecting an influence of Irish has been discussed by Cruttenden (1997) and by Knowles (1975).

Our opinion at this juncture is that the similarities in tonal patterns of Donegal (Ulster Irish) and Belfast (Ulster English) are very pervasive and hardly a coincidence. Whatever one might argue about the above-mentioned British dialects, it seems reasonable to hypothesise that the rise-plateau nuclear contour of Ulster English could be a direct influence from Ulster Irish. If so, this could be seen as supporting a view within historical linguistics that in such language contact situations, the syntax comes from the conqueror and the phonology from the conquered.

It is interesting to note here how very different the southern Irish dialects are to the Ulster dialects, and how superficially similar the declarative patterns are to those of the mainstream British accents. Yet they differ from the latter in not having rising nuclei in yes/no questions, and interestingly, this is a feature Grabe and Post (2002) mention for Dublin English.

Past speculations concerning Irish influences on English intonation in British dialects have not hitherto been based on any knowledge of Irish intonation, but rather on certain similarities to Belfast English, and on the fact that the accents in question were towns in which Irish immigrants settled. Given how very different the northern Donegal and the southern Cois Fhairrge patterns are, it is obvious that we will only really come to grips with this question when we (a) have a fuller understanding of the intonation contours of the main Irish dialects and (b) we tie this in with information about the known settlement patterns of immigrants and migrants from these areas.

With this in mind, this study sets the agenda for some future directions. For instance, it would be interesting to look at intonation in the dialects of Hiberno-English, as these may also be important to understanding the operation of possible cross-language influences.

Chapter 10

Summary and Conclusions

10.1 Introduction

This principal aim of this study has been to describe the intonation of the major dialects of Irish. The dialects examined include the Donegal dialect of Gaoth Dobhair, the Connaught dialects of Cois Fhairrge, Inis Oírr and Mayo, and the Munster dialect of Baile an Fheirtéaraigh in West Kerry.

There have been two primary aims. The first of these has been to provide a cross-dialect account of the tonal inventory of the major dialects of Irish, within the Autosegmental-Metrical (AM) framework of intonational analysis. This has been achieved by identifying phonologically significant pitch patterns, across three grammatically different sentence types. The three sentence types analysed are declaratives, wh-questions and yes/no-questions.

The second aim of the study has been to provide a more detailed description of how features of the major tonal categories of the Irish dialects are timed, in relation to the segmental string. The purpose here has been to capture some of the finer phonetic differences in pitch accent realisation across each of the dialects, thereby focussing on differences among otherwise structurally similar dialects.

10.2 Main Findings

The first step in the analysis was to establish a preliminary tonal inventory of the pitch accents of each dialect. This was carried out through the analysis of read speech on a corpus of 55 context-free read sentences, named Corpus A. These sentences were divided into 30 declarative sentences, 15 wh-questions and 10 yes-no questions. The sentences were labelled using the IViE labelling system (Grabe, Nolan and Farrar, 1998; Grabe, Post and Nolan, 2001), an adaptation of the ToBI system (Silverman et al., 1992; Beckman and Ayers-Elam, 1997).

Following Gussenhoven (1984) and Grabe (1998), one level of phrasing, the intonational phrase, was assumed in the analysis. The inventory of pitch accents in each dialect allowed for both bitonal and monotonal accents. All bitonal pitch accents in each dialect were left-headed. Where there were monotonal accents, these were generally considered as modifications of underlying bitonal accents,

following Gussenhoven's (1984) tone linking rules. The monotonal labels H* and L* were used where the trailing tones of H*+L and L*+H accents were deleted through complete linking. This method raised some questions about the issue of labelling what are essentially phonetic realisations of underlying phonological tones at the level of the tonal inventory. It was argued that the monotonal labels were employed to make the transcription more transparent, and that the only surface realisational differences permitted in the tonal inventory were those accents which were monotonal as a result complete linking.

The second half of the analysis was concerned with peak timing. Corpus B was designed to facilitate the measurement of tonal alignment across the different dialects. The test sentences in Corpus B were designed to elicit prenuclear and nuclear accented syllables, in a variety of conditioning environments, where the peak location might be expected to vary.

The principal findings of the thesis are outlined below. In the first section the tonal inventories of each dialect are compared. This is followed by a summary of the findings on the peak timing analyses.

