TWO MAKES THREE?
VOWEL QUANTITY IN MODERN IRISH

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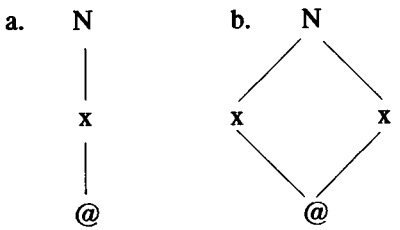
0. *Introduction*

The notion of quantity is used to describe phonological or phonetic contrasts. Thus pairs of words may be minimally contrastive due to the difference of length of a particular segment e.g. Irish *cóta* [ko:tə] 'coat' and *cotadh* [kotə] 'shyness' where the contrast is brought about by the difference in quantity of what is otherwise the same vocalic segment.

It has become a common phonological practice to associate quantity with timing slots or skeletal positions (e.g. Leben 1980). Quantity differences can be then expressed by structures where some segmental melody is linked to one or two skeletal positions, so that short and long vowels contain one and two skeletal positions respectively.[1]

The phonological structures of short and long vowels are given below, where N stands for nucleus, x denotes a skeletal point and @ represents a melody.

(1)



The structures in (1) demonstrate that phonetic contrasts of length have their

[1] A three-way quantity does not appear to be attested in natural languages (see Prince (1980) for an analysis of the apparent three-way quantity distinction in Estonian).

source in the phonological (deep) structure. In the case of the pair *cóta/cotadh* the contrast lies in the structure of the nucleus i.e. whether it is branching (two positions) or non-branching (one position).

Apart from expressing phonetic contrasts, phonological structures also play a crucial role in determining a particular behaviour of short and long vowels with respect to various phonological processes. One such process is, for instance, stress placement, which distinguishes between the structures presented in (1) above. Thus, in languages which exhibit quantity-sensitive stress placement, it is the branching nucleus that attracts stress. A similar situation can be observed in Irish which belongs to the group of languages with quantity sensitive stress assignment. Compare, for example, a bisyllabic word like ['sɑgərt] *sagart* 'priest', which contains two short vowels and is stressed on the first syllable, with another bisyllabic word e.g. [kɑ'li:n'] *cailín* 'girl' which is stressed on the second syllable because it contains a branching nucleus.

The distinction between branching and non-branching nuclei also accounts for phonological phenomena which affect the quality of vowels. Thus, for instance, in vowel harmony processes the quality of branching nuclei normally remains unaffected. A similar situation is found in Irish in which the phonological structure of the nucleus allows us to understand the effects of a process which might be called palatalization spreading. Generally speaking, palatalization spreads from right to left and affects both consonants and short vowels (see section 2.1.). However, branching nuclei seem to remain immune to this process. Thus [sɔp] *sop* 'wisp' alternates with [sip']² *soip* in the genitive (notice that both the final consonant and the vowel are affected). On the other hand, the branching nucleus in [ʃk'i'bo:l] *scioból* 'barn' remains intact in the genitive ([ʃk'i'bo:l'] *sciobóil*) although the final consonant is palatalized.

It follows that the existence of phonological structures needs to be understood in two ways. Firstly, they account for surface facts e.g. phonetic contrast of length. Secondly, they implicate a particular phonological behaviour of segments. In the case of the short vs. long vowel distinction, it is natural to assume that they may exhibit disjoint nehaviour. However, there are cases where two forms, which are different from the point of view of their phonological behaviour, seem to exhibit no phonetic contrast. This is the case with certain Irish long vowels. Consider the following data:

(2)	k'i:l'/k'i:l'ə	*cíl/cíle*	'raddle/gs.'
	k':l'/k'il'ə	*cill/cille*	'church/gs.'

In the nominative both forms contain the same long vowel [i:]. However, the genitive forms show that only one of the long vowels is shortened when the same inflectional ending is added to the stems. this implies that two different phonological representations of the vowel [i:] are involved here.

Another example of a phonetically identical segment showing disparate phonological behaviour is provided by the Irish diphthong [au]. We mentioned above that branching nuclei in Irish are not affected by palatalization. Whether the diphthong [au] forms a branching nucleus or not, something needs to be said about the disjoint behaviour of that diphthong in (3a and b).

(3)	a.	k'aun/k'i:n'	*ceann/cinn*	'head/gs.'
	b.	aun/aun' (or) awin'	*abhann/abhainn*	'gs./river'

The diphthong [au] is affected by palatalization in two different ways in (3a and b), none of which is expected if a branching nucleus is involved (cf. [ʃk'i'bo:l']).

The obvious conclusion concerning the behaviour of Irish long vowels, which may be drawn on the basis of the data in (2) and (3), seems to be that they must be represented by different phonological structures which would account both for the surface (two different underlying structures yield identical surface forms) and the phonological behaviour of these forms.The purpose of this paper is to establish the phonological structure or structures of Irish long vocalic segments i.e. those involving two skeletal positions, and to show that in this language more then one type of structure is needed in order to fully account for the behavioral diversity of long vowels. Thus by retaining the general view that long vowels contain two skeletal positions we will consider the different syllabic configurations in which they can be arranged.

