

Hungarian Consonant Basics (data from Siptár and Törkenczy 2000)

Surface Consonant Inventory

The surface inventory of consonants is given in (1) using standard phonetic descriptors.¹

(1) Surface Phonetic Consonant Inventory (36 “segments”)

Passive	Upper lip		Upper teeth		Alveolar ridge				Palate		Velum				Larynx			
Active	Lower lip				Tongue blade		Tongue body						Dorsum					
Laryn.	plain	voi	plain	voi	plain	voi	plain	voi	plain	voi	plain	voi	plain	voi	plain	voi	plain	voi
Stop	p	b			t	d					c	ɟ	ɕ	g	k	g		
Aff.							ts	dz	tʃ	dʒ								
Fric.			f	v			s	z	ʃ	ʒ	ç	j	ɣ		x		h	ɦ
Nas.		m		ɱ		n				ɳ		ɲ				ŋ		
Lat.						l												
Rhot.						r												
App.				ʋ								j						

Not all of these surface consonants are phonologically contrastive, and it looks as if some of them are strictly the result of phonetic effects (e.g. articulator overlap).

The first thing to note about the surface inventory is that it is quite phonetically dispersed. Seven manners, five passive articulators, four active articulators and three laryngeal configurations are used to differentiate among 36 different phonetic consonants. Further, all the obstruents form plain-voiced pairs, with the exception of the velar fricative, which is never voiced on the surface in this language.

Although the inventory in (1) is beautifully symmetrical, several members are non-contrastive and occur only in very restricted environments. In addition, there is evidence from the phonological patterning of the consonants that there is not a 1:1 mapping between the traditional phonetic descriptions and the phonological feature specifications. (2) abstracts away from the phonetically based allophony and presents only the surface phonological consonants. Note that the descriptors used here are now still “phoneticky”, but they hint at a phonological analysis to be provided.

¹ Note that even this is a simplification since there are several co-articulations that are excluded from this chart.

(2) Surface Phonological Consonant Inventory (26 “segments”)

	lab				cor		dor	
		voi		voi		voi		voi
stop	p	b	t	d	c	ɟ	k	g
stop&cont.			ts	dz	tʃ	dʒ		
cont.	f	v	s	z	ʃ	ʒ		
nasal	m		n		ɲ			
stop&high			l					
cont.&high			r					
	ʋ				j		ɰ	

The chart in (3) shows the contrastive inventory of the language. Note that one of the voiced fricatives is missing. I will claim that this segment only surface as the result of phonological processes and is not contrastive.

(3) Contrastive Phonological Consonant Inventory (25 “segments”)

	lab				cor		dor	
		voi		voi		voi		voi
stop	p	b	t	d	c	ɟ	k	g
stop&cont.			ts	dz	tʃ	dʒ		
cont.	f		s	z	ʃ	ʒ		
nasal	m		n		ɲ			
stop&high			l					
cont.&high			r					
	ʋ				j		ɰ	

Fronted Velars

The fronted velar obstruents are found only in “front-vowel context” (S&T p. 85). This is clearly a co-articulation effect and not the result of phonological feature spread.

Stops

It is clear that the stop obstruents [p, b, t, d, c, ɟ, k, g] are contrastive but subject to voicing-related neutralizations. As, (4) through (6) show, they can all appear in initial pre-vocalic position, intervocalically and in post-vocalic final position. It is important to note that plain stops are not subject to intervocalic voicing.

- (4)
- | | | | |
|----|---------|------|-----------|
| a. | [pɔr] | por | ‘dust’ |
| b. | [bɔr] | bor | ‘wine’ |
| c. | [tɔr] | tor | ‘feast’ |
| d. | [dal] | dal | ‘song’ |
| e. | [cu:k] | tyúk | ‘hen’ |
| f. | [dʒa:r] | gyár | ‘factory’ |
| g. | [ke:p] | kép | ‘picture’ |
| h. | [ge:p] | gép | ‘machine’ |

(5) a. [] “
 b. [] “

(6) a. [] “
 b. [] “

As (7) through (9) show, there are restrictions on the appearance of plain and voiced stops in obstruent-obstruent sequences within morphemes (all words beginning with consonant clusters are loans).

- | | | | | |
|-----|----|---------------|--------------|-----------------|
| (7) | a. | [ptɔ:zɪʃ] | ptózis | ‘ptosis’ |
| | b. | [psɪɦɔlo:guʃ] | pszichológus | ‘psychologist’ |
| | c. | [ksɪlɔfɔn] | xilofon | ‘xylophone’ |
| | d. | [d̥ze:tɔ] | dzéta | ‘zeta’ |
| | e. | [fta:lʃɔv] | ftálsav | ‘phthalic acid’ |
| | f. | [spi:tʃ] | szpícs | ‘speech’ |
| | g. | [sta:r] | sztár | ‘star’ |
| | h. | [scɛp:] | sztyepp | ‘steepe’ |
| | i. | [ski:tɔ] | szkíta | ‘Scythian’ |
| | j. | [ʃpɔrt] | sport | ‘sport’ |
| | k. | [ʃta:b] | stáb | ‘staff’ |
| | l. | [ʃkɔrpio:] | skorpió | ‘scorpion’ |

- | | | | | |
|-----|----|---------|-------|---------------|
| (8) | a. | [kɔptɔ] | kapta | ‘(boot) last’ |
| | b. | [lɛpkɛ] | lepke | ‘butterfly’ |
| | c. | [ɔktɔ] | akta | ‘file’ |
| | d. | [ɔtkɔ] | atka | ‘mite’ |

[Add voiced combinations here!]

(9)	a.	[rɛ̃tʂɛpt]	recept	‘receipt’
	b.	[tʂɔpf]	copf	‘plait’
	c.	[bitɕeps]	bicepsz	‘biceps’
	d.	[tɔpʃ]	taps	‘applause’
	e.	[dɛtk]	Detk	place name
	f.	[bɔck]	Batyk	place name
	g.	[ɔkt]	akt	‘nude’
	h.	[sɔktʃ]	Szakcs	place name
	i.	[sɛks]	szex	‘sex’
	j.	[vɔkʃ]	voks	‘vote’-noun
	k.	[sɔft]	szaft	‘juice’
	l.	[pɔrɔst]	paraszt	‘peasant’
	m.	[ɛʃt]	est	‘evening’
	n.	[grɔtɛsk]	groteszk	‘grotesque’
	o.	[ɛdʒ]	edz	‘train’
	p.	[ʃmɔrɔgd]	smaragd	‘emerald’
	q.	[gɛrɛzd]	gerezd	‘slice’-noun
	r.	[rɛzg]	rezg	‘vibrate’
	s.	[idø:ʒb]	idősb	‘senior’
	t.	[pyŋkøʒd]	pünkösöd	‘Whitsun’

This voicing neutralization occurs productively across morpheme boundaries and is always regressive.

(10)	a.	[kɔp-s]	kapsz	‘get’-2sg. pres. indef.
	b.	[rɔk-s]	raksz	‘put’-2sg. pres. indef.
	c.	[va:c-s]	vágysz	‘desire’-2sg. pres. indef.
		[find more of these]		
	d.	[dɔb-d]	dobd	‘throw’-sg. imp. def.
	e.	[hɔdʒ-d]	hagyd	‘allow’-sg. imp. def.
	f.	[fɔg-d]	fogd	‘hold’-sg. imp. def.
	g.	[ne:z-d]	nézd	‘watch’-sg. imp. def.
	h.	[kyz-dʒ]	küzdj	‘fight’-sg. imp. indef.
	i.	[ta:dʒ-d]	tátsd	‘open wide’-sg. imp. def.
	j.	[ve:ʒ-d]	vésd	‘etch’-sg. imp. def.
	k.	[ɛʒ-dʒ]	esdj	‘beg’-sg. imp. indef.

Non-Palatal Coronal Fricatives

There are four contrastive non-palatal coronal fricatives that form two plain-voice pairs that are subject to the same laryngeal neutralizations as the stops.

- (11) a. [sa:r] szár ‘stalk’
 b. [za:r] zár ‘lock’
 c. [ʃi:r] sír ‘grave’
 d. [ʒi:r] zsír ‘fat’

[Find data for ʃ and ʒ without a front vowel]

- (12) a. [] ‘’
 c. [] ‘’

- (13) a. [] ‘’
 c. [] ‘’

As (14) through (16) show, there are restrictions on the appearance of plain and voiced fricatives in obstruent-obstruent sequences.

- (14) a. [psihɔlo:guʃ] pszichológus ‘psychologist’
 b. [ksilɔfɔn] xilofon ‘xylophone’
 c. [dʒe:tɒ] dzéta ‘zeta’
 d. [spi:tʃ] szpícs ‘speech’
 e. [sta:r] sztár ‘star’
 f. [scɛp:] sztyepp ‘steepe’
 g. [ski:tɒ] szkíta ‘Scythian’
 h. [ʃpɔrt] sport ‘sport’
 i. [ʃta:b] stáb ‘staff’
 j. [ʃkɔrpio:] skorpió ‘scorpion’
 k. [sfe:rɒ] szféra ‘sphere’
 l. [ʃʃi:] scsí russian soup

- (15) a. [] ‘’
 [Intervocalic - add voiced combinations here!]

- (16) a. [tʃɔpf] copf ‘plait’
 b. [bitɛps] bicepsz ‘biceps’
 c. [tɒpʃ] taps ‘applause’
 d. [sɛks] szex ‘sex’
 e. [vɔkf] voks ‘vote’-noun
 f. [pɒrɒst] paraszt ‘peasant’
 g. [ɛʃt] est ‘evening’
 h. [grɔtesk] groteszk ‘grotesque’

 i. [ɛdʒ] edz ‘train’
 j. [gɛrɛzd] gerezd ‘slice’-noun
 k. [rɛzg] rezg ‘vibrate’
 l. [idø:ʒb] idősb ‘senior’
 m. [pyŋkøʒd] pünkösöd ‘Whitsun’

- (17) a. [] ‘
[Add morphological voicing alternations here!]

Affricates

Although it is clear that the stops and non-palatal coronal fricatives are contrastive but subject to voicing neutralizations, the status of the plain and voiced affricates is more controversial. The plain affricates are clearly contrastive in a variety of positions and subject to the same voicing assimilation patterns as those of stops and non-palatal coronal fricatives.

- (18) a. [] ‘initial, V__V, final affricates’
b. [] ‘initial, V__V, final affricates’

- (19) a. $\left[\begin{smallmatrix} \text{ } & \text{ } \\ \text{ } & \text{ } \end{smallmatrix} \right]$ “initial, V__V, final affricate sequences”
 b. $\left[\begin{smallmatrix} \text{ } & \text{ } \\ \text{ } & \text{ } \end{smallmatrix} \right]$ “

The difficulty comes in trying to determine if the voiced affricates are contrastive or only the result of voicing assimilation and/or stop-fricative sequences. According to S&T, a short voiced lamino-alveolar affricate arises from only two sources². They can be the result of a plain affricate that has undergone voicing assimilation to an adjacent voiced obstruent, or they can result from optional intrusive stop formation.

- (20) a. [le:dz-bøɫ] lécböl ‘from lath’
 b. [pe:nz]~[pe:ndz] pénz ‘money’

Although S&T claim that this segment never occurs in initial position (p. 87), they provide at least one counter-example themselves (p. 99).

- (21) a. [d̥ze:ɒ] dzéta ‘zeta’

While one could simply dismiss this as a loanword, it does exist and must be accounted for by the phonological grammar. Note that assuming that it is really an underlying //tz// sequence that has undergone voicing assimilation is untenable because this would be the only initial cluster containing an initial //t// followed by a fricative. We are left with the conclusion that although most instances of [d͡z] are probably underlying sequences or voiceless, there is evidence that at least some are actually underlyingly a single voiced segment. Note that there is probably a range of historical reasons for why the cluster analysis was appropriate in the past, but that a new phoneme has been introduced into the language in response to lexical borrowings and phonological reinterpretation.

² They also discuss long instances, which are the result of assimilation of two adjacent consonants. I will not discuss long consonants here.

S&T put forth several claims about the contrastive status of [d͡ʒ] - including the fact that it occurs in initial position where a cluster analysis would violate the phonotactics of the language. I will adopt their analysis without delving too deeply into the arguments.

- (22) a. [d͡ʒɛki] dzseki ‘jacket’
 b. [d͡ʒɛm] dzsem ‘jam’

[Discuss and give examples for all of the laryngeal neutralization combos, and add active voicing alternations]

Nasals

First, the labio-dental, palato-alveolar and velar nasals only appear when followed by a homorganic consonant, whereas bilabial, dental and palatal nasals can appear without a conditioning environment (i.e. word-initial prevocalic, inter-vocalic and word-final-postvocalic).

- (23) a. [mɒ] ma ‘today’ [imɒ] ima ‘prayer’ [a:m] ám ‘though’
 b. [nø:] nő ‘woman’ [ynø:] ünő ‘heifer’ [e:n] én ‘I’
 c. [ɲi:l] nyíl ‘arrow’ [ɒɲɒ] anya ‘mother’ [i:ɲ] íny ‘gums’

[find better cases of the palatal - i.e. without an adjacent front vowel]

- (24) a. [hɒɲfi] honfi ‘patriot’ [hɒɲve:d] honvéd ‘soldier (Hungarian)’
 b. [kint͡ʃ] kincs ‘treasure’ [find͡ʒɒ] findzsa ‘cup’
 c. [fa:ŋk] fánk ‘doughnut’ [iŋg] ing ‘shirt’

Although the vast majority of morpheme-internal nasal-consonant sequences are homorganic, there are examples of labial and palatal nasals followed by non-labial consonants. This suggests that at least these are contrastive (not subject to phonetic or phonological place assimilation) in nasal-consonant sequences.

- (25) a. [kɒmp] komp ‘ferry’ [lɒmb] lomb ‘foliage’
 b. [pɒnt] pont ‘dot’ [rɛnd] rend ‘order’
 c. [pɒɲc] ponty ‘carp’ [rɒɲɟ] rongy ‘rag’

- (26) a. [sɒmse:d] szomszéd ‘neighbour’
 b. [ɛmʃɛ] emse ‘sow’
 c. [hɒmlɒk] homlok ‘forehead’
 d. [kɒmrɒ] kamra ‘larder’
 e. [tɒmjɛ:n] tömjén ‘incense’
 f. [tɒrɒɲ-bɒn] toronyban ‘tower’-inessive

Fricative-approximants

There is another set of fricatives in Hungarian that have very limited distributions, do not participate in laryngeal neutralizations the way other fricatives do, and seem to be related to approximant consonants (and sometimes other fricatives) in non-trivial ways. Although they

display a mix of surface similarities and dissimilarities with one another suggesting that they are phonologically unrelated if one takes the view that phonological features map closely to phonetic realizations, their phonological behavior suggests that they are a single class that is subject to differences in phonetic implementation. This matches the intuition of many Hungarian phonologists in that these segments are often discussed together, even if they are ultimately analyzed as different from one another. The Parallel Structures Model provides a means of unifying them as a phonological class, while also explaining their phonetic differences.

Palatal Fricative-approximant

The palatal fricatives [ç, ʝ] only occur as the second member of final CC clusters. The voiceless of the pair only appears when following voiceless consonants in pre-pausal and pre-voiceless phrasal contexts. The orthography, traditional analyses and productive morphological alternations suggest that these two fricatives are allophones of the palatal approximant [j].