10.2.1 Tonal Inventories

Pitch accents

The findings indicate a strong North-South divide in terms of the intonation systems of the four dialects studied. This is demonstrated in Figure 10.1. Donegal Irish has a unique intonation system, when compared to the other Irish dialects. The main factor which distinguishes Donegal intonation from the intonation of the other Irish dialects is its primary underlying pitch accent. In Donegal Irish the predominant accent found across each of the sentence types is a rising accent, labelled L*+H. A typical contour in Donegal Irish, therefore, is made up of a sequence prenuclear rising accents, followed by the same rising accent in nuclear position. There are few falling accents produced by Donegal Irish speakers. In all just 3% of accents found in this study are falling. The analysis indicates that there is some evidence for *complete linking* in this dialect and this gives rise to phonetic variants of the bitonal accents. These are labelled as H* and L* accents. In the corpus it was found that 10% of accents are produced as high accents, and 11% of accents are produced as low accents.

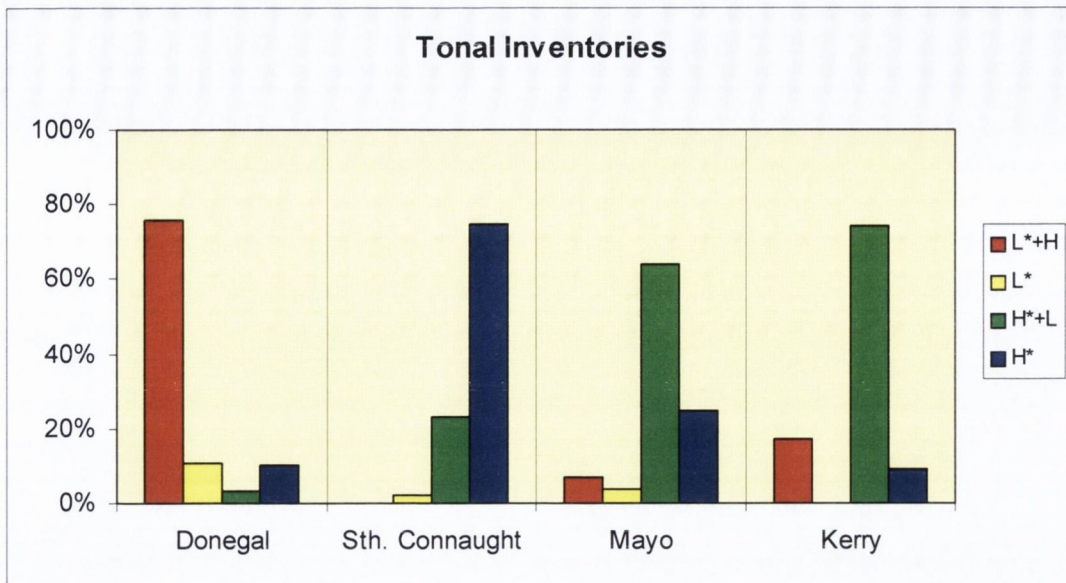


Figure 10.1. *A comparison of the tonal inventories of the four major dialects of Donegal, South Connaught, Mayo and Kerry.*

The remaining dialects of South Connaught, Mayo and Kerry Irish demonstrate more similar tonal structures, particularly in respect of the nuclear contour. In prenuclear position Mayo and Kerry contours are superficially more similar.

In Mayo and Kerry Irish the predominant accent employed by speakers in both prenuclear and nuclear position is a falling accent, labelled H^*+L . In Mayo Irish this accent accounts for 64% of accents in the corpus, while in Kerry Irish 74% of pitch accents are falling. 100% of nuclear accents in Kerry are falling. Mayo speakers also employ rising (L^*+H) accents and the monotonal variants of both underlying bitonal accents, labelled as H^* and L^* . The L^*+H and L^* accents are the least common accents found in the dialect of Mayo. Speakers of Kerry Irish on the other hand do not employ low accents, but rising accents are common in prenuclear position in this dialect. Some high accents were found in Kerry Irish and again are treated as underlying H^*+L accents which have undergone complete linking.

The findings for the South Connaught dialects (Cois Fhairrge and Inis Oírr) indicate that most common pitch accent in South Connaught is a high accent, labelled H^* . High accents account for 75% of accents found in Corpus A for South Connaught Irish, while falling accents make up 23% of accents in South Connaught Irish. In nuclear position, only falling accents are found.

