THE SONORITY HIERARCHY IN HUNGARIAN

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The classical "mirror rule" of traditional grammars subsumes three, logically independent observations:

(1) If PQ is a possible syllable onset (P, Q arbitrary consonants), then QP is not.

(2) If PQ is a possible onset, then QP is a possible coda, and conversely, if RS is a possible coda, then SR is a possible onset.

(3) If PQ is a possible coda, then QP is not.

Of course, if (2) holds, (1) and (3) are equivalent – but there might well be languages where (2) turns out to be false, but the other two statements are true. In fact, every language where consonant clusters are disallowed as codas but permitted as onsets is a counterexample to (2), and the same holds for those languages that allow complex codas but do not allow complex onsets. Before turning to the investigation of the mirror rule in Hungarian, let me add a further clause, (cf. Clements – Keyser 1983:47-48) which I will call Hjelmslev's Law:

(4) If PQR is a possible onset, then so are PQ and QR, and similarly for codas.

(5) If PQ and QR are possible onsets, then so is PQR, and similarly for codas.

This last requirement (the converse of Hjelmslev's Law) and (4) have the effect of extending (1) and (3) to arbitrarily long consonant clusters: in Hungarian, the longest cluster that we will encounter contains three consonants. If the notion "Sonority Hierarchy" (in the sense of Jespersen 1897-99) has any validity, then the statements (1-5) will follow automatically. Suppose that phonemes are

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partitioned into sonority classes, and the classes are ordered linearly among themselves in such a manner that vowels are at the high end of this ordering (called the sonority hierarchy). Now if we define a well-formed syllable as one with sonority (strictly) increasing from the onset to the nucleus, and (strictly) decreasing thereafter, (1-5) will necessarily hold.

The traditional view, which was based on non-borrowed (pre-16c) material is that Hungarian has no syllable-initial consonant clusters. (The idea that this could be retained in synchronic descriptions has been criticized at length by Siptár 1980.) The following table gives an overview of the two-member initial and final clusters attested. 1 at the intersection of row x and column y means that xy is an attested onset; 2 means that yx is an attested coda; 3 = 1 + 2 means that xy is an attested onset and yx is an attested coda; 4 means that whenever a combination like xy and/or yx arises in compounding, it is subject to consonant sandhi; 5 = 1 + 4 means that yx is subject to sandhi but xy is attested as onset; and 6 = 2 + 4 means that xy is subject to sandhi but yx is attested as coda.

(6)

	s	sz	f	p	k	c	t	cs	ty	h	v	b	g	d	gy	zs	z	ny	m	l	n	j	r	
s	2	4		3	3		5	5			5	4	4	4	4		4	4		1	3	3	2	3	s
sz	4	2	3	3	3	5	5		3		5	4	1	4	4		4	4	2	3	3	3	2	2	sz
f		2	2	2			1				4	4	4	4	4		4	4		2	3		3	3	f
p		1	1	2			1			1	4	4	4	4	4		4	4		2	3	5	2	3	p
k		3			2	2	2	2	2		5	4	4	4	4		4	4			3	3	2	3	k
c		4	2	2		2					5										2	2	2	2	c
t	2	6	2	2	2		2		4	2	5	4	4	4	4		4	4	6	2	2	2	2	3	t
cs	2				2			2												2	2	2	2	2	cs
ty							4		2			4	4	4	4		4	4	2			4		2	ty
h										2									2	1			3	1	h
v	4	4	4	4	4	4	4	4	4	4				2					2	2	3	2	2	2	v
b	4	4	4	4	4	4	4	4	4	4		2				2			2	1	4		3		b
g	4	4	4	4	4	4	4	4	4	4	1		2							3	3	2	3		g
d	4	4	4	4	4	4	4	2	4	4	2	2		2	6		6	3	6	2	2	2	2	3	d
gy	4	4	4	4	4	4	4	4	4	4				4	2		2	2	2		2	4		2	gy
zs	4	4	4	4	4	4	4	4	4	4				4			4		2			2	2		zs
z	4	4	4	4	4	4	4	4	4	4				4		4	2		2	1	2	2	3		z
ny							4												2			4		2	ny
m																				2	2	5	2	2	m
l																					2	2	2	2	l
n										4			1		4							2	2	2	n
j			2	2	2							2	2	2					2			2	2		j
r																								2	r
	s	sz	f	p	k	c	t	cs	ty	h	v	b	g	d	gy	zs	z	ny	m	l	n	j	r	