- (27) a. [kɒp-ç] kapj ‘get’-imp.
 b. [rɒk-ç] rakj ‘put’-imp.
 c. [døf-ç] döfj ‘stab’-imp.
 d. [dɔb-ʝ] dobj ‘throw’-imp.
 e. [hi:v-ʝ] hívj ‘call’-imp.
 f. [ɲom-ʝ] nyomj ‘push’-imp.
- g. [sɔmj] szomj ‘thirst’
 h. [fe:rj] férj ‘husband’

- (28) a. [jɛjɛʃ] jegyes ‘fiancé’
 b. [pa:ja] pálya ‘course’ Note the ‘ly’
 c. [rɒk-jɒ] rakja ‘puts it’
 d. [sɒbjɒ] szablya ‘saber’ Note the ‘ly’
- e. [zaj] zaj ‘noise’
 f. [ɒjto:] ajtó ‘door’
 g. [me:jbɛ] mélybe ‘down’ Note the ‘ly’
- h. [ʃɒjt] sajt ‘cheese’
 i. [mɒjd] majd ‘later’

While the predictable nature of the realization of this segment might suggest a phonological account, I will suggest that the frication and vocal fold vibration facts are the natural result of a combination of supra-laryngeal constriction, laryngeal configuration and vocal tract aerodynamics. Thus, these allophonic alternations are strictly phonetic in nature. This claim has a profound effect on how one analyzes the “schizophrenic” behavior of this segment with respect to voicing assimilation. As is often noted in work on voicing assimilation in Hungarian (e.g. S&T, Blaho, etc.), the palatal approximant is sonorant-like in that it does not trigger voicing assimilation in clusters (e.g. (34f)), but does seem to be the target of

assimilated devoicing (e.g. (33a-c)). By claiming that the frication and devoicing of this segment are due to phonetics, not phonology, I am claiming that this segment does not have a phonological feature [+voice] and that at least some cases of “devoicing” in this language are NOT the result of spreading a [-voice] feature.

Labial Fricative and Fricative-approximant

The plain labial fricative is contrastive in Hungarian and is subject to voicing neutralization just like the other obstruents we have seen thus far.

(29) a. [fɒl] fal ‘wall’

(30) a. [tre:fɒ] tréfa ‘joke’

(31) a. [final position]

(32) a. [fta:lsɒv] ftálsav ‘phthalic acid’

b. [fl]

c. [fr]

d. [fj]

e. [sfe:rɒ] szféra ‘sphere’

f. [bukfents̃] bukfenc ‘somersault’

g. [ɒsfɒlt] aszfalt ‘asphalt’

h. [na:ʃfɒ] násfa ‘pendant’

i. [klɒpfɒl] klopfol ‘beat (steak)’

j. [dɒfke] dafke ‘obstinacy’

k. [sɒft] szaft ‘gravy’

l. [tsɒpf] copf ‘plait’

m. [se:v-bɛn] széfben ‘in (a) safe’

In contrast, the surface voiced fricative and the labial approximant have an interesting and intricate relationship that is not unlike that displayed by the palatal fricative-approximant and the velar fricative-approximant (to be discussed). However, while the palatal fricatives were completely predictable from phonetic context and the velar fricative never voiced as a result of obstruent cluster neutralization, the plain labial fricative is a trigger and target of voice neutralizations but the “voiced” labial fricative is the target of neutralization or is completely neutral depending on its syllable position. Like the palatal, it is never the trigger of neutralization.

(33) a. [va:r] vár ‘castle’

(34) a. [pa:vɒ] páva ‘peacock’

(35) a. [final position]

- (36) a. [mɛdvɛ] medve ‘bear’
 b. [nɛdv] nedv ‘humidity’
 c. [tv]
 d. [kv]
 e. [gv]
 f. [tsv]
 g. [sv]
 h. [ʃv]
 i. [vl]
 j. [si:v-d] sívd ‘suck’-sg. imp. def.
 k. [re:v-bɛ] révbe ‘to port’
 l. [hi:f-s] hívsv ‘call’-2sg. pres. indef.
 m. [o:f-tɔm] óvtam ‘warn’-1sg. past.
 n. [kvɔrts] kvarc ‘quartz’
 o. [rakvɔ] rakva ‘putting’

Velar Fricative-approximant

Finally, the laryngeal fricatives are also greatly restricted in their distribution and seem to correspond both orthographically and distributionally with the voiceless velar fricative. The voiceless velar fricative is realized only in coda position. In initial onsets, it is a voiceless glottal fricative. In post-consonantal onsets, it is also a voiceless glottal fricative, but can delete in fast, casual speech. In intervocalic position, it is a voiced glottal fricative, which is subject to deletion in casual speech.

- (37) a. [hɛjɛʃ] hegyes ‘pointed’
 b. [le:ɦɔ]~[le:ɔ] léha ‘frivolous’
 c. [rɔk-ɦɔt]~[rɔkɔt] rakhat ‘may put’
 d. [sɔp-ɦɔt]~[sɔpɔt] szabhat ‘may cut’
 e. [ʃɔx] sah ‘Shah’
 f. [jɔxt] jacht ‘yacht’
 g. [pɛx-tø:l] pechtől ‘from bad luck’
 h. [me:x-bɛ] méhbe ‘into (the) womb’

Note the ‘ch’

Note the ‘ch’

[Look for mono-morphemic examples]

It is interesting to note that the alternations among the velar and glottal fricatives is easily accounted for as the result of natural phonetic processes and need not be analyzed as the result of phonological changes.

The following chart is a summary of the distribution of the fricative-approximants and the labio-dental fricative(s). It provides one interpretation of the contrastive inventory derived from the distributional facts. The fricative-approximants are interpreted here as not being phonological fricatives (including the velar). Note that the labio-dental fricative and the labio-dental approximant are phonetically distinct in most positions but show phonetic overlap only in codas either preceded or followed by obstruents (indicated by dark borders).

(38)

	//f//		//v//			//j//			//ɥ//		
	/f/	/ɸ/	/v/			/j/			/ɥ/		
	[[f]]	[[ɸ]]	[[v]]	[[ɸ]]	[[ɸ.]]	[[j]]	[[j.]]	[[j.]]	[[ɥ]]	[[ɥ.]]	[[ɥ.]]
	[f]	[v]	[v]	[v]	[f]	[j]	[j]	[ç]	[h]	[h]	[x]
#_V	✓		✓			✓				✓	
#_TV	✓										
#_DV											
#_SV											
#_ZV											
#_NV											
#_RV	✓		✓			?					✓
#_JV	✓		?			?					?
#T_V	?		✓			?					
#D_V	Tf?		✓			?					
#S_V	✓		✓			✓				(?)	
#Z_V	Sf?										
#N_V											
#R_V											
#J_V											
V_V	✓		✓			✓			(✓)		
VT_V	✓		✓			✓				(✓)	
VD_V	Tf?		✓			✓				(✓)	
VS_V	✓		✓			✓				(✓)	
VZ_V	Sf?		✓			?				(?)	
VN_V	✓		✓			✓				✓	
VR_V	✓		✓			✓				✓	
VJ_V	✓		✓			✓				✓	
V_TV	✓				✓	✓					✓
V_DV		✓		✓		✓					✓
V_SV	✓				?	✓					?
V_ZV		?		?		✓					?
V_NV	✓			?		✓					✓
V_RV	✓			✓		✓					✓
V_JV	✓			✓		✓					?
V_#	✓			✓		✓					✓
VT_#	✓				?			✓			?
VD_#	Tf?			✓			✓				?
VS_#	?				?			✓			?
VZ_#	Sf?			?			✓				?
VN_#	✓			✓		✓					✓
VR_#	✓			✓		✓					✓
VJ_#	✓			✓		?	?				?
V_T#	✓				✓	✓					✓
V_D#		✓		✓		✓					✓
V_S#	✓										
V_Z#		?									
V_N#				?		✓					?
V_R#				✓		✓					?
V_J#	✓			?		?					?

Legend: //UR// - phonological underlying representation. /SR/ - phonological surface representation. [[PF]] - my interpretation of the phonetic form. [PF] - traditional interpretation of the phonetic form. Shading=not attested. ✓ = attested. ?=predicted realization if found. Dark border=fricative/“approximant” overlap confusion. Merged boxes=phonetic variation.

- //f// is a phonologically contrastive segment that normally surfaces as a phonological labial fricative /f/, which is always phonetically realized as a voiceless fricative, [f]. There is a phonologically voiced allophone, /f̥/, that only occurs in response to voicing assimilation and is phonetically realized as a voiced fricative, [v].
- //v// is a phonologically contrastive segment that always surfaces as a phonological labial approximant /v/, which is phonetically realized in a number of ways depending on the phonetic context. In most onset positions, it freely varies between having slight to no frication noise, [v]~[v̥]. As the second member of a CC sequence, it never has frication, [v̥]. In coda position, it always has frication noise, and varies in the amount of spontaneous voicing depending on context, [v]~[f]. It undergoes phonetic devoicing to [f] iff followed by a plain obstruent regardless of the syllable affiliation of that obstruent.
- //j// is a phonologically contrastive segment that always surfaces as a phonological coronal approximant /j/, which is phonetically realized in a number of ways depending on the phonetic context. It is phonetically realized with spontaneous voicing and without frication noise, [j], in all contexts except when the second member of a word-final OC sequence. In such sequences, it is phonetically realized with frication noise and varies in the amount of spontaneous voicing depending on the context, [j]~[ç]. It undergoes phonetic devoicing to [ç] iff preceded by a voiceless obstruent and followed by a pause or voiceless obstruent.
- //ɥ// is a phonologically contrastive segment that always surfaces as a phonological dorsal approximant /ɥ/, which is phonetically realized in a number of ways depending on the phonetic context. It is usually phonetically realized with frication noise. In intervocalic position, it always has spontaneous voicing but can vary in the amount of frication depending on speech rate, [ɦ]~[0]. When realized without frication, it is heard as “deleted” since it becomes indistinguishable from the surrounding vowels. In all other positions it is not spontaneously voiced and can vary in the amount of frication by context. In non-postvocalic onset positions, it does not have significant velar frication and can vary in the amount of glottal frication by speech rate, [h]~[0]. When the first member of an onset CC sequence or in coda position, it has significant velar frication, [x].

The lack of frication noise and the spontaneous voicing of /j/ are the direct result of the aerodynamics of the vocal tract. This segment has a fairly wide constriction, fairly forward in the oral cavity, which does not induce air turbulence (frication) and allows for spontaneous vocal fold vibration when they are in neutral position. The presence of frication and loss of spontaneous voicing in final OC contexts are the direct result of vocal tract constriction conditioned by the preceding obstruent which not only causes sub-constriction pressure build up sufficient to cause air turbulence, but only to suppress spontaneous vocal fold vibration.

The lack of spontaneous voicing of /ɥ/ in most contexts is also the direct result of vocal tract aerodynamics. The presence of a velar constriction in close proximity to the glottis causes an equalization of the pressure differential across the glottis sufficient to suppress the Bernoulli effect. The “glottal fricative” quality of this segment is the result of air being forced through a non-vibrating neutrally configured glottis - as the air moves between the vocal folds, it breaks and produces turbulence. The additional velar frication that occurs in coda and the first member of an initial CC sequence is due to increased constriction of the vocal tract in these

contexts. Note that the velar stop may surface as voiced despite having a highly constricted vocal tract because this segment is phonologically specified with a voice feature that is interpreted by the phonetics-phonology interface as a set of vocal tract adjustments necessary to allow sufficient trans-glottal pressure differential during the stop closure to allow vocal fold vibration.

The general confusion surrounding /f/, /v/ and /ʋ/ is the direct result of two factors: 1) limitations in distinguishing these two segments articulatorily, combined with 2) subsequent acoustic similarity. The presence of frication noise in many realizations of /ʋ/ results from the fact that labio-dentals make use of the lower lip and upper teeth. The smooth, soft flesh of the lip combined with the hard sharp edge of the teeth makes fine-grained adjustments in the presence and intensity of frication noise difficult. The consequence is that labio-dental “approximants” are often realized with frication noise (from airflow breaking on the teeth) that varies by context. This leads to some ambiguity in the relationship between this noisy non-fricative and the actual obstruent. What makes matters worse for Hungarian is that it has both phonological voicing assimilation among obstruents and phonetic devoicing among some non-obstruents. The voiced labio-dental phonological fricative loses much of its frication noise under the effect of glottal pulsing, making it acoustically indistinguishable from the phonetically voiced non-fricative; and the spontaneously voiced non-fricative loses that voicing in particular contexts where the phonologically unvoiced fricative occurs, thus making them acoustically indistinguishable. Note that although I assume three phonological segments on the surface, these map to only two contrastive segments, i.e. the voiced fricative is not contrastive, but the result of assimilation.

Phonological Processes

Palatalization

Hungarian has three distinct types of palatalization, which fall into two categories: phonetic and phonological. Phonetic palatalization involves the co-articulation effects that front vowels and /j/ have on preceding non-palatal consonants. These may be analyzed as the result of phonetic co-articulation and not phonological feature sharing for two reasons. First, the amount of palatalization varies by context and speech rate. It is by no means categorical in this language. Second, palatalization mirrors other co-articulation effects, such as labialization of a non-labial consonant preceding round vowels, not all of which are phonologically round (as we saw in the discussion of the vowel system). I will come back to phonetic palatalization briefly below.

More interesting is phonological palatalization. This falls into two categories: lexical and post-lexical. In lexical palatalization, the dental consonants [t, d, n, l] and the palatal consonants [ç, ʝ, ɲ] become a long palatal when followed by an underlying //j/. This occurs both morpheme-internally and across a morpheme boundary. The latter is visible in productive alternations, while the former can be inferred by the lack of morphemes containing a dental consonant followed by a palatal approximant.

- (39)
- | | | | | | | |
|----|-------------|-----|----------|----------|--------|------------------------------|
| a. | //la:t-ja// | --> | /la:cca/ | [la:c:ɒ] | látja | ‘see’-3sg. ind. def. |
| b. | //ad-ja// | --> | /aɟja/ | [ɒɟ:ɒ] | adja | ‘give’-3sg. ind./imp. def. |
| c. | //ken-je// | --> | /keɲje/ | [keɲ:ɛ] | kenje | ‘smear’-3sg. imp. def. |
| d. | //fal-ja// | --> | /fajja/ | [fɒɟ:ɒ] | falja | ‘devour’-3sg. ind./imp. def. |
| e. | //ba:c-ja// | --> | /ba:cca/ | [ba:c:ɒ] | bátyja | ‘his brother’ |
| f. | //ɥaɟ-ja// | --> | /ɥaɟja/ | [hɒɟ:ɒ] | hagyja | ‘leave’-3sg. ind./imp. def. |
| g. | //ɥa:ɲ-ja// | --> | /ɥa:ɲja/ | [ha:ɲ:ɒ] | hányja | ‘throw’-3sg. ind./imp. def. |

There are four important observations to make here. First, this type of palatalization involves the addition of at least one feature that [c, ɟ, ɲ, j] have but [t, d, n, l] lack. Second, it involves non-merging total assimilation of the following approximant to a preceding non-labial dental with a phonetic closure. Third, the lateral does not become a palatal lateral, but loses its laterality under palatalization. This will be discussed below where I will claim that this is due to Structure Preservation. Fourth, lexical palatalization does not involve vowels in any way. That is, vowels are not the triggers or targets of palatalization and palatal consonants do not interfere with the front-back harmony system. I will return to this below.³

In contrast to lexical palatalization, post-lexical palatalization has a larger inventory of triggers, results in palatalization without full assimilation of the approximant (almost) and occurs both word-internally (except from /j/, which triggers lexical palatalization) and across a word boundary⁴. The triggers in this case are the full complement of palatal consonants, [c, ɟ, ɲ, j].

