# Head-dependent asymmetries in Munster Irish prosody

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**Abstract**

In this paper I propose an analysis of stress in Munster Irish which builds on two important premises. First, I argue for a distinction between the notion 'head of a constituent' and the notion of 'stress': these are separate entities, and the typologically frequent isomorphic distribution of the two is just one possible outcome of the phonological computation. Second, I propose to employ a particular family of constraints requiring head-dependent asymmetries (Dresher and van der Hulst 1998) to account for the mismatch between the placement of foot heads and stress in Munster Irish. Overall, the paper is an argument for elaborate abstract structure as an explanatory factor in phonology, as opposed to relatively shallow, substance-based representations.

## 1. Munster Irish stress: the problem

In this paper I propose a new approach to the problem of stress placement in Munster Irish. It has long been known that the stress system in Munster (the region covering the southern and south-western parts of the island of Ireland) is different from the quantity-insensitive left-aligned stress of other varieties of Irish. Apart from being quantity-sensitive, Munster Irish stress presents an unusual directionality effect where the generally true left alignment of stress is disrupted if the word starts with two heavy syllables (an effect known as 'forward stress', or *beimaistriú*; see Ó Sé 1989).

This system is analysed in the present paper as arising from the competing requirements of the alignment of foot heads and stress and the relative complexity of heads and dependents within feet, following on from work by Dresher and van der Hulst (1998). I argue that repairing violations of constraints on head complexity requires a particular modification of the internal structure of syllables with long vowels, which I call *weight-sacrificing recursion*. This modification leads to these long-vowel syllables being treated as phonologically light, which correctly predicts that they should fail to attract stress. This approach allows us to account for the special behaviour of #HH sequences without recourse to non-local constraints (Buckley 2009). More generally, it also demonstrates the value of a more elaborate representational approach which does not conflate head status and stress.

The paper is organised as follows. In the remainder of this section I describe the stress system of one dialect of Munster Irish. In §2 I present an account of the pattern in terms of Optimality Theory. In §3 I compare the present approach to some previous analyses of the pattern and argue for its superiority. The conclusion is found in §4.

### 1.1. Sources of the data

This paper is concerned with the dialect of Corca Dhuibhne (sometimes anglicized as Corkaguiney), or Dingle peninsula in County Kerry (south-west Ireland). The dialect of Corca Dhuibhne belongs to the southern group of Irish dialects, collectively known as Munster Irish. It is this dialect, rather than 'Munster Irish' as a whole, that will be the subject of this study. This restriction reduces the possibility of heterogeneous data being used as if belonging to one variety. This particular dialect also possesses a number of printed descriptions of various provenance, which can corroborate each other and ensure consistency.

The principal source of information is the monograph by Ó Sé (2000), as well as the later Ó Sé (2008). There exist several vocabulary sources for this dialect, of which Ó hÓgain (1984) and Ó Luineacháin (1995)[1] provide data on stress. An older description of the Corca Dhuibhne dialect is Sjoestedt-Jonval

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[1] I have not been able to consult this publication; see Ó Sé (2008) for a short discussion of the stress data it provides.

(1931). Texts in the dialect collected in the 1930s can be found in Wagner and Mac Congáil (1983). Among the more general descriptive sources dealing with Munster Irish stress the following must be mentioned: Loth (1913), van Hamel (1926), O'Rahilly (1936), Blankenhorn (1981), Ó Sé (1989), Ó Sé (2008), Hickey (2011).

The transcriptions in this paper follow the sources, with two exceptions. I use the explicit stress mark even where stress falls on the initial syllable, contrary to the normal practice of the sources, and I use the IPA symbol [ʲ] to denote palatalization, instead of the apostrophe or 'Celtic palatalization mark'. I do not amend the phonetic symbols, even if this means using an idealized transcription (e. g. Ó Sé 2000 notes that short mid vowels, which he writes [e o], are normally pronounced as low mid [ɛ ɔ]).

### 1.2. *Stress placement*

The most concise description of the basic stress pattern of Munster Irish is given by Ó Sé (2000). I quote this in the author's own translation (Ó Sé 2008:p. 96):

> Word stress falls on the second syllable if it is heavy, on the third syllable if it is heavy and the preceding syllables are light, and on the first syllable in all other cases.

Coda consonants in Corca Dhuibhne Irish are nonmoraic, as the example in (1) shows: stress falls on the initial syllable despite the second syllable being closed, and this cannot be due to extrametricality.[2]

(1)     *glioscarnaigh*     [ˈɡlʲiskərnɪɡʲ]     'glistening'

In its simplest form the stress pattern of Corca Dhuibhne Irish can be summarized in three principles of varying generality:

- Stress falls no further away from the left edge than the third syllable;

- Stress falls on the leftmost stressable syllable;

- Stress is attracted to heavy syllables;

- A heavy initial is not stressed if immediately followed by another heavy syllable.

The following examples are all taken from Ó Sé (2000) and Ó hÓgain (1984). There are fewer examples of four-syllable patterns because such words are rare in the language.[3]

| (2) | ĹL | *carraig* | [ˈkarɪɡʲ] | 'rock, boulder' |
|-----|------|-------------|-------------------|------------------|
| (3) | ĹLL | *clagarnach* | [ˈklagərnəx] | 'clattering' |
| (4) | ĹLLL | *armacach* | [ˈarəməkəx] | 'tender' |
| (5) | ĹLLH | *imleacán* | [ˈimʲɪlʲəkɑːn] | 'navel' |
| (6) | ĤL | *álainn* | [ˈɑːlɪnʲ] | 'nice' |
| (7) | ĤLL | *cúramach* | [ˈkuːrəməx] | 'careful' |
| (8) | ĤLH | *údarás* | [ˈuːdərɑːs] | 'authority' |
| (9) | ĤLHL | *údaráiseach* | [ˈuːdərɑːʃəx] | 'authoritative' |

[2]Hickey (2011:p. 311) provides some remarks on the rôle of codas in stress assignment, but admits that the material is too sparse for any definite conclusions.

[3]Several words here contain the epenthetic vowel [ə]/[ɪ] (Carnie 1994, Green 1997, Ní Chiosáin 1999). Constraints of space prevent full discussion, but the epenthetic vowel — at least in these examples — does not differ from underlying vowels for the purposes of stress assignment.

| (10) | ĤLHH | *amparánaíocht* | [ˈoumpərɑːniːxt] | 'ungainliness' |
|---|---|---|---|---|
| (11) | LĤ | *cailín* | [kaˈlʲiːnʲ] | 'girl' |
| (12) | LĤL | *coiméadann* | [kʲɪˈmʲɑːdən] | '(s)he observes' |
| (13) | LĤH | *bithiúntaíocht* | [bʲɪˈhuːntiːxt] | 'villainy' |
| (14) | LLĤ | *ceannaitheoir* | [kʲanəˈhoːrʲ] | 'buyer' |
| (15) | LLĤH | *amadántaíocht* | [əməˈdɑːntiːxt] | 'foolishness' |
| (16) | HĤ | *díomhaoin* | [dʲiːˈviːnʲ] | 'idle' |
| (17) | HĤL | *óganach* | [oːˈgɑːnəx] | 'young man' |
| (18) | HĤH | *amhránaí* | [uːˈrɑːniː] | 'songs' |

These examples present the regular pattern of stress in Munster Irish. Crucially, these generalizations are live rules: stress placement is not consistent throughout paradigms, meaning that stress is not simply stored with lexical items. In particular, the attraction of stress to peninital heavy syllables can be illustrated as follows:

| (19) | a. | (i) | *dúthaigh* | [ˈduːhɪgʲ] | 'region' |
|---|---|---|---|---|---|
| | | (ii) | *dúthaí* | [duːˈhiː] | 'regions' |
| | b. | (i) | *gainimh* | [ˈganʲɪvʲ] | 'sand' |
| | | (ii) | *gainimhe* | [gaˈnʲiː] | 'sand (gen. sg.)' |

In the following subsection I briefly consider exceptions to the general stress rules.[4]

### 1.2.1. *'Exceptional weight'*

There seems to be one important exception to the generalization that consonants do not contribute to weight. The sequence [ax] counts as a heavy syllable if the vowel forms the nucleus of a second syllable, even if these two segments may not otherwise be expected to be syllabified together:

| (20) | Láx | *bacach* | [bəˈkax] | 'beggar' |
|---|---|---|---|---|
| (21) | LáxL | *bacacha* | [bəˈkaxə] | 'beggars' |
| (22) | LáxL | *casachtach* | [kəˈsaxtəx] | 'coughing' |

However, this is not true in the case of the third syllable in a LLax sequence, or if there are genuine heavy syllables within the stress window. The following examples demonstrate this using the suffixes /–ax/ and /–axt/, which are realised with a schwa in unstressed position.

| (23) | ĹLax | *feargach* | [ˈfʲarəgəx] | 'angry' |
|---|---|---|---|---|
| (24) | Ĥax | *ciúineacht* | [ˈkʲuːnʲəxt] | 'quietness' |

For reasons of space and focus, I do not pursue the matter of these particular exceptions in much detail. The important synchronic generalization is that in all words with a stressed short [a] in the second syllable the first syllable *always* contains the 'reduced' vowels [ə]/[ɪ] (Ó Sé 2000:§30). The reduced vowels are never

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[4]In default of actual phonetic data, I take traditional descriptions such as those of O'Rahilly (1936), Ó Sé (2000), Ó Sé (2008) at face value. It might be conceivable that 'forward stress' is an epiphenomenal effect of the timing of high tone associated with the stressed initial syllable, similar to that found in Welsh (Williams 1985; 1999, Ball and Williams 2001) and Welsh English (Walters 2003), where non-native speakers tend to perceive the post-tonic syllable as more prominent because of extensive pitch movement (see Myers 2000 for discussion of phonetics vs. phonology in $F_0$ peak alignment). A somewhat similar proposal is made for Munster Irish by Blankenhorn (1981), but see counterarguments by Ó Sé (2008). Unfortunately the phonetic study of Irish stress by Dalton and Ní Chasaide (2005) did not include data from any Munster dialects. The matter is definitely in need of further investigation.

stressed in the dialect, so once this is accounted for, no further comment is necessary: the relevant words stress the leftmost stressable light syllable, in line with the regular pattern; however, see §1.2.4 below for more discussion.

Within this approach, we might still need to account for the distribution of the [ə] vowel. Historically, it is due to pretonic vowel reduction which was contingent on the height of the vowel in the peninitial stressed syllable (Ó Sé 1984; 1989, Hickey 2011), but a synchronic account must remain for the future.

### 1.2.2. *Exceptional stress*

Not all words in Munster Irish follow the rules laid out above. Ó Sé (2000:p. 48) notes the following exceptional types of stress assignment:

1. Adverbs with initial [ə], such as [əˈmax] 'outside', [əˈnuxt] 'tonight', [ənˈso] 'here', [əˈnuːəs] and several others;

2. Inflected forms of prepositions with variable stress: [ˈharəm] 'above me', but [haˈrumsə] 'above myself', [ˈorhə]∼[orˈhu] 'on them';

3. Items with exceptional initial stress despite the presence of heavy syllables inside the three-syllable window;

4. Items with exceptional non-initial stress on certain suffixes despite the presence of better-aligned heavy syllables;

5. Items with exceptional initial stress despite the second syllable being heavy, if the second syllable contains certain morphemes;

6. Items with second-syllable stress if that syllable contains [a] followed by a consonant other than [x];

The first two types include lexical items which have non-initial stress in the majority of Irish dialects, even those with fixed initial stress. (For example, many of the same words are found with non-initial stress in the dialect of Iorras Aithneach, belonging to the Connacht dialect group and normally exhibiting initial stress; Ó Curnáin 2007.) At least the first of these has a clear phonological motivation: ordinary initial stress would require stressing [ə], which, as we saw in §1.2.1, is avoided.

Examples of exceptional initial stress (type 3) often contain the vowel [iː] in the final syllable, as in (25). This situation is quite frequent, since an /–iː/ suffix is used to form the plural in a subset of nouns, as in (26). (However, there are also numerous examples of this suffix showing regular behaviour.)

(25)  *peaindí*      [ˈpʲandiː]       'pandy'

(26)  *geansaí*      [ˈɡʲansiː]       'pullovers'

However, unexpected initial stress is possible with other types of words:

(27)  *aturnae*      [ˈatuːrneː]      'attorney'

(28)  *Airseoir*     [ˈɑːrʃoːrʲ]      'adversary, Devil'

(29)  *buíocán*      [ˈbiːkɑːn]       'yolk'

(30)  *lamhnán*      [ˈlounɑːn]       'bladder'

(31)  *poiní*        [ˈpoːniː]        'pony'

Some of these exceptions can be explained historically: thus, the word for 'Devil' is historically quadrisyllabic, with the long vowel out of the stress window. This is confirmed by the obsolete spelling *Airbhiseoir*, which indicates the pronunciation [ˈarʲɪvʲɪʃoːrʲ].

Other examples of type (3) are less easily explained. One might question the relevance of borrowed forms such as *aturnae* and *poiní*. However, the fact that in *aturnae* stress fails to follow the English pattern and that the second vowel in *poiní* is long possibly indicates that many of these words are by now part of the native vocabulary.

Some examples of suffixes attracting stress despite the presence of preceding heavy syllables (type 4) include the 'theme vowels' [iː] and [oː] in certain conjugation types (Ó Sé 2000:§57).

(32)   *comhraicíonn*      [kuːrʲɪˈkiːn]        '(s)he fights'

(33)   *a gcomhraiceofá?*   [ə guːrʲɪˈkʲoːfɑː]   'will you fight?'

