Syllable structure and sonority hierarchies in Irish

Raymond Hickey
University of Bonn

0. Introduction

It is obvious when one examines a variety of alternating forms in Modern Irish that changes take place which are somehow connected with the principles of syllable structure operating in the language. Consider the sets of forms in (1).

(1) a focal /fəkəl/ ‘word’
b foclóir /fəkloːɾʲ/ ‘dictionary’
c oscail /əskəlʲ/ ‘open-IMPERATIVE’
d osclaím /əsklʲimʲ/ ‘I open’

In the first and third forms in (1) an unstressed vowel occurs in the second syllable and is lost in the remaining forms. This unstressed vowel loss is known as syncope and common in Irish with (i) word formation ((1)a + b) and (ii) inflection ((1)c + d).

With other words in Irish there appears to be an addition to the phonetic substance in the form of an unstressed central vowel as in the forms in (2).

(2) a gorm /ɡərm/ ‘blue’
b dearg /dʲərdʲ/ ‘red’
c tàirg /taːɾʲɪɡʲ/ ‘manufacture’

This process of epenthesis appears to be similar to that found in (1) and recent investigations have tried to indicate this (Guile, 1972; Hickey, forthcoming b). A satisfactory phonological description of the processes evident here must appeal to syllable structure in Irish and explain the triggering of the processes as being due to the demands of that structure. The surface manifestations of epenthesis and syncope also raise important questions about the nature of underlying forms and derivational stages which are matters of interest in the present study.

1. Syncope

Syncope is a phenomenon which is purely phonological; the grammatical status of those word forms which undergo syncope or conversely are not syncopated is irrelevant. The task one is presented with is that of providing a structural description of the syncope rule in Irish. Here one finds that considerations of syllable structure and division are paramount. The syllabification of the forms in (1)a + b is as follows

(3) a /fəkəsl/ b /fəkəsləːɾʲ/
From this one can conclude that it is the suffixation in (1)b + d which leads to the deletion of the second syllable vowel of the other forms. With suffixation the sonorant (here: /l/) can form the onset of the suffix syllable and so the preceding ‘unstressed vowel is deleted. But now assume that the unstressed second vowel in (1)b + c is not present in the underlying form but introduced later as in

(4)  underlying  /fakov/  
     /fako/  (i) by vowel insertion

With this interpretation there is no syncope in Irish but a rule of vowel insertion which provides an unstressed vowel under certain conditions. By ‘conditions’ I mean the following: no short unstressed vowels are present underlyingly in Irish. Every underlying form in its surface derivation undergoes a process of syllabification which is determined by the (surface) phonotactics of the language. It the underlying form is in conflict with surface phonotactics resyllabification takes place. The form in (4) has the following syllable structure when given a segment class interpretation.

(5)  /FVPS/  (F = fricative; V = vowel; P = plosive; S = sonorant)

The process of syllabification introduces a syllable boundary at both ends of this form and checks it for conformity with phonotactic structures as it is in conflict with the latter one has resyllabification

(6)  /$FVPS$/  →  /$FV_1P$V_2S/

There is a phonotactic restriction in Irish such that a plosive and a sonorant cannot occur together in the coda of a syllable; the introduction of a vowel between them leads to the resyllabification of them. Note that the phonetic means used in this resyllabification are minimal, only an unstressed central vowel is used in the process of vowel insertion. This vowel which one can symbolize as /i/ has the realization /a/ before a non-palatal consonant and /i/ before a palatal one.

The restrictions on coda structure in Irish are part of broader general conditions on syllable structure. To formulate these one must use segment class notation and one must assign various sonority values to these classes. This results in a sonority scale which has by now become a commonplace of phonological analysis (see Hooper, 1976: 196 + 206 and Vennemann, 1982: 284 for similar scales).