If (2) were a universal law, there could be no '1' or '2' entries in (6) at all. However, the high number of exceptional entries is counterbalanced by the 'low quality' of the exceptional words. First, a few intejections, namely pfuj 'phooey',

phű 'phew', hm 'id', and hja 'well' are included in (6), because they were mentioned in the dictionaries (Bakos 1974, Juhász &al 1982, Országh 1977, Papp 1969) or papers (Abondolo 1984, Kassai 1981, Siptár 1979, 1980) I have included in my corpus. But in a larger corpus it would be possible to find other interjections, such as grmbh, hmpf, or brrr. The onomatopoeic nature of these expressions makes it hard to exclude *any* combination categorically. Therefore I am inclined to discard these elements: with the exception of bolyh 'tomentum' which will have no onset counterpart, this move will increase the symmetry of the system.

Second, certain entries such as nganaszán 'name of Uralic tribe', ptózis 'ptosys', mnemotechnika 'mnemonics', ftálsav 'ftalic acid', szgrafitto, and perhaps a few others can hardly (if at all) be pronunced by native speakers in the manner suggested by the ortography. This is not to say that all 'foreign' words should be eliminated from the corpus (on the contrary, foreign words tend to fill in the accidental gaps in the system), but surely the line must be drawn *somewhere*. The items deemed exceptional above are likely to manifest exceptional behavior in simple reading and repetition tasks, while most 'learned' or foreign words such as gnóm 'gnome' or pszichológia 'psychology' are likely to pattern with native words. In fact, certain foreign words, such as szféra 'sphere' are likely to fare better than certain native words (especially proper names as Szakcs).

Third, the entries in the diagonal reflect the fact that geminate codas can be found with almost every consonant, but geminate onsets are absent. Examples are: juss 'share', hossz 'length', muff 'id', épp 'just', sikk 'fashion', vicc 'joke', ott 'there', priccs 'bunk', pötty 'dot', pech |hh| 'bad luck', alább 'below', agg 'old', haddelhadd 'rumpus', meggy 'sour.cherry', nézz 'look 2nd.sg.imp.indef', könny 'tear', bumm 'boom', toll 'pen', kinn 'out', falj |jj| 'devour 2nd.sg.imp.indef', orr 'nose'. The examples given are always the 'best' in the sense that proper names are avoided if common nouns can be found, monomorphemic or at least uninflected words are preferred to overtly inflected forms, surface forms having the same underlying representation are preferred to those coming from different URs, and finally native words are preferred to 'foreign' or 'learned' words. This means that in any case (e.g. the coda dd) the reader can infer from the given example (the compound haddelhadd) that no word can be found in its class which has lesser morphemic complexity but is not uninflected (as e.g. add 'give 2nd.sg.imp.def') or is not a proper name (as e.g. Fadd).

Conditions on well-formedness are frequently 'enforced' by a conspiracy of rules which modify the offending combinations that arise in the course of the derivations (cf e.g. Kisseberth 1970). The lack of geminate onsets in Hungarian appears to be a purely 'static' well-formedness condition in the sense that no rules are necessary to enforce it: as there are no single-consonant prefixes in Hungarian, the disallowed combinations simply do not arise. This example shows that even static conditions can have priority over the generalization expressed in (2).

Fourth, dynamic well-formedness conditions or, equivalently, the phonological rules enforcing these can also distort the picture. For instance, the onsets

sv, szv, kv, cv, and tv (as in svéd 'Swedish', szvit 'suite', kvarc 'quartz', cvikker 'pince-nez', and tviszt 'twist') have no coda counterparts, since devoicing (see 27) would turn these into fs, fsz, fk, fc, and ft. Similarly, the onsets szt, szc, scs, st, and pn (as in sztár 'movie star', szcenárió 'screenplay', scsi 'kind ofsoup', steril 'sterile', and pneumatikus 'pneumatic') correspond to codas that trigger rules of affrication and assimilation.

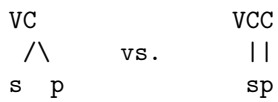
Taking all these factors into consideration, there remain only six '1' entries in (6), and half of these are caused by onsets appearing in a single word (zlotyi 'Polish currency', hradzsin 'castle in Prague', gvárdián 'Father Superior'). The rest might be attributed to accidental gaps in the coda system (blúz 'shirt', smaragd 'emerald'), with the exception of *szp codas (cf. pszichológia 'psychology'), the abscence of which appears to be systematic in the light of (3), given the coda psz (e.g. in gipsz, 'gypsum').