In type (5), certain suffixes avoid being stressed even if they are in a position when stress would normally fall on them. In all these cases stress always falls on the initial syllable:

(34)   *táimid*      [ˈtɑːmʲiːdʲ]       'we are'

(35)   *cuirimid*    [ˈkirʲɪmʲiːdʲ]     'we put (now)'

Finally, in type (6) a peninitial syllable containing short [a] seems to be counted as heavy if the vowel is followed by a consonant other than [x]:

(36)   *iomard*    [əˈmard]       'illness'

(37)   *réasac*    [rʲeːˈsak]     'undertow'

### 1.2.3.   Secondary stress

Secondary stress is not treated in any detail in the existing generative literature devoted to Munster Irish stress: it is briefly discussed by Doherty (1991), and Green (1997) abstracts away from it for lack of data. Luckily, Ó Sé (2000) describes it in some detail. He quotes the following patterns of secondary stress.

'Often' the first syllable receives secondary stress when the third syllable is stressed (which can only be the case if the first two syllables are light):

(38)   ˌLLĤ      *ceannaitheoir*   [ˌkʲanəˈhoːrʲ]   'buyer'

'Sometimes' there is secondary stress on a third heavy syllable if the first syllable is stressed:

(39)   ĤLH̀      *údarás*   [ˈuːdə(ˌ)rɑːs]   'authority'

This happens regularly if there is another syllable in the word:

(40)   ĤLH̀L     *údaráiseach*   [ˈuːdəˌrɑːʃəx]    'authoritative'

(41)   ĤLH̀H     *útamálaí*      [ˈuːtəˌmɑːliː]    'bungler'

The fourth syllable 'often' receives secondary stress if it is heavy and the first syllable carries main stress:

(42)   ĹLLH̀     *formadúil*   [ˈforəməˌduːlʲ]   'envious'

### 1.2.4.   Postlexical stress

Ó Sé (1989; 2000) also notes stress phenomena in phrasal contexts, paying special attention to stress demotion. It is found, among other contexts, when words with non-initial stress are not final in a phrase. In this case stress is demoted and removed to the first syllable, even if the next word is not stressed on the first syllable:[5]

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[5]Hickey (2011) describes the retraction in terms of clash resolution, but the example in (44) clearly shows that this is insufficient.

(43)   a.   *cailín óg*      [ˌkalʲiːnʲ ˈoːɡ]      'young girl'
       b.   *cailín*         [kaˈlʲiːnʲ]           'girl'

(44)   a.   *Contae Chiarraí*   [ˌkuːnteː xʲiːəˈriː]   'County Kerry'
       b.   *contae*            [kuːnˈteː]             'county'

Ó Sé (2000:§63) notes a 'clear resemblance' between the stress patterns of LLH words such as (38) and phrases such as (43a). However, stress does not shift to an initial syllable with a reduced vowel ([ə] or [ɪ]), though it still becomes secondary:

(45)   a.   *ceapóg sráide*   [kəˈpoːɡ ˈsrɑːdʲɪ]   'plant sp. *Rumex obtusifolius*'
       b.   *[ˌkəpoːɡ ˈsrɑːdʲɪ]

This is a clear parallel to the impossibility of stressing a reduced vowel discussed above in §1.2.1. However, Ó Sé (2000) also notes some examples where the [ə] in the first syllable can alternate with another vowel (mostly [u], sometimes [o]), while [ɪ] alternates with [i]. In both cases, stress shift pre-empts what is presumably reduction to schwa.

(46)   a.   (i)    *corcán*        [kərˈkɑːn]          'pot'
              (ii)   *corcán mór*    [ˌkorkɑːn ˈmuːər]   'a big pot'
       b.   (i)    *buidéal*       [bɪˈdʲeːl]          'bottle'
              (ii)   *buidéal mór*   [ˌbidʲeːl ˈmuːər]   'big bottle'

As discussed by Bennett (2012), this could indicate that stress placement actually precedes the appearance of the 'reduced' vowels [ə] and [ɪ] in the surface representation. However, the status of the variation is uncertain. In particular, the status of the variation between [u] and [o] deserves further study, specifically reference to the importance of the strong formant transitions associated with secondary articulations in Irish consonants (cf. Padgett 2001, Ní Chiosáin and Padgett 2012). In addition, it is not obvious that the difference between [ə] and [ɪ] on the one hand and [o u] and [i] on the other hand is one of phonological representation, rather than pure duration (cf. Barnes 2006; 2007 for Russian). Given all these uncertainties, I will leave a precise analysis for future work. What remains clear is that in surface forms the vowels written as [ə] and [ɪ] never bear stress, whether main or secondary.

In the following section I provide an analysis of the facts.

## 2.   Analysis

In this section I present an analysis of the stress pattern of Corca Dhuibhne Irish in terms of Optimality Theory. I propose that the prosodic hierarchy need not be enriched by an arbitrary additional level; rather, the pattern can be accounted for once we admit prosodic recursion into Gen and provide more explicit mechanisms for the computation of constraint violations. I also follow authors such as van de Weijer (1996), Dresher and van der Hulst (1998), Mellander (2003), Smith (2004), Rice (2007), Teeple (2009), Bennett (2012) in encoding complexity requirements in Con.

Specifically, I propose that the stress pattern of Corca Dhuibhne Irish is due to the impossibility of simultaneously satisfying the requirements of left alignment of heads and complexity asymmetries. The proposed account unifies the 'forward stress' with ternarity, but it is also relatively restrictive in that it does not introduce new levels of the prosodic hierarchy.

The gist of the analysis is as follows. Generally, the language stresses the leftmost stressable syllable within a three-syllable window, preferring a heavy syllable over a light one. However, two heavy syllables at the left edge of a word cannot form an optimal foot in Corca Dhuibhne Irish because the language prefers feet where the head is more complex than the dependent, ideally resulting in something like the Germanic foot of Dresher and Lahiri (1991), or the unevenly mapped foot of Rice (1992), or indeed the Irish foot of Gussmann (1997). The resolution of the conflict is achieved via weight-sacrificing recursion, whereby

the initial syllable becomes light for the purposes of phonological computation but preserves the bimoraic structure. In this situation, the leftmost stressable syllable is the peninitial one, which results in 'forward stress'. This captures Doherty's (1991) correct observation that HH... and LLH... are parsed similarly, but without the arbitrary and locality-violating ban on consecutive feet just in word-initial position.

In the next section I lay out the theoretical premises of the analysis, and then demonstrate how this approach can be applied to the relevant data.

## 2.1. Theoretical preliminaries

In this section I present the theoretical assumptions needed to derive the analysis that follows. Specifically, I argue for a logical and representational separation of foot structure and stress and then consider the nature of head-dependent asymmetries.

### 2.1.1. Headedness and stress

A common assumption in the literature is that stressed syllables are heads of some constituent (foot and/or word) (Halle and Vergnaud 1987, Hayes 1995). However, the relationship between the heads of constituents and stresses is far from straightforward. We can identify at least three types of mismatches between the distribution of constituent heads and the distribution of stresses: 'unstressed heads', 'stressed non-heads' and 'boundary mismatches'. I suggest that we can make sense of these mismatches if we recognize that being the head of a constituent such as a foot and being stressed are two logically (and representationally) independent properties. Specifically, I propose to reserve the term 'head' for prosodic nodes which are the loci of complexity asymmetries, as argued by Dresher and van der Hulst (1998), rather than as the location of metrical prominence (Halle and Vergnaud 1987).

The simplest type of mismatch is that I call 'unstressed heads': this refers to languages which are best analysed as making use of some sort of constituent structure, but where not all heads of prosodic constituents bear what is described as 'rhythmical stress'. Perhaps most famously, this is found in Cairene Arabic, which Halle and Vergnaud (1987), Hayes (1995), *inter alia*, analyse as exhibiting iterative footing despite the lack of 'secondary stresses'. Similar cases are found in Kera (Pearce 2006), where foot heads are important in processes such as tonal placement and vowel harmony even if they lack metrical prominence, and possibly in Latvian (Kariņš 1996, Buckley 2009). More broadly, this category encompasses cases treated under the category of 'headless feet' (e. g. Krämer 2009), where 'headless' really means 'having an unstressed head' (see below for more discussion).

In the derivational literature, the lack of metrical prominence on heads has traditionally been accounted for by tier conflation. Under this analysis, some positions are indeed heads at the relevant point in the derivation, so that the correct rules may apply to them, but conflation removes the metrical prominence at a later level. However, parallel incarnations of OT are unable to reproduce these opaque effects, and — short of adopting a multi-level derivation — there is arguably no way out other than a representational solution, where the association of metrical prominence with constituent heads is just one possibility allowed by the computation. For analyses in this vein, see Crowhurst and Hewitt (1995), Crowhurst (1996).[6]

I do not have much to say here about 'boundary mismatches': these are cases where the boundaries of constituents established on the basis of processes such as vowel harmony domains, size-based allomorphy

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[6]A reviewer notes that the position of derivational approaches to OT remains ambiguous in this respect. In this paper I subscribe to a fully parallel version of OT. This is done partly for the sake of the argument: the proposed solution might or might not work in derivational approaches based on local unfaithful mappings such as OT-CC (McCarthy 2007), and I leave this comparison for future research. As for stratal approaches (Kiparsky 2000, Bermúdez-Otero 2012), at this stage I am not aware of compelling examples of morphology–phonology interactions in Munster Irish prosody that would motivate a specifically stratal account (for one exception that easily submits to a parallel analysis, see below §2.3): it is possible that the analysis proposed here is simply the analysis of the word-level phonology of Munster Irish. (See also below footnote 13.)

or minimality restrictions do not match those needed to derive the placement of stresses; for more discussion of these, see Downing (2006), Vaysman (2008) and cf. also Hyde (2001).

The most interesting case is that of 'stressed non-heads', where some diagnostics clearly identify some constituents that do not bear surface stress as the loci of complexity asymmetries that are characteristic of the contrast between heads and non-heads. For instance, Kashaya (Buckley 2009) shows iambic lengthening (readily explainable as a branching asymmetry requiring that heads have more branches than dependents) despite the lack of 'secondary stress' (the lack of lengthening in word-final position is irrelevant here):

(47)　　ʔah(qoˈlaː)(maˈdaː)(daˈdu)　　　　'to get longer and longer'

Cases such as these shown that pronouncing feet without secondary stress to be 'headless' requires caution, since they might in fact show some head-like properties. By way of a final example, consider the case of Roman Italian (Garvin 1989, Krämer 2009). This variety of Italian combines an active process of stress retraction, driven by a dispreference for clash, with *raddoppiamento fonosintattico*, a process whereby consonants following word-final stressed vowels are geminated. In contexts where both processes are applicable, stress retraction counterbleeds *raddoppiamento*, creating an opaque interaction:

(48)　　a.　*sarà*　　　　　[saˈra]　　　　　　'will be'
　　　　b.　*sarà grande*　　[ˈsa(ra g)ˈgrande]　'will be big'
　　　　c.　　　　　　　　　*[saˈra g)ˈgrande]

As analysed by Krämer (2009), the foot shown in (48b) is 'headless' (since it bears no stress), and is only found in the surface representation because of an output-output correspondence constraint which demands its preservation to ensure the correspondence with the form in (48a). The *raddoppiamento* is an effect of a general FOOT BINARITY constraint and has nothing to do with head status.

I would suggest that a simpler analysis is possible if we take the augmentation in the second syllable of [saˈra] at face value, as a genuine marker of that syllable's status as a head (Smith 2002; 2004, Bennett 2012). If that syllable is a head even in [ˈsara gˈgrande], no appeal to output-output correspondence is necessary: it is simply the case that *CLASH outranks constraints which normally ensure that metrical prominence (however formalized) is associated only with heads. The retraction of the stress does not strip the final syllable of its head status: the interaction between stress placement and headedness is completely transparent, and it shows that 'stress' and 'head' are represented separately in the phonology. In the analysis that follows, I propose that Munster Irish is an entirely parallel example: the distributions of heads and stress are related, but not necessarily isomorphic, which results in stress falling on non-heads in certain well-defined circumstances.

More specifically, I assume that what is written as 'stress' in transcriptions of Munster Irish is a phonological feature that attaches to prosodic constituents rather than root nodes (for one exception from this analysis, see below p. 93). This feature is a unit of phonological analysis, and can be realized in a variety of ways in a given language, much as is assumed in substance-free feature theory (e. g. Morén 2007, Blaho 2008, Youssef 2010). It is the substance-free counterpart of suprasegmental features that are more straightforwardly based on substance, such as lexical tones are often assumed to be.[7] This conceptualization of stress allows us to view the frequent alignment of stress and prosodic headship as a typological rather than representational fact, and to express analyses such as that sketched just above for Roman Italian and below for Munster Irish.

### 2.1.2. Weight-sacrificing recursion

In this section I discuss an approach to the definition of bimoraicity that will be crucial to accounting for the pattern of stress in Munster Irish. Specifically, I will argue that the definition of a 'bimoraic syllable' should

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[7]As an aside, the realization of a given phonological tone can of course be phonetically non-uniform even within a language.

require the syllable node to *immediately dominate* two morae, rather than simply *contain* two different moraic nodes.

The simplest description of a 'bimoraic' syllable is 'a syllable that contains two distinct morae'. (Here and below the symbol × refers to whatever the terminal node of suprasegmental structures are assumed to be, i. e. timing slots or melodic root nodes.)

