A Note on Diphthongization before Tense Sonorants in Irish: An Articulatory Explanation

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Abstract
This article argues that the diphthongization found before historically long consonants in some dialects Irish is a direct correlate of the Advanced Tongue Root (ATR) articulation of these same consonants in other dialects.

1. Introduction

The well-studied phenomenon of vowel lengthening before tense sonorants in Modern Irish (Ó Siadhail 1989, Ó Siadhail and Wigger 1975, Ó Bacill 1979), exemplified in (1), is now well understood as a compensatory process (see for example Ní Chiosáin 1991). Tense or long sonorants (/L, L’, R’, N, N’, m/) often orthographically represented as mn, ln, rr, and m) trigger vowel lengthening and/or diphthongization in monosyllabic words, or when preceding a consonant. What is not clear about this phenomenon is the phonological motivation for the diphthongization that appears in many dialects (1) (data from Ó Sé 1995).

1) Short vowel
    crannáloch ‘wooded’ [kraNi:xə]    crauns ‘tree’ [kroun]
    polladh ‘perforation’ [pOlə]      poll ‘hole’ [poul]

In this short article, I present an articulatory explanation of this diphthongization. I claim this shift in vowel quality is a direct physiological result of the articulation of the tense sonorant. I claim that if tense sonorants involve an advanced tongue root, a natural consequence is that the body of the tongue is forced upwards in the mouth. This results in both
(a) the vowel being raised in the diphthong, and (b) the alveopalatal articulation of these consonants described in Ní Chasaide (1995), Ó Murchú (1985) and An tSiúr Annuntiata and An tAtháir Ó Huailacháin (1989) (as opposed to dental/velar articulation of the lax sonorants).

This article is organized as follows. In section 2, a brief description of the phenomenon is presented. In section 3, I discuss the lengthening aspect of the phenomenon, presenting Ní Chiosáin’s (1991) autosegmental analysis in terms of consonant degemination followed by compensatory lengthening of the vowel. Finally in section 4, I discuss the articulatory basis for the vowel-raising component of the diphthongization and relate the vowel height effect directly to the underlying featural structure of the consonant using evidence from dialect variation and from various phonetic descriptions of the phenomenon.

2. Background

2.1. A brief description of the phenomenon

Tense consonants in Irish trigger either the lengthening or diphthongization of the preceding vowel in stressed syllables when consonant appears either word finally (2a) or before another consonant (2b). When the tense consonant appears before a vowel, the vowel remains short (2c). (Data from Ó Sé (1995))

2) a) [fi:li:] fill ‘bend (V)’
   b) [fi:li:te] fillte ‘bent (A)’
   c) [fi:li:s] fillsléadh ‘bend (N)’

A similar example from Ní Chiosáin is seen in (3):

3) a) [gli:ao:Na] gleann ‘valley’ (nominative)
   b) [gTiu:Na] gleantha ‘valleys’
   c) [gTiu:Na] gleanna ‘valley’ (genitive)

For the most part, in all dialects, /R/ triggers only lengthening, and never diphthongization (4). This is unsurprising, given the fact that the /R/ ~ /l/ distinction is most restricted in distribution dialectally, and appears to be disappearing in the language.

4) /ba:R/ [ba:R] barr ‘top’ (Conamara)
   Similarly /m/ and /mˠ/ only trigger lengthening. In the account I give below in section 4, this follows straightforwardly, as these sonorants do not involve a lingual articulation at all, so tongue position features which might affect vowel quality would not necessarily be present.

Not all vowels undergo lengthening, and the range of vowels undergoing diphthongization seems to be highly dialect sensitive. For example it is highly extensive in Munster (Corca Dhuibhne etc.) as described by Ó Sé (1995), Ua Súilleabhráin (1994) and Sjoested-Jonval (1938). By contrast, the more northerly dialects have lengthening but no diphthongization. For a survey of the dialectal variation on this point, see Ó Baoill (1979), Ó Siadhail (1989), and O’Rahilly (1932). Much of my data is taken from Ó Siadhail (1989), Ní Chiosáin (1991) and Ó Sé (1995).

Ó Siadhail (1989) reports that high vowels almost universally just lengthen (5):

5) /ki:l/ [k’i:l] cill ‘graveyard’

The exceptions are in the Ring and Clare dialects, where diphthongization appears with underlying high vowels (6). Ó Siadhail claims that these forms actually involve vowel lowering, followed by subsequent application of the diphthongization that applies to mid and low vowels.

