

The Basic Hungarian Allophone System: Structure and Rules

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Introduction

The economical structure of the allophone system of a given language provides a not too large and rather neatly ordered stock of elements and so, through these beneficent characteristics, makes it possible for participants in a conversation to communicate. It is the aim of this paper to discern a structure behind one such set – the allophone system of Hungarian.

It should be assumed that speakers have access to rules R1 that delimit the number of possible allophones. This assumption opens up interesting perspectives, only one of which will be mentioned at the moment. As particular rules R1 specify the allophones and other possibilities are thus excluded, it is now possible for a selection of another kind to come about. The rules R1 stake out the borders within which the outcomes of different processes are confined. These processes are furthermore stated by morphonological or assimilatory rules R2. A problem with various rules R2 is that the outcome is not fully predictable in all cases. That is, there may be a choice in theory between different possible outcomes (in a synchronic system). The speakers' knowledge of the allophone system can be used as a partial explanation here (Olsson ms).

The task is to give rules that generate those elements that make up the basic allophone system – i.e. the allophones that are present in all registers.¹ An allophone chart will also be presented later on. It is assumed that the phonemes just bear the coding and are not the primary target of redundancy rules. Allophones show the full realization of all features, whereas phonemes may have certain features unspecified and archiphonemes most certainly do (by definition – whatever their reality).

¹Due to lack of space, I must omit parts of the original paper. For an account of the system that includes less salient sounds, see Olsson in press.

Consider first chart 1, which shows the consonant phonemes. The distinctive features are not given but instead common names for the different classes are used. The exception is [\pm voice] where there is a difference in voice within a particular class.

Some phonemes are or may be spelt differently in Hungarian orthography than in IPA notation. These are *dz* [dʒ], *dzs* [dʒʃ], *gy* [j], *c* [tʃ], *cs* [tʃ], *ty* [c], *zs* [ʒ], *sz* [s], *s* [ʃ] and *ny* [ɲ]. The most central allophones of a given phoneme have been indicated, i.e. as a rule underlying forms. As for the [h]-sounds and [x]-sounds, which most likely belong to the same phoneme, the most usual and characteristic variety – [h] – has been used. It is easier to generate the [h]-varieties from [x] (as in Olsson 1992) than the other way round, although [h] is undoubtedly the most common allophone. Positing an archisegment as underlier would be the most complicated solution, in terms of both complexity of the rule system and naturalness.

1 The Hungarian phonemes

	bilabials	labiodentals	dentals	alveolars	palatoalveolars	palatals	velars	laryngeal
nasals	m		n			ny		
stops	+voice	b	d				g	
	-voice	p	t				k	
affricates	+v.			dz	dzs	gy		
	-v.			c	cs	ty		
fricatives	+v.			z	zs			
	-v.		f	sz	s			
liquids			l	r				
glides	+v.	v				j		
	-v.							h

By calculation, it can be seen that the traditional ordering of sound units (in this case phonemes) along the axes is the most economical, as it gives the least number of possible combinations of features and consequently the best used type of chart (this goes naturally also for the allophone system). Place features are represented on the horizontal axis while the other features interact on the vertical axis (but cf. below for the feature [strid]).

It will first be valuable to distinguish between the two general kinds of restriction. The restrictions can be grouped into 1) gaps and 2) axial restrictions. The gaps are visible in the charts – i.e. they mark which combinations of place features with other features do not occur. An example is labial affricates, which do not occur in Hungarian – but which do occur in German, cf. *Pferd* 'horse'. Axial restrictions are on the other hand not visible in the charts as they are restrictions on cooccurrence between features on the same axis. An example is nasal affricates, which do not occur even as allophones in Hungarian, but which now appear as allophones in Welsh spoken in the Dyffryn Nantlle district – Griffen 1985 explains that in Llanfachreth [ənʃokladi] and [ənʃami] are used for 'my chocolate' and 'my jam', respectively, whereas in Dyffryn Nantlle [ənnʒokladi] and [ənnʒami] are used.²

Ferenc Kiefer (personal communication June 2, 1992) refers to the following three objections to the phoneme system described in (1).³ The first objection is that *dz* might turn out not to be a phoneme, as it does not occur in initial position and is only long elsewhere.⁴ An exception is however *brindza* 'a cheese-product', although an unusual word. For systemic reasons it makes sense to include *dz* as there otherwise would be a gap among both the strident consonants and the affricates. Kiefer then puts forward the argument that the long intervocalic and final *dz* may be regarded as combinations of two phonemes rather than as two instances of an affricate /dz/. From the point of view of simplicity, the postulation of an underlying long *dz* should be preferred, regardless of possible free rides (which in reality have to be paid for). Actually, different phonological rules must adjust a given combination in order to yield the long /dz/.

²A prerequisite for the new allophones is obviously the English loans with affricates previously unknown to Welsh. At the point where the affricates are felt native, they should become subject to the mutation system.

³It is not clear to me whether Kiefer actually shares any of these objections. As obstacles to (1) they should, however, be properly addressed.

⁴There are no initial combinations of stop + fricative and the phonemic status of *dz* is therefore questioned. This argument is not tenable in the case of *dzs* as there exist words like *dzsungél* 'jungle'.

Kiefer's second objection concerns the postulation of *gy* and *ty* as affricates and not as stops. The argument goes like this: although *ty* is phonetically an affricate in *tyúk* 'hen', its affricate character is weaker before an unstressed vowel, and before a consonant – as in *plëtyka* 'gossip' – it is phonetically a stop. To this may be said that one should take the variant in the strongest position as basic – i.e. the variant before a stressed vowel. In the other positions the affricate is gradually reduced in its fricative phase to the point where it apparently loses its fricative character altogether. The phonetic difference between the unaspirated stops *t*, *k*, etc. and the palatals *ty* and *gy* is simply too noticeable in initial position to motivate calling the latter consonants stops. (For a connection between affricacy and aspiration, see Griffen 1985.)

