Anna Bloch-Rozmej
Department of Celtic
John Paul II Catholic University of Lublin
Al. Racławicikie 14, 20–950 Lublin, Poland
*abloch@kul.lublin.pl*

# PHONOLOGICAL FUNCTION OF NOISE IN IRISH AND UKRAINIAN TURBULENT SOUNDS

## 0. Introduction

The aim of this article is to examine the property of turbulence in the systems of Irish and Ukrainian. We shall regard this question from the perspective of Government Phonology (as defined in Kaye, Lowenstamm and Vergnaud 1985, 1990; Harris 1994; Cyran 2003; Gussmann 2002, 2007) which is a non-linear and non-derivational approach, employing the autosegmental mode of the representation of melodies. The framework assumes that melodic expressions are defined by means of elements whose manifestation depends on their being autosegmentally licensed by the relevant skeletal positions. The elements are awarded considerable autonomy that is guaranteed by their representational arrangement on their own autosegmental lines and which determines their response to phonological processes. The element on which the focus of our attention will be placed on the forthcoming pages is that of *noise*. Noise defines the property of "aperiodic energy", while its articulatory pattern is that of "narrowed stricture producing turbulent airflow". Thus, noise is expected to reside in all obstruent segments. In our discussion of the Irish and Ukrainian evidence, we shall consider the contribution of this prime to the representation of turbulent sounds in these languages with a view to discovering possible constraints it is submitted to in the two systems.

## 1. The element of noise in segmental structure

Based on empirical evidence, Standard Government Phonology (e.g. Harris 1994) argues in favour of the componential view of segmental structure. Consonantal expressions, traditionally described in terms of the three dimensions of place, manner and voice, are defined by means of the elements: **I, U, A** – the resonance primes – **h, ʔ, N** – the manner elements – as well as **L** and **H** which specify the laryngeal contrasts. The properties encoded by the elements just listed are specified below:



celto-slavicaIII_12 korektura.indd 8:135 7.10.2010 14:14:38

(1) a. The resonance elements
**I** high, palatal
**U** round, labial
**A** low, coronal

b. The manner primes
**h** noise
**ʔ** occlusion
**N** nasality

c. The source elements
**L** low tone, slack vocal cords
**H** high tone, stiff vocal cords

As indicated above, the majority of phonological primes are capable of defining the aspects of both vocalic and consonantal segments. With reference to the list of primes provided in (1), it has to be added that in the GP-based literature, velarity is now commonly represented as the absence of the place-defining element from a consonantal structure. Within melodic units, one of the elements can be awarded head status, thus defining the salient property of the segment. In velar segments, the head position will thus be left empty. The ability to seize the head position within a melody can be limited in a language-specific manner by the so-called licensing constraints, i.e. restrictions on both the combinability of primes and their functional responsibilities.[1] Also, as mentioned above, the theory predicts that melodic expressions can be structured as headless. In such units, none of the elements enjoys head status. Segmental headlessness (or empty-headedness) receives language-specific phonetic manifestation and has consequences for the phonological behaviour of a headless melody.[2]

Phonological elements are autonomous entities. In terms of representation, each of them resides on its own autosegmental line and participates in phonological processes independently of the other primes. In terms of their phonetic realisation, each element receives unique interpretation. The full set of primitive segments that emerge as pre-deletion targets in lenition comprises [ʔ, h, ɾ, j, w, ɣ]. In accord with the principle of *Autonomous Interpretation*,[3] each of these sounds should be the autonomous phonetic

[1] In some languages for instance, certain elements are persistent non-heads. A licensing constraint can also determine that a particular prime should refuse to license another as operator.

[2] For example, headless segments can be transparent with respect to element spreading, as found in Connemara Irish in the case of leftward palatalisation spreading. As for phonetic manifestation, headless vocalic units in English, for example, are interpreted as lax, as opposed to the tense headed vowels.

[3] For the definition and implications of this axiom, see Harris and Lindsey (1995).



celto-slavicaIII_12 korektura.indd 8:136 7.10.2010 14:14:38

manifestation of a particular element. The process of spirantisation, which is one of the opening processes, proceeds along the following trajectory:

(2) *Opening trajectory* (Harris 1994: 120)

| spirantisation | | | > | aspiration | > | deletion |
|---|---|---|---|---|---|---|
| plosive | > | fricative | > | h | > | Ø |

Defined in terms of progressive decomplexification, the process of lenition reveals the existence of the noise prime which shows up as the least complex segment between the two extremes of a released obstruent and zero. The acoustic and articulatory patterns associated with **h** are supplied in (3):

(3) *Elemental pattern of Noise*

| Prime | Acoustic Pattern | Articulatory Pattern |
|---|---|---|
| h | Noise: aperiodic energy | Narrowed stricture producing turbulent airflow |

Unlike sonorants, which are characterised by periodicity, the released plosives, affricates and fricatives will contain this prime in their melodic composition. In isolation, **h** manifests itself as a glottal fricative [h]. In elemental compounds, the presence of a resonance prime will indicate the location of the noise-producing gesture. To illustrate the structural configurations involving the noise prime, let us consider a few structures of the English fricatives.[4] The relevant representations are provided in (4) below:

(4)

| [s] | [θ] | [f] | [v] | [ʃ] |
|---|---|---|---|---|
| x | x | x | x | x |
| \| | \| | \| | \| | \| |
| h | h | h | h | h |
| \| | \| | \| | \| | \| |
| A | A | U | U | A |
| \| | \| | \| | | \| |
| H | H | H | | I |
| | | | | \| |
| | | | | H |

The representations in (4) reveal that the laryngeal contrast between voiced and voiceless consonants in English is expressed through the pres-

[4] The structures in (4) are based on Harris (1994: Ch. 3). In his original representations, Harris employs the element **R** to specify the coronal place of articulation. However, in the present article, we replace **R** with **A**. For the discussion of the rationale behind the expulsion of **R** from segmental structure, see Bloch-Rozmej (2008a).



celto-slavicaIII_12 korektura.indd 8:137 7.10.2010 14:14:38

ence of the **H** prime in the latter and the absence of the source element from the former.[5] The headed status of the underlined primes expresses their preponderance over the remaining elements that occur in the structure of the segments. It is noteworthy that the headed elements are both phonologically more powerful and more influential in terms of their contribution to the phonetic manifestation of the segments.[6]

Bearing in mind the above theoretical remarks concerning the nature of phonological elements as perceived by Government Phonology, let us consider the phonological representation of the turbulent sounds in Irish.