Word initial szp is also possible (szpiker 'announcer'), and similarly with ksz we have kszilofón 'marimba', maszk 'mask', szkiff 'skiff' and keksz 'biscuit'. Aside from a couple of proper names (Szakcs and Recsk), and some inflected forms, the pairs listed above, and the type liszt 'flour' vs. sztár 'movie star' constitute the only counterexamples to (1) and (3) in Hungarian. Selkirk (1984) attempts to deal with the same problem in English by treating |sp,st,sk| clusters as affricates, but Clements (pc) notes that

(i) these clusters do not pattern with 'true' affricates (*crV, jrV, as opposed to sprV)

(ii) unlike true affricates, these clusters are easily broken up by speech errors

(iii) Selkirk's theory leaves the lack of syllable-final



contrasts unexplained.

Since the counterarguments based on distribution and speech errors are equally valid in the case of Hungarian, I will not adopt Selkirk's solution here. But as these cases (e.g. Danish fisk 'fish' vs. fiks 'fix') constitute the only serious counterexample to (1) and (3) in a number of languages, Selkirk is obviously right in trying to explain them by some special principle that leaves the larger generalization intact.

To sum up what we have so far, the mirror image of the onset structure of Hungarian syllables is, by and large, properly included in the set of attested coda combinations that make up the coda structure. As Algeo (1978) notes, it is possible to make the system look a great deal more elegant by being more selective with the data we include. For instance, the exclusion of inflected forms

would go a long way in eliminating the 'irregular' entries that appear under the diagonal. The 2nd.sg.imp.indef suffix 'j' is the only source of codas such as 'döfj' 'pierce!', lopj 'steal!', bukj 'fall!', szivj 'suck!', dobj 'throw!', or vágj 'cut!', and the 2nd.sg.imp.def suffix 'd' is the only source of codas such as dobd 'throw!', szivd 'suck!', or tanitsd 'teach!'.

Of the remaining 10 entries under the diagonal, two (NOSZF and MAFC) could be excluded on the basis that they are acronyms (these were the only acronyms included in the corpus, because the 'spelling pronunciations' *enóeszef and *emaefcé are never heard), and two (Apc and Szakcs) because they are proper names. One (borscs 'kind of soup') is the single example of its type, and another one (szomj 'thirst') can be argued to end in |h| rather than |j| on the surface. But no matter how hard one tries, there seems to be no way to exclude füst 'smoke', szaft 'gravy', recept 'prescription' or akt 'nude'.

As the 'hard' counterexamples all end in t, one might try to reshuffle the matrix in (6) so that only 'easy' items appear under the diagonal. To see what is involved here, let us take a look at the high end of the hierarchy. The ordering m < l < n < j < r appears to be extremely well motivated: the codas in film 'id', slejm 'phlegm', farm 'id', ajánl 'recommend', fájl 'file', görl 'girl',kombájn 'combine-harvester', modern 'id', and férj 'husband' are all decreasing in sonority. Moreover, every pair of decreasing sonority corresponds to an attested coda, with the exception of n > m, but even this is attested (in the reversed order) as onset. Yet it is possible to rearrange the sequence (e.g. to m < n < l < r < j) by the data-manipulation techniques discussed above, and the reader is invited to try it. For those who prefer to work with a larger set of data, I list here the 'best' example of each onset and coda type not mentioned so far: srác 'kid', sors 'fate', mersz 'daring', francia 'french', turf 'id', próba 'trial', szörp 'juice', krém 'cream', park 'id', bérc 'peak', trágya 'manure', szirt 'cliff', tekercs 'scroll', korty 'gulp', érv 'argument', bróm 'bromide', szerb 'Serbian', gróf 'peer', burg 'castle in Vienna', drót 'wire', kard 'sword', tárgy 'object', törzs 'tribe', zri 'rumpus', borz 'badger', szárny 'wing'; Majs, fájsz 'hurt 2nd.sg.pres.indef', fjord 'id' dölyf 'haughtiness', selyp 'lisp', sztrájk 'strike', Svájc, sejt 'cell', ejts |ejc| 'drop 2nd.sg.imp.indef', ölyv 'buzzard', cajg 'calico', majd 'then', pajzs 'shield', rajz 'drawing'; snájdig 'neat', pikáns 'piquant', sznob 'snob', pasziánsz 'solitaire', knock-out |knokaut| 'id', fánk 'doughnut', tánc 'dance', pont 'dot', kilincs 'doorknob', rokonszenv 'sympathy', gnóm 'gnome', rang 'rank', gond 'worry', pénz 'money'; sláger 'hit', fals 'out of tune', szláv 'Slavic', félsz 'fright', flaska 'bottle', golf 'id', plakát 'poster', talp 'sole', klassz 'groovy', halk 'silent', polc 'shelf', bolt 'shop', kulcs 'key', vlach 'id', nyelv 'tongue', blúz 'shirt', glória 'halo', rivalg 'whoop', föld 'earth', völgy 'valley'; smaragd 'emerald', szmötyi 'sediment', tömsz 'stuff 2nd.sg.pres.indef', tromf 'retort', kolomp 'bell', teremt 'create', teremts |mc| 'create 2nd.sg.imp.indef', hamv 'ash', domb 'hill', nyomd 'push 2nd.sg.imp.def', tömzs 'lode', nemz 'beget'; dzeta 'id', gerezd 'clove', küzdj |zj| 'fight 2nd.sg.imp.indef'; idösb |zb| 'elder', Pünkösd |zd| 'whitsun', esdj |zj| 'beg 2nd.sg.imp.indef'; kedv 'mood'; yacht 'id'; sztyepp 'prairie', hagysz |cs| 'let 2nd.sg.pres.indef', Batyk; steril 'sterile', Detk, barack 'peach'; skála 'scale', voks

