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AN ELEMENT-BASED APPROACH TO UKRAINIAN BACK FRICATIVES

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ABSTRACT

The discussion offered in this article focuses on the problem of the back fricative segments in Ukrainian. An attempt is made to provide their phonological representations that account both for their distribution and phonological behavior. The analysis proposed here is coached within the framework of *Government Phonology*, a non-linear model, that awards considerable autonomy to phonological primitives building melodic expressions. Our concern, therefore, is to specify which elements define each of the turbulent sounds and determine the role they play within the relevant melodic structures. In accordance with the principles of the framework, it is predicted that the internal elemental content and organization of primes directly conditions the phonetic manifestation of the fricative segments. The aim of the present analysis is also to pinpoint the significance of the head-dependent distinction that obtains within melodic structures, as it often underlies, if not determines, the strength of expressions and their susceptibility to phonological processes.

KEYWORDS: prime autonomy; noise; head; representation; strength.

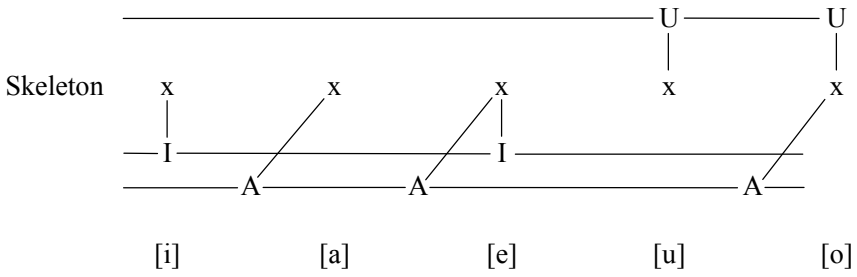
1. Theoretical preliminaries

The explanatory potential of the *Element Theory*, which is part of the Government Phonology framework, is contingent on the paradoxical interplay of prime autonomy and inter-element relations.[1] Thus, specific lexical representations of individual segments depend on the number and kinds of phonological primes on the one hand and, on the other, on the status the elements enjoy as well as the licensing constraints delimiting the combinability of melodic primitives imposed by particular linguistic systems.

1 For the earliest discussions of the nature and kinds of primes, see Kaye (1989), Kaye, Lowenstamm and Vergnaud (1985, 1990) or Rennison (1987, 1990). In recent years, there have been very serious contributions to the Element Theory such as those of Ploch (1997), Ritter (1997), Rennison (1998), Scheer (1996), Cyran (1997, 2003) and Nasukawa (1998, 2000).

Within the model of *Government Phonology* (Kaye et al. 1985, 1990[2]; Charette 1991; Harris 1994, 1997; Harris and Lindsay 1995; Brockhaus 1995; Cyran 1998, 2003; Scheer 1997, 1998, 2004; and Gussmann 2002, 2007) melodic expressions are defined by means of elements whose manifestation depends on their being autosegmentally licensed by the relevant skeletal positions. The association of each prime is direct and will not be mediated via any other element. The autonomous character of primes further derives from their independent phonetic interpretability since each of them defines a specific phonetic property. A single element, therefore, can constitute the whole segment or, alternatively, combine with some other primes to form complex melodic expressions. When submitted to phonological processing, particular elements can become added or deleted without interfering with the autonomy of other primes belonging to a given segment. Within the melodic plane, elements reside on separate autosegmental tiers which, in a language-specific manner, can sometimes be conflated. Tier conflation accounts for certain licensing constraints that delimit the combinability of primes.[3] In (1) below, the structure of the melodic plane is depicted (Harris (1994: 101)):

(1)



The primes indicated above, i.e. **I**, **U** and **A**, define the vocalic expressions in the first place. Their independent phonetic manifestations as mono-elemental vowels would thus be [i], [u] and [a] respectively. The mid vowels [o] and [e], for instance, are represented as elemental compounds. Within the structures of consonantal melodies, the three primes will be taken to specify their place of articulation, **I** defining palatals, **U** – labials and **A** – coronals. The other elements recognized by the theory in the representation of consonants are the following (Harris (1994)):

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[2] Henceforth KLV.

[3] One example of this mechanism could be the lack of front rounded vowels in English where the I and U tiers are conflated. This imposes the restriction on the combination of elements residing on these autosegmental tiers. See for instance Kaye (2001) for the implemenation of licensing constraints in phonological analyses.