## 2. Turbulence in Irish

Connemara Irish consonants, apart from the regular division along the place of articulation parameter, exhibit an additional contrast between palatalised (slender) and velarised (broad) series. The noise-containing fricative segments that display this difference in quality encompass the following units:

(5) a. *palatalised*

| | | | |
|---|---|---|---|
| *w'/v'* | bhéal | [v'eːl] | 'mouth' |
| *f'* | fiche | [f'iː] | 'twenty' |
| *ʃ* | sí | [ʃiː] | 'she' |
| *ɣ'* | dheá | [ɣ'ɑː] | 'good' |
| *x'* | chiumhais | [x'uːʃ] | 'border' |

b. *velarised*

| | | | |
|---|---|---|---|
| *f* | faoi | [fiː] | 'under' |
| *s* | suí | [siː] | 'location' |
| *ɣ* | dhá | [ɣɑː] | 'two' |
| *x* | chúis | [xuːʃ] | 'cause' |

In traditional accounts, e.g. Ó Siadhail (1989: 82), Irish is claimed to possess the following fricative sounds: [v/f$^{(')}$ s, ʃ, x$^{(')}$, ɣ$^{(')}$, h$^{(')}$]. It is significant to observe that the turbulent sounds in Irish exhibit a number of interesting properties. In detail, as can be easily discerned, the inventory of fricatives is asymmetric since both [s] and [ʃ] lack their voiced counterparts. Additionally, affricates arise only as contextual developments. Furthermore, in Munster Irish the process of spirantisation can target glides, as in

[5] In Polish or German, by contrast, where the phenomenon of final devoicing is attested, the laryngeal element employed in the structure of consonants will be **L**.

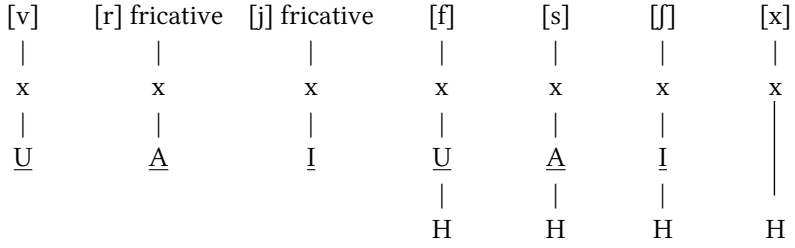
[6] For example, the head element can refuse to license (i.e. to co-occur with) another prime.



celto-slavicaIII_12 korektura.indd 8:138 7.10.2010 14:14:38

*anbhfuil tú* [ən v$^{w}$il' tu:] / [ən wil' tu:] 'are you...'. Likewise, the prepositional pronoun *uaim* 'from me' has three possible realisations, namely: [uim'] / [wuim'] / [vuim'], in which the vowel alternates with a glide and a fricative. With reference to that, Cyran (1997: 190) argues that [w] and [v] are not contrastive in Irish. Ó Cuív (1975: 42) describes the glide [j] as a palato-velar fricative. Moreover, the coronal [r] distinguishes between its flapped and trilled varieties. All the facts just listed indicate the existence of a close relationship between fricatives and glides which should find reflection in their lexical structures. A solution to this state of affairs is offered in Cyran (1997) where Irish obstruents are treated as noiseless, i.e. deprived of the noise element. Instead, it is proposed that the effect of friction derives from the headed nature of the resonance prime. With respect to this, it needs to be recalled that in GP-based representations of complex segmental expressions, one of the elements can possess the dominant status – that of the head – while other possible primes are operators/dependents. The function of the head prime is to define the salient property of the segment. Thus, the structures of the Irish fricatives would be the following:

(6) *Noise-less representations of Irish fricatives*




With the structures provided in (6), the account of the fricative-glide alternation becomes straightforward. Namely, spirantisation will be effected through the promotion of the resonance element to the head status.

Subscribing to the **h**-less analysis of the Irish obstruents proposed in Cyran (1997), let us now turn to the process of affricate creation attested to in Connemara Irish. Below in (7) a handful of illustrative examples have been supplied (de Bhaldraithe 1975):

| | | | |
|---|---|---|---|
| (7) | bheadh sé | [v'etʃe] | 'he would be' |
| | ghread sé | [jr'æ:tʃe] | 'he ran off' |
| | chreid sé | [xr'etʃe] | 'he believed' |
| | bíodh a fhios agat | [b'i:ts a:d] | 'you knew that' |

Affricates in Irish cannot be awarded an independent phonological status. Above all, such phonetic sequences arise due to assimilation processes

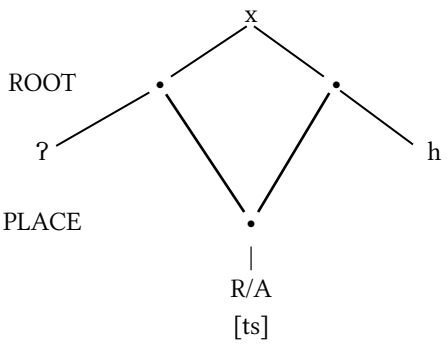


celto-slavicaIII_12 korektura.indd 8:139 7.10.2010 14:14:38

which take place primarily across word-boundaries. Some affricate sounds are also found in certain borrowings.[7] Affricate formation comes into effect when a fricative finds itself following the word-final consonant. Take the past form of the verb *creid* [kr'ed'] 'believe' (i.e. [xr'ed']), for instance, and combine it with the third person pronoun beginning with the palato-alveolar fricative [ʃ]. What should be expected to take place in the context provided by the verb-final plosive and the pronoun-initial fricative is the emergence of an affricate expression. Hence the realisation of *chreid sé* is [xr'etʃe].