The paper is organized as follows. Below we introduce some basic concepts of Government Phonology (Kaye, Lowenstamm, Vergnaud 1990, Kaye 1990, Charette 1991) which is the framework adopted in this presentation. In 2 we will look at compensatorily lengthened vowels in Irish and propose a representation which will be shown to differ from branching nuclei not only structurally but also in terms of phonological behaviour. This will be done by inspecting how branching nuclei and the vowel lengthened by compensation are affected by palatalization spreading (2.1.). In section 3. we consider yet another possible structure for long vowels which results from nuclear fusion. This structure will be compared to both branching nuclei and the lengthened vowel with reference to the processes of stress placement and palatalization spreading. The conclusion of this analysis will be that vocalic length in Modern Irish may be represented by three separate structures which account for different phonological consequences. The data used here is that of Munster Irish.[3]

1. *Theory of phonological representations*

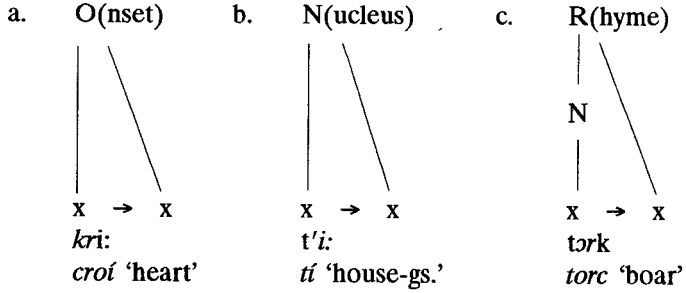
This analysis is couched in the framework of Government Phonology (GP). In this approach phonological structures (syllabic constituents) are subject to strict universal principles and language specific parameters (Kaye, Lowenstamm, Vergnaud (KLV) 1990). In GP all syllabic constituents are maximally binary and from

[2] In phonetic transcription the consonants affected by palatalization are marked by a diacritic.

[3] There are three major dialect areas of modern spoken Irish. The Munster dialect is spoken in the south and south west of Ireland. The spelling used here is standard i.e. pandialectal, but the transcription is consistently that of Munster.

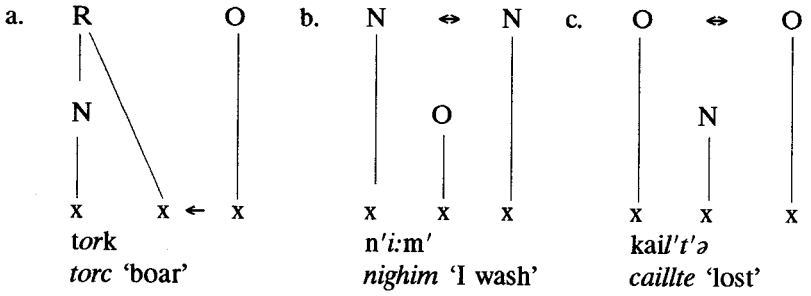
governing domains where segments are in a governor-governee (head-complement) relation. This is illustrated below.[4] The arrow indicates the direction of government which in the case of constituent relations is universally from left to right.

(4)



The theory also recognizes interconstituent relations like onset to rhyme (5a) or between nuclei (5b) and between onsets (5c).

(5)



The last two relations (5b and c) are contracted on relevant projections.[5] The direction of government in such domains is subject to language specific parameters. In the case of the rhyme-onset transconstituent relations (5a) the direction of Government is universally from right to left.[6] This follows from a general principle of "Coda licensing" (Kaye 1990).

Coda Licensing Principle

Post-nuclear rhymal position must be licensed by a following onset.

[4] The reader is referred to KLV (1990) and Charette (1991) for a detailed introduction to the theory of government in phonology.

[5] See section 3. and 2. for the actual phonological representations of these two forms.

[6] GP disallows a configuration where a branching rhyme (4c) contains a branching nucleus (4b) for the simple reason that such a structure excedes the possible number of skeletal positions within one governing domain (see KLV (1990) and section 3 below). Notice that this is a possible structure for the notorious cases of extra-heavy rhymes in e.g. English 'child'.

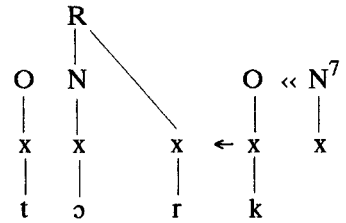
In other words, the rhymal complement in [tɔrk] (i.e. [r]) is justified by the following onset head [k]. Consequently, a single word-final consonant as in e.g. [n'ig'] *nigh* 'wash' cannot be syllabified in the rhyme ("coda") position because there is no onset to sanction it. In GP such consonant is syllabified as an onset which is followed by an inaudible vowel (empty nucleus). This is illustrated below in (6).

Another GP notion which is relevant to the ensuing discussion of Irish facts is that of "Government Licensing".

Government Licensing Principle (Charette 1990)
Non-nuclear heads must be government-licensed by their nucleus.

