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AITKEN'S LAW: SOME ASPECTS OF SCOTTISH VOWEL LENGTHENING*

Introduction

The aim of this article is to present and discuss the phenomenon of Scottish vowel lengthening together with the theoretical questions it raises. Scots (i.e. Scottish English, not Gaelic) has developed a system where vowel length is predictable to a great extent. This was brought about by changes that took place in the seventeenth century, according to which all historically long stressed vowels and diphthongs were shortened everywhere except in front of voiced continuants [r, v, z, ð] and before a word boundary. The non-high short stressed vowels [e, a, o] lengthened in the environment where long vowels stayed long (see Lass (1974:320)). Thus *sleeve* [sli:v], *far* [fa:r], *day* [de:], *rev* [rɛ:v], *smooth* [smu:ð], *nose* [no:z], *war* [wɔ:r] have long vowels while *leak* [lik], *coat* [kot], *lead* [lid], *fast* [fast], *leaf* [lif], etc. all possess short vowel reflexes. This change called Aitken's Law after Aitken's (1962) paper where he first paid closer attention to the phenomenon, led to a situation in most Modern Scots dialects where vowels have long and short reflexes according to the environment: long before [r, v, z, ð] and a boundary and short elsewhere.

In this paper we wish to show that there exists a close connection between vowels and consonants in the Scottish language, and this interaction can be couched in terms of the licensing effects vowels exert on consonant segments. Our task will consist in defining the role of consonants in the process affecting the quantity of vowels. However, this task will call for certain modifications and redefinition of some aspects of the phonological representation.

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The theoretical framework adopted in this paper is that of Government Phonology which is a principle-oriented approach to phonological theory, where linguistic variation is perceived to derive from a limited number of parameters implementing universal principles.

The work is organised in the following way. Section 1 reviews the basic principles of Government Phonology. Section 2 presents a description of Scots vocalic system. In section 3 we proceed to the specification of the contexts relevant to Aitken's Law. In the body of the paper (section 3) we postulate an approach to Scottish vowel lengthening couched in terms of Government Phonology based on Licensing Inheritance Principle. The last section summarises the work and provides conclusions.

The theoretical model

The central ideas of Government Phonology (GP) were first formulated and published in an article by Kaye, Lowenstamm and Vergnaud (KLV 1985), further revised and extended in KLV (1990), Kaye (1990), Harris (1990), Charette (1991) and Gussmann (1992). It is a non-linear phonological theory, which recognises a group of universal principles common to all linguistic systems along with a series of parameters delimiting the nature of linguistic variation from one system to another. GP is a theory of representations where phonological phenomena are viewed as stemming directly from the principles and parameters. It imposes a binary limit on the number of positions that a syllabic constituent – onset (O), nucleus (N), rhyme (R) – may contain. It does not make any use of distinctive features. All phonological oppositions are expressed in terms of elements each of which has an independent phonetic interpretation. The elements may combine to form segments. The notion of *government* is central to the theory and it is defined as a maximally binary, asymmetrical relation between two skeletal points.

The fundamental mechanism which integrates the units of phonological representation is that of licensing. Licensing is perceived by Brockhaus (1995) as the motor which drives phonology, in that every skeletal position within a domain, except for the head, has to be licensed, as stated below in the Licensing Principle.

(1) **Licensing Principle** (Kaye 1990:306)

All phonological positions save one must be licensed within a domain. The unlicensed position is the head of this domain.

Government Phonology recognises two basic types of licensing, namely prosodic (p-licensing) and autosegmental (a-licensing). The former refers to the prosodic hierarchy, where each unit has to belong to some higher order unit

(Harris 1994, 1997), while the latter occurs between skeletal positions and the melody. Within branching constituents such as the onset, the nucleus and the rhyme, licensing is head-initial while licensing between adjacent positions which belong to different constituents is head-final.

Further relevant aspects of the theory of government in phonology will be introduced and discussed when necessary.