Harris (1994: 40) argues that affricates are *qualitatively complex but quantitatively simplex* and should be represented as contour structures. In this way, he subscribes to the bi-partite analysis of affricates, whereby two melodies are subsumed under a single skeletal point. The account of affricate formation in Irish requires further theoretical clarification. As advocated by GP, in segmental structures, elements are organised under class nodes: Root, Place and Laryngeal.[8] Manner-defining primes are gathered under the Root. The Root node dominates the two remaining class nodes. The process of affrication can reflect either consonant weakening or strengthening. The former operation consists in the fission of a plosive's single Root node into two. Affrication in such a case means decomposition in the sense *that it results in a reduction in the degree of fusion contained in a position* (Harris 1994: 131).[9] Hence, the [ts] affricate will be represented in the following manner:

(8)




[7] We shall consider only those affricate sounds that arise due to assimilation processes and disregard those which can be found only in borrowings, e.g. [dʒ], in [dʒug] 'jug'.

[8] The existence of the class nodes reflects the functional unity of specific groups of primes. The class nodes dominate the terminal nodes, i.e. primes, and mediate between elements and the skeleton. Phonological processes may target either individual primes or the entire class nodes in which case all the elements gathered under the node will undergo the process.

[9] Strengthening, on the other hand, will consist in the addition of melodic material to a given segment, which would increase its internal complexity measurable in terms of the number of primes.



celto-slavicaIII_12 korektura.indd 8:140 7.10.2010 14:14:38

As shown above, a single skeletal position licenses two independent Root nodes and one node with the element specifying the place of articulation dimension of the new segment. The licensing of the two Root nodes by a single skeletal point expresses the two-phase nature of an affricate. The structure of an affricate proposed in (8) is characteristic of the English affricates. However, in Irish, the effect of affrication will not be classified as weakening of this kind. In the first place, no Root fission under a single prosodic slot takes place, but instead, segmental merger is effected in the sub-skeletal region under two independent positions (i.e. one dominating [d] and the other dominating the fricative). Secondly, the process does not involve any noise prime which would be licensed under a separate Root node within the same segmental structure (unlike in (8) above). Hence, we infer that affrication is a special phonetic manifestation of a different kind of lexical configuration. Let us now look more closely at the structure of *chreid sé* 'he believed'. First of all, we have to notice that the palato-alveolar affricate [tʃ] develops as a result of fusion of two segments: [d'] and [ʃ].[10] On the skeletal tier, the two positions dominating [d] and [ʃ] are separated by an empty nuclear point which terminates the verbal form.[11] Since no active elements are subsumed under the nuclear position, the interplay of primes constituting the consonantal segments can come into effect. The structure in (9) shows this element interaction.

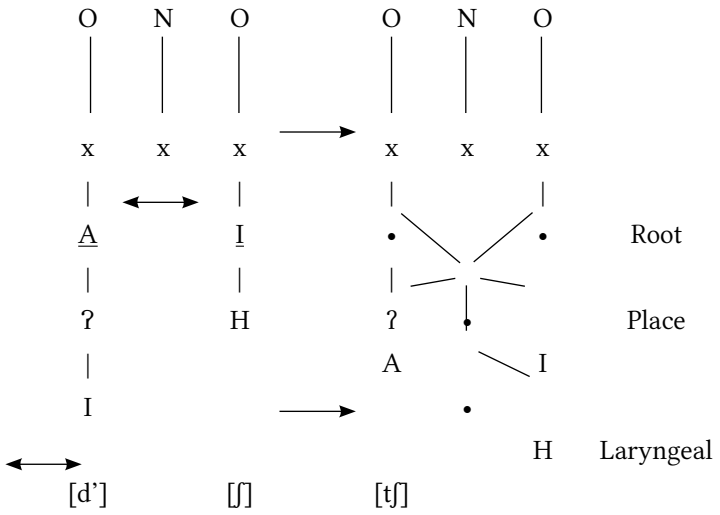
[10] Notice the occurrence of the [d´] segment in *creidim* [kr'ed'im'] 'I believe', for instance.

[11] It is one of the more radical claims of Government Phonology that phonological domains are structured as sequences of onsets and rhymes (headed by nuclei). In this way, all phonological domains terminate in a nucleus – the universal licenser of the preceding onset position. In some languages, the word-final nucleus can be parametrically licensed, which means that it will not receive phonetic manifestation. In such systems, words will end either with a vowel or a consonant. In languages where parametric licensing of word-final nuclei is switched off, lexical items have to terminate with a vowel (e.g. in Italian). Needless to say, Irish, English, German, Polish or Ukrainian do license word-final empty nuclei. For the principles regulating the structure of phonological domains and the syllabic constituents of the onset, nucleus and rhyme, see for instance Kaye (1990), Charette (1990) or Harris (1992).



celto-slavicaIII_12 korektura.indd 8:141 7.10.2010 14:14:38

(9)




*headedness alignment*

Following Harris (1994), the structure just depicted assumes that both the plosive and the following fricative are headed by the place-defining primes. Further, we adopt Cyran's (1997) solution to the effect that the property of friction in the Irish turbulent sounds derives from the headed nature of the resonance prime. The hypothesis that we put forward here is that the resonance elements, whose headship defines the property of friction, enter into the relation of headedness alignment which sparks off the process of affrication.[12] Headedness alignment should be understood as a kind of correspondence relation between melodically adjacent units. The condition of headedness alignment for the execution of affrication is supported by the absence of affrication effects when one of the consonants of the cross-morphemic cluster happens to be a velar spirant [x]. For example, in *amhdachtáil* [audaxtɑ:l'] 'admitting' or *eiteachtáil* [et'əxtɑ:l'] 'refusing', the two segments do not create any affricate because, as we maintain, the headless nature of the spirant rules out a possibility of headedness alignment. Further, the presence of a realised nucleus between such consonants will prevent affrication (as for example

[12] The idea of head alignment goes back to Charette and Göksel (1994/96). In their analysis of the Turkish evidence, the mechanism of head alignment was employed in the representation of vowel harmony phenomena. In the present article, we extend the operation of this mechanism allowing the existence of not only element alignment but also the possibility of functional alignment of two different elements performing the same function within their respective segments.