Kiefer's last objection concerns the placement of *j* among the glides. This move is traditionally not approved of by Hungarian researchers. The postulation can however be defended on the grounds that *j*, *v* and *h* form a natural group as regards their reactions towards epenthesis (Olsson 1992). Also, *j* often appears as a typical glide or approximant in other situations, but not as a fricative.

The last two objections may be refuted by showing that the proposed alternative places are in fact occupied by allophones of other phonemes (and the allophones involved seem different, thus e.g. the glide *j* and the voiced palatal fricative appear to be non-identical). Consider chart (10) below where it becomes clear that palatal stops and fricatives are in fact found (these come about via a fronting rule).

It might be argued that all glides have allophones that are [+cons] – this is at least the way it works phonologically, though the difference may be more structural than phonetic. In any case these [+cons] allophones are not basic, however.

I think, finally, that the reluctance to accept the glide group and palatal affricates in Hungarian may have a psychological motivation – fricatives and stops are in an obvious sense stronger than glides and affricates, respectively, and therefore it is not surprising that this view has become the traditional one.

Inventory gaps

Before entering upon the investigation of consonant gaps, some distinctive features will be reconsidered and one of these reconsiderations is the theme of the following subsection.

A note on labiodentals

Following Chomsky & Halle 1968, it is generally assumed that [distributed] – which is not a place feature – distinguishes bilabials from labiodentals, the former being [+distr] and the latter [-distr]. (It may be noted that a distinction between bilabials and labiodentals is technically necessary in order to differentiate between the nasal allophones [m] and [m̥].) The possibility that a feature F, which is indeed a place feature, differentiates between the two classes will be investigated in this subsection. The attribution of difference to a place feature appears sensible for, as Lass 1984:89 says, "it seems more plausible to take the articulatory types as primary, and derive stricture length from properties of the articulators".

Four rules in Olsson 1992 – two phonotactic rules and two consonant rules, stating nasal assimilations – would be directly affected by such a change. It will be seen that by this process the consonant rules may be collapsed.⁵ Consider first the general dissimilation rule. It is set up to account for the absence of initial combinations where adjacent consonants have identical values for the cover feature [place]. Thus, there are no initial combinations *tl*, *dl*, *szr*, *pv*, *bv*. The rule is stated as:

$$2 \quad \text{Dissimilation}$$

$$+ \quad \left[\begin{array}{c} \text{C} \\ [\alpha\text{place}] \quad [\quad] \end{array} \right]$$

$$\quad \quad \quad \downarrow$$

$$\quad \quad \quad [-\alpha\text{place}]$$

(In an initial consonant cluster, the second element differs from the first in terms of place features.)

It is said in Olsson 1992 that [distr] is not a place feature, which should explain why an initial sequence of bilabial plus labiodental is not allowed. Positing feature F as a differentiating factor would thus mean that a sequence of bilabial plus labiodental is not hindered by (2).

There are no such strong restrictions when it comes to medial and final consonant clusters. However, a succession of labials is prohibited as long as the first of them is not a nasal. (3) takes care of the restriction.

⁵Thore Pettersson insisted that the nasal assimilations should somehow be accounted for by one rule. After looking at the case once again, I realized that the difficulties were indeed surmountable.

3 Labial sequence specification

$$\left[\begin{array}{cc} & +lab \\ [&] [&] \end{array} \right]$$

↓

$$[+nas]$$

(When a labial is followed by another labial, the first is a nasal.)

This dissimilation rule is more permissive than (2) in the sense that a combination is allowed granted that the first element is a nasal. It is easily seen that (3) takes care of the lacking initial *bv* and *pv*, since the elements are oral labials and (3) fully covers this situation (and hence, the initial position of the combinations does not matter). Therefore, introduction of the feature F in this connection just means that the scope of (2) diminishes, while the scope of (3) stays the same (in the old analysis, the two rules in fact both prohibited the sequences in question – although only (2) was credited with the prohibition).

The postulation of F also has importance for nasal assimilation. Two nasal assimilation rules are proposed in Olsson 1992. The first takes care of regressive assimilation of *n* as in e.g. *nagyon kellemes* [nɔɟɔŋkelɛ:mæf] 'very comfortable', *sampongyár* [ʃɔmpɔŋɟar] 'shampoo factory', and *az oroslánból* [ɔzɔɾɔslɛmbɔl] 'out of the lion'. For cases like these, (4) is posited. It says that *n* takes on the place of a following consonant.

4 Nasal assimilation – Postcyclic

$$\left[\begin{array}{c} C \\ [+nas] \\ [+dent] \end{array} \right] \leftarrow \alpha place$$

(*n* assimilates in place to a following consonant.)

Actually, (4) means that *n* is assimilated in place to any following consonant, which is in fact true – it is just more noticeable in certain positions (i.e., where the existence of allophony has a neutralizing effect).

As for the other nasals, only *m* shows assimilation irrespective of style and tempo and this takes place before a labiodental, e.g. *nem veszélyes* [nɛmɟɛsɛjɛf] 'not dangerous'. To account for this, (5) is posited.

5 Labiodental assimilation – Postcyclic

$$\left[\begin{array}{c} [+lab] \\ [+nas] \leftarrow -distr \end{array} \right]$$

(*m* becomes assimilated (in [distr]) to a following labiodental.)