- (40)
- | | | | | | | |
|----|-----------------|-----|-------------|-------------|------------|----------------------|
| a. | //mit#jelenta// | --> | /micjelent/ | [micjelɛnt] | mit jelent | ‘what does it mean’ |
| b. | //ve:d#jeɟ// | --> | /ve:ɟjeɟ/ | [ve:ɟjeɟ] | védjegy | ‘trade mark’ |
| c. | //van#joga// | --> | /vaɲjoga/ | [vɒɲjɔɟɒ] | van joga | ‘he’s got the right’ |
| d. | //ke:t#ɲom// | --> | /ke:cɲom/ | [ke:cɲɔm] | két nyom | ‘two traces’ |
| e. | //vad#ɲu:l// | --> | /vaɟɲu:l/ | [vɒɟɲu:l] | vadnyúl | ‘wild hare’ |
| f. | //van#ɟufa:m// | --> | /vaɲɟufa:m/ | [vɒɲɟufa:m] | van gyufám | ‘I’ve got matches’ |
| g. | //ɥat#cu:k// | --> | /ɥaccu:k/ | [hɒc:u:k] | hat tyúk | ‘six hens’ |

[Find all combinations]

Finally, the post-lexical palatalization of the lateral is slightly different. Across a word boundary, there are two patterns depending on the nature of the trigger. When the trigger is a non-approximant, the lateral can remain unchanged in guarded speech or delete in casual speech.

careful

casual

³ This is an important fact because it is tempting to assign the palatal consonants a V-place[cor] feature based on their phonetic characteristics, the fact that they spread their palatal quality, and using V-place[cor] is useful in analyzing palatals and palatalization in some languages (e.g. Serbian and Russian - Morén 2005, Morén and Nessel 2006). However, we will see that applying the Slavic strategy to Hungarian is untenable. This suggests language-particular feature specification and phonetics-phonology mapping.

⁴ Post-lexical palatalization cannot occur across a morpheme boundary because suffixes do not begin with the appropriate triggers. **[Double-check this claim! e.g. -nyi table 4]**

- (41) a. //fe:l#cu:k// --> /fe:lcu:k/ ~ /fe:cu:k/ fél tyúk ‘half a hen’
 b. //øjø:l#ɲi// --> /øjø:lɲi/ ~ /øjø:ɲi/ ökölnyi ‘fist-sized’
 c. //kopol#cu:// --> /kopolcu:/ ~ /kopo:cu:/ kopoltyú ‘gill’

[Note that the deleted lateral leaves behind an empty slot that assimilates to the preceding vowel.]

In contrast, when the trigger is an approximant, the lateral can remain unchanged or undergo non-merging full assimilation with the approximant.

- (42) a. //føl#jut// --> careful /føljut/ ~ casual /føjjut/ följut ‘reach the top’

I will address the asymmetry in behavior between laterals and non-laterals at some later date.

Coronal Obstruent Place Assimilation

Another process effecting consonants is usually called strident place assimilation. This is actually quite complicated, with various changes in both place and manner depending on the phonological and social context, as well as speech rate. Only non-palatal coronal fricatives and affricates are claimed to be effected, but this claim seems slightly misleading, as there are two distinct processes under this label: coronal obstruent place assimilation and “strident” assimilation. Let us begin with adjacent coronal segments that have the same manner. Note that I am only presenting data for causal speech since careful/guarded speech does not show any assimilation other than voicing.

(43)

Stops	//tt//	[tt]	//td//	[dd]	//tc//	[cc]	//tʃ//	[ʃʃ]
	//dt//	[tt]	//dd//	[dd]	//dc//	[cc]	//dʃ//	[ʃʃ]
	//ct//	[tt]	//cd//	[dd]	//cc//	[cc]	//cʃ//	[ʃʃ]
	//jt//	[tt]	//jd//	[dd]	//jc//	[cc]	//jʃ//	[ʃʃ]
Fricatives	//ss//	[ss]	//sz//	[zz]	//sʃ//	[ʃʃ]	//sʒ//	[ʒʒ]
	//zs//	[ss]	//zz//	[zz]	//zʃ//	[ʃʃ]	//zʒ//	[ʒʒ]
	//ʃs//	[ss]	//ʒz//	[zz]	//ʃʃ//	[ʃʃ]	//ʃʒ//	[ʒʒ]
	//ʒs//	[ss]	//ʒz//	[zz]	//ʒʃ//	[ʃʃ]	//ʒʒ//	[ʒʒ]
Affricates	//tsts//	[tts]	//tsdz//	[ddz]	//tscʃ//	[ccʃ]	//tsʃʒ//	[ʃʃʒ]
	//dzts//	[tts]	//dzdz//	[ddz]	//dzcʃ//	[ccʃ]	//dzʃʒ//	[ʃʃʒ]
	//cʃts//	[tts]	//cʃdz//	[ddz]	//cʃcʃ//	[ccʃ]	//cʃʃʒ//	[ʃʃʒ]
	//ʃʒts//	[tts]	//ʃʒdz//	[ddz]	//ʃʒcʃ//	[ccʃ]	//ʃʒʃʒ//	[ʃʃʒ]

What we find is that there is regressive voicing assimilation in all cases, as well as regressive place assimilation. The behavior of the affricates is interesting because the fricative gesture of the first member is lost.

Combinations of fricatives followed by stops are not particularly interesting. They undergo voicing assimilation but escape place assimilation. Note that I could not find sequences of

fricative-palatal voiceless stop, I did find fricative-palatal voiced stop combinations. I hypothesize the voiceless stop realization based on the voiced stop pattern.

(44)

Fric.-Stop	//st//	[st]	//sd//	[zd]	//sc//	[sc]?	//sj//	[zʃ]
	//zt//	[st]	//zd//	[zd]	//zc//	[sc]?	//zʃ//	[zʃ]
	//ʃt//	[ʃt]	//ʃd//	[ʒd]	//ʃc//	[ʃc]?	//ʃʃ//	[ʒʃ]
	//ʒt//	[ʃt]	//ʒd//	[ʒd]	//ʒc//	[ʃc]?	//ʒʃ//	[ʒʃ]

Affricate-stop and stop-affricate combinations also show voicing assimilation, as well as place assimilation. What is most interesting about the affricate-stop combinations is that they exhibit what might at first be considered metathesis in that the fricative gesture appears last in the sequence rather than medially. Note that from a rule-based approach, voicing assimilation would have to be ordered before metathesis in order to get the voicing correct in pairs that are underlyingly disharmonic with respect to voice. We will return to this later.

(45)

Affric.-Stop	//tst//	[tts]	//tsd//	[ddz]	//tsc//	[ccʃ]	//tsʃ//	[ʃʒ]
	//dzt//	[tts]	//dzd//	[ddz]	//dzc//	[ccʃ]	//dzʃ//	[ʃʒ]
	//cʃt//	[tts]	//cʃd//	[ddz]	//cʃc//	[ccʃ]	//cʃʃ//	[ʃʒ]
	//jʒt//	[tts]	//jʒd//	[ddz]	//jʒc//	[ccʃ]	//jʒʃ//	[ʃʒ]

(46)

Stop-Affric.	//tts//	[tts]	//tdz//	[ddz]	//tcʃ//	[ccʃ]	//tʃʒ//	[ʃʒ]
	//dts//	[tts]	//ddz//	[ddz]	//dcʃ//	[ccʃ]	//dʃʒ//	[ʃʒ]
	//cts//	[]?	//cdz//	[]?	//ccʃ//	[]?	//cʃʒ//	[]?
	//jts//	[]?	//jdz//	[]?	//jcʃ//	[]?	//jʃʒ//	[]?

Stop-fricative combinations look just like affricate-stop combinations on the surface. This means that they form a stop-affricate sequence. This is something of a mystery since one might expect them to surface identical to singleton affricates. We will come back to this. They also show voicing assimilation and place assimilation.

(47)

Stop-Fric	//ts//	[tts]	//tz//	[ddz]	//tʃ//	[ccʃ]	//tʒ//	[ʃʒ]?
	//ds//	[tts]	//dz//	[ddz]	//dʃ//	[ccʃ]	//dʒ//	[ʃʒ]?
	//cs//	[tts]?	//cz//	[ddz]?	//cʃ//	[ccʃ]?	//cʒ//	[ʃʒ]?
	//js//	[tts]	//jz//	[ddz]	//jʃ//	[ccʃ]	//jʒ//	[ʃʒ]?

Affricate-fricative combinations display regular voicing and place assimilations, but they also undergo fortition in which the first fricative gesture becomes a stop. The surface result is identical to affricate-stop and stop-fricative combinations.

(48)

Affric.-Fric.	//ts̩s̩//	[t̩s̩]	//ts̩z̩//	[d̩d̩z̩]	//ts̩ʃ̩//	[c̩c̩ʃ̩]	//ts̩ʒ̩//	[ʃ̩ʃ̩ʒ̩]
	//d̩z̩s̩//	[t̩s̩]	//d̩z̩z̩//	[d̩d̩z̩]	//d̩z̩ʃ̩//	[c̩c̩ʃ̩]	//d̩z̩ʒ̩//	[ʃ̩ʃ̩ʒ̩]
	//c̩ʃ̩s̩//	[t̩s̩]	//c̩ʃ̩z̩//	[d̩d̩z̩]	//c̩ʃ̩ʃ̩//	[c̩c̩ʃ̩]	//c̩ʃ̩ʒ̩//	[ʃ̩ʃ̩ʒ̩]
	//ʃ̩ʒ̩s̩//	[t̩s̩]	//ʃ̩ʒ̩z̩//	[d̩d̩z̩]	//ʃ̩ʒ̩ʃ̩//	[c̩c̩ʃ̩]	//ʃ̩ʒ̩ʒ̩//	[ʃ̩ʃ̩ʒ̩]

Finally, fricative-affricate combinations are fairly uninteresting in that they show the same assimilation patterns already shown. The one thing that is unexpected here is the place assimilation when the second member is dental. It seems to undergo progressive place assimilation. This is completely unexpected because all other instances of place assimilation found in this language (that I know of) are regressive in nature.

(49)

Fric.-Affric.	//sts̩//	[s̩t̩s̩]	//sd̩z̩//	[z̩d̩z̩]	//sc̩ʃ̩//	[ʃ̩c̩ʃ̩]	//sj̩ʒ̩//	[ʒ̩ʃ̩ʒ̩]
	//zts̩//	[s̩t̩s̩]	//zd̩z̩//	[z̩d̩z̩]	//zc̩ʃ̩//	[ʃ̩c̩ʃ̩]	//zj̩ʒ̩//	[ʒ̩ʃ̩ʒ̩]
	//ʃ̩ts̩//	[ʃ̩c̩ʃ̩]**	//ʃ̩d̩z̩//	[ʒ̩ʃ̩ʒ̩]?	//ʃ̩c̩ʃ̩//	[ʃ̩c̩ʃ̩]	//ʃ̩j̩ʒ̩//	[ʒ̩ʃ̩ʒ̩]
	//ʒ̩ts̩//	[ʃ̩c̩ʃ̩]**	//ʒ̩d̩z̩//	[ʒ̩ʃ̩ʒ̩]?	//ʒ̩c̩ʃ̩//	[ʃ̩c̩ʃ̩]	//ʒ̩j̩ʒ̩//	[ʒ̩ʃ̩ʒ̩]

Other Consonant Processes

Although Hungarian has a variety of other processes affecting consonants (e.g. vowel nasalization, nasal deletion, liquid deletion, etc.), these are all quite marginal from a phonological perspective since they are optional and/or only relevant at quite fast speech rates. In addition, they seem not to be categorical in nature (i.e. they apply more or less depending on rate). Therefore, I will not discuss them here and assume that they are phonetic in nature.

Consonant Summary

[Blah, blah, blah]

(50) Consonant PSM Feature Specifications

					C-place			C-manner		??	??	V-manner	
					lab	cor	dor	closed	open	voice	nasal	closed	open
mannerless	place	//v//	/v/	[v, v, f]	✓								
		//j//	/j/	[j, j, ç]		✓							
		//w//	/w/	[h, h, x, x̥]			✓						
stop	placeless	//t//	/t/	[t]				✓					
		//d//	/d/	[d]				✓		✓			
	place	//p//	/p/	[p]	✓			✓					
		//b//	/b/	[b]	✓			✓		✓			
		//c//	/c/	[c]		✓		✓					
		//tʃ//	/tʃ/	[tʃ]		✓		✓		✓			
		//k//	/k/	[k, k̥]			✓	✓					
		//g//	/g/	[g, g̥]			✓	✓		✓			
fricative	placeless	//s//	/s/	[s]					✓				
		//z//	/z/	[z]					✓	✓			
	place	//f//	/f/	[f]	✓				✓				
			/f̥/	[v]	✓				✓	✓			
		//ʃ//	/ʃ/	[ʃ]		✓			✓				
		//ʒ//	/ʒ/	[ʒ]		✓			✓	✓			
stop & fricative	placeless	//ts//	/ts/	[ts]				✓	✓				
		//dz//	/dz/	[dz]				✓	✓	✓			
	place	//cʃ//	/cʃ/	[cʃ]		✓		✓	✓				
		//tʃʒ//	/tʃʒ/	[tʃʒ]		✓		✓	✓	✓			
nasal	placeless	//n//	/n/	[n, ɲ]							✓		
	place	//m//	/m/	[m, ɱ]	✓						✓		
		//ɲ//	/ɲ/	[ɲ]		✓					✓		
			/ɲ̥/	[ɲ̥]			✓				✓		
closed son.	placeless	//l//	/l/	[l]				✓				✓	
open son.	placeless	//r//	/r/	[r]					✓			✓	

Where is the segment composed of only C-laryngeal[voice]? It does not seem to exist as a separate segment on the surface, which is a violation of one of the economy principles of the PSM. There are a number of things that could be happening here. 1) There may be a condition in the language, that such a segment is disallowed (*[voice] >> MAX[voice]) but it the feature may be conjoined into a more complex segment. 2) The segment may exist, but surfaces homophonous to another segment (i.e. is a covert segment, like the covert vowels). 3) The feature may exist as a floating feature, not attached to a separate root node. In which case, we might expect to see some evidence of it in the morpho-phonology (recall the iotizing segment from Serbian). 4) It may be feature licensed by suprasegmental structure (like the other laryngeal features - tones) and does need an individual simplex segment. I leave these issues unresolved for the moment. 5) There may be a condition in the language that this feature cannot surface as an individual segment because it is featurally too weak (similar the

analysis of the iotizing segment /[̇]/ in Serbian). I leave this an open question for the moment.

[Representational explanation of the voicing, palatalization and coronal assimilation facts here.]

Consonant and Vowel Feature Comparison

If we combine the consonant chart with that of the S&T-like analysis, we see that the consonants and vowels are nearly EXACTLY parallel. The differences are 1) consonants use voice to distinguish members of pairs, while vowels use length. [I wonder if there might be some way to unify these - let's say by claiming that vowels have a phonological voicing contrast?] 2) The consonants include sonorants, which have both consonant and vowel manner features. 3) The "open" manner segment inventories are complementary. Consonants use labial and coronal place, but not dorsal, while vowels use dorsal place, but not labial and coronal. This is an interesting case of phonetic dispersion and perhaps phonetically/functionally motivated inventory asymmetries.