6) /k’il/ [k’ai:l’] cill ‘graveyard’ (Clare)

Mid vowels diphthongize in both Conamara and Munster Irish. With the resulting diphthongs being realized as [au] in front of broad [+back] consonants, and [ai] in front of slender [-back] ones.

7) a) /pO:l/ [paul] poil ‘hole’
   b) /pe:l/ [pail’] poill ‘holls’

While a few words with low vowels show diphthongization in Conamara, low-vowel diphthongization is primarily limited to Munster.

8) /gaN/ [gaun] gamm ‘scarce’ (Munster)
   [gan] (Conamara)
To summarize, tense consonants (including /R/) trigger a lengthening of the preceding vowel in most dialects. /R/, /R'/, /m/ and /m'/ seem to trigger lengthening but never diphthongization. High vowels are exempt from diphthongization as well. The further south one goes, the greater chance that this lengthening is realized as diphthongization. In Conamara, mid vowels diphthongize. In Munster, both mid and low vowels undergo the process. The lengthening and diphthongization is present when the sonorant is either word final or precedes a consonant. It does not occur when the sonorant precedes a vowel.

2.2. A few words on the origin of the phenomenon.
There are really two issues of interest in this process. First, we have the question of what triggers the lengthening part of this phenomenon. Second, we must address the question of what constitutes the phonological motivation for the quality change in these vowels. We can address this question both from a diachronic and synchronic point of view. Before turning to an analysis of diphthongization, a few words on the possible origins of the phenomenon are in order.

By the Old Irish period, the language appears to have been in the process of losing the contrast between geminate7 (long) consonants and single or short consonants (Thurneysen 1946). Among sonorants, the historical geminate/short contrast is retained in the distinction between tense and lax consonants (O’Rahilly 1932) (similar to the way in which the contrast between modern intervocalic fricatives and stops reflects the archaic distinction between single consonants and geminates and consonant clusters, and the way in which lax consonants constitute the lenited variant of tense consonants in many dialects). The geminate origin of these tense consonants is reflected in the modern spellings (which of course have been regularized to represent even cases that were not historically geminates) of tense consonants <rr>, <mn>, <ll> etc.5 in medial and final positions. As will be seen in the next section, the geminate nature of these elements is also reflected in the compensatory lengthening they trigger.

Williams (1984) observes that it is not at all clear when diphthongization and lengthening first appeared in Irish. Poetry from the late 16th century (well into the Modern Irish period) is the first place it is well attested. However, the effects of lengthening in these compensatory environments are well attested, so we might presume an earlier origin which results from degemination. The fact that lengthening is found in all dialects, but diphthongization shows a more limited geographical distribution suggests that the diphthongization is a relatively recent phenomenon. Since it is found most extensively in the dialect (Munster) that does not show a difference in the actual articulation of tense and lax sonorants, we might even speculate that the diphthongization is a result or residual effect of the loss of this distinction, as is hypothesized below in section 4.

3. Compensatory Lengthening
Ó Baoill (1979) and Ní Chiosáin (1991) identify the phenomenon discussed above in section 2 as compensatory. I adopt here, with very little modification, the illuminating analysis of Ní Chiosáin (1991), cast in Moraic theory (Hyman 1985; Hayes 1989; McCarthy and Prince 1986).

Moraic theory is an approach to syllable structure based on weight bearing units or morae (μ). Each language has a specific template for syllable structure. Ní Chiosáin proposes that Irish has a maximally binary moraic template. Morae can enter into the syllable structure from two origins, one is from the template along a particular mapping, and the other is from inherent specification. To see how this works, compare the treatment of short and long vowels in Moraic theory. The underlying representation of short vowels contains no mora; long vowels, by contrast, have one inherent mora:

9) short vowels
   \[
   \mu
   \overset{\text{V}}{\text{V}}
   \]

The mapping algorithm for syllables given by Ní Chiosáin is shown in (10), and the template for Irish is given in (11):

10)  a) all [- cons] segments project a mora
     b) morae dominating [- cons] segments project a syllable30
     c) map exhaustively to the template.
11) \( \sigma \rightarrow \mu (\mu) \)

When this algorithm is applied to structures like (9) we get two very different syllabic structures:

12) a) \[
\begin{array}{c}
\sigma \\
C \\
V \\
C \\
\end{array}
\]

b) \[
\begin{array}{c}
\sigma \\
\mu \\
C \\
V \\
C \\
\end{array}
\]

In the case of the short vowel (12a), the syllable projects a single mora, which is allowed by the template in (11). Long vowels have an inherent mora, and also project a mora by the mapping algorithm, this results in the bi-moraic structure shown in (12b).