It is thus assumed that [-distr] spreads to a labial nasal.

There are also cases of *n* plus labiodental, e.g. *nyáron volt* 'it was in summer' – here the nasal is assimilated as well: [ɲaɾɔŋvɔlt]. The dental nasal can not be assumed to be directly assimilated to the labiodental if [distr] – not being a place feature – is differentiating. The dental is instead changed to a labial before a labial by (4), and (5) then succeeds in changing the labial outcome of underlying *n* to a labiodental.

Consider now the possibility of F. Granted the existence of a differentiating place feature F, (5) can be reformulated as (6).

6 Labiodental assimilation II – Postcyclic

$$\left[\begin{array}{c} [+lab] \\ [+nas] \leftarrow \alpha place \end{array} \right]$$

(*m* becomes assimilated (in [place]) to a labiodental.)

The identity of F is the next question. It is apparently a place feature, but what properties does it have? The most elegant solution is in fact to use a feature already introduced in Olsson 1992, namely [dental]. Thus, bilabials are [-dental] and labiodentals are [+dental].

The definition of [dental] then has to be changed. The old definition – which only applied to *t*, *d*, *n* and *l* – was as follows:

7 [dental]. The tip of the tongue is articulator and may lie in front of or at the alveolar ridge.

The new definition can be given as (8). The details of the description are taken from Elert 1989:59, 61.

8 [dental]. The point of articulation is dental in a broad sense – it ranges from the lower part of the upper front teeth to the gums closest (a few mm) to the back of the front teeth.

Note the similarity between (4) and (6). They may be combined as (9), with a slight simplification as result.

9 Nasal assimilation II – *Postcyclic*

$$\left[\begin{array}{c} C \\ \left\langle +\text{lab} \right\rangle b \\ \left[\begin{array}{c} +\text{nas} \\ \left\langle -\text{dent} \right\rangle a \end{array} \right] \leftarrow \alpha \text{place} \end{array} \right]$$

(A nasal is assimilated in place to a following consonant. Unless the nasal is a dental, the consonants are both labials.)

In this analysis, *n* directly changes to a labiodental, also given (4) and (6). The nasal assimilations are further consistently analyzed as assimilations of place. The introduction of F is therefore well motivated in terms of the analysis of Hungarian as a whole.

In conclusion, then, the postulation of the differentiating feature F and its identification as [dental] is shown to have many advantages. (This is not to say that [distr] is rejected, but at least in the present work it can not be shown to have any importance in the rules or even as a distinguishing feature.)

Consonant gaps

In Olsson 1992 contemporary phonological usage was employed in terming the feature common to dentals, alveolars, alveopalatals and palatals [coronal]. A review of the gap rules at this point would have revealed that there is need for a feature comprising these groups. It would also be evident, though, that in other instances the above mentioned groups function together with the exception of palatals. This repeated appearance suggests that there is equal need for a feature which separates just dentals, alveolars and palatoalveolars. Such a feature already has been pointed out once in the phonological literature – this is [coronal] in the sense of Chomsky & Halle 1968. Much of the later phonological works (e.g. Halle & Clements 1983) treated palatals as [+cor] – thereby making [+cor] equivalent to [-grave] in the system proposed by Jakobson, Fant & Halle 1963. The above data suggest, however, that there should be a feature that corresponds to [cor] in Chomsky & Halle's sense. The situation is best resolved, I think, by using [coronal] in its old sense and reintroducing [grave]. The distinctive features for the Hungarian phonemes (the basic allophones) are presented in (10).

The system of consonant allophones in Hungarian is given in (12) together with different feature specifications. Those values have been given for the different features which are either the most restricted or the most easy to state. Strident consonants are within the bold-faced line.

10 Phonemes: distinctive features

		Consonants:[-syll]																									
		b	d	g	p	t	k	z	zs	f	sz	s	dz	dzs	gy	c	cs	ty	m	n	ny	l	r	v	j	h	
cons		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
voc		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
son		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
cor		-	+	-	-	+	-	+	+	-	+	+	+	+	-	+	+	-	+	+	-	+	+	-	+	-	
ant		+	+	-	+	+	-	+	+	-	+	+	-	-	+	-	-	+	+	-	+	+	-	+	+	-	
lab		+	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
dent		-	+	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
high		-	-	+	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	+	
back		-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
cont		-	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+
gr rel		-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	
fric		-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	
nas		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	
voi		+	+	+	-	-	+	+	-	-	-	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	
strid		-	-	-	-	-	+	+	-	+	+	+	+	-	+	+	-	-	-	-	-	-	-	-	-	-	
grave		+	-	+	+	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

As noticed in the preceding subsection, it is probable that the dental nasal takes on the same value for place as any following consonant. Therefore eight nasal allophones are posited, of which three may surface independently of assimilation processes – and are thus phonemic in certain (that is, most) instances.

Note first in (12) the limited distribution of affricates and strident consonants, which partly overlap. The members of these groups are not encountered outside the [-grave] area, so one may posit (11) to account for the situation.

$$11 \quad \left[\begin{array}{c} -\text{grad rel:} \\ +\text{strid} \end{array} \right]$$

↓

$$[-\text{grave}]$$

It is not indicated in (11) that no dental belongs to the groups, but a later rule – to be presented below – will remedy this situation.

12 The Hungarian allophone system

	+ant		+dent		+high		+back		
+nasal	m	m̥	n	N4	N5	ɲ	ŋ	N8	
-cont	b		d			g'	g		
	p		t			k'	k		
+grad rel				dz	dʒ	J			
				ts	tʃ	c			
				z	ʒ	ʧ'	ʧ		
	f		s	ʃ	ç	x			
+voc +cons			l	r					
-voc -cons		v				j		fi	
						j.		h	
	+lab		+cor						
			-grave						
									-son
									+fric

A shortcoming with (11) is that it does not include the fact that there are no high strident consonants. The problem with the missing generalization in (11) can actually best be solved by splitting the rule in two – as (13) and (14).