(51) Consonant and Vowel Feature Specifications using S&T-like Analysis

				C-place			V-place			C-manner		V-manner		voice	length	nasal
				lab	cor	dor	lab	cor	dor	closed	open	closed	open	???	???	
mannerless	placeless	//ə//	/ə/	[ɛ]												
	place	//v//	/v/	[v, v, f]			✓									
		//j//	/j/	[j, j, ɟ]				✓								
		//ʍ//	/ʍ/	[ɦ, h, x, ɣ]					✓							
		//ø//	/ø/	[œ]					✓							
		//ø:/	/ø:/	[ø:]					✓						✓	
		//e//	/e/	[ɛ]					✓							
		//e:/	/e:/	[e:]					✓						✓	
		//o//	/o/	[ɔ]					✓							
		//o:/	/o:/	[o:]					✓						✓	
“closed”	placeless	//t//	/t/	[t]						✓						
		//d//	/d/	[d]						✓				✓		
		//ɪ//	/ɪ/	[i]								✓				
		//ɪ:/	/ɪ:/	[i:]								✓			✓	
	place	//p//	/p/	[p]			✓			✓						
		//b//	/b/	[b]			✓			✓				✓		
		//c//	/c/	[c]				✓		✓						
		//ɟ//	/ɟ/	[ɟ]				✓		✓				✓		
		//k//	/k/	[k, k̟]					✓	✓						
		//g//	/g/	[g, g̟]					✓	✓				✓		
		//y//	/y/	[y]					✓			✓				
		//y:/	/y:/	[y:]					✓			✓			✓	
		//i//	/i/	[i]					✓			✓			✓	
		//i:/	/i:/	[i:]					✓			✓			✓	
		//u//	/u/	[u]					✓			✓			✓	
		//u:/	/u:/	[u:]					✓			✓			✓	
“open”	placeless	//s//	/s/	[s]							✓					
		//z//	/z/	[z]							✓			✓		
		//æ//	/æ/	[ɛ]									✓			
		//æ:/	/æ:/	[e:]									✓		✓	
	place	//f//	/f/	[f]			✓				✓					
			/ɸ/	[v]			✓				✓			✓		
		//ʃ//	/ʃ/	[ʃ]				✓			✓					
		//ʒ//	/ʒ/	[ʒ]				✓			✓			✓		
C-closed & C-open	placeless	//ts//	/ts/	[ts̚]						✓	✓					
		//dz//	/dz/	[dz̚]						✓	✓			✓		
	place	//c̟//	/c̟/	[c̟]				✓		✓	✓					
		//j̟//	/j̟/	[j̟]				✓		✓	✓			✓		
nasal	placeless	//n//	/n/	[n, ɲ, ŋ]												✓
	place	//m//	/m/	[m, ɱ]			✓									✓
		//ɲ//	/ɲ/	[ɲ]				✓								✓
C-closed & V-closed	placeless	//l//	/l/	[l]						✓		✓				
C-open & V-closed	placeless	//r//	/r/	[r]							✓	✓				

(52) Consonant and Vowel Feature Specifications

					C-place			V-place		C-manner		V-manner		voice	length	nasal
					lab	cor	dor	lab	cor	closed	open	closed	open	???	???	
mannerless	placeless	//ə//	/ə/	[ɔ]												
	place	//v//	/v/	[v, v, f]	✓											
		//j//	/j/	[j, j, ɟ]		✓										
		//ɰ//	/ɰ/	[ɸ, h, x, ɣ]			✓									
		//o//	/o/	[ɔ]				✓								
		//o:/	/o:/	[o:]				✓							✓	
		//e//	/e/	[ɛ]					✓							
		//e:/	/e:/	[e:]					✓						✓	
		//ø//	/ø/	[œ]				✓	✓							
		//ø:/	/ø:/	[ø:]				✓	✓						✓	
“closed”	placeless	//t//	/t/	[t]						✓						
		//d//	/d/	[d]						✓				✓		
		//ɪ//	/ɪ/	[i]								✓				
		//ɪ:/	/ɪ:/	[i:]								✓			✓	
	place	//p//	/p/	[p]	✓					✓						
		//b//	/b/	[b]	✓					✓				✓		
		//c//	/c/	[c]		✓				✓						
		//ɟ//	/ɟ/	[ɟ]		✓				✓				✓		
		//k//	/k/	[k, ɰ]			✓			✓						
		//g//	/g/	[g, ɣ]			✓			✓				✓		
		//u//	/u/	[u]				✓				✓				
		//u:/	/u:/	[u:]				✓				✓			✓	
		//i//	/i/	[i]					✓			✓				
		//i:/	/i:/	[i:]					✓			✓			✓	
		//y//	/y/	[y]				✓	✓			✓				
		//y:/	/y:/	[y:]				✓	✓			✓			✓	
“open”	placeless	//s//	/s/	[s]							✓					
		//z//	/z/	[z]							✓			✓		
		//a//	/a/	[ɒ]									✓			
		//a:/	/a:/	[a:]									✓		✓	
	place	//f//	/f/	[f]	✓						✓					
			/ɸ/	[v]	✓						✓			✓		
		//ʃ//	/ʃ/	[ʃ]		✓					✓					
		//ʒ//	/ʒ/	[ʒ]		✓					✓			✓		
		//æ//?	/æ/	[ɛ]					✓				✓			
		//æ:/?	/æ:/	[ɛ:]					✓				✓		✓	
C-closed & C-open	placeless	//ts//	/ts/	[ts]						✓	✓					
		//dz//	/dz/	[dz]						✓	✓			✓		
		//E//	/E/	[ɛ]								✓	✓			
		//E:/	/E:/	[ɛ:]								✓	✓		✓	
	place	//cʃ//	/cʃ/	[cʃ]		✓				✓	✓					
		//jʒ//	/jʒ/	[jʒ]		✓				✓	✓				✓	
nasal	placeless	//n//	/n/	[n, ɲ, ŋ]												✓
	place	//m//	/m/	[m, ɱ]	✓											✓
		//ɲ//	/ɲ/	[ɲ]		✓										✓
C-closed V-closed	placeless	//l//	/l/	[l]						✓		✓				
C-open V-closed	placeless	//r//	/r/	[r]							✓	✓				

Let us assume a general economy principle that merges adjacent identical autosegmental structures but leaves root nodes unmerged. In addition, let us hypothesize that affricates in this language have two C-manner features associated with the same manner node and that the order of the stop and fricative gestures in Hungarian is determined by phonetics, not phonology. This is the traditional analysis not that proposed for affricates in Morén (2003). In looking only at /t, s, $\widehat{ts}$, n, j, c, $\widehat{f}$, $\widehat{c\widehat{f}}$, $\widehat{ɲ}$ /, we get the output structures below. Note that place features are autosegmentally depicted below the root node and manner structures above the root node. This is consistent with autosegmental theory and will allow us to show the non-interaction of place and manner.

Input combinations:

	t	s	$\widehat{ts}$	n	j	c	$\widehat{f}$	$\widehat{c\widehat{f}}$	$\widehat{ɲ}$
t	✓	✓	✓	✓	✓	✓	✓	✓	✓
s	✓	✓	✓	✓	✓	✓	✓	✓	✓
$\widehat{ts}$	✓	✓	✓	✓	✓	✓	✓	✓	✓
n	✓	✓	✓	✓	✓	✓	✓	✓	✓
j	✓	✓	✓	✓	✓	✓	✓	✓	✓
c	✓	✓	✓	✓	✓	✓	✓	✓	✓
$\widehat{f}$	✓	✓	✓	✓	✓	✓	✓	✓	✓
$\widehat{c\widehat{f}}$	✓	✓	✓	✓	✓	✓	✓	✓	✓
$\widehat{ɲ}$	✓	✓	✓	✓	✓	✓	✓	✓	✓

Phonetic output combinations:

	t	s	$\widehat{ts}$	n	j	c	$\widehat{f}$	$\widehat{c\widehat{f}}$	$\widehat{ɲ}$
t	tt	tts	tts	tn	cc	cc	cc $\widehat{f}$	cc $\widehat{c\widehat{f}}$	c $\widehat{ɲ}$
s	st	ss	sts	sn	sj	sc	ff	f $\widehat{c\widehat{f}}$	s $\widehat{ɲ}$
$\widehat{ts}$	tts	tts	tts	tsn	c $\widehat{f}$ j	cc $\widehat{f}$	cc $\widehat{f}$	cc $\widehat{c\widehat{f}}$	c $\widehat{f}$ $\widehat{ɲ}$
n	nt	ns	nts	nn	j $\widehat{ɲ}$	nc	n $\widehat{f}$	nc $\widehat{f}$	j $\widehat{ɲ}$
j	jt	js	jts	j $\widehat{ɲ}$	jj	jc	j $\widehat{f}$	j $\widehat{c\widehat{f}}$	j $\widehat{ɲ}$
c	tt	tts	tts	cn	cc	cc	cc $\widehat{f}$	cc $\widehat{c\widehat{f}}$	c $\widehat{ɲ}$
$\widehat{f}$	ft	ss	f $\widehat{c\widehat{f}}$	f $\widehat{ɲ}$	fj	fc	ff	f $\widehat{c\widehat{f}}$	f $\widehat{ɲ}$
$\widehat{c\widehat{f}}$	tts	tts	tts	c $\widehat{f}$ $\widehat{ɲ}$	c $\widehat{f}$ j	cc $\widehat{f}$	cc $\widehat{f}$	cc $\widehat{c\widehat{f}}$	c $\widehat{f}$ $\widehat{ɲ}$
$\widehat{ɲ}$	j $\widehat{ɲ}$	j $\widehat{ɲ}$	j $\widehat{ɲ}$	nn	j $\widehat{ɲ}$	jc	j $\widehat{f}$	j $\widehat{c\widehat{f}}$	j $\widehat{ɲ}$

Phonological output combinations:

	t	s	$\widehat{ts}$	n	j	c	$\widehat{f}$	$\widehat{c\widehat{f}}$	n
t	tt	$\widehat{tsts}$	$\widehat{tsts}$	tn	cc	cc	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	c $\widehat{f}$ n
s	st	ss	$\widehat{sts}$	sn	sj	sc	$\widehat{ff}$	$\widehat{f\widehat{c\widehat{f}}}$	s $\widehat{f}$ n
$\widehat{ts}$	$\widehat{tsts}$	$\widehat{tsts}$	$\widehat{tsts}$	$\widehat{tsn}$	$\widehat{tsj}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}n}$
n	nt	ns	$\widehat{nts}$	nn	n $\widehat{f}$ n	n $\widehat{c}$	n $\widehat{f}$	n $\widehat{c\widehat{f}}$	n $\widehat{f}$ n
j	jt	js	$\widehat{jts}$	j $\widehat{n}$	jj	j $\widehat{c}$	j $\widehat{f}$	j $\widehat{c\widehat{f}}$	j $\widehat{f}$ n
c	ct	$\widehat{tsts}$	$\widehat{tsts}$	cn	cc	cc	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	c $\widehat{f}$ n
$\widehat{f}$	$\widehat{ft}$	ss	$\widehat{f\widehat{c\widehat{f}}}$	$\widehat{fn}$	$\widehat{ff}$	$\widehat{fc}$	$\widehat{ff}$	$\widehat{f\widehat{c\widehat{f}}}$	$\widehat{fn}$
$\widehat{c\widehat{f}}$	$\widehat{tsts}$	$\widehat{tsts}$	$\widehat{tsts}$	$\widehat{c\widehat{f}n}$	$\widehat{c\widehat{f}j}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}c\widehat{f}}$	$\widehat{c\widehat{f}n}$
n	nt	ns	$\widehat{jts}$	nn	n $\widehat{f}$ n	n $\widehat{c}$	n $\widehat{f}$	n $\widehat{c\widehat{f}}$	n $\widehat{f}$ n

- (53) Non-alternating adjacent segments with no common features (dark border)
 /tn/=[tn], /st/=[st], /sn/=[sn], /sj/=[sj], /sc/=[sc], /sp/=[sp], /tsn/=[tsn], /tsj/=[tsj],
 /nt/=[nt], /ns/=[ns], /nts/=[nts], /jt/=[jt], /js/=[js], /jts/=[jts], /jn/=[jn], /cn/=[cn],
 /ft/=[ft], /fn/=[fn], /cfn/=[cfn], /nt/=[nt], /ns/=[ns], /nts/=[nts]

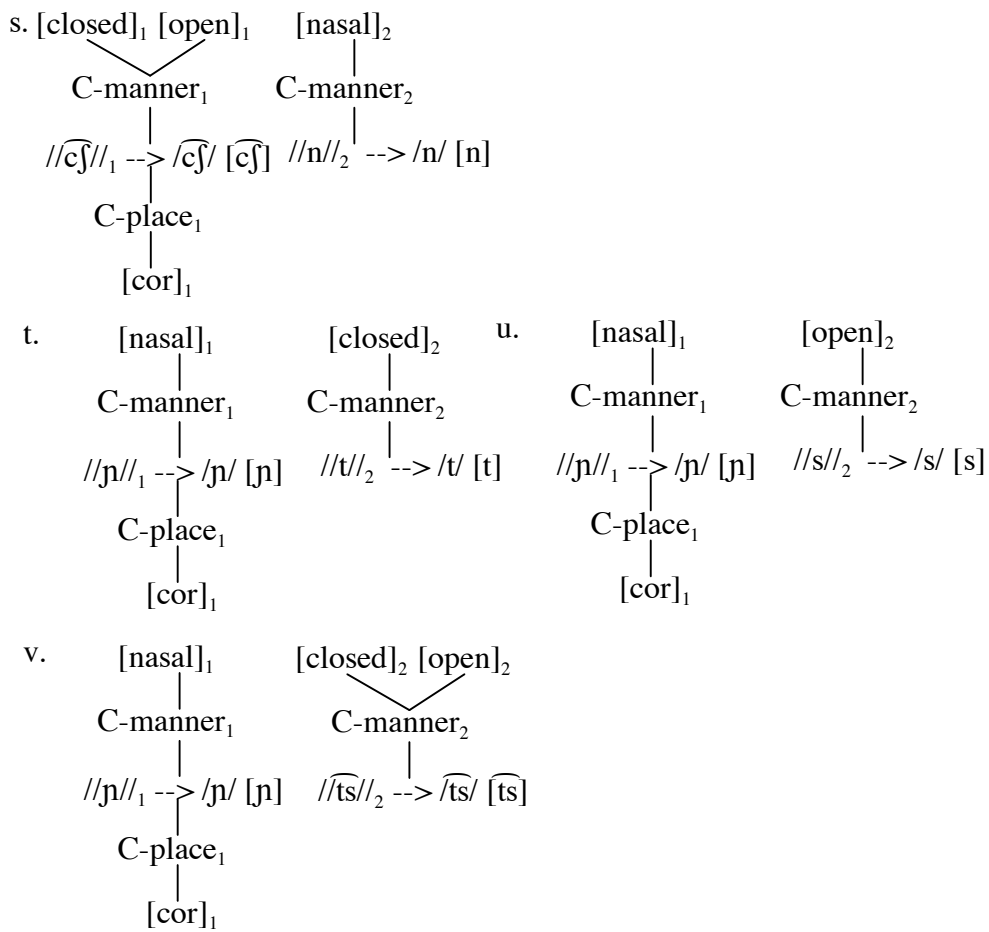
- a. [closed]₁ [nasal]₂ b. [open]₁ [closed]₂
 C-manner₁ C-manner₂ C-manner₁ C-manner₂
 //t//₁ --> /t/ [t] //n//₂ --> /n/ [n] //s//₁ --> /s/ [s] //t//₂ --> /t/ [t]

