References

Anderson, J. and C. Ewen (1987) *Principles of dependency phonology*. Cambridge: Cambridge University Press.
Cyran, E. and E. Gussmann (in press) Consonant clusters and governing relations: Polish initial consonant sequences. In H. van der Hulst and N. A. Ritter, eds.
Diffloth, G. (1976) Minor-syllable vocalism in Senoic languages. In *Austroasiatic studies* (part I). P. N. Jenner, L. C. Thompson, and S. Starosta, eds., 229-247. Honolulu: University Press of Hawaii.
Dresher, E. and H. van der Hulst (to appear) Head-dependen asymmetries in phonology: complexity and visibility, *Phonology*.
Hulst, H. van der and N. A. Ritter (in press) Head-driven phonology. In H. van der Hulst and N. Ritter, eds.
Hulst, H. van der and N. A. Ritter, eds. (in press) *The syllable: views and facts*. Berlin and New York: Mouton de Gruyter.
Hulst, H. van der and N. A. Ritter (in prep.) *The syntax of segments*.
Kaye, J. (1990). 'Coda' licensing. *Phonology* 7:301-30.
Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1985) The internal structure of phonological elements: a theory of charm and government. *Phonology Yearbook* 2:305-28.
Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1990) Constituent structure and government in phonology. *Phonology* 7:193-232.
Murray, R. and T. Vennemann (1987) Sound change and syllable structure in Germanic phonology. *Language* 59:514-28.
Ritter, N. A. (1995) *The role of universal grammar in phonology: a government phonology approach to Hungarian*. Ph.D. dissertation. New York: New York University.
Rowicka, G. (in press) On trochaic proper government. In *Phonologica 1996. Syllables?!*. J. R. Rennison and K. Kühnhammer, eds. The Hague: Holland Academic Graphics.
Rowicka, G. (this volume) The audibility and visibility of Mohawk ghosts.
Shaw, P. (1993) The prosodic constituency in minor syllables. *Proceedings of the 12th West Coast Conference on Formal Linguistics*, 117-133.
Smalley, W. A. (1961) *Outline of Khmu? structure*. New Haven, CT: American Oriental Society.
Svantesson, J. (1983) *Kammu phonology and morphology*. Lund: Gleerup.

The prosodic hierarchy at work: lenition of voiceless spirants in Old Irish*

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This paper is devoted to spirant alternations in Old Irish. In this language original fortis fricatives alternate with their lenis counterparts in certain contexts. A number of scholars have regarded the distribution of spirants and the interchange between voiced and voiceless members of the class as irregular, and hence not susceptible to a principled interpretation. This is due to spelling inconsistencies and scribal errors, which in many cases obscured the cause of the phonological process of voicing and frequently led to misinterpretations. There exist, however, a number of examples which suggest that a certain regularity governed the distribution of both voiceless and voiced spirants. Moreover, the evidence suggests that lenis fricatives, unless they are original, occur only in contexts where lenition is regularly found, that is, in weak positions in a word.

The analysis presented below adopts the concepts and principles of *Government Phonology* (Kaye, Lowenstamm and Vergnaud (KLV) 1985, 1990, Charette 1990, Harris 1994). The paper is organised as follows: section 1 outlines some general principles of Government Phonology (GP) with regard to the notion of licensing; section 2 introduces the problem of spirant alternations in Old Irish; in section 3 it is proposed that the licensing principles of GP offer a possible solution to this problem.

1. Licensing in Government Phonology and the theory of elements

The concept of *phonological licensing* is central to Government Phonology. Licensing defines relations among units in the phonological hierarchy, both prosodic and melodic. Under *prosodic* licensing, each unit in the prosodic hierarchy must belong to some higher-order structure. *Autosegmental* licensing determines the attachment of melodic material to skeletal positions. The skeletal and constituent dimensions are integrated into a hierarchy of larger domains: the foot and the word. The ultimate head of the domain is the source of licensing power that is transmitted to the lower levels of projection. These relations are formalised in the following principle (Kaye 1990:306, Harris 1994:156).

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(1) THE LICENSING PRINCIPLE

All positions within a phonological domain must be licensed save one, the head of the domain.