Aitken's Law – the Scottish vowel length rule[1]

The following is the full range of vowels found in Scots. They fall into two sets – short: [i ɪ e ɛ u o ɔ ʌ a] and long: [i: e: ɛ: u: o: ɔ: a:]. Below we display Scottish vowels in a handful of examples.

(2)	short		long
[i] e.g. *beet*	[bit]	[i:] e.g. *sneeze*	[sni:z]
[e] e.g. *bait*	[bet]	[e:] e.g. *day*	[de:]
[ɛ] e.g. *met*	[mɛt]	[ɛ:] e.g. *rev*	[rɛ:v]
[a] e.g. *fat*	[fat]	[a:] e.g. *far*	[fa:r]
[o] e.g. *coat*	[cot]	[o:] e.g. *nose*	[no:z]
[u] e.g. *foot*	[fut]	[u:] e.g. *move*	[mu:v]
[ɔ] e.g. *pot*	[pɔt]	[ɔ:] e.g. *war*	[wɔ:r]
[ɪ] e.g. *bit*	[bɪt]	-----	
[ʌ] e.g. *but*	[bʌt]	-----	

What can be easily observed from the above examples is that, the vowels [ɪ] and [ʌ] do not have long equivalents. We will return to this point later in our discussion of the contexts for Aitken's Law.

Apart from the above monophthongs, there are two diphthongs, namely, [ai] and [ɔi]. What is characteristic and striking about Scots diphthongs is that, just like monophthongs, they can be either short or long. The long series, however, display also a qualitative difference in that the second element of the diphthong is lowered to [e], as indicated below. The following words in (3) can illustrate the diphthongs listed above:

[1] So far, Aitken's Law has been discussed in three widely known frameworks. Lass (1974) analyses the phenomenon from the standpoint of historical phonology using generative terms. Ewen (1977) shows how the Law of Scottish vowels can be understood within the Dependency Phonology framework. Kamińska (1995) offers a treatment of the process presented in the framework of Lexical Phonology. In our view not all the aspects of the phenomenon have been touched upon in a satisfactory and acceptable manner. Previous accounts, e.g. Kamińska (1995), concentrated mainly on the phonetic side of the Law presenting empirical tests of vowel length in front of various segments. Lass (1974), on the other hand, merely makes an attempt to show that Aitken's Law is nothing but the last step of the process of length formulation in Scottish English.

(3)

short	long
[ai] e.g. *bite* [bait]	[ae:] e.g. *fire* [fae:r]
[ɔi] e.g. *boil* [bɔil]	[ɔe:] e.g. *noise* [nɔe:z]

As mentioned above, a peculiar phenomenon in Scots is that long vowels can only be encountered in stressed positions in front of voiced continuants and a word boundary, i.e. [r v z ð #] (where # stands for word boundary). Thus, length occurs for above-listed vowels in certain predictable contexts. The distribution of length in Scots can be represented as in the table (4) below (quoted from Lass (1974:317)). The gaps are probably due to historical accidents.

(4)

Vowels	**-#**	**-r**	**-v**	**-ð**	**-z**
[i:]	*bee* [bi:]	*beer* [bi:r]	*sleeve* [sli:v]	*breathe* [bri: ð]	*sneeze* [sni:z]
[e:]	*day* [de:]	*mare* [me:r]	*brave* [bre:v]	-----	*graze* [gre:z]
[ɛ:]	-----	-----	*rev* [rɛ:v]	-----	------
[a:]	-----	*far* [fa:r]	*have* [ha:v]	-----	*has* [ha:z]
[u:]	*do* [du:]	*poor* [pu:r]	*move* [mu:v]	*smooth* [smu:ð]	*lose* [lu:z]
[o:]	*row* [ro:]	*bore* [bo:r]	*grove* [gro:v]	*clothe* [klo:ð]	*nose* [no:z]
[ɔ:]	*cow* [kɔ:]	*war* [wɔ:r]	------	------	*cause* [kɔ:z]

Thus Scots vowels are invariably long only in the contexts specified above and short elsewhere, i.e. in front of both voiceless and voiced stops, voiceless fricatives, nasals and liquid [l] (For a detailed list of examples see Kiełtyka (in prep.)).