- c. [open]₁ [nasal]₂ d. [open]₁
 C-manner₁ C-manner₂ C-manner₁
 //s//₁ --> /s/ [s] //n//₂ --> /n/ [n] //s//₁ --> /s/ [s] //j//₂ --> /j/ [j]
 C-place₂
 [cor]₂

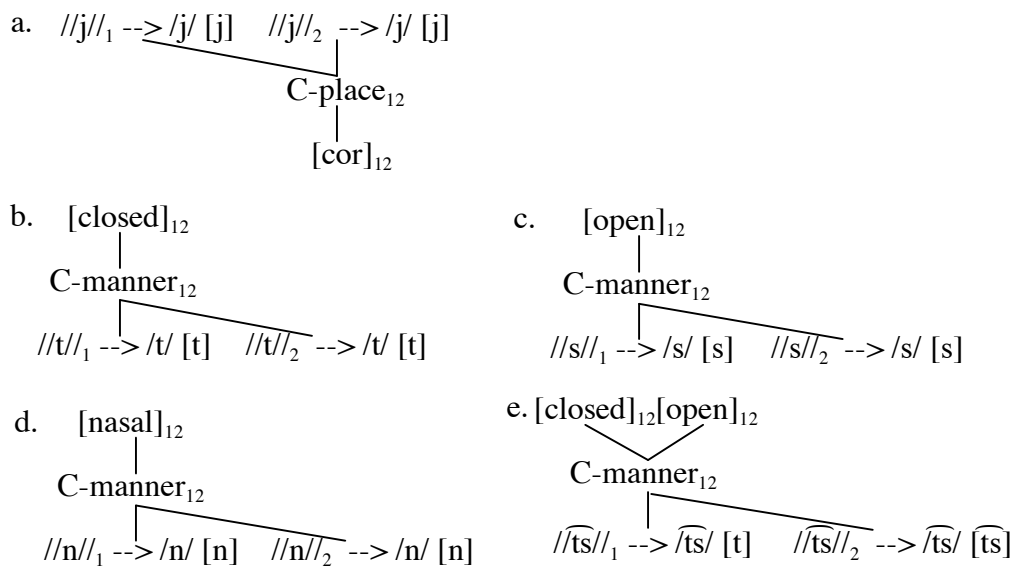
- e. [open]₁ [closed]₂ f. [open]₁ [nasal]₂
 C-manner₁ C-manner₂ C-manner₁ C-manner₂
 //s//₁ --> /s/ [s] //c//₂ --> /c/ [c] //s//₁ --> /s/ [s] //n//₂ --> /n/ [n]
 C-place₂
 [cor]₂ C-place₂
 [cor]₂

- g. [closed]₁ [open]₁ [nasal]₂ h. [closed]₁ [open]₁
 C-manner₁ C-manner₂ C-manner₁
 //ts//₁ --> /ts/ [ts] //n//₂ --> /n/ [n] //ts//₁ --> /ts/ [ts] //j//₂ --> /j/ [j]
 C-place₂
 [cor]₂

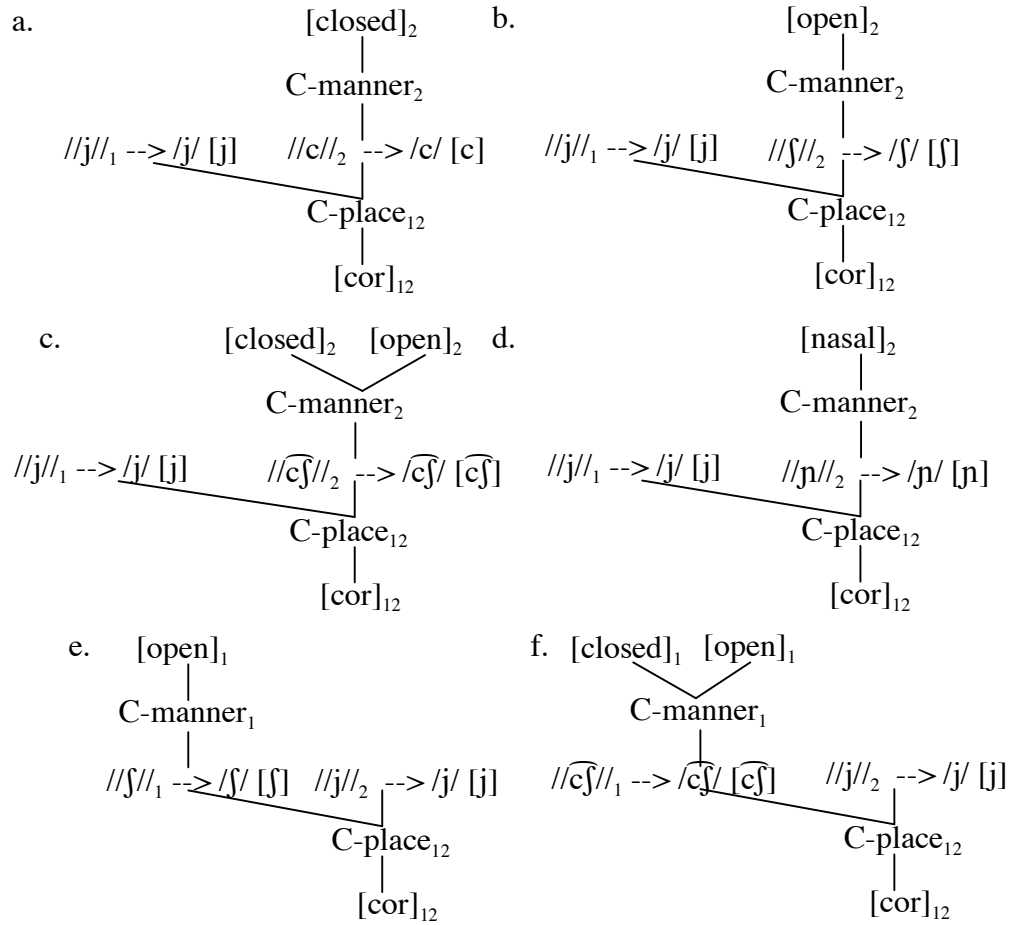
- i. $\begin{array}{c} [\text{nasal}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //n//_1 \rightarrow /n/ [n] \end{array} \quad \begin{array}{c} [\text{closed}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //t//_2 \rightarrow /t/ [t] \end{array}$ j. $\begin{array}{c} [\text{nasal}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //n//_1 \rightarrow /n/ [n] \end{array} \quad \begin{array}{c} [\text{open}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //s//_2 \rightarrow /s/ [s] \end{array}$
- k. $\begin{array}{c} [\text{nasal}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //n//_1 \rightarrow /n/ [n] \end{array} \quad \begin{array}{c} [\text{closed}]_2 \quad [\text{open}]_2 \\ \diagdown \quad \diagup \\ \text{C-manner}_2 \\ | \\ //ts//_2 \rightarrow /ts/ [\text{ts}] \end{array}$
- l. $\begin{array}{c} [\text{closed}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //j//_1 \rightarrow /j/ [j] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} //t//_2 \rightarrow /t/ [t] \end{array}$ m. $\begin{array}{c} [\text{open}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //j//_1 \rightarrow /j/ [j] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} //s//_2 \rightarrow /s/ [s] \end{array}$
- n. $\begin{array}{c} [\text{closed}]_2 \quad [\text{open}]_2 \\ \diagdown \quad \diagup \\ \text{C-manner}_2 \\ | \\ //j//_1 \rightarrow /j/ [j] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} //ts//_2 \rightarrow /ts/ [\text{ts}] \end{array}$ o. $\begin{array}{c} [\text{nasal}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //n//_2 \rightarrow /n/ [n] \end{array} \quad \begin{array}{c} //j//_1 \rightarrow /j/ [j] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array}$
- p. $\begin{array}{c} [\text{closed}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //c//_1 \rightarrow /c/ [c] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} [\text{nasal}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //n//_2 \rightarrow /n/ [n] \end{array}$
- q. $\begin{array}{c} [\text{open}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //ʃ//_1 \rightarrow /ʃ/ [ʃ] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} [\text{closed}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //t//_2 \rightarrow /t/ [t] \end{array}$ r. $\begin{array}{c} [\text{open}]_1 \\ | \\ \text{C-manner}_1 \\ | \\ //ʃ//_1 \rightarrow /ʃ/ [ʃ] \\ | \\ \text{C-place}_1 \\ | \\ [\text{cor}]_1 \end{array} \quad \begin{array}{c} [\text{nasal}]_2 \\ | \\ \text{C-manner}_2 \\ | \\ //n//_2 \rightarrow /n/ [n] \end{array}$



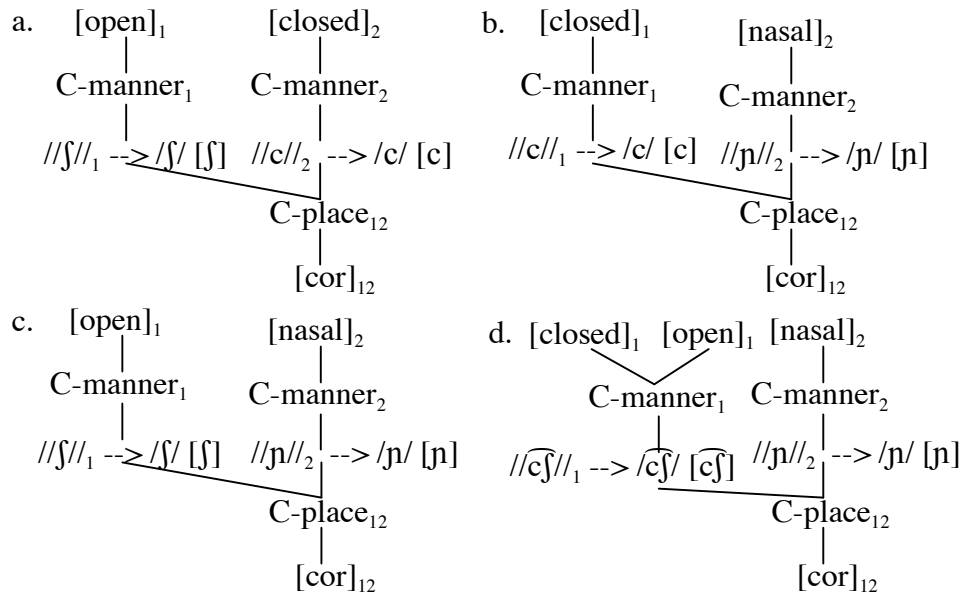
(54) Non-alternating adjacent segments with just place or just manner
 /jj/=[jj], /tt/=[tt], /ss/=[ss], /nn/=[nn], /tsts/=[tts]

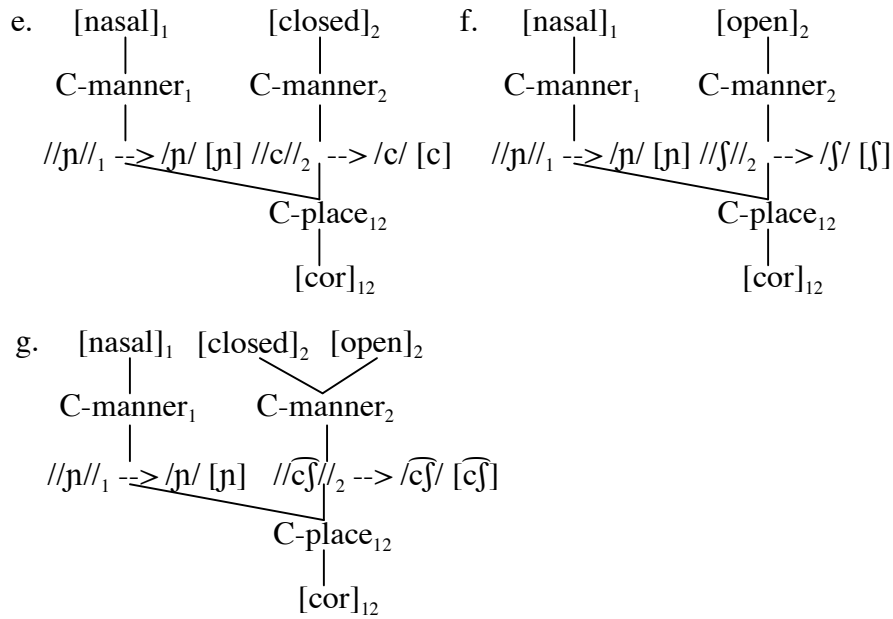


- (55) Non-alternating adjacent segments where one has manner and they have common place /jc/=[jc], /jʃ/=[jʃ], /jč/=[jč], /jɲ/=[jɲ], /ʃj/=[ʃj], /čj/=[čj]

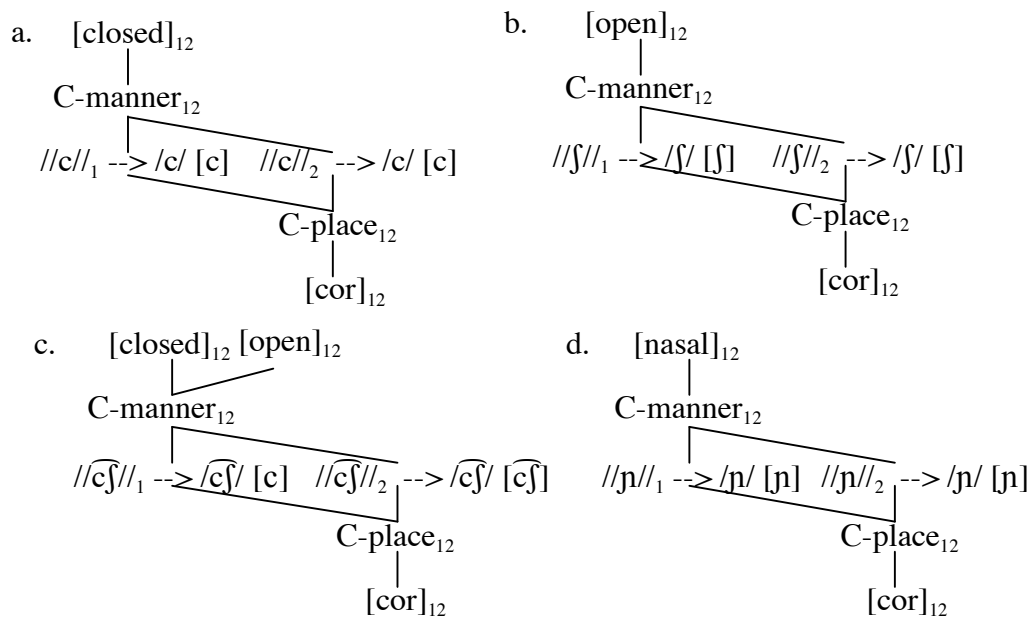


- (56) Non-alternating adjacent segments with common place and different manners /ʃc/=[ʃc], /cɲ/=[cɲ], /ʃɲ/=[ʃɲ], /čɲ/=[čɲ], /ɲc/=[ɲc], /ɲʃ/=[ɲʃ], /ɲč/=[ɲč]