Ni Chiosáin argues that a similar treatment should be given to tense sonorants. These should be treated as long consonants, which have inherent morae.

13) lax consonants

\( /l/ \)

tense consonants

\( /L/ \)

For Ni Chiosáin this prosodic distinction is the only difference between so-called lax and tense consonants. Although she is not explicit on this point, in her inventories of Irish phonemes she presents no articulatory differences between them. I present a slightly contrasting view below in section 4.

The way in which moraic consonants get inserted into the syllable structure adds a slight complication to the mapping algorithm in (10). Ni Chiosáin claims that only sonorants are allowed to bear morae. Somewhat stipulatively, she claims that sonorant consonants in Irish are never actually allowed to surface with an attached mora. This is effected by means of the rule of Moraic Consonant Delinking (MCD):

14) \[
\begin{array}{c}
\mu \\
\rightarrow \\
C \\
\end{array}
\]

The result of the rule in (14) is that any syllable containing a tensed sonorant will also contain a floating mora. It is this mora that triggers the compensatory lengthening of the vowel. Consider the following derivation of gleamn 'glen' /g' l:a:N/ [g' l:a:n] taken from Ni Chiosáin (1991):

15) a) \[
\begin{array}{c}
\mu \\
\rightarrow \\
/l'/ a \ N \\
\end{array}
\]

b) \[
\begin{array}{c}
\mu \\
\rightarrow \\
/l'/ a \ N/ \\
\end{array}
\]

c) \[
\begin{array}{c}
\mu \\
\rightarrow \\
[g' l: a: n] \\
\end{array}
\]

(15a) shows the underlying representation of this word, with the inherent mora. (15b) shows both the result of mapping to the template and the application of the MCD rule. Finally (15c) shows the resultant linking of this mora to the vowel, and subsequent resyllabification, which results in vowel lengthening. Syllables without moraic consonants will, obviously, not result in any vowel lengthening.

Let us now consider what happens in a form where the underlying nasal is not entirely tautosyllabic with the vowel that precedes it. This is the situation where the tense consonant precedes a vowel, and thus is ambisyllabic. An example, again taken directly from Ni Chiosáin (1991), is the genitive of the word for 'valley' /g' l:a:N/ [g' l:a:n] gleanna:

16) a) \[
\begin{array}{c}
\mu \\
\rightarrow \\
/g' l: a \ N/ \\
\end{array}
\]

b) \[
\begin{array}{c}
\mu \\
\rightarrow \\
/g' l: a \ n/ \\
\end{array}
\]

c) \[
\begin{array}{c}
\mu \\
\mu \\
\rightarrow \\
/g' l: a \ n/ \\
\end{array}
\]

The rule of MCD does not apply in this form because the structural
description for this rule specifies only one association line dominating the consonant. In (16b), there are two association lines, so the rule does not apply, thus there is no floating mora and no compensatory lengthening.

Ni Chiosáin thus provides a satisfactory, if partially stipulative, account of the lengthening component of the phenomenon in question. What is lacking is an explanation for why in some dialects diphthongization rather than mere lengthening is triggered. It is this question that I turn to in the next section.

3. Diphthongization

3.1 Analysis

As noted above in section 2, the diphthongization component of this phenomenon is more limited both in terms of what segments it applies to, and in terms of which dialects it appears in. I think, in part because of this, an explanation for the raising of the second part of the vowel has not been readily forthcoming. It is a well-attested fact that the front/back quality of these lengthened short vowels is predictable from the underlying quality of the consonants that surround them. However, why a long sonorant should affect the height of the vowel is much more mysterious. There is no obvious articulatory explanation for this fact. It is to this question that I turn now.

One surprising fact on which, to my knowledge, no author has commented is the complementarity between the diphthongization of the vowel, and an overt difference in pronunciation in the tense/lax sonorant. Dialects which exhibit diphthongization (such as Corca Dhuibhne and other Munster dialects; as well as Conamara Irish) seem to be precisely the set of dialects without a modern surface tense/lax distinction in sonorants. Those dialects, primarily in Ulster, with such a distinction (see for example Lucas 1979 and Hamilton 1974) exhibit only lengthening, not diphthongization.