While phonetically the dialects of South Connaught differ from the dialects of Mayo and Kerry, the underlying phonological structure of these three dialects is essentially the same. In intonation it is not always easy to determine whether different pitch accents are systemically different, or merely different at a realisational level¹. A fairly clear example of a systemic difference between varieties of Irish is the rising accents of Donegal Irish vs. the falling accents in the more southerly dialects. The similarities between the three Southern dialects, at the phonological level at least, are more apparent in the tonal inventory of nuclear accents. The dialects of South Connaught, Mayo and Kerry each have a strong propensity towards employing a falling accent in this position. There is slightly more variation in the prenuclear contour where a range of accents may be employed, particularly by speakers of Kerry Irish who often employ a rising accent in this position. Comparisons of the prenuclear and nuclear inventories are illustrated in Figures 10.2 and 10.3, respectively.

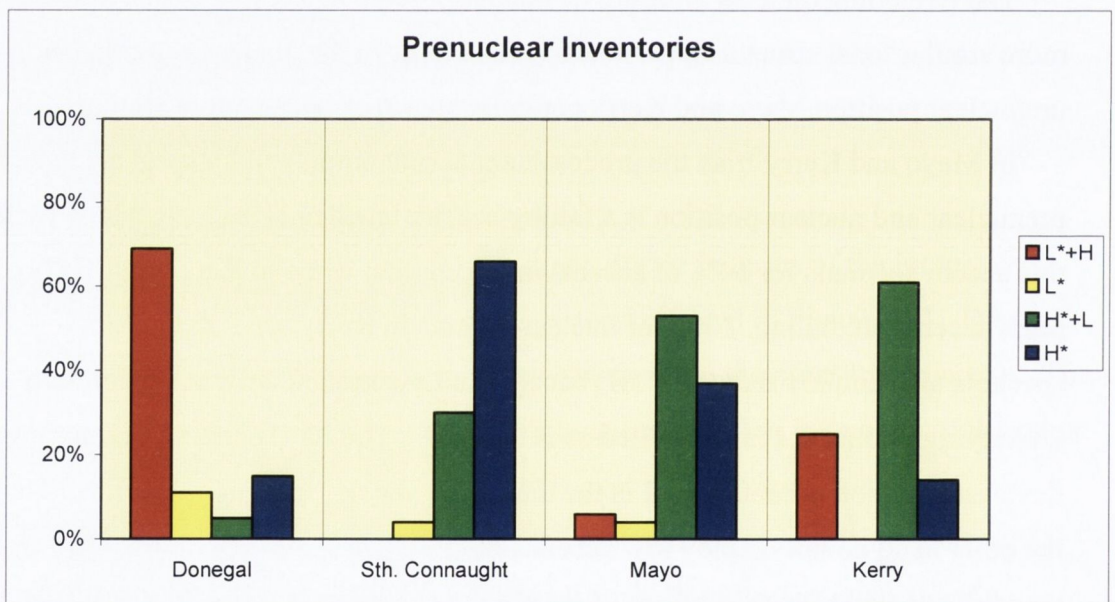


Figure 10.2. *A comparison of the prenuclear tonal inventories of the four major dialects of Donegal, South Connaught, Mayo and Kerry.*

¹ Ladd (1996: 119) describes systemic differences as differences in the inventory of phonologically distinct tune-types, irrespective of semantic differences, and realisational differences as differences of detail in the phonetic realisation of what may be regarded phonologically as the same tune