(7)  Sonority scale in Irish
     (vowels 0, greatest degree)
     liquids 1
     nasals 2
     fricatives, voiced 3
        " unvoiced 4
     plosives, voiced 5
        " unvoiced 6

A general principle of syllable structure, not only in Irish, is that there is an increase of sonority towards the vocalic nucleus of a syllable and a corresponding decrease
away from it. This latter fact means that in a segmentally complex syllable coda the segments of which it is composed must represent a decrease in sonority moving away from the vocalic nucleus towards the latter edge of the syllable. Take the form in (8); note that the palatal or non-palatal nature of the final cluster is irrelevant to its sonority assessment.

(8) toisc /t̠as̠k̠j/ (/6046/) ‘circumstance’

No vowel insertion takes place as there is a steady decrease in sonority towards the latter edge of the single syllable in (8). But in

(9) oscail ‘open’
    underlying /a sk̠l̠/ (/0461/)

there is an increase after the plosive; this then triggers insertion.

(10) underlying /a sk̠l̠/
      /$a sk̠l$/  (i) by syllabification
      /$a sk$/$/  (ii) by vowel insertion and resyllabification

This interpretation of vowel insertion covers all the many cases of ‘syncope’ which occur in derivational morphology and with verbal inflection in Irish.

2. Epenthesis

One of the reasons for supporting the vowel insertion view of the syncope process as opposed to assuming underlying unstressed vowels which undergo deletion on suffixation is that a rule of vowel insertion is needed elsewhere in Irish phonology. Consider to begin with the set of forms in (11).

(11) a arm /ar am/ ‘arm’
     e bolg /bʌləɡ/ ‘stomach’
    b ainm /an 1m̠j/ ‘name’
     f oic /aɪk/ ‘evil’
    c banbh /ba n̠əv/ ‘piglet’
     g banc /bʌn k/ ‘bank’
    d seilf /s eil̠f/ ‘shelf’

It is obvious from these forms that an epenthetic vowel occurs to break up the cluster of the syllable coda. Sonority values can be given to the segments and syllabification shown giving the following picture

(12) a -12$ → $1V 2$  e -15$ → $1V 5$
    b -22$ → $2V 2$  f -16$ → $1V 6$
    c -23$ → $2V 3$  g -26$ → $2V 6$
    d -14$ → $1V 4$

A few generalizations can be made on epenthesis in Irish. For one thing it involves syllable codas consisting of two segments of which the first is a sonorant. This
sonorant does not need to be differentiated further; both liquids (value 1 in (7) and (12)) and nasals (value 2 in (7) and (12)) trigger epenthesis. For another thing the second segment of the coda cluster may be any consonantal segment (sonorant, fricative or plosive) except a voiceless plosive (see (11)f + g which have no epenthesis). This means that for Irish the rule of epenthesis applies to all coda clusters consisting of a sonorant and a further segment which occupies any position on the scale down to, but not including, voiceless stops (the least sonorous elements) The Irish epenthesis rule contrasts with that in Dutch (Hickey, 1986) where epenthesis is found for the entire sonority scale, i.e. including clusters of sonorant and voiceless stop e.g. melk /mɛlk/ ‘milk’ (Kooij, 1977: 65f.) An interesting corollary of this is that for a language with total epenthesis (down the entire sonority scale) there is no syncope (vowel insertion is an automatic irreversible rule, cf. Dutch handeling (German Handlung with vowel deletion or lack of insertion) ‘action’ and Dutch handelen (German handeln) ‘to act’.

Both syncope (vowel insertion) and epenthesis have phonetic motivation. With the first process the triggering factor is decreasing sonority from nucleus to edge of the syllable. Phonetically this means that an ideal syllable consists of an articulatory closing changing to an opening (a movement at maximum from complete constriction, i.e. a stop to a complete lack of constriction, i.e. a vowel, these two articulatory gestures being normally correlated with voicelessness for the first and voice for the latter); the rhyme of an ideal syllable ideally has a closing again (a movement at maximum away from the vowel articulation back towards a consonantal one; here the consonantal closing after the nucleus is usually less than that at the beginning of the syllable) (Fudge, 1976: 381-384).