(49)     Simple bimoraic syllable: long vowel

$$\sigma$$

$$\mu \qquad \mu$$

$$\times$$

$[\mu\mu]_\sigma$
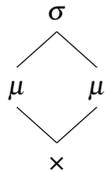
In principle, the definition of 'containment' here is ambiguous. At least the two following combinations present themselves:

- The tree includes a $\sigma$ node which has two distinct $\mu$ daughters;

- There exists a string marked as a $\sigma$ which includes two distinct $\mu$ strings.

The difference might appear purely academic. This is not so, however, if we allow recursion of prosodic constituents. Consider now the two representations in (50) and (51).

(50)     Syllable node recursion

$$\sigma$$

$$\sigma \qquad \sigma$$

$$\mid \qquad \mid$$

$$\mu \qquad \mu$$

$$\times$$

$[\mu\mu]_\sigma$
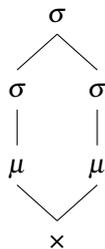
(51)     Mora node recursion

$$\sigma$$

$$\mu \qquad \mu$$

$$\mid \qquad \mid$$

$$\mu \qquad \mu$$

$$\times$$

$[\mu\mu]_\sigma$
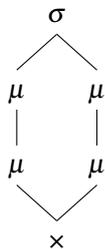
Both representations are, in principle, formally legitimate in a representational theory which admits the possibility of recursion. For these representations, however, the two ways definitions of weight give

different results. The second definition of a heavy syllable, which is sensitive to string containment, designates both (50) and (51) as heavy syllables, since both include a $\sigma$ constituent parsing two instances of $\mu$. On the first definition only (51) counts as heavy, since no $\sigma$ has two $\mu$ daughters.

I propose is that the first method of weight computation is correct (for Corca Dhuibhne Irish), because it captures the distinction between two types of heavy syllables in a way the other approach fails to do. Specifically, the type of structure shown in (50) represents a syllable constituent which is not 'heavy' in the sense that is bimoraic under the relevant assumptions, but which still allows the presence of two distinct morae in the syllable, which is needed to express the difference between short and long vowels (with diphthongs in this language also falling into the latter category). I will argue that the weight-to-stress principle (WSP) in Corca Dhuibhne Irish is sensitive to bimoraicity as defined by immediate constituency, and that this accounts for the phenomenon of 'forward stress'. Specifically, recursion of the type shown in (50) is used to make a syllable 'light' in the relevant sense and thus avoid a violation of WSP, which is vacuously satisfied by light syllables.

In the analysis that follows I show that this motivation for recursion can usually be satisfied by only a few levels of recursive constituency. The existence of anti-recursion constraints in CON keeps the recursion in check. This is a crucial difference between recursion in OT-based phonology as envisaged here and the infinite recursion assumed for syntax: while it is often assumed that restrictions on recursion in syntax are related to performance factors rather than grammar, OT provides for the exclusion of certain structures with very deep recursion from the set of contenders, via harmonic bounding (Riggle 2004).[8]

## 2.2. *Accounting for the pattern*

In this section I present an OT account of the pattern. The ranking is shown in Figure 1.

I start the section by laying out the analysis of the most contentious part of the Munster Irish stress system, namely 'forward stress', i.e. the prosodification of word-initial HH sequences with stress on the second syllable. I propose the following constraints to account for the pattern:

(52)   FOOT FORM: the head constituent of a foot is located at its left edge;

(53)   WORD FORM: the head constituent of a word is located at its left edge;

(54)   WEIGHT-TO-STRESS PRINCIPLE (WSP): all heavy syllables, defined as $\sigma$ nodes immediately dominating two distinct $\mu$ nodes, are associated with stress;

(55)   BRANCHING COMPLEXITY/FOOT: if a foot branches, then the head constituent has more branches than the dependent (Dresher and van der Hulst 1998, Rice 2007);

(56)   BRANCHING COMPLEXITY/WORD: if a word branches, then the head constituent has more branches than the dependent;

(57)   PEAKLEFT: stress is located as close to the left edge of a word as possible. For the purposes of the proposed analysis, this alignment constraint must be able to 'count', contra McCarthy (2003), see Hyde (2008; 2012), Jurgec (2010).

(58)   *Recursion[$\alpha$]: assign a violation mark for each pair of constituents of the same sort [$\alpha$], where one immediately dominates the other;

(59)   *CLASH: two consecutive syllables do not bear stress;

[8] I am of course not suggesting that complexity requirements such as those described here or mooted by Rice (2007) are the only possible motivations for phonological recursion. Evidence for recursive constituency in prosody is found not only in stress systems but also in phenomena related to tone placement (Itô and Mester 2007; forthcoming, Elfner 2011); recursion can be motivated both phonologically (Martínez-Paricio in preparation) and with reference to the phonology–morphosyntax mapping. The place of the complexity requirements in this broader picture remains to be ascertained.
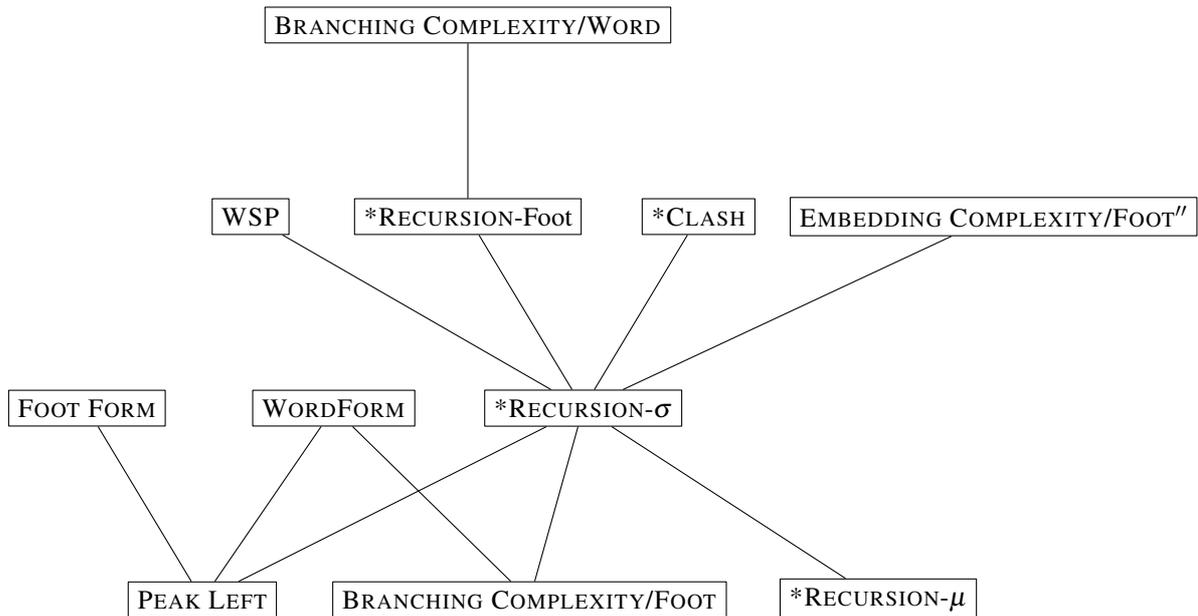
Figure 1: Complete ranking for Corca Dhuibhne Irish

Most of these are relatively familiar, or at least use a constraint schema (BRANCHING COMPLEXITY) previously proposed in the literature. The following constraints deserve comment:

- Since I make use of recursion, I also adopt the $X'$ schema and in particular the notions of 'minimal' and 'maximal' projections (e. g. Levin 1985, Smith 1999, Itô and Mester 2007; 2009, Elfner 2011), i. e. instances of a particular sort that, respectively, dominate and are dominated by nodes of a different sort.

- As discussed above in §2.1.1, if stress is conceptualized as a feature, then *CLASH is merely a special case of the OCP

A final constraint needed for the analysis is an extension of the proposal by Dresher and van der Hulst (1998) to recognize 'visibility' as a possible dimension of complexity. They suggest that one type of head-dependent asymmetry involves heads having access to information about deeper levels of embedding than dependents. In their formulation, this asymmetry is expressed in terms of a *possibility* for heads to support greater 'visibility'; however, they do not consider a scenario where, in parallel to their proposals regarding branching complexity, a head *requires* visibility at deeper levels of embedding. I suggest that weight-sacrificing recursion in Munster Irish is driven by a constraint which states that heads *must* dominate more levels of embedding than dependents. Under this scenario, the interaction of the constraint in (60) and constraints on the placement of heads determines the locus for weight-sacrificing recursion, and therefore for 'forward stress'.

(60)    EMBEDDING COMPLEXITY/Ft″: given a maximal projection of a foot Ft″, if *a* is the head of Ft″ and *b* is the dependent branch in Ft″, then there are more levels of embedding between *a* and its deepest embedded dependent than between *b* and its deepest embedded dependent.[9]

---

[9]Although in this formulation the constraint could appear to violate locality, in the sense of 'counting beyond one', it hinges on comparing the cardinalities of sets. This only requires establishing the existence of certain types of functions between the two sets, without reference to any number of individual elements.

For reasons of focus, I do not discuss some additional representational issues. For instance, I silently assume that all (content) words must have at least one stress (this is often formalized as a CULMINATIVITY constraint). In addition, I do not consider some candidates which do not have a crucial bearing on either stress placement or the details of prosodic parsing. For instance, I assume that Corca Dhuibhne Irish disallows gratuitous skipping of levels: thus, a word cannot directly dominate a syllable.[10]

With the constraints in place, we now turn to the account of the pattern.

### 2.2.1. 'Forward stress'

We begin with the account of the 'forward stress' pattern, whereby an initial heavy syllable fails to attract stress if and only if the next syllable is also heavy: that is, we account for the stress patterns in the forms HH́, HH́L, and HH́H. Accounting for these patterns will motivate most of the unorthodox machinery proposed in this paper, while in §2.2.2 I show that this machinery is also able to account for patterns which do not require it.

**Disyllabic forms**  In the case of HH́ forms, the winning candidate is that shown in (61). (Here, as elsewhere in the paper, I use squares to highlight heads of feet, circles to highlight heads of words, and the acute and grave accent to represent main and secondary stress respectively). The winner uses recursion of a syllable node to create a syllable that is bimoraic for the purposes of syllable-internal structure (i. e. vowel length or the representation of diphthongs) but monomoraic for the purposes of the weight-to-stress principle.

(61)    Winning parse in HH́ forms
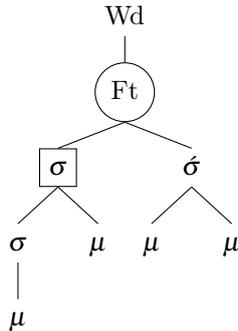
First, we compare (61) to orthodox bipedal candidates consisting of two feet. I suggest that the latter are knocked out by a high-ranking BRANCHING COMPLEXITY/WORD, which requires that the head of a word node have more branches than the dependent but is vacuously satisfied if the word node does not branch. This is shown in (62). I also show the constraints *CLASH and WSP, which could, in this instance, play the same rôle as the BRCOMPL constraint; however, below I show that BRCOMPL/WD must also be ranked in the top stratum.

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[10]This is obviously a language-specific fact of grammar rather than a representational impossibility (cf. e. g. Itô and Mester 2007).
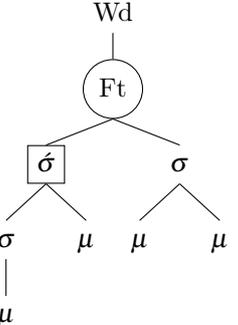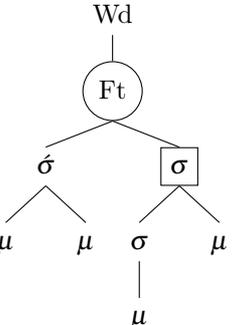
(62)    Preference for monopedal candidate in HH forms

| HH | WSP | BrCompl/Wd | *Clash | *Recursion-σ | BrCompl/Ft | PkLeft |
|---|---|---|---|---|---|---|
| a. ☞  |  |  |  | * | * | * |
| b.  |  | *! | * |  |  |  |
| c.  | * | *! |  |  |  |  |
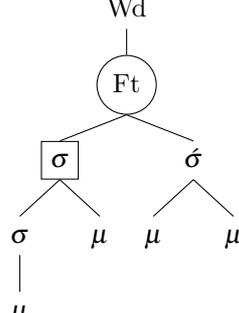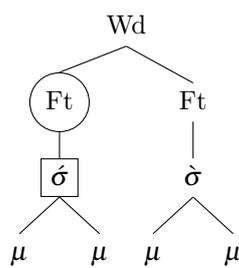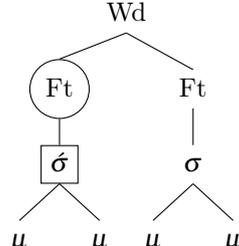
Under this ranking, HH words are always parsed into a single foot consisting of two syllables. There are, however, several options for the internal organization of that foot. I suggest that the head of the foot is always placed at its left edge due to FOOT FORM. The constraint EMBEDDING COMPLEXITY/FT″ dominates the anti-recursion constraint on syllable nodes to enforce the addition of an extra level in the initial syllable. In these conditions, WEIGHT-TO-STRESS compels a violation of PEAK LEFT to produce 'forward stress'. This is shown in (63). Note that although *RECURSION-σ dominates *RECURSION-$\mu$, in this particular context mora recursion is unavailable, as it does not remove the WSP violation.