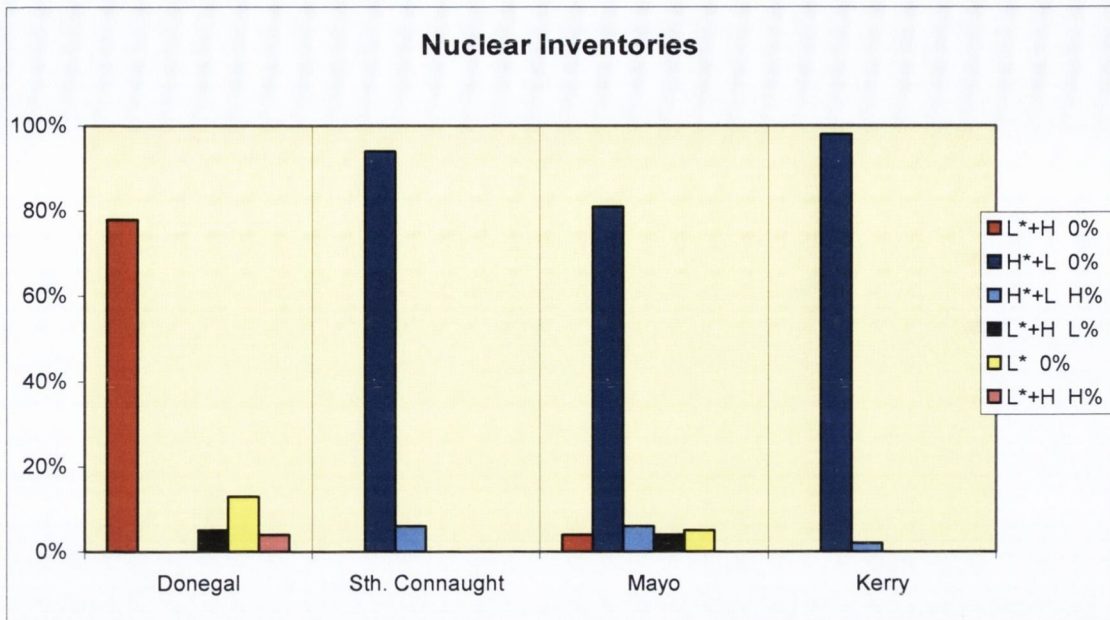


Figure 10.3. *A comparison of the nuclear tonal inventories of the four major dialects of Donegal, South Connaught, Mayo and Kerry.*

Boundary tones

Each of the four dialects demonstrate differences in terms of their use of both initial and final boundary tones. The occurrence of initial high boundary tones is demonstrated in Figure 10.4. These initial boundary tones (%H) are common in Donegal Irish and account for 23% of initial boundary tones found in the analysis of Corpus A. The remaining initial boundary tones are unspecified, and therefore unlabelled. In the majority of utterances in Donegal Irish (91%) there was no need for a boundary tone specification in phrase-final position. 4% of utterances require a high boundary tone in phrase-final position, labelled H%, and 5% of utterances require a low boundary tone, labelled L%. The latter results in a rise-fall contour when preceded by a rising nuclear accent.

Initial high boundary tones were not found in South Connaught Irish and in 94% of nuclear contours the final boundary tone remains unspecified. In the remaining 6% of utterances a high boundary tone is found, giving rise to a fall-rise contour. This high boundary tone is labelled H%.

Initial high boundary tones were only found in wh-questions in Mayo Irish. In nuclear position there were three boundary tone specifications in this dialect, giving rise to 5 nuclear contours: fall; rise; fall-rise; rise-fall; low level. This suggests that Mayo Irish has the richest nuclear contour inventory of the dialects studied here,

although the falling contour is clearly the dominant one. Kerry Irish on the other hand demonstrated a lack of variation in terms of its nuclear contour inventory. This is similar to South Connaught, however initial high boundary tones (%H) are common in Kerry Irish and account for 20% of initial boundary tones found in Corpus A. The remaining initial boundary tones are unspecified.