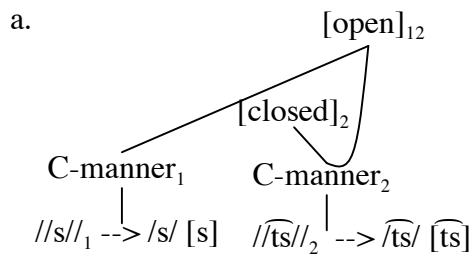




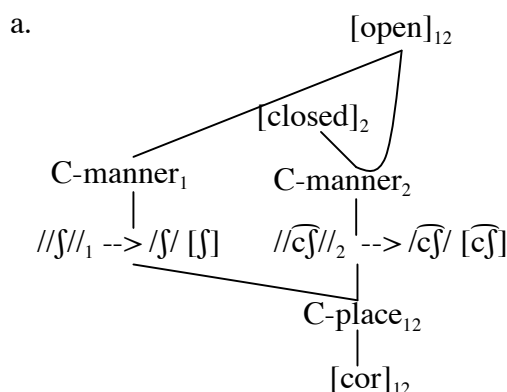
(57) Non-alternating adjacent segments with common place and manner
 /cc/[cc], /ff/[ff], /c̥f̥c̥f̥/[c̥f̥c̥f̥], /nn/[nn]



(58) Non-alternating adjacent segments with partial common manner and no common place /sts/[sts]



- (59) Non-alternating adjacent segments with partial common manner and common place
 $/\widehat{c}\widehat{f}/ = [\widehat{c}\widehat{f}]$



Phonological Processes

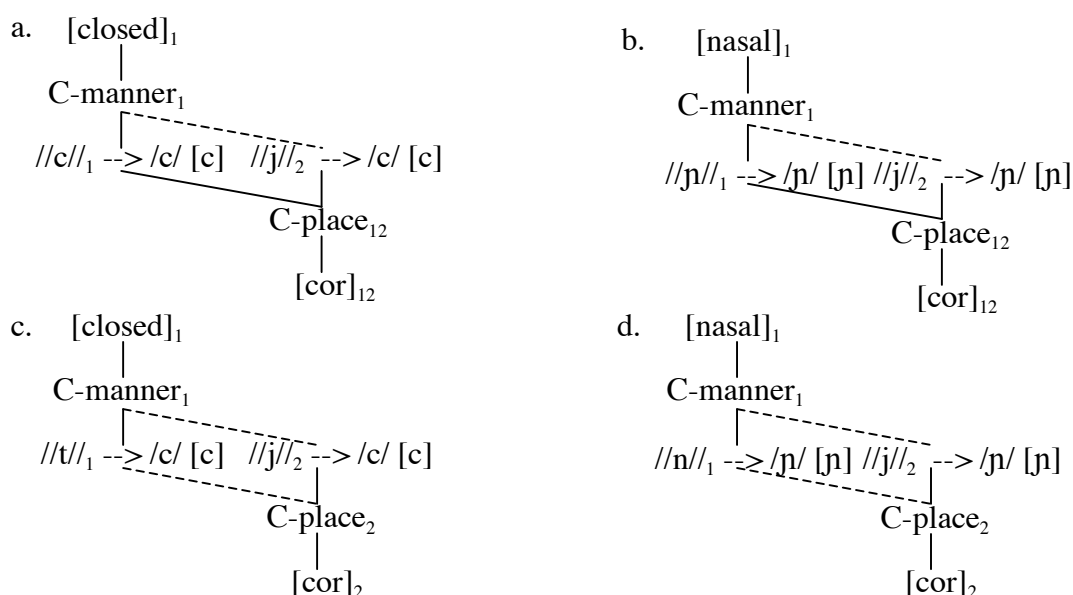
Palatalization and Manner Assimilation

Within words, placeless and C-place[cor] consonants usually undergo coronal assimilation or neutralization. However, the environment in which these processes take place varies according to underlying manner of articulation. We will begin with non-C-manner[open] segments.

Lexical - Non-C-manner[open] Segments

Recall that within words, the dental and palatal non-continuants merge with a following palatal glide to form a long palatal consonant: $//t, d, n, c, ʃ, ɲ + j// \rightarrow /cc, ʃʃ, ɲɲ, cc, ʃʃ, ɲɲ/$. In the case of the palatals, this entails assimilation only of manner. The place structures merge automatically. However, in the case of the dentals, both place and manner assimilate.

- (60)

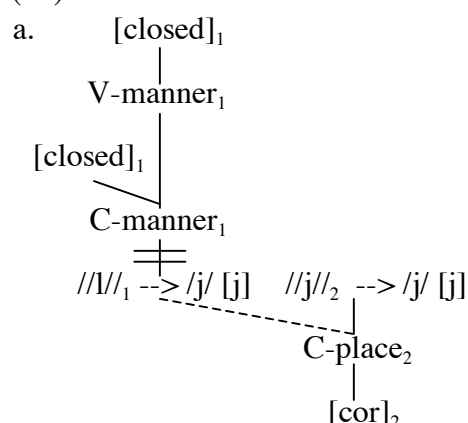


There are several things to note here. First, the resulting structures are already found in the non-alternating forms (see (57)). Thus, they do not violate structure preservation (i.e. create

otherwise unavailable structures). Second, the place assimilation is necessarily regressive. Recall that [jt] and [jn] are well formed (see (53)). Third, manner assimilation here is necessarily progressive. Recall that [jc] and [jn] are well formed (see (55)). Fourth, segments with a C-manner[open] do not trigger manner assimilation to the following coronal glide, and they are not targeted by place assimilation from that glide. Recall that [sj] and [tsj] are well formed (see (53)). Finally, although the palatal fricative and affricate share their place with the glide, they still do not trigger manner assimilation. Recall that [ʃj] and [tʃj] are well formed (see (55)). This suggests that 1) C-manner[open] does not assimilate to a mannerless segment, but C-manner[closed] and C-manner[nasal] do, and 2) regressive C-place[cor] assimilation only occurs when two segments share the a manner feature (or have no manner features at all).

In addition, the lateral undergoes lexical palatalization, but loses its manner features because the lateral is absolutely prohibited in this language from having a place feature (again, this shows structure preservation). We might think of this as the need to spread the coronal place overrules the need to keep the lateral manner features. This suggests that there is a general requirement that C-place[cor] assimilate to the left, but not to a segment with another place or with C-manner[open]. Note that the trill does not participate in this assimilation because it has a C-manner[open] feature in this analysis.

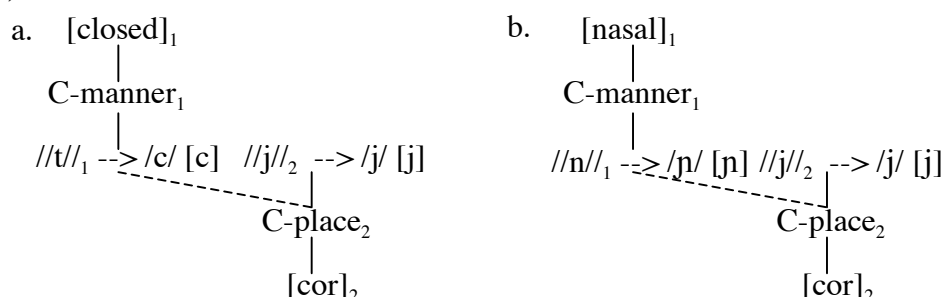
(61)

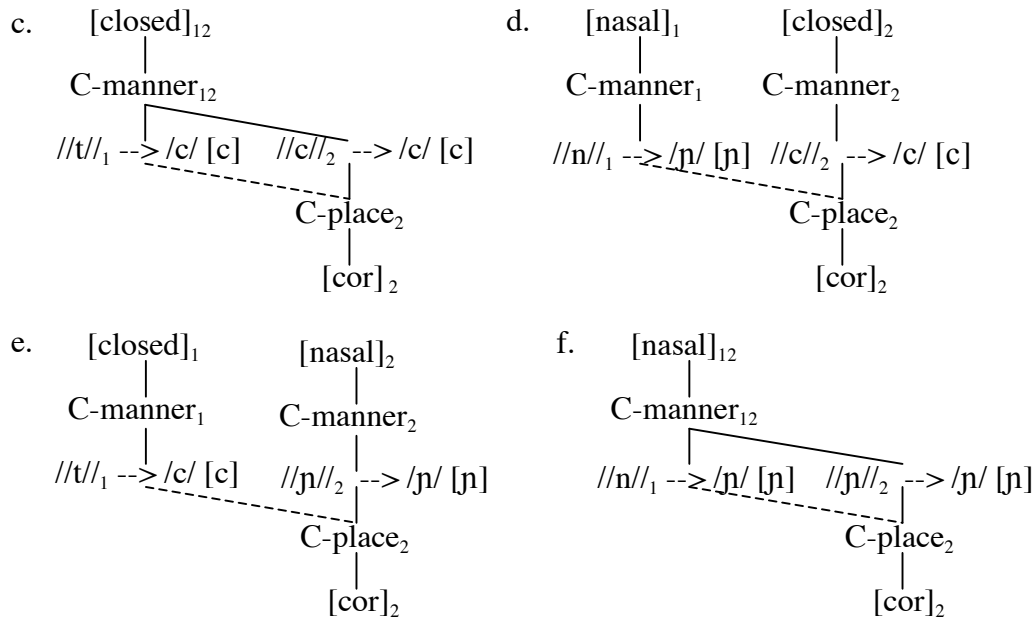


Post-lexical Non-C-manner[open] Segments

Recall that non-C-manner[open] segments also undergo non-merging palatalization both within words and across word-boundaries, where the set of triggers includes all palatal non-C-manner[open] consonants. Note that adjacent underlying palatal consonants necessarily share their common C-place[cor] structure (discussed above). Therefore, they vacuously satisfy the requirement to assimilate and are not shown here. //tj//=/cj/[cj], //nj//=/ɲj/[ɲj], //tc//=/cc/[cc], //nc//=/ɲc/[ɲc], //tɲ//=/cɲ/[cɲ], //ɲɲ//=/ɲɲ/[ɲɲ]

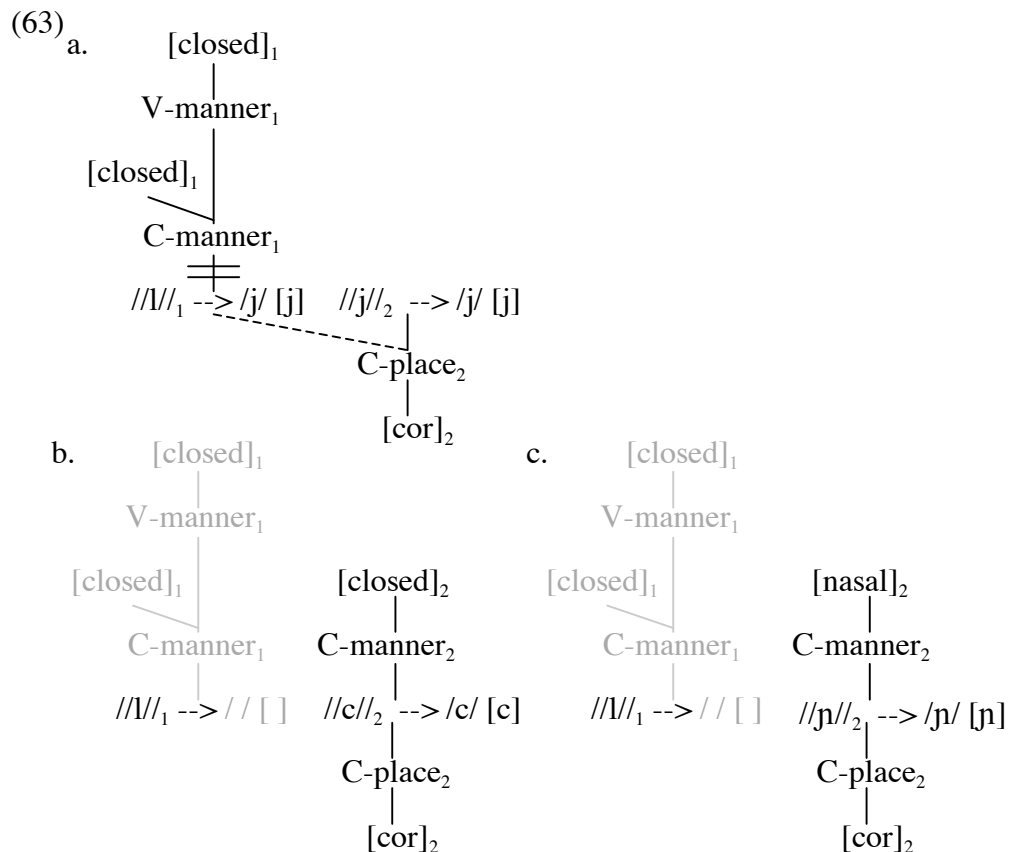
(62)





Again, the non-C-manner[open] segments undergo C-place[cor] assimilation even without sharing manner with the trigger.

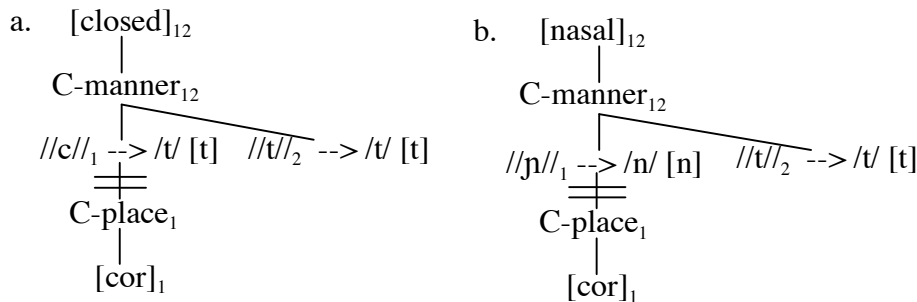
Recall that the lateral completely resists post-lexical palatalization in more careful speech, but completely deletes in faster speech, except in the palatal glide environment in which it undergoes what looks like lexical palatalization regardless of register or rate. //lj//=/jj/= [jj], //lc//=/c/= [c], //ln//=/n/= [n]



Non-C-manner[open] Place Neutralization

Before moving on to the C-manner[open] segments, it is important to mention two further “place assimilations”, that end up being neutralizations rather than assimilations. When a palatal stop or nasal occurs before a non-palatal stop or nasal, respectively, the first loses its place feature. $//ct// = /t/ = [t]$, $//nt// = /n/ = [n]$

(64)



This neutralization does not occur when the following consonant does not share a manner feature. Recall that $/nt/$, $/ns/$, and $/nts/$ are allowed in this language (see (53)).

There are several ways one might approach this neutralization. I will leave it for future research.