(63)  Distribution of prominence and stress in HH́ forms

| HH | FTFORM | EMBCOMP/FT″ | WSP | *RECURSION-σ | PKLEFT |
|---|---|---|---|---|---|
| a. | | *! | * | | |
| b. ☞ | | | | * | * |
| c. | | | *! | * | |
| d. | *! | | | * | |

a.
```
        Wd
         |
        (Ft)
        /    \
     [ǒ]      σ
     / \     / \
    μ   μ   μ   μ
```

b. ☞
```
        Wd
         |
        (Ft)
        /    \
     [σ]      ǒ
     / \     / \
    σ   μ   μ   μ
    |
    μ
```

c.
```
        Wd
         |
        (Ft)
        /    \
     [ǒ]      σ
     / \     / \
    σ   μ   μ   μ
    |
    μ
```

d.
```
        Wd
         |
        (Ft)
        /    \
     ǒ       [σ]
    / \      / \
   μ   μ    σ   μ
            |
            μ
```
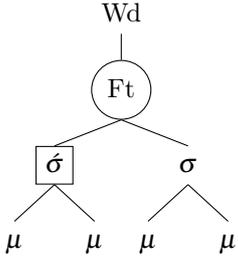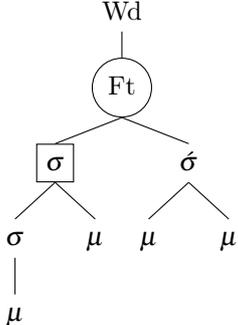
A final set of rankings shows that runaway recursion is not tolerated. Note that the winning parse for HH forms violates BRANCHING COMPLEXITY/FT, since both constituent in the foot are branching. In principle, that could be remedied by recursion in the dependent branch which would also save a WSP violation. However, EMBEDDING COMPLEXITY/FT would in that case compel more recursion in the head branch, which establishes the relatively high ranking of *RECURSION-σ.

(64)    Excessive recursion cannot repair branching complexity violations
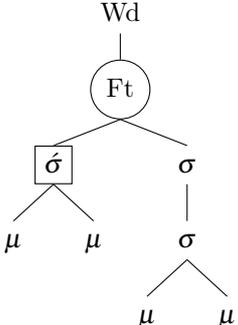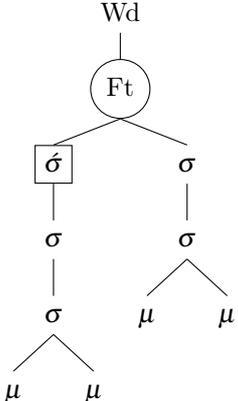
| HH | EMBCOMPL/FT″ | *RECURSION-σ | BRCOMPL/FT |
|---|---|---|---|
| a. | *! | * | |
| b. | | **!* | |
| c. ☞ | | * | * |

Given this relatively high rank of RECURSION-σ, in the remainder of this paper I will not consider candidates which satisfy the requirement on embedding complexity by excessive recursion.

To sum up, the 'forward stress' pattern in disyllabic words is due to the combined effect of WSP, which requires that bimoraic syllables should be stressed, and constraints on foot parsing, the placement of heads inside feet, and additional constraints on head-dependent asymmetries. Specifically, recursion is deployed to both fulfil the requirements regarding depth of embedding and (vacuously) satisfy WSP.

**Tri- and quadrisyllabic forms**     The addition of more syllables does not disrupt the 'forward stress' pattern. The key constraint here is WORD FORM, which requires that the head foot should be aligned to the left edge within a word. Under these circumstances, all HH-initial words build an initial disyllabic foot of the form in (61) at the left edge, and thus consequently exhibit 'forward stress'. This is shown in (65) for HHL ([oːˈɡɑːnəx] 'young man').[11]

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[11]I assume for the sake of the argument that the final light syllable is parsed into a degenerate foot. This is in any case irrelevant for stress placement in HHL forms. In general, I am not aware of stress data that shed light on the possibility of such feet in Corca Dhuibhne Irish. The language does allow words such as [ˈmʲa] 'decay' or [ˈɾi] 'running' (*meath*, *rith*) without imposing a minimum size requirement. However, this is not a decisive argument, since monopedal words are often a special case in terms of minimum foot size; for more discussion, see e. g. Downing (2006), Blumenfeld (2011).

(65)  Forward stress in HHL forms

| HHL | BrCompl/Wd | WdForm | BrCompl/Ft | PkLeft |
|---|---|---|---|---|
| a. ☞ (Wd → [Ft [σ (σ μ) , σ́ (μ μ)]] , Ft [σ (μ)]) | | | * | * |
| b. (Wd → Ft [σ́ (μ μ)] , Ft [σ (σ μ) , σ (μ μ)]) | | *! | | |
| c. (Wd → Ft [σ́ (μ μ)] , Ft [σ (σ μ) , σ (μ μ)]) | *! | | | |
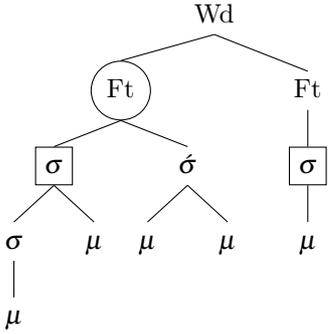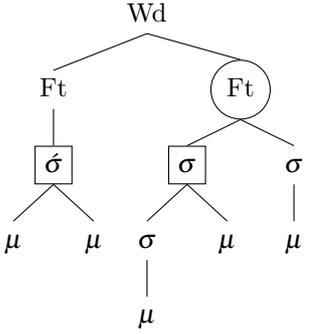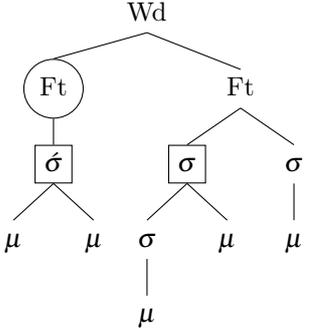
The assumption that word heads are aligned to the right is also borne out by the fact that main stress tends to precede secondary stress.

The tableau in (65) also shows the importance of BRANCHING COMPLEXITY/WD. Recall that in (62) that constraint appeared superfluous, since it was redundant in the presence of WSP and *CLASH; in (65), however, neither of the latter two constraints can influence the distribution of prominence in (65), because the outcome hinges only on the constituent structure.

Another option for HHL forms involves the recursion of the Foot node. It performs as well as the winning candidate on complexity constraints, in particular since the recursion of the Foot node allows it to satisfy EMBCOMPL/FT″ without recourse to weight-sacrificing recursion in the head, simply by virtue

of the extra layer of structure. Instead, weight-sacrificing recursion can be used in the dependent of the minimal foot projection to save a WSP violation (recall that WSP dominates *RECURSION-σ) in the second syllable, improving on PEAK LEFT. This shows that *RECURSION-Ft must dominate PEAK LEFT, as shown in (66).
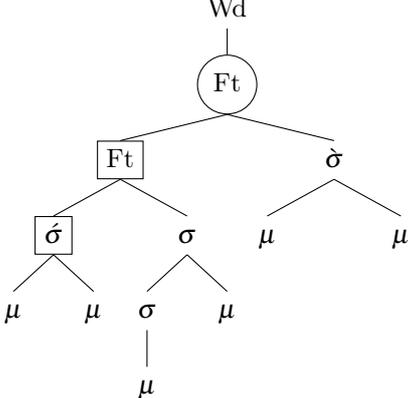
(66)    Foot recursion cannot optimize peak placement

| HHL | EMBCOMPL/FT″ | *RECURSION-Ft | WSP | PEAK LEFT |
|---|---|---|---|---|
| a. ☞ <br> *(tree diagram)* | | | | * |
| b. <br> *(tree diagram)* | | *! | | |
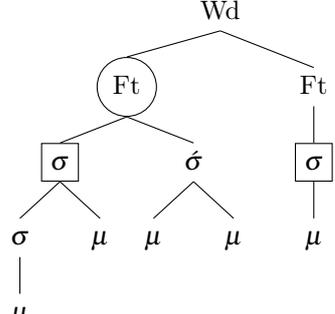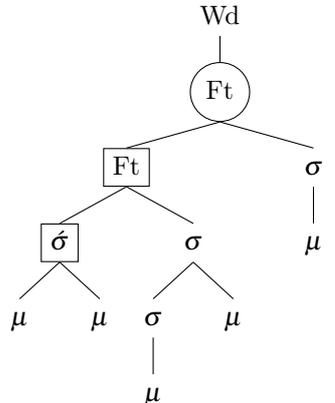
The analysis of HHH forms ([uːˈrɑːniː] 'songs') is similar, in that the requirements on head placement and head-dependent asymmetries in words enforce the construction of an initial left-headed [HH] foot, knocking out structures parallel to candidates (b.) and (c.) in (65). This gives 'forward' stress, and high-ranking *CLASH then excludes stress on the third heavy syllable.

(67)   Analysis of HHH forms

| HHH | *RECURSION-Ft | *CLASH | *RECURSION-σ | PKLEFT |
|---|---|---|---|---|
| a. ☞ [tree: Wd → (Ft), Ft; (Ft) → σ[σ→μ, μ], ś[μ, μ]; Ft → σ[σ→μ, μ]] | | | ** | * |
| b. [tree: Wd → (Ft), Ft; (Ft) → σ[σ→μ, μ], ś[μ, μ]; Ft → ὸ̀σ[μ, μ]] | | *! | * | *** |
| c. [tree: Wd → (Ft); (Ft) → Ft, ὸ̀σ; Ft → ś[μ, μ], σ[σ→μ, μ]; ὸ̀σ[μ, μ]] | *! | | * | |
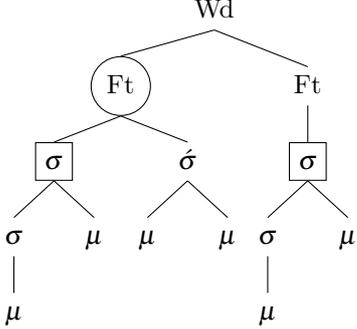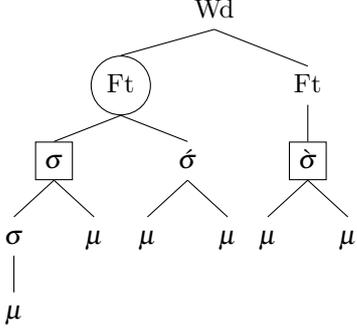
The parsing of HHH words shows that weight-sacrificing recursion can be used not only to satisfy embedding complexity requirements, as in the case of [HH] feet, but also to satisfy other constraints (in this instance, *CLASH). This shows that the ranking in (62) is the correct one, even if it appears redundant: both BRCOMPL/WD on the one hand and *CLASH and WSP on the other hand must dominate *RECURSION-σ to derive the correct pattern.

(68)  Weight-sacrificing recursion driven by *CLASH

| HHH | *CLASH | WSP | *RECURSION-σ |
|---|---|---|---|
| a. ☞ (Wd → [Ft: σ́ σ], [Ft: σ́]; σ with σ̣-μ, μ μ, μ; σ with σ̣-μ, μ) | | | ** |
| b. (Wd → [Ft: σ́ σ], [Ft: σ́]; σ with σ̣-μ, μ μ, μ μ, μ) | | *! | * |
| c. (Wd → [Ft: σ́ σ], [Ft: σ̀]; σ with σ̣-μ, μ μ, μ μ, μ) | *! | | * |
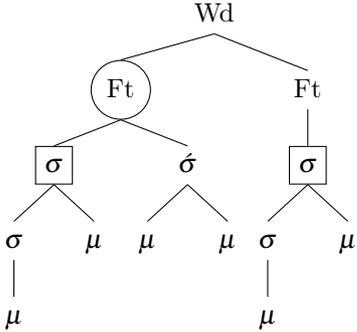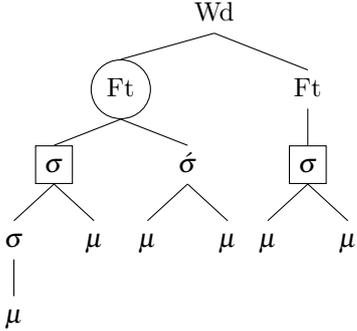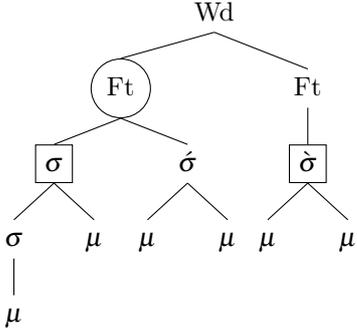
In this section I have shown that the ranking in §1 accounts for the deviant 'forward stress' pattern. In this account, 'forward stress' is derived from the interaction of constraints on the placement of heads and head-dependent asymmetries rather than from any device singling out word-initial sequences of HH syllables. In the next section I will demonstrate that the ranking also covers the less typologically unusual patterns of stress in the language and that, perhaps more importantly, the devices used in accounting for 'forward stress' are independently needed to derive the rest of the stress patterns.

## 2.2.2. *Quantity-sensitive stress*

Recall that apart from the 'forward stress' contexts Corca Dhuibhne Irish stress shows a rather common pattern: stress falls on the leftmost stressable syllable within a three-syllable window, where 'stressable' is understood to mean a syllable with a non-schwa vowel, with stress on heavy syllables (those containing long vowels and diphthongs) being preferred to stress on light syllables. In this section I demonstrate that the present proposal, which does not rely on any mora-counting devices, is superior to a more traditional approach with moraic feet, for two reasons:

- It captures the fact that quadrimoraic structures exhibit differing behaviour: HH patterns with LLH but not with LLLL;

- It provides a straightforward account for the existence of a three-syllable window.

