AKADÉMIAI DOKTORI ÉRTEKEZÉS

The Phonotactics of Hungarian

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For J & K

Human existence de Selby has defined as ‘a succession of static experiences each infinitely brief’, a conception which he is thought to have arrived at from examining some old cinematographic films which belonged probably to his nephew. [...] Apparently, he had examined them patiently picture by picture and imagined that they would be screened in the same way, failing at that time to grasp the principle of the cinematograph.

Flann O’Brien: The Third Policeman

For it is plain, that every word we speak is in some degree a diminution of our lungs by corrosion, and consequently contributes to the shortening of our lives.

Jonathan Swift: Gulliver’s Travels

Contents

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Abbreviations

abl.	ablative
acc.	accusative
adj.	adjective
ant	anterior (feature)
ATR	advanced tongue root
C	consonant
CC	cluster of two consonants
CCC	cluster of three consonants
Co	coda
camp.	comparative
cond.	conditional
cons	consonantal (feature)
cont	continuant (feature)
COR	coronal node
dat.	dative
def.	definite conjugation
dim.	diminutive
DOR	dorsal node
ECH	Educated Colloquial Hungarian
FCS	fast cluster simplification
FSVS	final stem vowel shortening
GP	government phonology
imp.	imperative
ind.	indicative
indef.	indefinite conjugation
iness.	inessive
inf.	infinitive
instr.	instrumental
intr.	intransitive
IPA	International Phonetic Alphabet
ISVS	internal stem vowel shortening
L	laryngeal node
LAB	labial node
lat	lateral (feature)
LVL	law vowel lengthening
MSC	morpheme structure constraint
N	nucleus or placeless nasal
nas	nasal (feature)
NPA	nasal place assimilation
O	onset
OCP	Obligatory Contour Principle
OP	[+open$_1$]
OVS	object-verb-subject

P	any place feature
pl	plural
PL	(C-)place node
poss.	possessive
pres	present
R	root node or rhyme sentence
SAA	stop+affricate affrication
SCL	Syllable Contact Law stop+fricative affrication singular
SLH	Standard Literary Hungarian
so	someone
son	sonorant (feature)
SOV	subject-object-verb
SPE	*The Sound Pattern of English* (Chomsky and Halle 1968)
spr.	suppressive
SSC	syllable structure constraint
SSP	Sonority Sequencing Principle
sth	something
strid	strident (feature)
SVO	subject-verb-object
SVS	stem vowel shortening
V	vowel or vocalic node or verb
V_d	defective vowel
V_f	full vowel
V_{FOP}	lowered full vowel
V_u	unstable vowel
VH	vowel harmony
VOS	verb-object-subject
VP	verb phrase
VSO	verb-subject-object
VV	cluster of two vowels
X	timing slot
XP	any phrasal category
$1sg^s$ $2sg/pl^o$	1st sg. subject 2nd sg/pl. object
•	root node
*	incorrect or non-existent form
%	grammaticality judgements differ across speakers
.	syllable boundary
{ }	syllable boundaries (where left and right syllable edges have to be distinguished)
⟦ ⟧	analytic domain boundaries
]	(synthetic) morpheme boundary (only in rules)
-	concatenation (X-Y = Y is attached to X)
/ /	underlying segment(s)
[ ]	surface segment(s)
σ	syllable node
μ	mora

Transcription

The transcription symbols used in the dissertation are standard IPA except for the ones listed below (on the choice of symbols see Nádasdy and Siptár 1989):

	present dissertation	IPA
Vowels:	ö	ø
	öː	øː
	ü	y
	üː	yː
Consonants:	t^y	c
	d^y	ɟ
	š	ʃ
	ž	ʒ
	t^s	ts
	č	tʃ
	ǰ	dʒ
	n^y	ɲ

Chapter 1.

Introduction: Aims, scope, coverage, and layout

1.1. Aims and scope

This dissertation[1] has a dual aim. On the one hand, it is intended to give a comprehensive and detailed account of the phonotactic pattern of Hungarian, i.e. to describe what is a phonologically possible Hungarian word in terms of the strings of segments it consists of. On the other hand, the 'static' phonotactic regularities discovered will be shown to be active in a 'dynamic' way as well by conditioning phonological processes, chiefly vowel~zero alternations and consonant~zero alternations (which are phonologically universally prone to phonotactic conditioning).

The dialect this study focusses on is Educated Colloquial Hungarian (ECH) (cf. Nádasdy 1985), i.e. the 'educated' Budapest variety of Hungarian. In addition to native speaker judgements that underlie all data and generalizations presented in this dissertation, the description of the phonotactic phenomena discussed here is based on a computerized database (cf. Kornai 1986) comprising phonological (and other types of) information concerning approximately 80 000 lexical items. I shall always indicate it clearly whenever I discuss other varieties of Hungarian and/or use other sources of data.

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[1]The dissertation is based on chapters Five (Phonotactics: Syllable Structure, pp. 95-153) and Eight (Processes Conditioned by Syllable Structure, pp. 214-277) of *The Phonology of Hungarian* (Siptár and Törkenczy 2000) a recent monograph I co-authored with Péter Siptár published by Oxford University Press in the series *The Phonology of the World's Languages.* Naturally, the chapters and material included here in a revised and extended form are those that have been written exclusively by the present author.

1.2. Principal claims

In this section I present an overview of the specific *principal* claims that I make and argue for in the dissertation. Since the bulk of the dissertation is of analytical nature, most of the claims are analytic ones and only some of them are theoretical. For the convenience of the reader I have thoroughly cross-referenced each claim to the sections of the dissertation where I discuss them in detail.

(i) There are two syllable templates in Hungarian, the core syllable template, which is restricted to Block 1 of the derivation and the extended syllable template, which only becomes available for syllabification in Block 2. The extended syllable template may contain an Appendix preceding the Onset and/or an Appendix following the coda. There are no sonority sequencing violations in the core syllable, but may such violations may occur in the extended syllable. See sections 2.2; 3.2.4.3.; 4.1.4.5.

(ii) Hungarian words may begin with more than one consonant, but there are no branching onsets in Hungarian (cf. section 3.2.2). Word-initial consonants in word initial consonant clusters are licensed by being syllabified into the Appendix (cf. sections 3.2.4.3.; 4.1.4.5.)

(iii) In Hungarian there are no regular intervocalic CCC clusters undivided by an analytic boundary (cf. section 3.3.2.2.). Monomorphemic words containing intervocalic clusters of more than two consonants *phonologically* are treated in Hungarian as if they were compounds, i.e. a morphologically unitary domain is phonologically analysed as if it were two independent domains (cf. section 4.1.4.5.).

(iv) Hungarian permits maximally binary branching codas. Word-final consonant clusters consisting of more than two consonants and some word-final two member clusters are licensed as coda + appendix. The identity of these ‘extra’ word-final consonants in word-final consonant clusters that are licensed by being syllabified into the Appendix is determined by morphology (the analytic suffixes *-j, -d, -sz*) and lexical marking. See section 3.2.4.

(v) Language-specific variations on the universal sonority hierarchy may exist, but only inasmuch as different language particular settings of sonority distance between segment classes are possible, language particular sonority ‘reversals’ are unpermitted (cf. section 2.2.)

The sonority hierarchy for Hungarian is

stops, affricates < fricatives < < nasals < < liquids

l < < r < < j

(where < is a smaller sonority distance than < <)

This manifests itself in the licensing constraints on coda clusters and interconstituent clusters (cf. sections 3.2.4.2. and 3.3.2.1.)

(vi) Codas licensed by government (right-to-left) and/or root or place binding. See section 3.2.4.

(vii) In Hungarian heteromorphemic hiatus is not permitted across a synthetic domain edge. Tautomorphemic hiatus is restricted by universal constraints (such as the Obligatory Contour Principle) and language-specific ones (two alternative hypotheses are offered: one disallows hiatus altogether, the other restrict it two some maximally two-member vowel sequences). See section 3.3.1.

(viii) The Syllable Contact Law is inoperative in Hungarian in general (cf. section 3.3.2.) although the phonotactics of verbs is skewed towards it in terms of type frequency (3.4.3).

(ix) Interconstituent clusters are licensed by government (right-to-left or left-to-right), root-binding, and Sp-licensing (cf. 3.3.2.) ~~co~~nstrained by the antilabial constraint (Chapter 3, (43), the antifricative constraint (Chapter 3, (52) and the antipalatal constraint (Chapter 3, (45)).

(x) /v/ is phonotactically asymmetrical: it behaves as an obstruent when in coda position, but it behaves as a sonorant when in onset position (Chapter 3, (51)).

(xi) The minimal word/stem in Hungarian is bimoraic (Chapter 3, (62))

(xii) In addition to SSCs, MSCs also determine the Hungarian phonotactic pattern. The relevant MSCs determine the distribution of long vs. short vowels domain finally (Chapter 3, (58), (62) (the minimal word/stem constraint), (65), (66), (67)) and the distribution of long vs. short vowels before consonant clusters (Chapter 3, (70ab) (*VVCC))

(xiii) There are phonotactic constraints in Hungarian that are independent of syllable or morpheme structure (cf. Chapter 3. (81)).

(xiv) The phonotactics of (monomorphemic) verbs is more restrictive than that of non-verbs. this manifests itself in the stricter conditions on government and binding in the case of codas (Chapter 3, (71), (73), (74), (75), (76)) and in frequency effects in the case of intervocalic clusters. See 3.4.3.

(xv) According to their phonological behaviour suffixes fall into the following classes:
a. analytic (no vowel~zero alternation)
b. synthetic Type A (phonotactically unmotivated vowel~zero alternation): they have an underlying initial full vowel (e.g. -V_fk ‘pl’)
Type B (phonotactically motivated vowel~zero alternation): they are underlyingly consonant-initial (e.g. *-t* ‘acc’).

(xvi) Three types of vowel~zero alternation are distinguished: (i) stem-internal vowel~zero alternation, (ii) stem-final vowel~zero alternation (which is arbitrarily restricted to a few suffixes/stems and involves the deletion of the stem-final vowel) and (iii) suffix-initial vowel~zero alternation. Of these (ii) is considered morphological (phonologically irregular). (i) and (iii) are analysed in detail. It is argued that (i) can be analysed as neither deletion nor epenthesis, but is the default spell-out (Default V) of defective vowels (i.e. vowels that only consist of a skeletal slot without any segmental melody), which are lexically present in the underlying representation of 'epenthetic stems' (Chapter 4, (22)). (iii) is analysed as the result of vowel deletion to repair hiatus (the rule Hiatus: Chapter 4, (28)) in Type A suffixes, and as the result of epenthesis (overparsing) by syllabification that inserts a defective vowel to break up an illicit cluster in Type B suffixes. There is no separate epenthesis rule: vowel~zero alternation is due to syllabification and default-spell-out.

(xvii) Syllabification is a right-to-left template-matching algorithm in Hungarian and is non-exhaustive (it can skip defective vowels (Section 4.1) but continuous (i.e. may reapply after each affixation and/or application of a phonological rule). A defective vowel can only syllabify in a singly closed syllable (Chapter 4.(23)). Syllabification is *not* cyclic in Hungarian (cf. 4.1.4.3.).

(xviii) A lowering stem/suffix underlyingly has a final floating [+ $open_1$] feature and a morpheme-final defective vowel V_d. Lowering is a process that spreads the floating [+ $open_1$] feature locally to a (full or defective) vowel which is incorporated into a syllable and is at the edge of a morpheme (Chapter 4.(33)). This spreading is a feature filling process.

(xix) The rules Hiatus and Lowering show derived environment effects, but they are not cyclic. Arguably, all Hungarian phonological rules apply non-cyclically, even the ones that only apply in derived environments (Section 4.1.4.3).

(xx) The past suffix is a /t/ whose root node is associated to a single timing slot followed by an empty timing slot (i.e. a timing slot devoid of melodic content) which is completely invisible to syllabification. The past suffix ends in a floating [+ $open_1$]

feature and a defective vowel V_d because it is lowering. The empty timing slot of the suffix is filled by spreading from the root node of the preceding /t/ if the /t/ is preceded by a full vowel (/t/-spread: Chapter 4 (42)) There is no lexical degemination in Hungarian.

(xxi) Given the representations of 'epenthetic' stems, the accusative and the past tense suffix assumed, vowel~zero alternation in all these cases is the result of a unitary process: syllabification.

(xxii) The occurrence of variation in vowel~zero alternation is due to the existence of parallel stems (parallel underlying representations). See section 4.1.4.4.

(xxiii) The rules Hiatus (Chapter 4, (28)) and Default V (Chapter 4, (22)) only apply at Block 1.

(xxiv) Monoconsonantal analytic suffixes and irregular initial and final consonant clusters ones in monomorphemic words syllabify (into the extended syllable) at Block 2

(xxv) The Obligatory Contour Principle is responsible for the special restrictions on the distribution of consonants flanking the unstable vowel of an 'epenthetic' stem (Section 4.1.4.6.1.).

(xxvi) The stem external vowel~zero alternation after /t/-final stems is due (a) to the morphological OCP-motivated rules (Chapter 4 (64) and (65)), which break up (64) and merge (65) the root nodes of a fake geminate and (b) lexical marking.

(xxvii) The difference between the behaviour of alternating (e.g. instrumental *-val/-vel*) and non-alternating v-suffixes (e.g. deverbal noun-forming *-vány/-vény*) does not derive from an underlying representational difference but from the fact that the former are synthetic and the latter are analytic. The alternation in alternating v-suffixes is due to the interaction between the rules C-spread (Chapter 4 (72)), which is a generalised form of /t/-spread (Chapter 4 (42) and replaces it in the grammar, and v-delink (Chapter 4 (71)).

(xxviii) There is no non-postlexical degemination (what seems as degemination in the lexical phonology is really the lack of gemination (spreading)) (sections 4.1.4.4. and 4.2.1.).

(xxix) Productive *h*-alternation ([h]~[x]) is due to a rule that deletes the place node of an underlying voiceless dorsal fricative which is unspecified for [consonantal] in onset position (Chapter 4 (74)). Non-productive *h*-alternation ([h]~[∅]) is non-phonological (lexical allomorphy).

(xxx) Fast Cluster Simplification is phonotactically motivated, but is unrelated to syllable or morpheme structure (Chapter 4 (82)).

1.3. Chapter layout

The chapter layout of the dissertation is organised so as to be suitable for the two major objectives. There are two central chapters (which take up the bulk of the dissertation): ‘Chapter 3. “Static” phonotactics: the shape of the Hungarian word’ which discusses syllable structure, morpheme structure, and ‘sequence’ phonotactics; and ‘Chapter 4. “Dynamic” phonotactics: phonotactically motivated processes’ in which phonotactically conditioned alternations are analysed. The two central chapters are preceded by a general introduction ‘Chapter 1. Introduction: Aims, scope, coverage, and layout’ and ‘Chapter 2. Preliminaries’, which is a more theoretically or non-analytically oriented chapter that focusses on two topics: the theory phonotactics in general and its place and status within (various) phonological framework(s) (‘2.1. Theoretical background: phonotactics in phonological theory’); and the general theoretical assumptions underlying the present work (‘2.2. Framework and theoretical assumptions ’). Finally, I have attached two appendices: Appendix A, which is intended to serve as reference on the featural composition of Hungarian segments assumed in the dissertation, and Appendix B, in which I present exhaustive and near-exhaustive lists of lexical items that contain ‘interesting’ or unusual substrings of segments (and which is the result of many hours of frantic search in various databases and sources).

Chapter 2.

Preliminaries

2.1 Theoretical background: phonotactics in phonological theory

In this section I shall examine the central theoretical issues of phonotactic analysis in general, discuss the structuralist and the generative phonotactic tradition, highlight some problems/moot points, and identify the theoretical status of the phonotactic analysis presented in the dissertation.

Phonotactics is 'the study of the positions occupied by phonological units relative to one another'.[1] This definition is probably general enough to be acceptable for a phonologist of any theoretical affiliation with the qualification that the *phonological unit* referred to in the definition is assumed to be of *segment* size[2] (although in principle the distribution of any phonological unit could be meant – such as the distribution of various types of syllables[3]). Furthermore, it is also generally assumed that the largest unit within which segmental distribution is to be examined from a phonotactic point of view is the phonological word. The reason is that phonotactic regularities do not seem to apply across word boundaries and thus the main objective of a phonotactic analysis is to characterise what is a phonologically well-formed word[4] (in other words, which string of segments can form a phonotactically

[1]Algeo (1978: 206)

[2]This naturally does not mean that the phonotactic statements expressing the regularities of the distribution of segment-sized units cannot refer to phonological units smaller than the segment (e.g. features, nodes in a feature-tree) or larger than the segment (e.g. the morpheme, the syllable).

[3]In English, for instance, two unstressed syllables cannot begin a word.

[4]There are aspects of phonological well-formedness that are not phonotactic in nature, for example, the well-formedness of words related to alternation patterns. A word may be phonologically ill-formed even though it is phonotactically well-formed. For instance, **sárat* [ʃaːrɔt] 'mud' (accusative) is ill-formed because the vowel of the stem *sár* [ʃaːr] 'mud' shortens

grammatical word).[5]

2.1.1. The division of labour between the phonotactic and the non-phonotactic aspects of phonology: levels

Structuralist and post-structuralist (generative) phonological frameworks are typically *multi-level* in the sense that in order to account for what they consider to be phonological regularities (which may be (partially) different in different frameworks) they postulate (at least) two levels of representation (the phonological/underlying and the phonetic/surface) and a mapping process that maps the phonological representation onto the surface one. Given that in a multi-level framework there are thus (at least) two alphabets (inventories) of segment-sized phonological units, this creates a level problem for phonotactics: which is the level at which phonotactic regularities should be analysed/stated? As the patterning of sounds, i.e. the distribution of (the properties) of sounds in natural language is the object of phonological study, how much and which aspect(s) of this distributional information is to be handled by the phonotactics and how much and which aspect(s) by the mapping component?[6]

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before suffixes like the accusative (*sarat* [ʃɔrɔt]). However, there is nothing anomalous about the combination of segments in **sárat* [ʃaːrɔt] – it is just as well-formed phonotactically as attested *várat* [vaːrɔt] 'castle' (accusative), [jaːrɔt] *járat* 'passageway'. I will return to this problem below.

[5]This is not meant to imply that there may be no phonotactic regularities that are expressible with reference to the (adjacent) string of segments involved exclusively, i.e. without reference to a larger phonological unit within which the string in question is positioned ('sequence constraints,' see section 2.1.2).

[6]Note that this problem does not even arise in one-level models (such as (some versions of) Declarative Phonology) where phonology basically *is* phonotactics (cf. Bird and Ellison 1994, Novák 1998, Bird, Coleman, Pierrehumbert and Scobbie 1992, etc.), and this can be seen as an advantage of these models. The same is true of other recent constraint-based models that dispense with the underlying representation (Burzio 1996, 2002). Although Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1993, 1995) differentiates between input and output and is thus not a one-level model, it avoids the level problem since – because of the 'Richness of the Base' (Smolensky 1996) – it claims that there are no language-specific restrictions on the input, no phonotactics of the lexicon and the surface pattern emerges as a result of the interaction of GEN and EVAL applied to any input (cf. Kager 1999, McCarthy

In structuralist phonology (e.g. Trubetzkoy 1939/1969, Harris 1951, Hockett 1958) phonotactics refers to the combination of *phonemes*, so phonotactic regularities are stated at the phonological ('phonemic') level and thus apply to the phonological representation. As morphophonological alternations are considered to lie outside phonology proper, the mapping between the phonological representation and the phonetic one consists in the application of allophonic statements. Thus, the division of labour between phonotactics and allophonic statements is this: allophonic statements express/incorporate distributional information about non-contrastive (redundant) features (more precisely: features that are *always* non-contrastive (redundant) in the system[7]) and phonotactic statements express the distribution of contrastive features.[8]

As in generative phonology in general morphophonology (alternations) is part of phonology, and the mapping (the derivation of the surface representation from the underlying one via phonological rules) is allowed to manipulate distinctive as well as redundant features (in the same way[9]), underlying representations are more abstract and the difference between underlying and surface phonotactics is significant. For instance, in Standard British English words cannot end in a consonant cluster that consists of a nasal followed by a non-coronal voiced plosive ([*mb#, *ŋg#]). However, there are morphemes that can surface with a final cluster of this kind, though not when they are word-final. In the latter case the voiced stop is not realised: *bomb* [bɒm] ~ *bombard* [bɒmˈbɑːd], *strong* [strɒŋ] ~ *strong* [strɒŋgə]. If we consider these to be regular (non-suppletive) alternations, underlying forms with final /mb, ŋg/ are postulated, from which the voiced stops are deleted by a phonological rule word-finally. The obvious question is: Are strings with final nasal+ non-coronal stop clusters *phonologically* well-formed in English? The problem is that underlyingly they are, while at the surface they

2002). The discussion of these models is beyond the scope of this dissertation.

[7]given the 'once a phoneme, always a phoneme' principle (e.g. Gleason 1955, Jones 1957)

[8]In Trubetzkoy this is more subtle: importantly, phonotactics also determines/underlies the status of a phonological opposition, whether it is 'constant' or 'neutralisable' (cf. Trubetzkoy 1939/1969).

[9]cf. Halle (1959)

are not. The early and classical generative[10] approach to the problem was to confine phonotactics to the underlying representation (in the form of statements (redundancy rules) about morpheme structure (MSCs), see below) and the surface pattern was assumed to be accounted for by MSCs and phonological rules in conjunction. Surface phonotactics had no theoretical status in these models: '[…] the facts about permissible and impermissible sequences at the output level are non-significant, the fortuitous product of the restrictions on underlying representations plus the phonological rules' (Sommerstein 1977: 193-194). It soon became clear, however, that this division of labour is fraught with serious deficiencies since surface phonotactic constraints do play a role in the mapping as well[11] ('derivational constraints', cf. Kisseberth 1970, Shibatani 1973) and it was argued that surface phonotactic constraints are necessary, and it is the underlying phonotactic constraints that are redundant and have no theoretical status (e.g. Sommerstein 1974, 1977). A more recent formulation of the same stance is that phonotactic constraints (in the form of syllable structure constraints) are 'everywhere rules' (cf. Kenstowicz 1994) that are active throughout the derivation but do not apply to the underlying representation (trivially, since underlying representations are unsyllabified). This is (basically[12]) the approach that we take in the present dissertation.

In Lexical Phonology (e.g. Kiparsky 1982*ab*, 1985), this picture can become somewhat more intricate because the modular organisation of the lexical phonology/morphology makes it possible to express the well-known difference between the phonotactics of different phonological/morphological levels/strata, in particular, the fact that the phonotactics of root-level derivatives is typically the same as that of underived words while the phonotactics of word-level derivatives is usually very different. This can be accommodated by allowing partially different phonotactic rules to apply in the different lexical levels/strata.

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[10]cf. Halle (1962), Chomsky and Halle (1968), Postal (1968), Anderson (1974)

[11]Another (related) deficiency was that the approach lead to a 'duplication problem': sometimes the same generalisation had to be stated twice in the phonology: once as an MSC, once as a phonological rule, cf. Kenstowicz and Kisseberth (1977, 1979) for a detailed discussion.

[12]Though we also claim that MSCs, i.e. phonotactic constraints whose domain is the morpheme (*not* the feature-filling redundancy rule MSCs of SPE) are also necessary to account for the phonotactic pattern of Hungarian (see sections 2.1.2, 3.4).

The analysis given in the present dissertation follows this by postulating two syllable templates that express phonotactic restrictions, the ‘core syllable’ and the ‘extended’ syllable templates, and only allowing core syllables to be built in Block 1 of the derivation and restricting extended syllables to Block 2 (see sections 2.2, 4.1.4.5).

2.1.2. The domain of phonotactic constraints

We have pointed out above that the ultimate aim a phonotactic analysis is to characterise the phonologically well-formed word. However, this does not necessarily mean that (a) the basic *domain* within which the phonotactic constraints/rules of the theory are assumed to apply is the word, or (b) a theory must have just one basic domain (a single ‘structural base’) with reference to which all the significant phonotactic generalisations can be captured. Indeed, most frameworks derive phonological the well-formedness of the word from that of a smaller unit such as the morpheme or the syllable and many analyses recognise the fact that while the phonotactic grammaticality of a larger unit may be derivable from the phonotactic grammaticality of the smaller units from which it is composed, there may be phonotactic regularities specific to (and only statable with reference to) the larger unit too.

Structuralist phonology was not committed to a single most important structural base for phonotactic analysis. It was assumed that the identity of such a unit may even be language-specific: in some languages the syllable may be the most appropriate unit for the statement of phonotactic regularities, in others it may be the word or the morpheme (e.g. Trubetzkoy 1939/1969).

Early and classical generative phonology assumed that the morpheme was the only structural base: phonotactic statements were Morpheme Structure Rules/Constraints (MSRs/MSCs). In fact, (implicitly or explicitly) the morpheme was also considered to be the largest domain for phonotactic regularities: the well-formed word was assumed to be a concatenation of well-formed morphemes (and any restrictions on their concatenation were considered to be morphological and not phonological in nature[13]). Morpheme-based phonotactics followed from the assumption that phonotactic rules only applied to the underlying representation (see section 2.1.1) of morphemes listed in the lexicon (since the lexicon was considered to be a list of morphemes), and the assumption that phonological representations consisted of strings of segments (which were represented as one-column feature matrices) and the only groupings of these segments were morphological/syntactic in nature (whose boundaries were represented by boundary symbols like '#', '+ ' or '= '). *Prosodic* groupings of segments such as the syllable had no theoretical status, since syllable division is (almost always) predictable from the sequences of segments and thus was considered to have no place in underlying representations. Whatever regularities seemed to be expressible with reference to the syllable were considered to be expressible and were to be expressed with reference to the segment sequences themselves directly (since syllable division was predictable from the segment sequences anyway), cf. Chomsky and Halle (1968). The syllable as the domain of phonotactic constraints (and a legitimate prosodic unit of phonological representations to which phonological rules may be sensitive to) was reintroduced into generative phonology following arguments presented in Kahn (1976/1980)[14] and became standard in Autosegmental Phonology and Metrical Phonology and generally in later phonological theories within the generative tradition (e.g. Steriade 1982, Clements and Keyser 1983, Goldsmith 1990, etc.).[15] Kahn's phonotactic arguments for the syllable concerned the

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[13]Independently of the domain issue, this assumption is clearly false. There are well-known cases of phonological conditions on affixation (e.g. in English deverbal noun-forming *-al* and verb-forming *-ize* can only attach to stems with non-final stress; deadjectival verb-forming *-en* cannot attach to sonorant-final stems; etc, cf. Siegel 1974, Carstairs-McCarthy 1998, Raffelsiefen 1996; for a comprehensive review of interesting cases see the LINGUIST List < linguist@linguistlist.org> Vol-13-92) and of phonological conditioning of suppletive alternations (e.g. the *-sz~ -(V)l* alternation in the 2nd sg. present indefinite (see Section 3.2.4.3)).