celto-slavicaIII_12 korektura.indd 8:142 7.10.2010 14:14:39

in *costasach* [kostəsəx] 'costly, expensive'). We also predict that headedness alignment is possible only in cases where the dimension of headedness performs an additional phonological function, e.g. that of specifying some phonetic property. In (Ulster?) Irish, headedness of non-nuclear structures is interpreted as noise. In vocalic expressions, headedness is naturally not associated with friction, which is a typically consonantal property. Furthermore, it seems that only the segments that are lexically attached to their skeletal points are allowed to form headedness alignment domains. Notice what happens when a plosive is prefixed to a fricative-initial word:

| (10) | sneachta | [ʃnʾæχtə] | 'snow' |
|---|---|---|---|
| | *but* | | |
| | an tsneachta | [əˈtʾrʾæχtə] | 'of the snow' |
| | snámh | [sNã:v] | 'swim, deep' |
| | *but* | | |
| | sa tsnámh | [sə ˈtrã:v] | 'into the deep' |
| | snáthaid | [sNã:dʾ] | 'needle' |
| | *but* | | |
| | an tsnáthaid | [ə ˈtrã:dʾ] | 'the needle' |

In none of the cases of [t]-prefixation is the creation of an affricate possible. We want to maintain that this is attributable to the fact that [t] is a floating segment having no distinctive association to a skeletal position.

Returning now to the structure in (9) which depicts the execution of the affrication process, let us observe that the bond of headedness alignment involving two melodically adjacent segments leads to segmental fusion whereby two independent melodies are realised as one affricate expression. Thus, the process should be regarded as an example of strengthening, i.e. increasing the degree of elemental fusion in the sub-skeletal region. Noticeably, the elemental material formerly dominated by two separate Place nodes belonging to [d] and [ʃ] now becomes subsumed under a single Resonance node dominated by two Root nodes.

To sum up, Cyran's (1997) representations of Irish obstruents as noiseless, or more precisely **h**-less, segments and the proposal of headedness alignment formulated in this paper seem to combine neatly in the account of both the distributional asymmetries in the class of Irish consonants, the spirantisation of glides and the affrication process attested to in Connemara Irish. In what follows, our attention will be diverted to the fricatives in Ukrainian.



celto-slavicaIII_12 korektura.indd 8:143 7.10.2010 14:14:39

## 3. Turbulence in Ukrainian

Unlike in Irish, the inventory of Ukrainian turbulent consonants is pretty prolific. The set of fricatives comprises the following units: [f, v, s, z, ʃ, ʒ, x, ɣ, ɦ]. In addition, the system distinguishes between the palatalised and non-palatalised segments. To be precise, we also attest the so-called semi-palatalised consonants which are realizations of the non-palatalised sounds before the high front vowels. Thus, their palatalised character is a contextual development.[13] It is noteworthy that Ukrainian possesses lexical affricates, namely: the non-palatalised dental/alveolar [ts, dz], palatalised alveolar [ts', dz'] and the post-alveolar [tʃ, dʒ]. The presence of lexical affricates, in the structure of which their two phase articulation has to be encoded by means of independent elements, implies the employment of the element of noise by the system of Ukrainian. Recall that the property of turbulence in Irish can be phonologically expressed as the headship of the place-defining prime. The same cannot be proposed for Ukrainian. However, the element of noise, though present in this system, seems to call for special licensers in order to be manifested. In the brief of this article, we would like to summarise the discussion of the status of noise offered in Bloch-Rozmej (2008b) which identifies the licensing restrictions that are synchronically imposed on **h** in Ukrainian. The segments whose behavior is particularly revealing in this respect are: the voiceless velar fricative [x], the voiced velar [ɣ] and the voiced laryngeal (glottal) fricative [ɦ].[14] It is noteworthy that unlike Clements and Hume (1995), where the glottals are refused consonantal status, we choose to follow Szigetvári (1998: 397) in treating all noise-containing segments as consonants. In addition, we wish to adhere to the historical process of prosthesis which discloses the significance of the element of noise in the structure of Ukrainian segments.

### 3.1. The back fricatives in Ukrainian: A historical excursus

Ukrainian possesses three back fricatives: [x], [ɣ] and [ɦ]. Zhovtobriuch (1980: 63) refers to [ɦ] as a pharyngeal segment, whereas Vasylenko

[13] See also Szpyra-Kozłowska (2002: 41, 63, 73).

[14] For the detailed discussion of the origins of the three sounds, see Zhovtobriuch (1980) and Shevelov (2002). As indicated in Ziłyński (1932: 102, 1979), the production of the laryngeal [ɦ] requires 'muscular effort around the speaker's chest and a considerable narrowing in the larynx'. The realisation of this fricative resembles that of a low vowel. Interestingly, in slow speech, there is hardly any noise heard, except for slight friction that resembles sighing (Ziłyński 1932: 102). In consequence, in prevocalic contexts, the laryngeal can often disappear (Ziłyński 1932: 103).The phonetic manifestation of the laryngeal alternates between the breathy voiced phonation type and the constricted manner of articulation in the glottal region.



celto-slavicaIII_12 korektura.indd 8:144 7.10.2010 14:14:39

(2001: 72) treats it as glottal. However labeled, the segment involves the activity of the larynx and the audible friction in the glottis. As described in Zhovtobriuch (1980), the fricative evolved in late Middle Ages from a voiced velar stop [g] via a voiced velar fricative [ɣ]. The author makes a further prediction that the laryngeal might have appeared already in the Old East-Slavonic and in present-day Standard Russian, for instance, the velar plosive [g] replaced he original [ɦ], whereas Ukrainian inherited the original sound. This hypothesis is challenged by Shevelov (2002: 448) who maintains that the Ukrainian, Slovak and Czech fricative [ɦ] originated from the occlusive velar consonant.[15] Unlike Shevelov who does not pay much attention to the intermediate stage in the [g]-to-[ɦ] shift in the form of [ɣ], Zhovtobriuch (1980: 65) points out that the voiced velar fricative emerged around the 13th century as a result of the loss of occlusion in the articulation of [g]. He indicates that [ɣ] in Byelorussian and southern Russian dialects proves the existence of that segment in Ukrainian dialects as well. Zhovtobriuch explains that in the 14th century, words previously spelt with 'г' came to be preceded by 'к', which, according to the author, reflects its fricative pronunciation. As described in Frick (1995), some writers of the 16th and 17th centuries used 'г' as a phonogram for a fricative, whereas in loan words, this spelling was changed to 'ʃ', as for instance in the Polish word *ʃojność* (Pugh 1985: 59, Nimtchuk 1974: 34). The literature of that period reveals that the [g]>[ɦ] shift had not been finished throughout the entire Ukrainian territory by that time and the change was not identical for each dialectal community. The different spelling symbols employed by writers, i.e. 'г', 'к', 'кг' and 'ʃ', seem to imply that the [g]>[ɦ] shift involved the three stages of [g], [ɣ] and [ɦ].