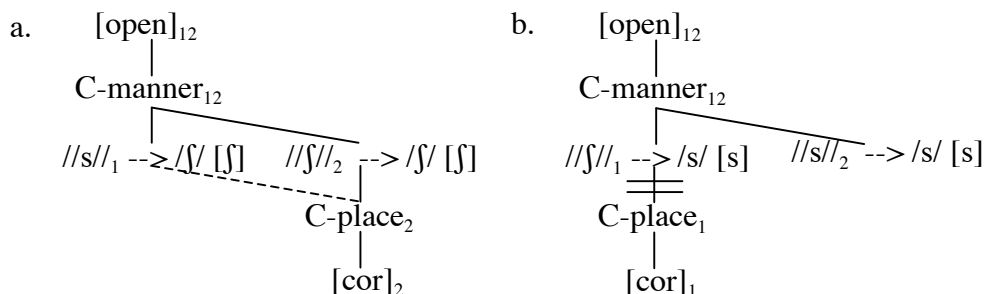
C-manner[open] Segment Palatalization

The pattern of place and manner assimilation is more complicated when C-manner[open] segments are involved. This is probably why the literature usually only discusses “strident place assimilation”. However, we will see that it is not that different from what happens among non-C-manner[open] (i.e. “non-strident”) segments.

Beginning with fricative-fricative sequences, they share both manner and coronal place, and the second member determines the place. Note that this includes forcing the first member to de-link its original place (like we just saw with the palatal stop and nasals in (64)).

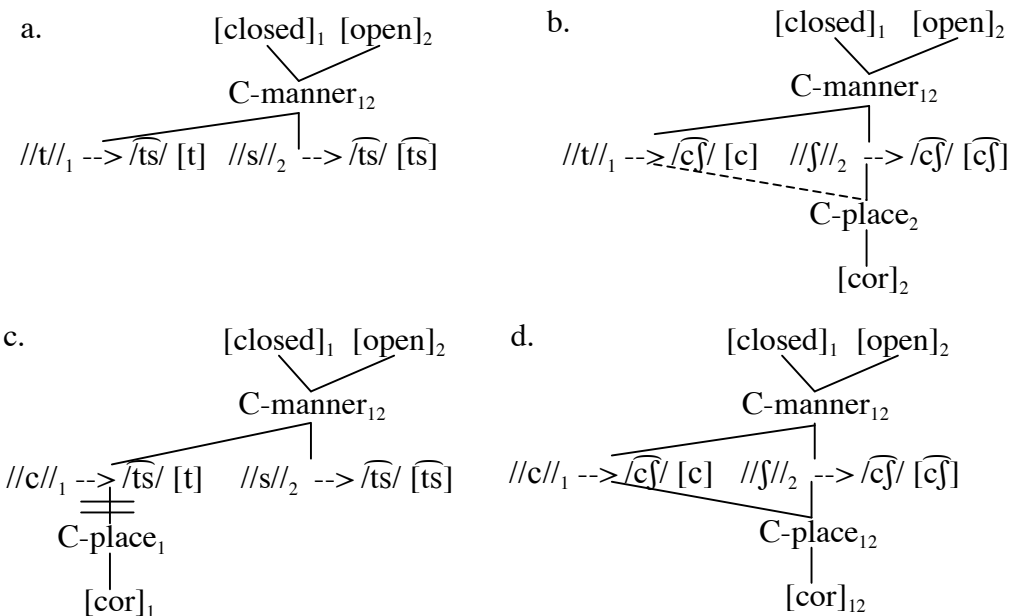
$//sf// = /f/ = [f]$, $//ss// = /s/ = [s]$

(65)



Stop-fricative sequences are interesting because one might think that they simply become a sequence of unassimilated segments like the fricative-stop sequences discussed above. However, they not only undergo place assimilation (regressive), but they also surface identically to a sequence of two affricates (see (54) and (57)). I analyze this as a merger of the C-manner structure. $//ts// = \widehat{ts}/\widehat{ts} = [\widehat{ts}]$, $//tʃ// = \widehat{cʃ}/\widehat{cʃ} = [\widehat{ccʃ}]$, $//cs// = \widehat{ts}/\widehat{ts} = [\widehat{ts}]$, $//cʃ// = \widehat{cʃ}/\widehat{cʃ} = [\widehat{ccʃ}]$

(66)

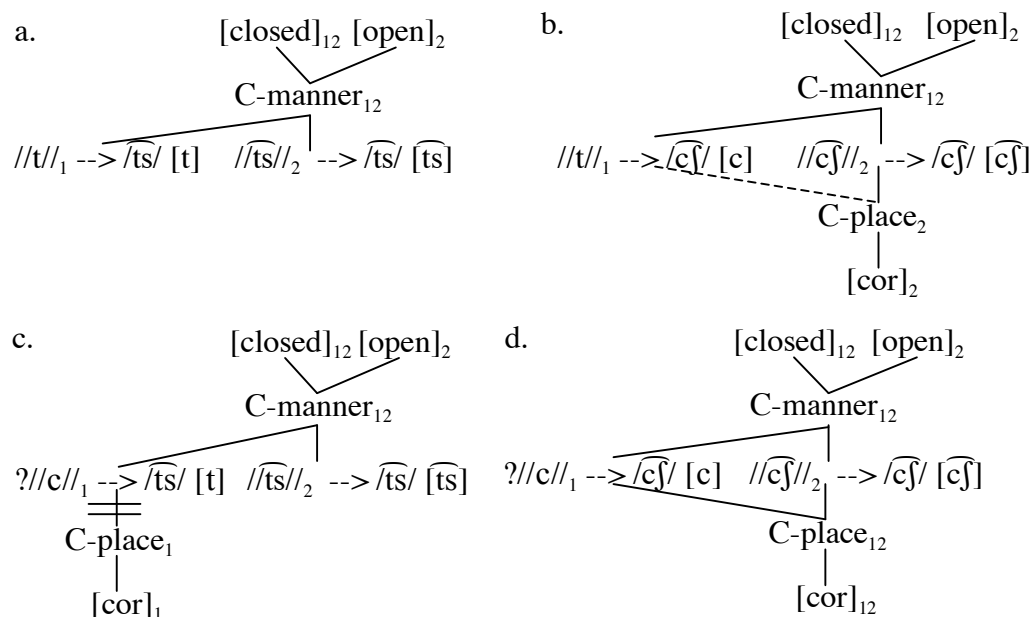


Note that place assimilation is the same as that seen above for manner-shared non-C-manner[open] segments and fricatives. That is, there is regressive place assimilation, but place neutralization if the second member is placeless. Second, manner assimilation is asymmetrical between fricative-stop and stop-fricative sequences. The former do not assimilate, but the latter do. This might be analyzed in one of two ways. Either the C-manner[open] undergoes only regressive assimilation when C-manner[closed] is involved, or the C-manner[closed] undergoes only progressive assimilation when C-manner[open] is involved.

Stop-affricate sequences show the same pattern of both manner and place assimilation.

$//\widehat{ts}/ = /\widehat{tsts}/ = [\widehat{ts}]$, $//\widehat{tc}/ = /\widehat{c}\widehat{c}\widehat{f}/ = [\widehat{cc}\widehat{f}]$, $//\widehat{cts}/ = /\widehat{tsts}/ = [\widehat{tts}]$, $//\widehat{cc}\widehat{f}/ = /\widehat{c}\widehat{c}\widehat{f}/ = [\widehat{cc}\widehat{f}]$

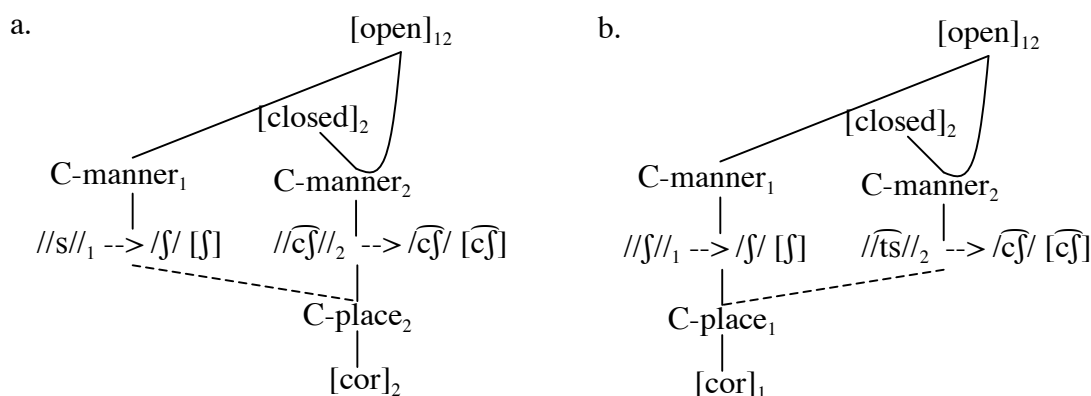
(67)



Interestingly, fricative-affricate sequences share only place, and that place seems to be spread bidirectionally from the segment actually specified with a place feature. As far as I know, this is the only progressive place assimilation in the language. Combined with the lack of manner assimilation in fricative-stop sequences, this suggests that it is a stop feature in the first member of the sequence that normally triggers manner assimilation.

$//\widehat{sc}\widehat{f}/ = /\widehat{c}\widehat{f}/ = [\widehat{c}\widehat{f}]$, $//\widehat{ts}/ = /\widehat{c}\widehat{f}/ = [\widehat{c}\widehat{f}]$

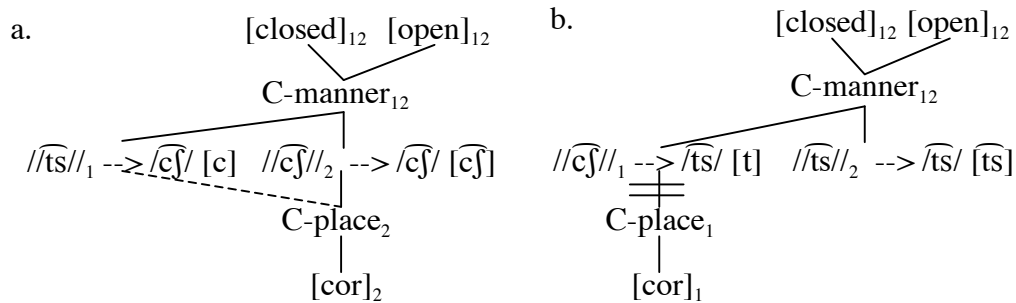
(68)



Affricate-affricate sequences undergo expected place assimilation and neutralization.

$//\widehat{ts}\widehat{c}\widehat{f}// = \widehat{c}\widehat{f}\widehat{c}\widehat{f} = [\widehat{cc}\widehat{f}]$, $//\widehat{c}\widehat{f}\widehat{ts}// = \widehat{ts}\widehat{ts} = [\widehat{tts}]$

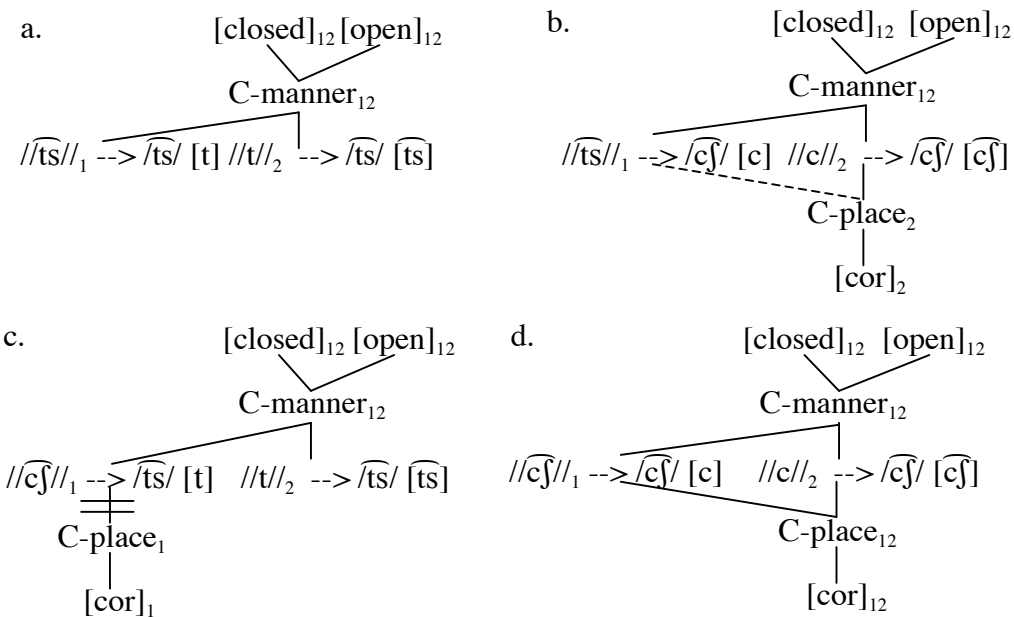
(69)



The output of affricate-stop sequences is identical to that of affricate-affricate sequences. They undergo place assimilation and neutralization.

$//\widehat{ts}\widehat{t}// = \widehat{ts}\widehat{ts} = [\widehat{tts}]$, $//\widehat{ts}\widehat{c}// = \widehat{c}\widehat{f}\widehat{c}\widehat{f} = [\widehat{cc}\widehat{f}]$, $//\widehat{c}\widehat{f}\widehat{t}// = \widehat{ts}\widehat{ts} = [\widehat{tts}]$, $//\widehat{c}\widehat{f}\widehat{c}// = \widehat{c}\widehat{f}\widehat{c}\widehat{f} = [\widehat{cc}\widehat{f}]$

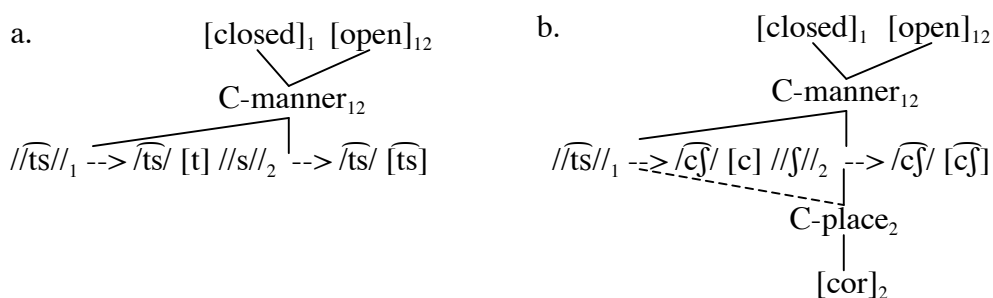
(70)

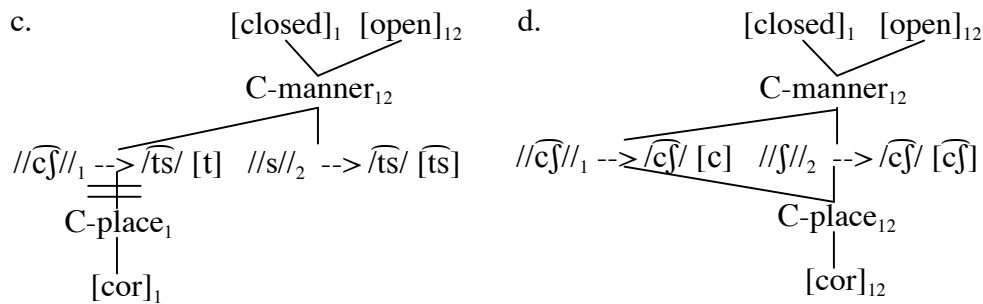


The last coronal obstruent sequence to deal with is affricate-fricative. They surface as a phonological affricate sequence.