[14]Kahn was not the only one (or the first one) to argue for the syllable as the appropriate phonotactic domain after SPE (cf. Fudge 1969, Brown 1969, for instance), but he was the most influential within the generative paradigm.

[15]This includes (most versions of) Optimality Theory too. Classical Government Phonology (e.g. Kaye, Lowenstamm and Vergnaud 1990, Harris 1994) and its later offsprings, strict CV phonology (e.g. Lowenstamm 1996, Scheer 1999) and strict VC phonology (e.g. Szigetvári 1999, 2000b) seem counterexamples at first, but they are not since they all recognise a

relationship between word-initial/final clusters and word-medial clusters (in morphologically simple words). He pointed out that a possible medial consonant cluster can be analysed into a combination of a possible word-final consonant or consonant cluster plus a possible word-initial consonant or consonant cluster: hypothetical **atktin* is not a possible word in English because /*tk#/ is not a possible final cluster and /*#kt/ is not a possible initial cluster – by contrast, hypothetical *atklin* is a possible word because /#kl/ is a possible initial cluster (*clue, clash,* etc.). If the morpheme is the (only) domain of phonotactics, then this fact is nothing more than an accident (Kahn 1976: 57-58). However, if the basic domain of phonotactics is the syllable and if we assume that the set of word-initial clusters is coextensive with the set of syllable-initial clusters and the set of word-final clusters is coextensive with the set of syllable-final clusters, then the above observation follows from syllabification: **atktin* is not a possible word because it is not syllabifiable (**a.tktin, *at.ktin, *atk.tin, *atkt.in*). *Atklin,* on the other hand, is a possible word because it is syllabifiable since /kl/ is a possible syllable/word (*at.klin*).[16]

The syllable as a basic phonotactic domain has two additional advantages. The first concerns the 'uniformity' of the syllable. The syllable is obviously a more uniform structural base than the morpheme (or the word) in the sense that it displays a much more limited range of variation: morphemes (words) can differ from one another in a wider range of dimensions (length, number of vowels, etc) than syllables which have a uniform structure in the sense that

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prosodic domain of phonotactic organisation (Onset-Rime doublets in classical Government Phonology, pairs of CV positions and pairs of VC positions in strict CV and strict VC Phonology, respectively), they just deny the existence of the syllable as a constituent. We will return to a real counterexample, Phonetically Grounded/Driven Phonology (e.g. Hayes 1996, Steriade 2000) later in this section.

[16]Note that the relationship between word-initial/final and word-medial clusters is more complex than Kahn (1967) suggested. It is a well-known fact that phonotactics is more 'relaxed' at the periphery of analytic domains (e.g. word-finally and word-initially) than medially (cf. e.g. Kenstowicz 1994, Harris 1994, Törkenczy and Siptár 1999ab and references cited therein). One consequence of this is that not all combinations of a well-formed syllable-initial cluster plus a well-formed syllable-initial cluster form well-formed medial clusters (see section 3.1). This, however, does not *crucially* change the force of the argument for the syllable vs. the morpheme as the basic domain of phonotactics since exclusively morpheme-based phonotactics would predict *no* systematic relationship between word-initial/final and word-medial clusters (which is an untenable claim).

they *always* consist of a single nucleus preceded and/or followed by an optional consonant (cluster). The uniformity of the syllable is a desirable property if it is seen as a building block from the well-formedness of which the phonotactic grammaticality of the word derives (Törkenczy 2000, 2001). Also, the uniformity of the syllable predicts that phonotactic statements can be stated more generally than those that can be formulated with reference to the morpheme.[17]

The syllable as a prosodic unit is usually/often assumed to have an internal (Onset - (Nucleus - Coda)$_{\text{Rhyme}}$)$_{\text{Syllable}}$ structure.[18] This internal organisation is advantageous since it expresses phonotactic tendencies, i.e. phonotactic generalisations/expectations follow from it, such as the lack (or the marked character) of phonotactic constraints between a consonant and a following vowel. Since the morpheme has no internal phonological organisation (if we do not recognise its organisation as a combination of syllables) and as a phonotactic domain it is just a morpheme size string of segments it suggests no comparable predictions.

We assume in the present dissertation that the status of the syllable as the basic phonotactic domain is firmly established and we will formulate the basic Hungarian phonotactic constraints as Syllable Structure Constraints (SSCs). However, there is evidence (Kaye 1974, Kenstowicz and Kisseberth 1977, Törkenczy 1994*a*, Booij 1995, 1999, Hammond 1997) that the phonotactic well-formedness of words also depends on constraints independent of prosodic structure (syllabic organisation). The relevant constraints are Morpheme Structure Conditions (MSCs) and sequence constraints. MSCs define possible morpheme shapes and may refer to categorial information (word classes). Thus, they can impose constraints on what is a possible morpheme, noun, verb, etc. in a given language. These constraints are different from classical generative MSRs/MSCs (e.g. Chomsky and Halle 1968): the recognition of the

[17]Discovering the 'universal' (cross-language) properties of the syllable (e.g. Trubetzkoy 1939/1969, Kaye and Lowenstamm 1981, Blevins 1995) seems a more plausible task than characterising the general properties of the morpheme across languages. Note, however, that Trnka (1936) attempted to formulate 'general laws of phonemic combination' with reference to the morpheme – note also Trubetzkoy's critique (Trubetzkoy 1939/1969: 244-247).

[18]There are other views of intrasyllabic structure than this one (which we assume in the present dissertation). For some discussion of the organisation of the syllable and references see section 2.2.

morpheme as a domain does not entail a commitment to *underlying* MSCs: they may apply to (near) surface representations, derived representations, or underlying representations (or all three).[19] MSCs only complement SSCs if there are phonotactic regularities in a given language that are only expressible with reference to the morpheme as a domain.

A particular language may also have well-formedness conditions that constrain the combination of segments irrespective of their affiliation with prosodic or morphological units. These sequence constraints may state that a given (sequential) combination of segments (or features) XY is ill-formed regardless whether it is wholly contained within or cuts across structural units such as syllables or morphemes within the word or even across the word (for some examples of clear cases of sequence constraints in Hungarian see sections 3.3.2.2, 3.5 and 4.2.3. In this dissertation we argue that all the three kinds are necessary to account for the phonotactic pattern of Hungarian.[20]

2.1.3. Phonotactic strata

It is a well-documented property of the lexicon of a natural language that it may have a stratified structure. Phonologically, stratification manifests itself in the fact that lexical items that belong to different lexical strata (sublexicons) may display (partially) different phonological regularities. Probably the best known examples are Japanese (Itô & Mester 1995) and English (Chomsky & Halle 1968). The stratum-specific phonological regularities may involve alternations (captured by phonological rules) or phonotactic patterns (captured by phonotactic constraints: SSCs, MSCs, or sequence constraints). These sublexicons exist

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[19]There are recent arguments that even underlying morpheme structure constraints are necessary (Booij 1995, 1999, Hammond 1997).

[20]Note that there are recent theories which argue that *all* phonotactic constraints are sequence constraints, i.e. local restrictions on segment combination (grounded in perception/perceptibility) and (prosodic) domains (such as the syllable) have no role in phonotactics (e.g Côté 2000, Steriade 2000, Rebrus and Trón 2002).

synchronically —they are not simply etymologically identical/similar sets of words.[21] Sublexicons/lexical strata may sometimes be identified independently of the phonological regularities, specifically, phonological rules and/or phonotactic constraints may be associated with a specific word-class.[22] Stress-assignment in English, for instance, follows two patterns (the 'verb pattern' and the 'noun' pattern) rather than a single homogeneous one (cf. Chomsky and Halle 1968). The phonotactics of the Classical Arabic verb is different from that of the noun (cf. McCarthy 1981). A similar situation exists in Hungarian where the phonotactics of verbs is more restrictive that the phonotactics of non-verbs (cf. Trón & Rebrus 2000, 2001, Rebrus & Trón 2002, Törkenczy 2000, 2001; see section 3.4.3) and where word-class membership partially determines the distribution of stem-final floating [+ open_1] (which causes Lowering, cf. sections 4.1.3 and 4.1.4.3).

It is a nontrivial problem how phonotactic grammaticality ratings are influenced by a more intricate structuring of the lexicon. Several scenarios seem possible (e.g. each sublexicon has its own phonotactic subgrammar, or there is a designated default sublexicon that determines the grammaticality ratings of unlisted strings, etc). We shall not pursue this issue here (it is beyond the scope of the present dissertation), but note that the phonotactic 'space' in a language may not be homogeneous, so phonotactic constraints must be permitted to be associated with a sublexicon.

2.1.4. Degrees of phonotactic well-formedness, irregularities, accidental gaps

It is usually taken for granted that native speaker judgements about the phonotactic well-formedness of strings of segments show a binary division of strings into well-formed and ill-

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[21]The items in a given sublexicon may or may not be etymologically related, as is the case with the sublexicons in Japanese (Yamato, Sino-Yapanese, Foreign and Mimetic, cf. Itô & Mester 1995). 'Foreign' words of various origin may constitute a sublexicon in a language (as in Japanese), but that does not mean that *all* the words of foreign origin in that language necessarily belong to the foreign stratum/sublexicon since some words of foreign origin are not identifiable phonologically (e.g. *tánc* 'dance' in Hungarian).

[22]There may be other independently identifiable strata. Recently there has been claims that place-names form a phonotactic sublexicon in Hungarian, cf. Rebrus & Trón (2002).

formed. It has to be pointed out, however, that this is not necessarily true, and there exists some experimental evidence that native speakers can distinguish more than two degrees of phonotactic grammaticality (Ohala 1984, 1986, Scholes 1966, Greenberg & Jenkins 1964). Although the evidence is far from conclusive, there have been attempts to construct algorithms that assign strings to more than two levels of phonotactics well-formedness (Chomsky & Halle 1968, Scholes 1966, Greenberg & Jenkins 1964, Clements & Keyser 1983). While these algorithms often make wildly different predictions,[23] they all agree in the central assumption (which they share with the usual approach that only distinguishes two levels of well-formedness) that while unlistedness in the lexicon (non-occurrence) does not necessarily entail phonotactic ungrammaticality, the more similar an item is to most of the listed items, the more well-formed it is (or in the case of two-level models: the more likely it is to be well-formed). There seems to be an agreement that accidental gaps exist and that the lexicon of a natural language contains (a small number of) items that are phonotactically irregular.[24] The difference between a multi-level phonotactic approach (i.e. one that permits more than two degrees of well-formedness) and a two-level approach (i.e. one that permits only two degrees of well-formedness) is that in the former accidental gaps and irregular strings (like any occurrence or non-occurrence) may represent various degrees of phonotactic well-formedness while in the latter an accidental gap is perfectly well-formed (it has the same status as a systematic occurrence) and an irregular attested string is just as ill-formed as a systematic gap.

In this dissertation I shall take the conservative stance and assume that there are only two degrees of phonotactic grammaticality: well-formed and ill-formed, and that strings

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[23]For instance, about the evaluation of the number of anomalies in a string: some suggest that the number of phonotactic violations in a string does not influence the well-formedness of the string (Chomsky & Halle 1968) others predict that the more violations a string has, the less well-formed it is (Greenberg & Jenkins 1964). For a detailed discussion and critique of the various algorithms see Törkenczy 1987, 2000*ab*.

[24]The only approach I know that denies the existence of accidental gaps (in fact, the relevance of the accidental-systematic distinction) is Rebrus & Trón (2002). Note that, although some string are claimed to be phonotactically better than others in Rebrus & Trón (2002), this does not imply different degrees of phonotactic well-formedness in the sense discussed above. What they mean is a difference in markedness which manifest itself in implication: the presence a ‘worse’ (i.e. more marked) string (universally) implies the presence of a better (i.e. less marked) one.

present in or absent from the lexicon may be well-formed or ill-formed[25] (which is basically the classical structuralist position, cf. Fischer-Jørgensen 1952, Vogt 1954).

2.2. Framework and theoretical assumptions

In this section I discuss the main theoretical assumptions underlying the description of Hungarian phonotactics presented in this book.[26] These concern (i) the derivation and the relationship between morphological and phonological domains, (ii) the representation of segments, and (iii) the representation of syllable structure. Further discussion of some details appears in the analytical chapters where they are relevant to the issues at hand.

In this dissertation I assume that—as in other languages (e.g. English)—there are two kinds of morphological domains in Hungarian. We shall refer to the two kinds of domains as 'synthetic' and 'analytic'.[27] The distinction is crucial in (i) the relationship between morphological domains and syllable structure/phonotactics, and (ii) the derivation.

Analytic morphological domain boundaries are opaque to phonotactic constraints, in other words, phonotactic constraints do not apply across them (cf. Kaye, Lowenstamm and Vergnaud 1990). For instance, in Hungarian there are no phonotactic restrictions that constrain which consonants can be juxtaposed in a cluster $C_\alpha C_\beta$ when C_α is the last consonant of the first half of a compound word and C_β is the first consonant of the second half of the compound. The restrictions one may find are purely accidental or non-phonological.[28] Intervocalic /kp/,

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[25]Naturally one expects the number of actually occurring irregular strings to be very low and the phonotactically permitted/delimited 'space' to be filled by strings represented in the lexicon—though it has to be admitted that this 'expectation' is not formally built in the framework adopted in the dissertation (or in any generative model).

[26]These are essentially the same as those in Siptár & Törkenczy (2000).

[27]The terms are borrowed from Government Phonology (cf. e.g. Kaye and Vergnaud 1990, Kaye 1995), but the distinction is traditional in different varieties of Generative Phonology. It is the same as that between '+ ' boundary and '#' boundary affixation, or Level 1 and Level 2 affixation (cf. Harris 1994).

[28]The few non-accidental regularities that can be found are due to postlexical assimilations such as Voice Assimilation and Nasal Place Assimilation, cf. Siptár & Törkenczy (2000).

for example, is only found under the conditions described above (*kerékpár* ‘bicycle’), and is in fact not a well-formed interconstituent cluster (i.e. is excluded by a transsyllabic constraint, cf. section 3.3.2). This type of morphological boundary is analytic and is a barrier to syllabification/phonotactic interaction. In Hungarian, compounds[29] (⟦⟦*kerék*⟧ ⟦*pár*⟧⟧) and preverbs (⟦⟦*meg*⟧ ⟦*dob*⟧⟧ ‘throw at’) are analytic. Suffixes may be analytic (e.g. *-ban/ben* ‘in’: ⟦⟦*fény*⟧*ben*⟧⟧ ‘in (the) light’, *-d* ‘imp. def.’: ⟦⟦*nyom*⟧*d*⟧ ‘push!’) or synthetic (e.g. *-t/-ot/-et/-öt* ‘acc.’: ⟦*nyom-ot*⟧ ‘trace’ (acc.)).[30] Note that analytic suffixes are in an analytic domain separate from the stem, but—unlike compounds and preverbs—they do not form an independent one.[31] In Hungarian, the phonotactic pattern of monomorphemic stems is similar to, though not always identical with, that of stem+ synthetic suffix combinations.[32] The boundary between the stem and a synthetic suffix is thus transparent to syllabification/phonotactic interaction. However, it is not completely invisible to phonology since there are regularities that can only be expressed if it can be referred to (e.g. Hiatus (section 4.1.4.2), and Lowering (section 4.1.4.3).

I follow Lexical Phonology in assuming that there is a lexical and a postlexical phase of the derivation, and also in that there is a modular difference between (potentially partially overlapping) sets of lexical rules that is related to the morphological domains within which rules apply (I shall refer to the two lexical modules as Block 1 and Block 2). The relationship between morphological domains and modules has been interpreted in various ways. Classical

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[29]Of course, words always form their own analytical domains: ⟦*Légy*⟧⟦*bátor*⟧ ‘Be brave!’.

[30]Some authors distinguish a third type, the quasi-analytic suffix which is ‘intermediate’ between analytic and synthetic. See Rebrus & Törkenczy (1999), Rebrus (2000b), Törkenczy (1998b), Törkenczy & Siptár (1999a). In this dissertation I consider these suffixes idiosyncratic phonologically and suggest that the special alternations they are involved in are instances of suppletive allomorphy, see sections 3.2.4.3., 4.1.3., and 4.1.4.4.

[31]This difference is important in Vowel Harmony because (most) analytic suffixes harmonize, but preverbs and compound members do not (cf. Siptár & Törkenczy 2000).

[32]For instance, identical coda clusters are permitted monomorphemically and when the coda consists of a stem-final consonant and a consonant that belongs to a synthetic suffix. However, hiatus is possible monomorphemically (and across an analytic boundary) but not when one of the vowels is stem-final and the other is initial in a synthetic suffix. See section 4.1.4.2.

Lexical Phonology (e.g. Kiparsky 1982*ab*) assumed an interleaving of morphology and phonology and thus, both phonological processes and morphological operations were said to take place in the module they 'belong to'. As the modules are ordered with respect to one another, both the phonological processes and the morphological operations in Block 1 have to precede those in Block 2. Because of the problem of violations of the affixal order predicted by level ordering and that of 'bracketing paradoxes' (cf. Aronoff 1976, Fabb 1988, Cole 1995), a different interpretation was proposed in Halle and Vergnaud (1987) and Halle and Kenstowicz (1991). In their view it is only the phonological processes that are assigned to the modules. All of morphology happens before phonology and each suffix is simply marked according to which block of rules it triggers. Thus, the order of morphological operations does not have to mirror the order of the modules. There is evidence of violations of level ordering in Hungarian. The suffix *-hat/-het* 'may' is a case in point. It can be attached without a linking vowel to any stem that ends in a single consonant: *lo*_**p-h**_*at* 'may steal' (3sg indef.), *dö*_**f-h**_*et* 'may thrust' (3sg indef.), *lá*_**t-h**_*at* 'may see' (3sg indef.), *ra*_**k-h**_*at* 'may put' (3sg indef.), etc. The lack of phonotactic interaction between the stem-final and the suffix-initial consonant suggests that it is an analytic (Block 2) suffix. Yet it can be followed by a suffix such as the past tense suffix *-(V)t(t),* which is synthetic (Block 1) since the occurrence of its initial linking vowel depends on the last consonant of the stem (cf. section 4.1.4.4.): *rohan-hat-*_**ott**_ 'may run' (3sg past indef.)—compare *rohan-t* 'run' (3sg past indef.). We adopt the view that morphology precedes phonology rather than being interleaved with it, and that the phonological rules belong to (ordered) lexical modules, but otherwise shall interpret derivation in a somewhat different way.[33]

We shall assume that the suffixes are marked according to whether they are analytic or synthetic. Analytic suffixes must be in a (dependent) domain which is different from that of the stem they are attached to. This domain may be monomorphemic or may contain synthetic suffixes as well. Block 1 rules will apply only *within* (dependent or independent)

[33]This interpretation owes very much to Government Phonology (cf. Harris 1994, Kaye 1995), but is very different from it in many respects (e.g. Government Phonology does not permit rule ordering, let alone blocks of phonological rules).

analytic domains (thus in a structure ⟦⟦X⟧Y⟧⟧, they may apply (independently) to X and Y).[34] Block 1 rules show derived environment effects, but the derivation is not (necessarily) cyclic within the domain (cf. section 4.1.4.3). Following Cole (1995) we assume that derived environment effects (i.e. that a given rule does not apply within the morpheme, but does when the triggering environment is the result of affixation (of certain affixes)) are not (exclusively) the property of cyclic rules, so we shall refer to the Derived Environment Constraint instead of the Strict Cycle Condition. When all the Block 1 rules have applied, the whole word is subjected to the rules of Block 2. An extended syllable template (cf. Chapter 3 and section 4.1.4.5) is available when this happens and Block 2 rules are assumed not to be subject to the Derived Environment Constraint. A given rule may occur in both blocks or only one of them.[35]

The feature geometry assumed is essentially that proposed in Clements and Hume (1995), compare Siptár & Törkenczy (2000) and Appendix A.

The view of syllable structure and syllabification taken here will be fairly traditional. I assume that syllable structure is not present underlyingly, but is built up by syllabification in the course of the derivation.[36] Syllabification is seen as a template-matching algorithm (Itô 1986, 1989) ~~cf~~. section 4.1.4.1.

I assume that the segments belonging to a syllable are organized into the sub-syllabic constituents onset, nucleus, rhyme and coda. I also make the assumption that the constituents are hierarchically organized:[37]

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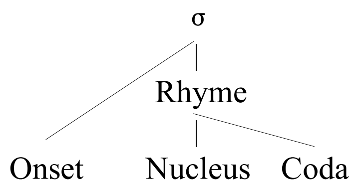
[34]It is necessary to allow Block 1 rules to apply within a dependent analytic domain because it may contain a synthetic suffix.

[35]I take no stand as to whether rules can be 'turned on' or only 'turned off' (cf. Mohanan 1986, Halle and Mohanan 1985, Borowsky 1986).

[36]For a contrary view cf. Kaye, Lowenstamm and Vergnaud (1990).

[37]For other views of syllable structure and sub-syllabic organization cf. Clements and Keyser (1983), Kahn (1980), Kaye, Lowenstamm and Vergnaud (1990), Hyman (1985), Hayes (1989). For more 'radical' phonological theories that deny syllabic organisation altogether see Chomsky & Halle (1968) (Classical Generative Phonology); Lowenstamm(1996), Scheer (1999), Szigetvári (2000*ab*), Polgárdi (2000, 2002, 2003*ab*) ((Strict) CV Phonology); Szigetvári (1999) (VC Phonology); Steriade (2000) (Phonetically Grounded Phonology).

(1)



Under this view, syllable well-formedness derives from the well-formedness of the subsyllabic constituents. Given the hierarchical structure in (2), no restrictions (or at least only weaker ones) are expected to apply between the constituents onset and rhyme than between the nucleus and the coda or within each (sub)constituent. This is sometimes referred to as the Principle of Free Cooccurrence (Kaye 1995) and appears to hold true of Hungarian.[38] Furthermore, (in Hungarian and universally) constraints on syllable well-formedness seem to apply to subsyllabic constituents and not to the constituent 'syllable' itself. This has led some researchers (Aoun 1979, Kaye, Lowenstamm and Vergnaud 1990) to deny the existence of the syllable as a constituent altogether. As nothing seems to hinge on this matter, we take no theoretical stand and retain the syllable as a convenient way of referring to the combination of an onset and a rhyme.

I assume that all segments that are phonetically interpreted must be prosodically licensed (Itô 1986, 1989). The question is whether this assumption necessarily means that each segment that appears at the surface is affiliated to one of the subsyllabic constituents. The answer is very important in the analysis of the so-called edge effects, i.e. the special character of (certain) clusters at the edges of (certain) morphological domains. There are strict and permissive approaches to this problem. Under the strict view, edge effects must be accounted for by normal syllable *structure* (i.e. the answer to the question above is yes). Thus, no special syllable structures are postulated that are limited to domain edges. Government Phonology

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[38]Some authors deny the validity of the principle as a universal (Clements and Keyser 1983, Davis 1985) and there are known counterexamples. However, it appears that the unmarked case is when the principle holds (e.g. Fudge 1987). Note that this does not mean that there may be no phonotactic constraints holding between a vowel and a preceding consonant; it only means that if such a constraint obtains, it is not a syllable structure constraint ~~it~~ can easily be a constraint on morpheme shape, for instance (cf. Davis 1991, Booij 1995, 1999).

exemplifies this approach.[39] In the permissive approach edge effects are accounted for by special syllable structures that can only appear at domain edges. There are several variations: in some analyses the special syllable structures in question may contain an additional subsyllabic constituent such as the appendix (e.g. Fudge 1969, Fujimura 1979, Hulst 1984), other approaches permit direct licensing (i.e. unmediated by a subsyllabic constituent) by the syllable node in the special syllables (e.g. Steriade 1982, Clements and Keyser 1983), still others allow direct licensing of segments by prosodic nodes higher than the syllable at domain edges (Rubach and Booij 1990, Törkenczy 1994*a*). It is difficult (and not always possible) to find empirical differences between the various approaches.

In this dissertation I adopt the permissive approach and allow an extended syllable, i.e. one containing an appendix, in Block 2 (cf. Chapter 3 and section 4.1.4.5). Only the core syllable template shown in (2) is available for syllabification in Block 1.

Phonotactic constraints are often explainable with reference to sonority and the Sonority Hierarchy (e.g. Clements 1988, Vennemann 1988, Rice 1992). Despite the difficulties with the phonetic definition of the Sonority Hierarchy (Clements 1990, Laver 1994), I take it to be a well-established phonological relationship between classes of segments. We also assume that the Sonority Hierarchy is universal[40] and is the following:

(2) *Sonority Hierarchy*

stops, affricates < fricatives < nasals < liquids < glides < vowels

Although the Sonority Hierarchy is universal, there has to be room for some language particular variation: sonority 'reversals' are not permitted (e.g. a language may not classify obstruents as less sonorous than nasals), but different language particular settings of sonority distance between segment classes are possible (e.g. a language may determine that the sonority distance between stops and fricatives is smaller than that between fricatives and nasals; cf. Steriade 1982, Hulst 1984). We assume that phonotactic constraints can refer directly to the

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[39]In GP, instead of special structures, special segmental material (empty vowels) may appear at the edges of domains. See, Kaye, Lowenstamm and Vergnaud (1990), Kaye (1990). See also Burzio (1994) on the relationship between allowing special structures vs. special segments.

[40]For arguments against language particular Sonority Hierarchies, cf. Clements (1990).

Sonority Hierarchy.[41] In order to account for sonority-based asymmetries of segment combination we shall borrow the term 'government' from Government Phonology (e. g. Kaye, Lowenstamm and Vergnaud 1990), and Rice (1992)[42] and state:

(3) *Government*

A segment X governs an adjacent segment Y if X is less sonorous than Y.[43]

I take government to be asymmetrical, but not intrinsically strictly directional in all governing domains, i. e. it is always directional, but its direction may be fixed in some structural positions but free in others.[44] I assume that government is universally left to right in onsets and right to left in codas. In Hungarian transsyllabic clusters, however, the directionality of government is not fixed (it may be left to right or right to left), cf. section 3.3. I follow Kaye, Lowenstamm and Vergnaud (1990) and assume that government applies between timing slots.

Following Rice (1992) I assume that there may be another asymmetrical relationship between adjacent segments, i. e. the relationship of 'binding'. I follow (and generalize) Rice's definition (compare Rice 1992):

(4) *Binding*

A bound segment contains dependent structure.