In this paper we will be dealing with both prosodic and autosegmental licensing. The former type, strictly connected with stress, is responsible for the fact that some nuclear positions in the phonological hierarchy are more prominent, licensed on a higher level of projection, than others (see Harris 1994:151ff. for details).

One of the fundamental assumptions of GP is that nuclei are the licensers of the onsets they follow (Charette 1990). Nuclei can determine not only the skeletal structure but also the melodic content of the preceding onsets. Consequently, the autosegmental licensing of the melodic component of onsets depends on the prosodic licensing obtained from the nuclei that follow. This is captured by the following principle (Harris 1994:206).

(2) THE LICENSING INHERITANCE PRINCIPLE

A prosodically licensed position inherits its autosegmental licensing potential from its licenser.

Now, since the status of nuclei varies in the hierarchy, their licensing potential may also be unequal. The prominence and the licensing power of nuclei can influence the melodic quality of the preceding onsets more noticeably in some languages than in others. It will be argued below that Old Irish voiceless spirants in recessive position are lenited (voiced), whereas those followed by prominent nuclei remain intact.

Unlike most other phonological theories, GP recognises that nuclei may be empty, i.e. nuclear positions may have no melodic content. An empty nucleus needs to be licensed in order to remain empty. Domain-finally, empty nuclei are licensed by parameter. In some languages this parameter is switched *ON* (e.g. English, Polish, Irish, Old Irish); in others (e.g. Japanese and Italian) it is turned *OFF*, and a word has to end in a vowel. Word-medially an empty nucleus, so as to stay empty, must be *properly governed* by a full nucleus to its right, that is, prosodically licensed by a realised vowel adjacent to it on the nuclear projection.

In GP, segments are said to be composed of phonological *elements*, i.e. the smallest units of phonological representation. Elements may be phonetically realised either in isolation or in compound expressions. At present a number of elements are considered indispensable: (I) – palatality, (U) – labiality or velarity, (A)[1] – coronality, (ʔ) – stopness, (h) – noise, (N) – nasality, (H) – high tone, (L) – low tone.[2] The first three elements occur both in vowels and in consonants. The rest, except for tonal elements in some contexts, appear in the representations of consonants only. Thus the typical vowel [o] is composed of (A•U), while the typical consonant [p] consists of (U•ʔ•h•H). The distinction between voiceless and voiced consonants is usually understood as the presence or the absence, respectively, of one of the tone elements. Since Celtic languages do not have fully voiced obstruents, the high tone element is assumed to occur in the structure of fortis segments but is said to be absent from lenis expressions (cf. Harris 1994:134ff.). In the present discussion we will refer to the high tone element almost exclusively.

[1] In this paper the element (A) is assumed to represent coronality (cf. Broadbent 1991).

[2] There have been many attempts to reduce the number of elements. For a comprehensive review see Cyran (1996).

2. Spirant alternations in Old Irish

Old Irish has two sets of fricatives: voiceless and voiced. Their inventory includes the labials [f] and [v], the dentals [θ] and [ð], the velars [χ] and [ɣ], and also [s] and [h]. The distribution of spirants is somewhat limited. Only [s] can appear in all positions in the word, while [h] is either a weakened variant of [s] or a segment prefixed to words beginning in a vowel in certain morpho-syntactic contexts, and [f] can only be found word-initially and medially. The remaining spirants occur word-medially and finally, positions in which the corresponding stops cannot appear. This phenomenon is caused by a process called *lenition*, that is, weakening of consonants in specified environments, mainly intervocalically. What is meant by lenition is that original Proto-Indo-European (PI.E.) stops, which can have been preserved in other Indo-European languages, are transformed in Old Irish and other Insular Celtic languages into fricatives between vowels, as is illustrated by the following examples.[3]

(3)

[v]	[iviði]	***ib**id*	'drinks'	– Latin *bi**b**it*
[ɣ]	[dliiɣieð]	*dli**g**ed*	'duty'	– Gothic *dul**g**s*
[ð]	[saðiið]	*sai**d**id*	'sits'	– Latin *se**d**ere*
[χ]	[oχt]	***ch**t*	'eight'	– Latin *o**ct**ō*
[θ]	[aθir]	***th**ir*	'father'	– Greek *πα**τ**ήρ*