It seems to me that this complementarity is a striking argument in favour of the phenomena being related to one another. This generalization is missed in all previous accounts. In particular, I claim that diphthongization of vowels is a direct result of two interrelated factors. First, I claim that there is a distinction between dialects with overt expression of tense sonorants and those without it. In particular, I claim that dialects with the tense/lax distinction have an "Advanced Tongue Root" [+ATR] feature attached to their feature complexes. By contrast, in dialects with diphthongization, I claim this feature is attached to the prosodic mora structure, and not the root node of the vowel. When the mora delinks from the sonorant, it takes the feature with it. Subsequently, when the mora is compensatorily attached to the vowel, the feature becomes attached to that vowel.

17) a) Munster b) Ulster

\[ \text{[+ATR]} \quad \text{L} \quad \text{[+ATR]} \quad \text{[+ATR]} \]

Another way of phrasing this is that [+ATR] is a floating prosodic feature in Munster Irish, and not in Ulster. The second part of this analysis is in explaining why the [ATR] feature triggers a change in vowel height. This comes from a simple articulatory fact, ATR articulation, where the back of the tongue is advanced forward in the mouth, naturally results in the body of the tongue being forced up. The mass of the tongue muscle is stable, when the root of the tongue is pushed forward there is a necessary corresponding shift of the back of the tongue upward to compensate as observed in Auchangeli and Pulleyblank (1994). This is formalized in the grounding condition in (18b)

18) a)

\[ \text{[+ATR]} \]

b) If [+ATR] then [+High]
3.2 The phonetics of ‘tense’ sonorants

Although there is extensive phonetic analysis of many Irish dialects, this work was primarily conducted as transcription of native speakers. Very little instrumental analyses of Irish articulatory phonetics have ever been conducted (notable exceptions include Ni Chasaide). In particular, a clear gap in the literature is seen in the use of modern soft-tissue imaging tools such as fMRI scans and palatology. Turning to the matter at hand, given where in the mouth ATR articulation occurs (that is, out of view in the pharynx) it is impossible at this point to verify with total certainty that tense sonorants do indeed involve an advanced tongue root. I look forward to someone with an appropriately equipped lab conducting such a verification. This said, there is certainly attested articulatory evidence that indirectly points towards a [+]ATR analysis.

Before we get into the details, it should be noted that many phonic descriptions of Irish dialects totally ignore the question of differences among sonorants (Ó Baoill 1986; Ó Cuív 1924) or treat the distinction as being only one of length (Ni Chiosáin 1991). Even among those that do assume a difference either synchronically or diachronically (such as Breathnach 1947; Ó Siadhail 1989; Ó Cuív 1944; Lucas 1979; Hamilton 1974; Christian Bros. 1905; Stockman 1974 etc.), there is no specification of the nature of the difference between tense and lax sonorants, instead simply a labelling of them as “tense” or “lax”. It may be naïve to interpret this terminology as referring to the same phenomena as found in the vowel system of English. However if by chance there is such a correspondence, then tense sonorants may well be analysed as [+]ATR much like tense vowels in English. This is, of course, only the weakest of possible arguments.

Some works do provide articulatory descriptions of these sonorants. Two works on Irish phonetics are Ó Murchú (1985) and An Siúr Annuintaile le Muire and An tAithair Ó Huallacháin (1989). Both of these sources describe three way distinctions between /i/, //, and /a/ and between /lN/, /lN/ and /N/. These are distinguished in terms of the place of articulation of the sound, and in terms of the amount of tongue coming into contact with the roof of the mouth. Neither of these sources discuss the broad variants (/lN/, /lN/), which must also exist (as noted by Ó Siadhail 1989) at least underlyingly in order to account for diphthongization and lengthening in forms like ann ‘in it’ [aqun] (Munster) ~ [aN] (Ulster) even if they do not surface in any dialect. Dialect studies of Irish vary in the type...
and number of these sonorants. Ni Chasaide (1995) (see also Ni Chasaide 1979) provides perhaps the most detailed and accurate description of the articulation of these sounds in Ulster (Gaelt Dobhair) Irish. She also posits a three-way distinction – but this time between /l/, /L/, and /L/. However, she also notes that researchers have also posited that /l/ has existed in historical times. A similar three-way distinction is made by de Bhaldraithe (1945), Ó Buíl (1970), Ó Baoil (1996) and Mhic an Fhaileigh (1968) show four-way distinctions. The following chart describes the places of articulation for each of these sonorants as described by these authors.