13 Affricate gap

[+grad rel]
↓
[-grave]

14 Strident gap

[+strid]
↓
[+cor]

Superficially, (14) does not seem to fill any gaps in (12). It is however formally inevitable to include a rule which shows a constraint on the occurrence of stridents along the vertical axis. The non-occurrence of stridents except in a narrow mid area on the chart (horizontally speaking in this case) where there are no non-stridents is so systematic that there is no use in indicating strident and non-strident rows in the area marked [+fric].

In the columns starting with *n*, N4 and N5, one may observe the distribution of obstruents: they are either dental or strident. This fact is covered by (15).

15 Coronal gap

[C
-son
+cor]
↓
[αdent
-αstrid]

Obviously, (15) is the rule that takes care of the non-occurrences of dental affricates and stridents.

Except for the nasals, the occurrence of labials is balanced, so that there are only continuous labiodentals and only non-continuous bilabials. The following rule takes care of the restriction.

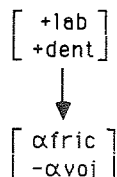
16 Labial gap

[+lab
-nas]
↓
[αcont
αdent]

It is not quite sufficient to describe the gaps in the labial columns by (16). One of the cases not covered by (16) is the non-occurrence of a

labiodental liquid – which is not to be accounted for in this connection, however, since it is covered by a rule stated below. It is on the other hand clear that the other remaining gaps in the labial area can easily be taken care of by one and the same rule – which is (17).

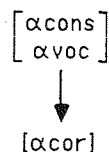
17 Labiodental gap



The non-occurrences of a voiced counterpart to *f* and a voiceless counterpart to *v* are covered by (17).

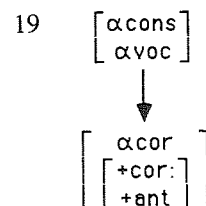
So far it has been seen that rules with alpha-variables may be instrumental in describing the allophone system. The next rule in fact involves the same Greek letter variable three times. This rule concerns the interesting distribution of glides and liquids. Glides are confined to labial and postpalatoalveolar areas – actually, in the latter case, palatal and laryngeal places. Liquids show the reverse distribution – they only occur in coronal areas. The complementary distribution is described in (18), where $[\alpha\text{cons}, \alpha\text{voc}]$ (in Jakobsonian terms) stands for the class of approximants.

18 Approximant gap



Note regarding (18) that the reversion of the status of $[\text{+cor}]$ to the status it enjoyed in SPE, where it did not involve palatals, means that the determinee need not be specified as $\alpha[\text{+cor}, \text{-high}]$.

A difficulty with (18) is that there is a place for a palatoalveolar liquid – and this place is not filled by a sound or prohibited by a rule. The problem may be resolved by making an addition to (18), as in (19).



The solution appears unsatisfactory because the addition does not seem organic but ad hoc and furthermore complicates (18) to a great extent. This expedient is therefore rejected, which can be done with light heart since a better explanation is readily available.

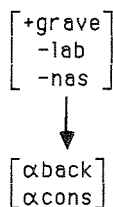
Consider Japanese, where the sounds *r* and *l* are not systematically differentiated – so that to a Western ear the liquid in *karada* ‘body; health’ may sound like either *r* or *l*. In Japanese the liquid then (ideally speaking) freely ranges over the sounds that e.g. to a Hungarian listener are *r* and *l*.⁶ Principally the same phenomenon might be going on with the mysterious palatoalveolar liquid. In reality, then, there is no mystery and the non-lateral liquid may be regarded as holding a place in both the fourth and the fifth column. This is of course a unique circumstance in Hungarian, but there are some indices in favour of this solution. While separating dentals from alveolars as in (1), Lavotha & Lavotha 1973:20 allot a special place to *r* as apico-alveolar in between what they term predorso-dentalalveolar (here dental) and predorso-alveolar (here alveolar). It seems best to let *r* have a share in both columns in the centre of the coronal area, however. This is because of (2) – the phonotactic rule (in Hungarian and other languages) which says that in an initial consonant sequence there can not be two immediately adjacent consonants with the same place. For Hungarian, this explains that there are no initial sequences of the form *szr* [sr]. Continuing to reason in this way, it appears that initial sequences of *sr* [r] can not be allowed – for *r* now shares place not only with *sz* but also with *s*. The prediction is not quite borne out as there are a few words which start with *sr* – *srác* ‘kid’ and *sróf* ‘screw, n.’ with the derived verbal form *srófol* ‘screw, v.’. These words may however be considered as exceptions – there also exist the words *zrí* ‘din’ and *Zrínyi* ‘family name of a Hungarian national hero’, although alveolars + *r* are not allowed (and, by another rule,

⁶Differences in the distribution are due to dialect, sociolect and sex. Informants may claim, on basis of individual preferences, that the liquid approaches one of the sounds in character.

voiced fricatives are not allowed at all in initial clusters).⁷ (Combinations that the phonotactic rules do not allow ought to be less salient for the speech participants as the parts of the cluster have to be coded in more detail.) To conclude, (18) is preferred and *r* is not specified for [ant].

The last rule for consonant gaps, (20), concerns the velars and laryngeals. The nasal group is excluded – cf. (16) whereby all labials except nasals are differentiated along two features whose values must agree. There is a characteristic distribution of [cons] in postpalatal orals, so that all velars are true consonants, while all laryngeals are glides.