PI.E. stops are changed into spirants in Old Irish and lexicalised. Here, however, another interesting process takes place. PI.E. fortis stops which become Celtic fricatives are subject to further lenition in Old Irish. Some domain-medial and final original fortis spirants undergo a contextually conditioned voicing process. Original [θ], [χ] and [f] are voiced to [ð], [ɣ] and [v] in word-final position in words consisting of at least two syllables (Thurneysen 1946:82ff., Pokorny 1914:27, McCone 1996:132ff.). Furthermore, [θ] is voiced to [ð] in polysyllabic words when separated from the main stress by at least two syllables. It is worth noting that original voiced fricatives tend not to alternate (Thurneysen 1946:81).

[3] The superscript symbol [i] indicates palatalisation of the consonant it follows.

Word-finally, velars often depart from this principle in that they occur in complementary distribution according to the environment. If the quality of the final velar is palatalised, the voiced spirant [ɣ] appears and, when that quality is non-palatalised, the voiceless [χ] is found (Pokorny 1914:27).

Thus, original voiceless fricatives remain voiceless when followed by a full vowel and are voiced when preceding a domain final empty nucleus. However, despite the theoretical claim that it is the fortis spirants that are voiced and not the other way round, this assumption is a little unconvincing. Let us consider some cases which indicate that it is indeed the fortes which are original. For example, in the 3sg. present of Old Irish verbs the paradigmatic ending is *-ith* [iθʲ]. However, it almost always appears as *-id* [iðʲ]. The original shape of the ending can be observed only if followed by suffixed pronouns which begin with vowels (McCone 1987:11).

(4)

[bʲerʲiðʲ]	*beirid*	'carries'	but	[bʲerʲθʲi]	*beirthi*	'carries it/him'
[gavʲiðʲ]	*gaibid*	'seizes'	but	[gavʲθʲi]	*gaibthi*	'seizes it/him'

In the so-called *F-Future*, where the fricative [f] is a typical property of this tense, word-finally this spirant is voiced to [v].

(5)

Absolute 1sg.	–	*F-Future*	–	*Conjunct 1sg.*
[marvfʲa]		*marbfea* 'kill'		[marvʲiv] *marbiu**b***
[Lʲeːgʲfʲa]		*léicfea* 'leave'		[Lʲeːgʲiv] *léiciu**b***

Let us return again to the 3sg. verbs with suffixed personal pronouns, and see what happens when pronouns like those in (4) are suffixed to verbs whose stems end with the coronals [n] and [s], that is, consonants after which the process of delenition as a result of assimilation can take place. The spirant of the 3sg. ending is despirantised to [t], which indicates that the underlying sound is the voiceless one.

(6)

[bʲeniðʲ]	*benaid*	'strikes'	but	[bʲenti]	*bentai*	'strikes him/it'
[saːsiðʲ]	*sásaid*	'satisfies'	but	[saːstum]	*sástum*	'satisfies me'

If the original spirant was voiced [ð], then it should be delenited to [d], which is not the case. It seems proper, then, to conclude that voiceless spirants are indeed original and voiced ones appear only in special contexts, namely, preceding domain-final empty nuclei whose role is undoubtedly decisive. In particular, domain-final empty nuclei apparently do not allow the voiceless spirant to remain fortis. Moreover, in the following section we examine unstressed realised nuclei which also cause voicing in voiceless spirants. This peculiarity seems to be the result of the weak licensing power of unstressed and empty nuclei in Old Irish.

A voiceless spirant followed by a stressed or weakly stressed nucleus preserves its shape, whereas one preceding an empty or unstressed nucleus is lenited (in this case: voiced).

Old Irish developed an alternating stress pattern: the first syllable always receives primary stress and then every second syllable is weakly stressed (Lewis and Pedersen 1974:70). This fact allows us to make certain assumptions as far as the metrical structure of Old Irish words is concerned. Generally speaking, feet can be either left-dominant (*trochaic*) or right-dominant (*iambic*). Moreover, they can be either binary or ternary (see Burzio 1994:33ff.). If a language has alternating stress, then it tends to have binary feet (Goldsmith 1990:172). Old Irish feet are binary and left-headed. Obviously, there are many monosyllabic or trisyllabic words in which binary feet cannot occur. In such cases we can speak of so-called degenerate feet.[4] Moreover, in some languages, e.g. Spanish, empty nuclei are important as far as stress assignment is concerned, and pedified, whereas in others, e.g. English, they are not (Harris 1994:76).