### 3.2. The distribution of the back fricatives in Ukrainian

Synchronically, as indicated in the relevant literature (i.e. Ziłyński 1932, 1979, Bilodid 1969, Tots'ka 1981, Rusanovskij et al. 1986, Vasylenko 2001, Czaplicki 2006), Ukrainian possesses three back fricative segments: the voiceless back fricative, its voiced counterpart and the voiced laryngeal fricative. The illustrative examples containing the segments under discussion are quoted from Czaplicki (2006: 74) and Dalewska-Greń (2002) in (11) below:

[15] Comp. the data collected by Rott-Żebrowski (1971: 167, 173–4, 177). One of the arguments brought up in favour of this assumption is related to the realisation of the Greek loan words containing [g] in the original which in Russian, is realised as [g], not the fricative.



celto-slavicaIII_12 korektura.indd 8:145 7.10.2010 14:14:39

| (11) | a. [x] | | | b. [x'] | | |
|---|---|---|---|---|---|---|
| | | ch<u></u>ata | 'cottage' | | ch<u></u>idnyk | 'pavement' |
| | | chlib | 'bread' | | ch<u></u>imik | 'chemist' |
| | | chram | 'temple' | | arch<u></u>iv | 'archives' |
| | | puch | 'down' | | | |
| | | komacha | 'insect' | | | |
| | | chmara | 'cloud' | | | |
| | c. [ɦ] | | | | | |
| | | harno | 'beautifully' | | hrib | 'grave' |
| | | knyha | 'book/nom.sg' | | hluchyj | 'deaf' |
| | | Boha | 'God/gen.sg.' | | | |
| | | doroha | 'way/nom.sg.' | | | |
| | d. [ɣ] | | | e. [ɣ'] | | |
| | | rih | 'horn/nom.sg.' | | hilka | 'twig' |
| | | Boh | 'God' | | berehi | 'river banks/nom.pl.' |
| | | bereh | 'river bank/nom.sg.' | | hihant | 'giant' |
| | | druh | 'friend' | | hirka | 'hill' |
| | | dorih | 'way/gen.pl.' | | | |

The data reveal that the voiceless velar fricative occurs in the onsets of syllables, at the beginning of words and in the word-final position. On the other hand, its voiced counterpart is restricted to two contexts: before the vowel [i] and word-final. Further, we see that the voiced glottal fricative is barred from the position preceding this high front vowel, where it is realised as [ɣ']. Also in the word-final context, [ɦ] is replaced by [ɣ]. However, the voiced laryngeal is capable of taking up the intervocalic sites. Thus, clearly, of the three back fricatives, the voiceless velar enjoys the greatest distributional freedom, whereas its voiced counterpart appears to be most distributionally-restricted. The occurrence of the palatalised fricatives [x'] and [ɣ'] before the high front [i] seems to require no explanation as the palatalised nature of the segments in question is the result of the influence of the vowel. In terms of GP, this effect will be represented as the spreading of the element **I** contained in the structure of the vowel onto the preceding consonant.

The pattern of distribution involving the Ukrainian non-palatalised back fricatives, when confronted with the traditionally recognised syllabic constituents of the onset, nucleus and coda, reveals that the voiced glottal fricative [ɦ] occurs in sites classified as onsets, whereas [ɣ] takes up codas. The former are considered as phonologically strong, whereas the latter count as recessive. Within the framework of GP, onset positions are universally licensed by nuclei which in the majority of cases are filled with melodic content. By contrast, word-final nuclei in consonant-final words are melodically empty, thus possessing considerably diminished autosegmental licensing

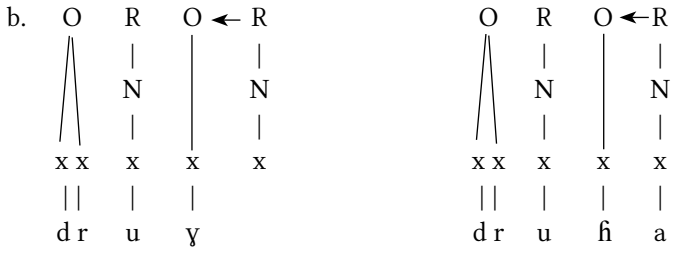


celto-slavicaIII_12 korektura.indd 8:146 7.10.2010 14:14:39

potential.[16] In consequence, their capability of licensing the preceding onset material is also impoverished, when compared with melodically-filled nuclear positions. Given such conditions, the segment associated with coda points should also be weaker than one found in onsets. The restricted distribution of the voiced velar fricative confirms this prediction. Without going into a lengthy, complicated discussion of phonological strength, for the purposes of the current analysis, let us recall that within the model of Phonological Government, segmental strength is directly related to elemental complexity. Put differently, stronger segments will be made up of more phonological primes. Further, the more elements are to be linked to the licensed position, the stronger licenser is called for. Thus, we should expect more complex segments to occur before filled nuclei, rather than before empty nuclear points. The examples in (12a) below illustrate the availability of the laryngeal before a stronger licenser and the presence of [ɣ] at the end of words where the onset segment is sanctioned by the word-final empty nucleus. In (12b) two illustrative structures depicting the respective contexts have been provided:

(12) a. druh/druha [ɣ]/[ɦ] 'friend/gen.sg.'
vah/vaha [ɣ]/[ɦ] 'weight/gen.pl./nom.sg.'

b.