(2)

Element	*Property*
@	velarity[4]
?	occlusion
h	noise
L	slack vocal cords
H	stiff vocal cords
N	nasality[5]

As indicated in (2), the element **h** specifies the property of noise, which is crucial in the production of fricative segments. In acoustic terms, noise stands for aperiodic energy, while its articulatory pattern is that of "narrowed stricture producing turbulent airflow" (Harris 1996: 314). The laryngeal elements **L** and **H**, in turn, define the voiced and voiceless character of segments respectively.

Phonological primes, though all autonomous, can enjoy different status within melodic structures. The fundamental distinction in prime status recognised by the theory is that of head versus dependent.[6] An element awarded the status of the segment's head defines its salient property and performs the dominant function within the melody. Other primes belonging to a given segment are mere dependents. It is generally assumed that melodies that have their head position filled with an active prime are phonologically stronger than headless ones. However, headedness reveals only one aspect of segmental strength.[7] Another criterion that should be taken into account when estimating the strength of melodies is their internal complexity calculable in terms of the number of primes. On the whole, the more primes a melody is composed of, the greater the potential to discharge licensing/governing responsibilities of the position it is dominated by.

Skeletal points along with their segments are projected onto syllabic constituents, which are constructed in terms of the governing relations that obtain between adjacent positions. *Government Phonology* recognises the existence of three syllabic constituents: Nucleus, Onset and Rhyme.

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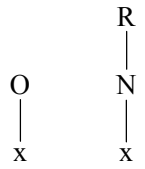
[4] In the latest GP-based accounts, the neutral element @ has been dispensed with altogether and the velar place of articulation is commonly represented as empty-headedness (e.g. Charette and Göksel 1996; Cyran 2003).

[5] In some phonological studies, attempts were made to replace the nasal element with the low tone element L, or rather fuse the two elements, for example in Nasukawa (1998).

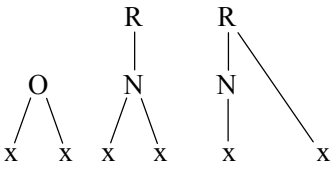
[6] The problem of the phonological function of headedness has been subject to discussion in numerous analyses. See for example Charette and Göksel (1996, 1998), Ritter (1997), Bloch-Rozmej (2003), Carr et al. (2005).

[7] The concept of segmental strengh has a long history in the phonological literature. For insightful studies of this issue, see Sievers (1901), Murray (1988), Murray and Vennemann (1983), Harris (1990), Cyran and Nilsson (1998), Gussmann (1999, 2001, 2002).

(3a) *Non-branching*



(3b) *Branching*[8]



A multi-level lexical representation of a word consists of a linear sequence of segments at the melodic level, a linear sequence of skeletal points at the skeletal level and a linear sequence of Onset–Rhyme constituents at the constituent level. Each onset point is universally licensed by the following nucleus, whereas a rhymal complement position has to be governed by the onset to its right.[9] Government represents a stronger form of licensing which is the primary mechanism underlying the organisation of the phonological structure and the source of all phonological events. Governing relations are binary and asymmetrical, while the melodic content of the potential participants of such relations has to respect the *Complexity Condition*:

(4) *Complexity Condition* (Harris 1990: 274)
Let α and β be segments occupying the positions A and B respectively. Then, if A governs B, β must be no more complex than α.

The establishment of a governing bond between non-nuclear positions requires government-licensing that comes from the following nucleus.[10] The government-licensing capacity of nuclear types is a language-specific property, especially when the nuclei are devoid of melodic content. In fact, any position, in order to license its elements needs to receive a sufficient amount of the autosegmental licensing potential from its licenser.[11] The nucleus that holds the position of the head of a phonological domain is the ultimate source of licensing potential for all positions constituting this domain.

In what follows, the tools of the theoretical model briefly outlined above will be applied to the Ukrainian data with a view to arriving at the phonological representations of the back fricatives attested to in this language. We start by defining the aims of the analysis and the objects submitted to a closer *GP*-based examination.

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[8] The governing relations between the positions of a branching constituent are universally left-headed (KLV 1990).

[9] The two principles that impose such conditions are Onset Licensing (Charette 1990) and Coda Licensing Principles (Kaye 1990).

[10] As required by the Government Licensing Principle (Charette 1990: 242).

[11] Harris (1994) formulates this proviso as the Licensing Inheritance Principle.