Voiceless spirants are therefore lenited in specified contexts; distance from stress seems to be a relevant factor in determining these contexts. From the viewpoint of GP, lenition is understood as element suppression. If spirants are voiced, the element (H) responsible for voicelessness is delinked from their structure. For example, the fricative [f], which has the structure (U•h•H) is lenited to [v], the structure of which is (U•h). The reason for element decomposition in onsets may be the weak licensing power of posterior nuclei. This is how prosodic licensing influences autosegmental licensing. Before we consider the following set of examples, let us recall that domain-final spirants are voiced only in words consisting of at least two syllables.

(7)

a.

[kaθ]	*cat**h***	–	[kaθo]	*cat**h**o*	'battle/gen.sg.'
[eχ]	*ec**h***	–	[eχu]	*ec**h**u*	'horse/acc.pl.'

b.

[Loχiðʲ]	*lochaid*	–	[Loχθa]	*loch**th**a*	'mouse, dat.sg./acc.pl.'
[aðiɣʲ]	*adaig*	–	[aðʲχʲi]	*aid**ch**i*	'night/dat.sg.'
[marvʲiv]	*marbiu**b***	–	[marvfʲa]	*marb**f**ea*	'kill, 1sg.fut.conj./1sg.fut.abs.'

c.

[foLʲsʲiɣʲiðʲ]	*foilsigid*	–	[foLʲsʲiɣʲθʲe]	*foilsigth**e***	'reveal, 2pl.conj./2pl.abs.'
[Lavriðʲ]	*labraid*	–	[Lavriθʲe]	*labrait**h**e*	'speak, 2pl.conj./2pl.abs.'

These examples contain monosyllabic (7a), disyllabic (7b) and polysyllabic words (7c). The right-hand column shows cases with original Early Old Irish voiceless

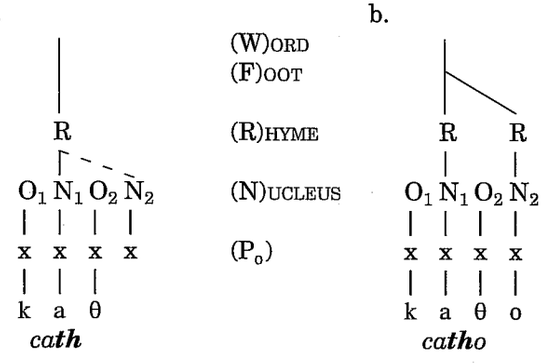
[4] Burzio (1994:33ff.) claims that feet must be at least binary and for this purpose he proposes the recognition of empty syllables. Hayes (1995:102) states that a degenerate foot consists of a light syllable in languages which have no quantity distinction. Old Irish does not distinguish between heavy and light syllables in polysyllabic words, but in monosyllabic words ending in a vowel the stressed vowel must be long.

spirants which occur in word-medial position. In the column on the left, same spirants, being word-final, are lenited, i.e. voiced, in (7b,c) but not in (7a). It is traditionally assumed that original voiceless fricatives are not voiced when preceded by a vowel bearing primary stress. In (7b,c) the fricatives follow unstressed vowels. From the viewpoint of GP, there are two reasons why one might regard the pattern observed for spirants in polysyllabic words as strange. First, if certain segments in a given language are voiced or devoiced word-finally, then this regularity should pertain to the whole system and not only to polysyllabic words. Second, what should matter for prosodic licensing in an onset-nucleus relation and, subsequently, for autosegmental licensing of an onset position, is the status of the following and not the preceding nucleus. In both monosyllabic and polysyllabic stems, however, the final spirants are followed by empty nuclei which, theoretically, should have the same status and licensing potential. Apparently, though, they do not. Let us then analyse this incongruity in stages, beginning with monosyllabic stems which do not display the voicing alternation.