The phenomenon of 'forward stress' in Corca Dhuibhne Irish hinges on the fact that a sequence of two light syllables is not prosodically equivalent to a heavy syllable. I propose that footing in Corca Dhuibhne Irish is syllabic rather than moraic, and start with accounting for the difference between the quadrimoraic sequences LLLL and LLH.
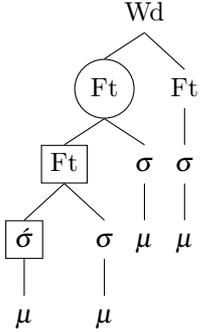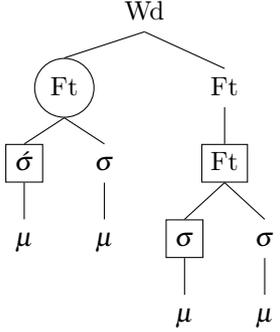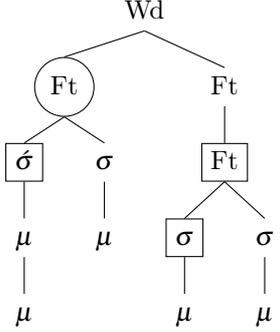
In the case of the LLLL sequences (['arəməkəx] 'tender'), I propose that that the correct parse is that with a ternary foot at the left edge of the word. I follow authors such as Rice (1992; 2007) in viewing this phenomenon as a consequence of constraints requiring a head constituent to branch: the head of a foot must be more have more branches than its dependent, so another foot is built as the head. I suggest that in this case the ternarity is motivated by the constraint BRCOMPL/WD, because the classic iterative parse cannot satisfy this constraint. Note that in the analysis of cases such as this one where stress may fall on light syllables with recursion I only consider candidates that use mora recursion. This is because of the ranking of *RECURSION-$\sigma$ over *RECURSION-$\mu$, the arguments for which are discussed below.

(69) The analysis of LLLL forms

| LLLL | BRCOMPL/WD | EMBCOMPL/FT″ | *RECURSION-FT | *RECURSION-μ |
|---|---|---|---|---|
| a. ☞ (Wd → Ft[circled] [Ft σ σ], Ft[boxed] [σ́ σ], μ μ μ μ) | | | * | |
| b. (Wd → Ft[circled] [σ́ σ], Ft [σ σ], μ μ μ μ) | *! | ** | | |
| c. (Wd → Ft[circled] [σ́ σ], Ft [σ σ], μ μ μ μ, μ μ) | *! | | | ** |
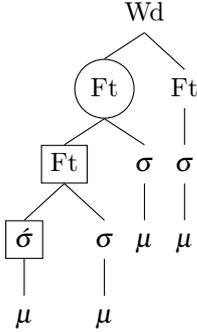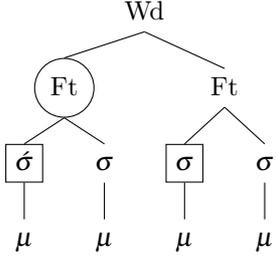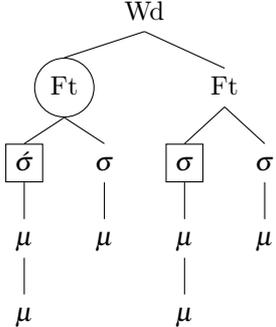
Note that the winning candidate does not have to use recursion of the $\sigma$ node, because the embedding complexity requirement as formulated here only applies to *maximal* projections of feet. For this reason, there is no need for syllable recursion in the innermost foot. However, EMBCOMPL/FT″ becomes active if foot recursion in the dependent branch is used to repair violations of BRCOMPL/WD, knocking out this alternative without the ternary parse.

(70)    No foot recursion in the dependent branch:

| LLLL | BrCompl/Wd | EmbCompl/Ft″ | *Recursion-Ft | *Recursion-μ |
|---|---|---|---|---|
| a. ☞ (Wd: [Ft [Ft σ́–μ, σ–μ], σ–μ, σ–μ]) | | | * | |
| b. (Wd: [Ft σ́–μ, σ–μ], [Ft [Ft σ–μ, σ–μ]]) | *! | | * | |
| c. (Wd: [Ft σ́–μ–μ, σ–μ], [Ft [Ft σ–μ, σ–μ]]) | | | * | *! |

In all of these cases, the issue at stake is only prosodic structure: in the absence of heavy syllables, which could potentially trigger WSP violations, stress will always drift to the left because of PEAKLEFT. I assume that there are no active constraints to enforce secondary stress on light syllables, such as rhythm-optimizing constraints à la Kager (2000), Alber (2005). Nevertheless, the rankings seen so far set the scene for an analysis of the three-syllable window as a ternary foot with a branching head.
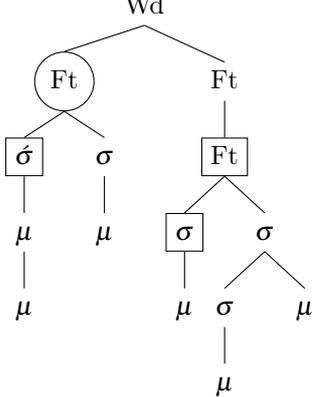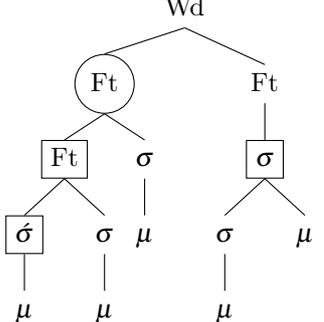
A final remark is in order on words that consist of light syllables only. I assume that *RECURSION-Ft is ranked sufficiently high to deter runaway recursion and the parsing of all light syllables into a single foot; I do not show the tableaux to save space. This constraint is minimally violated to ensure that the branching-ness requirement for word heads is met, and parses with a recursive foot are also a relatively 'cheap' way

to satisfy embedding complexity requirements on maximal projections of feet. Further recursion does not provide interesting optimizations, so it is dispreferred.[12]

The ternary foot parse also emerges in the derivation of the three-syllable window, which is seen most clearly in LLLH forms, where the heavy syllable outside the window fails to attract main stress: [ˈimʲɪlʲəˌkɑːn] 'navel'. In this case, a bipedal [LLL][H] parse is optimal in terms of complexity requirements, and since it is the leftmost foot in the word that is the head, main stress falls on the initial syllable to optimize PEAKLEFT, while the heavy syllable receives secondary stress, saving a WSP violation.
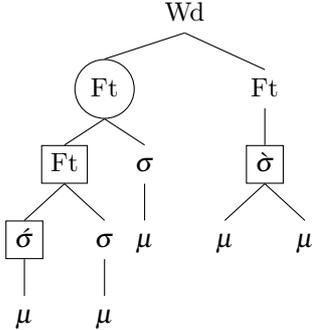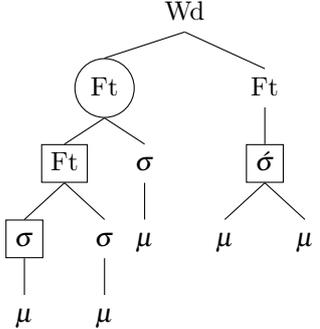
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[12]To save space, I do not show the structure of LLL words. The winning candidate in the case involves a $[[\acute{\sigma}\sigma]_{Ft}\sigma]_{Wd}$ structure, with the initial syllable also showing recursion of the $\mu$ node. This is because this parse and $[[[\acute{\sigma}\sigma]_{Ft}\sigma]_{Ft}]_{Wd}$ fare equally well on embedding complexity, but mora recursion is the preferred type of recursion. Stress placement is vacuous in this case, since it is driven by PEAK LEFT alone.

(71)    Analysis of LLLH: minimizing recursion

| LLLH | WSP | *RECURSION-Ft | *RECURSION-σ | PEAKLEFT |
|---|---|---|---|---|
| a. ☞ (Wd → Ft [Ft [ó μ μ] σ μ], Ft [ǒ σ μ μ]) | | * | | |
| b. (Wd → Ft [ó μ μ, σ μ], Ft [Ft [σ μ, σ μ μ]]) | | * | *! | |
| c. (Wd → Ft [Ft [ó μ μ, σ μ], σ μ], Ft [σ [σ μ, μ]]) | | * | *! | |
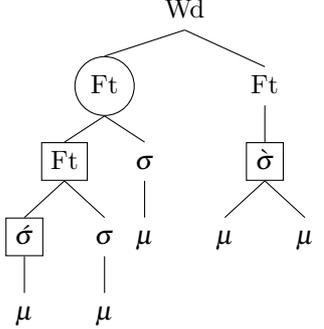
The constraint PEAKLEFT still has a rôle to play, since it enforces the appearance of stress in the initial foot, while the secondary stress on the final syllable is a way of satisfying WSP.

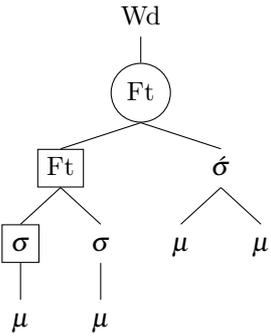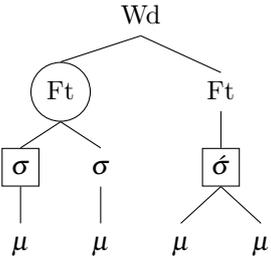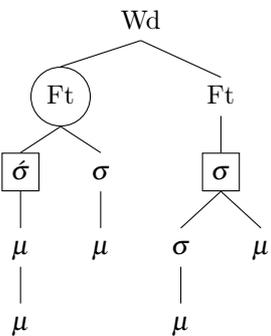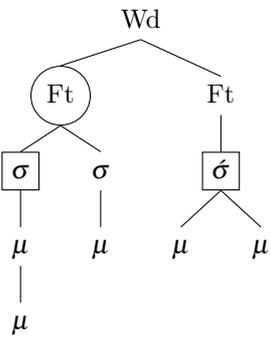(72)    Analysis of LLLH: PEAK LEFT enforces initial stress

| LLLH | WSP | PEAKLEFT |
|---|---|---|
| a. ☞ (tree: Wd → Ft, Ft; first Ft → Ft → σ́ (μ), σ (μ), σ (μ); second Ft → σ̀ (μ, μ)) | | |
| b. (tree: Wd → Ft, Ft; first Ft → Ft → σ (μ), σ (μ), σ (μ); second Ft → σ́ (μ, μ)) | | *!** |

Words of the form LLH ([kʲanəˈhoːrʲ] 'buyer') are somewhat similar to those exhibiting 'forward stress': they also involve a mismatch between head status and stress: in this case, stress falls on the non-head foot of the word. These words also show the effect of the inactivity of constraints enforcing iterative parsing or rhythm optimization: stress on the heavy syllable satisfies WSP, and PEAK LEFT is ranked too low to enforce any stress on the preceding light syllables. Specifically, recursion of the syllable node cannot be used to ensure better stress alignment under coercion from WSP

In this respect, the contrast between ĹLLH and LLĤ is crucial. In the former, satisfying complexity constraints requires relatively large amounts of recursion (of both feet and syllables), and the placement of stress is decided by PEAK LEFT by emergence of the unmarked. In the latter, fewer violations of anti-recursion constraints are completely unavoidable, meaning that these constraints decide the outcome without referring to peak placement.

(73)  Analysis of LLH

| LLH | EMBCOMPL/FT″ | *RECURSION-FT | *RECURSION-σ | PEAKLEFT | *RECURSION-μ |
|---|---|---|---|---|---|
| a.  Wd — Ft [ Ft [σ σ] σ́ ]  (Ft) [σ—μ, σ—μ] [μ μ] | | *! | | ** | |
| b.  Wd — Ft [σ σ] Ft [σ́]  μ μ μ μ | *! | | | ** | |
| c.  Wd — Ft [σ́ σ] Ft [σ]  μ μ σ μ / μ μ | | | *! | | * |
| d. ☞  Wd — Ft [σ σ] Ft [σ́]  μ μ μ μ / μ | | | | ** | * |

An issue with this analysis of LLH forms is the fact that, as described by Ó Sé (2000), the initial syllable in these forms can bear 'secondary stress' ([ˌkʲanəˈhoːrʲ]). This is incompatible with the main thrust of the present analysis, which assumes that the head foot is left-aligned in the word. Therefore, in the presence of multiple stresses, the leftmost one should be the main stress. However, I suggest there are reasons to doubt that the 'secondary stress' described by Ó Sé (2000) in ˺LLH˹ forms is the same phonological object as other secondary stresses in the language. In other words, I suggest that assigning secondary stress to initial syllables in LLH forms could be a misanalysis.

First, ˺LLH˹ is the only type of word where secondary stress precedes main stress: otherwise, the picture is entirely compatible with the present analysis based on consistent left alignment of heads. Second, it is the only instance of secondary stress that appears to have a top-down, presumably rhythmical, motivation rather than a bottom-up rationale driven by syllable structure (i. e. WSP): all other secondary stresses in the language fall on heavy syllables, and secondary stress appears not to optimize rhythm (for instance, there is no rhythm optimization in ˊLLLL forms). Third, as noted by Bennett (2012), descriptions of 'secondary stress' in ˺LLH˹ forms might refer not so much to actual prominence peaks as to the fact that the initial syllable in such words appears to resist the reduction of unstressed vowels to [ə] or [ɪ]. In the present analysis, this lack of reduction is easily compatible with the 'unstressed head' status of the initial syllable, which does head the foot and therefore shows head-like behaviour, triggering a positional faithfulness effect. However, this does not mean that it bears the 'stress' feature. If this analysis is on the right track, it further confirms the necessity of distinguishing between 'foot heads' and 'stressed syllables', as argued in this paper.