The phonetic triggering of epenthesis is the natural lengthening of vowels before clusters of a sonorant or a further sonorant and voiced stop. This phonetic lengthening (Hickey 1986) tends to lengthen the sonorant as well. The latter may break the tension towards lengthening by maintaining its original length and developing an unstressed schwa after it (and before the following segment). The natural phonetic tendency towards lengthening is greatest before clusters of sonorant and sonorant or sonorant and voiced stop, a position where lengthening is found in other languages as well, cf. late Old English vowel lengthening (e.g. bindan → bindan ‘to bind’).

Epenthesis can occur most easily when the sonorant is alveolar so that it can resist the tendency to lengthen by tapping (using a ballistic movement of the tongue to produce a brief articulation) and consequently resolve the tendency towards lengthening by epenthesis. Epenthesis may be extended by analogy to clusters of a sonorant and a voiceless stop (as in Dutch) where phonetically there is no tendency to cause lengthening of the syllable rhyme (under the conditions specified above) and is resolved by disyllabification, thus southern Belgian dialects of Dutch which have syllable timing as a low-level transfer phenomenon from French also have full epenthesis (Collins and Mees, 1982: 213f.).

The description of epenthesis and syncope so far has relied on the notion of sonority value and principles of syllabic structure. But it is obvious from the clusters in (12) that they do not conform with the principle enounced above that the syllable in Irish is characterized by a decrease in sonority from vocalic nucleus to latter edge. If this were the case then the structural possibilities in

(13) \[ V S O \] (with O = obstruent)
\[ 0 \quad 1/2 \quad 3-5 \]
which are an abstraction of the sonority values of underlying epenthetic clusters should be acceptable on the surface which they clearly are not. Thus one finds that the principle of steady sonority decrease while accounting for the vowel insertion process in (1) is flouted by the epenthesis rule in Irish.

For the phonologist the lack of epenthesis in clusters of the types in (12)f + g can be explained phonetically and are of no theoretical interest. What is of phonological importance is the question of underlying forms.

If one assumes that underlyingly there is syncope and no epenthesis then for both processes one has a stage in the derivation of surface forms in which an unstressed central vowel is inserted. Vowel insertion has the same effect of resyllabification in both instances. But there is an essential difference between both phonological processes. It will have been noted that epenthesis is not indicated orthographically in Irish. This has an obvious reason; epenthesis is an automatic phonotactic adjustment in the synchronic phonology of Modern Irish. Furthermore it is obligatory and is not reversed in derivation for example.

For phonological analysis the important fact about a thesis is that the segments which contain an epenthetic vowel agree in the feature [palatal] (an abbreviation for the relevant combination of [high] and [back]), one has either –C[–pal] VC[–pal] or –C[+pal] VC[+pal]. A consequence of this is that epenthesis can never have a morphological function in Irish. In the present-day language grammatical categories are frequently indicated by a change in the feature [palatal] as in

(14) a. leabhar /lIaur/ ‘book-NOMINATIVE’
b. leabhair /lIaur/ ‘book-GENITIVE’

If the value for [palatal] of the final consonant of an epenthetic cluster changes with a shift in grammatical category then the value for both segments of the cluster changes.

(15) a. leanbh /lIanav/ ‘child-NOMINATIVE’
b. linbh /lImrv/ ‘child-GENITIVE’

This situation contrasts sharply with that of syncope. Consider to begin with a variety of (surface) syncopating forms.

(16) a. dilie /dlIis/ ‘genuine’
b. dilseacht /dlIisxt/ ‘ownership’
c. uasal /usal/ ‘noble’
d. uaisleacht /usIisxt/ ‘nobility’
e. tuiseal /tsIal/ ‘stumble’
f. tuisleach /tsIsxt/ ‘stumbling’
g. deacair /dlakrI/ ‘difficult’
h. deacracht /dlakIxt/ ‘difficulty’

The main point of interest here is the value for [palatal] which the consonants of the syncopating cluster have with unstressed vowel insertion and without it. In (16)a + b the matter is simplest as the lateral and the voiceless fricative are palatal with and without syncope. In (16)c the non-syncopated segments are [–palatal] but both
[+palatal] on syncope. Here there is a change in value for both consonants. This is not the case in (16)e + f where the structure C[+pal] VC[–pal] becomes C[+pal] Cl[+pal] on unstressed vowel loss. Note that a consonant cluster in Irish must agree in terms of palatality; C[opal] C[–opal] is impermissible in Irish. In (16)g the non-syncopated segments have different values for [palatal], this time C[–pal] VC[+pal], but both resolve to a non-palatal cluster: CC[–pal] (it suffices to indicate the value for [palatal] of a single segment as this value is also shared by other elements of the cluster).