2. Aims and study objects

The ensuing presentation will focus on the distribution, certain phonetic characteristics, phonological representation, and some aspects of behavior of the back fricatives in Ukrainian. The segments analyzed here will be the voiceless velar fricative [χ], the voiced velar [ɣ] and the voiced laryngeal (glottal) fricative [ɦ].[12] As indicated in Ziłyński (1932:102, 1979), the laryngeal [ɦ] is pronounced with muscular effort around the speaker's chest and a considerable narrowing in the larynx. The fricative, sometimes referred to as "Murmelstimme", resembles the realization of a low vowel as in slow speech, there is hardly any noise heard, except for slight friction that resembles sighing (Ziłyński 1932: 102). The laryngeal's vowel-like manifestation can lead to its disappearance before vowels (Ziłyński 1932: 103). Thus, the phonetic realization of the laryngeal alternates between the breathy voiced phonation type and the constricted manner of articulation in the glottal region.

It is noteworthy that many of the existing accounts treat the system of Ukrainian as asymmetrical in terms of the fricative voiced/voiceless pairs by refusing the glottals the consonantal status (e.g. Clements and Hume 1995). In the present analysis, we choose not to follow this assumption and regard Ukrainian fricatives as consonantal expressions, which in accordance with Szigetvári's (1998: 397) proposal have to contain the element of noise. It will be submitted that the actual phonetic shape of the relevant consonants derives from specific element configurations within the melodic plane in the structure of phonological domains. Furthermore, we shall address the issue of element status as either segment's head or dependent with a view to pointing out possible interpretational consequences of elemental headship for the phonetic output. It should be observed that apart from determining the salient property of the melodic expression, headedness itself can be, depending on language-specific settings, interpreted as adding a special phonetic dimension to the overall manifestation of the segment.[13] A closer look will also be taken at the consonant-vowel interactions in which the segments in question participate. More specifically, we shall try to determine the impact of the licensing strength of nuclei upon the manifestation of the preceding consonantal expressions.[14] To be precise, we predict that the onsets preceding an empty nucleus favor the occurrence of autosegmentally weaker melodies as these receive less licensing potential from their nuclei.

In sum, the aim of the discussion will be to put forward concrete phonological representations of the back fricatives in Ukrainian along with Ukrainian-specific licensing

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[12] For the discussion of the origins of the three sounds, see Zhovtobriuch (1980) and Shevelov (2002).

[13] Such attempts were made in Ritter (1997), Cyran (1997) or Bloch-Rozmej (2003). It turns out that in Polish, the headed status of an element within a non-nuclear expression can bring about the effect of noise. In German, in turn, headedness can be interpreted as voicing.

[14] The licensing strength of nuclei pertains to their ability to support a wider range of consonantal segments before them by conferring enough autosegmental licensing potential onto the preceding skeletal slots.

constraints on element interactions whose operation to a large extent determines the phonetic manifestation of segments.

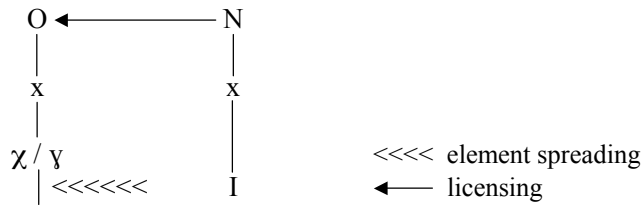
3. Distribution evidence and its *GP* interpretation

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 (5) below:

(5a)	[χ]	chata	'cottage'	puch	'down'
		chlib	'bread'	ptach	'bird'
		chram	'temple'	usmich	'smile'
		chutro	'fur'	much	'fly/gen.pl.'
		pchaty	'push'	komach	'insect/gen. pl.
		mucha	'fly'	chmara	'cloud'
		komacha	'insect'		
(5b)	[χ']	chidnyk	'pavement'		
		chimik	'chemist'		
		chid	'walking'		
		archiv	'archives'		
(5c)	[ɦ]	harno	'beautifully'	Boha	'God/gen.sg.'
		hazeta	'newspaper'	knyha	'book/nom.sg'
		hostryj	'sharp'	doroha	'way/nom.sg.'
		hra	'game'		
		hrib	'grave'		
		hlyna	'clay'		
		hluchyj	'deaf'		
(5d)	[ɣ]	Boh	'God'	bereh	'river bank/nom.sg.'
		druh	'friend'	rih	'horn/nom.sg.'
		dorih	'way/gen.pl.'		
		vah	'weight'		
		stih	'rick'		
(5e)	[ɣ']	hilka	'twig'	berehi	'river banks/nom.pl.'
		hihant	'giant'	nohi	'leg/nom.pl.'
		hirka	'hill'		
		hist'	'guest'		
		hidnyj	'worthy'		