Thus, a bound segment contains structure that does not differ from that of the segment that

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[41]Note that this does not mean that the Sonority Hierarchy is a primitive (a scalar feature, for instance). I assume that the Sonority Hierarchy is derived. I take no stand whether it is to be defined in terms of features (cf. Clements 1990) or structurally (cf. Kaye, Lowenstamm and Vergnaud 1990, Harris 1990, Rice 1992).

[42]There are important differences between GP's and Rice's interpretation of government. Our interpretation here is closer to Rice (1992).

[43]I do not take a stand as to the interpretation/derivation of sonority. For the sake of simplicity (3) can be interpreted as directly referring to (2)).

[44]Compare Kaye, Lowenstamm and Vergnaud (1990) who assume that government is strictly directional in all governing domains.

binds it (e.g. in a homorganic nasal+ stop cluster the nasal is bound by the stop). Binding can apply to various nodes of the feature tree, e.g. to the root node ('root-binding') or the place node ('place binding') for instance. (in the example above the nasal is 'place-bound'; in a (true) geminate the first consonant is 'root-bound', i.e. it has the same structure from the root down as the second consonant). I assume that binding is strictly directional and is right to left.

The mora is not a primitive in the present treatment, but is considered to be derivative of syllable structure. It is only used as a unit of measuring syllable weight (which, incidentally, plays very little role in Hungarian phonology[45], cf. section 3.4.1) and does not function as a subsyllabic constituent/timing unit. I shall use 'bimoraic' as a convenient label to refer to syllables that have a branching rhyme or/and a branching nucleus. For arguments against moraic syllable structure (as proposed in Hyman 1985, Hayes 1989) cf. Brentari and Bosch (1990), Davis (1990), Sloan (1991), Tranel (1991), Rialland (1993).

[45]For a different view, cf. Vago (1989*a, b*, 1992)

Chapter 3.

'Static' phonotactics: the phonological shape of the Hungarian word

3.1 Introduction

The phonological or phonotactic well-formedness of a word can be seen as an interplay of two factors: a prosodic and a non-prosodic one. On the one hand, a phonologically well-formed word must be parsable into (well-formed) prosodic units. In this dissertation we accept the general assumption that the prosodic unit that is chiefly responsible for phonotactic well-formedness is the syllable.[1] In addition, there are well-known examples of phonotactic constraints whose domain is a higher level prosodic unit such as the foot or the prosodic word.[2] As the foot does not seem to play an important role in Hungarian, a phonotactically well-formed Hungarian word is a unit which is exhaustively parsable into well-formed syllables. Thus, the phonotactic well-formedness of a word is derivable from well-formedness conditions on syllables (*Syllable Structure Constraints* (SSCs)). This relation between the well-formedness of words and syllables, however, is not symmetrical: while it holds that a well-formed word consists of a string of well-formed syllables, it is not true that any string of well-formed syllables constitutes a well-formed (potential[3]) word: there are *transsyllabic constraints* that obtain between syllables, or more precisely, between adjacent subconstituents of different syllables. These constraints do not refer to a prosodic unit higher than the syllable, but impose restrictions on the bonding of syllable edges (interconstituent clusters). In addition, as we have

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[1]Naturally, this is only true of frameworks that refer to the syllable (compare SPE, Government Phonology, Phonetically Grounded/Driven Phonology).

[2]For instance, the distribution of /h/ in English cf. Anderson and Ewen (1987), Harris (1994).

[3]Naturally, well-formedness conditions of any kind must define units that are *potentially* well-formed in the given language, in other words, they must not treat accidental gaps as ill-formed (cf. e.g. Chomsky 1964, Halle 1962, Vogt 1954).

pointed out above, a language may have constraints on prosodic structure that directly refer to prosodic units higher than the syllable (e.g. conditions on word minimality, etc.).

The phonotactic well-formedness of words may also depend on *Morpheme Structure Constraints (MSCs)* and *Sequence Constraints*, i.e. constraints independent of prosodic structure. We shall see that MSCs and sequence constraints partially determine the phonotactic pattern of Hungarian.[4]

3.2. Syllable structure: SSCs

In this section we discuss the constraints that apply within (the constituents of) the syllable and define the syllable template in Hungarian.

3.2.1. The Hungarian syllable template: the basic syllable types

If we disregard the possible complexity of the onset, the nucleus and the coda, Hungarian has the following syllable types:[5]

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[4]See section 2.1.

[5]There is a surprising degree of agreement about this: authors of very different theoretical backgrounds agree that (disregarding constituent complexity) these are the basic syllable types in Hungarian, cf. Rácz (1961), Kaye and Lowenstamm (1981), Kornai (1990a, 1994), though see Kassai (1981) who also permits syllables consisting of consonants only. Naturally, authors whose framework excludes one (or more) of these structures come to different conclusions (e.g. Kaye, Lowenstamm and Vergnaud 1990).

(1)	word-initial	word-medial	word-final
CV	**pa**.tak ‘creek’	fe.**ke**.te ‘black’	sem.**mi** ‘nothing’
V	**i**.on ‘ion’	da.**u**.er ‘perm’	te.**a** ‘tea’
VC	**em**.ber ‘man’	a.**or**.ta ‘aorta’	ri.**ad** ‘get frightened’
CVC	**tom**.pa ‘dull’	ke.**men**.ce ‘oven’	be.**teg** ‘sick’

(1) exemplifies the basic syllable types and shows that they are free to occur in any position (initial, medial and final) in the word.

Blevins (1995) proposes the following binary (YES/NO) parameters to account for language particular variation in syllable typology: Obligatory Onset, Coda, Complex Nucleus, Complex Onset, Complex Coda[6] (note that there is no Onset parameter, i.e. languages cannot choose to have no onsets). (2) shows the parameter settings for Hungarian[7] (disregarding the last three parameters which refer to constituent complexity):

(2)		
	Obligatory Onset	NO
	Coda	YES

As complex nuclei occur in Hungarian (i.e. the Complex Nucleus parameter is set ‘YES’), the syllable inventory in (1) can be extended:

(3)	word-initial	word-medial	word-final
CVV	**só**.vár ‘desirous’	sza.**mó**.ca ‘wild strawberry’	sző.**l**ő ‘grape’
VV	**í** .ró ‘buttermilk’	i.di.**ó**.ta ‘idiot’	rá.di.**ó** ‘radio’
VVC	**ér**.ték ‘value’	ki.**ál**.tás ‘shout’	le.**ány** ‘girl’
CVVC	**sár**.kány ‘dragon’	ka.**szár**.nya ‘barracks’	**sí r** ‘grave’

A comparison of (1) and (3) reveals that the distribution of long and short vowelled syllables

[6]Blevins (1995) has a sixth parameter for Edge Effect that we discuss later.

[7]There are alternative ways of expressing (more-or-less) the same typological distinctions as these parameters cf. e.g. Kaye and Lowenstamm (1981), Clements and Keyser (1983), Prince and Smolensky (1993).

is the same within the word. Furthermore, neither closed nor open syllables are restricted to word-final position and onsetless syllables may occur in positions other than word-initial. Note that long vowels are equally permitted in open and closed syllables (on the distribution of long vowels before consonant clusters, see section 3.4.2).

The three parameter settings discussed so far are fairly uncontroversial. What is more problematic is the setting of the remaining two 'complexity' parameters Complex Onset and Complex Coda. Hungarian words *can* begin and/or end with consonant clusters (e.g. *prém* 'pelt', *ptózis* 'ptosis', *part* 'shore', *akt* 'nude', etc.) but this is not necessarily evidence that these clusters are true onsets or codas.[8] It is a well-known fact that word edges (or certain morphological domain-edges) license special syllable structures. Specifically, there may be consonants or consonant sequences at the edges of these domains that are not incorporated into the onset or the coda of the syllable whose phonetically realized nucleus is the first or the last one in the word, respectively. So the question is whether the consonant clusters that occur word-initially and word-finally in Hungarian are true complex onsets and codas (respectively) or they are 'edge clusters', i.e. clusters occurring at domain edges whose initial or final member(s) are licensed by some special mechanism limited to the edges of domains and not by an onset or a coda constituent dominating them. At this point we are not primarily concerned with the actual licensing mechanism, which will be discussed later, but the analysis of onsets and word-initial clusters (section 3.2.2) and codas and word-final clusters (section 3.2.4).

3.2.2. Onsets—word-initial clusters

As we have seen already, it is not compulsory for a Hungarian syllable to have a (filled) onset. Thus, both vowel-initial and consonant-initial syllables are possible. In principle, any

[8]Some authors do consider it as evidence (e.g. Kahn 1976/1980), but currently there seems to be an agreement among phonologists that the assumption that word-initial/final consonant clusters are necessarily complex onsets/codas is false, see, e.g. Kenstowicz (1994), Kaye (1992), Kaye and Lowenstamm (1981), Kaye, Lowenstamm and Vergnaud (1990), Harris (1994), Steriade (1982), Rubach and Booij (1990), Davis (1990), Törkenczy and Siptár (1999ab).

consonant may be syllabified into a simplex onset.[9] Word-initial two-member and three-member consonant clusters occur—they are shown in Tables I and II. The question is whether these clusters realize branching onsets or not.

[9]Word-initially, palatal $/t^y/$ only occurs in a single morpheme *tyúk* ‘hen’, but we consider this accidental.

TABLE I. *Word-initial CC clusters*

	p	t	t^y	k	b	d	d^y	g	t^s	č	ǰ	f	s	š	v	z	ž	m	n	n^y	l	r	j	x
p		+											+						+		+	+		
t															+							+		
t^y																								
k													+		+				+		+	+		
b																					+	+		
d																+						+		
d^y																								
g															+				+		+	+		
t^s															+									
č																								
ǰ																								
f		+																			+	+	+	
s	+	+	+	+					+			+			+			+	+		+			
š	+	+		+						+					+			+	+		+	+		
v																					+			
z																					+	+		
ž																								
m																			+					
n								+																
n^y																								
l																								
r																								
j																								
x																						+		

Examples: *ptózis* 'ptosis', *pszichológus* 'psychologist', *pneumatikus* 'pneumatic', *plakát* 'poster', *prém* 'fur', *tviszt* 'twist', *tréfa* 'joke', *xilofon* 'xylophone', *kvarc* 'quartz', *knédli* 'dumpling', *klór* 'chlorine', *krém* 'cream', *blúz* 'blouse', *bronz* 'bronze', *dzéta* 'zeta', *drukkol* 'cheer (3sg pres. indef.)', *gvárdián* 'Father Superior (of Franciscan monastery)', *gnóm* 'gnome', *gladiátor* 'gladiator', *gróf* 'count', *cvekedli* < type of pasta> , *ftálsav* 'phthalic acid', *flóra* 'vegetation', *friss* 'fresh', *fjord* 'id.', *szpícs* 'speech', *sztár* 'star', *sztyepp* 'steppe', *szkíta* 'Scythian', *szcéna* 'scene', *szféra* 'sphere', *szvetter* 'sweater', *szmog* 'smog', *sznob* 'snob', *szláv* 'Slav', *sport* 'id.', *stáb* 'staff', *skorpió* 'scorpion', *scsí* < Russian soup> , *svéd* 'Swedish', *smink* 'makeup', *snassz* 'passé', *slussz* 'finished', *sróf* 'screw', *vlach* 'Walachian', *zlotyi* < Polish currency> , *zrí* 'trouble', *mnemonika* 'mnemonics', *nganaszán* 'Nganasan', *Hradzsin* < proper noun>

TABLE II. *Word-initial CCC clusters*

	pr	tr	kr	kl
s		+		+
š	+	+	+	

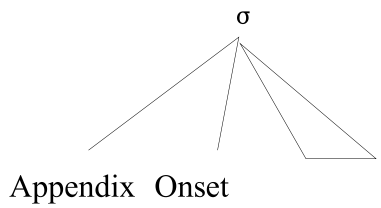
Examples: *sztrájk* 'strike', *szklerózis* 'sclerosis', *spriccel* 'spray' (3sg pres. indef.), *strázsa* 'guard', *skrupulus* 'scruple'

All the words which begin with consonant clusters are loan words, but this fact does not in itself say anything about the status of the initial clusters: it is perfectly possible that the words in question are phonotactically just as 'normal' as any 'native' item in the lexicon. Indeed, Hungarian speakers can detect no difference between the well-formedness of a word such as *prém* 'fur' and *rém* 'monster'. While there are few words beginning with three consonants, words beginning with two consonants cannot be said to be infrequent (though there are many more consonant-initial words that begin with a single consonant). Also, there appear to be phonotactic restrictions holding between the consonants making up the word-initial clusters. While some of these restrictions are unrelated to syllable structure (e.g. the ban on adjacent obstruents differing in voicing), others seem specific to this position and may be interpreted as holding between the members of a branching onset (e.g. the non-occurrence of geminates).[10]

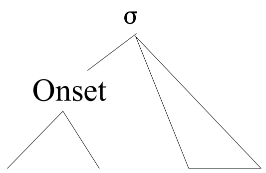
[10] Accordingly, (some of) these clusters have been analysed as branching onsets. For a detailed analysis and specific constraints cf. Törkenczy (1994a).

These constraints may be construed as evidence for the well-formedness of branching onsets. Nevertheless, we want to suggest that the setting for the Complex Onset parameter is in fact 'NO' in Hungarian, and all the clusters that occur word-initially are 'edge clusters'. We assume that the non-final consonants in these clusters are licensed by a special mechanism restricted to domain edges, notably, they are syllabified into a subsyllabic constituent called 'appendix'. Thus, they are represented as (4a) rather than (4b):

(4) a.



b.



Evidence for or against this position may be drawn from alternations/processes that are sensitive to syllable structure and phonotactic patterns. Syllable structure conditioned alternations (to be discussed in detail in Chapter 4) do not present conclusive evidence since there is no alternation in Hungarian that would require that the clusters in question should *not* be represented as branching onsets. However, it must be pointed out that the relevant alternations/processes (such as vowel ~ zero alternations (cf. Chapter 4) and Fast Cluster Simplification (cf. section 4.2.3)) never make a branching onset interpretation *necessary* — i. e. an analysis of these syllable structure sensitive processes is always perfectly compatible with an edge cluster (appendix) interpretation of these consonant sequences.

Phonotactic patterns are another possible source of evidence: if we could show that the 'need' to analyse consonant clusters or substrings of consonant clusters as putatively branching onsets only arises at domain edges, then we could see this as an argument against their branching onset status, as domain edges may license 'special' edge clusters. Given that the word-initial position is suspect (since the clusters occurring there may be edge-licensed as appendix+ onset), the most promising place to look for such evidence is medial. In principle—since they could be syllabified in two ways: (i) VC.CV or (ii) V.CCV—two-member medial clusters (CC clusters) can give us a clue if some alternation or distributional fact distinguishes (i) from (ii). For instance, restrictions on the length of vowels in closed vs. open syllables (closed syllable shortening effects as in English, Turkish, Yawelmani etc.) could distinguish the two syllabifications. Unfortunately, no such fact or phenomenon is available in Hungarian.[11] Medial clusters containing more than two consonants are interesting, however: in such a cluster, syllabification will result in a complex syllabic constituent, either a coda or an onset (-CC.C- or -C.CC-), or *vice versa*, in a language where complex onsets (or codas) are well-formed, *regular* medial clusters of three consonants (or more) are expected to occur. Therefore, the lack/scarcity/irregularity of medial -CCC- clusters can be taken to suggest that branching onsets are ill-formed.[12]

At first sight, Hungarian seems to abound in word-medial -CCC- clusters. However, the main source of such clusters is analytic suffixation (e.g. ⟦ ⟦ *kard* ⟧ *ból* ⟧ 'from (the) sword', ⟦ ⟦ *vers* ⟧ *ről* ⟧ 'about (the) poem', ⟦ ⟦ *elv* ⟧ *telen* ⟧ 'without principles', etc.) and compounding (e.g. ⟦ ⟦ *vers* ⟧ ⟦ *láb* ⟧ ⟧ '(metrical) foot', ⟦ ⟦ *elv* ⟧ ⟦ *társ* ⟧ ⟧ 'comrade', etc.). We have pointed out above (see Chapter 2) that clusters straddling the edge of an analytic domain do not say anything about the phonotactics of the language, they are 'accidental' in the sense that no phonotactic restrictions apply across analytic domain edges—the relevant consonants are just juxtaposed without any restrictions. Thus, 'real data' are monomorphemic items, or words with synthetic suffixation containing medial -CCC-. Interestingly, there are no examples in Hungarian of synthetic suffixation creating -CCC- clusters.[13] There *are* monomorphemic words with -CCC- clusters in the language, but, significantly, their number is rather low, about 300 items in our database. Again, all the relevant words are loans, but, naturally, this does not in

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[11]Long vowels other than *é/á* are not permitted before consonant clusters, but this constraint has nothing to do with syllable structure: all consonant clusters (whether they are potentially well-formed as branching onsets or not) behave in the same way: */iːkta/ and */iːkla/ are equally ill-formed. For details, see section 3.4.2.

[12]For a discussion of complex codas, see sections 3.2.4., 4.1.4.4 and 4.1.4.5.

[13]Multiply suffixed past forms of cluster-final stems are the only exception (e.g. [fiŋ**kt**ɔk] 'fart' (3pl past indef.)). Even these clusters are often broken up ([fiŋ**got**ːɔk]), cf. section 4.1.4. See also the behaviour of cluster-initial (-C_iC_jV…) suffixes in section 4.1.2.2.

itself say anything about their well-formedness in Hungarian (examples: *bisztró* 'bistro', *centrum* 'centre', *komplex* 'complex', *export* 'id.', *improvizál* 'improvise (3 sg pres. indef.)', *instancia* 'instance', *ostrom* 'siege', etc.). Furthermore, there are 95 types of clusters altogether that the approximately 300 tokens exemplify, but, typically, the number of tokens in a given type is extremely low (cf. section 3.3.2.2 for a full list of the relevant clusters). There are only 7 types with 10 or more tokens and the majority of types (n= 48) only have one token. This suggests that medial -CCC- clusters are special/irregular in Hungarian.

True, (monomorphemic) medial -CCC- clusters do display certain regularities (e.g. in a medial -CCC- cluster $C_\alpha C_\beta C_\gamma$, C_β is never a sonorant[14]), we claim that these regularities are accidental in Hungarian in that they only reflect some of the regularities of the source languages the relevant words were borrowed from.[15] More precisely, if a constraint obtaining between medial $C_\alpha C_\beta C_\gamma$ is non-accidental, then we have to do with either of the following two situations: (i) it is identical with a constraint obtaining between the consonants of a corresponding two-member medial cluster $C_\alpha C_\beta$ and thus reduces to a constraint applying between a syllable-final consonant and the following syllable-initial one, i.e. it is an interconstituent constraint (e.g. there are no words with medial *-tpC-* in Hungarian, but there are no words containing medial *-tp-* either); (ii) it is an MSC or a sequence constraint and thus it has nothing to do with syllable structure at all (e.g. adjacent obstruents have to agree in voicing in Hungarian). Otherwise, all apparent medial -CCC-specific constraints are accidental, just 'debris' of the constraints that exist in the languages the particular words containing them were borrowed from. Of course, as (more-or-less random) 'samples' from the phonotactics of the source languages, which conform to universal phonotactic constraints themselves, these clusters may nevertheless reflect universal phonotactic regularities/tendencies.

Another argument for the special character of medial -CCC- clusters involves a comparison of medial -CC- clusters and -CCC- clusters. In a language that permits branching onsets we expect to find -$C_\alpha C_\beta C_\gamma$- clusters where $C_\beta C_\gamma$ is a well-formed branching onset and

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[14]For a discussion of medial -CCC- clusters, see section 3.3.2.2.

[15]Of course, this does not mean that an explanation of why these clusters are not repaired is not in order, see a possible explanation in section 4.1.4.5.

-$C_\alpha C_\beta$- is a permitted interconstituent cluster (-C_α.$C_\beta C_\gamma$-). And *vice versa*, in general, for every -$C_\alpha C_\beta C_\gamma$- cluster we should find a matching -$C_\alpha C_\beta$- cluster if the latter is a permitted interconstituent cluster. Of course, accidental gaps may exist, but this should be the general tendency. It is interesting to compare English and Hungarian since, in the literature English is generally taken to be a language that has branching onsets. As can be seen in (5), English is well-behaved with respect to the generalization above.

(5)	English	**V$C_\alpha C_\beta$V**	**V$C_\alpha C_\beta C_\gamma$V**
	-kt-	vector	electronic
	-pt-	chapter	dioptry
	*-tk-	–	–
	*-pk-	–	–
	*-tp-	–	–
	*-kp-	–	–

Hungarian, on the other hand, is very different: some -$C_\alpha C_\beta C_\gamma$- clusters corresponding to well-formed -$C_\alpha C_\beta$- are curiously missing:

(6)	Hungarian	**V$C_\alpha C_\beta$V**	**V$C_\alpha C_\beta C_\gamma$V**
	-kt-	akta ‘file’	spektrum ‘spectrum’
	-pt-	kapta ‘(boot) last’	dioptria ‘dioptry’
	-tk-	atka ‘mite’	–
	-pk-	lepke ‘butterfly’	–
	*-tp-	–	–
	*-kp-	–	–

We can either say that the missing clusters are accidental gaps, or the other explanation is that complex onsets are ill-formed. We suggest that the latter interpretation is correct.

It follows from the irregular status of medial -$C_\alpha C_\beta C_\gamma$- clusters that it is never necessary to syllabify two (or more) consonants into an onset in medial position. Therefore we claim that the consonant clusters that occur in word-initial position (the only position where consonant clusters arguably look like complex onsets) do not form onsets, but are edge clusters. Thus, the setting of the Complex Onset parameter is ‘NO’ in Hungarian. In our interpretation the phonotactic restrictions word-initial clusters display[16] are just (fragmentary) reflections of the constraints that apply in the source languages the relevant words come from,[17] or those of the universal phonotactic regularities that the phonotactics of the source languages (and the phonotactics of any language) conforms to.

The fact that branching onsets are not permitted does not in itself explain the scarcity/irregularity of -CCC- clusters. The reason is that a -CCC- cluster can in principle be parsed exhaustively even if it does not contain a branching onset: it could consist of a complex coda and a following non-branching onset: -CC.C-. This raises the question whether complex codas are well-formed in Hungarian.[18] If the answer is negative, it follows that medial -CCC- clusters are ill-formed (assuming that complex onsets are also ill-formed word-initially and word-medially). There are words ending in more than one consonant, but this does not in itself ascertain the status of these final clusters as complex syllabic constituents. We will return to this problem in section 3.2.4.

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[16]Such as the absence of initial /sr/ (compare attested /šr/ *sróf* ‘screw’), cf. Törkenczy (1994a) and Törkenczy and Siptár (1999).

[17]Chiefly English and German (cf. Siptár 1980).

[18]GP has a ‘built-in’ negative answer to this question since the theory does not permit complex codas (it does not even have a coda constituent, cf. Kaye, Lowenstamm and Vergnaud (1990), Harris (1994)).

3.2.3. Rhymes

The rhyme may be branching or non-branching in Hungarian. Thus, the following rhyme templates are well-formed:

```
(7)  a.    R                b.  R
           |                    |
           N                    N
           |                    |\
           X                    X  X

     c.    R                d.  R
           |\                   |\
           N  Co                N  Co
           |  |                 |  |\
           X  X                 X  X  X

     e.    R                f.  R
           |\                   |\
           N    Co              N    Co
           |\   |               |\   |\
           X  X  X              X  X  X  X
```

In general, there is no restriction on nuclei in branching or non-branching rhymes in Hungarian: any vowel can occur in a closed or an open syllable:

(8)	closed σ		open σ	
i	**rit**.mus	‘rhythm’	**szi**.ta	‘sieve’
ü	**ül**	‘sit’	**hü**.lye	‘stupid’
u	szi.**rup**	‘syrup’	**bu**.ta	‘dumb’
e	**em**.lő	‘breast’	**te**	‘you’
ö	**öt**.let	‘idea’	**ö**.reg	‘old’
o	o.**rom**	‘peak’	**ro**.ham	‘attack’
a	a.**lak**	‘shape’	**pa**.ta	‘hoof’
iː	**sír**	‘grave’	**sí**	‘ski’
üː	**űr**	‘space’	**tű**	‘needle’
uː	**púp**	‘hump’	**bú**.tor	‘furniture’
eː	**sért**	‘hurt’	**mé**.ter	‘metre’
öː	**őr**	‘guard’	**sző**.lő	‘grape’
oː	**ól**	‘pigsty’	**hó**	‘snow’
aː	**fánk**	‘doughnut’	al**á**	‘under’

It is apparent in (8) above that (i) any vowel quality is possible and (ii) long and short vowels equally occur both in branching and in non-branching rhymes, i.e. no rhyme-specific phonotactic statement is necessary.

We shall see in later sections that this is an oversimplification because (a) the distribution of vowels in stem/word-final open syllables is different from that in medial open syllables (see section 3.4.1) and (b) only a very limited set of long vowels can occur in word-medial closed syllables and word-final syllables closed by more than one consonant when these syllables are undivided by a morpheme boundary (see section 3.4.2). The constraints that (a) and (b) are due to are not SSCs strictly speaking because they refer to the phonological word or apply within the morpheme.

There is one phonotactic restriction, however, which seems specific to the rhyme. This constraint concerns the distribution of surface roundedness/labiality within the rhyme. Vowels preceding the nasal+ stop clusters /mp, mb/ must be rounded *if the vowel and the entire consonant cluster are within the rhyme.* Accordingly, while there are many words like *l**u**mp* ‘drunkard’*, k**o**mp* ‘ferry’*, t**ö**mb* ‘block’*, d**o**mb* ‘hill’, words like hypothetical **l**i**mp* or **s**e**mb* whose vowels are not rounded are unattested.[19] By contrast, there are many words like *ember* ‘human being’*, bimbó* ‘bud’*, lámpa* ‘lamp’*, némber* ‘hag’ in which the second member of the nasal+ stop clusters is not within the rhyme (*em.ber, bim.bó, lám.pa, ném.ber*) and thus the vowel is not required to be rounded. This constraint can be seen as evidence for the rhyme node in Hungarian. Note that it is ‘directional’. It is a constraint on vowels preceding /mp, mb/ and cannot be seen as a requirement that labiality/rounding has to be shared within a V+ nasal+ stop rhyme since any vowel quality is possible in rhymes containing non-labial nasal+ stop clusters: e.g. /nt/ *bánt* ‘hurt’*, csont* ‘bone’*, ment* ‘save’*, dönt* ‘decide’*, hint* ‘sprinkle’; /ng/ *ing* ‘shirt’*, ráng* ‘jerk’*, zeng* ‘resound’*, döng* ‘buzz’*, korong* ‘disk’. It has to be pointed out that the status of this constraint is unclear. It is (almost) exceptionless, but it does not play an active role in the phonology. There are no alternations that it would condition, and no evidence is available concerning native speakers’ intuitions about the well-formedness of strings violating it.