This major principle refers to branching onsets (4a) and rhyme-onset governing relations (5a) and indicates that every non-nuclear governing domain is licensed. As an illustration of the two principles a full representation of the word [tɔrk] is given below.

(6)



(←) = governing relation
(«) = Government Licencing

Thus, the word-final empty nucleus, which is required by the "Coda Licensing Principle", government-licenses the interconstituent relation in (6).

Let us now turn to the analysis in which we will try to show that Irish surface long vowels involving two skeletal positions can in fact have three different structural (phonological) sources. In addition, it seems that the existence of all three can be justified in this language.

2. *Vowel lengthening in Irish*

This section illustrates what looks like a synchronic instance of compensatory lengthening in Irish. The long vowel which results from this process, even though it contains two skeletal positions, will be shown to behave like a short vowel. Distributionally this vowel occurs before certain sonorants.

There are two types of sonorants in Irish, which are traditionally refered to as 'lax' and 'tense' (Ó Cuív 1975, Ó Siadhail 1989), and phonetic contrast between the two types is still heard in western and nothern dialects like Connemara and Donegal. This distinction is no longer made or heard in Munster. On the other

hand, some contrast is still retained in this dialect in the phonological behaviour of sonorants. Namely, certain word-final sonorants cause lengthening of the preceding vowel while others do not. The data below illustrate the phenomenon.

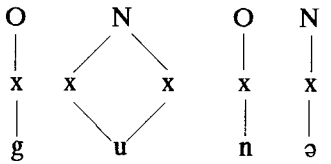
(7)

a.	bɑ:r	*barr*	bɑrə *barra*	'top (nom. sg./pl.)'
	k′i:l′	*cill*	k′il′ə *cille*	'churchyard (nom. sg./gen.sg.)'
	aum	*am*	ɑmə *ama*	'time (nom. sg./gen.sg.)'
	k′aun	*ceann*	k′anə *ceanna*	'head (nom. sg./pl.)'
b.	gɑn	*gan*	'without'	
	k′un	*cion*	'affection'	
	m′il′	*mil*	'honey'	

The quantity alternations in (7a) seem to suggest the following mechanism. The vowel lengthens before a word-final "lengthening" sonorant. On the other hand, no lengthening takes place if such a sonorant is followed by a vowel. In government terms the mechanism can be described more precisely as depending on the nature of the word-final nucleus. Recall that in GP every word-final consonant is syllabified as an onset followed by an empty nucleus. Thus vowel lengthening occurs before a "lengthening" sonorant followed by an empty nucleus e.g. [k′i:l′ø],[8] and not if the nucleus has a melody e.g. [k′il′ə].

There are two reasons to believe that we are dealing with phonological lengthening here. Firstly, not all sonorants participate in these alternations i.e. 'plain' sonorants do not lengthen the preceding vowel in the context defined above (see (7b)). Secondly, the presence of a realized nucleus following a sequence of long vowel and sonorant does not entail shortening of the type [bɑ:r/bɑrə] (7a) which would bar long vowels from this position. It seems that such a process does not occur in Irish. Therefore words like [gu:nə] *gúna* 'gown' or [m′i:n′ə] *míne* 'smooth-gs.' are perfectly legitimate.

We will assume that cases like [gu:nə] contain an underlying long vowel which structurally may have the form of a branching nucleus (8). Thus words like [gu:nə] *gúna* 'gown' will differ structurally from [k′un] only with respect to the structure of the nucleus i.e. in [gu:nə] the nucleus is branching (8).



(8)

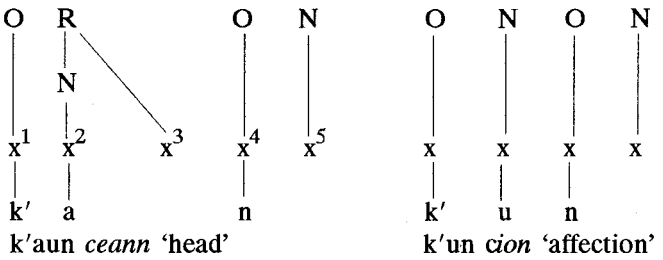
On the other hand, the contrast between [k′aun] and [k′un] will be attributed

[7] See KLV (1990), Charette (1991) for a justification for empty categories in Government Phonology, and also for methods of interpreting them.

[8] ø denotes an empty nucleus here.

to the structural difference in the representation of "lengthening" versus "non-lengthening" sonorants. It has been proposed (Cyran 1992, 1993) that the "lengthening" sonorants are represented phonologically as geminates.[9] The respective structures of [k′aun] and [k′un] are given below in (9a and b).

(9) a. lengthening b. non-lengthening



The structure in (9b) contains a plain (lax) sonorant in onset position which does not cause lengthening of the preceding vowel. Let us now see how the structure in (9a) is interpreted. Notice that this form contains an empty position in the rhyme. Bearing in mind what possible phonological domains of government there are (cf. the structures in (4) and (5) we know that we are dealing with two governing domains here i.e. a branching rhyme with the nucleus (x) as the head, and a rhyme-onset transconstituent relation with the onset (x) as the head. In both these relations the rhymal position acts as a complement. Thus it has two governors, which is an exceptional situation in the theory of government, as normally, a complement can be governed by one governor only.