<table>
<thead>
<tr>
<th></th>
<th>/l, n/</th>
<th>/l, n/</th>
<th>/l, N/</th>
<th>/l, N/</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; O H.</td>
<td>alveolar (back of the tongue raised /l/ quality)</td>
<td>alveolar (front (lamina) of the tongue raised /l/ quality)</td>
<td>–</td>
<td>palatal-alveolar, with the tip of the tongue touching the lower teeth</td>
</tr>
<tr>
<td>Ó Murchú</td>
<td>dental</td>
<td>alveolar</td>
<td>–</td>
<td>palatal</td>
</tr>
<tr>
<td>Ni Chasaide</td>
<td>alveolar</td>
<td>palatalized alveolar</td>
<td>velerized dental</td>
<td>palatalized alveopalatal</td>
</tr>
<tr>
<td>de Bhaldraithe</td>
<td>–</td>
<td>palatalized alveolar</td>
<td>velerized dental</td>
<td>palatal</td>
</tr>
<tr>
<td>Ó Buíl</td>
<td>velerized alveolar</td>
<td>palatalized alveolar</td>
<td>dental (close to interdental)</td>
<td>source says palatalized alveolar (but articulatory description is of palatal)</td>
</tr>
<tr>
<td>Mhic an Fhaileigh</td>
<td>velerized post-alveolar</td>
<td>palatalized alveolar</td>
<td>velerized dental</td>
<td>alveopalatal</td>
</tr>
<tr>
<td>Ó Baoil</td>
<td>tip of the tongue against the &quot;ridge of the teeth&quot;,15 with the back of the tongue raised towards the velum</td>
<td>tip of the tongue against the &quot;ridge of the teeth&quot;, with the front of the tongue pressed towards the palate</td>
<td>front of the tongue against the upper teeth</td>
<td>front of tongue against the lower teeth and against the &quot;ridge of the teeth&quot;</td>
</tr>
</tbody>
</table>

*merged with velerized dental

This is quite a mess. Let us consider what unifying themes emerge: The slender lax consonants /l/, /n/ seem to be quite clearly alveolar in articulation with a /l/–like quality to the sound. Broad consonants (of both lax and tense sort) seem to involve either dental or alveolar articulation with a raised tongue back, resulting in a /l/–quality to the sounds. It is not at all clear what the difference between these broad tense and lax consonants are, since researchers do not seem to agree on which ones are actually realized in the language. One thing that can be observed about Ni Chasaide’s and de Bhaldraithe’s descriptions is that they are fully consistent with a high tongue body or back (giving a combination of a [+back] [+high] secondary articulation) with the tongue tip anchoring the articulation at the teeth. Finally, the overwhelming trend in the description of slender tense sonorants /l/, /n/ is that they involve some kind of palatal articulation with contact on the roof of the mouth stretching from the alveolar ridge to the palate with the entire body of the tongue.

This latter description is consistent with two hypotheses about the featural content of tense consonants. One is the account given above in section 4.1, where an ATR feature is present and as an ancillary effect forces the tongue body up (22). This is seen most clearly in an TÁthair Amhuinte a Le Muire and an Tháthair Ó Huailfachain (1989)’s description of a balled-up tongue pressed against the whole front of the mouth, with the tongue tip touching the lower teeth.

Alternately one might simply hypothesize a [+high] feature instead of ATR triggering some ancilliary raising. This [+high] would result in
diphthongization in Munster, and a palatal articulation of the sonorant in Ulster. There is a good reason, however, to think that the ATR analysis is preferable. This evidence comes from the behavior of diphthongization in Conamara Irish.

4.3 Diphthongization in Conamara Irish: Evidence for ATR

As noted above two possible analyses for the diphthongization exist: one where [ATR] is the relevant feature, and the vowel height is the natural consequence of this articulatory gesture. The other, is that a simple [+high] feature triggers the alternation. On the surface, the [+high] hypothesis seems simpler and is certainly consistent with the attested articulatory descriptions of tense sonorants. However, there is fairly straightforward evidence from the behavior of the Conamara dialect that allows us to distinguish among these hypotheses.