20 Postpalatal gap



In chart (21), the chart showing the allophone system – i.e. (12) – has been supplied with patterns indicating the relevant gap rules.

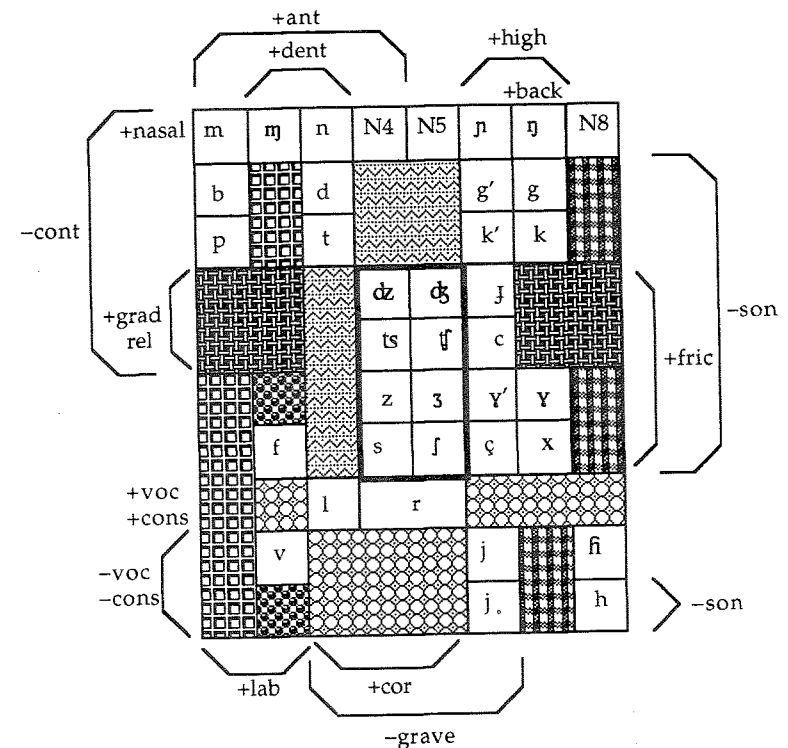
Note that (13) and (20) state the non-occurrence of postvelar affricates. Here the first mentioned rule is indicated as source. Another overlap in (21) is that both (13) and (16) state that there are no labiodental affricates. Finally, (18) prohibits – like (16) – a bilabial liquid and – like (20) – a post-velar liquid as well. The amount of vacuous application is rather low and the rules are simple and few, so the overall impression of the rule system is good. (I do not believe that vacuous application should be disallowed.)⁸

Some of the gaps are wide-spread in the world's languages, sometimes reaching the level of universal application (the non-existence of postvelar affricates, for instance, seems to have secured such a place). As to the Hungarian speaker in general, he should not be considered to be endowed with the ability to understand a good many other languages – at least he is inclined not to confuse the system with that of another system while speaking Hungarian.

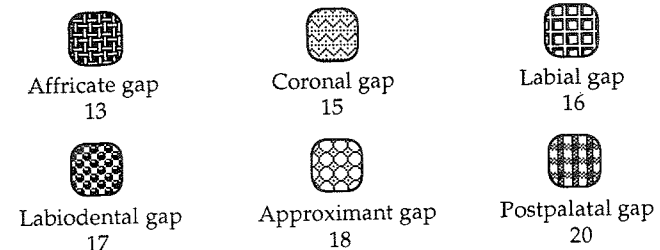
⁷I have only heard the combination *sr* once – and then in the word *srác*, where the speaker actually used a uvular variety of *r*.

⁸Actually, if three of the rules are slightly changed there would be no vacuous application and a totally redundancy-free rule system is therefore possible. However, this move would detract from the high degree of naturalness in the rules.

21 The Hungarian allophone system with patterns for gap rules



What the patterns stand for:



When a universal constraint – one that can be directed towards an individual language – may be rightfully posited, it is probable that there is a reason for this move in the fact that – in this case – a filling of the sound gap is phonetically impossible. There may be very few cases where a

logically possible phenomenon can be dismissed a priori for an individual language. This move must be performed with deduction from other linguistic facts.

Claims on universal application should always be treated with scepticism. Apparently OVS was on the verge of being postulated as an impossible word order – purely on inductive grounds – until Desmond Derbyshire presented the case of Hixkaryana. The voiced aspirates in Sanskrit were questioned by researchers from the West – probably because such sounds had not been encountered in languages they knew. The enterprise of universally working rules is therefore not promoted in this work.

Vowel gaps

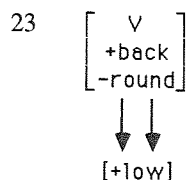
It is easier to give rules for vowels than for consonants since generally there is no allomorphy and hence no allophones that are questionable or difficult to describe due to their restricted occurrence (but cf. Olsson in press for the situation in colloquial speech). The set of long vowels differs from the set of short vowels in its structure. It can be shown that the rules for vowel gaps are optimal when none of them applies to both long and short vowels, as other solutions would be less economical.

Consider first the long vowel set in (22).

22 Long vowels

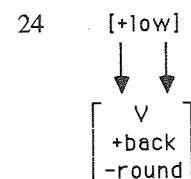
	Front [-back]		Back [+back]		
[rounded]:	-	+	-	+	
High	í [i:]	ű [y:]		ú [u:]	[+high]
Mid	é [e:]	ő [ø:]		ó [o:]	
Low			á [a:]		[+low]

The first rule takes care of the fact that there are no non-low back unrounded vowels in Hungarian. The generalization is stated in (23), where the two arrows mark that the vowel has to be long. Clearly, the generalization cannot be extended to short vowels, as there is not even a low short vowel that is back and unrounded.