The mechanism of the [bɑ:r/bɑrə] alternations is that the vowel lengthens when the sonorant geminate is followed by an empty nucleus, and no lengthening takes place if that nucleus has a melody. Given the structure in (9a) we may observe that the interpretation of such forms will depend on whether the rhymal complement is realized or remains empty i.e. whether it is "claimed" by the head of the rhyme or the following onset head. It is obvious that the only variable which may be assumed to be responsible for the realization of the rhymal complement is associated with the type of nucleus that follows (licenses) the onset head x^4.

It will be recalled that one of the functions of nuclei is to government-license non-nuclear heads i.e. heads of non-nuclear governing relations. The Government Licensing Principle (Charette 1990) requires that branching onsets (as in [*kri*:] *croí* 'heart') and rhyme-onset relations (as in [k′*ir*′*k*′ə] *circe* 'hen-gs.') need to be licensed by the following nucleus. In Irish, both realized and empty nuclei are government licensers domain-finally e.g. [k′arkø] *cearc* 'hen' and [k′irk′ə] *circe* 'hen-gs.'. There is however some difference in the licensing potential as given by

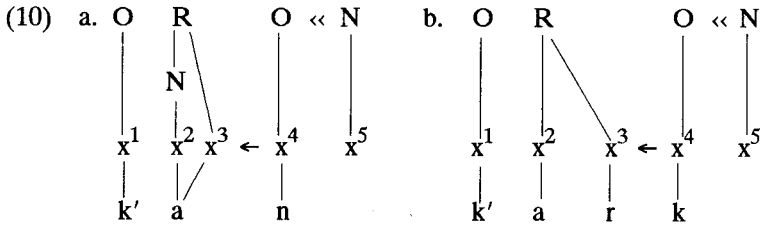
[9] In traditional terms the phonological distinction between "tense" and "lax" sonorants could be made by assigning the feature TENSE to one of them. We believe this is insufficient in order to understand how an arbitrary specification like this could offer a nonarbitrary explanation of the phonological behaviour of such a segment.

the two types of nuclei. This becomes clear when we consider the distribution of branching onsets in Irish. They are not found word-finally, which means, that only nuclei with phonetic content can license branching onsets.

In the case of branching onsets an additional factor is involved namely, the head of a branching onset is not directly adjacent to its licenser and in Irish only phonetically expressed vowels can license indirectly. This means that Irish empty and realized nuclei differ in their licensing potential. Let us now see how this observation can be applied to our problem of the interpretation of the rhymal complement in *ceann* (9a).

Formally, the structure of *ceann* (9a) looks parallel to what we expect in *cearc* i.e. the two forms contain a branching rhyme followed by an onset and a domain final empty nucleus. There is however a fundamental difference concerning the segmental make-up of the two forms. The rhymal position x^3 in the geminate (10a) is empty. This entails different requirements and outcomes. The empty position in x^3 requires **Proper** Government, which is a stronger form of government (KLV 1990:219). Therefore, if the onset head is licensed by a weak licenser (empty nucleus) the rhymal complement cannot be properly governed. Consequently, the vowel in the preceding nucleus is lengthened and yields a diphthong [au].[10] The reason for inclusion of the governing relation in (10a) will be discussed below. It is important, however, to distinguish between this ordinary governing relation and Proper Government (see (11a)).

(10)



k′aun *ceann* 'head' k′ark *cearc* 'hen'

(«) = licence to govern
(←) = government

When the domain final nucleus is not empty it discharges a stronger licensing potential which leads to a relation of **Proper** Government between the onset head x^3 and the empty rhymal complement x^4 in (11a) but not in (11b), as proper government involves empty positions and the rhymal complement in *circe* is not empty. However, when the relation of Proper Government is contracted in the case of

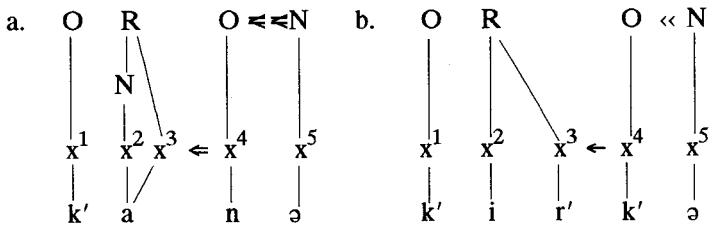
[10] The actual reflex of the lengthened vowel is discussed below in this section. Notice that this result of what we would call compensatory lengthening conforms with the stipulation put forward by de Chene and Anderson (1979) that diphthongization constitutes the first stage of compensatory lengthenig. Although this view was later questioned in Wetzels and Sezer (1986) we still regared this as an interesting point especially since in the case of Irish we are not dealing with a historical development but rather with a synchronic process.

Munster geminates the melody from the onset head does not spread. instead, the properly governed position remains unrealized phonetically as per the Empty Category Principle (KLV 1990:219).