Finally, I suggest, however tentatively, that the first syllable in LLH words might bear phonetic prominence which is due not to the presence of a 'stress' feature but to prosodic boundary marking (cf. Gordon 2000). In other words, this initial prominence (whatever its ontological status) is driven by the postlexical phonology, and need not be accounted for by the word-level phonology that I am concerned with in this paper. Some circumstantial evidence for the postlexical affiliation of this initial prominence can, I suggest, be found in the similarity noted by Ó Sé (2000) between the prosodic pattern of LLH words such as [ˌkʲanəˈhoːrʲ] 'buyer' and postlexical trisyllabic sequences with final stress such as [ˌkalʲiːnʲ ˈoːg] 'young girl'. (Recall also that the placement of 'secondary stress' in non-phrase-final words is also different from regular stress placement, which suggests the two types of 'stress' are governed by different rules.) Nevertheless, it is clear that the matter deserves further empirical enquiry.

In the case of HLL, stress is correctly predicted to fall on the initial syllable by PEAK LEFT. The best way to satisfy the requirements of EMBCOMPL/FT″ in this case is by phonetically vacuous recursion of a mora (e. g. Hayes 1995, Kariņš 1996), since *RECURSION-$\mu$ is ranked the lowest of all the recursion constraints, and in this case the mora recursion does not lead to WSP violations.

(74)   Analysis of HLL forms

| HLL | BrCompl/Wd | *Recursion-Ft | *Recursion-σ | *Recursion-μ |
|---|---|---|---|---|
| a. ☞ (tree) | | | | * |
| b. (tree) | | | *! | |
| c. (tree) | | *! | | |
| d. (tree) | *! | | | |

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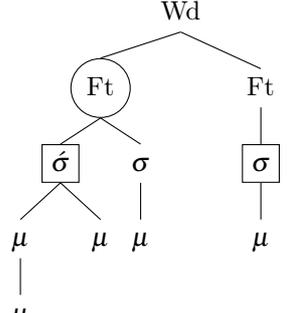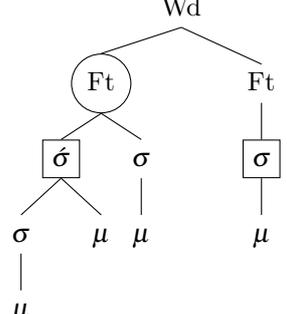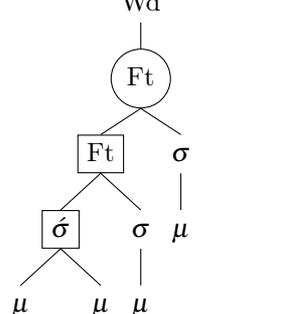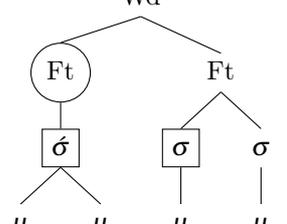
The importance of mora recursion is brought into focus by HLH forms such as [ˈuːdəˌrɑːs] 'authority', where it is used to satisfy embedding complexity requirements *and* Peak Left. Specifically, it allows the initial syllable to be stressed while satisfying EmbCompl/Ft″ without sacrificing weight.

(75)   Analysis of HLH: mora recursion used to satisfy PEAK LEFT

| HLH | WSP | *RECURSION-σ | PEAK LEFT | *RECURSION-μ |
|---|---|---|---|---|
| a. ☞ Wd [Ft [σ́ (μ μ), σ (μ)], Ft [σ̀ (μ μ)]] | | | ** | * |
| b. Wd [Ft [σ́ (σ(μ) μ), σ (μ)], Ft [σ̀ (μ μ)]] | | *! | ** | |
| c. Wd [Ft [σ́ (μ μ), σ (μ)], Ft [σ (σ(μ) μ)]] | | *! | | * |
| d. Wd [Ft [σ́ (μ μ), σ (μ)], Ft [σ (μ μ)]] | *! | | | * |

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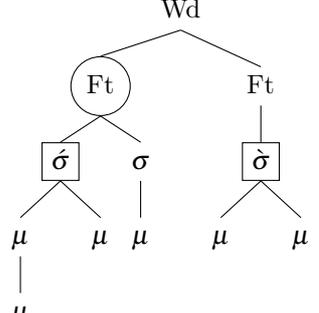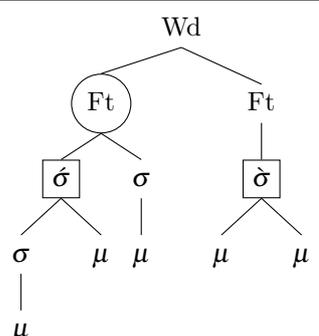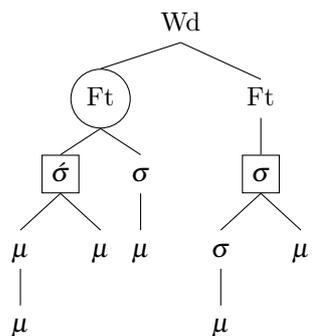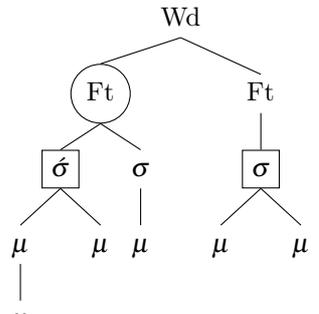
The crucial difference between cases such as those with 'forward stress', which use syllable recursion, and cases such as those in (75), where mora recursion comes to the fore, is the rôle of WSP. Although in principle recursion of morae is preferred to the recursion of syllables, the latter has the advantage of being able to enforce the sacrifice of weight, as discussed in §2.1.2. Therefore, the ranking of *RECURSION-σ over *RECURSION-Ft becomes apparent only in emergence-of-the-unmarked situations when WSP does not make a significant difference to the outcome.

The analysis of HLHL words, which are stressed similarly (['uːdəˌrɑːʃəx] 'authoritative'), involves a very similar representation. I assume that it involves a bipedal parse [HL][HL], with foot recursion in the dependent branch to satisfy branching complexity requirements for words. The rest of the structure is explained by the ranking in (75), so I do not show it here.

(76)    Analysis of HLH: complexity requirements trump anti-recursion constraints



An advantage of this analysis is that the foot recursion in the dependent foot frees the third syllable in HLHL and HLHH words (the analysis of the latter is not shown here for brevity) from the necessity to use recursion under duress from embedding complexity requirements. In these conditions, the second foot in HLHH is not compelled to use weight-sacrificing recursion in the head, i. e. first, syllable. Consequently, PEAKLEFT compels the placement of (secondary) stress on the initial syllable of a foot in [ĤL][H̀H] foot forms, unlike word-initial [HĤ] feet where the embedding complexity requirements enforce a different foot-internal structure.

This approach has the advantage of deriving the difference between initial and non-initial [HH] feet as an effect of global top-down conditions (i. e. complexity asymmetries). This feature distinguishes the

present analysis from previous approaches to the pattern, which have relied either on what are essentially stipulations singling out initial HH structures or on local optimizations of foot structure, which are unable to derive the distinction between what would appear to be identical structures (see §3 for more discussion of previous approaches).

The last pattern discussed in detail in this paper is LHH ([bʲɪˈhuːntiːxt] 'villainy'). Constraints on head alignment and complexity asymmetries enforce a bipedal parse ([LH][H]), with another instance of an unstressed head enforced by WSP.

(77)  Analysis of LHH

| LHH | WSP | *CLASH | *RECURSION-σ | PEAKLEFT | *RECURSION-μ |
|---|---|---|---|---|---|
| a. ☞ [Wd: Ft(σ ⸲ ś) Ft(σ)] | | | * | * | * |
| b. [Wd: Ft(σ ⸲ ś) Ft(ʌ̀)] | | *! | | *** | * |
| c. [Wd: Ft(σ ⸲ ś) Ft(σ)] | *! | | | * | * |
| d. [Wd: Ft(ś ⸲ σ) Ft(σ)] | | | **! | | * |
| e. [Wd: Ft(ś ⸲ σ) Ft(ʌ̀)] | | | * | **! | * |

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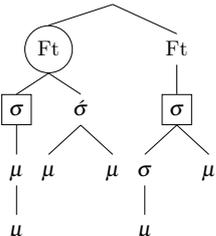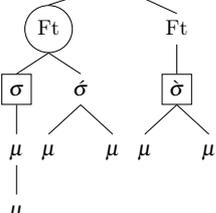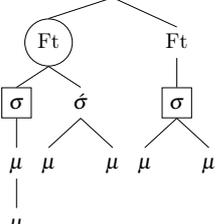
This concludes the analysis of the principal facts of stress placement in Corca Dhuibhne Irish. To summarize, the proposed account makes extensive use of elaborate phonological structure to derive the facts almost exclusively from top-down global conditions. Specifically, stress placement is driven by the interaction of constraints on prosodic constituency and a relatively simple PEAK LEFT constraint that simply enforces leftmost stress.

*2.3. Analysis of exceptional stress*

In this section I briefly discuss the analysis of 'exceptional' stress patterns discussed in §1.2.2. In most cases, the availability of 'stress' as a feature makes it relatively easy to analyse exceptional stress as a consequence of the presence of that 'stress feature' in the underlying representation, coming from the lexicon. This concerns cases such as [ˈpʲandiː] 'pandy', [ˈlounɑːn] 'bladder', and [rʲeːˈsak] 'undertow'. This is especially clear in the case of exceptionally stressed morphemes such as the 'theme vowels'.

Another type of exceptional stress concerns the avoidance of stressing long vowels in the case of certain suffixes, such as [ˈtɑːmʲiːdʲ] 'we are'. The inertness of these suffixes for stress assignment is relatively straightforward to explain if we assume they are clitics, adjoining prosodic words where the assignment of stress is insensitive to the presence of such clitics; cf. the Italian 3pl suffix *-no*, which patterns with clitics in being parsed outside the stress domain. This also has diachronic support, as the relevant suffixes are in fact previously independent personal pronouns that were merged with the verb forms at a relatively late date (e. g. Breatnach 1995).

The avoidance of stressing [ə] was already discussed above in §1.2.1 and §1.2.4. For now, I will assume that the 'exceptional weight' of second-syllable [a] before [x] is really a historical artefact of the lexicon: since short vowels before second-syllable [a] reduce to [ə] (Ó Sé 1984; 2000), stress in forms such as [bəˈkaxə] 'beggars' is due not to the special status of [a(x)], but to the fact that the preceding vowel is unstressable (for alternative accounts, see Green 1997, Bennett 2012). One advantage of this approach is that it readily explains the fact that only second-syllable [a(x)] sequences demonstrate this aberrant behaviour: since, for historical reasons, there are no /(C)ə(C)ə(C)ax/ words, the third-syllable [a] will never be the leftmost stressable vowel and is free to reduce.[13]

In the next section I compare the present analysis to some previous approaches.

## 3. Previous approaches

Within the theoretical tradition, the problem of forward stress was mentioned by Ó Siadhail and Wigger (1975), an early generative treatment of Irish phonology. However, no detailed theoretical treatment was proposed in that work or in the later Ó Siadhail (1989). The first systematic (descriptive) study of stress in Irish dialects, apart from the venerable O'Rahilly (1936), is Ó Sé (1989). A rule-based account was proposed by Doherty (1991). Afterwards, Edmund Gussmann in an influential paper (published as Gussmann 1997 but circulated much earlier) claimed to have discovered inadequacies in the picture of Munster Irish stress given by authors such as Ó Sé (1989). Rowicka (1996) reinterpreted these data in terms of Optimality Theory, and Green (1996) also follows Gussmann's (1997) version of the data. In the final version of his dissertation, Green (1997) is more cautious with respect to the data, but retains the main features of the analysis.

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[13]The hypothesis that the attraction of stress to [ax] is due to the properties of the vowel of the preceding syllable rather than to the properties of [ax] itself finds circumstantial support in data from another Munster variety, namely the dialect of Cape Clear. Its stress system is similar to that of Corca Dhuibhne, but, as documented by Ó Buachalla (2003), stress falls on the initial syllable when [ax] is preceded by [h], as in *ceathach* 'showery', *fathach* 'giant' (in Irish orthography, <th> stands for [h]). Presumably this is due to the [h] blocking the reduction of the preceding vowel: it is difficult to see how a preceding [h] could impinge on the 'prominence' of [ax], on which both Green (1997) and Bennett (2012) rely. Ó Buachalla (2003) also claims that stress is not attracted to [ax] in the 'abstract noun' suffix *-(e)acht*, as in *tinneacht* 'soreness' (*tinn* 'sore'), *troimeacht* 'heaviness' (*trom* 'heavy'). This could perhaps be treated in stratal terms, with *-(e)acht* as a word-level suffix and faithfulness to prosodified stem-level output blocking vowel reduction.

Both Gussmann (1997) and Rowicka (1996) present a picture of the data that is different from the one given by Ó Sé (2000) and followed in this paper. Their claims are evaluated by Ó Sé (2008), who argues that they do not hold for the 'conservative' variety that he describes. I will follow Ó Sé (1989), Ó Sé (2008) in accepting the received view of stress patterns in Irish.

## 3.1. *Early approaches*

Doherty (1991) proposes a rule-based account which is based on the idea that the stress system of Munster Irish is built around moraic trochees which are only projected by bimoraic syllables, in addition to an obligatory initial foot. Further, initial feet are made extrametrical by a special rule if they are structurally adjacent to another foot. Thus, in HH words both syllables project feet ([H][H]), whereafter the first foot is rendered extrametrical due to adjacency. By contrast, in LLLL forms only the initial foot is required, thus giving [LL]LL and initial stress.