[19]The word *galamb* ‘dove’ is problematic/exceptional if the constraint is taken to apply to the UR because the vowel of the final syllable is only rounded at the surface /galamb/ → [gɔlɔmb], see Törkenczy (1994).

3.2.4. Codas–word-final consonant clusters

In Hungarian the coda differs from the onset in that the former may branch. Thus, the setting of the Complex Coda parameter (Blevins 1995) is 'YES'. The coda is maximally binary branching. Furthermore, complex codas may be morphologically complex (i.e. there are suffixes solely consisting of consonants syllabified into the coda).

3.2.4.1. Non-branching codas

Any underlying consonant may systematically occur in a non-branching coda.[20]

3.2.4.2. Branching codas

In Hungarian the surface form of words may end in at most three consonants (*hat* 'six', *part* 'coast', *szfinx* [sfiŋks] 'sphinx'). Nevertheless, we claim that the coda is maximally binary branching, and that the more complex clusters at the ends of words are not (exhaustively) syllabified into a single coda. Furthermore, not all word-final two-term clusters realize branching codas. Let us examine word-final two-term clusters first. The notation used in Table III is as follows: a blank space in an intersection of a row and a column means that the relevant cluster is unattested. Numbers occur at intersections when a given cluster is attested: 1 = a cluster that *only* occurs undivided by a morpheme boundary (analytic or synthetic); 2 = a cluster that *only* occurs when divided by a morpheme boundary (analytic or synthetic), 3 = a cluster that occurs *both* monomorphemically and when divided by a morpheme boundary (analytic or synthetic). A box is struck out by dashes to indicate that the relevant cluster(s)

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[20]The surface realization of underlying consonants may be determined by syllabic constituency, see the behaviour of /x/ (section 4.2.2). Coda /ǰ/ hardly ever occurs: *bridzs* /briǰː/, ?/briǰ/ 'bridge (card game)'.

is/are subject to (eliminated on the surface by) assimilations.[21]

TABLE III. *Word-final CC clusters*

	p	**t**	**t^y**	**k**	**b**	**d**	**d^y**	**g**	**t^s**	**č**	**ǰ**	**f**	**s**	**š**	**v**	**z**	**ž**	**m**	**n**	**n^y**	**l**	**r**	**j**	**x**
p	1	1			—	—	—	—			–	1	3	1		—	—						2	
t		3	–	1	—	—	—	—	—	—	—		—	—		—	—			–			–	
t^y			1	1	—	—	—	—			–		2			—	—						–	
k		1		1	—	—	—	—		1	–		3	1		—	—						2	
b	—	—	—	—	1	2			—	—		—	—	—									2	–
d	—	—	—	—		3	–		—	—		—	—	—	1	1	—			–			—	—
d^y	—	—	—	—		2	3		—	—		—	—	—									—	—
g	—	—	—	—		3		1	—	—		—	—	—									2	–
t^s				1	—	—	—	—	3		–					—	—							
č				1	—	—	—	—		3	–					—	—							
ǰ	—	—	—	—		2			—	—	1	—	—	—										–
f		1			—	—	—	—			–	1	2			—	—						2	
s		3		1	—	—	—	—			–		3			—	—						–	
š		3			—	—	—	—			–			3		—	—						–	
v	—	—	—	—		2			—	—		—	—	—									2	–
z	—	—	—	—		3	2	1	—	—		—	—	—		2							—	—
ž	—	—	—	—	2	3	2		—	—		—	—	—									—	—
m	1	3			1	2				2		1	2		1	1	1	1					3	
n	–	3	–	1	–	3	–	1	1	3			3	1	1	1		–	1	–	1		–	
n^y		2	1			2	3						2		1					3			–	1
l	1	3		1		3	3	1	1	3		1	2	1	1			1			1	—	—	
r	1	3	1	1	1	3	3	1	1	3		1	3	1	1	1	1	1	1	1	1	1	3	
j	1	3		1		3		1	1	3		1	3	1	1	1	1	1	1		1		3	1
x		1																						1

Examples: (two examples are cited if a given cluster occurs divided and undivided by a morpheme boundary): *csepp* ‘drop’*; recept* ‘receipt’*; copf* ‘plait’*; bicepsz* ‘biceps’*, kapsz* ‘get’ (2sg pres. indef.)*; taps* ‘applause’*; lopj* ‘steal’ (sg imp. indef.)*; ott* ‘there’*, olvadt* ‘molten’*; Detk* ‘place name’*; pötty* ‘dot’*; Batyk* ‘place name’*; vágysz* ‘desire’ (2sg pres. indef.)*; akt*

[21]None of these assimilations are related to syllable structure (i.e. they operate regardless of the syllabification of the cluster to which they apply) and some of them are postlexical (see Chapter 7). Note that Table III shows the inventory of word-final clusters *after* these assimilations have applied, i.e. clusters that are subject to assimilations appear in it in the assimilated form.

'nude' (noun)*; sakk* 'chess'*; Szakcs* 'place name'*; szex* 'sex'*, raksz* 'put' (2sg pres. indef)*; voks* 'vote' (noun)*; rakj* 'put' (sg imp. indef.)*; több* 'more'*; dobd* 'throw' (sg imp. def.)*; dobj* 'throw' (sg imp. indef.)*; kedd* 'Tuesday'*, vidd* 'carry' (sg imp. def.)*; nedv* 'juice'*; edz* 'train' (3sg pres. indef)*; hagyd* 'allow' (sg imp. def.)*; meggy* 'sour cherry'*, adj* 'give' (sg imp. indef.)*; smaragd* 'emerald'*, fogd* 'hold' (sg imp. def.)*; agg* 'old'*; fogj* 'hold' (sg imp. indef.)*; barack* 'peach'*; vicc* 'joke' (noun)*, látsz* 'see' (2sg pres. indef)*; Recsk* 'place name'*; giccs* 'kitch'*, táts* 'open wide' (sg imp. indef.)*; tátsd* 'open wide' (sg imp. def.)*; bridzs* 'bridge (game)'*, szaft* 'juice'*; treff* 'clubs'*; döfsz* 'stab' (2sg pres. indef)*; döfj* 'stab' (sg imp. indef.)*; paraszt* 'peasant'*, löszt* 'yellow soil' (acc.)*; groteszk* 'grotesque'*; klassz* 'great'*, eressz* 'let go' (2sg pres. indef)*; est* 'evening'*, kost* 'ram'*; friss* 'fresh'*, hass* 'effect' (sg imp. indef.)*; hívd* 'call' (sg imp. def.)*; hívj* 'call' (sg imp. indef.)*; gerezd* 'slice' (noun)*, nézd* 'watch' (sg imp. def.)*; küzdj* 'fight' (sg imp. indef.)*; rezg* 'vibrate' ((3sg pres. indef.)*; nézz* 'watch' (sg imp. indef.)*, idősb* 'senior'*; pünkösd* 'Whitsun'*, vésd* 'etch' (sg imp. def.)*; esdj* 'beg' (sg imp. indef.)*; kolomp* 'bell'; *vikomt* 'viscount' *teremt* 'create' (3sg pres. indef.)*; lomb* 'foliage of a tree'*; nyomd* 'push' (sg imp. def.)*; teremts* 'create' (sg imp. indef.)*; tromf* 'trump'*; nyomsz* 'push' (2sg pres. indef)*; hamv* 'ash'*; nemz* 'beget' (3sg pres. indef.)*; tömzs* 'lode'*; stramm* 'healthy and strong'*; szomj* 'thirst'*, nyomj* 'push' (sg imp. indef.)*; ront* 'mess up' (3sg pres. indef.)*, sünt* 'hedgehog' (acc.)*; fánk* 'doughnut'*; rend* 'order' (noun)*, bánd* 'feel sorry for' (sg imp. def.)*; ring* 'sway' (3sg pres. indef.)*; lánc* 'chain'*; kincs* 'treasure'*, bánts* 'hurt' (sg imp. indef.)*; fajansz* 'faience'*, kensz* 'smear' (2sg pres. indef.)*; pátens* 'letter'*; ellenszenv* 'antipathy'*; vonz* 'attract' (3sg pres. indef.)*; kinn* 'outside'*; ajánl* 'recommend' (3sg pres. indef.)*; lányt* 'girl' (acc.)'*; konty* 'bun'*; hányd* 'throw' (sg imp. def.)*; rongy* 'rag'*, mondj* 'say' (sg imp. indef.)*; hánysz* 'throw' (2sg pres. indef)*; enyv* 'glue'*; könny* 'tear' (noun)*, menj* 'go' (sg imp. indef.)*; enyh* 'relief'*; talp* 'sole'*; folt* 'patch'*, élt* 'live' (3sg past indef.)*; halk* 'quiet'*; küld* 'send' (3sg pres. indef.)*, öld* 'kill' (sg imp. def.)*; hölgy* 'lady'*, áldj* 'bless' (sg imp. indef.)*; rivalg* 'blare' (3sg pres. indef.)*; polc* 'shelf'*; kulcs* 'key'*, ölts* 'wear' (sg imp. indef.)*; golf* 'id.'*; élsz* 'live' (2sg pres. indef.)*; fals* 'out of tune'*; nyelv* 'language'*; film* 'id.'*; hall* 'hear' (3sg pres. indef.)*; szörp* 'soft drink'*; tart* 'hold' (3sg pres. indef.)*, várt* 'wait' (3sg past indef.)*; korty* 'swig'*; park* 'id.'*; szerb* 'Serb'*; kard* 'sword'*, várd* 'wait' (sg imp. def.)*; tárgy* 'object' (noun)*, hordj* 'carry' (sg imp. indef.)*; dramaturg* 'director's assistant'*; harc* 'fight' (noun)*; korcs* 'mongrel'*, tarts* 'hold' (sg imp. indef.)*; turf* 'id.'*; kommersz* 'cheap', *versz* 'beat' (2sg pres. indef)*; sors* 'fate'*; érv* 'argument'*; borz* 'badger'*; törzs* 'tribe'*; reform* 'id.'*; konszern* 'concern'*; árny* 'shadow'*; görl* 'girl in chorus line'*; orr* 'nose'*; fürj* 'quail'*, várj* 'wait' (sg imp. indef.)*; lajt* 'water-barrow'*, fájt* 'hurt' (3sg past)*; hüvelyk* 'thumb'*; majd* 'later'*, fújd* 'blow' (sg imp. def.)*; cajg* 'cheap cloth'*; Svájc* 'Switzerland'*; nefelejcs* 'forget-me-not'*, felejts* 'forget' (sg imp. indef.)*; dölyf* 'arrogance'*; fédervejsz* 'talcum powder'*, fújsz* 'blow' (2sg pres. indef.)*; Majs* 'place name'*; ölyv* 'hawk'*; rajz* 'drawing'*; pajzs* 'shield' (noun)*; slejm* 'phlegm'*; kombájn* 'combine harvester'*; fájl* 'file'*; ujj* 'finger'*, falj* 'devour' (sg imp. indef.)*; bolyh* 'fluff'*; jacht* 'yacht'*; pech* 'bad luck'.

In Table III (i) not all the attested clusters are systematic occurrences (i.e. some of them are exceptional/irregular); (ii) not all the systematic (well-formed) clusters represent branching codas (some of the clusters are 'marginal', cf. e.g. Steriade 1982, Kenstowicz 1994, Blevins 1995) and (iii) the morphological complexity of a given cluster may be a result of analytic suffixation (which is a barrier to syllabification) or synthetic suffixation (which is not). We shall discuss these various types of clusters below.

An examination of Table III reveals that most of the attested word-final clusters conform to the Sonority Sequencing Principle (SSP) (cf. e.g. Selkirk 1982, Steriade 1982, Clements 1990, Zec 1988, Kenstowicz 1994, Blevins 1995) which requires that sonority has to increase towards the centre of the syllable.[22] In terms of government as defined in section 2.2, this means that within a branching (two-term) coda the second consonant must govern the first. However, some of the clusters in Table III seem to violate this requirement. Some of these 'exceptions' are systematic. First, given that government is assumed to apply at the skeletal tier (cf. section 2.2), it cannot hold between the timing slots dominating the root node of a geminate since the melodic content of the two slots is the same and thus they are equally sonorous. Nevertheless, geminate codas are well-formed. The licensing of final clusters consisting of geminates may be attributed to (i) root-binding (cf. section 2.2) or (ii) some special licensing mechanism. For expository reasons, here we shall simply assume that the relevant licensing mechanism is root-binding and defer the argumentation until later in this

[22]There is a weaker version of the principle that tolerates sonority plateaus (cf. e.g. Törkenczy 1994, Blevins 1995). Here we adopt the stronger version.

section. So let us state the following (partly universal partly language specific) constraint for branching codas in Hungarian:

(9) *Hungarian Branching Coda Constraint*

Branching codas must be licensed either by government or root-binding.

Given the assumption that the direction of government is universally right to left in a coda, (9) upholds the SSP and permits geminate codas because they contain a shared root node (the first X is bound).

Some of the attested clusters in Table III do not conform to (9). These are the following:

(10) a. ps, t^{y}s, ks, fs,
pj, kj, bj, gj, fj, vj, mj, rj,
bd, d^{y}d, gd, ǰd

b. pt, kt,
tk, t^{y}k, t^{s}k, čk,
pf,
pš, kš,
kč, dv, dz, nl

There is an important subdivision within the set of clusters in (10). While the clusters in (10b) are always monomorphemic, those in (10a) are predominantly polymorphemic.[23] Specifically, the latter type of clusters are the result of suffixation by 2sg definite imperative *-d*, 2sg indefinite imperative *-j*, or 2sg present indicative indefinite *-sz.* We shall discuss these suffixes in more detail below. They are peculiar in that they may be added to consonant-final stems freely, i. e. without regard to phonotactic constraints. The clusters in (10b), in contrast to those in (10a) are 'lexically restricted' in the sense that they only occur in a handful of words (all of which tend to be loans or place names). It has been argued (see Rebrus and Trón 2002) that

[23]Note that (rarely) /gd, ps, ks, mj, rj/ also occur monomorphemically.

the phonotactics of place names in Hungarian is different from that of other monomorphemic words, i.e. they form/belong to a separate phonotactic stratum. We could accommodate this observation in the present framework by claiming that there is a special template available for place names (see also section 3.4.3).

The complete list of words with final clusters of the (10b) set that can be found in our database is shown in (11):

(11)
pt recept 'receipt', korrupt 'corrupt'
kt absztrakt 'abstract', akt 'nude', defekt 'puncture', direkt 'on purpose', egzakt 'exact', indirekt 'indirect', intakt 'intact', kompakt 'compact', korrekt 'unbiased', perfekt 'perfect', verdikt 'judgement', viadukt 'viaduct'
tk Detk 'place name'
t^{y}k Batyk 'place name'
t^{s}k barack 'peach', palack 'bottle', tarack 'howitzer'
čk Recsk 'place name'
pf copf 'plait'
pš arabs 'Arab horse', taps 'applause'
kš voks 'vote'
kč Szakcs 'place name'
dv kedv 'mood', nedv 'fluid', üdv 'salvation'.
dz edz 'train$_{\text{verb}}$', pedz 'begin to understand'
nl ajánl 'recommend'[24]

The monomorphemic occurrences of some of the clusters in (10a) mentioned above are also only attested in very few stems:

[24]Note that words in final /dz/ cease to be exceptional at the surface since they are pronounced with a geminate affricate [d^{z}ː]: e.g. *edz* [ɛd^{z}ː]. *Ajánl* is often pronounced with a final geminate or non-geminate *l*: [ɔjaːlː] or [ɔjaːl], in which case the phonotactic violation is 'repaired'.

(12) gd smaragd ‘emerald’

mj szomj ‘thirst’

rj férj ‘husband’, fürj ‘quail’, sarj ‘offspring’

ks bilux, bórax ‘sodium borate’, bokafix ‘ankle-length socks’, boksz ‘boxing’, exlex ‘lawless’, fix ‘certain’, főnix ‘phoenix’, -impex < suffix occurring finally in the name of foreign trade companies: e.g. Medimpex (company specialising in the import and export of pharmaceuticals)> , index ‘id.’, keksz ‘biscuit’, kódex ‘codex’, koksz ‘coke’, komplex ‘complex’, konvex ‘convex’, krikszkraksz ‘unintelligible markings’, lasztex ‘lastex’, nikotex ‘denicotinized’, ónix ‘onyx’, ortodox ‘orthodox’, paradox ‘id.’, reflex ‘id.’, suviksz ‘shoeshine’, turmix ‘milkshake’

ps bicepsz ‘biceps’, gipsz ‘gypsum’, mumpsz ‘mumps’, ripsz ‘repp’, ripsz-ropsz ‘at once’, snapsz ‘schnapps’, zsupsz ‘crash!’

We claim that – as opposed to the polymorphemic clusters in (10a)[25] – those in (11) and (the monomorphemic occurrences in) (12) are irregular, thus the stems listed in (11) and (12) are accidental occurrences and do not characterize the phonotactic structure of Hungarian.[26]

Thus, we have seen that the clusters that violate (9) either contain the suffixes *-d, -sz, j* or are irregular. This, however, does not mean that those that conform to (9) are necessarily *all* permitted/well-formed.

First, it must be noted that of the fricative+ stop/affricate clusters (i.e. the only type of obstruent cluster that is not already excluded by the requirement of right-to-left government within a branching coda), only those are well-formed where *both* consonants are coronal.

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[25]The licensing of these clusters is discussed later in this section.

[26]Presumably, native speakers are able to identify these items as ‘foreign/strange/non-Hungarian’ (unfortunately, no experimental evidence is available to test this prediction). This statement must be modified slightly if we decide to analyse the phonotactics of place names along the lines sketched above: if they are assumed to constitute a separate phonotactic stratum and thus there is a different template available to them, then one would expect native speakers to be able to identify them as ‘place names’ on the basis of their phonotactic shape. Even then, as opposed to the ‘general’ or ‘regular’ template, this special place-name template would be inert in the sense that it would not interact with the phonotactically motivated processes discussed in Chapter 4.

There are very few exceptions to this requirement, all of which (we claim) are phonotactically irregular: [ft, sk, zg, žb]. The following is a full list of the stems containing these clusters:

(13) ft lift 'elevator', kuncsaft 'customer', seft 'illegal deal', szaft 'gravy', taft 'taffeta'

sk arabeszk 'arabesque', baszk 'Basque', burleszk 'slapstick', etruszk 'Etruscan', groteszk 'grotesque', humoreszk 'humorous piece of writing', kioszk 'news-stand', maszk 'mask', obeliszk 'obelisk', odaliszk 'odalisk', pittoreszk 'picturesque'

zg rezg 'vibrate'[27]

žb idősb 'elder', kevesb 'fewer', nemesb 'nobler'[28]

The irregularity of non-coronal obstruent clusters in the coda is confirmed by the fact that they are broken up by epenthesis if (synthetic) suffixation should create such a cluster while coronal clusters are not: compare /žiraːf-t/ 'giraffe' (acc.) [žiraːf**o**t] and /foš-t/ 'excrement' (acc.) [fošt] (verbs behave somewhat differently: compare [foš**o**tː] 'defecate' (3sg past indef.), see sections 3.4.3 and 4.1.2.)

Note also that affricates are disallowed in coda obstruent clusters regardless of the place of articulation of the other consonant: *ft^s#, *st^s#, *št^s#, *fč#, *sč#, *šč#.

Coda clusters containing sonorants are not constrained by the above requirements: e.g. *halk* 'quiet' *lomb* 'foliage', *perc* 'minute', *lánc* 'chain'. Thus, obstruent clusters in branching codas have to obey stricter constraints than other clusters. This suggests that a minimum sonority distance requirement is at play here. Let us assume that there is a minimum of sonority distance that is normally required for government to license clusters as branching

[27]This item is only included because it is usually cited in the literature on Hungarian phonotactics. Actually, it only appears as a bound form before vowel-initial suffixes (as an allomorph of the 'epenthetic' stem *rezeg*, cf. Chapter 4) and thus it is not an exception. *Rezg* as a free morpheme is obsolete and/or poetic.

[28]These obsolete forms are actually polymorphemic. They all contain a no longer productive suffix *-b* and are not used in ECH. The corresponding regular (attested) forms are *idősebb, kevesebb, nemesebb*.

codas.[29] Suppose that the sonority distance settings for Hungarian consonants are the following (where < is a smaller sonority distance than < <):

(14) *Sonority Hierarchy: Hungarian*[30]

stops, affricates < fricatives < < nasals < < liquids

Furthermore, let us assume that (15) constrains government in Hungarian:

(15) a. Government can apply if the sonority distance between the segments in a governing relationship is at least S_{min}

b. S_{min} = < < or > >

(where S_{min} is the minimum sonority distance)

(14) and (15) together leave all obstruent clusters unlicensed. Let us further assume that clusters with *subminimal distance*, i.e. clusters whose members are not equally sonorous but do not conform to (15), may be well-formed if licensed by some special provision in the grammar. Note that this special licensing may not derive from binding because the consonants the clusters discussed consist of do not necessarily *share* a COR node since they may differ in the value for [anterior]: e.g. *most* [mošt] ‘now’. Furthermore, coda clusters with subminimal sonority distance are not licensed by virtue of their simply being COR. It is evident that they display the same directionality effects as the clusters that conform to the minimal sonority distance requirement. For instance, /tš/ is a COR cluster, but is not a well-formed branching coda because, albeit minimally, /š/ *is* more sonorous than /t/. This suggests that it is *government* that licenses these clusters, but if the distance is subminimal between the members of a cluster, then government is subject to the following constraint in a coda:

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[29]Recall that, while individual languages may not reverse sonority relationships in the Sonority Hierarchy, they can have different sonority distance settings between segment classes in the hierarchy. Cf. section 2.2.

[30]Glides are omitted because Hungarian has no glides in our analysis.

(16) *Subminimal government*

In a coda cluster C1C2, government can apply in a configuration C1> C2 iff C1 and C2 are both COR

This gives the right result for fricative+ stop clusters, but also (incorrectly) allows coronal fricative+ affricate codas. Note, however, that the relevant clusters (st^s, sč, št^s, šč) do not have to be excluded by a constraint specific to the coda, but are unpermitted irrespective of their syllabic constituency and/or affiliation (i.e. they are excluded by a *Sequence Constraint*). These clusters only occur in compounds when divided by an analytic domain boundary: [[*húsz*][*centis*]] '20-centimetre long', [[*tenyész*][*csődör*]] 'stud', [[*hős*][*cincér*]] 'oak cerambix', [[*has*][*csikarás*]] 'stomach-ache'.[31]

Let us now examine word-final sonorant clusters. Some of them (notably liquid+ nasal clusters) are licensed by government. Not all of them occur, but we consider these gaps accidental.[32] In the remaining types (nasal+ nasal, nasal+ liquid and liquid+ liquid clusters) the second consonant cannot govern the first one. This correctly excludes nasal+ nasal, nasal+ liquid codas,[33] but incorrectly renders *all* liquid+ liquid codas inadmissible. Although the evidence is somewhat meagre (as the relevant clusters only occur marginally in a few stems), we claim that government can apply in some of the liquid+ liquid clusters (notably /rl, jl, jr/).[34] This is accounted for if we assume a fine-tuned sonority scale

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[31]In our database there are eleven exceptional monomorphemic items containing these clusters: *borscs* < Russian soup> *szcéna* 'scene', *scsí* '< Russian soup> ', *diszciplina* 'discipline', *proszcénium* 'proscenium', *reminiszcencia* 'reminiscence', *oszcillo-* 'oscillo-', *o[p]szcén* 'obscene', *excentrikus* 'eccentric', *transzcendens* 'transcendent', *excellenciás* 'excellency'(see Törkenczy 1994a).

[32]With one possible exception: /jn^y/. See the discussion below.

[33]We have already seen that the single violation *ajánl* is irregular (and is normally repaired by the time it surfaces as [ɔjaːl(ː)]). The other apparent violations are *j*-final and will be discussed later in this chapter.

[34]As pointed out above, the relevant clusters are rare. /rl/ and /jl/ only occur in *görl* 'showgirl', *fájl* 'file', *geil* [gejl] 'nauseatingly sweet'; /jr/ does not occur at all. They might be considered exceptional, but there is evidence (independent of coda phonotactics) for the sonority relations in (17), see section 3.3.2.

in which different liquids represent different degrees of sonority along the lines described in Hooper (1978), Clements (1990). For instance:

(17) l < < r < < j

Again, the sonorant coda clusters that appear to violate the directionality requirement (i.e. the SSP) are all *j*-final.

All sonorant+ obstruent codas are licensed by government. Nevertheless, some of these clusters are ill-formed. Let us examine nasal+ obstruent clusters first. The problem with these clusters is that in addition to the homorganic ones /mp, mb, nt, nd, n^yt^y, n^yd^y/[35] (e.g. *kolomp* 'bell', *lomb* 'foliage', *ront* 'destroy', *rend* 'order', *ponty* 'carp', *gyöngy* 'pearl'), non-homorganic /n^yt, n^yd/ also occur (*lány-t* 'girl' (acc.), *hány-d* 'throw' (sg imp. def.). /n^yt, n^yd/ only occur polymorphemically. We have pointed out above that definite imperative *-d* can be added to stems without regard to any phonotactic restriction. Thus, (as we shall see later) the polymorphemic occurrences of /n^yd/ are not licensed by being syllabified into the coda. One might want to argue that the same state of affairs applies to /n^yt/ as well. This is not the case, however. /n^yt/ is always the result of suffixation by the accusative suffix or the past tense suffix. These suffixes are unlike the imperative *-d* in that a 'linking' vowel appears before them to prevent certain consonant clusters from being derived.[36] The behaviour of these (types of) suffixes with respect to nasal-final stems is shown (18):[37]

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[35]/mt, nk, ng/ also appear in Table III. Of these /mt/ only occurs in two exceptional items *teremt* 'create', *vikomt* 'viscount'. The latter two clusters are not problematic because they actually surface as homorganic clusters: e.g. *link* [liŋk] 'untrustworthy', *rang* [rɔŋg] 'rank'. [ŋk] and [ŋg] are not even non-homorganic underlyingly since /n/, from which all surface reflexes of [ŋ] derive is unspecified for place (cf. Appendix A).

[36]See the details in Chapter 4.

[37]In fact there is a third type of suffix behaviour. Suffixes like the 2sg definite are always vowel-initial unless added to a vowel-final stem: compare *nyom-od, bán-od, hány-od* (Type A suffixes, cf. section 4.1.2.2).