The Empty Category Principle
A position may be uninterpreted phonetically if it is properly governed.

Thus the empty rhymal complement in *ceanna* remains uninterpreted.

(11)

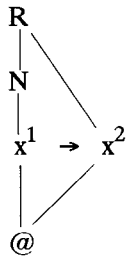


k′anə *ceanna* 'head-pl.' k′ir′k′ə *circe* 'hen-gs.'

(≼≼) = licence to properly govern
(⇐) = proper government

With the empty nucleus as a weak licenser the rhymal position is claimed by the head of the rhyme and interpreted as a long vowel or heavy diphthong of the following structure.[11]

(12)



Johnsen vovel

This structure is clearly derived from an underlyingly short vowel followed by an empty position within the rhyme. Thus the process of vowel lengthening before the "lengthening" sonorants resembles other typical processes of compensatory lengthening (de Chene and Anderson 1979, Leben 1980). The phonology of Irish differentiates between the 'Johnsen vowel' and a branching nucleus as the quantity

[11] Although it is a clear instance of compensatory Lengthening, in GP this structure has come to be known as the 'Johnsen vowel' (Kaye, Hellan, Johnsen 1990) and this name will be used here.

alternations in (7) indicate. Recall that branching nuclei are not shortened when followed by a vowel in the following nucleus e.g. [gu:nə].

The phonological form of words containing a geminate sonorant, and in effect, the 'Johnsen vowel' is to a large extent verifiable. One argument in support of this structure comes from the quantity alternations just described which clearly point to the fact that we are dealing with phonological length i.e. two skeletal positions which are not structured like other long vowels (branching nuclei). There are other phenomena like 'vowel epenthesis' and the way in which the quality of the lengthened vowel is determined (Cyran 1993) which can be given a natural and unified account if the presence of a geminate structure is assumed.

We will only look at the qualitative alternations involving the 'Johnsen vowel' here with the view to show the behavioural differences between this structure and other long vowels. It will be shown below that the phonological length of this vowel does not prevent it from patterning with short vowels with respect to palatalization spreading, which in fact, is fully predicted by the structure of the 'Johnsen vowel'.

2.1. *Vowels and palatalization spreading*

Irish has palatalized and velarized consonants. Palatalized consonants interact with preceding short vowels yielding qualitative alternations which are illustrated below.

(13)

muk/mik′	*muc/muic*	'pig/dat.'
sɔp/sip′	*sop/soip*	'wisp/gs.'
f′ar/f′ir′	*fear/fir*	'man/gs.'

The phenomenon does not affect true long vowels which could be represented as branching nuclei (14a). However, it does affect compensatorily lengthened vowels (14b).

(14)

a.	sk′ibo:l/sk′ibo:l′	*scioból/sciobóil*	'barn/gs.'
	kɑ:s	*cás*	'case'
	kɑ:s′	*cáis*	'cheese'
b.	k′aun/k′i:n′	*ceann/cinn*	'head/gs.'
	loum/li:m′	*lom/loim*	'bare/gs.'

For our purposes the important fact observed in (14) is that the alternation *lom/loim* (14b) is parallel to *sop/soip* (13) rather than to *scioból/sciobóil*. In other words, the data in (14b) show that the 'Johnsen vowel' parallels the behaviour of short vowels. This agrees with the prediction entailed by its structure (12), i.e. that underlyingly it is a short vowel. Therefore, its participation in the vocalic transitions caused by palatalization spreading is fully justified.

It has to be borne in mind that phonetically the 'Johnsen vowel' in [li:m′] (14b), although derived from a short vowel, is not in any way different from the underlying long [i:] as in e.g. [l′i:n] *líon* 'net'. Consider further examples where such surface ambiguity is revealed only by quantity or quality alternations.

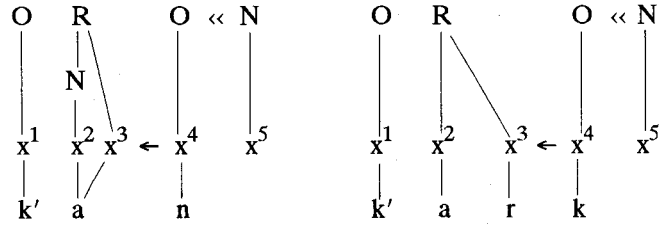
(15)

k′i:n′	k′anə	*cinn/ceanna*	'head pl./gs.'
ki:n′	ki:n′ə	*caoin/caoine*	'smooth surface/gs.'
k′i:l′	k′i:l′ə	*cíl/cíle*	'raddle/gs.'
k′i:l′	k′il′ə	*cill/cille*	'church/gs.'

The palatalization spreading effects clearly show that words with underlying long vowels (branching nuclei) and derived long vowel (Johnsen vowel) have different phonological forms. Each of them offers different predictions. Thus, the 'Johnsen vowel' is involved in both quality and quantity phenomena while branching nuclei do not participate in either.