The account by Doherty (1991) is rather simple and makes some compelling generalizations, in particular with respect to the parallel between HH and LLH forms, where in both cases an initial foot is rendered extrametrical by virtue of adjacency to another foot. However, at its core is the assumption that two adjacent feet are impossible only when the first of them is word-initial. When translated into an OT metalanguage, the stipulative nature of this prohibition becomes apparent: it can be formalized as a constraint along the lines of *#[]$_{Ft}$[]$_{Ft}$, but this formulation shows that the prohibition does almost no other work except enforcing 'forward stress', which puts the explanatory adequacy of the approach into serious doubt. In this respect, the present analysis has an important advantage, discussed above, whereby the difference between two types of consecutive heavy syllables is derived from the interaction of independently attested mechanisms.

A second concern with Doherty's (1991) approach is that the putative *#[]$_{Ft}$[]$_{Ft}$ constraint clearly violates the locality criterion, since it mentions three different objects. For more discussion of this sort of locality, I refer to Buckley (2009), who makes a persuasive case for adhering to strictly local interaction in the formulation of constraints.

Gussmann (1997) uses a set of informal constraints, requiring where possible that the output contain a canonical HL foot, with H being the head (for similar approaches, see cf. Dresher and Lahiri 1991, Rice 1992, van der Hulst and Klamer 1996, Mellander 2003), without committing to a particular theoretical framework. In the next section I consider the work of Rowicka (1996), who essentially translates Gussmann's (1997) account into Optimality Theory, and thus shares its empirical and formal difficulties, but is also much more explicit.

## 3.2. *Rowicka (1996): an OT approach*

Rowicka (1996) proposes that the basis for stress is the ternary foot, in which respect her analysis is quite similar to the one espoused here. In her approach, a foot can have three types of structures: a binary head with no dependent, a binary foot with a non-branching head, and a ternary one with a binary head and a non-branching complement.

The respective foot types are proposed to derive from the ranking of the constraints FtBin ('foot nodes are branching') and HeadBin, ('head nodes within the foot are branching'; cf. Bennett 2012), as well as Syllable Integrity (which prohibits a constituent boundary between tautosyllabic moras) and the Weight-to-Stress principle, in the formulation of which she follows Prince and Smolensky (1993:56): 'Heavy syllables are prominent in foot structure and on the grid'.

As presented, a serious problem with the approach by Rowicka (1996) is the lack of an explicit theory of constituents below the foot level. By introducing the constraint HeadBin, she effectively treats 'foot head' as an individual sort of constituent in the prosodic hierarchy. This is crucially distinct from a X′-based approaches, where the property of being a 'foot head' comes in addition to belonging to a sort of prosodic

constituents (i. e. a foot or a syllable). Consequently, it remains unclear whether constraints that refer to 'feet' or 'syllables' should also apply to these 'foot heads'. For instance, Rowicka's (1996) constraint system includes only constraints that encourage the branching of both 'feet' and 'heads', but no constraint which puts an upper bound on the number of elements contained in either of these, with the result that it is not at all obvious how a binary foot can ever be optimal in her system (with the exception of the situations that she considers, where there is not enough material for a ternary foot).

Thus, Rowicka (1996) effectively introduces an additional level of the prosodic hierarchy. In fact, given that she assumes the existence of $[(\sigma\sigma)]$ 'feet', it would appear that Rowicka's (1996) 'foot head' roughly corresponds to the traditional foot, and 'foot' is another sort of constituent between the foot and the word (see the next section for more discussion).

Doherty (1991), Gussmann (1997), and Rowicka (1996) all seek to discourage the first syllable in a sequence of two heavy ones from being stressed. However, having ruled out this configuration, they part ways because of their different approach to the data. Doherty (1991) sets up a system where stress falls on the leftmost stressable syllable; this is the approach taken by traditional descriptions and followed in this paper. Gussmann (1997) and Rowicka (1996), on the other hand, assume that stress tends to the right by default: thus HLHL words, according to them consist of two identical HL feet, and the words is headed by the one on the right. The latter approach is inconsistent with the kind of data treated here, as discussed by Ó Sé (2008). Apart from the issues identified by Ó Sé (2008), I note that the right-headed approach makes the largely incorrect prediction that in the case of two or more stresses in a word main stress should *follow* secondary stress, which, as discussed above, is precisely the opposite of the situation in Corca Dhuibhne Irish. I conclude, therefore, that the analysis of Rowicka (1996) is fraught with both empirical and conceptual difficulties.

## 3.3. *Green (1997): a rich prosodic hierarchy*

Green (1996; 1997) sets out to demonstrate the usefulness of the colon (cf. Hammond 1987, Hayes 1995) in accounting for the stress pattern of Munster Irish. The colon is a level of the prosodic hierarchy between the foot and the word, and according to Green (1997:p. 102) cola are binary over feet and syllables: they can consist of two feet or a foot and an unfooted syllable. Green (1997) also follows all previous works in assuming moraic footing for Munster Irish.

It is immediately obvious that cola are an effective way of getting the three-syllable window. It is also clear that Green's (1997) colon is very much akin to Gussmann's (1997) and Rowicka's (1996) 'Irish foot' (or the 'Germanic foot' of Dresher and Lahiri 1991), as it basically consists of a bimoraic constituent (the erstwhile foot head, now reinvented as the foot) and a 'trailing' part.

The main use of the colon is to make sure that the second syllable in an initial HH sequence is stressed: Green (1997) proposes that Munster Irish builds right-headed left-aligned cola if possible, which gives the correct result in cases such as HH́ and LLH́.

Empirically, the 'right-headed' approach of both Green (1997) and Rowicka (1996) is hard to reconcile with the fact that in the unmarked case when all syllables are light stress tends to the left. This is particularly relevant for LLLL forms, which have enough material to build two feet: if feet are parsed into a right-headed prosodic constituent, this should make the second of these feet the head.

Green (1997:128) claims that LLL words have the structure in (78).

(78)  Structure of LLLL words (reproduced from Green 1997)

[×              . ]     word

{×          . }        colon

(×    . )              foot

L    L    L    L

In fact, however, he does not demonstrate a tableau for this derivation. Green (1997) uses the following constraints:

- COLBIN: 'cola are binary'

- COLONFORM-RIGHT: 'cola are right-headed'

- ALL-*κ*-LEFT: 'the left edge of every colon is aligned with the left edge of the word'

- PARSEFT: 'parse feet into cola'

In (79) I apply the ranking proposed by Green (1997) to LLLL forms. I follow Green (1997) in using (round brackets) for feet, {braces} for cola and [square brackets] for prosodic words. I also use the word [ˈarəməkəx] 'tender' as an example instead of Green's (1997) [ˈfohərəgə] 'bathe', since I have also not been able to find this particular form in the sources for Corca Dhuibhne.

(79)  Tableau for LLLL forms according to Green (1997)

| /armakax/ | COLBIN | COLFMRT | ALL-*κ*-L | PARSE-FT |
|---|---|---|---|---|
| a. ☹ [{(ˈarə)mə}kəx] | | *! | | * |
| b. ☞ [{ə(ˈramə)}kəx] | | | | |
| c. ☞ [{(ərə)(ˈmakəx)}] | | | | |

As the tableau shows, the factual winner is harmonically bounded by at least two other candidates. These candidates could have been defeated by a high ranking of ALLFEETLEFT, which bans feet in positions other than the right edge. However, the existence of non-initial feet is crucial for Green (1997), as this is what ensures the correct result in the case of 'forward stress'.

(80)  Tableau for HH words according to Green (1997)

| /dʲiːviːnʲ/ | COLBIN | COLFMRT | ALL-*κ*-L | PARSE-FT |
|---|---|---|---|---|
| a. ☞ [{(dʲiː)(ˈviːnʲ)}] | | | | |
| b.    [{(ˈdʲiː)(viːnʲ)}] | | *! | | |
| c.    [{(ˈdʲiː)}(viːnʲ)] | *! | | | * |

Under a traditional approach, the footing of non-initial heavy — but not light — syllables can be ensured by ranking WEIGHT-TO-STRESS above ALLFEETLEFT. However, I have suggested above that WEIGHT-TO-STRESS must properly refer not to footing (i. e. hierarchical structure).

This objection is clearly internal to the theory. The real problem with the colon-based approach is the lack of clarity regarding the rôle of the colon in the overall prosodic structure of the word and of the representational possibilities for colon-internal structure. For instance, as alluded to above, any theory

which assumes that heads in Munster Irish are aligned to the right has to deal with the fact that main stresses always precede secondary stresses, as in HLHL forms such as [ˈuːdəˌrɑːʃəx] 'authoritative'. For Green (1997), there is no stress on the second heavy syllable in such forms: it projects a foot, but that foot is not part of a colon, because of the high ranking of ALL-κ-LEFT. The tableau in (81) is reproduced from Green (1997:p. 129) (using a different word).

(81)    The analysis of HLHL according to Green (1997)

| /uːdarɑːʃax/ | ALL-κ-LEFT | WSP | PARSEFT |
|---|---|---|---|
| a. ☞ [{(ˈuː)də}(rɑː)ʃəx] | | * | * |
| b.    [{(ˈuː)də}{(rɑː)ʃəx}] | *!* | * | |

Similarly, the second heavy syllable in [ˈuːdərɑːs] 'authority' is said to be unstressed because it 'falls outside the colon, [and] is not eligible to become the head syllable of a word' (p. 127). At this point, the lack of a representational distinction between stress and footing makes it quite difficult to evaluate the proposal. For instance, as (81) shows, the second heavy syllable involves a violation of WSP even though it is in fact footed: it is not clear whether the foot is intended to be 'headless' (not to mention the fact that the syllable *is* in fact stressed in these words).[14] Green (1997) appears to assume that a constituent at level $n$ can only be headed by a constituent of level $n - 1$. That is, the head syllable of a word must be inside a colon, and similarly a light syllable cannot be the head of a colon in the presence of a foot, even if that leads to misalignment, as in the case of HLL words, which build a left-headed colon. The precise rationale for this assumption is not entirely clear.

Another issue is the rôle of the syllable in colon parsing. Since Munster Irish is a quantity-sensitive language, Green (1997) assumes feet are built over morae (leaving aside the question of how exactly this algorithm 'bypasses' the syllable). However, the weak element of the colon is stipulated to be at least as small as a syllable, with no rationale given.[15]

The main issue for any traditional approach to Munster Irish stress is distinguishing between the different quadrimoraic structures: LLLL and HLL behave similarly with stress at the left edge, while HH, LLH, and LHL all stress the first heavy syllable from the right edge. Green (1997) resolves this conundrum by producing a ranking whereby the only non-initial feet are those that are projected by heavy syllables, and then imposing the single-colon structure on the resulting parse. In the final reckoning, this is essentially the same approach as that employed by Doherty (1991): only heavy syllables are footed, and a non-initial heavy syllable within four morae of the left edge shows special behaviour. Although Green's (1997) approach is less brute-force, it still relies on introducing an *ad hoc* level of the prosodic hierarchy, the relationship of which to other levels remains unclear.

In contrast, the present approach does not rely on any stipulations regarding initial quadrimoraic sequences. All foot parsing is driven by the same global principles that make no exceptions for the left edge, and stress is simply leftmost within the resulting structure, *modulo* WSP and *CLASH. In the final reckoning, the constituents used in the analysis, containing up to four morae, are somewhat reminiscent of the ternary structures of Gussmann (1997) and Rowicka (1996) and of Green's (1997) cola, but their ontology is much clearer: they are feet, and even when they are singled out by a constraint (as in the case of maximal projections), they do not cease being feet. I would suggest, therefore, that the present analysis has a number of both conceptual and empirical advantages over previous accounts of Munster Irish stress.

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[14]Similarly, Green (1997) appears unable to explain secondary stress in ĹLLH̀ forms.

[15]This can, however, be readily explained as a visibility asymmetry in terms of Dresher and van der Hulst (1998).

## 4. Conclusion

In this paper I have proposed an approach to the problem of stress in a variety of Munster Irish, and I have argued that the correct analysis rests on two pillars, both of which ultimately have to do with the existence of elaborate phonological representations.

First, I have argued that there is a representational distinction between the notions of being a 'head' of a prosodic constituent and of bearing 'stress'. The status of a prosodic node as a head is expressed by it being able to be the locus of head-dependent asymmetries, as argued by authors such as van de Weijer (1996), Dresher and van der Hulst (1998), Rice (2007) and others, whereas 'stress' is a feature that may or may not be associated exclusively with heads by the phonological computation. This approach presents a principled interpretation of notions such as 'tier conflation' and 'headless feet' in frameworks with 'shallow' phonological computations such as parallel Optimality Theory.

Second, I have proposed that the analysis and derivation of Corca Dhuibhne Irish requires the learner to recover a significant amount of what is essentially phonetically vacuous structure, including the notions of recursive constituents, the $X'$ schema, and elaborate constituent structure. At the very least, the analysis can be taken as an argument for constituent rather than flat structure (Kenstowicz 1993). More seriously, this approach asserts the autonomy of phonological representations: inasmuch as they cannot be recovered from the phonetics, the learner has to weigh up various representational to arrive at a grammar that is consistent with the ambient data. Although this can be viewed as a 'problem' in terms of learnability (since the learner has to recover significant amounts of 'hidden' structure), I would suggest that this is rather an argument for the hypothesis that an autonomous phonological component with a domain-specific representational alphabet is a necessary component of a theory of grammar.

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### References

Alber, Birgit. 2005. Clash, lapse and directionality. *Natural Language & Linguistic Theory* 23 3: 485–542.