(18)		**imperative *-d***		**accusative *-t***	
	m	nyom-d	'push'	szem-et	'eye'
	n	bán-d	'repent'	ón-t	'tin'
	n^y	hány-d	'throw'	lány-t	'girl'

We claim that this difference is attributable to the fact that accusative *-t* is syllabified into the coda while imperative *-d* is licensed in a different way. Given this assumption and because the well-formedness of nasal+ stop clusters obviously does not depend on the voicing of stops,[38] /n^yt, n^yd/ have to be considered licensed codas. Since nasal+ stop clusters are licensed by government, we have to assume that they also have to meet an additional requirement which filters out those which are ill-formed. This constraint has to disallow non-homorganic nasal+ stop clusters, but permit /n^yt, n^yd/. (19) achieves this result:[39]

(19) In a nasal+ stop coda cluster C1C2, C1 must be place-bound unless both of them are COR

It is not obvious whether the same constraint holds for nasal+ affricate clusters or not. Hungarian only has COR affricates, therefore /m/+ affricate codas are predicted to be ill-formed. This prediction appears to be true: there is a single exception /mč/, which only occurs in the morphologically complex form *tere*[mč] 'create' (2sg imp. def.).[40] Note, however, that the constraint extended to nasal+ affricates would permit /$n^y t^s$, n^yč, n^yǯ, nǯ/ as coda clusters, but they do not occur. Of these, /nǯ/ is permitted since /nč/ occurs (e.g. *mancs* 'paw') and it is unlikely that the voicing difference should entail a difference in well-formedness. The others do not occur because an MSC (which bans preconsonantal nasals with an independent place specification) excludes them within the morpheme, and they may not result from suffixation

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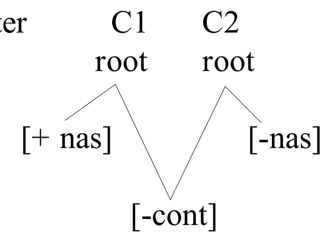
[38]Though nasal+ voiceless stop clusters are marked universally compared to nasal+ voiced stop clusters (see Kager 1999 and references therein).

[39](19) would in fact allow unattested coda /nt^y/ and /nd^y/, but this causes no problems because /n/ is underlyingly placeless and thus these clusters would surface as [$n^y t^y$] and [$n^y d^y$] as a result of nasal place assimilation (cf. e.g. Vago 1980, Siptár & Törkenczy 2000).

[40]On the syllable structure of this form, see Section 4.2.4.3.

because there are no suffixes that consist of an affricate. For this reason, permitting them causes no problems and therefore we extend (19) to cover nasal+ affricate codas too:

(20) In a coda cluster



C1 must be place-bound unless both of them are COR

The distribution of final nasal+ fricative clusters is governed by a slightly different constraint. Disregarding /v/ for the moment (whose sonority ranking, as we shall see, is problematic), only those nasal+ fricative clusters whose first member is /n/ and whose second member is a coronal seem to be well-formed. Although /mf, ms, mz, mž, n^ys/ are attested, they only occur (i) in polymorphemic clusters whose second consonant is 2sg present indefinite *-sz,* which always behaves in a special way (/ms/ *nyom-sz* 'push'; /n^ys/ *hány-sz* 'throw'), or (ii) in a few irregular stems. The following is an exhaustive list of these stems:

(21) mf tromf 'trump'
mz nemz[41] 'beget (3sg pres. indef.)'
mž tömzs 'lode'

Given the MSC referred to above, (22) accounts for the observed distribution:

(22) In a coda cluster C1C2 where C1 is [+ nasal] and C2 is [-son, + cont], C2 must be COR.

In the above discussion of branching codas we have disregarded /v/. As argued in Siptár & Törkenczy (2000), /v/ is a 'two-faced' consonant: it behaves as a sonorant in onsets, but as

[41]This item is obsolete in ECH as a free form.

an obstruent in codas (this is encoded by its unspecification for the feature [son], see Appendix A). We propose that despite its asymmetrical behaviour in onsets and codas (cf. Siptár & Törkenczy 2000 section 4.1.1) /v/ always has the sonority ranking of a fricative.[42] Given the constraints discussed in the present section and the above assumption about its ranking in the sonority hierarchy, its distribution in final clusters is the expected one. Thus, government does not allow it to cooccur with obstruents as the first or the second element in coda clusters since the sonority distance between fricatives and other obstruents is subminimal.[43] The few exceptional stems in which it does cooccur with obstruents in final position are listed in (11). Because of the directionality of government /v/+ sonorant codas are ill-formed. In codas /v/ is permitted following a sonorant if the sonorant is a liquid or a nasal since government can apply (e.g. *érv* 'argument', *elv* 'principle', *ölyv* 'hawk') and (22) does not constrain nasal+ /v/ coda clusters as /v/ is unspecified for [son] (e.g. *hamv* 'ash', *ellenszenv* 'antipathy', *könyv* 'book').[44]

We have not examined the distribution of preconsonantal /j/ yet. Törkenczy (1994a) claims that there are two constraints that apply to preconsonantal /j/ in branching codas; one requires that obstruents following /j/ must be coronal and the other excludes palatal consonants after /j/. In our view, these constraints are untenable because they make unmotivated and unnecessary distinctions between equally well-formed /jC/ clusters. For instance, /jn/ and /jm/ conform to the above constraints and thus are judged well-formed as opposed to /jn^y/, which violates them, and is therefore supposed to be ill-formed. This seems to make the right prediction since /jn/ and /jm/ are attested, but /jn^y/ is not. However, this difference is not really significant since the only stems in which the first two clusters are attested are *kombájn*

[42]It would be undesirable to allow the sonority ranking of a segment to vary depending on the position it occurs in. The sonority ranking of /v/ as a fricative in onsets generally does not cause problems because we argue that branching onsets do not occur in Hungarian. /v/, however, does behave in a special way in onsets in interconstituent clusters, see Section 3.3.2.1.

[43]Subminimal government is excluded because /v/ is not COR.

[44]/v/ is extremely rare in final clusters containing sonorants other than /r/. The following is a complete list: *elv, nyelv* 'language', *ölyv, hamv, -szenv* 'feeling' < bound morpheme> , *enyv* 'glue', *könyv*. Of these *hamv* is obsolete as a free form. In the present analysis this is seen as an accident.

'combine-harvester' and *slejm* 'phlegm'. In fact, preconsonantal /j/ is rare in final (nongeminate) clusters other than /jt/.[45] Furthermore, /jt/ is the only cluster whose coda status can be tested in alternations: as the accusative and the past suffix (which can be realized as [t]) attach to /j/-final stems without an epenthetic vowel (*sóhaj-t* [šo:hɔjt] 'sigh' (acc.), *búj-t* [bu:jt] 'hide' (past)), /jt/ must be a possible coda (cf. section 4.1.4). In order to avoid making untestable well-formedness distinctions within the set of final /jC/ clusters we claim here that all of them are well-formed and no constraint applies specifically in this environment.

3.2.4.3. Appendices

In the discussion of final clusters in the previous section we have disregarded the final clusters that contain the consonants /d, j, s/ when they realize the definite imperative, the indefinite imperative, and the 2sg present indefinite suffix respectively. Final clusters containing these suffixes often violate government (e.g. *lopsz* 'steal' (2sg pres. indef.)) and/or other constraints applying within the coda (*nyomd* 'push' (sg imp. def.)). In general, there are no phonotactic constraints applying between these suffixes and the final consonant of the stem they are attached to. This is completely true of definite imperative *-d* and indefinite imperative *-j*. These suffixes may be added to any stem. The gaps in /j/ or /d/ final clusters in Table III are not due to phonotactics: they are either (i) accidental (there are no verb stems ending in affricates or /x/, so /t^sj, čj, ǰj/[46] and /xd/, /xj/ do not occur), or (ii) the result of assimilations (e.g. [šd]

[45]/j/ frequently occurs in the final *polymorphemic* clusters /jd, js, jč/ but they all contain analytic suffixes (2sg definite imperative *-d*, indefinite imperative *-j*, or 2sg present indicative *-sz)*. The following is a complete list of *stems* with final jC clusters other than /jt/: /jp/ *selyp* 'lisper'; /jk/ *sejk* 'sheik', *sztrájk* 'strike', *-ajk* 'lip < bound form> ', *hüvelyk* 'thumb'; /jd/ *fajd* 'grouse', *gajd* 'hubbub', *majd* 'later', *ofszájd* 'offside'; /jg/ *cajg* 'cheap cloth'; /jt^s/ *Svájc* 'Switzerland'; /jf/ *dölyf* 'arrogance'; /js/ *fédervejsz* 'talcum powder', *hajsz* < interjection> ; /jš/ *Majs* < place name> ; /jv/ *ölyv 'hawk'*; /jz/ *csuszpájz* < a kind of vegetable dish> , *rajz* 'drawing', *spájz* 'pantry'; /jž/ *pajzs* 'shield'; /jm/ *slejm* 'phlegm'; /jn/ *kombájn* 'combine harvester'; /jl/ *fájl* 'file'; /jh/ *bolyh* 'fluff'. The items *selyp* and *bolyh* are only included because they are cited in the literature~~ in~~ ECH they are bound forms that only occur before vowel-initial suffixes; as free forms they are obsolete.

[46]Even if there were such underlying forms, they would be eliminated by assimilation (cf. Siptár & Törkenczy 2000).

does not appear at the surface, but underlyingly it does, and is later eliminated by voicing assimilation, e.g. /lešd/ → [lɛžd]). To sum up, definite imperative *-d* and indefinite imperative *-j* are phonotactically completely independent of the stems they are added to. This phonotactic independence also manifests itself in the fact that final clusters that contain these suffixes may violate sonority sequencing (i.e. government).[47] The suffix *-sz* behaves similarly, albeit to a somewhat limited extent. Final clusters containing it may violate sonority sequencing (e.g. /ps/ *kapsz* 'get' (2sg pres. indef.), /tʸs/ *vágysz* 'desire' (2sg pres. indef.), /ks/ *raksz* 'put' (2sg pres. indef.), but there is a phonotactic(ally motivated) phenomenon that concerns *-sz*: it cannot be attached to a stem that ends in a [+ strident] consonant; instead the allomorph *-Vl* is selected (e.g. *tesz-el* 'put' (2sg pres. indef.), *néz-el* 'look' (2sg pres. indef.), *keres-el* 'search' (2sg pres. indef.) and not **te*[sː], **né*[sː], **kere*[šs][48]). The allomorphy is certainly phonologically motivated, but we assume that it is not related to syllable structure: *-Vl* is selected even when the cluster that would result from suffixation with *-sz* is a well-formed coda/final cluster such as geminate [sː], e.g. *tesz-el* (compare geminate [dː] and [jː] that can be the result of suffixation with definite imperative *-d* and indefinite imperative *-j* respectively: *add* [ɔdː] 'give' (2sg imp. def.), *fejj* [fɛjː] 'milk' (2sg imp. indef.)).

Another aspect of the independence of these suffixes can be seen if we examine word-final clusters that consist of more than two consonants. There are extremely few monomorphemic words that end in more than two consonants. (23) lists all the relevant items:

[47]In striking contrast, there are just a handful of irregular monomorphemic items (listed in (12)) and none containing suffixes other than *-d, -sz* and *-j* that are in violation of sonority sequencing.

[48][šs] final forms like *kere*[šs] do rarely occur, but they are obsolete/unusual in ECH.

(23)
(23)	mps	mumpsz ‘mumps’
	nks	szfinx ‘sphinx’, szkunksz ‘skunk’
	nst	dunszt ‘steam’, kunszt ‘trick’
	rst	karszt ‘karst’, verszt ‘verst’
	kst	szext ‘sixte’
	ršt	vurst ‘sausage’
	ršč	borscs < Russian soup>
	jst	lejszt ‘hard work’
	jšt	mihelyst ‘as soon as’

We consider all the words in (23) exceptional/irregular. Disregarding these words, the polymorphemic final three-term clusters that occur are the ones listed in Table IV:

TABLE IV. *Polymorphemic word-final CCC clusters*

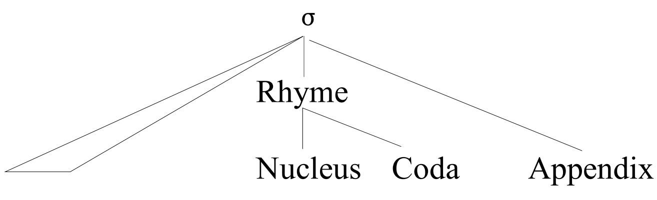
	t	d	s	j
dz	—	+	—	—
mǰ	—	+	—	
ŋk		—	+	
ŋg	—	+	—	+
nt^s	+	—		
nǰ	—	+	—	
ns	+	—		—
nš	+	—		—
nl		+	+	—
lǰ	—	+	—	
rn	+			—
rǰ	—	+	—	
rl	+			—
jǰ	—	+	—	
js	+	—		—
jš	+	—		—
jn	+			—

Examples: *edzd* ‘train’ (sg imp. def.), *teremtsd* ‘create’ (sg imp. def.), *lengsz* ‘swing’ (2sg pres. indef.), *zengd* ‘resound’ (sg imp. def.), *pénzt* ‘money’ (acc.), *bontsd* ‘open’ (sg imp.

def.), *ENSZ-t* ‘UN’ (acc.), *brilliánst* ‘brilliant’ (acc.), *ajánld* ‘recommend’ (sg imp. def.), *ajánlsz* ‘recommend’ (2sg pres. indef.), *töltsd* ‘pour’ (sg imp. def.), *konszernt* ‘concern’, *tartsd* ‘hold’ (sg imp. def.), *görlt* ‘girl’ (acc.), *hajtsd* ‘bend’ (sg imp. def.), *fédervejszt* ‘talcum powder’ (acc.), *mihelyst* ‘as soon as’, *pajzst* ‘shield’ (acc.), *kombájnt* ‘combine harvester’ (acc.), *zengj* ‘resound’ (sg imp. def.).

Table IV shows the final polymorphemic CCC clusters that appear at the surface (the notation is the usual one where the boxes struck out by dashes denote clusters that are/would be eliminated by assimilations). The number of underlying clusters would be higher than those shown in Table IV because there are processes that simplify consonant clusters (e.g. degemination (cf. Siptár & Törkenczy 2000) turns the underlying triliteral cluster /rrs/ into [rs] in *varrsz* [vɔrs] ‘sew’ (2sg pres. indef.) and Fast Cluster Simplification (cf. section 4.2.3.) may delete the second consonant from underlying /Ngd/ in *fingd* [fiŋd] ‘fart’ (sg imp. def.)). The attested clusters either have one of the three suffixes *-d, -j, -sz* discussed above, or the accusative *-t* as their final element. Let us set aside the accusative for the moment and concentrate on the other three. The fact that they can create final CCC clusters by attaching to stems ending in branching codas further attests to their phonotactic independence. We can account for this independence by claiming that they are in fact not syllabified into the coda, but belong to a special subsyllabic constituent, the appendix. Thus, in Hungarian the extended syllable can have an appendix not only initially, but finally as well:

(24)



The extended syllable shown in (24) is restricted to the right edge of analytic domains, i.e. the appendix must be peripheral. Furthermore, it may only occur after a coda. Consonant clusters that are (partially) in the appendix are unconstrained by coda restrictions (e.g. may violate sonority sequencing and may consist of more than two consonants). Regularly, on the coda side only analytic suffixes may be in the appendix. *-d* and *-j* are clearly syllabified into the appendix. We have seen that they can be added to any stem-final consonant and they can occur as the last consonant in final CCC clusters, i.e. they can attach to any stem ending in a branching coda. The surface non-occurrence of some final C1C2C3 clusters where C1C2 is a possible coda and C3 is *-d* or *-j* is due to assimilations (e.g. [ltj] does not occur because /tj/ becomes [č] in imperatives (cf. Siptár & Törkenczy 2000)); or is unrelated to syllable structure (e.g. /mbd/ and /mbj/ do not occur because the morphology does not generate these combinations (there are no verb stems ending in /mb/, and *-d* and *-j* are verbal suffixes).

The appendix status of *-sz* is more problematic. We have seen that, *modulo -Vl* allomorphy, there are practically no restrictions between the stem final consonant and *-sz*. This is what we expect of an appendix. However, an inspection of Table IV reveals that very few *-sz*-final CCC clusters are attested (only [ŋks/ and [nls]). This is unexpected even if one takes it into consideration that *-sz* can only be added to verbs. The reason why there are few *-sz*-final CCC clusters is that, *typically*, *-sz* attaches to stems that end in more than one consonant with a linking vowel (e.g. *lá**t**sz*, **lá**t**asz* 'see' vs. **osz**t**sz, osz**t**asz* 'distribute'; ***adsz***, ****adasz*** 'give' vs. **kez**d**sz, kez**d**esz* 'begin'). Some stems allow forms with and without the linking vowel (e.g. *fingasz, fingsz* 'fart'); others only have forms without it (e.g. *varrsz* but **varrasz* 'sew').

The occurrence of accusative *-t* in final CCC clusters is a further complication. We have pointed out above that accusative *-t* syllabifies into the coda, and if it cannot, an epenthetic vowel occurs before it (compare *leve**s**-**t*** 'soup' (acc.) and *zsirá**f**-**ot*** 'giraffe' (acc.)), i.e. there is phonotactic interaction between it and the stem-final consonant (see the details in Chapter 4). Since three-term codas are not allowed, we would expect it to be preceded by an epenthetic vowel after stems ending in consonant clusters. Table IV shows that this is not the case; it can appear as the last consonant in a final CCC cluster. It does not behave like an appendix, however: it never occurs without an epenthetic vowel after stem final clusters C1C2 if C2+ [t] is not a possible branching coda (compare *far**m**-**ot*** 'farm' (acc.) and *konszer**n**-**t***), i.e. there is a phonotactic interaction between the *-t* and the stem-final consonant. On the other hand, the epenthetic vowel is not *always* missing if C2 of the stem-final cluster plus [t] make a possible branching coda. Some of these cases have independent explanations (e.g. all /rn^y/-final nouns are 'lowering stems', which in itself requires a linking vowel to be present before the suffix even though /n^{y}t/ is a possible coda: *árny-**at*** 'shadow' (acc.), *szárny-**at*** 'wing' (acc.), *szörny**et*** 'monster' (acc.), and similarly with other combinations, e.g. *fürj-**et*** 'quail' (acc.), *törzs-**et*** 'trunk' (acc.), cf. section 4.1.3. on lowering stems). Others, however, have no independent explanation: /rš/-final stems always have a linking vowel before the accusative, even if the stem is not lowering: e.g. *bors-ot* ‘pepper’ (acc.) although /rš/ and /št/ are well-formed codas.

Thus the general problem is that the phonotactic restrictions on the melodic content of final clusters and those on the complexity of final clusters seem to suggest conflicting classifications for 2sg present indefinite *-sz* and accusative *-t*.[49] The former suffix is completely insensitive to the melodic content of the stem-final consonant (a typical appendix-like behaviour: *csap-sz* ‘hit’ (2sg pres. indef.), but *usually* cannot be attached to cluster-final stems without a linking vowel (*oszt-asz* ‘distribute’ (2sg pres. indef.)).[50] The latter, on the other hand, *is* sensitive to the stem-final consonantal melody (a typical coda-like behaviour: *ón-t* ‘tin’ (acc.) vs. *nyom-ot* ‘trace’ (acc.)), but *if the final consonantal melody is right,* can be *sometimes* added to stems ending in a consonant cluster without a linking vowel (*konszern-t*). The question is how to explain the non-appendix like behaviour of *-sz* and the non-coda like behaviour of *-t*.

First, let us try to answer the first part of the question. The problem is that—contrary to our expectations—a linking vowel appears after cluster-final stems before the suffix *-sz* (which is assumed to syllabify as an appendix). It is significant that not only the presence, but the quality of the linking vowel is also unexpected. The normal linking vowels are mid *e/ö/o* (i.e. [-open$_1$])[51] and not low *a/e* (i.e. [+ open$_1$]). The latter quality is the one that we get after lowering stems and suffixes: e.g. *fog-**a**t* ‘tooth’ (acc.), *szög-**e**t* ‘nail’ (acc.), *tök-ök-**e**t* ‘pumpkins’ (acc.) (compare non-lowering *bog-**o**t* ‘knot’ (acc.), *rög-**ö**t* ‘clod’ (acc.)). Here, however, the lowered quality is not due to the stem but to the suffix itself. Verb stems are never lowering, and the quality of the linking vowel before *-sz* is always (unexpectedly) low after all the stems that it can follow (compare *mond-**o**k* ‘say’ (1sg pres. indef.) and *mond-**a**sz* ‘say’ (2sg pres. indef.). Also, a low linking vowel normally does not alternate with zero: it

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[49]Cf. Rebrus (to appear). The past suffix also behaves similarly to the accusative (cf. section 4.1.2.2.).

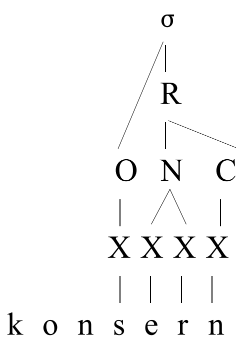
[50]Because of its behaviour after cluster-final stems, in some treatments *-sz* is regarded as a quasi-analytic suffix, see section 4.1.2.2 and Rebrus (2000), Rebrus and Törkenczy (1998).

[51]Underlying mid *e* is eventually phonetically implemented in ECH as low [ɛ] (cf. Siptár & Törkenczy 2000).

is present after lowering stems even after stems whose final consonant could form a well-formed branching coda with the suffix: e.g. *fal-**at*** 'wall' (acc.), *has-**at*** 'stomach' (acc.), *vár-**at*** 'castle' (acc.) (compare non-lowering *hivatal-t* 'office' (acc.), *kas-t* 'hive' (acc.), *vér-t* 'blood' (acc.)).[52] By contrast, the low linking vowel of *-sz* is not stable: it is not present after some stems (compare *hat-sz* 'influence' (2sg pres. indef.) and *tart-asz* 'hold' (2sg pres. indef.)) We suggest that considering the *-Vsz* variant of *-sz* as an instance of allomorphy is in harmony with these facts. Then the *-Vsz* variant appears in the lexicon along with *-sz* and thus the unexpectedness of the vowel quality is then just a lexical fact. The low initial vowel of the *-Vsz* variant behaves just like any low linking vowel, i.e. it is stable and does not alternate with zero. The fact that the *-Vsz* allomorph typically[53] appears after cluster-final stems, i.e. the allomorphy is phonotactically conditioned, is on a par with the behaviour of *-Vl,* which is a variant of *-sz* after [+ strident] stems. Both can be seen as cases where morphology is dependent on phonological information. This interpretation makes it possible to maintain that *-sz* syllabifies as an appendix.

A possible answer to the second part of the question (which concerns the behaviour of *-t* after cluster final stems) is to claim that the reason why *-t* attaches without a linking vowel to stems like *konszern* is that in these words the first consonant of the final cluster is not in the coda but in the nucleus as shown in (25) (where only the relevant structure is displayed):

(25)



This syllabification would allow *-t* to attach to *konszern* without a linking vowel (i.e. into the

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[52]See section 4.1.3 on lowering stems.

[53]The *-Vsz* allomorph also appears after a more-or-less arbitrary set of stems ending in *t* preceded by a long vowel. All the stems ending in the verb-forming suffix *-í t* belong here. E.g. *alakí t-asz* 'form', *vét-esz* 'err', *fűt-esz* 'heat' (compare *lát-sz* 'see').

coda of the stem-final syllable) in spite of the fact that codas are maximally binary branching. In other words, it would explain why *-t* appears to be insensitive to the number of stem-final consonants (in some stems) although it must be syllabified as a coda. There are, however, several problems, which make this explanation untenable.

First of all, a very complicated statement would be needed to specify the conditions in which a consonant can syllabify into the nucleus. The class of consonants that could syllabify in this way is not difficult to identify. They must be [+ sonorant], since *-t* always attaches with a linking vowel to C1C2-final stems if C1 is an obstruent, even if C2+ *t* is a well-formed coda: *taps-ot* not **taps-t* 'applause' (acc.) (compare *kas-t* 'hive' (acc.), *most* 'now'), *sze*[ks]*-et* not **sze*[ks]*-t* 'sex' (acc.) (compare *szesz-t* 'alcohol' (acc.), *liszt* 'flour'). Furthermore, [+ sonorant] segments could only be in the nucleus of a closed syllable otherwise we would predict that (i) any consonant can follow a sonorant within the same syllable and (ii) no interconstituent constraints refer to sonorant final syllables (these predictions are untrue; cf 3.2.4.2 and 3.3.2). It is a significant fact that additional conditions would also have to be stipulated since /r/ behaves differently from other sonorants when it precedes stem-final obstruents. As pointed out above, *-t* attaches to /rš, rs, rz/-final stems with a linking vowel (*bors-ot* 'pepper' (acc.), *mersz-et* 'courage' (acc.) *borz-ot* 'badger' (acc.)).[54] The problem is that (i) /r/ does not behave in this way before other stem-final consonants (compare e.g. *konszern-t*), and (ii) other sonorants do not behave in this way before stem-final /š, s, z/ (compare e.g. *konstans-t* 'constant' (acc.), *fajansz-t* 'faience' (acc.), *pénz-t* 'money' (acc.)). Thus, the conditions on the hypothesized syllabification of sonorants into the nucleus can hardly be formulated with a sufficient degree of generality.

Furthermore, there is some degree of unpredictable variation. Some stem-final sonorant+ /s, š, z, ž, n, n^y, l, r, j/ clusters show more than one kind of behaviour: in some stems they always take the suffix *-t* without a linking vowel, in others they always require a linking vowel, and there are stems that allow both variants:

[54]Note that these are not lowering stems, thus the presence of the linking vowel cannot be attributed to a factor independent of the clusters examined.