The question which arises here is whether the value for [palatal] which the non-syncopated clusters have can be predicted from the underlying cluster. It has been assumed for the description of the operation of surface syncope above that the base forms for both surface suffixed and surface non-suffixed forms have syncope and that there is a process of vowel insertion, something which receives support from the process of epenthesis. Assuming syncopated underlying forms, the difficulty lies in predicting the following changes in surface derivation.

(17) a  CC [–pal]  →  C [–pal] VC [+pal]
b  CC [+pal]  →  C [+pal] VC [–pal]
c  CC [+pal]  →  C [–pal] VC [–pal]
d  CC [+pal]  →  C [+pal] VC [+pal]

(underlying)  (surface)

Although (16)a + b above look unproblematic they are in fact as difficult as any of the changes in the values for [palatal] when vowel insertion applies because one cannot assume that there is a global rule maintaining the values for [palatal] as this is contradicted not only by (17)b + c but by (17)a as well.

In fact (17)a is the easiest case to deal with. As non-palatal clusters always turn up as C[–pal] VC[+pal] after vowel insertion this alteration in the value for [palatal] can be specified to begin with and be part of the redundancy rules of Irish phonology. At least one can postulate this if one chooses to ignore the following instance

(18) a  tirim  /tʰɾɪm/  ‘dry-NOMINATIVE SINGULAR’
   b  tiroma  /tʰɾɔɾma/  ‘dry-NOMINATIVE PLURAL’
   (underlying) CC[–pal]  →  (surface) C[+pal] VC[+pal]

which can be treated as a (lexicalised) exception inasmuch as a non-palatal underlying cluster resolves to two segments which are both [+palatal].

But the changes in (17)b – d require that it be generally lexically specified how the clusters resolve after vowel insertion. Morphological information is of no assistance here as it has no bearing on the assignment of the value for [palatal] after vowel insertion. It is not the case for example that the abstractness suffix /əxt/ always palatalizes the segments which precede it or vice versa (Hickey, in press); contrast (16)b + d with (16)h. Neither can one appeal to the notion of natural palatalization whereby a front vowel palatalizes, and a back vowel velarizes a preceding vowel. The vowel /a/ is phonetically velar (/u/ is the palatal counterpart in Irish) but palatalized consonants ((16)b,d – f) are also found before it.

What is required to deal with the problem of value assignment for [palatal] is
an explicit [palatal] adjustment rule which is lexically specified for each form. This then gives derivations as in (19).

(19) a underlying /us\textsuperscript{i}l\textsuperscript{j}/
      /us\textsuperscript{i}al/ (i) by unstressed vowel insertion
      /us\textsuperscript{i}l/ (ii) by explicit [palatal] adjustment rule
      here: C[+pal] C[+pal] \rightarrow C[–pal] VC[–pal]

b underlying /ts\textsuperscript{i}l\textsuperscript{j}/
      /ts\textsuperscript{i}al/ (i) by unstressed vowel insertion
      /ts\textsuperscript{i}l/ (ii) by explicit [palatal] adjustment rule
      here: C[+pal] C[+pal] \rightarrow C[+pal]VC[–pal]

While the ordering of the adjustment rule after vowel insertion will account for palatality value assignment to flanking consonants it implies that in the phonology of Irish vowel insertion is an earlier and hence more basic rule than the assignment of the value for [palatal] to a consonant. Assuming epenthesis to be another case of vowel insertion this then further implies that epenthesis is earlier in derivations than palatality value assignment, the latter however being a central device in the morphology of the language. From this situation there results a certain degree of theoretical discomfort in having a low-level automatic phenomenon (epenthesis) ordered before the main grammatical device in nominal morphology in Irish, viz. palatality value assignment.

References

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