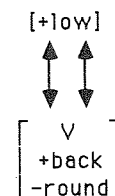
It may be noted that a notational variant of (23) – taken as part of a rule that also accounts for the same restriction in the case of short vowels (assuming underlying unrounded [a] – rounded at a late stage – as a phoneme instead of [ɒ]) – is very famous in the literature on Hungarian phonology. Mentioned as an independently motivated rule, it has sometimes been invoked as support for absolute neutralization of abstract back unrounded vowels (e.g. Vago 1976:245) – though it has also been referred to without this connotation (e.g. Ringen 1980:152 fn. 13) or without an expressed view (van der Hulst 1985:293). As I see inventory rules, they help to specify elements that occur in reality and they should never be confused with absolute neutralization rules – which are questionable from a historical and psychological point of view and certainly may be discarded with the help of non-abstract solutions, even in cases where they are seemingly needed as many processes appear to hinge on the decision to use an abstract form. (23) is thus no absolute neutralization rule in this framework. (Absolute neutralization rules are in fact usually written in the same form as the one used for inventory rules in this work. The prohibition on absolute neutralization rules can therefore not be defended by pointing to some property of the rule formalism.)

It must further be stated that the only long low vowel in Hungarian is back and unrounded. This is accomplished by (24) in a straightforward manner.



Of course, (23) and (24) are easily seen to be related. They are united in (25), which in the end turns out to be the only gap rule for long vowels.

25 Long vowel gap



The bidirectional arrows indicate that the process is reversible – such arrows are used in logic to express the equivalence relation, which is just what the arrows do here too. The use of this tool hardly burdens phonology, due to its use in logic. In this case it has a real task, too.

When it comes to gap rules for the short vowels, one has to differentiate between the eight-vowel dialect and the seven-vowel dialect. The eight-vowel dialect is characterized by the presence of both *e* [æ] and *ë* [e] (both are now spelled *e*, but *ë* is often used to indicate [e] in texts about the Hungarian sound system). The seven-vowel dialect only has one *e*, which is often rendered as [ɛ] – i.e. its position is somewhere between the two *e* sounds in the other dialect. Phonologically, this latter *e* is in any case best treated as low – due to its reactions towards different rules. The eight-vowel dialect is said to be used by two-thirds of Hungarians (including Hungarians in other countries). The distinction does not occur in the big cities Budapest and Debrecen (where *ë* has merged with *e*; in some other areas it has merged with *ö*).

The short vowels are presented in (26), where two charts cover the different standard dialects.

26a Short vowels: The eight-vowel dialect

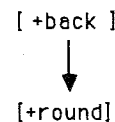
[rounded]:	Front [-back]		Back [+back]		
	-	+	-	+	
High	i	ü [y]		u	[+high]
Mid	ë [e]	ö [œ]		o [ɔ]	
Low	e [æ]			a [ɒ]	[+low]

26b Short vowels: The seven-vowel dialect

[rounded]:	Front [-back]		Back [+back]		
	-	+	-	+	
High	i	ü [y]		u	[+high]
Mid		ö [œ]		o [ɔ]	
Low	e [ɛ]			a [ɒ]	[+low]

A phenomenon which is common to both dialects is the roundness of back vowels – the rule can be stated as in (27).

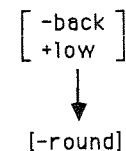
27 Backness gap



The generality of (27) is enhanced by its simple formulation. It looks like one of SPE's marking conventions, though it is not. (Of course, one of the simple marking conventions – there are different kinds.)

The remaining gap in the eight-vowel dialect displays the non-existence of a low, front and rounded vowel. The statement in (28) covers the gap.

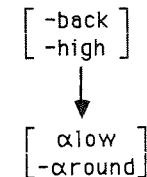
28 Frontness gap (Eight-vowel dialect)



(28) might have been written differently (with any of the features in the top matrix interchanged with the bottom feature and accompanied by an exchange of the two values), but one advantage is that, like (27), (28) now specifies a value for [round].

For the seven-vowel dialect, (29) is formulated to account for the fact that a front non-high vowel has different values for [low] and [round].

29 Frontness gap (Seven-vowel dialect)



(29) looks more complicated than (28), although there may be a gain in practice as the specification of *ö* and *e* is surely simpler in the seven-vowel dialect. Measures of simplicity are in conflict here. As the seven-vowel dialect represents a merger, it is likely to be the simpler system. The neutral vowels may in this dialect furthermore be specified as [-back,-round] (including *e*, although just slightly neutral), whereas in the eight-vowel

dialect the neutral vowel set pertinent to the vowel harmony rule may have to be specified as [-back,-round,-low] (excluding *e* [æ]; though the situation in this dialect has not been investigated experimentally).

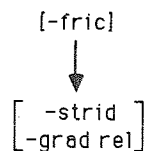
Axial restrictions

A sharp delimitation between vowel restrictions and consonant restrictions should not be drawn, for as will be seen some rules apply both to vowels and to consonants.

It follows naturally that more specific valued features are input to less specific ones (by a valued feature I mean a feature specified for a sign). The same inclusive relationship of course exists for the gap rules (but in that case alpha-variables are often at work, making the structure very neat).

One may first observe various redundancies in the obstruents. Among the more specific valued features are [+grad rel] (*gradual release*; cf. Lass 1984 for a justification of the term) and [+strid]. Both these specifications imply [+fric]. Instead of giving two implications to [+fric] it is simpler to turn the other way round and start with [-fric], as in (30).