(26)[55]	**-t**	**-Vt**	**-t/-Vt**
nš	protestáns-t	revans-ot	briliáns-t/briliáns-ot
ns	fajansz-t	sansz-ot	reneszánsz-t/reneszánsz-ot
jz	csuszpájz-t	rajz-ot	-
nz	pénz-t	bronz-ot	csimpánz-t/csimpánz-ot
jž	-	-	pajzs-t/pajzs-ot

A similar behaviour can be attested if we examine stems that end in geminates whose melodic content is such that after the corresponding stem-final non-geminate segments no linking vowel appears. These are the stems ending in /ss, šš, zz, nn, n^yn^y, ll, rr, jj/.[56] Typically, no linking vowel appears after these geminates before *-t*: *idill-t* 'idyll' (acc.), *finn-t* 'Finnish' (acc.), *plüss-t* 'plush' (acc.), *dzsessz-t* 'jazz' (acc.), etc.[57] Most of the examples with a linking vowel are lowering stems and thus they are irrelevant to the issue at hand: e.g. *ujj-at* 'finger' (acc.), *toll-at* 'feather' (acc.), *gally-at* 'twig' (acc.), etc. (cf. section 4.1.3 on lowering stems). Nevertheless, here too there *is* some idiosyncratic variation: *genny-t/genny-et* 'pus' (acc.), *orr-t/orr-ot* 'nose' (acc.)', *bross-t/bross-ot* 'brooch', etc.[58] These facts suggest that idiosyncratic restrictions would have to be imposed on the incorporation of sonorants into the

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[55]This chart is based on Papp (1975). The /z, ž/-final clusters surface with /s, š/ respectively, before *-t* because of Voicing Assimilation (cf. Siptár & Törkenczy 2000). Glosses: *briliáns* 'brilliant', *bronz* 'bronze', *csimpánz* 'chimpanzee', *csuszpájz* 'vegetable dish', *pajzs* 'shield', *rajz* 'drawing', *reneszánsz* 'Renaissance', *revans* 'return match', *sansz* 'chance'.

[56]There are no stems ending in /žž/.

[57]These three-term clusters actually surface as two-term as a result of Degemination (cf Siptár & Törkenczy 2000).

[58]There are no (non-lowering) /ss, šš, zz, nn, n^yn^y, ll, rr, jj/-final noun stems that select the variant with the linking vowel only, unless we include examples like *mell-et* 'breast' (acc.), *szenny-et* 'dirt' (acc.) which cannot be identified as lowering stems on the basis of the quality of the linking vowel in ECH (though other dialects show that they are lowering stems, cf. 4.1.3). There are some comparable verb stems, however, which always require a linking vowel before the past tense suffix *-(t)t* (which behaves similarly to the accusative, cf. section 4.1.4.4): *hall-ott* 'hear' (3sg past indef.), *hull-ott* 'fall' (3sg past indef.), *kell-ett* 'have to' (3sg past indef.), *vall-ott* 'confess' (3sg past indef.) Note that *hull-t* 'fall' (3sg past indef.) is a possible alternative form along with *hull-ott.*

nucleus. Some stems would have to be marked as not allowing it and others as optionally allowing it.

Even if the complexities/difficulties pointed out above were disregarded, the most serious problem with the hypothesis is that, after the relevant clusters, *-t* behaves in the same way even if the vowel preceding the cluster is long: *kombájn-t, protestáns-t* 'protestant' (acc.), *pénz-t* 'money' (acc.) ([nst] or [nt^{s}t]), *fájl-t* 'file' (acc.), etc. Therefore, if we maintained that in these stems the postvocalic consonant of the final cluster is in the nucleus, then we would have to allow ternary braching nuclei. In fact, in trying to avoid ternary codas we would end up creating ternary nuclei.

Because of the problems discussed above we consider the syllabification shown in (25) untenable and suggest that the behaviour of *-t* after cluster-final stems like *konszern* is due to the fact that the relevant stems are lexically marked so that they *exceptionally* allow the syllabification of *-t* into the appendix. These stems will then have no linking vowel before *-t.* The stems that show variation (e.g. *briliáns*) appear twice (marked and unmarked) in the lexicon of speakers who use both variants.[59] The lexically unmarked cluster-final stems will always have a linking vowel before *-t.* Thus, all word-final clusters containing the suffixes *-d, -j, -sz* have the structure coda+ appendix and accusative *-t* can also syllabify as an appendix after some cluster-final stems. This makes it possible to maintain that the coda constituent is maximally binary branching in Hungarian, although word-final ternary clusters do occur. In addition to the restriction on its melodic/morphological content, the occurrence of the appendix is subject to the following general condition (which is a version of the Peripherality Condition, cf. Hayes 1995):

(27) The appendix (i) must be peripheral in an analytic domain and (ii) must not be adjacent to the nucleus.

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[59]This suggests that for some speakers even these stems can be non-variable, a prediction that appears to be true.

3.3. Transsyllabic constraints

Transsyllabic constraints are constraints applying between adjacent segments belonging to different syllables. Logically, transsyllabic constraints could refer to segment clusters of the following kinds:

(28) a. V.V
b. C.C
c. V.C
d. C.V

(28a) shows two adjacent nuclei (hiatus), (28b) is a coda followed by an onset (interconstituent cluster), (28c) is a nucleus followed by an onset, and (28d) is a coda consonant followed by a nucleus. Out of these four possibilities (28d) appears to be universally excluded by the Maximal Onset Principle (cf. Blevins 1995) (or any equivalent mechanism designed to capture the fact that a prevocalic consonant syllabifies universally as an onset rather than a coda[60]). There are no transsyllabic constraints applying between a vowel and a following non-tautosyllabic consonant in Hungarian (28c) (for the distribution of long vowels before consonant clusters see section 3.4.2). Let us examine the constraints applying in contexts (28ab).

3.3.1. Hiatus

Nuclei can be adjacent (hiatus may occur) with the following restrictions: The initial vowel of vowel-initial synthetic suffixes deletes when they are attached to vowel-final stems (compare *ház-**on*** 'on (the) house' and *kapu-**n*** 'on (the) gate', cf. section 4.1.4.2). Some of the

[60]Barra Gaelic and Kunjen are sometimes cited as possible counterexamples, cf. Clements (1986), Sommer (1981) and Blevins (1995).

remaining vowel clusters are broken up by a (postlexical) process of hiatus filling (e.g. *fáig* [faːjig] 'up to the tree' cf. Siptár and Törkenczy 2000 and references cited therein). The rest of the hiatuses surface (e.g. *kakaó* [kɔkɔoː] 'cocoa', *csataordí tás* [čɔtɔordiːtaːš] 'battle cry').

Table V shows clusters of two vowels (vowels in hiatus) that occur in Hungarian. Table V abstracts away from hiatus filling, but is near surface in the sense that it shows vowel clusters that survive after the deletion of the initial vowels of vowel-initial synthetic suffixes in hiatus. Blanks indicate that the combination in question is not attested, stars mark vowel clusters that only occur when separated by an analytic boundary, and a given vowel cluster is spelt out if there is at least one monomorphemic stem in which it occurs.

TABLE V *VV clusters*

	i	ü	e	ö	u	o	a	iː	üː	eː	öː	uː	oː	aː
i	*	*	ie	*	iu	io	ia	*	*	ieː	iöː	iuː	ioː	iaː
ü	*	*	üe			*	üa			üeː				
e	ei	*	*	*	eu	eo	ea	*		*	*	*	eoː	eaː
ö														
u	ui	*	ue		uu	uo	ua	uiː		*	*		uoː	uaː
o	oi		oe			oo	oa			oeː				oaː
a	ai	*	ae	*	au	ao	*	aiː	*	*	*	*	aoː	*
iː	*	*	*		*					*				
üː	*	*	*	*	*		*	*		*		*		*
eː	*	*	*		*	*	*	*		*				*
öː	*	*	*	*	*	*	*	*		*	*	*	*	*
uː	*	*	*	*	*	*	*			*				*
oː	*	*	*	*	*	*	*	*	*	*	*	*	*	*
aː	*	*	*	*	*	aːo	*	*		*		*	*	*

Examples:[61] *kies* 'picturesque', *július* 'July', *liliom* 'lily', *riadt* 'frightened', *diéta* 'diet', *miliő*

[61]Only monomorphemic examples are given.

'milieu', *fiú* 'boy', *dió* 'walnut', *kiált* 'shout', *menüett* 'minuet', *nüansz* 'nuance', *habitüé* 'regular visitor', *koffein* 'caffeine', *múzeum* 'museum', *neon* 'id.', *tea* 'id.', *sztereó* 'stereo', *leány* 'girl', *jezsuita* 'Jesuit', *influenza* 'flu', *vákuum* 'vacuum', *fluoreszkál* 'fluoresce', *pápua* 'Papuan', *intuíció* 'intuition', *duó* 'duo', *január* 'January', *sztoikus* 'stoic', *poentíroz* 'embellish with jokes', *kooperál* 'cooperate', *boa* 'id.', *poén* 'punchline', *oázis* 'oasis', *mozaik* 'mosaic', *Izrael* 'Israel', *autó* 'car', *aorta* 'id.', *naív* 'naive', *kakaó* 'cocoa', *káosz* 'chaos'

In most cases the difference between stars and blanks in Table V is phonologically accidental. The reason is that morphologically complex hiatuses only survive (i.e. escape deletion) if the two nuclei become juxtaposed as a result of (i) compounding (*disznóölés* 'pig killing'), (ii) prefixation (by preverbs, e.g. *beleönt* 'pour into') or (iii) analytic suffixation (e.g. *ollóért* 'for scissors'), i.e. when they are separated by an analytic domain edge, a boundary across which no phonotactic or syllable structure constraints hold (cf. section 2.2). In a few cases, blanks are due to a regularity which is unrelated to hiatus. Thus, the lack of stars in the rows for /o, ö/ (the non-occurrence of polymorphemic /o, ö/-initial vowel clusters) is due to the fact that /o, ö/ are not permitted at the end of an analytic domain in general (cf. section 3.4.). Vowel Harmony (cf. Siptár and Törkenczy 2000 and references cited therein) accounts for the absence of monomorphemic vowel clusters containing front rounded vowels and back vowels.[62]

Bearing in mind the above observations, the following regularities specific to hiatus can be observed in Table V. In hiatus

(29) a. identical segments cannot occur.
b. a long vowel cannot be prevocalic.
c. the vowels /ö, öː, ü, üː/ cannot occur.

No separate statement needs to be included in the grammar of Hungarian to account for (29a) since it can be explained with reference to a general constraint on the form of phonological representations, the Obligatory Contour Principle (OCP), which bans adjacent identical

[62] *nüansz* 'nuance' and *Szöul* 'Seoul' are the only exceptions. Note also the exceptional behaviour of domain-final /o/ in 'foreign compounds' discussed below.

elements on the same tier.[63] Vowel clusters containing identical segments within an analytic domain[64] are impossible to represent since (30a) below is the representation of long vowels and (30b) is excluded by the OCP.

(30) a. X X b. X X

$\quad$ V_α $\qquad$ V_α V_α

Words like *kiirt* [kiirt] 'exterminate', *rakétaautó* [rɔkeːtɔɔutoː] 'rocket car', *biliig* [biliig] 'up to the chamber pot', etc. are only apparent counterexamples since in them the vowel segments making up the relevant clusters are in different analytic domains, they are 'fake' geminate vowels (and can be represented as (30b) without violating the OCP): ⟦⟦*ki*⟧⟦*irt*⟧⟧, ⟦⟦*rakéta*⟧⟦*autó*⟧⟧, ⟦⟦*bili*⟧*ig*⟧⟧.[65] The same applies to vowel clusters consisting of identical long vowels as in ⟦⟦*lé*⟧*ért*⟧⟧ 'for juice'. In Table V the monomorphemic occurrence of /oo/ and /uu/ (e.g. *vákuum* 'vacuum', *zoológia* 'zoology') seem truly problematic as they appear to be in violation of (29a) (i.e. the OCP). However, the few words that contain them[66] are either pronounced with single long (rarely short) vowels ([vaːkum/vaːkuːm, zoːloːgiɔ]) or, rarely, with fake geminates comparable with the cases described above ([vaːkuum, zooloːgiɔ]). We assume that in the latter pronunciation these words have been reanalysed as containing more than one internal analytic domain: ⟦⟦*váku*⟧⟦*um*⟧⟧, ⟦⟦*zo*⟧⟦*ológia*⟧⟧ to avoid violating the OCP (cf. 4.1.4.5). Note that the latter form is problematic in another respect: it violates the language-specific constraint (58) against domain-final mid vowels (cf. 3.4.1). If the form is pronounced

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[63]For various formulations of and problems with the OCP cf. Leben (1973), McCarthy (1986) Odden (1986, 1988).

[64]We assume that the OCP does not hold across the edge of an analytic domain.

[65]In fact, the fakeness of these geminates can even be heard in Hungarian as the two vowels are pronounced with distinct pulses, compare *kiirt* [kiirt] vs. *sírt* [šiːrt] 'cried'. The difference between fake and true geminate vowels is even more apparent in the case of *á* and *é*: *odaad* [odɔɔd] 'give over to' vs. *kád* [kaːd] 'tub', *leesik* [lɛɛšik] 'fall down' vs. *késik* [keːšik] 'be late' (cf. 4.1.4.5).

[66]The following is a complete list of the relevant items in our database: *kooperál* 'cooperate', *koordináta* 'coordinate', *zoológia, individuum* 'individual', *vákuum.*

[zooloːgiɔ], the OCP and (58) are in conflict: both of them cannot be upheld at the same time. Apparently, the otherwise inviolable constraint (58) can be suppressed in this case. This behaviour can also be observed in the pronunciation of 'foreign compounds'. These are complex structures whose first member is a bound morpheme of foreign origin such as *para-* 'id.', *kvázi-* 'quasi-', *pszicho-* 'psycho-', etc. Although these items may be part of words which are phonologically indistinguishable from monomorphemic ones (e.g. *paralel* 'parallel'), they can be productively used to form compounds whose second member may be a native or a nonnative word (e.g. *kvázi-vörös* 'quasi-red', *paraszimpatikus* 'parasympathetic'). These are often phonologically identifiable as compounds: e.g. ***kvázi****-vörös* (note the lack of vowel harmony), ***para****anyag* [pɔrɔɔnʸɔg] 'suberin' (note the fake geminate and the lack of Low Vowel Lengthening in *para-*), ***para****szövet* 'phellem' (note the lack of vowel harmony and that of Low Vowel Lengthening in *para-*). Curiously, in ECH short /o/ can occur finally in the first member of these structures even when they are transparently compound-like and other phonological phenomena (such as the lack of vowel harmony) mark them as compounds: e.g. *pszicho-biológia* [psihobioloːgia, *psihoːbioloːgia] 'psychobiology', *pszeudo-főnév* [psɛudoföːneːv, *psɛudoːföːneːv] 'pseudo-noun'. It is unclear why (58) (an otherwise very active constraint which even loans have to conform to) can be violated in just these cases.

We have assumed that in Hungarian the members of all long – short vowel pairs are melodically identical and their only difference is that the root of a given feature tree is associated to one timing slot in the short member and two timing slots in the long one. Given this assumption, (in addition to clusters of identical vowels) the OCP should also exclude vowel clusters in which a short vowel and its long counterpart combine in any order (e.g. *ií*, *í i*). This prediction is borne out: hiatuses of this type do not occur, either (when undivided by an analytic domain edge).[67] Naturally, the OCP does not exclude these clusters if the vowels they consist of belong to different analytic domains: ⟦⟦*ki*⟧⟦*í r*⟧⟧ 'write out', ⟦⟦*le*⟧⟦*ég*⟧⟧ 'burn down', ⟦⟦*sí* ⟧*ig*⟧ 'up to the ski', ⟦⟦*rá*⟧⟦*ad*⟧⟧ 'put on', ⟦⟦*fő*⟧⟦*ördög*⟧⟧ 'chief devil', ⟦⟦*ki*⟧⟦*í r*⟧⟧ 'write out' etc.

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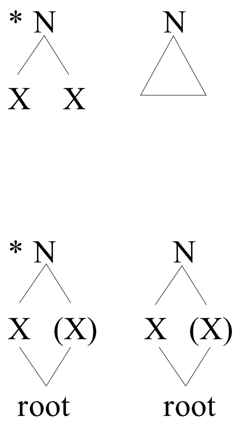
[67]The behaviour of *a* - *á* and *e* - *é* is exactly like that of the other short - long pairs, which confirms that (despite the phonetic difference in quality between them) the members of these respective pairs should have identical underlying feature melodies, i.e. should be represented on a par with other short - long pairs.

(29a) is clearly a systematic (i.e. non-accidental) OCP-based constraint. By contrast, the interpretation of (29b) and (29c) is less obvious. The reason is that although these constraints are almost exceptionless,[68] it is difficult to say if they account for accidental or systematic gaps. (29b) is a better candidate for a systematic regularity, because there are sporadic examples in which an original prevocalic long vowel shortens in loan words adopted into Hungarian (e.g. [buik] and not *[buːik] (from English *Buick* [bjuːɪk])).[69] (29c) may well be an accident due to several (unrelated) factors: Vowel Harmony (see above), the relative infrequency of front rounded vowels and accidents of borrowing (most monomorphemic items with hiatus are loans).

(i) One possible analysis is that we take hiatus to be well-formed in general and consider (29bc) to be systematic regularities. Then they can be expressed as (31ab):

(31) a. b.



Condition: the segment associated with either (or both) roots is LAB

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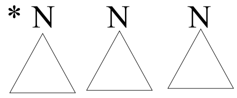
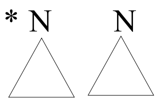
[68]The full list of exceptions is *káosz* in the case of (29b) and *entellektüel* 'intellectual', *menüett, müezzin* 'muezzin', *habitüé, nüansz, enteriőr* 'interior', *exteriőr* 'exterior', *miliő* in the case of (29c).

[69]Similarly, *Zooey* (from J. D. Salinger's novel *Franny and Zooey*) is pronounced [zui] rather than *[zuːi] (note that this example obviously is not a spelling pronunciation).

As there are no monomorphemic examples of vowel clusters consisting of more than two nuclei,[70] in analysis (i) a separate constraint is needed to exclude *VVV:

(32) 

(ii) It is notable, however, that the number of monomorphemic items actually surfacing with hiatus (i.e. unrepaired by hiatus filling) is low and that most of the relevant items are loans. The number of monomorphemic items with underlying hiatus found in the database used is n= 1311. Most of these items, however, contain /i/ or /iː/ in hiatus (n= 1075) and surface with compulsory hiatus filling (cf. Siptár and Törkenczy 2000). Thus, there are only 236 monomorphemic items actually surfacing with hiatus. This may suggest an alternative analysis in which hiatus is ill-formed:

(33) 

In this analysis, (31ab) are accidental and not part of Hungarian phonology at all and (32) is redundant. Note that there is another way to express that hiatus is ill-formed: we could change the obligatory onset parameter (2) to 'YES'. The ill-formedness of hiatus would follow from this parameter setting. Well-formed onsetless syllables would still exist, but they would be limited to initial position in an analytic domain: e.g. *itt* 'here', *ár* 'price', etc. This can be interpreted as an extension or generalization of the Peripherality Condition (Hayes 1980): exceptional syllable structure is permitted at the edge of a domain, not only in the sense that extra material can be added to the basic syllable template (peripheral extrasyllabic consonants may occur or peripheral consonants may be syllabified into a special constituent (the appendix)), but also in the sense that subminimal syllables may be licensed in peripheral position. Under analysis (ii) what remains to be explained is why violations of (33) are not

[70] *paranoia* 'id' [pɔrɔnojjɔ] does not violate (30). *dauer* 'perm' ([dɔuɛr] in ECH) is the single exception, but in substandard Hungarian even this word is pronounced [dɔjjɛr].

repaired in items to which Hiatus Filling (cf. Siptár and Törkenczy 2000) does not apply.

The choice between the two analyses[71] is an empirical one: it depends on native speakers' reactions to words containing hiatus. As our own intuitions are somewhat ambiguous and experimental data pertaining to this problem are not available, we leave this question open.

[71]One might suggest a third, sonority-based alternative to account for the predominance of hiatuses containing an /i/ melody. One could say that only vowel clusters containing a [-open$_2$] (high) melody are allowed (hiatuses permitted by this constraint may or may not be seen as subject to (31ab) so this analysis does not say anything about the status of (31ab)). Hiatus is otherwise disallowed. This can be given a sonority interpretation: as [-open$_2$] vowels are usually assumed to be less sonorous than [+ open$_2$] (nonhigh) vowels (e.g. Goldsmith 1990, Laver 1994) we can say that hiatus is only allowed in Hungarian if there is a sonority difference between the members of the vowel cluster (this presupposes that there is no sonority difference between [+ open$_1$] (low) vowels and [-open$_1$] (nonlow) vowels). It does not matter which of the two vowels is more sonorous: e.g. *k**ia**bál* 'shout', *moz**ai**k* 'mosaic' (note that even these hiatuses would be subject to postlexical Hiatus Filling [kijɔbaːl, mozɔjik]). The constraint then would be:

(i) Hiatus is asymmetric: one of the vowels must be governed.

Unfortunately this analysis makes wrong predictions about the well-formedness of clusters both of whose vowels are high. These would be ruled out by (i) because there is no sonority difference between the vowels. This is wrong since hiatuses in which both vowels are [-open$_2$] are well-represented within the set of hiatuses one of whose vowels has a [-open$_2$] specification: e.g. *fiú, július, jezsuita*, etc.

3.3.2. Intervocalic consonant clusters

In this section I discuss the constraints that apply to transsyllabic consonant clusters.

3.3.2.1. Two-member clusters

We have seen that any consonant can occur in a simplex onset or coda in Hungarian. Nevertheless, not all possible combinations of a nonbranching coda and a nonbranching onset can occur within a word: there are transsyllabic constraints specific to this context. Table VI shows the attested intervocalic two-member consonant clusters.[72] Table VI abstracts away from allophonic differences (hence the lack of [ŋ, ɱ] for instance). The notation used is the usual one: a blank space in an intersection of a row and a column means that the relevant cluster is unattested; a star (*) in a box indicates that the relevant cluster only occurs when the two consonants are separated by an analytic morphological domain boundary; a cluster is spelt out if it is attested in monomorphemic items and the number of such items in the database is $n > 15$; numbers have been used to indicate the number of monomorphemic items in the database when the cluster in question is attested in monomorphemic items and the number of such items is $n \leq 15$. A box containing a spelt out cluster, a star or nothing is struck out by dashes to indicate that the relevant cluster(s) is/are subject to (eliminated on the surface by) assimilations.[73]

[72]Table VI is the result of a computer search in the database used (cf. Chapter 1) with some additions since the database does not contain inflected items.

[73]None of these assimilations are related to syllable structure (i.e. operate regardless of the syllabification of the cluster to which they apply) and some of them are postlexical (Siptár & Törkenczy 2000).

TABLE VI *Intervocalic CC clusters*

	p	**t**	**t^y**	**k**	**b**	**d**	**d^y**	**g**	**t^s**	**č**	**ǰ**	**f**	**s**	**š**	**v**	**z**	**ž**	**m**	**n**	**n^y**	**l**	**r**	**j**	**x**
p	pp	pt	*	10	*	*	*	*	15	5	–	2	ps	8	*	*	*	*	3	*	pl	pr	2	*
t	*	tt	–	tk	*	*	*	*	*	*	—	3	*	*	tv	*	*	6	3	*	tl	tr	*	5
t^y	2	*	$t^y t^y$	11	*	—	—	—		*	–	1	*	*	1	—	—	4	*	4	1	*	*	1
k	*	kt		kk	*	*	*	*	kt^s	3	–	8	ks	11	kv	*	*	km	8	2	kl	kr	6	6
b	*	*	*	*	bb	7	*	*	*	*		*	*	*	1	7	3	*	1	*	bl	br	4	*
d	*	*	—	*	*	9	*	*	*	*		*	*	*	dv	~~dz~~	*	dm	3	*	dl	dr	*	*
d^y	*	*	—	*	2	*	7	*	—	*		*	*	*	3	2		3	*	1	5	*	*	*
g	*	*	—	*	1	3	*	gg	*	*		*	*	*	3	gz	*	gm	gn	*	gl	gr	6	*
t^s	*	*		t^sk	*	*	—	*	t^st^s		–	*	*	*	*	—	—	1	3	*	5	*		*
č	*	*		čk	*	*	—	*	*	10	–	*	*		*	—	—	6	3	*	1	*		*
ǰ	—	—	—	—	*	*		*	—	—	8	—	—	—					*			*		*
f	*	8		3	*	—	—	—		*	–	ff	1	*	*	—	—	*	1	*	9	fr	1	*
s	15	st	2	sk	*	*	*	*	3	*	–	5	ss	*	3	*	*	sm	4	3	sl	*	1	*
š	šp	št	6	šk	*	*	*	*	*	*	–	1	*	šš	6	*	*	šm	2	3	šl	*	*	4
v	*	*	—	*	*	*	*	*	—	*		*	*	*	*	*		*	*	*	5	2	1	*
z	*	*	—	*	1	zd	*	zg	*	*		*	*	*	2	zz	*	zm	6	*	zl	3	*	*
ž	*	*	—	*	*	4	2	4	—	*		*	*	—	*	*	*	6	4	*	2	*	—	*
m	mp	2		1	mb	2	*	*	*	2		15	1	1	4	3	5	mm	8	3	ml	3	3	3
n	*	nt	*	nk	*	nd	*	ng	nt^s	nč	9	nf	ns	nš	nv	nz	4	*	nn	*	nl	*	*	3
n^y	*	*	n^yt^y	*	*	*	n^yd^y	*	*	*		*	1	1	6	*	*	*	*	n^yn^y	1	*	*	6
l	9	lt	1	lk	6	ld	3	lg	lt^s	lč		lf	2	lš	lv	2	1	lm	ln	*	ll	*	*	9
r	rp	rt	rt^y	rk	rb	rd	7	rg	rt^s	rč		rf	rs	rš	rv	rz	rž	rm	rn	rn^y	rl	rr	rj	rx
j	1	jt		jk	4	jd	*	7	2	4		2	js	1	4	9	*	6	9	4	jl	4	11	11
x	*	*		*	1	*	*	*		*		*	*	*	*			*	1		1	*	*	1