3. An analysis of spirant voicing in terms of licensing

The problem of word-final voicing is very difficult to explain unless we adopt the view that since stress is connected with the distribution of licensing, then the higher the level at which a position is licensed, the more prominent the position will be. In polysyllabic words spirants followed by realised nuclei appear in their lexical shape, whereas those preceding empty nuclei are lenited. Such a phenomenon is by no means unusual as one can observe similar cases of final voicing/devoicing[5] in many other languages. However, in (7a) the fricatives preserve their structure even if followed by an empty nucleus. This anomaly can be explained by the fact that the distribution of licensing in the case of monosyllabic stems looks very much alike in both cases, irrespective of whether a spirant is followed by a vowel or by an empty nucleus. Consider the representations of [kaθ] and [kaθo] below.

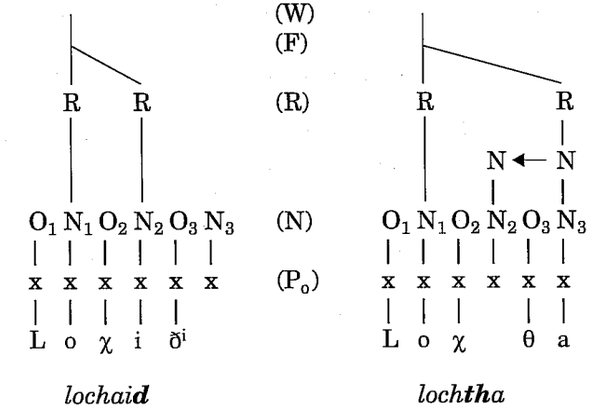
(8) a. b.



[5] In fact, devoicing of consonants is prevalent word-finally.

In (8a) the final empty nucleus (N_2) is licensed by parameter on the P_0 projection, while the final realised nucleus (N_2) in (8b) is licensed on the rhyme projection. (N_2) in (8a) is also left unpedified because it is not clear as yet how empty nuclei could or should be footed, hence the dotted line. In terms of prominence, however, this fact seems irrelevant as both nuclei (N_2) are unstressed and have the same status. The situation changes dramatically when we are dealing with disyllabic words and their syncopated forms. There the final nuclei following a given spirant have a different status according to whether they are realised or empty.

(9) a. b.



lochaid *lochtha*

(←) *Proper Government*

In (9a) the final empty nucleus (N_3) is licensed by parameter on the P_0 projection. In (9b) the final nucleus (N_3) receives licensing at the rhymal level of projection. Additionally, (N_3) properly governs (N_2) on the nuclear projection. Thus, the nucleus (N_3) in (9b) is more prominent and has more power to allow the spirant to remain voiceless while the nucleus (N_3) in (9a) is too weak to support the voicelessness in the spirant it follows. (N_3) is left unfooted in (9a) because even if we pedified empty nuclei, an empty nuclear position would not be a proper candidate for the head of a foot. We will return to this problem later. Moreover, the voiceless spirant [χ] attached to (O_2) in both cases cannot be voiced as it immediately follows the head of the domain, that is (N_1) - the main licenser. The cases of (8a) and (9a) seem identical as far as the level at which the final empty nuclei are licensed is concerned. The licensing of (N_2) in (8a), though, cannot be treated on a par with that of (N_3) in (9a). It seems, then, that the distance from the head of the domain to the domain-final empty nucleus influences the licensing properties of this nucleus. It might be the case that, since in (9a) the head of the domain (N_1) has to license one realised nucleus (N_2) and one empty nuclear position (N_3), this head can transmit less licensing to the final empty nucleus

than the head of the domain in (8a), that is the nucleus (N_1), which has to give licence to only one empty nucleus. It is proposed in Jaskuła (1996) that, since the greater the distance from the main licenser the smaller the licensing potential of domain-final empty nuclei, this fact should be observed in the definition of the Final-empty-nucleus parameter.

(10) *Final empty nuclei licensed by the head of the domain? ON/OFF*

Such a version of the parameter helps formalise the above idiosyncrasies in which empty nuclei participate. It is not clear, however, at which level of projection domain-final empty nuclei are licensed by the head of the domain. Moreover, the question also arises as to why in languages which do not license domain-final empty nuclei, e.g. Italian and Japanese, these nuclei, which have the same role as final empty nuclei in other languages, are considered to be licensed by the head of the domain. These problems, however, require further investigation.