Ball, Martin J. and Briony Williams. 2001. *Welsh phonetics*. No. 17 in Welsh Studies. Edwin Mellen Press, Lewiston, Queenston, Lampeter.

Barnes, Jonathan. 2006. *Strength and weakness at the interface: positional neutralization in phonetics and phonology*. Walter de Gruyter, Berlin.

Barnes, Jonathan. 2007. Phonetics and phonology in Russian unstressed vowel reduction: a study in hyperarticulation. MS., Boston University.

Bennett, Ryan. 2012. *Foot-conditioned phonotactics and prosodic constituency*. Ph.D. thesis, University of California, Santa Cruz.

Bermúdez-Otero, Ricardo. 2012. The architecture of grammar and the division of labour in exponence. In *The phonology and morphology of exponence: the state of the art*, edited by Jochen Trommer, no. 41 in Oxford Studies in Theoretical Linguistics, pp. 8–83. Oxford University Press, Oxford.

Blaho, Sylvia. 2008. *The syntax of phonology: a radically substance-free approach*. Ph.D. thesis, University of Tromsø, Tromsø.

Blaho, Sylvia, Patrik Bye, and Martin Krämer (eds.) . 2007. *Freedom of analysis?*. No. 95 in Studies in Generative Grammar. Mouton de Gruyter, Berlin.

Blankenhorn, Virginia S. 1981. Pitch, quantity and stress in Munster Irish. *Éigse* 18: 225–250.

Blumenfeld, Lev. 2011. Coercion and minimality. *The Linguistic Review* 28 2: 207–240.

Breatnach, Liam. 1995. An Mheán-Ghaeilge. In *Stair na Gaeilge*, edited by Kim McCone, Damian McManus, Cathal Ó Háinle, Nicholas Williams, and Liam Breatnach, pp. 221–333. Coláiste Phádraig, Maigh Nuad.

Ó Buachalla, Breandán. 2003. *An teanga bheo: Gaeilge Chléire*. Institiúid Teangeolaíochta Éireann, Baile Átha Cliath.

Buckley, Eugene. 2009. Locality in metrical typology. *Phonology* 26 4: 389–425.

Carnie, Andrew. 1994. Whence sonority? Evidence from epenthesis in Modern Irish. In *MIT working papers in linguistics 21: Papers on pnohology and morphology*, edited by Andrew Carnie, Heidi Harley, and Tony Bures. MITWPL, Cambridge, MA.

Crowhurst, Megan J. 1996. An optimal alternative to Conflation. *Phonology* 13 3: 409–424.

Crowhurst, Megan J. and Mark Hewitt. 1995. Prosodic overlay and headless feet in Yidiɲ. *Phonology* 12 1: 39–84.

Ó Curnáin, Brian. 2007. *The Irish of Iorras Aithneach, Co. Galway*. Dublin Institute for Advanced Studies, Dublin.

Dalton, Martha and Ailbhe Ní Chasaide. 2005. Tonal alignment in Irish dialects. *Language and Speech* 48 4: 441–464.

Doherty, Cathal. 1991. Munster Irish stress. In *Phonology at Santa Cruz 2*, edited by Armin Mester and Scarlett Robbins, pp. 19–32.

Downing, Laura J. 2006. *Canonical forms in prosodic morphology*. No. 12 in Oxford Studies in Theoretical Linguistic. Oxford University Press, Oxford.

Dresher, Elan and Harry van der Hulst. 1998. Head-dependent asymmetries in prosodic phonology: visibility and complexity. *Phonology* 15 3: 317–352.

Dresher, Elan and Aditi Lahiri. 1991. The Germanic foot: metrical coherence in Germanic. *Linguistic Inquiry* 22 2: 251–286.

Elfner, Emily. 2011. *Syntax-prosody interactions in Irish*. Ph.D. thesis, University of Massachusetts, Amherst, Amherst.

Garvin, Barbara. 1989. Un fenomeno di prosodia romanesca nel Belli e nella lingua odierna. In *Il romanesco ieri e oggi*, edited by Tullio De Mauro, pp. 149–174. Roma: Bulzoni.

Gordon, Matthew. 2000. Re-examining default-to-opposite stress. *BLS* 26: 101–112.

Green, Anthony Dubach. 1996. Stress placement in Munster Irish. *CLS* 32: 77–92.

Green, Anthony Dubach. 1997. *The prosodic structure of Irish, Scots Gaelic, and Manx*. Ph.D. thesis, Cornell University.

Gussmann, Edmund. 1997. Putting your best foot forward: stress in Munster Irish. In *Celts and Vikings: proceedings of the Fourth Symposium of Societas Celtologica Nordica*, edited by Folke Josephson, pp. 103–133. Göteborgs Universitet, Göteborg.

Halle, Morris and Jean-Roger Vergnaud. 1987. *An essay on stress*. MIT Press, Cambridge.

van Hamel, Anton Gerardus. 1926. De accentuatie van het Munster-Iersch. *Mededeelingen der Koninklijke Akademie van Wetenschappen, afdeling Letterkunde* LXI, serie A: 287–324.

Hammond, Mike. 1987. Hungarian cola. *Phonology Yearbook* 4: 267–269.

Hayes, Bruce. 1995. *Metrical stress theory: principles and case studies*. University of Chicago Press, Chicago.

Hickey, Raymond. 2011. *The dialects of Irish: Study of a changing landscape*. No. 230 in Trends in Linguistics. Mouton de Gruyter.

Ó hÓgain, Éamonn. 1984. *Díolaim focal (A) ó Chorca Dhuibhne*. Acadamh Ríoga na hÉireann, Baile Átha Cliath.

van der Hulst, Harry and Marian Klamer. 1996. The uneven trochee and the structure of Kambera roots. In *Dam Phonology*, edited by Marina Nespor and Norval Smith. Holland Academic Graphics, The Hague.

van der Hulst, Harry and Nancy Ritter (eds.) . 1999. *The syllable: views and facts*. No. 45 in Studies in Generative Grammar. Mouton de Gruyter, Berlin.

Hyde, Brett. 2001. A restrictive theory of metrical stress. *Phonology* 19: 313–339.

Hyde, Brett. 2008. Alignment continued: distance-sensitivity, order-sensitivity, and the Midpoint Pathology. MS., Washington University.

Hyde, Brett. 2012. Alignment constraints. *Natural Language & Linguistic Theory* 30: 789–836.

Itô, Junko and Armin Mester. 2007. Prosodic adjunction in Japanese compounds. In *Proceedings of FAJL 4*, vol. 55 of *MIT Working papers in linguistcs*, pp. 97–112. MITWPL, Cambridge, MA.

Itô, Junko and Armin Mester. 2009. The onset of the prosodic word. In *Phonological argumentation: essays on evidence and motivation*, edited by Steve Parker, no. 5 in Advances in Optimality Theory, pp. 227–260. Equinox, London.

Itô, Junko and Armin Mester. forthcoming. Prosodic subcategories in Japanese. *Lingua* .

Jurgec, Peter. 2010. *Feature Spreading 2.0: a unified theory of assimilation*. Ph.D. thesis, University of Tromsø, Tromsø.

Kager, René. 2000. Rhythmic directionality by positional licensing. Handouts of talks at the International Conference of Stress and Rhythm, CIEFL, Hyderabad, and at the Fifth HILP Phonology Conference, Potsdam. ROA-514.

Kariņš, A. Krišjānis. 1996. *The prosodic structure of Latvian*. Ph.D. thesis, University of Pennsylvania, Philadelphia.

Kenstowicz, Michael. 1993. Evidence for metrical constituency. In *The view from Building 20*, edited by Kenneth L. Hale and Samuel Jay Keyser, pp. 257–273. MIT Press, Cambridge, MA.

Kiparsky, Paul. 2000. Opacity and cyclicity. *The Linguistic Review* 17 2–4: 351–367.

Krämer, Martin. 2009. *The phonology of Italian*. Oxford University Press.

Levin, Juliette. 1985. *A metrical theory of syllabicity*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, MA.

Loth, Joseph Marie. 1913. L'accent dans le gaélique du Munster. *Revue de phonétique* 3: 317–343.

Ó Luineacháin, Dáithí. 1995. *Cnuasach focal ón gCom*. Coiscéim, Baile Átha Cliath.

Martínez-Paricio, Violeta. in preparation. *An exploration of minimal and maximal feet*. Ph.D. thesis, University of Tromsø, Tromsø.

McCarthy, John J. 2003. OT constraints are categorical. *Phonology* 20: 75–138.

McCarthy, John J. 2007. *Hidden generalizations: phonological opacity in Optimality Theory*. No. 1 in Advances in Optimality Theory. Equinox.

Mellander, Evan. 2003. (HL)-creating processes in a theory of foot structure. *The Linguistic Review* 20 2–4: 243–280.

Morén, Bruce. 2007. The division of labour between segment-internal structure and violable constraints. In Blaho et al. (2007), pp. 313–344.

Myers, Scott. 2000. Boundary disputes: the distinction between phonetic and phonological sound patterns. In *Phonological knowledge: concepts and empirical issues*, edited by Noel Burton-Roberts, Philip Carr, and Gerard Docherty, pp. 245–272. Oxford University Press, Oxford.

Ní Chiosáin, Máire. 1999. Syllables and phonotactics in Irish. In van der Hulst and Ritter (1999), pp. 551–575.

Ní Chiosáin, Máire and Jaye Padgett. 2012. An acoustic and perceptual study of Connemara Irish palatalization. *Journal of the International Phonetic Association* 42 2: 171–191.

O'Rahilly, Thomas F. 1936. *Irish dialects: past and present, with chapters on Scottish and Manx.* Browne & Nolan, Dublin.

Padgett, Jaye. 2001. Contrast dispersion and Russian palatalization. In *The role of speech perception in phonology*, edited by Elizabeth V. Hume and Keith Johnson, pp. 187–218. Academic Press, San Diego.

Pearce, Mary. 2006. The interaction between metrical structure and tone in Kera. *Phonology* 23 2: 259–286.

Prince, Alan S. and Paul Smolensky. 1993. Optimality Theory: Constraint interaction in generative grammar. Tech. rep., Rutgers University Center for Cognitive Science and University of Colorado, Boulder.

Rice, Curt. 1992. *Binarity and ternarity in metrical systems: parametric extensions.* Ph.D. thesis, University of Texas, Austin.

Rice, Curt. 2007. The roles of GEN and CON in modeling ternary rhythm. In Blaho et al. (2007), pp. 233–257.

Riggle, Jason. 2004. Contenders and learning. *WCCFL* 23: 649–662.

Rowicka, Grażyna. 1996. 2+2=3: Stress in Munster Irish. In *A Festschrift for Edmund Gussmann from his friends and colleagues*, edited by Henryk Kardela and Bogdan Szymanek, pp. 217–238. Wydawnictwo KUL, Lublin.

Ó Siadhail, Mícheál. 1989. *Modern Irish: grammatical structure and dialectal variation.* Cambridge University Press, Cambridge.

Ó Siadhail, Mícheál and Arndt Wigger. 1975. *Córas fuaimeanna na Gaeilge.* Institiúid Ard-Léinn Bhaile Átha Cliath, Baile Átha Cliath.

Sjoestedt-Jonval, Marie-Louise. 1931. *Phonétique d'un parler irlandais de Kerry.* Librairie Ernest Leroux, Paris.

Smith, Jennifer L. 2002. *Phonological augmentation in prominent positions.* Ph.D. thesis, University of Massachusetts, Amherst, Amherst.

Smith, Jennifer L. 2004. Making constraints positional: toward a compositional model of CON. *Lingua* 114 12: 1433–1464.

Smith, Norval. 1999. A preliminary account of some aspects of Leurbost Gaelic syllable structure. In van der Hulst and Ritter (1999), pp. 577–630.

Ó Sé, Diarmuid. 1984. Coimriú siollaí tosaigh sa Ghaeilge. *Éigse* 20: 171–186.

Ó Sé, Diarmuid. 1989. Contributions to the study of word stress in Irish. *Ériu* 40: 147–178.

Ó Sé, Diarmuid. 2000. *Gaeilge Chorca Dhuibhne.* Institiúid Teangeolaíochta Éireann, Baile Átha Cliath.

Ó Sé, Diarmuid. 2008. Word stress in Munster Irish. *Éigse* 36: 87–112.

Teeple, David. 2009. *Biconditional prominence correlation.* Ph.D. thesis, University of California, Santa Cruz, Santa Cruz.

Vaysman, Olga. 2008. *Segmental alternations and metrical theory.* Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, MA.

Wagner, Heinrich and Nollaig Mac Congáil. 1983. *Oral literature from Dunquin, Co. Kerry.* Institute of Irish studies, Queen's University of Belfast, Belfast.

Walters, J. Roderick. 2003. On the intonation of a South Wales "Valleys accent" of English. *Journal of the International Phonetic Association* 33 2: 211–238.

van de Weijer, Jeroen. 1996. *Segmental structure and complex segments.* No. 350 in Linguistische Arbeiten. Max Niemeyer Verlag, Tübingen.

Williams, Briony. 1985. Pitch and duration in Welsh stress perception: the implications for intonation. *Journal of Phonetics* 13 4: 381–406.

Williams, Briony. 1999. The phonetic manifestation of stress in Welsh. In *Word prosodic systems in the languages of Europe*, edited by Harry van der Hulst, no. 20 in Empiricial Approaches to Language Typology, pp. 311–354. Mouton de Gruyter, Berlin.

Youssef, Islam. 2010. Laryngeal assimilation in Buchan Scots. *English Language and Linguistics* 14 3: 321–345.

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