Examples (a question mark marks items in which the relevant cluster may contain an analytic domain boundary): *szappan* ‘soap’, *kapta* ‘(boot) last’, *lepke* ‘butterfly’, *kapca* ‘foot-cloth’, *lépcső* ‘stairs’, *copfos* ‘pigtailed’, *apszis* ‘apse’, *ipse* ‘fellow’, *srapnel* ‘shrapnel’, *paplan* ‘quilt’, *apró* ‘tiny’, *kopja* ‘spear’, *suttog* ‘whisper’, *patkó* ‘horseshoe’, *hétfő?* ‘Monday’, *ótvar* ‘eczema’, *ritmus* ‘rhythm’, *etnikum* ‘ethnic group’, *katlan* ‘cauldron’, *matrac* ‘mattress’, *nátha* ‘flue’, *pitypang* ‘lion’s tooth’, *hattyú* ‘swan’, *pletyka* ‘rumour’, *fityfiritty* ‘imp’, *kotyvaszt* ‘concoct’, *trutymó* ‘suspicious substance’, *sa*[t^y]*nya* ‘stunted’, *fátylas* ‘veiled’, *petyhüdt* ‘limp’, *akta* ‘document’, *csökken* ‘decrease’, *akció* ‘action’, *bakcsó* ‘night heron’, *bakfis* ‘young girl’, *buksza* ‘purse’, *taksa* ‘price’, *ekvivalens* ‘equivalent’, *lakmusz* ‘litmus’, *akna* ‘mine’, *szoknya* ‘skirt’, *lakli* ‘tall youngster’, *bokréta* ‘bunch of flowers’, *csuklya* ‘hood’, *nyikhaj* ‘worthless person’, *zsibbad* ‘go numb’, *labda* ‘ball’, *szubvenció* ‘subvention’, *dobzoska* ‘pangolin’, *habzsol* ‘devour’, *abnormis* ‘abnormal’, *ablak* ‘window’, *abrak* ‘fodder’, *gereblye* ‘rake’, *addig* ‘until then’, *dudva* ‘weed’, *madzag* ‘string’, *ködmön* ‘sheepskin waistcoat’, *bodnár* ‘cooper’, *nudli* ‘noodle’, *nadrág* ‘trousers’, *bugyborék* ‘bubble’, *poggyász* ‘luggage’, *fegyver* ‘arms’, *jegyző* ‘town clerk’, *hagyma* ‘onion’, *naro*[d^y]*nyik* ‘Narodnik’, *kagyló* ‘shell’, *Magda* ‘Magdalen’, *aggódik* ‘worry’, *dágvány* ‘wallow’, *lagzi* ‘wedding’, *magma* ‘id.’, *bognár* ‘cartwright’, *nyegle* ‘arrogant’, *egres* ‘gooseberry’, *máglya* ‘bonfire’, *mackó* ‘bear’, *icce* < old liquid measure (0.88 litre)> , *cicfarok?* ‘achillea’, *kecmereg* ‘crawl’, *fecni* ‘slip of paper’, *spicli* ‘informer’, *tacskó* ‘dachshund’, *gleccser* ‘glacier’, *kocsma* ‘pub’, *plecsni* ‘stain’, *becslés?* ‘estimate’, *kaftán* ‘caftan’, *cafka* ‘whore’, *affér* ‘affair’, *ofszájd* ‘offside’, *sufni* ‘shed’, *kifli* ‘roll’, *cifra* ‘ornamented’, *ifjú* ‘youth’, *aszpik* ‘jelly’, *asztal* ‘table’, *kesztyű* ‘glove’, *deszka* ‘plank’, *diszciplína* ‘discipline’, *aszfalt* ‘asphalt’, *asszony* ‘woman’, *köszvény* ‘gout’, *eszme* ‘idea’, *disznó* ‘pig’, *tarisznya* ‘satchel’, *maszlag* ‘lie’, *csoroszlya* ‘old hag’, *ispán* ‘land-steward’, *ostoba* ‘stupid’, *ostya* ‘wafer’, *iskola* ‘school’, *násfa?* ‘pendant’, *lassú* ‘slow’, *fösvény* ‘miser’, *ismer* ‘know’, *masni* ‘ribbon’, *rusnya* ‘ugly’, *pislog* ‘blink’, *kushad?* ‘crouch’, *bóvli* ‘junk’, *sevró* ‘kidskin’, *szovjet* ‘Soviet’, *üzbég* ‘Uzbek’, *gazda* ‘owner’, *mézga* ‘resin’, *özvegy* ‘widow’, *bezzeg* ‘by contrast’, *csizma* ‘boot’, *parázna* ‘lecherous’, *üzlet* ‘shop’, *ezred* ‘0.001', *rozsda* ‘rust’, *uzsgyi* ‘let’s go’, *vizsga?* ‘examination’, *zsolozsma* ‘chant’, *alamizsna* ‘alms’, *vizsla* ‘beagle’, *tompa* ‘blunt’, *tamtam* ‘tomtom’, *tömkeleg* ‘abundance’, *tombol* ‘rave’, *dumdum* ‘id.’, *csámcsog* ‘eat noisily’, *kámfor* ‘camphor’, *szomszéd* ‘neighbour’, *emse* ‘sow’, *nyamvadt* ‘lousy’, *vamzer* ‘informer’, *tömzsi* ‘stocky’, *amnesztia* ‘amnesty’, *cammog* ‘trudge’, *nyámnyila* ‘weakling’, *sámli* ‘stool’, *kamra* ‘chamber’, *tömjén* ‘incense’, *lomha* ‘slow’, *minta* ‘pattern’, *lankad* ‘get tired’, *bendő* ‘stomach’, *angol* ‘English’, *kanca* ‘mare’, *szerencse* 'mare', *halandzsa* 'nonsense', *fanfár* 'fanfare', *vánszorog* 'crawl', *közönség?* 'audience', *szenved* 'suffer', *cenzor* 'censor', *avanzsál* 'advance', *dunna* 'quilt', *jelenleg?* 'now', *inhalál* 'inhale', *kulipi*[n^{y}]*tyó* 'small house', *a*[n^{y}]*gyal* 'angel', *kényszer?* 'coercion', *manysi* 'Vogul', *ponyva* 'canvas', *tényleg?* 'really', *dinnye* 'melon', *enyhe* 'slight', *alpári* 'vulgar', *balta* 'hatchet', *kopoltyú* 'gill', *alku* 'deal', *silbak* 'guard', *oldal* 'side', *tölgyes* 'oak-forest', *balga* 'foolish', *délceg* 'dashing', *olcsó* 'cheap', *csalfa* 'deceitful', *alszik* 'sleep', *válság?* 'crisis', *tolvaj* 'thief', *emulzió* 'emulsion', *balzsam* 'ointment', *alma* 'apple', *elnök* 'chairman', *csillag* 'star', *málha* 'pack', *törpe* 'dwarf', *párta* 'girl's headdress', *gyertya* 'candle', *szarka* 'magpie', *borbély* 'hairdresser', *erdő* 'forest', *bárgyú* 'feeble-minded', *márga* 'marl', *herceg* 'prince', *furcsa* 'strange', *férfi* 'man', *erszény* 'purse', *harsány* 'loud', *árva* 'orphan', *borzalom* 'horror', *perzsel* 'scald', *lárma* 'noise', *párna* 'pillow', *ernyő* 'umbrella', *gerle* 'dove', *virrad* 'dawn', *varjú* 'crow', *marha* 'cattle', *selypít* 'lisp', *bojtár* 'young herdsman', *bojkott* 'boycott', *lajbi* 'vest', *vajda* 'voivode', *tajga* 'taiga', *krajcár* 'farthing', *hajcsár* 'drover', *tájfun* 'typhoon', *majszol* 'munch', *hajsókál* 'nurse', *csajvadék* 'riff-raff', *gejzír* 'geyser', *bajmol* 'take trouble', *ajnároz* 'worship', *ejnye* 'Shame on you!', *kajla* 'scatterbrained', *majré* 'fright', *zsöllye* 'stalls', *kályha* 'stalls', *barkohba* < word-game> , *technika* 'technique', *ihlet* 'inspiration', *kehhent* 'cough'.

First it must be pointed out that clusters that straddle analytic boundaries do not reveal the constraints governing interconstituent sequences. Analytic affixation and compounding often create clusters that are unpermitted in monomorphemic items; e.g. /nm, kp/ are not permitted monomorphemic interconstituent clusters, nevertheless ⟦⟦*kan*⟧⟦*muri*⟧⟧ 'stag party' and ⟦⟦*kerék*⟧⟦*pár*⟧⟧ 'bicycle' are well-formed because the consonants in the relevant clusters belong to different analytical domains. Virtually any cluster can be the result of an analytic morphological operation.[74] The point is that clusters whose member consonants belong to different analytic domains are not relevant to the phonotactic pattern of interconstituent clusters. Therefore, we shall disregard interconstituent clusters that only occur when separated by an analytic domain boundary: such a cluster is no different as to its phonotactic status from

[74]Of course, some of these clusters are subject to assimilations, consequently, there are completely unattested clusters at the surface, e.g. */dp/ is subject to regressive voicing assimilation and thus [dp] is unattested: *szabadpiac* 'free market' [sɔbɔtpijɔt^{s}].

an unattested one ~~it~~, i.e. the combination of segments it consists of, may realise a systematic or an accidental gap.

First, let us examine the sonority relationship between the members of an interconstituent cluster. It is often assumed in the literature that interconstituent clusters obey the Syllable Contact Law (SCL) according to which the first consonant in an interconstituent cluster must be more sonorous than the second one (cf. e.g. Vennemann 1988, Clements 1988, 1990, Kaye, Lowenstamm and Vergnaud 1990, Rice 1992, Harris 1994). In terms of government (as is defined in this dissertation, cf. section 2.2), this means that in a well-formed interconstituent cluster the coda consonant should be governed by the following onset consonant. (34) shows, however, that the Syllable Contact Law is inoperative in Hungarian: (i) interconstituent clusters may consist of segments of identical sonority (34a), and (ii) often the same segments or segment classes occur in both possible orders (34b) (recall that there are no branching onsets in Hungarian, see section 3.2.2):[75]

(34) a. le**pk**e 'butterfly'
ka**pc**a 'foot cloth'

b.

a**k.t**a 'document'	a**t.k**a 'mite'
de**sz.k**a 'plank'	bu**k.sz**a 'purse'
i**s.k**o.la 'school'	ta**k.s**a 'price'
ro**n.d**a 'ugly'	bo**d.n**ár 'cooper'
a**l.m**a 'apple'	e**m.l**ő 'breast'
ba**l.t**a 'hatchet'	ka**t.l**an 'cauldron'
Má**r.t**a 'Martha'	Má**t.r**a 'place name'
ma**j.r**é 'fright'	va**r.j**ú 'crow'

However, the fact that the SCL does not hold does not mean that any two consonants can form

[75]The lack of branching onsets is not the only reason why the SCL does not hold in Hungarian: there are interconstituent clusters with rising sonority that would not be well-formed onsets even if branching onsets were permitted, e.g. /tl/ *katlan* 'cauldron', /kn^{y}/ *szoknya* 'skirt', /km/ *lakmusz* 'litmus', /zn/ *vézna* 'thin', /n^{y}l/ *tényleg* 'really', etc.

an intervocalic cluster: systematic gaps do occur.

Let us examine Table VI and disregard clusters containing /x/ and /v/ for the moment (we shall discuss their behaviour separately at the end of this section). Then, it can be seen in the table that the greatest variety of monomorphemic intersyllabic clusters are of the type in which there is a *sonority difference* between the two consonants making up the cluster. In general, hardly any special restrictions (pertaining to place of articulation, for instance[76]) apply to clusters of this type. Therefore, we assume that the primary source of licensing for interconstituent clusters is government:

(35) An interconstituent cluster whose member consonants are in a governing relationship (right-to-left or left-to-right) is well-formed.

As Table VI shows, however, (i) not all interconstituent clusters whose member consonants are equally sonorous are ill-formed; and (ii) not all interconstituent clusters whose member consonants have different sonority are well-formed. (i) suggests that government is not the only way in which interconstituent clusters can be licensed: geminates and some stop+ stop clusters, for instance, are well-formed and thus must be licensed by some other special means of licensing (note that (35) does not imply that clusters whose member consonants are not in a governing relationship are necessarily ill-formed). There are two types of interconstituent clusters that statement (ii) holds true of: clusters consisting of fricatives and stops (in either order) and nasal+ stop clusters. Let us disregard the latter type for the moment and focus our attention on the former: some intervocalic fricative+ stop and stop+ fricative clusters are not well formed. A possible way to handle this problem is to say that *in Hungarian* the sonority difference between fricatives and stops is not great enough for government to apply. Recall that the sonority distance settings for Hungarian consonants and the minimum sonority distance requirement are as follows (cf. section 3.2.4.2.):

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[76]Nasal+ obstruent clusters are an obvious counterexample, cf. the discussion below.

(36) a. *Sonority Hierarchy: Hungarian*

stops, affricates < fricatives < < nasals < < liquids

b. S_{min} = < < or > >

Thus, no governing relationship can obtain between the consonants in fricative+ stop and stop+ fricative clusters in general, consequently special provisions must be made to license those clusters of this type that *are* well-formed. This would explain why—like other clusters whose members are equally sonorous (e.g. stop+ stop or nasal+ nasal clusters)—only *some* fricative+ stop and stop+ fricative clusters are well formed.

Let us now examine the non-analytic interconstituent clusters that are unlicensed by government. We have noted above that some of these clusters are well-formed. Three types of behaviour may be distinguished.

First, all intervocalic geminates are well-formed (the lack of monomorphemic /vː/ and /ž/ is an accidental gap). Geminates obviously cannot be licensed by government if we assume that government applies between timing slots (cf. 2.2) because the two adjacent timing slots have the same segmental content and thus are equally sonorous. Following Rice (1992) we assume that the licensing of geminates is due to the fact that they have shared structure (specifically, a single root node) and thus can be attributed to binding:[77]

(37) *Interconstituent binding*

An interconstituent cluster C1C2 where C1 (the coda consonant) is root-bound is licensed.

The second type of well-formed clusters that seem unlicensed by government is liquid+ liquid combinations. All possible combinations of the three segments involved (/l, r, j/) seem to be permitted.[78] Although all three are COR, their licensing cannot be attributed to binding (place-binding) because (a) /j/ is [-anterior] and thus does not share its place node (or even COR

[77]Compare Kaye, Lowenstamm and Vergnaud (1990) who assume that the first slot in a geminate is empty and governed by the second.

[78]The clusters /lr/ and /lj/ are subject to assimilations that are unrelated to syllable structure.

node) with /l, r/ and (b) there are ill-formed interconstituent clusters whose member consonants share a place node (e.g. */fp, st^s/, etc.). The licensing of liquid+ liquid combinations ceases to be a problem if we assume the fine-tuned sonority scale introduced in section 3.2.3:

(38) l < < r < < j

Given (38), the licensing of liquid+ liquid interconstituent clusters can be simply attributed to government.

The third group of well-formed interconstituent clusters not licensed by government consists of some nasal+ nasal clusters and some obstruent+ obstruent clusters. This group differs from the previous two in that only *some* of these clusters are well-formed.

An examination of Table VI shows that in (nongeminate) stop+ stop interconstituent clusters the second consonant must not be labial. Clusters whose second consonant is labial are ill-formed/unattested whereas those ending in coronals or velars are well-formed. The working of this 'antilabial constraint' can be seen in the following examples:

(39) **stop + stop**

pt	*tp	kapta '(shoemaker's) last'
pk	*kp	lepke 'butterfly'
bd	*db	labda 'ball'
kt	= tk	akta 'document', atka 'mite'

The same constraint seems to hold in affricate+ stop,[79] nasal+ nasal and stop+ fricative clusters. Consider the following examples:

(40) a. **affricate + stop**

čk	*čp	kecske 'goat'
t^sk	*t^sp	lecke 'homework'

[79]Stop+ affricate clusters are omitted because there are no labial affricates in Hungarian.

b. **nasal + nasal**

mn *nm himnusz ‘hymn’

c. **stop + fricative**

pš *pf tapsi ‘bunny rabbit’, †cupfol[80]

kš *kf kuksol ‘hide, cower’, †bukfenc

ps *pf apszis ‘apse’, †cupfol ‘pluck’

ks *kf taxi ‘id.’, †bukfenc ‘somersault’

There are a very small number of exceptions to the ‘antilabial’ constraint in the types of combinations examined. The complete list of the (monomorphemic) exceptional items (stems) I have found is as follows: /t^yp/ *pi**typ**ang* ‘dandelion’, *pi**typ**alatty* ‘quail’s song’; /gb/ *rö**gb**i* ‘rugby’; /g^yb/ *bu**gyb**orék* ‘bubble’, *lö**gyb**öl* ‘handwash in water without rubbing’ < not in ECH> ; /pf/ *cu**pf**ol* ‘pluck’, *co**pf**os* ‘pigtailed’; /tf/ *pla**tf**orm* ‘stand’; /t^yf/ *fi**tyf**iritty* ‘imp’; /kf/ *ba**kf**is* ‘young girl’, *bi**kf**ic* ‘kid’, *bu**kf**enc* ‘somersault’, *pa**kf**on* ‘German nickel-silver’, *ukmu**kf**ukk* ‘in a jiffy’.

Fricative+ stop clusters behave in a more complex way: the ‘antilabial’ constraint does not work when the first consonant is coronal (41b), but it does if it is non-coronal (41a):

(41) **fricative + stop**

a. ft fk *fp afta ‘thrush’, cafka ‘whore’

b. sk = sp viszket ‘itch’ = aszpik ‘jelly’

st = sp posztó ‘felt’ = aszpik ‘jelly’

št = šp este ‘evening’ = püspök ‘bishop’

šk = šp eskü ‘oath’ = püspök ‘bishop’

zd = zb gazda ‘master’ = azbeszt ‘asbestos’

We can account for these regularities if we assume that a special kind of licensing (call it Sp-

[80]The symbol † marks attested, but phonotactically ill-formed items.

licensing) is needed in order for an interconstituent cluster to be well-formed if it is not licensed by government or binding. A given language may or may not allow Sp-licensing to apply. We assume that in Hungarian, *in general*, Sp-licensing is granted to interconstituent clusters, i.e. it can license coda-onset clusters that are unlicensed by government or binding. Note that this type of licensing is not derivable from government if government is solely based on sonority; nor does it derive from binding.[81] Sp-licensing is thus stipulative and its conditions are language specific.[82]

(42) *Sp-licensing*

Sp-licensed interconstituent clusters are well-formed.

Hungarian, however, imposes certain constraints on Sp-licensing, i.e. it disallows Sp-licensing in some interconstituent configurations. These constraints are discussed and formalised below:

The 'antilabial' effects are due to the following condition on Sp-licensing:

(43) In an interconstituent cluster C1C2, LAB consonants cannot Sp-license the preceding consonant. Condition: C1 $\neq$ [COR, + cont]

As is expected, no antilabial effects can be detected when an interconstituent cluster is licensed by government or root-binding (note that in principle the clusters in question could display antilabial effects because there are labial consonants in the various manner classes that appear in the second position). Consider the following examples:

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[81]It could not be interpreted as binding even if we assumed that coronals are placeless because there are well-formed and Sp-licensed interconstituent clusters not containing a coronal: e.g. /pk/ as in *lepke* 'butterfly'. /pk/ is not licensed by government (there is no sonority difference between the segments), and cannot be licensed by binding since /p/ has its own independent place specification.

[82]Hopefully, further research will be able to derive (some of) the effects due to Sp-licensing from general principles.

(44)[83] a. **stop + nasal**

etnikum ‘ethnic group’ = ritmus ‘rhythm’

bodnár ‘cooper’ = ködmön ‘sheepskin coat’

b. **nasal + stop**

cinke ‘titmouse’ = lámpa ‘lamp’

fondorlat ‘devious trick’ = bomba ‘bomb’

c. **liquid + stop**

boldog ‘happy’ = kolbász ‘sausage’

árkád ‘arcade’ = Árpád < name>

d. **affricate + nasal**

fecni ‘slip of paper’ = kecmereg ‘crawl’

kalucsni ‘galosh’ = pacsmag ‘suspicious concoction’

e. **fricative + nasal**

disznó ‘pig’ = pászma ‘ray of light’

vézna ‘thin’ = zuzmó ‘lichen’

f. **nasal + fricative**

unszol ‘urge’ = ténfereg ‘loiter’

emse ‘sow’ = kámfor ‘camphor’

g. **liquid + fricative**

válság ‘crisis’ = delfin ‘dolphin’

persze ‘of course’ = férfi ‘man’

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[83] C+ liquid and C+ affricate clusters are disregarded because there are no labial liquids or affricates.

h. **liquid + nasal**

málna 'raspberry' = elme 'mind'

barna 'brown' = lárma 'noise'

In addition to the interconstituent clusters that are licensed by government or root-binding there is another group of clusters which could in principle display an 'antilabial' effect, but do not: all clusters consisting of fricatives and/or affricates appear to be ill-formed. There are very few words containing non-analytic fricative/affricate+ fricative/affricate clusters. The following is an exhaustive list of the exceptional/irregular items:[84] /st^s/ *diszciplína* 'subject', *proszcénium* 'fore-stage', *reminiszcencia* 'memory', /fs/ *ofszájd* 'off-side', /sf/ *aszfalt* 'asphalt', *atmoszféra* 'atmosphere', *blaszfémia* 'blasphemy', *foszfát* 'phosphate', *foszfor* 'phosphore', /šf/ *násfa* 'pendant'. Assuming that affricates are contour segments that contain the feature [+ continuant], the 'antifricative' constraint can be interpreted as a ban on the occurrence of the features [-son, + cont] under *both* root nodes in an interconstituent cluster. Since, trivially, the constraint only holds if the cluster is not licensed by government or binding, it can be built into Sp-licensing:

(45) A [- son, + cont] segment cannot Sp-license another [- son, + cont] segment in an interconstituent cluster.

This 'antifricative' constraint can mask the effect of the 'antilabial' constraint (cf. Törkenczy 1998)—this is why fricative/affricate+ fricative/affricate clusters do not display an 'antilabial' effect.

A further constraint can be identified if we examine the clusters that contain palatals. It seems that /t^y, d^y, n^y/ make an interconstituent cluster ill-formed irrespective of whether they occur in the first or the second position *if* the two consonants are not in a governing relation. Consider the following examples (in 46 below the first column of clusters has clusters whose

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[84] We have disregarded triliteral clusters (there are four stems containing them in the database: *o[p]szcén* 'obscene', *excentrikus* 'eccentric', *transzcendens* 'transcendent', *excellenciás* 'excellency'(see Törkenczy 1994a)) and clusters containing /v/. Cf. the discussion below.

members are in a governing relationship and the second nole shows clusters whose members are not):

(46)	$d^{y}m$	$*d^{y}d$	hagyma ‘onion’	
	$n^{y}d^{y}$	$*n^{y}n$	ke[n^{y}]gyel ‘stirrup’	
	$n^{y}v$	$*n^{y}n$	ponyva ‘canvas’	
	rt^{y}	$*\check{s}t^{y}$	kártya ‘card’	(†ostya ‘wafer’)
	rd^{y}	$*\check{z}d^{y}$	bárgyú ‘stupid’	(†mezsgye ‘border’)
	rn^{y}	$*mn^{y}$	ernyő ‘umbrella’	(†nyimnyám ‘weakling’)

The palatal liquid /j/ is unlike /t^{y}, d^{y}, n^{y}/ in that it forms well-formed interconstituent clusters with any consonant irrespective of whether it occurs in the first place or the second place. This is to be expected, given that /j/ is at least minimally sonority-distinct from all the other sonority classes. Thus, all the examples below are well-formed:

(47)	/j/	se[j]pít ‘lisp’	gyapjú ‘wool’
		hajcsár ‘drover’	
		majszol ‘munch’	ifjú ‘youth’
		hajnal ‘dawn’	tömjén ‘incense’
		kajla ‘scatterbrained’	varjú ‘crow’
		ká[j]ha ‘stove’	

Again, the ‘antipalatal’ effects can be seen as a result of a constraint on Sp-licensing:

(48) [COR, –ant] consonants cannot Sp-license another consonant in an interconstituent cluster.

There are few exceptions to (48). The following is an exhaustive list of occurring ill-formed items: /$t^{y}p$/ *pi**typ**ang* ‘dandelion’, *pi**typ**alatty* ‘quail’s song’; /$t^{y}k$/ *bu**tyk**os* ‘bottle’, *bü**tyk**ös* ‘knobbly’, *bü**tyk**öl* ‘repair’, *fü**tyk**ös* ‘stick’, *he**tyk**e* ‘proud’, *lö**tyk**öl* ‘quickly wash’, *pi**tyk**e* 'ornamental button', *ple**ty**ka* 'rumour', *po**ty**ka* 'carp', *szo**ty**ka* 'whore', *szu**tyk**os* 'filthy'; /t^{y}f/ *fi**tyf**iritty*; /t^{y}h/ *pe**tyh**üdt* 'limp'; /g^{y}b/ *bu**gyb**orék* 'bubble', *lö**gyb**öl* 'handwash in water without rubbing' < not in ECH> , /d^{y}z/, *je**gyz**ő* 'town clerk', *na**gyz**ol* 'show off'; /st^{y}/ *ke**szty**ű* 'glove', *gimna**szty**orka* 'Russian military jacket', *Osztyapenkó* < name of (the statue of) Soviet war hero> ; /št^{y}/ *agga**sty**án* 'very old man', *bá**sty**a* 'bastion', *boro**sty**án* 'ivy', *hada**sty**án* 'war veteran of advanced age', *o**sty**a* 'wafer', *o**sty**epka* 'a kind of ewe cheese'; /žd^{y}/ *me**zsgy**e* 'border', *u**zsgy**i* 'let's go'; /žg/ *vi**zsg**a* 'exam', *pe**zsg**ő* 'champagne', *nyü**zsg**és* 'hubbub', *po**zsg**ás* 'healthy-looking < of sb's face> '; /mn^{y}/ *nyá**mny**ám* 'weakling', *nyá**mny**ila* 'weakling', *nyi**mny**ám* 'weakling'.

In the discussion of interconstituent clusters so far we have disregarded those containing /x/ or /v/. As can be seen in Table VI, /x/ is free to occur as the second consonant, but is rare as the first consonant in an interconstituent cluster (note that it does occur in this position in a few words, e.g. *ihlet* 'inspiration'). This distribution is not due to an interconstituent constraint. We assume that C+ /x/ and /x/+ C clusters *are* licensed by government (i.e. that the sonority difference between /x/ and other sonority classes is sufficient for government to apply[85]) and the scarcity of preconsonantal /x/ (regardless of whether the coda is part of an interconstituent cluster or not) is accidental. Note that even if the distribution were due to a constraint, it would be relevant to the coda position *alone* rather than the interconstituent domain.

The behaviour of /v/ is less straightforward. We shall see that it is just as 'two-faced' in its phonotactic behaviour in this position as it is with respect to voicing assimilation (cf. Vago 1980, Siptár & Törkenczy 2000, Siptár 1996). In order to see this let us examine what kind of behaviour we predict with respect to the interconstituent constraints discussed above (i) if /v/ is an obstruent (and has the sonority ranking of a fricative); and (ii) if /v/ has the sonority ranking of a non-nasal sonorant.

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[85]The ranking of [h] (the realization of /x/ in the onset in Hungarian) in the sonority hierarchy is problematic. It is usually ignored in discussions of the sonority relations between segment classes (cf. for instance, Laver 1994, Ladefoged 1993, Steriade 1982, van der Hulst 1984, Anderson and Ewen 1987) or only mentioned in passing (e.g. Clements 1990 observes that 'the sonority ranking of voiceless approximants is not well-established' (p. 293)—Levin 1985 points out that [h] and [ʔ] may function as obstruents (p. 65)). In the lack of (counter)evidence we simply stipulate that /x/ has the same sonority rank as a fricative.