In the third person singular of Old Irish deponent verbs we also find cases where the distance from the head of the domain and the distribution of licensing can have an impact on the licensing capacity of realised nuclei. It should be borne in mind that the voiceless spirant [θ] only alternates in syllables which are not immediately preceded by the head of the domain (i.e. the leftmost nucleus of the word).[6] Consider the following examples.

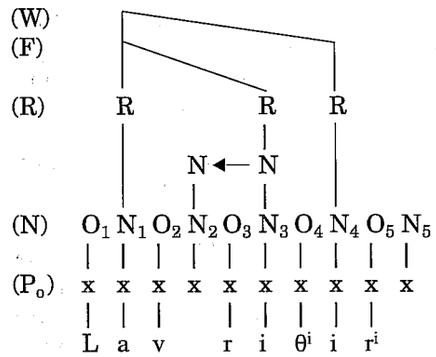
(11)

a.	[Lavriθʲirʲ]	*labrai**th**ir*	'speaks'
	[saμLiθʲirʲ]	*samlai**th**ir*	'compares'
b.	[foLʲsʲiɣʲiðʲirʲ]	*foilsigi**d**ir*	'reveals'
	[suðʲiɣʲiðʲirʲ]	*suidigi**d**ir*	'places'

In the trisyllabic deponent verbs in (11a) the original voiceless spirant [θ] is realised in its lexical form while in (11b), where the fricative occurs in tetrasyllabic deponents, lenition (i.e. voicing) takes place and it surfaces as [ð] (see McCone 1987:79). This fact also has to do with licensing, as the weakly stressed nuclei following fortis spirants are more prominent in the phonological hierarchy than the unstressed ones which follow lenis fricatives. Thus, the distance from the main licenser is very important not only for empty but also for realised nuclei. This is illustrated in (12) below.

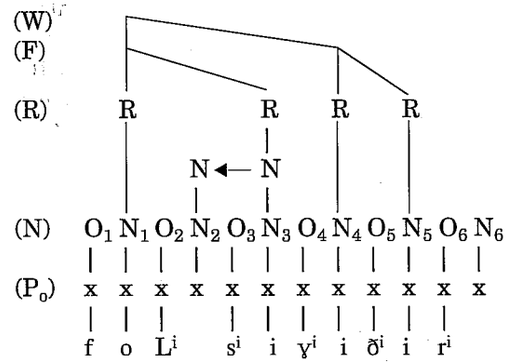
[6] McCone (1981:44) proposes a sound law for original voiceless dental stops and fricatives which are voiced "in contact with an unstressed vowel, but otherwise remained unvoiced". This law, when applied to all fortis fricatives, can explain why they are not lenited right after the head of the domain. It seems, though, that McCone treats vowels bearing secondary stress as unstressed.

(12) a.



*labrai**th**ir*

b.



*foilsigi**d**ir*

In (12a,b) we assume that the head of the domain, that is, the first nucleus of the word, licenses the remaining nuclear positions at different levels, directly and indirectly. Thus, since every second syllable is stressed, every other realised nucleus is the head of a foot. Such nuclei are licensed by the head of the domain on the foot projection. The head of the foot then licenses its dependent rhyme on the rhyme projection (see Harris 1994:153ff.). Hence, in a word like *foilsigidir* in (12b) the strongly stressed nucleus (N_1) is the head of the domain, the head of the leftmost foot and the head of the first rhyme. It licenses (N_4) – the weakly stressed head of the rightmost foot – on the foot projection; (N_3), being unstressed and belonging to the first foot, is licensed by the head of the domain on the rhyme projection; the unstressed (N_5), which is part of the second foot, is licensed by the head of its own foot (N_4) on the rhyme projection; (N_2) and (N_6), both empty, are licensed by Proper Government and by parameter, respectively.

This chain of licensing shows that the more prominent the nucleus happens to be in its phonological domain, the higher the level at which it is licensed.[7]

In (12a) the nucleus (N_4) which follows the spirant [θ] is licensed on the foot projection and hence is more prominent in its own domain than the nucleus (N_5) in (12b) following the spirant [ð], which is licensed on the rhyme projection. Therefore, the weakly stressed (N_4) in (12a), being the head of a degenerate foot, allows the fricative to appear in its original version, while the unstressed (N_5) in (12b) is too weak to provide the same kind of support for the spirant. As a result, the original [θ] is lenited to [ð].