When analysing the above data from the phonotactic perspective, it should be observed that palatalised fricatives occur in the context preceding the high front vowel [i], which is a predictable effect. Hence, the emergence of both [χ'] and [ɣ'] in the relevant sites can be considered as accounted for. The palatalised segments are simply the result of the **I** prime spreading from the nucleus containing [i] onto the position to its left. At this point, it has to be remarked that the mechanism of element spreading does not have a dynamic character. Rather, as observed in Harris (1994), it is a matter of interpretation of a given prime over an extended stretch of the representation. Consider (6) below where the palatalised quality of [χ'] and [ɣ'] is depicted as an outcome of **I**-spreading occurring as a manifestation of the onset-nucleus licensing relation.

(6)



The above structure reveals that the palatal prime, even though distinctively attached to the nuclear slot, contributes also to the interpretation of the preceding onset segment due to the operation of element spreading.

Turning to the occurrence of the other back fricatives in Ukrainian words, its pattern can be summarised as follows:

(7) *Pattern of distribution*
- (a) [χ] can be found both in syllable onsets word-initially, medially and word-finally.
- (b) [ɦ] is capable of occupying word-initial onset positions and intervocalic ones, whereas it is absent from the word-final context.
- (c) may not appear before [i]. When followed by [i], it changes into [ɣ'].
- (d) he word-final position, [ɦ] is replaced by [ɣ].

The pattern depicted above reveals an important property of the voiced velar fricative. Namely, its appearance is limited to basically two contexts: before a high front vowel [i] and word-final, the latter being interpreted by *GP* as one preceding the word-final empty nucleus.[15] Its restricted distribution might indicate that in the lexical forms of

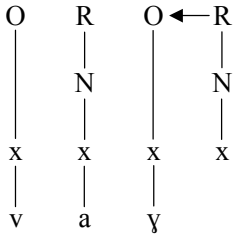
[15] Within the model of GP, all domains are structured as sequences of onsets followed by rhymes. Hence, phonological domains have to universally terminate with a nucleus which in consonant-final items is empty.

words where [ɣ] is phonetically realised, the phonological unit it manifests is different. The related items where the relevant alternations are attested to are given in (8) below (Czaplicki 2006: 75):

(8)	druh / druha	[ɣ]/[ɦ]	‘friend/gen.sg.’
	vah/vaha	[ɣ]/[ɦ]	‘weight /gen.pl./nom.sg.’
	hirka/hora	[ɣ’]/[ɦ]	‘mountain/dimin./nom.sg’
	hist’/host’a	[ɣ’]/[ɦ]	‘guest/gen.sg.’

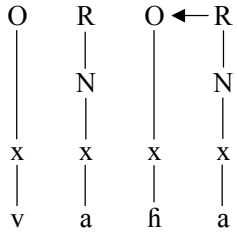
Seen from the point of view of the traditional concept of the syllable and its constituents, i.e. onset, nucleus and coda, the voiced glottal fricative [ɦ] will be bound to occur in sites classified as onsets, whereas [ɣ] takes up codas. Within the *GP* framework, the latter will be claimed to occupy prosodically weaker contexts. The positions preceding a word-final empty nucleus or the rhymal complement point governed by the following onset (traditional codas) are recognised as weak and susceptible to weakening operations (Harris 1994). Consequently, one might predict that the variant occurring in these positions will be the weaker of the two alternants, as it calls for less autosegmental licensing potential to be realised.

(9a) *fricative in a weak context*



vah ‘weight/gen.pl.’

(9b) *fricative in a strong context*



vaha ‘weight/nom.sg’

Thus, in (9a), the velar fricative occupying the onset point licensed by the empty nucleus receives a diminished amount of the autosegmental licensing potential than that depicted in (9b) where it is licensed by a full vowel.

As far as the place contrast between [χ] and [ɦ] is concerned, it is preserved in syllable onsets but removed in ‘traditional’ codas where [ɦ] is replaced with [ɣ].