$//\widehat{ts}\widehat{s}// = \widehat{ts}\widehat{ts} = [\widehat{tts}]$, $//\widehat{ts}\widehat{f}// = \widehat{c}\widehat{f}\widehat{c}\widehat{f} = [\widehat{cc}\widehat{f}]$, $//\widehat{c}\widehat{f}\widehat{s}// = \widehat{ts}\widehat{ts} = [\widehat{tts}]$, $//\widehat{c}\widehat{f}\widehat{f}// = \widehat{c}\widehat{f}\widehat{c}\widehat{f} = [\widehat{cc}\widehat{f}]$

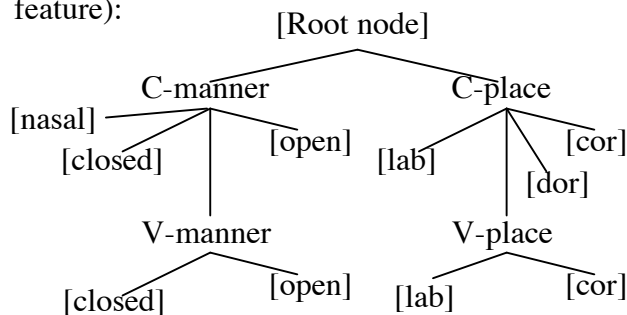
(71)





(Somewhat lame) Summary

A large and complex surface phonetic inventory for both vowels (~14) and consonants (~36) can be accounted for using just seven features used in recursive structures: [lab], [cor], [dor], [closed], [open], [nasal], [voice?]. The PSM structure for Hungarian is (excluding the voicing feature):



The phonological patterns seem to suggest that the phonological inventory is not the same as the surface phonetic inventory. There are, in fact, more phonological vowels (21) than the phonetics suggests and few phonological consonants (26).

Vowel processes

- V-place[cor] harmony - progressive to all vowels (perhaps not /E(:)/)
- V-place[lab] harmony - progressive (the target is limited to underlyingly featureless vowels)
- Epenthesis - to repair syllable structure (is a featureless root node)
- Unstable vowel - underlyingly there, but surfaces only when syllable structure requires it to (is a featureless root node)
- Epenthetic and unstable vowels - get place from the preceding vowel via V-place[cor] and/or V-place[lab] harmony or default articulation ([ɔ])

Consonant processes

- Voicing assimilation - regressive (didn't really address it here)
- C-place[cor] assimilation - regressive (mostly, and the target is limited to placeless non-V-manner - is semi-dependent on shared manner)
 - Cannot create a new structure with C-manner[open], but occurs if such a structure already exists (free ride), and can get progressive assimilation if fricative-affricate sequence)
- C-place[cor] neutralization - feature is lost in first member of a sequence if the second does not have it.
- C-manner[closed] assimilation - progressive if the target already has C-manner and it does not create an illicit segment (/tn//=/tn/, */tN/, but //ts//=/tsts/ and //tss//=/tsts/).

Set Theory and Constraints on Hungarian Feature Co-occurrence

/V/	=	V{P{lab}}	MAX-P{lab}	>>	*P{lab} *V{P{lab}}
/j/	=	j{P{cor}}	MAX-P{cor}	>>	*P{cor} *j{P{cor}}
/W/	=	W{P{dor}}	MAX-P{dor}	>>	*P{dor} *W{P{dor}}
/o/	=	o{P{P'{lab}}}	MAX-P{P'{lab}}	>>	*P{P'{lab}} *o{P{P'{lab}}}
/e/	=	e{P{P'{cor}}}	MAX-P{P'{cor}}	>>	*P{P'{cor}} *e{P{P'{cor}}}
/t/	=	t{M{closed}}	MAX-M{closed}	>>	*M{closed} *t{M{closed}}
/s/	=	s{M{open}}	MAX-M{open}	>>	*M{open} *s{M{open}}
/l/	=	l{M{M'{closed}}}	MAX-M{M'{closed}}	>>	*M{M'{closed}} *l{M{M'{closed}}}
/a/	=	a{M{M'{open}}}	MAX-M{M'{open}}	>>	*M{M'{open}} *a{M{M'{open}}}
/n/	=	n{M{nasal}}	MAX-M{nasal}	>>	*M{nasal} *n{M{nasal}}

Don't really want to be able to have faithfulness to individual segments. So, it looks like faithfulness constraints on individual class-node structures are best. However, markedness constraints could be conjunction or whole structure. The advantage of conjunction is that we build them from primitives. The disadvantage is that we have to have markedness constraints against individual segments when more than one class node is involved.

/ø/ = ø{P{P'{lab, cor}}}

MAX-P{P'{lab}}, MAX-P{P'{cor}} >> *P{P'{lab}}, *P{P'{cor}}
 *P{P'{lab}} & *P{P'{cor}}
 *P{P'{lab, cor}}
 *ø{P{P'{lab, cor}}}

/p/ = p{P{lab}, M{closed}}

MAX-P{lab}, MAX-M{closed} >> *P{lab}, *M{closed}
 *P{lab} & *M{closed}
 *p{P{lab}, M{closed}}

/c/ = c{P{cor}, M{closed}}

MAX-P{cor}, MAX-M{closed} >> *P{cor}, *M{closed}
 *P{cor} & *M{closed}
 *c{P{cor}, M{closed}}

/k/ = k{P{dor}, M{closed}}

MAX-P{dor}, MAX-M{closed} >> *P{dor}, *M{closed}
 *P{dor} & *M{closed}
 *k{P{dor}, M{closed}}

/u/ = u{P{P'{lab}}, M{M'{closed}}}

MAX-P{P'{lab}}, MAX-M{M'{closed}} >> *P{P'{lab}}, *M{M'{closed}}
 *P{P'{lab}} & *M{M'{closed}}
 *u{P{P'{lab}}, M{M'{closed}}}

/i/ = i{P{P'{cor}}, M{M'{closed}}}

MAX-P{P'{cor}}, MAX-M{M'{closed}} >> *P{P'{cor}}, *M{M'{closed}}
 *P{P'{cor}} & *M{M'{closed}}
 *i{P{P'{cor}}, M{M'{closed}}}

/f/ = f{P{lab}, M{open}}

MAX-P{lab}, MAX-M{open} >> *P{lab}, *M{open}
 *P{lab} & *M{open}
 *f{P{lab}, M{open}}

/S/ = S{P{cor}, M{open}}

MAX-P{cor}, MAX-M{open} >> *P{cor}, *M{open}
 *P{cor} & *M{open}
 *S{P{cor}, M{open}}

/æ/ = æ{P{P'{cor}}, M{M'{open}}}

MAX-P{P'{cor}}, MAX-M{M'{open}} >> *P{P'{cor}}, *M{M'{open}}
 *P{P'{cor}} & *M{M'{open}}
 *æ{P{P'{cor}}, M{M'{open}}}

/ts/ = ts{M{closed, open}}

MAX-M{closed}, MAX-M{open} >> *M{closed}, *M{open}
 *M{closed} & *M{open}
 *M{closed, open}
 *ts{M{closed, open}}

/E/ = E{M{M'{closed, open}}}
 MAX-M{M'{closed}}, MAX-M{M'{open}} >> *M{M'{closed}}, *M{M'{open}}
 *M{M'{closed}}&*M{M'{open}}
 *M{M'{closed, open}}
 *E{M{M'{closed, open}}}

/I/ = I{M{closed, M'{closed}}}
 MAX-M{closed}, MAX-M{M'{closed}} >> *M{closed}, *M{M'{closed}}
 *M{closed}&*M{M'{closed}}
 *M{closed, M'{closed}}
 *I{M{closed, M'{closed}}}

/y/ = y{P{P'{lab, cor}}, M{M'{closed}}}
 MAX-P{P'{lab}}, MAX-P{P'{cor}}, MAX-M{M'{closed}} >> *P{P'{lab}}, *P{P'{cor}},
 *M{M'{closed}}
 *P{P'{lab}}&*P{P'{cor}}&*M{M'{closed}}
 *P{P'{lab, cor}}&*M{M'{closed}}
 *y{P{P'{lab, cor}}, M{M'{closed}}}

/cS/ = cS{P{cor}, M{closed, open}}
 MAX-P{cor}, MAX-M{closed}, MAX-M{open} >> *P{cor}, *M{closed},
 *M{open}
 *P{cor}&*M{closed}&*M{open}
 *P{cor}&*M{closed, open}
 *cS{P{cor}, M{closed, open}}

	//V{/}	*V{}	MAX-V{}
b.	V{}	*	
-->d.			*

	//V{/}	MAX-V{}	*V{}
-->b.	V{}		*
d.		*	

	//P{lab}/	*P{lab}	MAX-P{lab}
c.	P{lab}	*	
-->d.			*

	//P{lab}/	MAX-P{lab}	*P{lab}
-->c.	P{lab}		*
d.		*	

	//V{P{lab}}/	*V{P{lab}}	*P{lab}	*V{}	MAX-V{}	MAX-P{lab}
a.	V{P{lab}}	*	*			
b.	V{}			*		*
c.	P{lab}		*		*	
-->d.					*	*

All Mark >> All Faith = null

	//V{P{lab}}//	MAX-V{}	MAX-P{lab}	*V{P{lab}}	*P{lab}	*V{}
-->a.	V{P{lab}}			*	*	
b.	V{}		*			*
c.	P{lab}	*			*	
d.		*	*			

	//V{P{lab}}//	MAX-P{lab}	*V{P{lab}}	*V{}	MAX-V{}	*P{lab}
a.	V{P{lab}}		*			*
b.	V{}	*		*		
-->c.	P{lab}				*	*
d.		*			*	

	//V{P{lab}}//	MAX-P{lab}	MAX-V{}	*V{P{lab}}	*V{}	*P{lab}
-->a.	V{P{lab}}			*		*
b.	V{}	*			*	
c.	P{lab}		*			*
d.		*	*			

	//V{P{lab}}//	MAX-P{lab}	*V{P{lab}}	MAX-V{}	*V{}	*P{lab}
a.	V{P{lab}}		*			*
b.	V{}	*			*	
-->c.	P{lab}			*		*
d.		*		*		

	//V{P{lab}}//	*V{P{lab}}	*V{}	MAX-V{}	*P{lab}	MAX-P{lab}
a.	V{P{lab}}	*			*	
b.	V{}		*			*
c.	P{lab}			*	*	
-->d.				*		*

	//V{P{lab}}//	*V{P{lab}}	*V{}	MAX-P{lab}	MAX-V{}	*P{lab}
a.	V{P{lab}}	*				*
b.	V{}		*	*		
-->c.	P{lab}				*	*
d.				*	*	

	//V{P{lab}}//	*V{P{lab}}	MAX-P{lab}	MAX-V{}	*V{}	*P{lab}
a.	V{P{lab}}	*			*	*
b.	V{}		*		*	
-->c.	P{lab}			*		*
d.			*	*		

	//o{P{P'{lab'}}}//	*o{P{P'{lab'}}}	*o{}	*P{P'{lab'}}}	MAX-P{P'{lab'}}}	MAX-o{}
a.	o{P{P'{lab'}}}	*		*		
b.	o{}		*		*	
c.	P{P'{lab'}}}			*		*
-->d.					*	*

	//o{P{P'{lab'}}}//	*o{P{P'{lab'}}}	*o{}	MAX-P{P'{lab'}}}	*P{P'{lab'}}}	MAX-o{}
a.	o{P{P'{lab'}}}	*			*	
b.	o{}		*	*		
-->c.	P{P'{lab'}}}				*	*
d.				*		*

	//o{P{P'{lab'}}}//	*o{P{P'{lab'}}}	MAX-o{}	*o{}	*P{P'{lab'}}}	MAX-P{P'{lab'}}}
a.	o{P{P'{lab'}}}	*			*	
-->b.	o{}			*		*
c.	P{P'{lab'}}}		*		*	
d.			*			*

	//o{P{P'{lab'}}}//	MAX-P{P'{lab'}}}	*o{P{P'{lab'}}}	MAX-o{}	*o{}	*P{P'{lab'}}}
a.	o{P{P'{lab'}}}		*			*
b.	o{}	*			*	
-->c.	P{P'{lab'}}}			*		*
d.		*		*		

	//o{P{P'{lab'}}}//	MAX-P{P'{lab'}}}	MAX-o{}	*o{P{P'{lab'}}}	*o{}	*P{P'{lab'}}}
-->a.	o{P{P'{lab'}}}			*		*
b.	o{}	*			*	
c.	P{P'{lab'}}}		*			*
d.		*	*			

Is it possible to get the whole segment to appear but not a floating structure? It doesn't seem like it. So, either every language without floating features must have a higher ranked constraint forcing a root node, or floating features are simply not allowed as structures. This would imply that the appearance of floating features in the literature must be due to something else. Perhaps they are "degenerate" segments like the iotizing segment? Another option would be that faithfulness constraints can be to entire segments.

	//P{P'{lab'}}//	MAX-P{P'{lab'}}}	*P{P'{lab'}}}
c.	P{P'{lab'}}}		*
d.		*	

	//o{P{P'{lab'}}}//	MAX-o{P{P'{lab'}}}	*P{P'{lab'}}	MAX-P{P'{lab'}}	MAX-o{}	*o{P{P'{lab'}}}	*o{}
-- >a.	o{P{P'{lab'}}}		*			*	
b.	o{}	*		*			*
c.	P{P'{lab'}}	*	*		*		
d.		*		*	*		

	//ø{P{P'{lab', cor'}}}//	*ø{P{P'{lab', cor'}}}	*ø{P{P'{lab'}}}	MAX-ø{}	*ø{P{P'{cor'}}}	*ø{}	*P{P'{lab', cor'}}	*P{P'{lab'}}}	*P{P'{cor'}}	MAX-P{P'{lab', cor'}}	MAX-P{P'{lab'}}}	MAX-P{P'{cor'}}
a.	ø{P{P'{lab', cor'}}}	*	*		*		*					
a.	ø{P{P'{lab'}}}		*				*		*			*
a.	ø{P{P'{cor'}}}				*			*	*	*		
b.	ø{}	*	*		*	*			*	*	*	*
c.	P{P'{lab', cor'}}			*		*						
c.	P{P'{lab'}}			*			*		*			*
c.	P{P'{cor'}}			*				*	*	*		
d.				*					*	*	*	*

	//o{P{P'{lab'}}}//	*o{P{P'{lab'}}}	*o{}	MAX-P{P'{lab'}}	*P{P'{lab'}}	MAX-o{}
a.	o{P{P'{lab'}}}	*			*	
b.	o{}		*	*		
-- >c.	P{P'{lab'}}				*	*
d.				*		*

	//o{P{P'{lab'}}}//	*o{P{P'{lab'}}}	MAX-o{}	*o{}	*P{P'{lab'}}	MAX-P{P'{lab'}}
a.	o{P{P'{lab'}}}	*			*	
-- >b.	o{}			*		*
c.	P{P'{lab'}}		*		*	
d.			*			*

	//o{P{P'{lab'}}}//	MAX-P{P'{lab'}}	*o{P{P'{lab'}}}	MAX-o{}	*o{}	*P{P'{lab'}}
a.	o{P{P'{lab'}}}		*			*
b.	o{}	*			*	
-- >c.	P{P'{lab'}}			*		*
d.		*		*		

	//o{P{P'{lab'}}}//	MAX-P{P'{lab'}}	MAX-o{}	*o{P{P'{lab'}}}	*o{}	*P{P'{lab'}}
-->a.	o{P{P'{lab'}}}			*		*
b.	o{}	*			*	
c.	P{P'{lab'}}		*			*
d.		*	*			