We observed earlier that the vowels [ɪ] and [ʌ] did not undergo lengthening in Scots. Thus [ɪ] is short in *fir* [fɪr], *his* [hɪz], *give* [gɪv], and [ʌ] is short in *fur* [fʌr], *love* [lʌv], *buzz* [bʌz]. Lass (1974:318) notices that only the vowels marked [-high], [-tense] could undergo lengthening in Scots, whereas [ɪ] and [ʌ][2] constitute a natural class and are characterised as [+high] and [-tense] which accounts for their resistance to lengthening. This observation is, however, not satisfactory enough. The reasons for the failure of Aitken's Law in front of [ʌ] and [ɪ] as well as a government-based analysis are discussed in some detail in Kiełtyka (in prep.)

[2] The vowel [ʌ] is derived from [u] which is why Lass (1974) regards it as [+high].

The diphthongs participate in length alternations in the same environments as the long vowels. Their lengthening, however, is accompanied by the quality change in that the second element of the diphthong is lowered to [e], as indicated below. (The gaps are due to historical accidents).

(5)

Diphthongs	**-#**	**-r**	**-v**	**-ð**	**-z**
[ai] ⇒ [ae:]	*fly* [flae:]	*fire* [fae:r]	*five* [fae:v]	*scythe* [skae:ð]	*size* [sae:z]
[ɔi] ⇒ [ɔe:]	*boy* [boe:]	*Moir* [moe:r]	-------	-------	*noise* [noe:z]

The above diphthongs are to be understood in the following way: [ai] and [ɔi] are short but they are lengthened to [ae:] and [ɔe:] respectively, in the lengthening context specified above (see Aitken (1981:132)). Thus the distribution of diphthongs parallels that of long and short vowels. The conclusion to be drawn is that long diphthongs behave like long vowels and short ones follow the pattern of short vowels.

As observed above, the short diphthongs are to be found in exactly the same contexts as the short vowels, i.e. in front of both voiceless and voiced stops, voiceless fricatives, nasals and liquid [l] (A full set of contexts together with relevant examples can be found in Kiełtyka (in prep.)).

In the sections below we will try and apply the data to account for Scots vocalic lengthening using the principles and parameters of Government Phonology.

Aitken's Law within the framework of Government Phonology

As we saw in the previous sections the inspection of Scots vocalic length leads to some distributional asymmetries between positions. It is intriguing why length shows up before one group of sounds but fails to appear before another. A good way of checking the melodic identity of the two groups would be examining their complexity. If it appears that the members of the sets have something in common in terms of elemental complexity, then we can investigate the distribution of licensing charge by applying the Licensing Inheritance Principle. Let us now, therefore, proceed to identifying the elemental make-up of Scots consonants.

Scots consonantal complexity

On the basis of phonological patterning (see Kamińska (1995), Wells (1982)), we can infer that the melodic make-up of Scots consonants is not much different from English ones. As we have already shown, vocalic length and consonantal

complexity are interrelated in Scots. In order to investigate what the nature of the interdependence is, let us examine Scots consonantal complexity so as to see whether the contexts responsible for vowel length display any similarities in their phonological behaviour. First, however, let us introduce the phonological elements *per se* and afterwards concentrate on Scots consonantal complexity.