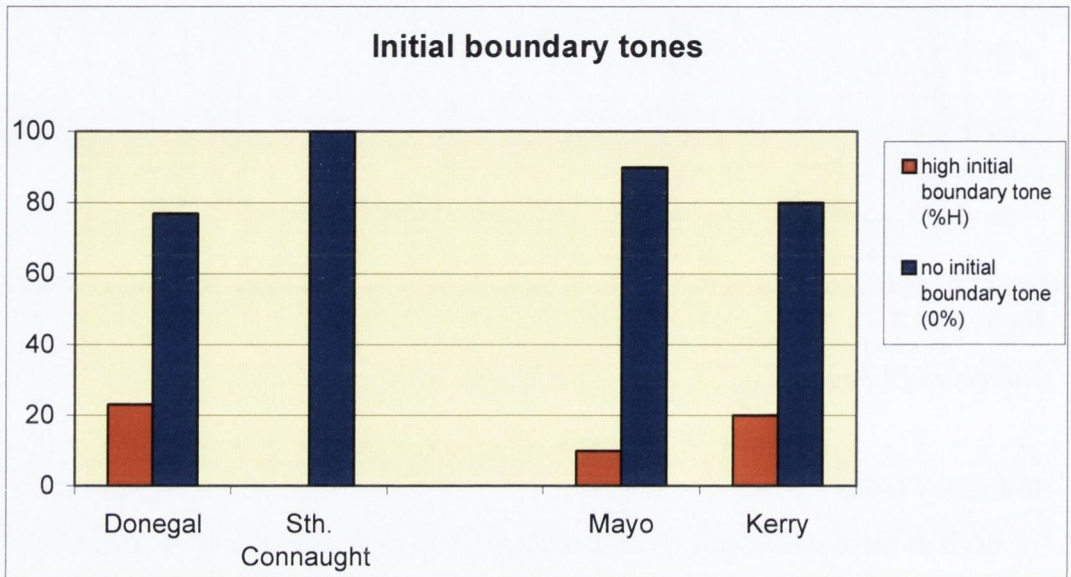


Figure 10.4. Occurrence of initial high boundary tones across the dialects

10.2.2 Peak timing

In addition to describing a tonal inventory of Irish dialects, one of the principal aims of this study has been to describe how the major tonal categories of the Irish dialects are timed, in relation to the segmental or syllabic string. We tested two hypotheses. With the first of these, the *variable peak hypothesis*, the expectation was that increasing the number of syllables following the nuclear accent in each dialect would yield a *rightwards* drift in the peak timing, while increasing the size of the anacrusis would yield a *leftwards* peak shift. This was tested by designing a set of sentences where we elicited prenuclear and nuclear accented syllables in a variety of conditioning environments, whereby the peak location might be expected to vary, under the aforementioned conditions

The findings of this *variable peak hypothesis* indicate that the dialects of Donegal and Cois Fhairrge (one of the South Connaught dialects) demonstrate very fixed peaks in terms of tonal alignment with the segmental/syllabic string, while the

other Irish dialects demonstrate more variable peaks. Mayo Irish, Inis Oírr Irish and Kerry Irish showed varying degrees of peak drift across the different prenuclear and nuclear conditions, depending on the dialect. Inis Oírr (South Connaught) demonstrated peak drift in both prenuclear and nuclear conditions. Mayo showed considerable peak drift in prenuclear position, but much less so in nuclear position. Kerry demonstrated peak drift in prenuclear position, but none in nuclear. In terms of the *variable peak hypothesis* we conclude that some dialects are *fixed* while others are *variable*.

The preceding chapter summarised the principal findings of the peak timing analyses and tested a further hypothesis, the *realignment hypothesis*. With this hypothesis we proposed that accent differences in two very different dialects might be treatable in terms of a possible realignment of the melodic and segmental tiers. Following a careful analysis of the peak timing differences in Donegal Irish and Cois Fhairrge Irish, we concluded that the alignment data presented militates against this hypothesis. The findings show that any attempt to relate the different contours of the two dialects to a single underlying contour would have to invoke very complex phonetic realisation rules. We concluded that the best treatment of the dialect differences is in terms of different underlying categories.

10.3 Conclusions and future work

On the basis of the analyses carried out here a phonological model of the tonal inventory of the Irish dialects has been proposed. As pointed out in the first chapter, little work has been carried out on Irish intonation to date and so this work on Irish is merely a starting point for further research in this field. The present results are based solely on analysis of read speech. In the future, spontaneous speech and perception studies could be used to verify the categories observed in the present study. Furthermore wider coverage of the dialects is required. For instance it would be of interest in the future to expand the work to incorporate analyses of other dialects such as Muscraí, Tuar Mhic Éadaigh and Gleann Cholm Cille.

Additionally, there is a need to look at other aspects of Irish intonation. These include observing tonal categories that might be found in affective speech and in sentences containing narrow focus. There was a suggestion that downstep occurs in certain dialects of Irish, but this would need to be studied in much greater detail. A complete study on how downtrends function in Irish could be considered.

The examination of peak alignment in this study has merely touched the surface of a growing area of research in intonation. This could be expanded to cover other factors such as prosodic context (focus, pitch range), utterance type, speaking rate, etc.

Furthermore, there is a need to include some coverage of matched dialects of Hiberno-English, as these may also be important to understanding the operation of possible cross-language influences. Sullivan (2006) has carried out a first account of tonal alignment in some varieties of Hiberno-English, namely Malahide, Belfast and Wexford. It would be interesting to extend such a study to cover the intonation of Mayo English, Galway English and Kerry English, as such analyses would provide interesting comparisons with the Irish data studied here.

Finally, an area of future interest will be that of adapting this model of Irish intonation so that it can be implemented in synthesis. Providing an account of Irish that will enable such an application of results is particularly relevant to current research being carried out in this area (see Ní Chasaide et al., 2006; Ní Chasaide et al., 2004; Prys et al., 2004).

To conclude, it is hoped that this study on Irish intonation will be seen as a useful starting point for any future work carried out on Irish intonation. Furthermore, it is hoped that it contributes in some way to our existing knowledge of Irish linguistics and to research on intonational typology.

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