'vote'; spicli 'informer', taps 'clap', szpáhi 'spahí, gipsz 'gypsum', copf 'pigtail', Apc; szféra 'sphere', szivsz |fs| 'suck 2nd.sg.pres.indef'. The point of the exercise is that only a few gross statements about the sonority hierarchy appear to be incontrovertible. Voiceless consonants will precede the voiced ones, and obstruents will precede the resonants in every reasonable rearrangement of (6), but besides these (rather trivial) observations, little can be said with certainty.

With that, the question becomes the following: what can we possibly gain by employing a theoretical construct (the sonority hierarchy) if, on the one hand, it is next to impossible to model the facts (i.e. to arrange the consonants on a scale) by it in an unambiguous manner, and if, on the other hand, the predictions (i.e. 1-3) made by the theory do not really fit the data? My answer is based on the well-known facts that syllables are psychologically real units of speech production (cf e.g. Kim 1971) and of speech perception (Savin – Bever 1970).

The sonority hierarchy makes it possible to factor out a large part of the linear precedence (LP, see Gazdar – Pullum 1982) information that must be encoded with every syllable node immediately dominating a number of timing units. In fact, no LP information has to be stored with C*V and VC* syllables conforming to the hierarchy. In syllables containing Cs on both sides of the V it is sufficient to store only the fact that a given consonant precedes or follows the vowel (so that *pit* will not be confused with *tip)* – of course, this will have to be stored with V-initial and V-final syllables as well, so as to know which is which. The consonants can be arranged among each other on the basis of sonority: the more sonorant a consonant, the closer it comes to the vowel.

This proposal can be implemented without recourse to an abstract scale if we take it into account that sonority can be expressed in terms of *features.* To quote Basboll (1973:132): "In fact, the claim is that the features of the "hierarchy" are distributed around the peak of the syllable, so that each feature may spread continuously over several segments in the way indicated in the hierarchy. This could be formulated so that 'one instance of' e.g. the feature <+sonorant> 'belongs to' several segments at the same time." In autosegmental terms this means that the timing units must be arranged around the wovel in such a manner that the features linked to them can undergo contour simplification maximally. For instance, in the monosyllable brancs 'gang', we have to store only the facts that b and r precede, and n and cs follow the vowel. The alternative ordering *bracsn is excluded because the <+son> features of n and the vowel are not adjacent, and thus cannot be simplified. Similarly, the order *rbancs can be excluded because the <+son> of r can not be collapsed with that of the vowel, and the order *rbacsn is excluded even more strongly, as it would require 3 instances of <+son> instead of the optimal 1.

From this perspective, the existence of isolated counterexamples is not really worrysome: with those, we will simply have to store more LP information. The mechanism outlined above acts as a default: extra information concerning the position of the features can override it. This means that it matters but little whether we have proper names, foreign, or learned words: it is quite conceivable

that such items require a larger amount of storage in a system that works best with native words. Inflected forms, however, belong in a different class, at least if we suppose that these are not stored in the lexicon but are created 'on the fly'. In generating a form like lopj 'steal 2nd.sg.imp.indef' we *know* that the suffix j will follow the stem lop, so the default mechanism need not be engaged at all.

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