30 Non-fricative restriction



By then – in a logically satisfying manner – changing direction on the implication, one gets the two required implications that fill in [+fric]. The following implications are thus corollaries of (30).

31 [+strid]

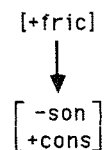


32 [+grad rel]



From the value [+fric] one infers easily, as in (33), two major class features.

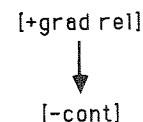
33 Fricative restriction



Note now the power of implication – a reversal of (33) leads to two implications which say that sonorants, on the one hand, and vowels and glides, on the other, carry the feature [-fric] (the determining groups are in part overlapping).

The last obstruent rule to consider is (34), which concerns the affricates.

34 Affricate restriction

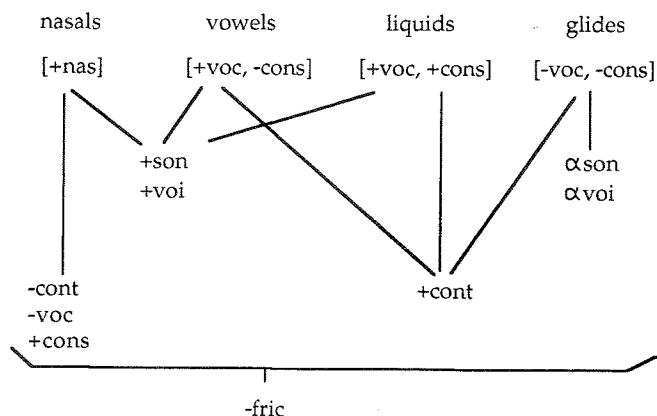


Affricates are thus not continuous (and conversely, of course, the members of the large group of continuants – including vowels, liquids, glides and fricatives – are not affricates). The self-evident nature of some axial rules should not be held against them, as the task is to fill in redundant features, irrespective of the actual explanations. When there is a rule that seems definitional, this is not a drawback per se but the rule may be seen as a true statement about the structure of the allophone system.

Let us now proceed to the axial rules for the vertical axis that mostly concern other features than those whose non-redundant value is typical for obstruents. These rules involve vowels, liquids, glides and nasals. It is shown in (35) how these classes predictably select certain features.

Voiceless glides – as all voiceless elements – are assumed to be [-son]. This position seems phonetically sound and also fits with the behaviour of [h] in a number of rules in different languages. In Hungarian, the glide allophones [h] as in *három* 'three' or *göthös* 'weak-chested' and [j] as in *döff* 'stab!' are thus voiceless and obstruents.

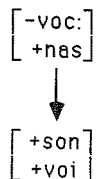
35 Feature selection in weak classes



The restrictions are naturally described by four rules where two of the specifying classes – nasals and glides – are each once the odd man out as to the values they transfer to the features to be specified. Two rules take care of [son] and [voi] and it makes intuitive sense to include [-fric] here, rather than in the other rules, since the two former rules make similar specifications. The two latter rules on the other hand disagree as to the value of the feature they both specify.

The first rule – (36) – should specify that nasals, vowels and liquids are sonorants, voiced and non-fricative.

36 Sonority & voice restriction

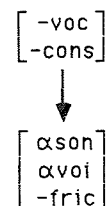


Interestingly, [-fric] does not have to be specified in (36), as it follows from linking with (33) that the specifying group (or the one that is being specified) has to be marked [-fric]. The reason is that through reversal of (33) it becomes clear that [+son] implies [-fric]. Hence, as the specifying group in (36) is specified as [+son] it is also [-fric].

The specifying group is given with the help of subset specification, which was used in Olsson 1992. With this notational technique, disjunction in phonology – indicated by curly brackets – can be abolished. The colon marks implication, a logical constant that is necessary in phonological formalism. The rule is thus to be read: a sound that is a nasal if not vocalic is a voiced sonorant.

The next rule is (37), which specifies [son], [voi] and [fric] for glides.

37 Glide restriction

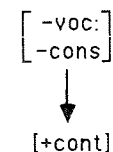


The ultimate difference between (36) and (37) is then that (37) is more general, allowing voiceless obstruents.

It is important to note that there is a linking involved, so that the valued feature [-fric] for the specified groups in (37) and (36), in the latter case thus coming about by linking, feeds (31). Members of the classes in (35) therefore are predictably [-strid, -grad rel].

The classes of sounds that are supposed to be weakest on the strength hierarchy which is proposed by e.g. Vennemann 1988 are vowels, liquids and glides – which by (38) are specified for [cont].

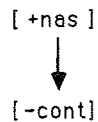
38 Weak element restriction



The obligatory continuousness may of course be regarded as a mark of weakness.

As the situation appears from (35), nasals trigger more specifications, involving the major features [cons] and [voc]. But note now that the rule that specifies nasals – (39) – must only specify them as [-cont], because the values for [voc] and [cons] follow by inversion of (38).

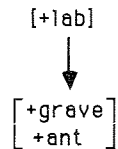
39 Nasal restriction



The remaining rules, except one for vowels, describe the redundancies on the horizontal axis – for the place features. These rules may seem even more definitional than the earlier ones, but are necessary.

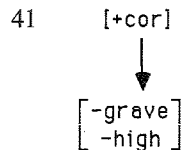
First of all, labials are [+grave] and [+ant].

40 Labial restriction



The fact that labials are also [-back] and [-cor] follows from other rules.

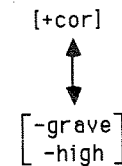
One of these rules should state that coronal consonants are [-grave]. This is (41). It follows from one of the inversions of (41) – [+grave] → [-cor] – that labials, being [+grave], are furthermore [-cor]. (41) also includes an inference about [high].