(10)	haj [ɦ]	‘woods’	versus	chaj [χ]	‘let’
	but				
	mah [ɣ]	‘magus’	versus	mach [χ]	‘taking’

As illustrated here, the glottal fricative is turned into a velar segment, whereas the velar one remains unaffected by any change of place.[16] In *GP* terms, the word-final consonant, though also associated with an onset position, represents a prosodically recessive context. Hence, if any change of place occurs in this site, it will be interpreted as a weakening operation which, within the theory, is effected through element loss.

On the face of the facts just mentioned, Ukrainian back fricatives could be organised into a specific distribution-based hierarchy. This scale would look as follows:

(11) *Distributional freedom scale*

χ ɦ ɣ

→

decreasing freedom

The scale proposed above is based only on the distributional evidence. However, we believe, it reveals the prosodic strength of positions that serve as hosts for the segments arranged in (11). It has to be borne in mind that skeletal positions endowed with a considerable amount of licensing potential are capable of supporting a larger range of segmental contrasts and autosegmentally support more complex melodic structures.

Returning to the scale in (11), we see that the voiceless velar fricative enjoys the greatest distributional freedom and can easily occur in all positions within a domain. At the other end of the scale, there is a voiced velar fricative [ɣ] which is attested in prosodically weak contexts. The supportive potential of a word-final empty nucleus is considerably smaller than that of a realised one, which manifests itself in a language-specific manner. To see exactly how this is effected in Ukrainian, the internal representations of the fricatives have to be explored. However, before putting forward any concrete structures, let us list possible consequences of being licensed by an empty nucleus:

(12) *Effects evoked by a melodically empty licenser*

- Decreased autosegmental potential transfer
- Possible loss of elements from the licensee.
- Possible lack of government-licensing granted to preceding relations.
- Possible incapability of licensing certain segment types.

On the whole, it has to be remembered that the actual capacities of empty nuclei constitute language-specific properties. Also the licensing characteristics of word-medial and word-final empty nuclear positions can differ. In what follows, concrete representations of Ukrainian fricatives will be submitted which, together with the licensing constraints employed by this system, account for the fricative-containing forms described above.

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[16] Also compare the [ɦ]–[ɣ] alternations illustrated in (5) above.

4. Phonological structures of the back fricatives

A closer examination of the Ukrainian evidence reveals the absence of the voiced glottal fricative in the final context. The segment becomes regularly replaced by the voiced velar [ɣ]. Assuming the reduction-inducing capability of an empty nuclear licenser, the weaker nature of the voiced velar fricative should be reflected in its phonological constitution. Part of the answer to this problem might lie in the approach of *GP* to the representation of velarity. More specifically, velar consonants are most frequently structured as empty-headed, i.e. possessing no active prime defining their place of articulation. Furthermore, one has to be aware of the other factor determining the structure of segments within the model in question, namely complexity, which is calculable in terms of the number of primes, a segment contains. The more complex an expression is, the more autosegmental potential it calls for from its licenser and a stronger licenser itself it constitutes. We also have to recall the requirements of the *Complexity Condition* which demands that the segment linked to a governing point be no less complex than one attached to the position of the governee. Thus, positions capable of licensing more melodic material will be regarded as phonologically stronger.

In sum, keeping in mind the existing consonant alternations involving fricatives and the theoretical assumptions just mentioned, we shall propose that the absence of the glottal fricative word-finally and the unrestricted occurrence of the velar fricatives should be ascribed to the difference in the head status of the relevant consonants. More precisely, empty-headed velars are free to take up final onset positions, whereas headed glottals will be barred from that context. Thus, the representations of the back fricatives in Ukrainian could be either as depicted in (13a) or (13b) below:

(13a)

[χ]	[ʏ]	[ɦ]
x	x	x
|	|	|
h	h	h
	|	|
	L	L

(13b)

[χ]	[ɣ]	[ɦ]
x	x	x
|	|	|
h	h	h
|		
H		

As illustrated above, the fricatives are defined by means of the noise element **h** and one of the laryngeal primes **H** or **L**. The dilemma that we encounter with respect to the structures in (13) consists in the choice of the laryngeal element for Ukrainian consonants. The evidence here is far from revealing the straightforward solution. First of all, word-final devoicing is absent from Standard Ukrainian, which indicates the lack of the **L** prime.[17] On the other hand, the stiff vocal folds element – **H** is often responsible for

[17] Dalewska-Greń (2002: 104–110) mentions some very rare cases of final devoicing in lexicalized items, as in *borh* 'debt' or *torh* 'haggle'. However, she also points out that Ukrainian voiced consonants preserve their voiced character before voiceless segments (e.g. *ki*[z]*ka* 'goat/dim.').