*druh* 'friend /nom.sg.' *druha* 'friend/gen.sg'

The place contrast between [x] and [ɦ] is preserved in syllable onsets (e.g. in [ɦ]*aj* 'woods' versus [x]*aj* 'let') but removed in "traditional" codas where [ɦ] is replaced with [ɣ] (as in ma[ɣ] 'magus' versus ma[x] 'taking'). In the word-final context, any alteration of place that affects onset segments represents a weakening operation attributable to the effect of the prosodi-

[16] The ultimate source of all the licensing potential within a given domain is the head nucleus occupied by the stressed vowel. The other nuclei present in this domain receive their potential from the head and subsequently transmit part of it onto their onset licensees. Without going into unnecessary details, it needs to be explained that melodic emptiness is typical of prosodically recessive positions which are either licensed by parameter or governed. The potential that such empty nuclei can transfer onto onsets is greatly diminished. Hence, frequent weakening effects are attested before such nuclear positions.



celto-slavicaIII_12 korektura.indd 8:147 7.10.2010 14:14:39

cally weak empty nuclear licenser. Consonantal weakening is carried out through the loss of elements from the internal structure of a segment.

The analysis of the distributional facts concerning the occurrence of the back fricatives in Ukrainian leads us to the establishment of the Ukrainian-specific scale of distributional freedom in which the voiceless velar fricative conspicuously outruns the other two segments as it can be found in the widest range of contexts. The most restricted unit is the voiced velar fricative. In what follows, we shall try to establish whether distributional freedom corresponds to phonological strength understood as elemental complexity. It is important to observe that the segment that entertains the greatest distributional freedom is allowed to occur both before strong and weak licensers. On the other hand, the data listed in (11) above show that the laryngeal is prevented from occupying the word-final sites where it would inevitably have to be licensed by an empty nucleus – the weakest possible nuclear licenser. A conclusion to be drawn from these observations is such that the laryngeal constitutes too strong a segment to be supported by a position licensed by an empty nucleus. Pursuing this line of reasoning, Bloch-Rozmej (2008b) proposes the following representations of the Ukrainian back fricatives:

(13)

| a. | [x] | b. | [ɣ] | c. | [ɦ] |
|---|---|---|---|---|---|
| | x | | x | | x |
| | \| | | \| | | \| |
| | h | | h | | h |
| | | | \| | | \| |
| | | | L | | L |

The structures in (13) assume that the velar place of articulation of segments does not necessitate any active element in the internal make-up of the melody. In other words, in velar segments, the lack of a place-specifying prime will be manifested as velarity. It also has to be explained that the fricatives are defined by the elements of noise (**h**) and the slack vocal folds prime **L** which specifies the voiced character of [ɣ] and [ɦ].[17] Further, the difference between the laryngeal and the voiced velar fricatives is expressed as the headed nature of the former and empty-headedness of the latter. Put differently, the element of noise resides in the head position of the laryngeal fricative and in the velar segment, **h** remains a mere dependent.

[17] As indicated in the relevant literature (e.g. Ziłyński 1932: 97, Dzendzelivs'kyj 1965: 107–8, Shevelov 2002: 794–8, 885), one finds frequent voicing effects in south-western and eastern dialects of Ukrainian, e.g. regressive voicing across domain boundaries. This, in turn, suggests that the source element employed by Ukrainian is **L**.



celto-slavicaIII_12 korektura.indd 8:148 7.10.2010 14:14:39

With the structures of the fricatives just specified, let us explore their explanatory potential with respect to the distributional restrictions that the three segments undergo. In detail, the absence of the laryngeal fricative word-finally and the unrestricted occurrence of the velar fricatives there derive from the difference in the head status of the relevant consonants. Empty-headed velars are free to take up final onset positions, whereas headed glottals will be prohibited in that context. Such a state of affairs is attributable to the licensing capacities of the word-final empty nucleus, which in Ukrainian seems to be too weak to support headed segments. Since [ɣ] is headless, the replacement of the laryngeal with this sound at the end of words comes as no surprise. The least complex sound, namely [x], is also the easiest to license. Hence its ability to occupy all possible non-nuclear sites within a phonological domain. The voiceless velar fricative requires the smallest amount of the autosegmental licensing potential from its nuclear licenser. The voiced laryngeal, in turn, being a headed structure, constitutes a phonologically strong segment and, consequently, calls for more potential to sustain both of its elements and its headed status. To express the relationship between segmental headedness and the licensing capacity of nuclei, Bloch-Rozmej (2008b) proposes the following Ukrainian-specific constraint:

(14) ***h**-licensing in Ukrainian*

A word-final empty nucleus may not license **h** as head.

The operation of the above axiom explains the loss of the headed status of the word-final glottal fricative which, due to this change, comes to be realised as a headless velar. Imposing restrictions on the licensing of the noise prime is not a Ukrainian-specific invention. The employment of the noise element in different systems is often limited, as pointed out in Cyran (1997) for instance. The constraint proposed in (14) is in the spirit of Cyran's ***h**-parameter* stating that the employment of noise by different languages is parameterised. In Ukrainian dialects, the element is used to encode consonantal contrasts but its licensing is confined to stronger nuclear licensers, in particular in cases when **h** is called upon to perform the head function.

### 3.3. Noise and the phenomenon of prosthesis

The occurrence of the headed structure of the glottal fricative before strong nuclear licensers, to its absence from the word-final contexts (before weak prosodic licensers), in the dialects of Ukrainian is not an accidental phenomenon. The history of this language reveals that filled nuclei



celto-slavicaIII_12 korektura.indd 8:149 7.10.2010 14:14:40

had a strengthening effect upon the preceding onset segments. One historical development that can be mentioned in support of this observation is the process of prosthesis. The effect in question manifested itself as an onset strengthening operation in the form of consonant realisation at the beginning of words. As indicated in Shevelov (2002: 114) and de Wulf (2003), the appearance of prosthetic consonants before the word-initial vowel was a common effect in Slavonic languages. Prosthesis was manifested in the form of lip rounding, aspiration or yotacisation. Thus, the sounds used in such contexts were [v], [j] or [ɦ]. In the context of the current discussion, the most interesting case is that of the glottal fricative. The segment represented as a headed **h**+**L** combination is synchronically barred from the word-final site preceding an empty nucleus, though at a certain historical stage it was required before a filled nuclear position.