In Conamara Irish, only mid vowels show diphthongization:

23) a) /fiːl/ [fiːl] fill bend
b) /poːl/ [pəul] poll hole
c) /g'laːN/ [gˠlaːn] gleann valley

This is a fairly surprising result. Why should low vowels be exempt from the process? We might think that an answer to this question lies in the incompatibility between [+high] and [+low], which presumably violates some universal constraint on feature co-occurrence:

24) *[+high, +low]

If this were the case, however, we would also expect low vowels in Munster Irish to be immune to the phenomenon — contra to fact. This suggests the relevant feature involved is not [+high], and the non-diphthongization of Conamara Irish low vowels finds an alternative source. In an ideal situation, we would like to attribute this difference to some other phonological property of Conamara that is not found in Munster.

One feature of Conamara Irish, not regularly found in Munster, is a rule of long vowel backing (Ó Siadhail 1989). Underlyingly long low vowels and low vowels that have been lengthened compensatorily (in contrast to ones that have been lengthened by certain late lengthening processes) are articulated farther back in the mouth:

25) a) aː → aː;
    b) /baːd/ bád ‘boat’ → [baːd]

Consider now the articulation of such low back vowels. They are inherently incompatible with an ATR articulation — not because of height, but because of backness. ATR involves advancing the tongue root (and thus the tongue body) frontwards, low back vowels by show the opposite effect.

26) [lal]

We can formalize this in the following well-formedness statement:

27) *[+low, +back, +ATR]

If this is the case, then the ATR component of the lengthening process is neutralized by (26–7). Notice that this analysis requires [ATR] not [high] since there is nothing articulatorily incompatible between [+back] and [+high], indeed Irish has [+back, +high] vowels like [u]. Moreover, it allows us to derive the unexpected behavior of Conamara low vowels from an independent property of this dialect, the low vowel backing rule.

5. Conclusion

In this short article, I have argued that diphthongization in from of tense sonorants in Modern Irish dialects is due to an ancillary effect of an [ATR] feature on those tense sonorants. Depending upon the dialect, this
[ATR] feature is either realized as a high alveopalatal articulation of the sonorant or in the raising on the second mora of a compensatorily lengthened segment. The differences among dialects have two causes. Conamara and Munster Irish, in contrast with Ulster Irish, treat the [ATR] feature as a prosodic feature, associated with Morae. This explains why Munster and Conamara Irish have diphthongization but Ulster exhibits tense articulation among the sonorants. The differences between Munster and Conamara follow from the fact that the latter dialect has a vowel-backing rule for low vowels, and a [+low, +back] articulation is incompatible with an ATR gesture.

What is obviously missing from this account is instrumental evidence for ATR gestures in southern Irish diphthongs, and Ulster sonorants. I hope that with the recent proliferation of such new technologies as fMRI and other soft-tissue imaging, that confirmation or refutation of this hypothesis will soon be forthcoming.

Notes
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1. As is standard on the literature on Irish phonology, I use capitals to represent the class of 'tense' or 'long' sonorants. These symbols do not have their IPA values here. A thorough discussion of the articulation of these consonants is found below. Not all dialects show a difference in pronunciation between tense and lax sonorants (as discussed extensively below in section 3). However, like Ó Sláthall (1989), I frequently mark the distinction in my transcriptions as the effect of these consonants is seen elsewhere in the phonology, even when there is no outward articulatory difference in the dialect.

2. A quick note on transcription: careful readers will notice occasional inconsistencies among the transcriptions of words in this paper. I have chosen where possible to retain the transcription of the original source material, which are often from a variety of dialect areas, thus accounting for apparent inconsistencies. More on the differences between dialects is discussed below.

3. The transcriptions in the following data are modified from the original for expository purposes. The actual [N] ~ [n] and [L] ~ [l] distinctions in Conamara and Munster are usually neutralized, realized only by the vowel length alternation. I have indicated the distinction in this transcription, so that it is clear what the context of the diphthongization/lengthening is. The actual transcriptions for these words should read [t[}, [t[le], [t[i]], [g[uen], [g[ante], [g[t]. Discussion of the consonant neutralization is found below in section 3.

4. I adopt here the underlying inventories of Ni Chiosáin (1991). She claims that short vowels in Irish only show distinctions of height, the front/back distinction is predictable from the quality of the surrounding consonants (that is, broad, [+back] consonants trigger [+back] short vowels and slender [-back] consonants result in [-back] short vowels).