As proposed in Kaye, Lowenstamm and Vergnaud (KLV 1985) and Harris and Lindsey (1995), all phonological segments are formed out of a set of primitives called **elements.** These elements may occur alone or in combination. All segments are composed of an operator and a head, the operator being an optional unit. These elements,[3] motivated and defined in KLV (1985; 1990) and Harris (1990; 1994), are listed below:

(6)

A	coronality
I	palatality
U	labiality
N	nasality
@	velarity
h	noise
ʔ	occlusion
L	low tone
H	high tone

In Scots one finds six plosives with three contrastive places of articulation: bilabial [p, b]; alveolar [t, d]; and velar [k, g]. The representational system of Government Phonology distinguishes between these by means of three elements: **U** – which is responsible for labiality, **A** – for coronality, and **@** – for velarity. In the composition of plosives these elements serve as the heads of segments. Apart from this property, plosives contain the element of occlusion **ʔ** and the **h** component since they are all stops with audible noise release. Moreover, as shown by Harris (1994:133 ff.), Germanic – in contradistinction to Slavic and Romance – exploits **H**(igh) and not **L**(ow) tone as its source element for voicelessness and aspiration. Voicing in Germanic languages is a manifestation of the absence of **H** in the representation of segments. Thus, the Scots voiceless series are differentiated from the voiced series by the presence or absence of **H** element. (Accounting for the existence of any of those primes in Scots goes beyond the scope of this paper. We assume that the melodic make-up of both Scots and English consonants is similar and employ the description presented in Harris (1994) as relevant reference). A detailed representation of the internal composition of Scots plosives is presented in Kiełtyka (in prep.).

[3] There have been attempts to revise and minimise the number of elements, e.g. Cyran (1997), however whatever element inventory we employ, our reasoning and the ultimate results remain unchanged.

Scots fricatives possess the elements: **U**, **@** or **A** defining place of articulation for [f, v], [h], [s, z] and [θ, ð] respectively; the noise **h** which signals their spirant nature and the voiceless segments exhibit the **H** which gives them this property.

A palato-alveolar fricative or affricate should be considered to be a palatalised version of a plain alveolar. In element terms, this means that [ʃ, ʒ] contain the **h** and **A** contained in [s, z], supplemented by the palatal element **I**. In the case of affricates [tʃ, dʒ] the melodic make-up is the following: **h** and **ʔ** for the manner of articulation and the fusion of **A** and **I** defines palato-alveolar place.

Scots liquids share a common place of articulation: [r, l] are coronal sounds and contain the element **A**. Moreover, [l] includes **h** and **ʔ** which are absent from [r]. Thus the melodic make-up of [l] resembles that of voiced stops in Scots which may stem from the fact that [l] behaves like any of the stops in question in that it is always preceded by a short vowel.

As in the case of plosives and spirants, three contrastive places of articulation for Scots nasals can be distinguished: bilabial, alveolar and velar, represented by **U**, **A**, and **@** respectively. And again, like in plosives, the place of articulation is the head of the segment. The operators, then, are the occlusion element **ʔ**, the nasals being stops, and the nasality element **N**.

It appears that what is common for the lengthening context in Scots is that all the relevant segments, i.e. [r, v, z, ð] are not more than bi-elemental. It transpires, then, that the complexity of consonants which follow the lengthenable Scots vowels is to be held responsible for quantitative shifts. If the complexity of consonants reflects vowel length changes in that the greater complexity of the consonant in a way forces shortness in the vowel, and, conversely, more limited or lesser consonantal complexity permits branching nucleus, then we should seek a solution in licensing which is the fundamental mechanism integrating the units of phonological representation and the motor which drives phonology (see Brockhaus (1995)). In the section to follow we will make an attempt to show that phonological licensing and Licensing Inheritance Principle in particular govern the relations between segments to such an extent that even vocalic quantity does not remain intact. Let us, therefore, try and see how licensing can integrate the units of phonological representation.

Licensing distribution

In what follows we will try to employ the **Licensing Inheritance Principle**, as formulated in Harris (1997:340) (quoted in (8) below) and see whether or to what extent it is helpful in accounting for the quantity of Scots vowels.