the additional effect of aspiration (Harris, 1996:128-130), as found in English for instance. This property of consonants is not attested in present-day Ukrainian. However, one has to bring up the voicing effect found in southwestern dialects of Ukrainian where the voiceless [χ] undergoes voicing in the neighbourhood of a voiced consonant ([χ]>>[ɣ]). The same process targets [k] changing it to [g] in Boyko and Sanian (Ziłyński 1932: 97; Dzendzelivs'kyj 1965: 107–108). In eastern dialects, regressive voicing is regular across domain boundaries (Shevelov 2002: 794–798, 885):

(14)	[jak>g] [ʒe]	'how come'
	[tak>g] [ʒe]	'this is how'
	[mi χ > ɣ] [ʒɨta]	'a sack of rye'
	[ɦovorɨʃ > ʒ] [do]	'you speak to'

It seems, thus, that the more likely candidate for coding the laryngeal contrasts in Ukrainian would be **L** and the voicing effect should be analysed in terms of **L**-spreading.

Another issue to be addressed is the asymmetry of the back fricative inventory in Ukrainian.[18] In the first place, [χ] possesses both palatalised and non-palatalised variants, similar to [ɣ]. Secondly, the voiced glottal fricative remains immune to palatalisation, or rather changes into a voiced velar segment when subdued to the effect of the palatal prime. Moreover, it does not have any voiceless counterpart. It has to be remembered, however, that any phonetic segment that surfaces in the realisation of forms, is the output of a unique phonological representation. In terms of *Government Phonology*, its manifestation will depend on the primes constituting its internal structure, their organisation in the melodic plane together with the status assigned to each of the primes and the metrical strength of the position to which it is attached. Consequently, the immunity of the glottal fricative to both palatalisation and devoicing has to be perceived as determined by the phonological structure of the melody and the licensing constraints employed by the system of Ukrainian.

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[18] With reference to the symmetry of phonological systems, Czaplicki (2006) quotes Rubach (1993) who maintains that symmetrical systems are favoured over non-symmetrical ones. A quest for symmetry would thus lead to refusing the glottal fricative its phonological status. Such an assumption (i.e. replacing [ɦ] with an underlying [ɣ]) enables the account of the regular alternations between velars and postalveolars taking place before the vowel [ɛ]. Examples of this process could be:

junak	junače	'young man/voc.'	k~tš
Javtuch	Javtuše	'first name/voc.'	x~š
Druh	druže	'friend/voc.'	ɣ~ž

As far as GP-based accounts are concerned, the question of the glottal fricative as a phonological unit is discussed in Gussmann (2001) where it is argued that despite the fact that [ɦ] does not exist as a fully-fledged melody phonetically, its lexical status in the system of Polish has to be recognised on the basis of its phonological patterning.

The proposal concerning the status of the fricatives put forward in Czaplicki (2006) assumes that the lexical back fricatives in Ukrainian are [χ] and [ɣ], whereas their palatalised variants as well as the glottal fricative are an outcome of phonological processing. As for the application of palatalisation, velars can freely undergo this modification in the expected context of the following high front [i]. Recall that also in *GP* terms, the effect of palatalisation receives a straightforward account in the context preceding the **I**-containing vowel. As already illustrated, palatalisation will be analysed as an outcome of **I**-spreading. The glottal fricative will resist palatalisation, which is conditioned by physical factors. As pointed out in Czaplicki (2006: 79), it is physically impossible to articulate a laryngeal with simultaneous palatalisation.

Returning to the *GP*-based account, it seems that the distributional scale proposed in (11) has to be restructured. In particular, if the prosodic strength of positions is directly related to the complexity of melodies they are to license, the voiced velar fricative would seize stronger sites than its voiceless counterpart, both appearing in weaker contexts than [ɦ] which, in addition to the same number of primes as [ɣ], is a headed melodic structure. Assuming the most complex character of the voiced glottal fricative, we are able to account for its absence from the word-final position. More specifically, a word-final empty nucleus turns out incapable of licensing the headed structure of the voiced glottal fricative. The [χ] as the elementally weakest of the three fricatives requires the smallest amount of the autosegmental licensing potential and hence can occupy all positions within a domain. The headed expression of [ɦ] calls for a stronger licenser. Hence, it will be found in onsets licensed by melodically filled nuclei. The voiced velar fricative as a headless expression will be attested to in prosodically weak sites, such as the word-final onset position. It seems that the final empty nucleus in Ukrainian possesses considerably diminished licensing capacity compared to full vowels or even a word-medial empty nuclear position. If we consider the word *hlyna* ‘clay’, for instance, the word-medial empty nucleus separating [ɦ] and [l], can freely support the glottal fricative.[19]