(41) fully expresses the denotation of [+cor] in terms of two other valued features in the system, as the [+cor] area is situated in and fills out the intersection of [-grave] and [-high]. Of course, the relation between [+cor] and the two other valued features is then even closer than (41) states. That is, one might just as well, and better, change (41) to include the concept of equivalence – as in (42) – instead of just implication.

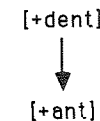
The fact that one may use equivalence here is not to say that [+cor] should be transcribed as '[-grave], [-high]'. As has become evident from the gap rules, the feature [coronal] has a real task in the present study. The equation mark in (42) just means that the inference works both ways.

42 Coronal restriction



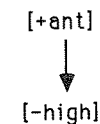
Like labials, dentals are [+ant] – (43) – but there are both [-grave] and [+grave] dentals.

43 Dental restriction



Another rule takes care of the connection between [dent] and [high] – as all [+ant] consonants are [-high] by (44), it must not be specifically stated that dentals are [-high].

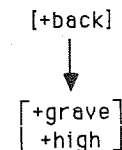
44 Anterior restriction



The other rule that is input to (44) is (40), the rule for labials.

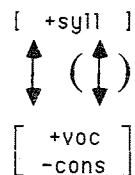
One last rule is necessary in order to bring out all correlations among the place features. This is (45), that gives the basic inferences from [+back].

45 Velar restriction



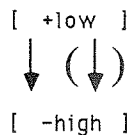
In Hungarian, only vowels are syllabic. This is clear from phonotactics and versification. The state is described by (46), which depicts it as an equivalence relation.

46 Syllabicity restriction



There is only one axial restriction for vowels, described by (47). (Interestingly, place features are given on both axes but in such a way as to become more visually revealing – the height features are placed on the vertical axis while the front-back dimension is given on the horizontal axis, where roundness is interspersed.)

47 Height restriction



Of course, (47) is reversible – a low vowel is thus not high and a high vowel is not low. It makes no sense, though, to describe a high consonant as [-low] as that feature is not used for consonants. The situation is resolved by positing some features – necessarily negatively specified – as not pertaining to all sounds with a given value for [syll]. One is then not compelled to specify [syll] in cases where a feature which can only occur for one of the values is present. To be sure, this move has not been carried out to the full in the rest of the paper, but it can be done. It is shown in (48) how this attribution of features can be performed.

48 Feature assignment

- a) [+seg] → {[syll], [cons], [voc], [son], [cont], [fric], [strid], [grad rel], [high], [back], [nas]}
- b) [+syll] → {[low], [round]}
- c) [-syll] → {[ant], [lab], [dent], [cor], [grave]}

Naturally, some of the features in (a) are still predictable for vowels, because of certain axial rules and the way they interact. Thus, as is well-known, vowels are [+son], [+voc] and [+cont], but [-cons], [-nas], [-fric],

[-strid] and [-grad rel]. The feature system is not self-evident – [grave] is e.g. not specified for vowels, whereas Chomsky & Halle 1968:307 suppose that it equates [back] for this class. A thorough revision of the feature system is not my task in this paper, however.

The features in (b) and (c) are mostly place features, but (b) also includes [round] which of course is characteristic for vowels.

Summary

Two kinds of restrictions delimit the Hungarian allophone system – gaps and axial restrictions. A gap involves features on both the horizontal and the vertical axis, whereas axial restrictions only involve one axis at a time – they are not visible in sound charts.

It is shown that two earlier assumed nasal assimilation rules can be combined without disturbing consequences if a place feature – and not just [distributed] – is posited to differentiate labials from labiodentals. The wanted feature is supposed to be [dental], which thus increases its scope.

Dentals, alveolars, palatoalveolars and palatals work as a group in some gaps. In other gaps, they also work together – except for the palatals. The latter case of grouping can be covered by the feature [coronal], as used in SPE. The former group is described as [+cor] in most recent work, but actually represents [-grave] in the Jakobsonian sense. Thus, a case can be made for having both [coronal] and [grave] as distinctive features.

Features are specified with either [+seg], [+syll] or [-syll] as input. The assignment rules are of course closely connected, so the mechanism is practically a tripartite rule. This rule suffices, together with gap rules and axial rules, to describe the different allophones and – at the same time – rule out all non-occurring combinations of features.

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Filling the Word Gap

An Experimental Typology of Infant Utterances Between Babbling and Speech

Tim Schmitz-Reinthal

Introduction

This article evolved from a project initially dealing with the articulatory features of first language acquisition. While working with that project the problem arose of how to separate utterances which are worth examining and those which are not. I then changed the emphasis of my studies and began to research the field of utterance classification in the early stages of L1-acquisition. As I discovered, there was a lot of pioneering work to do, because as soon as there are the first words available from a first language learner no-one seemed any longer to be interested in the previous stages of speech which, however, were still in use.

Background (Why words?)

"In studies of early child language the word has been tacitly accepted as a basic unit for analysis." (Vihman & McCune 1989:1)

Words, even if they are not easy to define in linguistic terms, have often been used as the basic object in language acquisition research. They have been seen in contrast to babbling. An invisible line has been drawn between 'speech' and 'prespeech' and that implies a step from speechless babbling children to those which are able to handle words. Research has concentrated on that part of utterances that is close to the words used by adults, which have been used as a standard. Jakobson 1942 and many researchers after him have described the development of a mother tongue as discrete steps and not as a continuum.

While working on the project mentioned above, dealing with the acquisition of phonemic features together with the acquisition of semantic units (words), some questions began to arise: Why words? How to define them? Are there only words and non-words?