(8) *A prosodically licensed position inherits its autosegmental licensing potential from its licensor*.

In order to make the principle in (8) easier to understand let us note that autosegmental licensing is strictly connected with the **Complexity Condition** specified in (9) below:

(9) *Let α and β be melodic expressions occupying the positions A and B respectively. Then, if A governs B, β is no more complex than α.*

The Complexity Condition accounts for the autosegmental licensing power of different positions within a domain, where greater power implies a greater toleration of melodic complexity. The condition specifies that a governed position can never have a greater capacity to license melodic material than its governor. By autosegmental licensing potential we mean the ability of a position either to directly license melodic content or confer autosegmental licensing potential on another position. From this it transpires that a prosodically unlicensed position has a greater degree of autosegmental licensing potential at its disposal than its licensee.

There are two aspects of Licensing Inheritance worth noting, namely: a licensed position acquires its ability to license melodic material from its licensor and the stock of autosegmental licensing potential invested in an unlicensed position is finite and is attenuated through transmission to licensed positions.

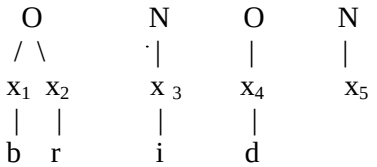
In the section to follow we are going to proceed to the analysis of the Scottish vowel length in the light of the theory of representations.

A new approach to Aitken's Law

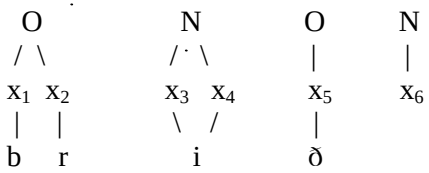
In a pair of words like *breed* vs. *breathe* the vowels display identical quantity in most varieties of English but differ in terms of length in Scots. In the latter dialect the word *breed* is pronounced [brid] with a short vowel as it is followed by a consonant which belongs to the so-called 'short environment' (the one which does not cause lengthening). On the other hand, the vowel in *breathe* pronounced [briːð] is long because followed by a consonant of the so-called 'long environment' (the one which forces lengthening).

(10) The representation of *breed* (a) vs. *breathe* (b)

a.

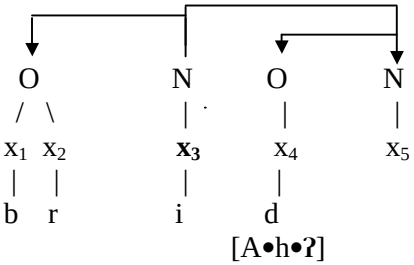


b.



Let us now try to apply the Licensing Inheritance Principle introduced in (8) above and see how it works for Scots vowel quantity.

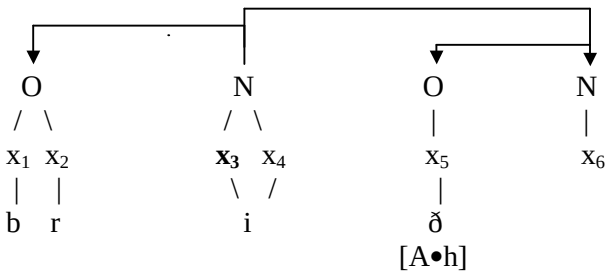
(11) The representation of *breed* [brid]