In terms of phonological elements we are dealing here with lenition understood as elemental decomposition, that is, the high tone element present in the structure of voiceless spirants is delinked as a result of the weak licensing potential of weak and empty nuclei. Subsequently, if an onset position receives insufficient prosodic licensing from the following nucleus, the autosegmental licensing of that onset is diminished. Hence, the element (H) is suppressed.

All the cases we have referred to point towards the fact that the different licensing properties of nuclei depend on the level at which they are licensed: namely, the higher the level at which a nuclear position is licensed, the stronger the licensing potential of this position. Moreover, no division into empty and realised nuclei seems to be necessary here. Specifically, empty nuclei are always weaker than realised ones but when only realised nuclei are involved, the levels at which they are licensed are crucial for their licensing abilities. What is important is that lenition occurs if a nucleus which follows a spirant is in a recessive position (i.e. unstressed) and, at the same time, does not immediately follow the head of the domain on the nuclear projection. We recall that, since stress is alternating in Old Irish, these observations concern both domain-final empty nuclei in words with at least two syllables and realised nuclei in words with at least three syllables. Futhermore, any nucleus, be it empty or realised, which immediately follows the head of the domain is relatively strong, since it is either licensed directly by that head or belongs to the foot whose head is the head of the domain. Hence, no voicing alternation occurs before nuclei licensed directly by the head of the domain, even if these nuclei bear no stress.

One problem which remains is whether or not empty nuclei should be pedified in the same fashion as realised ones. Theoretically, only those empty nuclei which are projected beyond the level of the nucleus and which matter for stress placement should be footed. However, the distribution of stress and licensing is regular in Old Irish and empty nuclei are not treated on a par with realised nuclei with reference to stress placement. We can see in (8a) and (8b) that both domain-final nuclei (N_2), one empty [kaθ] and one filled [kaθo], appear to have the same status as far as their licensing properties are concerned. This fact might

[7] One may wonder why the velar spirant in (O_4), which is followed by a relatively strong nucleus, appears as a lenis consonant. Let us recall that our lenition process refers to original voiceless fricatives exclusively, whereas the segment [ɣ] is originally voiced and cannot undergo fortition.

suggest that we should pedify empty nuclei. However, in other cases empty nuclear positions seem to have nothing to do with the metrical structure of words. For example, the structure of words such as [foL^{i}øs^{i}iɣ^{i}ið^{i}ir^{i}] vs. [suð^{i}iɣ^{i}ið^{i}ir^{i}], one with and the other without a word-medial empty nucleus, seems the same, and spirants exhibit uniform behaviour, namely, they are both voiced. If we pedified empty nuclei, the metrical structure of [suð^{i}iɣ^{i}ið^{i}ir^{i}] would have to be the same as that of [Lavøriθ^{i}ir^{i}], which is not the case, because the original spirant [θ] is voiced only in the first example. Therefore, we must conclude that empty nuclei remain unfooted and only realised nuclei are incorporated into metrical structure. Moreover, the licensing properties of nuclei depend on the distance from the main licenser.

Conclusion

This paper has sought to demonstrate that a close inspection of the notion of phonological licensing can provide the key to understanding various complex processes occurring in languages. It has been shown that original Old Irish voiceless spirants undergo the process of voicing when followed by less prominent nuclei. The same fricatives remain unvoiced when they find themselves in front of nuclei bearing primary and secondary stress. Moreover, we have observed the strange behaviour of domain-final empty nuclei whose licensing potential is dependent on the distance from the head of the domain. In order to explain the correlation between these two factors a new version of Final-empty-nucleus parameter has been proposed. Another problem which appeared during the discussion is that of the pedification of empty nuclei. It has been postulated that, since empty nuclei are not taken into account in the process of assigning stress, they should not be incorporated into metrical structure. What is essential for understanding why empty nuclei are unpedified and yet can have different licensing properties is the fact that stress placement and the licensing properties of nuclei are very close, but not identical, phenomena. In particular, the licensing abilities of nuclei depend on the distribution of stress and licensing, but that distribution does not depend on any properties of the nuclei.