Within the framework of GP, the special character of the onset-nucleus relationship is expressed in terms of a licensing bond whereby the nuclear point provides autosegmental licensing potential both for its own elements and those gathered under the preceding onset position. Thus, the strength of the nuclear point directly conditions the manifestation of the onset segment. As already stated, an empty nucleus is deficient in terms of its licensing capacity. In Ukrainian, it fails to license the noise prime in the head status of a segment. Word-initially, as the history of this language reveals, a melodically-filled nucleus required a melodically-expressed onset segment. This requirement might have been a language-specific preference for a realised, melodically-strong domain-initial CV sequence. Interestingly, in Boyko, the prosthetic [ɦ] gained the upper hand, even though also [v] was used in this function. Interestingly however, the choice of the prosthetic consonant appeared to be contingent on the distribution of word-stress. In particular, the laryngeal filled in the empty onsets preceding word-initial stressed nuclei, as in [‘ɦostrɨj] ‘spicy/nom.sg.’, whereas in the unstressed CV domains, the prosthetic consonant was [v] (e.g. in [vo’ɦirok] ‘cucumber/nom.sg.’). In Dnistrian, Volynian and Podillian, the laryngeal fricative was employed irrespective of the stress placement (Dzendzelivs’kyj 1965: 93). Consider the words in (15):

| | | |
|---|---|---|
| (15) | [ɦo’lɨva] | ‘oil/nom.sg.’ |
| | [ɦo’ratɨ] | ‘plow/inf.’ |
| | [ɦu’nuka] | ‘grandson/gen.sg.’ |
| | [‘ɦosin] | ‘autumn/nom.sg.’ |

It seems that in the dialects just mentioned, the element of noise enjoyed a privileged status of an empty onset-filler, comparable to an empty nucleus filler which in one language can be schwa (as in Irish) and [e]



celto-slavicaIII_12 korektura.indd 8:150 7.10.2010 14:14:40

in another (as in Polish) for instance. In Boyko, as might be predicted, only a stressed nucleus, the strongest prosodic licenser, was able to license the laryngeal as an empty nucleus filler. Assuming that the manifestation of the laryngeal fricative necessitated the addition of the element of noise, restricting the range of possible licensers of such segments to stressed vowels seems fully justifiable. The realization of the [v] segment before unstressed vowels, which can be considered as prosodically weaker (as they are dependent on the stressed head of the domain), also appears understandable. As extensively argued in Cyran and Nilsson (1998), [v] in Ukrainian should be represented as a headed **U** prime only. Thus, in terms of complexity, it would be weaker than the laryngeal fricative. In consequence, its licensing as a prosthetic consonant would be feasible also for unstressed nuclei.

## 4. Conclusion

Our discussion of the property of turbulence in Irish and Ukrainian revealed the existence of an important difference between these two systems. In Irish, its Connemara variety in particular, the noise component of the turbulent segments has to be represented as elemental headedness. Put differently, the noise-containing segment will not include any independent phonological prime to express turbulence. This phonetic effect derives from the headed status of some active element in the structure of a consonant. By contrast, fricative segments attested to in Ukrainian should be represented as containing an active element of noise (**h**), whereas the voiced/voiceless contrast requires the use of the low tone laryngeal element **L**. A closer look at the behavior of the back fricatives in this system allows us to conclude that the two primes combine to form the consonants [ɦ] and [ɣ]. Significantly however, in the former, the element of noise possesses the status of the head, while in the voiced velar fricative, both primes remain dependents. The headless nature of the fricative defines its velar place of articulation, similar to [x]. Nevertheless, the voiceless velar fricative lacks the laryngeal element, which makes it the least complex (and thus the weakest) member of the back set. As a result, the back fricatives can be arranged into a Ukrainian-specific complexity hierarchy where the laryngeal fricative is the most complex segment, and thus the strongest one, while the voiceless velar, being a mono-elemental melody, features as the weakest. The strongest of the three fricatives is both elementally most complex and headed. In Ukrainian, the complexity of melodies, which is directly dependent on the phonological strength of prosodic positions, accounts for the differing degrees of distributional freedom



celto-slavicaIII_12 korektura.indd 8:151 7.10.2010 14:14:40

that these segments entertain. Simpler and less complex melodies are easy to license and hence less distributionally-restricted. The historical process of prosthesis seems to support this analysis. In particular, it is noteworthy that the prosthetic laryngeal fricative required the strongest prosodic licenser – the stressed vowel (i.e. the head of the domain). The less complex [v] was possible before unstressed vowels – weaker prosodic licensers. The element of noise, as argued in the article, was awarded special status in the system of Ukrainian, namely that of an empty onset filler.

We have also seen that the internal structure of segments interacts with the Ukrainian-specific licensing constraint delimiting the licensing of the noise prime. The legitimate licensers of this element as segmental head can be a nucleus with melodic content or, less frequently, a word-medial empty nucleus (as in *høluchyj* 'deaf'). The existence of such a constraint accounts for the restricted distribution of the glottal fricative and the distributional freedom of the voiceless velar fricative in Ukrainian. In addition, the manifestation of the historical prosthetic laryngeal in some dialects was dependent on a licence coming from the stressed vowel. In other dialects, the only condition on the licensing of such additional segments was the availability of a filled nuclear licenser.

References

Bilodid, I. K., 1969: *Suchasna ukrayins'ka literaturna mova. Fonetyka*, Kyjev: Naukova Dumka.

Bloch-Rozmej, A., 2008a: *Melody in Government Phonology*, Lublin: Wydawnictwo KUL.

Bloch-Rozmej, A., 2008b: 'An Element-based Approach to Ukrainian Back Fricatives', in: Dziubalska-Kołaczyk, K. & J. Weckwerth, eds., *Poznań Studies in Contemporary Linguistics* 44, 1, 5–20.

Charette, M., 1990: 'Licence to Govern', *Phonology* 7, 233–253.

Charette, M. & Göksel, A., 1994/96: 'Switching and Vowel Harmony in Turkish', *SOAS Working Papers in Linguistics and Phonetics* 4, 31–52.

Clements, G. N., & Hume, E. V., 1995: 'The Internal Organization of Speech Sounds', in: J. A. Goldsmith, ed., *The Handbook of Phonological Theory*, Cambridge (Mass.) & Oxford: Blackwell, 245–306.

Cyran, E., 1997: *Resonance Elements in Phonology. A Study in Munster Irish*, PASE Studies and Monographs 3, Lublin: Wydawnictwo Folium.