As a final argument for the postulated empty rhymal position in forms yielding the 'Johnsen vowel' let us look at two forms which clearly suggest that a branching rhyme is involved. First consider again the structure of the word *ceann* 'head' as compared with *cearc* 'hen'.

(16)



(←) governing relation[12]

Strucurally both forms contain a branching rhyme. This entails a governing relation between a rhymal complement and the following onset (Coda Licensing, Kaye 1990). Therefore, when the 'Johnsen vowel' obtains i.e. the vowel is lengthened as in e.g. [k′aun], one should expect some degree of identification of the rhymal complement by the onset head which would satisfy the Coda Licensing principle. The evidence in support of this prediction seems to be provided by the phonetic make-up of the resulting diphthong in *ceann* i.e. [au]. Notice that the alternation [k′aun/k′anə] clearly suggests that the underlying vowel is [a], which indicates that there seems to be no local source for the diphthong [au].[13]

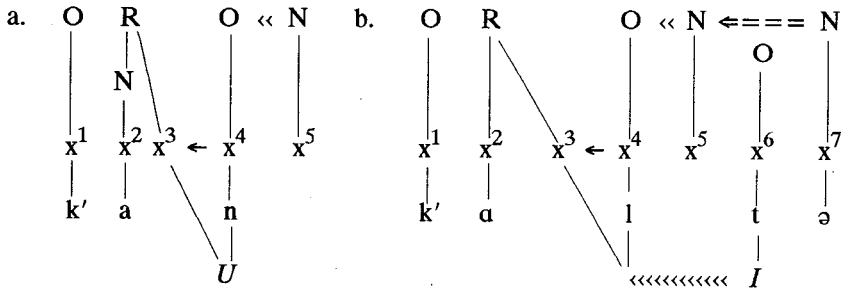
[12] Recall that empty nucleus does not license the geminate head to properly govern the empty rhymal position.

[13] In Government Phonology processes which involve changes in the segmental material have to have a local source. In this case, in order to derive a diphthong [au], a presence of the element U is required (see note (14)).

It was mentioned above that Irish has palatalized and velaraized consonants. Phonologically, the palatalized consonants contain the element "I" (Harris 1990:263). On the other hand it has been established (Ó Baoill 1979) that Irish velarized consonants are characterized by "U-resonance" which in GP may be represented as the presence of the element "U".[14] Thus the local source of the element "U", which is needed for the derivation of [au], seems to be present if we assume that "U" is provided by the following velarized onset head.

So the full structure of *ceann* should look like that in (17a).

(17)



k'aun *ceann* 'head' kail't'ə *caillte* 'lost'

The rhymal complement x^3 in *ceann* is not properly governed because the onset head is followed by a weak licenser. This position has to be realized so the second element of the diphthong [au] is provided by the onset head. The situation in (17b) is parallel to that in *ceann*. This time the second element of the diphthong is "I" coming from a palatalized consonant. Notice that in this form the nucleus x^2 itself is not affected as it is a back [ɑ] which does not interact with palatalization e.g. [bɑn'ə] *bainne* 'milk'. However we still obtain a diphthong [ai]. In other words, compensatory lengthening applies in *caillte* because the nucleus responsible for licensing the geminate head (x^5) is itself licensed by the following nucleus (x^7). Thus the melodic make-up of [au] and [ai] in (17a and b) depends on the quality of the onset head and clearly points to the consonantal (non-nuclear) nature of the second segment.

We have looked at a synchronic process of compensatory lengthening in Irish which produces a long vowel (typically a diphthong). The structure of this vowel (Johnsen vowel) differs from that of a branching nucleus, which we have assumed to be the underlying representation of long vowels, and the disparate phonological behaviour of the two structures with respect to quality and quantity alternations seems to justify their existence.

Let us now consider the possibility that Irish has a third structure expressing

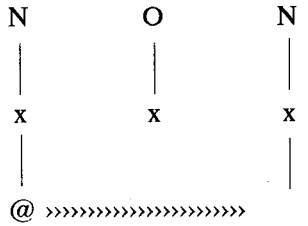
[14] *I*, *U* and *A* are the basic vocalic elements of phonological representation in GP. They correspond to vowels [i], [u] and [a] when they are independently pronounced. In the representation of consonants, they define "palatality", "labiality" and "pharyngeality"(see KLV (1990), Williams and Brockhaus (1992) and Harris and Lindsey (in press)).

length. Phonetically, it sounds like a long vowel and involves two skeletal positions phonologically, but the way in which it is derived suggests that its structure is still altogether different from the two discussed above.

3. *Nuclear fusion*

The diagram (18) represents the last possible phonological structure of long vowels which is predicted by GP. It seems that this form is also present in Irish. This configuration involves two consecutive nuclei separated by an empty onset. In the case of this structure the direction of spreading is either from left to right or right to left and is subject to language specific parameters. Since the actual direction of spreading in Irish is irrelevant to our discussion it will be assumed that the melody spreads from left to right.

(18)

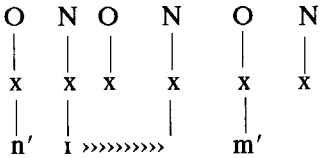


Compare now the imperative and the first person singular forms of the first conjugation in (19a and b). The first person singular is formed by addition of the personal inflectional ending [-im'].