(⟶) direction of licensing

A short vowel like [i] in (11) above is a simplex segment occupying one timing slot. Such a vocalic unit – the head of the domain, hence, the source of licensing potential, has to distribute the licensing charge to all the segments which have to be pronounced and, thus, it diminishes its licensing power. The licensing potential is transmitted to the following onset (via the final nucleus) which has to autosegmentally license as many as three elements as in (11) above. What happens is that the licensing charge is depleted to such an extent that there is not enough left over to sanction a branching nucleus. It follows, then, that if a vowel in Scots has to license a three- or more elemental segment such as a voiced or voiceless stop, a voiceless fricative or an affricate, it is too weak to be able to sanction its complement. For this reason branching nuclei are not attested in front of these segments. Thus, bearing all that in mind, we can predict that if a position like x_4 in (11) is occupied by a segment supporting three or more elements, i.e. a stop, a voiceless fricative or an affricate, the preceding vowel cannot afford to branch which is, in reality, attested. We can multiply examples where short vowels are followed by the segments in question in Scots (*deem* [dim], *wreath* [riθ], *beef* [bif], etc.). This strengthens our premise that whenever a nucleus licenses a three- or four-elemental segment it may not branch. On the other hand, when a nucleus sanctions only up to two elements in the following consonant it is, still, strong enough to branch. We must admit, however, that our observation is based on an assumption that voiced obstruents do not have an element responsible for voicing (see section: **Scots consonantal complexity**).

(12) The representation of *breathe* [bri:ð]

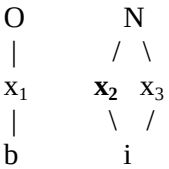


(⟶) direction of licensing

When the vowel is long as in (12) above, it occupies two timing slots one being the head, the other – the complement. The head first licenses the following two-elemental onset, as otherwise it would not be pronounced, and doing so it diminishes its licensing power by transferring to it some of the potential. However, since the licensing charge is only partially depleted, because the toneless voiced fricative possesses only two primes that need autosegmental licensing, there is enough licensing potential left over to license a branching nucleus. Thus our observation is the following: an onset whose melodic make-up is as complex as two or fewer elements, can be preceded by a branching nucleus as the amount of licensing power, although diminished through onset licensing, suffices to sanction the vowel complement. Conversely, if the onset following a lengthenable vowel has in its melodic make-up more than two primes, the vowel cannot be lengthened – its licensing potenial is too attenuated to sanction the vocalic complement.

Let us now examine the situation at the end of a word. We pointed out earlier that one of the contexts where Scots vowels show length is in front of a word boundary, i.e. at the end of the phonological domain. Thus, words like *day* [de:], *bee* [bi:], *row* [ro:], *cow* [kɔ:], *do* [du:], *fly* [flae:] or *boy* [boe:] all possess lengthened vowels. The phonological representation of *bee* [bi:] is drawn below.

(13)

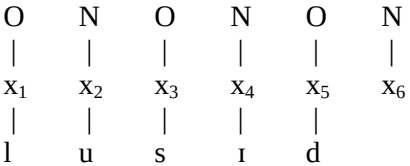


In accordance with the Licensing Principle quoted in (1), the position $\mathbf{x_2}$, being the head of this phonological domain is responsible for distributing the licensing charge to the adjacent positions. The head licenses the onset to its left and the rest of the licensing potential can be transmitted to the nuclear complement. There is

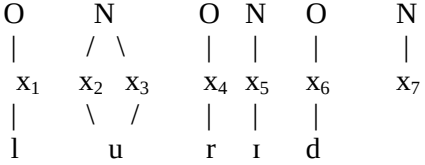
nothing to license to the right, hence, the licensing potential is only minimally attenuated. The ultimate result is the branching nucleus.

Let us now consider the examples of bi-syllabic words such as *lucid* [lusɪd] with two short vowels in (14a) vs. *lurid* [lu:rɪd] with a long vowel before [r] in (14b).

(14) a.



b.



In (14a) we encounter two short vowels. The vowel preceding [s] is not lengthened due to Aitken's Law as [s] is one of the segments in front of which vowels display short reflexes. The motivation for not lengthening the vowel preceding [d] is twofold. First, this vowel[4] (as well as [ʌ]) is never lengthened in Aitken's Law environments. Second, [d] does not belong to Aitken's Law environments. Additionally, it must be emphasised that even if the two mentioned conditions were fulfilled, still the vowel would not undergo lengthening because it does not bear primary stress. Aitken's Law predicts that only stressed vowels are susceptible to lengthening, other conditions being satisfied.