Cyran, E. & Nilsson, M., 1998: 'The Slavic [w>v] Shift: a Case for Phonological Strength', in: E. Cyran, ed., *Structure and interpretation. Studies in phonology*, Lublin: Folium, 89–100.



celto-slavicaIII_12 korektura.indd 8:152 7.10.2010 14:14:40

Cyran, E., 2003: *Complexity Scales and Licensing Strength in Phonology*, Lublin: Wydawnictwo KUL.

Czaplicki, B., 2006: 'Back fricatives in Ukrainian – an OT perspective.', in P. Bański, B. Łukaszewicz and M. Opalińska (eds.), *Studies in constraint-based phonology*, 73–89, Warszawa: Wydawnictwo Uniwersytetu Warszawskiego.

Dalewska-Greń, H., 2002: *Języki słowiańskie*, Warszawa: Wydawnictwo Naukowe PWN.

De Bhaldraithe, T., 1975: *The Irish of Cois Fhairrge, Co. Galway. A Phonetic Study*, Dublin: The Dublin Institute for Advanced Studies.

De Wulf, C., 2003: 'Procope van de h-.' *Taal en Tongval* 2, *Gent*, 216–231.

Dzendzelivs'kyj, J. O., 1965: *Конспект лекцій з курсу української діалектології, vol. I фонетика*, Uzhhorod: Uzhhorodz'kyj Derzhavnyj Universytet.

Frick, D., 1995: *Meletij Smotryc'kyj. Collected works*, Harvard: Harvard University Press.

Gussmann, E., 2002: *Phonology: analysis and theory*, Cambridge: Cambridge University Press.

Gussmann, E., 2007: *The phonology of Polish*, Oxford, USA: Oxford University Press.

Harris, J., 1992: 'Licensing Inheritance.' *UCL Working Papers in Linguistics* 4, 359–406.

Harris, J., 1994: *English Sound Structure*, Oxford: Blackwell.

Harris, J., & Lindsey, G. 1995: 'The elements of phonological representation.' In J. Durand and F. Katamba (eds.) *Frontiers of phonology. Atoms, structures, derivations*, 34–79, London: Longman.

Kaye, J., 1990: 'Coda' Licensing', *Phonology* 7, 301–330.

Kaye, J., Lowenstamm, J. & Vergnaud, J.-R. 1985: 'The internal structure of phonological elements: a theory of charm and government', *Phonology Yearbook* 2, 305–328.

Kaye, J., Lowenstamm, J. & Vergnaud, J.-R. 1990: 'Constituent structure and government in phonology', *Phonology* 7, 193–231.

Nimchuk, V. V., 1974: *Мелетій Смотрицъкий. Граматика*, Kiev: Naukova Dumka.

Ó Cuív, B., 1975: *The Irish of West Muskerry. Co. Corc. A Phonetic Study*, Dublin: Dublin Institute for Advanced Studies.

Ó Siadhail, M., 1989: *Modern Irish. Grammatical Structure and Dialectal Variation*, Cambridge: Cambridge University Press.

Pugh, S., 1985: 'The Ruthenian language of Meletij Smotryc'kyj', in: O. Pritsak and I. Shevchenko (eds.) *Harvard Ukrainian Studies* 1/2/, Harvard 59.



celto-slavicaIII_12 korektura.indd 8:153 7.10.2010 14:14:40

Rott-Żebrowski, T., 1971: 'Różnice fonetyczne w zapożyczeniach', in: S. Kozak (ed.) *Slavia Orientalis*, 165–79, Kraków: PAN.

Rusanovskij, V. M., Zhovtobriuch, M. A. Gorodenskaja, E. G. & A. A. Grishchenko, 1986: *Ukrainskaja grammatika*, Kijev: Naukova Dumka.

Shevelov, J., 2002: *Історична фонологія української мови.* Kharkiv: Akta.

Szigetvári, P., 1998: 'Why [h] is not voiced', in: Cyran, E., ed., 287–301.

Szpyra-Kozłowska, J., 2002: 'Wprowadzenie do współczesnej fonologii', Lublin: Wydawnictwo UMCS.

Tots'ka, N., 1981: *Suchasna ukrayins'ka literaturna mova. Fonetyka*, Kyjev: Vyshcha Shkola.

Vasylenko, V., 2001: *Українська мова. Поглиблений практичний курс*, Poznań: Wydawnictwo Naukowe UAM.

Zhovtobriuch, M. A. ed., 1980: *Історична граматика української мови*, Kyjev: Vyshcha Shkola.

Ziłyński, J., 1932: *Opis fonetyczny języka ukraińskiego*, Kraków: Polska Akademia Umiejętności.

Ziłyński, J., 1979: *A phonetic description of the Ukrainian language*, Harvard: Harvard University press.



celto-slavicaIII_12 korektura.indd 8:154 7.10.2010 14:14:40

# Fonološka funkcija šuma u irskim i ukrajinskim šumnicima

Sažetak

Cilj je ovoga rada proučavanje svojstva šumnosti u irskom i ukrajinskom iz perspektive fonologije upravljanja (Kaye, Lowenstamm and Vergnaud, 1985, 1990, Cyran 2003) koja se bavi nelinearnim pristupom autosegmentalnom načinu prezentacije intonacije. Elementi imaju značajnu autonomiju koju jamči njihov reprezentativni redoslijed i koja određuje njihov odnos prema fonološkim procesima. Intonacijski izrazi definirani su pomoću elemenata čija pojavnost ovisi o tome da su oni autosegmentalno dopušteni odgovarajućim položajima kostura. Naša pažnja usmjerena je na šum. Šum određuje svojstvo "aperiodičke energije", a njegova artikulacijska shema je suženje prolaza pri prolasku zračne struje. Prema tome, šum je svojstvo zatvornih glasova. U našem razmatranju irskih i ukrajinskih primjera, osnovnu funkciju šumnika proučavat ćemo kroz odnose u kojima sudjeluje i kroz moguća ograničenja u uporabi u sustavima ova dva jezika.

Ključne riječi: šum, šumna sastavnica, shema elementa, poravnanje

Key words: turbulence, noise component, elemental pattern, alignment



celto-slavicaIII_12 korektura.indd 8:155 7.10.2010 14:14:40

celto-slavicaIII_12 korektura.indd 8:156 7.10.2010 14:14:40