(19)	a.	lɑs/lɑsim'	*las/lasaim*	'light'
		kir'/kir'im'	*cuir/cuirim*	'put'
	b.	n'ig'/n'i:m'	*nigh/ním*	'wash'
		sig'/si:m'	*suigh/suím*	'sit'

The long vowel in (19b) results from the fusion of two successive nuclei as a result of the delinking of the melody in the intervening onset. We are not concerned here with the actual process of melody delinking, but rather with the resulting structure.[15] The phonological representation of *ním* 'I wash' is given below in (20).

(20)



n'i:m' *ním* 'I wash'

[15] The process seems to affect certain velar plosives and also labial fricatives in intervocalic position as in [n'iv'/n'i:] *nimh/nimhe 'poison/gs.'*.

Thus phonologically, the long vowel in [n′i:m′] results from nuclear fusion. Nonetheless, such structures behave like branching nuclei for the purpose of stress assignment.

In Irish stress assignment is to large degree quantity sensitive (Loth 1913, Gussmann in prep.). The basic patterns of stress placement depend on whether the vowels are short (V) or long ($\bar{V}$) and are given below.

(21)	a.	'V V	'sɑgərt	*sagart*	'priest'
	b.	'V V V	'skɔl′ənə	*scoileanna*	'schools'
	c.	'V̄ V	'ko:tə	*cóta*	'coat'
	d.	V 'V̄	kɑ' l′i:n′	*cailín*	'girl'
	e.	V 'V̄	prɑ:'ti:	*prátaí*	'potatos'

Words containing two or three short vowels are stressed on the first syllable. The last two examples show that the second nucleus always attracts stress if it is long (branching nucleus). Notice what happens in verbs of the second conjugation where the first syllable contains either a long vowel or a heavy diphthong and where the same type of nuclear fusion as in the first conjugation (19) is observed.

(22)

'k′u:nig′/k′u:'ni:m′	*ciúnaigh/ciúnaím*	'calm/I calm'
'air′ig′/ai'r′i:m′	*éirigh /éirím*	'get up/I get up'

The stress in (22) is shifted to the second syllable to fit the pattern shown in (21e). Thus, if we assume that the vowels in the first syllable in (22) are branching nuclei, we come to the conclusion that a sequence of fused nuclei behaves exactly like a branching nucleus. In other words, from the point of view of the system of stress placement the difference between the two structures is irrelevant because they behave in the same fashion. On the other hand, it seems that from the point of view of vowel consonant interaction certain fused nuclei follow the short vowel pattern, thus showing a possible disparity between this form and branching nuclei.

(23)

k′u:'nu:/k′u:'ni:m′	'calming/I calm'
mɑ'ru:/mɑɑ'ri:m′	'killing/I kill'

An interesting fact is that the qualitative alternations involved in this structure seem to be confined predominantly to [u:] and [i:] and thus reflect, in a sense, the secondary articulation elements present in the segmental makeup of Irish consonants.

Whether the alternation in (23) is indeed part of phonology is not clear. In order to be sure that a productive process is involved here a larger scope of this phenomenon would have to be attested. However, it seems that only vowels [u:] and [i:] can be shown to be derived synchronically from two fused nuclei. Additionally, other long vowels e.g. [a:], [o:] and [e:], maybe with the exception of the latter, do not interact with consonants or alternate with other vowels. This fact suggests that perhaps the alternation shown in (23) above does not belong to phonology.

Assuming that the alternations [k′u:'nu:/k′u:'ni:m′] (23) are lexical the question arises as to the systemic validity of the fused structure (18) in Irish. If it behaves like what we have to this point assumed to be a branching nucleus with respect to both stress assignment and consonant-vowel interaction, then one comes to the inevitable conclusion that a branching nucleus and the fused structure are one and the same thing, i.e. we are dealing with one structure and we need decide which one.

At this stage a clear answer cannot be given as to whether the two structures (branching nucleus and fused structure) exist side by side or whether one of them is redundant. However, given the fact that we have synchronic evidence for the structure of fused nuclei, one might propose a sweeping claim that all long vowels in Irish are in fact sequences of nuclei.[16] Notice that the existence of a branching nucleus has, in a sense, been taken for granted and assumed in this analysis for the purpose of comparison with the 'Johnsen vowel'. Therefore it seems that it is the structure of branching nuclei that needs to be scrutinized and justified rather than the structure of fused nuclei.