Going into more detail, let us assume that in polysyllabic words every nucleus inherits the licensing charge to sanction neighbouring positions on a different level of projection. Thus the reason for the occurrence of the short vowel [u] in *lucid* is that the licensing charge of x_2 in (14a) is depleted through sanctioning the remaining positions to such an extent that what is left over does not suffice to license a branching nucleus. From the above it follows, then, that the potential pronunciation *[lu:sɪd] *lucid* with a long vowel preceding [s] is not attested in Scots. On a closer look, however, it appears that the head of the domain is able to license far more than three or even four elements (three elements of [s], one element of [ɪ] and three elements of [d] amount to seven) as we argued earlier when discussing the monosyllabic words. This is either a weak point of our hypothesis or a signal that bi-syllabic words should be analysed in a different way from monosyllabic ones.

[4] The reasons for the immunity of [ɪ] and [ʌ] to lengthening are discussed in some detail in Kiełtyka in (prep.).

Thus, as we have seen from our discussion of *lucid* in (14a) the Licensing Inheritance Principle does not prove to be of much help as far as the analysis of polysyllabic words under operation of Aitken's Law is concerned, or in other words, the application of licensing inheritance to polysyllabic words leads to absurd results (The head licenses more than three elements). The conclusion we, thus, arrive at is that either our interpretation of licensing inheritance needs reconsidering and modifying or the very principle calls for modification which is evident through the necessity of different analyses of mono- and polysyllables. In our view, if we wish to maintain the validity of the claim that Licensing Inheritance operates in polysyllables, the following amendment has to be postulated. The head of the domain is not the only source of licensing potential but every nucleus has at its disposal some licensing charge encoded in it. However, in order to be able to distribute its charge, every nucleus needs to be sanctioned by the head of the domain. The head licenses all the other nuclei present in the domain, hence a polysyllabic word contains much more licensing power than a monosyllable. Since every nucleus sanctions the segments that surround it, the head's licensing potential is only minimally depleted. Bearing all that in mind we can posit that the head can be strong enough to support its complement, in other words it can branch. By way of illustration, let us consider (14b) above where we get a long vowel in front of [r]. Since the stressed vowel [u] is branching, we can predict that the following onset is not more complex than two elements. What happens is that the head transmits some of the licensing charge to the remaining nuclei (x_7 and x_5) to enable them, in a way, to use their own charge stocked in them to sanction the preceding onsets. As we have already mentioned, the nuclei possess their own licensing power, therefore they do not attenuate the head's licensing abilities. The main licenser still has enough potential left over to support the long vowel [u:]. The result is a branching nuclear segment.

Concluding, let us emphasise the fact that if Licensing Inheritance Principle is viewed in a slightly modified manner it can prove a useful tool in accounting for nuclear length in polysyllabic words. What becomes evident is that the principle makes the head of the phonological domain work as a motor which when sanctioning remaining nuclear segments 'activates' the stock of licensing potential previously invested in them. From the above it follows, then, that the head is the only nuclear segment which can get lengthened in the phonological domain in Scots.

Conclusion

In this paper we have discussed the phenomenon of Scottish vowel lengthening couched in terms of Government Phonology. We began with the

presentation of the Scots vowel inventory. Later we proceeded to Aitken's Law proper with the contexts for its occurrence and the relevant length distribution. In the body of the paper we proposed an approach to the phenomenon stemming from the phonological possibilities with which Government Theory supplies us. Specifically, we postulated that the Licensing Inheritance Principle can be employed to account for Scots quantity variations. In addition, we proposed a tentative modification of the standard application of the principle. Our account touches upon the vowel-consonant interactions present in the language viewed as distributing the licensing charge among segments which can result in quantitative shifts of nuclei. We hope to have demonstrated that this analysis enables us to understand the variations in the phonological behaviour of Scottish vowels.

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