References

Broadbent, J. (1991) Linking and intrusive *r* in English. *UCL Working Papers in Linguistics* 3:281-302.

Burzio, L. (1994) *Principles of English stress*. Cambridge: Cambridge University Press.

Charette, M. (1990) Licence to govern. *Phonology* 7:233-253.

Cyran, E. (1996) The parametric occurrence of elements in phonological systems. In *A Festschrift for Edmund Gussmann from his friends and colleagues*. H. Kardela and B. Szymanek, eds., 75-98. Lublin: Redakcja Wydawnictw KUL.

Goldsmith, J. A. (1990) *Autosegmental and metrical phonology*. Oxford: Blackwell.
Harris, J. (1994) *English sound structure*. Oxford: Blackwell.
Hayes, B. (1995) *Metrical stress theory. Principles and case studies*. Chicago: The University of Chicago Press.
Jaskuła, K. (1996) *Empty nuclei in the phonology of Old Irish*. M.A. thesis. Lublin: Catholic University of Lublin.
Kaye, J. (1990) 'Coda' licensing. *Phonology* 7:301-330.
Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1985) The internal structure of phonological elements: a theory of charm and government. *Phonology Yearbook* 2:305-328.
Kaye, J., J. Lowenstamm, and J-R. Vergnaud (1990) Constituent structure and government in phonology. *Phonology* 7:193-231.
Lewis, H. and H. Pedersen (1974) *A concise comparative Celtic grammar*. Göttingen: Vandenhoeck and Ruprecht.
McCone, K. (1981) Final /t/ to /d/ after unstressed vowels, and an Old Irish sound law. *Ériu* 32:29-44.
McCone, K. (1987) *The early Irish verb*. Maynooth: An Sagart.
McCone, K. (1996) *Towards a relative chronology of ancient and medieval Celtic sound change*. Maynooth: St. Patrick's College.
Pokorny, J. (1914) *A concise Old Irish grammar and reader*. Halle: Max Niemeyer, Dublin: Hodges, Figgis and Co., Ltd.
Thurneysen, R. (1946) *A grammar of Old Irish*. Dublin: The Dublin Institute for Advanced Studies.

A-head alignment: the case of vowel harmony in Korean*

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Vowel harmony (VH) in Korean has been viewed as the result of the harmonic opposition between "light" vowels and "dark" vowels. Within a sound symbolic word, all the non-initial vowels belong to the same group to which the initial vowel belongs. However, this harmonic division is not capable of explaining all the combinatorial patterns of vowels in sound symbolic words, as there are cases where light vowels and dark vowels may coexist. These patterns violate the proposed harmonic division and have been treated as exceptions. In this short article, couched in the theory of phonological elements, we will argue that "head-alignment", a phonological phenomenon first proposed in Kaye, Lowenstamm and Vergnaud (1985), can explain all the possible vowel patterns in sound symbolic words without having to resort to the notion of exceptions.

1. Problems with previous studies

Traditionally, the vowels of Korean have been classified using the semantic categories of "light" vowels and "dark" vowels, as shown in (1). It has been claimed that this opposition is responsible for VH (Heo 1965, Kim-Renaud 1976).

(1) *light vowels*: a ɛ o
dark vowels: ə e u i ɨ

In the sound symbolic words given in (2), the vowels are either all light or all dark.

(2)	*light-light-(light)*		*dark-dark-(dark)*		
	kˈaŋcʰoŋ	(a–o)	kˈəŋcʰuŋ	(ə–u)	'skipping'
	cʰalsˈak	(a–a)	cʰəlsˈək	(ə–ə)	'lapping'
	pancˈak	(a–a)	pəncəˈk	(ə–ə)	'flashing'
	kˈolkˈak	(o–a)	kˈulkˈək	(u–ə)	'swallowing'
	soktˈak	(o–a)	suktˈək	(u–ə)	'whispering'
	pˈɛcok	(ɛ–o)	pˈicuk	(i–u)	'protruding'

* This study is a reanalysis of Lee (1994), which treats vowel harmony in Korean as a case of ATR harmony. We would like to thank our colleagues Peter Hendriks and Gi-Hyun Shin for proof-reading the text.