Recall that underlying long vowels were shown not to be affected by palatalization spreading e.g. [sk′ibo:l/sk′ibo:l′] *scioból/sciobóil* 'barn/gs.'. There is however an exception to the uniform behaviour of long vowels, namely, long [e:] is susceptible to decomposition into [ia] in Munster Irish when it finds itself between a palatalized and velarized consonant e.g. [m′e:r′ə/m′iar] *méire/méar* 'finger (gs./nom.)'. There is a theory internal reason why this vowel has to be represented as a sequence of nuclei rather than a branching nucleus. Namely, the result of the decomposition of [e:] i.e. the diphthong [ia] cannot form a branching nucleus (Kaye, Lowenstamm, Vergnaud 1985). Additionally, most Irish diphthongs show lack of integrity thus suggesting that they are not subsumed under a branching nucleus but rather form a sequence of nuclei (Cyran, in prep.) e.g. [aun/awin′] *abhann/abhainn* 'river (gs./nom.)', [kuən/kuen′] *cuan/cuain* 'haven (nom./gs.)'. In fact, most Irish diphthongs can be shown to have the structure of two successive nuclei therefore there is little reason why phonetically pure long vowels should have a different stucture, especially since one member of this set i.e. [e:] clearly patterns with diphthongs (recall also the behaviour of [u:] and [i:]).

The proposal for scrapping branching nuclei, however, requires that the resistance of most pure long vowels to palatalization spreading receive a coherent and plausible systemic explanation. In other words, we would need to explain why they are not affected by palatalization spreading in spite of their structure (succession of short nuclei). The scope of this paper does not allow us to present the arguments for or against this claim, and the question whether there are two or three structures expressing vocalic quantity in Irish will for the moment have to be reserved for future study.

There is, however, one important prediction which follows from the presence

[16] Obviously, this claim does not embarce the Johnsen vowel as it has to remain separate because of its behaviour.

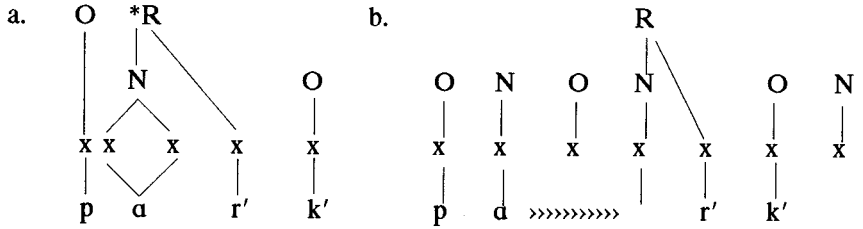
of the fused structure in a language which contains branching rhymes as well, namely, we can expect to find surface forms which apparently violate the binarity theorem i.e. we may find forms with extra-heavy rhymes. This seems to be the case in Irish. Consider the date below and the structures in (25).

(24)

pɑ:r'k'	*páirc*	'field'
ɑ:rd	*ard*	'high'
lu:ŋg	*long*	'ship'

Notice that the consonantal cluster in those apparently illicit forms need not be homorganic e.g. *páirc*.

(25)

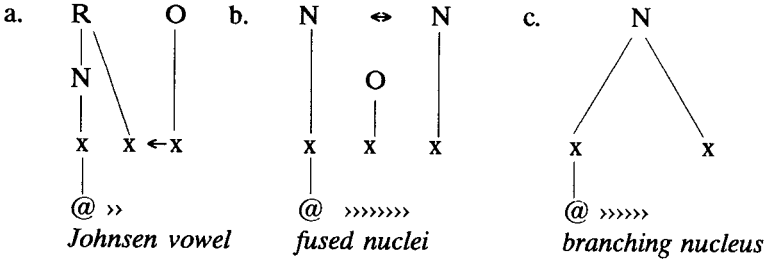


The structure in (25a) is a blatant insult to the binary theorem which says that syllabic constituents can maximally contain two positions. Notice that the constituent rhyme contains a branching nucleus and a "coda". The structure in (25b) conforms to the condition on phonological structure which says that syllabic constituents are maximally binary. If it can be proved that branching nuclei do not exist in Irish, it would be the only possible structure of the socalled super-heavy rhymes in this language.

4. *Conclusion*

The purpose of this paper was to show the logical conclusions of the assumption that it is the differences in phonological behaviour and not the surface shape of

(26)



long vocalic segments that should point to and determine their phonological structures in Irish. We have shown that surface long vowels are ambiguous and have different phonological structures which justify their behaviour. As a result we have established that Irish may have three different phonological structures for long vowels. All of them involve two skeletal positions (26) and each structure offers different predictions and has different phonological consequences.

We have shown that the vowels in (26a and b) have synchronic sources and assumed that the lexically long vowels have the form of branching nuclei. A rather lengthy for the 'Johnsen vowel' was necessitated by the need to justify the postulation of this structure. The paper ends with a tentative proposal that perhaps there are no branching nuclei in Irish. This follows from the similarity between this structure and the sequence of nuclei with respect to stress placement and the fact that most diphthongs show lack of integrity. On the other hand most pure long vowels show something which could be referred to as inalterability, which means that they are immune to such processes as palatalization spreading.[17] No definitive answer can be given at this stage as to whether we are dealing with two or three phonological structures expressing vocalic length. We hope to have demonstrated that these structures enable us to understand the variations in the behaviour of long vowels with respect to two processes i.e. stress assignment and palatalization spreading.

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[17] Compare (Hayes 1986) for an analysis of ambiguity, integrity, and inalterability of long consonants.

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