5. In Ring and Muskerry these can alternately surface as [ei] and [ou] (Ó Sláthall 1989).

6. As noted above the [L]-[l] and [N]-[n] distinctions do not surface as such in these dialects.

7. Greene (1956) argues that only geminate sonorants (but not obstruents) existed in Old Irish. See also the discussion in Isaac 1997.

8. Greene (1966) offers a different explanation for the digraphic (<fl>, <nr>, <mn>) representation of tense consonants. He claims that this was a convention borrowed from Latin orthographic representations of dark and light sonorants. While this is certainly consistent with their modern usage, it does not explain the compensatory effects discussed below in section 3. Nor does it explain why the digraphic forms correspond to the non-limited set of sonorants, as predicted by the geminate theory of origin: geminates and sonorants in clusters are resistant to lenition, thus the fact that the tense forms are the non-limited variants follows straightforwardly.


10. (10b) requires a small caveat, in that if multiple morae dominate a single vowel, then only one syllable is projected.

11. I have slightly modified Ni Chiosáin’s transcription here to make it consistent with Ó Sláthall (1989).

12. The choice of [+ATR] rather than [+high] may appear strange here, however the behavior of diphthongization in Conamara Irish discussed below in section 4.1 shows that the height of the vowel is not directly correlated to a [high] feature, but is an articulatory consequence of the [ATR] feature.

13. Ó Murchú’s (1989) description of tense sonorants in the East Perthshire dialect of Scots Gaelic (which is closely related to Irish), also describes the distinction only in terms of length.

14. Such as Quiggin (1906), Sommerfelt (1922) and Ó Searcaigh (1925).

15. Ó Baoill’s description, in Irish, reads as follows (Carnie added the
phonetic symbols, italics are Ó Baoilí's 'Le id (i) agus an (æ) a dhéanamh cuírtear tosach na teanga ar fad in éadan na bhfiaca uachtaracha nuair is consain leathan iad, agus in éadan na bhfiaca lochtaíracha agus iomaíre na bhfiaca nuair is consain chaol iad. Le i agus an a rá cuírtear barr na teanga in éadan iomaíre na bhfiaca. Ar ndóigh chomh maith leis sin bheart nó lósach na teanga ardaítear cál na teanga i dtreo an charball nuair is consain chaol a bhiomh an rá..." (p. 15).

16. I take this to mean the alveolar ridge.

17. I use the term Conamara here as a blanket term for all the dialects on the Conamara Peninsula. However, not all these dialects behave this way. For example, Cois Fhairrge as described by de Bhaldrátha (1945) has a distinctive among sonorants and does not (at least as far as I can tell from his description) have diphthongization.

References
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An Analysis of the Errors of Adult Learners of Welsh

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Abstract
The present article presents the results of an analysis of the syntactic errors of thirty-two adult Welsh learners. The errors were obtained from the form-filling task of the Use of Welsh Examination. The results were used to test a number of hypotheses concerning the acquisition of Welsh. An attempt is made to define error in Welsh which does not preclude dialect forms. Lexical error is defined as any word not included in the major Welsh dictionaries. Grammatical error is defined according to the description provided by two grammars of Welsh written by King (1993) and Thorne (1993). The definition of developmental error was partially based on the work of Morris Jones (1988). Seven hundred and one syntactic errors were obtained and categorized and examples for each category are provided. The overwhelming majority of syntactic errors were local in communicative effect. A total of 48% of the errors were ambiguous, i.e., they could not be classified according to cause. There were slightly more developmental errors than interlingual, 199 as opposed to 172. There were also five times as many syntactic errors as lexical, 701 as opposed to 143. Women committed a syntactic error once every eleven words while men tended to every nine and a half words. However, no difference was observed between the frequency of error in Welsh-speaking and anglicized areas. The article concludes with a discussion of the overall implications of the results.

In 1997 I completed a four-year Ph.D. programme entitled ‘Dadansoddia o wallax ysgrifenedig a wneir mewn arholiadau Cymraeg i Oedolon’ (An Analysis of Written Errors Committed in Adult Welsh Examinations). The present article presents the results of a pilot study conducted as part of this research programme. The sample for this study comprises the Written Test Task a) of thirty-two candidates of Use of Welsh, a WJEC second-language examination for adults. This examination is broadly the adult equivalent of GCSE. The Written Test represents 20% of the overall marks and consists of three tasks: a) filling in a form which asks for personal details; b) writing a letter; c) a cloze passage.