The occurrence of the most complex of the three fricatives, i.e. a headed [ɦ] mainly before realised nuclei, to its absence before word-final empty licensers cannot be accidental. A closer look at the historical developments observable in the dialects of Ukrainian reveals the working of the onset strengthening operation of melodically filled nuclei in the form of prosthesis. Historically, as pointed out in Shevelov (2002: 114) or de Wulf (2003) the phenomenon of prosthetic consonants before the word-initial vowel was a common effect in Slavonic languages and took on the form of lip rounding, aspiration or yotacisation. Thus, the sounds used in such contexts were [v], [j] or [ɦ]. Without going into any detailed analysis of this phenomenon, we would like to treat it as a piece of evidence in favour of the headed nature of the glottal fricative.

[19] [ɦ] as an L plus h compound has the same complexity as [l] defined by means of the elements A and occlusion. Such a pair of segments may not constitute a branching onset structure, where a slope in complexity is required, but has to be split by an empty nucleus.

At this stage, driven by the want of coding the maximal range of contrasts with a minimum of phonological units, we might want to resign from the element of noise (**h**) altogether and combine the phonetic effect of noise with headedness.[20] This move, however, will complicate the representation of the stop-fricative contrast if headlessness is still to be used to code velarity. More specifically, we could never represent the difference between [k] and [χ] without using an active prime to code their velar place of articulation. Consequently, this option still remains to be explored and the present account preserves **h** in the structure of Ukrainian fricatives. Nevertheless, the evidence documenting the distributional restrictions concerning these segments suggests the operation of the Ukrainian-specific licensing constraint pertaining to the licensing of noise. Its formulation is provided in (15) below:

(15) ***h****-licensing in Ukrainian*
A word-final empty nucleus may not license **h** as head.

The operation of the constraint just formulated accounts for the replacement of the glottal fricative with a headless velar in the word-final context. 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. In general, the constraint proposed in (15) is in the spirit of Cyran's ***h****-parameter* stating that the occurrence of noise in languages is parameterised. In Ukrainian dialects, the element is used to code consonantal contrasts but its licensing is confined to stronger nuclear licensers.

5. Conclusion

Our discussion of the back fricative segments attested to in Ukrainian has to be concluded with a number of important observations. First of all, as submitted in this article, their fricative nature should be coded with an active element of noise (**h**), whereas the voiced/voiceless contrast requires the use of the low tone laryngeal element **L**. The two primes combine to form the consonants [ɦ] and [ɣ]. Significantly, however, in the former, the element of noise possess 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 [χ]. Nevertheless, the voiceless velar fricative lacks the laryngeal element, which makes it the least complex (an thus the weakest) member of the back set. Consequently, the revised hierarchy based on the internal complexity of segments would be as follows:

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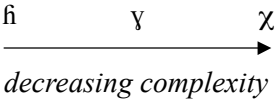
[20] In a number of GP-based analyses, attempts were successfully undertaken to use the dimension of headedness for coding certain phonetic properties, e.g. in Cyran (1997), Ritter (1997).

(16) *Complexity scale*



The above scale differs from the one proposed in (11) where the variable chosen for its establishment was the distributional freedom of the fricatives. Importantly, the scale in (16) emerges as better grounded. The leftmost consonant is both elementally complex and headed, both properties being, according to the *GP* theory, markers of phonological strength. More precisely, positions to which this melody will want to attach will have to be prosodically strong to support a headed complex expression. The rightmost segment is capable of occupying the weakest prosodic sites since it is mono-elemental and headless, which makes it easy to license. It turns out that in Ukrainian the complexity of melodies which is directly dependent on the phonological strength of prosodic positions in a way accounts for the differing degrees of distributional freedom enjoyed by these melodies. Simpler, less complex, melodies are those that are easy to license and hence less distributionally restricted.

The analysis offered in this article submits 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. The existence of such a constraint accounts for the restricted distribution of the glottal fricative and the distributional freedom of the other two back fricatives in Ukrainian.

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