First let us suppose that /v/ has the sonority ranking of a fricative. (49ab) show the predictions about the well-formedness of vC and Cv clusters respectively. Stars mark ill-formed clusters and ✓ marks well-formed ones. */✓ appears if some of the clusters within the class are predicted to be well-formed others are not.

(49) a. vC

	stop	affricate	fricative	nasal	liquid
/v/ +	*/✓	*	*	✓	✓

b. Cv

stop	affricate	fricative	nasal	liquid	
*	*	*	✓	✓	+ /v/

If /v/ is a LAB fricative, then both Cv and vC interconstituent clusters are predicted to show antilabial effects. /v/+ LAB stop and stop+ /v/ clusters are expected to be ill-formed because they are not licensed by government (the sonority distance between stops and fricatives is too small) and Sp-licensing cannot apply since the second member of the interconstituent cluster is LAB. This prediction is only partly borne out: although /v/+ labial stop clusters do not occur, stop+ /v/ clusters are well-formed: e.g. *udvar* ‘courtyard’, *rögvest* ‘at once’, *fegyver* ‘weapon’, *lekvár* ‘jam’, *borotva* ‘razor’, *kotyvaszt* ‘concoct’ (cf. Table VI).

If /v/ is a fricative, then in accordance with (45), both vC and Cv clusters should display ‘antifricative’ effects. This is true of /v/+ fricative/affricate clusters, but (similarly to stop+ /v/ clusters) fricative+ /v/ clusters are well-formed: e.g. *ösvény* ‘path’, *özvegy* ‘widow(er)’, *öszvér* ‘mule’.

If /v/ is a fricative, then obstruent+ /v/ and /v/+ obstruent clusters are expected to show ‘antipalatal’ effects since government cannot license the relevant clusters and according to (48) Sp-licensing cannot apply. This again is only partly true since—contrary to the prediction—palatal obstruent + /v/ clusters are well-formed (e.g. *fegyver* ‘weapon’, *kotyvaszt* ‘concoct’)

If /v/ is a fricative, both /v/+ sonorant and sonorant+ /v/ clusters are predicted to be well-formed because these clusters are licensed by government This prediction is borne out.

To sum up, a fricative interpretation of /v/ makes correct predictions about the well-formedness of interconstituent clusters containing /v/ if (i) the other consonant in the interconstituent cluster is a sonorant and (ii) if /v/ occurs as C1 in an interconstituent cluster C1C2.

Let us now examine what predictions are made and whether they are borne out if /v/ is interpreted as a non-nasal sonorant. Let us assume that the sonority distance between /v/ and the other non-nasal sonorants is great enough for government to apply (i.e. '/v/ < < liquids'). (50ab) show that under this interpretation all interconstituent clusters containing /v/ (vC and Cv alike) are predicted to be well-formed. The reason is that if /v/ has the sonority ranking of a non-nasal sonorant, then government would license all the clusters shown in (50), consequently binding and Sp-licensing would have no effect.

(50) a. vC

	stop	affricate	fricative	nasal	liquid
/v/ +	✓	✓	✓	✓	✓

b. Cv

stop	affricate	fricative	nasal	liquid	
✓	✓	✓	✓	✓	+ /v/

This prediction is not correct, however, since (as we have seen above) /v/+ fricative/affricate, /v/+ labial stop[86] and /v/+ palatal obstruent clusters are ill-formed. This suggests that the sonorant interpretation of /v/ makes correct predictions if (i) /v/ occurs as C2 in an interconstituent cluster C1C2; and/or (ii) the other consonant in the cluster is a sonorant.

Thus, we are faced with a 'sonority ranking paradox': /v/ behaves as an obstruent when it occurs as the first member of an interconstituent cluster, but it behaves as a sonorant when it is the second member of an interconstituent cluster.[87] The question is how to express this in

[86]/v/+ stop clusters do not occur even if the stop is not LAB. In our interpretation this is accidental.

[87]This is completely in agreement with the ambiguous nature of /v/ (cf. Vago 1980, Siptár & Törkenczy 2000, Siptár 1996). It should be noted, however, that /v/+ liquid clusters are

terms of licensing. First of all, it is not possible for the same segment to have different sonority rankings depending on the position it occurs in, and we do not want to postulate two different underlying /v/-s (a sonorant and an obstruent).[88] Furthermore, it does not help to assume that /v/ is 'asymmetrical' in the sense that ~~al~~though it is different in terms of sonority from both obstruents and sonorants ~~it~~ is 'closer' to obstruents than to sonorants (obstruents < /v/ < < sonorants), because this would still incorrectly predict antipalatal, antifricative and antilabial effects in intervocalic obstruent+ /v/ clusters. The reverse, i.e. that it is closer to sonorants than to obstruents (obstruents < < /v/ < sonorants) does not help either, because it would remove /v/+ obstruent clusters from the purview of the constraints on Sp-licensing and, incorrectly, no antipalatal, antifricative and antilabial effects would be predicted. Thus, there seem to be two options: we can assume that (i) /v/ has the sonority ranking of a sonorant that is minimally sonority-distant from both the obstruents and the other sonorants (obstruents < < /v/ < < sonorants) and stipulate that /v/ has to be Sp-licensed when it occurs in a coda which is part of an interconstituent cluster (even if it is licensed by government); or, alternatively, (ii) /v/ has the sonority ranking of a fricative, but is stipulated to be exempt from the restrictions on Sp-licensing in an onset which is part of an interconstituent cluster. The two solutions are equivalent in that both of them are stipulative. However, since the distribution of /v/ in branching codas suggests that it has the sonority ranking of a fricative (cf. section 3.2.4), we choose the latter solution and propose the following constraint:

(51) /v/ is Sp-licensed in an onset in an interconstituent cluster[89]

(51) has the desired effect because while /v/ as C1 in an interconstituent cluster C1C2 remains

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rare and /v/+ nasal clusters do not occur. We consider this accidental.

[88]The two underlying segments would be in complementary distribution, and other phonological processes involving [v] do not require such an analysis; see (cf. Siptár & Törkenczy 2000).

[89]One might want to build (51) into the constraints on Sp-licensing by exempting /v/ from each of the relevant constraints. That, however, would unnecessarily complicate the constraints while leaving the analysis no less stipulative. It would be more interesting to derive the effect of (51) from the uniqueness of the representation of /v/, the fact that it is unspecified for [son]. We leave this problem for future research.

subject to the ‘antilabial’ and the ‘antipalatal’ licensing constraints, it is permitted to occur freely (i.e. unconstrained by these constraints) when it is C2 because it is licensed by (51) in that position. In its present form, (45) cannot prevent /v/+ fricative clusters from being Sp-licensed because /v/ is unspecified for [son] (i.e. it does not have [-son] feature that (45) crucially refers to). Thus, incorrectly, no ‘antifricative’ effects are predicted. This can be remedied by a minimal modification of (45):

(52) [-son, + cont] segments cannot Sp-license [+ cont] segments in an interconstituent cluster.

Now (52) can revoke Sp-licensing and /v/+ fricative clusters are correctly judged to be unlicensed. Note that the modification has no adverse effect—(52) still prevents interconstituent clusters consisting of fricatives and/or affricates (in any order or combination) from being Sp-licensed. The only difference is that (52) does not allow fricatives to Sp-license [+ cont] sonorants. The relevant clusters are well-formed (see Table VI), but they are licensed by government anyway and Sp-licensing is not necessary. Thus the change makes no difference here.

Finally, certain interconstituent clusters are ill-formed in spite of the fact that they appear to be licensed by the constraints discussed above. Specifically, non-homorganic nasal+ stop clusters are disallowed although they are licensed by government. This suggests that the licensing of nasals is subject to the following restriction:

(53) Coda nasals must be place-bound when followed by stops.

Note that (53) is not specifically an interconstituent constraint (see section 3.2.4) and that it also holds true of affricates (contour segments whose left ‘face’ is a stop). There are few exceptions to (53). What follows is a complete list of the exceptional items: /mt/ *ta**mt**am* ‘tomtom’, *nyo**mt**at*? ‘print$_{\text{verb}}$’, /mk/ *tö**mk**eleg* ‘abundance’, /md/ *dumdum* ‘id’, *dí nomdánom* ‘merry-making’, /mč̱/ *csá**mcs**og* ‘eat noisily’, *cse**mcs**eg* ‘eat noisily’.[90]

3.3.2.2. Clusters consisting of more than two members

We have pointed out earlier that intervocalic clusters consisting of more than two consonants are irregular unless an analytic boundary breaks up the cluster.[91] There are such irregular items, but their number is relatively low. In the database there is just one item containing a five-member medial cluster ([ŋkštr] *angström* ‘id’) and there are only 23 monomorphemic stems with a four-member medial cluster. The following monomorphemic four-member clusters occur (the numbers in angled brackets indicate the number of monomorphemic items a given cluster occurs in):

[90]These items may not be exceptional at all in that they probably contain internal domain boundaries that fall between the nasal and the stop. They are included here for the sake of completeness.

[91]For the arguments see the discussion in section 3.2.2.

(54)	pštr	< 1>	obstruál ‘obstruct’
	pstr	< 1>	absztrakt ‘abstract’
	jštr	< 1>	lajstrom ‘list’
	kskl	< 1>	exklúzív ‘exclusive’
	kskr	< 1>	krikszkraksz ‘hardly legible script’
	kspl	< 2>	explicit ‘explicit’, explozív ‘explosive (adjective)’
	kspr	< 1>	expressz ‘express’
	kstr	< 4>	dextrin ‘id.’, extra ‘id.’, extrém ‘extreme’, foxtrott ‘id.’
	nkst	< 1>	gengszter ‘gangster’
	nštr	< 7>	instruál ‘instruct’, demonstrál ‘demonstrate’, konstruál ‘create’, konstruktív ‘positive’, menstruál ‘menstruate’, monstre ‘grand’, monstrum ‘oversized creature/object’
	nskr	< 1>	szanszkrit ‘Sanskrit’
	rštl	< 1>	vurstli[92] ‘amusement park’

There are about 288 monomorphemic stems containing a three-member cluster in our database (e.g. *centrum* ‘centre’, *komplex* ‘complex’, *export* ‘id.’, *improvizál* ‘improvise’). There are 91 kinds of clusters in these items, but, typically, the functional load of a given cluster is extremely low: each type is only ‘utilized’ in a handful of morphemes. The following monomorphemic three-member clusters occur. The numbers in angled brackets indicate the number of monomorphemic stems a given cluster occurs in and in the case of [x] and [ŋ] noncontrastive differences are indicated. See Appendix B (i) for a complete list of the relevant stems.

[92]Usually with a three-member cluster in ECH: /ršl/ *vursli*

(55)

pšk	< 1>	zdr	< 1>	ntl	< 1>	rgl	< 2>
psl	< 3>	mbl	< 1>	ntr	< 19>	rkl	< 2>
pst	< 2>	mbr	< 5>	nt^sv	< 1>	rkm	< 1>
pst^s	< 1>	mfl	< 2>	ŋgl	< 8>	rkt	< 1>
ptr	< 1>	mpl	< 15>	ŋgr	< 5>	rpr	< 1>
ksh	< 3>	mpr	< 10>	ŋgv	< 3>	rpt^s	< 1>
ksk	< 3>	mpt	< 1>	ŋkf	< 1>	rsl	< 1>
ksl	< 1>	mst	< 1>	ŋkl	< 5>	ršl	< 3>
ksn	< 1>	mzl	< 1>	ŋkp	< 1>	ršp	< 1>
ksp	< 10>	nčk	< 1>	ŋkr	< 5>	ršr	< 1>
kst	< 9>	ndg	< 2>	ŋkt	< 2>	rtl	< 2>
kst^s	< 2>	ndl	< 5>	ŋkt^s	< 4>	rtn	< 1>
ktr	< 6>	ndr	< 8>	ŋkv	< 1>	rtr	< 3>
fst	< 1>	ndv	< 1>	lfr	< 1>	rt^sl	< 1>
skr	< 1>	nfl	< 4>	lft	< 1>	rtv	< 2>
skv	< 4>	nfr	< 1>	lgr	< 1>	rxm	< 1>
spr	< 2>	nsf	< 1>	lkl	< 1>	jbn	< 1>
sth	< 2>	nsk	< 1>	lsk	< 1>	jdl	< 1>
stm	< 1>	nsp	< 3>	lšt	< 1>	jgl	< 1>
str	< 27>	nšp	< 4>	ltr	< 4>	jšl	< 2>
štr	< 10>	nst	< 3>	rbl	< 2>	jst	< 1>
štv	< 1>	nšt	< 10>	rdr	< 2>	xth	< 1>
vdb	< 1>	nst^s	< 1>	rdv	< 1>		

The fact that these clusters are irregular does not mean that they do not display certain regularities. Figure (56) informally summarizes some of them:

(56)[93]	— **C1**	**C2**	**C3** —
a.		C2≠[+ son]	
b.	IF C1= [−son, −cont] THEN C1≠[+ cor]		
c.	IF C1= [s, š]	THEN C2= [−son, −cont]	
d.	IF C1= [−son, −cont]	AND C2= [−son, −cont]	THEN C3= [+ son]
e.	C1= [+ son]	IF C2= [−son, −cont]	AND C3= [−son, −cont]
f.	IF C1< C2	THEN C2= [s, š]	
g.	IF C1≈C2	THEN C2= [+ cor]	

In our analysis these regularities (and other possible ones crucially referring to medial -CCC-) are at least partly accidental in Hungarian. They are accidental inasmuch as they reflect a random set of the regularities of the source languages the relevant words were borrowed from, and may be systematic to the extent they result from (possibly universal) non-syllable-based restrictions (sequence constraints).

[93]Notation: x> y ‘x is more sonorous than y’; x< y ‘x is less sonorous than y’; x≈y ‘x and y are equally sonorous’.

3.4. Morpheme structure: MSCs

In this section we discuss phonotactic constraints that hold within the morpheme. These constraints may or may not be related to syllable structure.

3.4.1. Domain-final open syllables and the minimal word/stem

In section 3.2.3. above we pointed out that in general any of the underlying vowels can occur in nuclear position in a syllable. This is not true of open syllables in final position, or more precisely of open syllables at the right edge of a stem. In this position (underlyingly) high ([−open$_2$]), mid ([−open$_1$, + open$_2$]) and low ([+ open$_1$]) vowels behave differently. The restrictions are the following.

Short [−open$_1$, + open$_2$] vowels (/o, ö/) cannot occur in final position.

(57)	VV]$_{stem}$	V]$_{stem}$
/o/	*olló* 'scissors', *só* 'salt'	–
/ö/	*szőlő* 'grape', *nő* 'woman'	–

This constraint is usually assumed to hold in word-final position (cf. Nádasdy 1985, Nádasdy and Siptár 1994, Törkenczy 1994). However, it is really a constraint on the stem, because /o, ö/ cannot occur at the right edge of an internal analytic domain or immediately before a non-analytic suffix either.[94]

Assuming that unaffixed free morphemes are stems, and that such a stem plus an affix is also a stem, this constraint can be expressed as

[94]The interjection *(no)no* 'well' is a counterexample. Interjections in general do not seem to conform to the phonological constraints of the language (e.g. even syllabic consonants may occur in interjections, which otherwise are unattested in Hungarian: [pṣt] *pszt*! 'hush!'). Note also the behaviour of foreign compounds, see 3.3.1.

(58)

$$\begin{array}{c} *\mathrm{N} \\ | \\ \mathrm{X} \\ | \\ \begin{bmatrix} -\mathrm{open}_1 \\ +\mathrm{open}_2 \end{bmatrix} \end{array} \;]_{\mathrm{stem}}$$

This constraint holds regardless of the number of syllables the stem consists of: monosyllables and polysyllables behave in the same way. (58) is one of the few phonotactic constraints that has an active role in the phonology of Hungarian. The final vowels of loans ending in /o, ö/ are invariably lengthened in Hungarian (e.g. *libretto* [libretto:]).[95]

The behaviour of domain-final [$-$open$_2$] vowels is more complex. (59) shows the distribution of [$-$open$_2$] vowels at the end of an analytic domain in monosyllabic and polysyllabic words. As can be seen below, three types of items can be distinguished: words in the first column (marked VV) are always pronounced with a long final vowel and those in the third (marked V) invariably have a short final vowel. By contrast, the words in the column marked VV/V may have either long or short final vowels. All native speakers of Standard Hungarian agree in their treatment of the words in columns VV and V, but they may treat those in column VV/V in three different ways. *Innovative* speakers of ECH have short final vowels in these words (for them there is no difference between the words in VV/V and those in V). *Conservative* ECH speakers pronounce them with a long final vowel (i.e. for them there is a lexical difference between the words in VV/V and those in VV). For a third group of speakers (we shall call this group '*intermediate*' ECH speakers) the final vowels in the words in column VV/V may be optionally long or short.

[95]Note also that there are no *cseh*-type stems with an /o/ or /ö/ in the stem-final syllable (cf. section 4.2.2), which suggests that (58) is a constraint that applies at the surface.

(59)[96]		**VV**	**VV/V**	**V**
	i	sí	–	mi
monosyllables	ü	tű	–	–
	u	bú	–	–
	i	futósí	vizaví	buli
polysyllables	ü	kötőtű	keserű	eskü
	u	mélabú	ágyú	falu

(59) is misleading because it conceals two crucial facts.[97]

(i) Although there are *polysyllabic* words whose final vowel must be pronounced long (in all the three dialects), all of them are compounds or preverb+ verb combinations (i.e. they consist of more than one analytic domain) whose final morpheme is a *monosyllabic* free stem: e.g. ⟦⟦*futó*⟧⟦*sí* ⟧⟧, ⟦⟦*kötő*⟧⟦*tű*⟧⟧, ⟦⟦*méla*⟧⟦*bú*⟧⟧. There are no monomorphemic words, or polymorphemic ones whose final morpheme is a polysyllabic free stem, in this group. Furthermore, there is not a single polysyllabic item in the other two columns (VV/V or V) whose final morpheme is a monosyllabic free stem. All the polysyllabic words in the latter two columns are either monomorphemic or end in a suffix.

(ii) There is only a very limited number of monosyllabic items that end in a short [-open$_2$] vowel. The complete list is *ki* 'who', *ki* 'out', *mi* 'what', *mi* 'we', *ti* 'you' (pl.), *ni* 'look!'. Of these, *ni* is an interjection and the rest are function words.

Taking (i) and (ii) into consideration and assuming that it applies only to content words, the constraint that governs the distribution of final [-open$_2$] vowels can be (informally) formulated as follows:

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[96]Glosses: *sí* 'ski', *mi* 'we', *tű* 'pin', *bú* 'sorrow', *futósí* 'cross-country ski', *vizaví* 'opposite, across', *buli* 'party', *kötőtű* 'knitting pin', *keserű* 'sour', *eskü* 'oath', *mélabú* 'spleen', *ágyú* 'cannon', *falu* 'village'.

[97]There is another fact that (59) does not indicate: word-final long /iː/ is extremely rare. There are only 9 such items in our database and with the exception of *rí* 'cry', *sí* , *vizaví* and *zrí* 'trouble' they are interjections or onomatopoeic words. We have no explanation for this depleted distribution and consider it an accident.

(60) Domain final [-open$_2$] vowels are

i. long in monosyllables and short in polysyllables (Innovative ECH)

ii. long in monosyllables (Conservative/intermediate ECH)

As in (58), the domain in which (60) applies is the stem because [-open$_2$] vowels behave in the same way word finally, at the end of the non-final constituent of a compound, immediately preceding an analytic suffix and immediately preceding a non-analytic suffix. (61) shows this in the innovative ECH dialect (where final [-open$_2$] vowels are always short in polysyllables):

(61)[98]	**word-final**	**compound**	**analytic suffix**	**non-analytic suffix**
monosyllabic	b[uː]	b[uː]-bánat mǝ̈a-b[uː]	b[uː]-nak	b[uː]-t
polysyllabic	ágy[u]	ágy[u]-talp	ágy[u]-nak	ágy[u]-t

In accordance with the definition of the stem above, suffix-final [-open$_2$] vowels behave in the same way as [-open$_2$] vowels at the end of lexical stems: compare *tet*ű [tɛtü] 'louse' and *jószí v*-ű [joːsivü] 'kind-hearted'.

In all the three dialects, monosyllabic words/stems are treated in the same way (i.e. they have long final [-open$_2$] vowels), thus the variation that distinguishes these dialects is confined to polysyllabic words/stems. This fact can be accounted for if we assume that there is a constraint that applies to all dialects and requires that the minimal word/stem should be bimoraic:[99]

(62) Stem/word$_{min}$ = $\mu\mu$

---

[98]Dashes in (61) only appear to indicate morpheme division. Glosses: *bú* 'sorrow', *búbánat* 'sorrow and remorse', *búnak* 'sorrow+ DAT', *bút* 'sorrow+ ACC', *ágyú* 'cannon', *ágyútalp* 'gun-carriage', *ágyúnak* 'cannon+ DAT', *ágyút* 'cannon+ ACC'

[99]On the mora, cf. section 2.2.

We assume that all stems (affixed and unaffixed) in the lexicon have to conform to (62).[100] It does not apply to affixes, function words, interjections and onomatopoeic words.[101] The minimal stem/word constraint is trivially (vacuously) true of stems ending in [–open$_1$, + open$_2$] (mid) vowels: as stem-final short mid vowels are excluded in general, stems consisting of open monosyllables that end in a mid vowel cannot violate (62). As pointed out above, stems ending in [-open$_2$] (high) vowels conform to (62). In innovative ECH the distribution of high vowels can be interpreted as the result of a constraint that bans stem-final long high vowels which is blocked if it should violate (62) (we shall return to the formalization of this constraint later).

Let us now examine the behaviour of [+ open$_1$] (low) vowels in final position. Stems ending in low vowels also observe (62). There are a (small) number of function words and interjections (*be* 'into', *de* 'but', *he* 'what? < I cannot hear you> ', *le* 'down', *ne* 'no(t)', *se* 'either', *te* 'you', *ha* 'if', *ja* 'Now I understand', *na* 'Come on!') and two truly exceptional content words (*fa* 'tree', *ma* 'today') which violate it. Although low vowels are also subject to the minimal word/stem constraint (like high and mid vowels), their distribution in final position is different in several ways. Disregarding the exceptional words listed above, they pattern in the following way:

(63)

	stem-final ≠ word-final		**word-final**	
	monosyllabic	polysyllabic	monosyllabic	polysyllabic
e, a	–	–	–	+
eː, aː	+	+	+	+

(63) shows that (i) —unlike mid vowels—both long and short low vowels occur finally (e.g. *csokoládé* 'chocolate', *teve* 'camel', *burzsoá* 'bourgeois', *apa* 'father'); (ii) —unlike high vowels in innovative ECH—both long and short low vowels occur finally in polysyllabic words: thus, *modulo* the minimal word/stem constraint, the distribution of long and short low vowels is the same in word-final position; and (iii) —unlike high and mid vowels—low vowels behave

[100]On the minimal word constraint in Hungarian, cf. Csúri (1990) and Törkenczy (1994a).

[101]The full list of exceptions to (62) ending in non-low (i.e. [–open$_1$]) vowels is *ki, ki, mi, mi, ni, no, ti,* all of which are function words or interjections.

differently in non-word-final stem-final position and word-final position: only long [eː, aː] can occur before suffixes.[102] This can result in alternations such as *apa* ~ *apá-t* 'father' (acc.), *teve* ~ *tevé-t* 'camel' (acc.).

Word-final *á* is rare and final *é* is relatively infrequent. Not counting words containing the suffixes *-vá/vé*, *-ná/né*, final *á* occurs in function words, abbreviations and interjections.[103] Final *é* fares relatively better: disregarding suffixes that end in *é*, it occurs in about 130 stems all of which are loan words.

The question is how to make sense of this distribution. This problem is related to the analysis of stem-final *é* ~ *e, á* ~ *a* alternations. As pointed out above, of the [+ open_1] vowels only *é* and *á* can occur before suffixes. Let us assume that the underlying difference between *é* ~ *e, á* ~ *a* is only quantitative (cf. Vago 1980, Siptár & Törkenczy 2000, etc). Then, in an analysis in which all long vowels are underlyingly (pre)associated with two timing slots and short ones with a single timing slot, in principle, these alternations may be interpreted in two ways: as (i) the lengthening of underlying final short [+ open_1] vowels before suffixes; or (ii) the shortening of underlying final [+ open_1] vowels word-finally.[104] The choice determines the underlying distribution of final *é* and *á*. If analysis (i) is chosen, the distribution of these vowels in final position is unconstrained by any restriction *specific to [+ $open_1$] vowels*: both long and short [+ open_1] vowels may occur in all final environments underlyingly. Under this analysis the lack/low number of tokens with final low vowels in some environments in (63) is either due to the minimal word/stem constraint, which is independent of [+ open_1] vowels (and rules out stems that are too short – this would apply to final short [+ open_1] vowels in monosyllables (*fa* and *ma* are irregular)), or is accidental (thus, the relative infrequency of final *é* and *á* need not be accounted for in the phonology). The surface lack of stem-final *e* and *a* before suffixes is due to a phonological rule that lengthens short low vowels stem-finally if

[102]Some suffixes are exceptional in that they may be preceded by *a* and *e*, e.g. *-ság/ség* as in *apa-ság* 'fatherhood'. For a discussion of low vowel alternations, see Vago (1980), Nádasdy & Siptár (1994, 1998), Siptár & Törkenczy (2000), Siptár (2002).

[103]There are about 15 items; *burzsoá* 'bourgeois' and *hajrá* 'spurt' are the only content words with final *á.*

[104]The same is true of a linear analysis where length is a feature [±long].

a suffix follows ('Low Vowel Lengthening', cf. Vago 1980a, Nádasdy and Siptár 1994, Siptár & Törkenczy 2000; compare Rebrus 2000*a*). Under this analysis the underlying distribution of [+ open$_1$] (i.e. low) vowels is analogous with that of [–open$_2$] (i.e. high) vowels in conservative ECH.

Under the shortening analysis only long low vowels occur stem (and word) finally at the underlying level, and the word-final short surface reflexes are derived by rule.[105] According to this analysis there *is* an underlying constraint that is specific to [+ open$_1$] vowels: the short ones cannot occur finally. The minimal stem/word constraint would hold without exception. *fa* and *ma* conform to it *underlyingly*. Note, however, that (exceptionally?) the word-final low vowel shortening would not be blocked by the minimal word constraint (*fa* and *ma* surface with a short vowel) while it does seem to apply to high vowels in innovative ECH. In this analysis the underlying distribution of [+ open$_1$] vowels is analogous with that of mid vowels. The problem with this analysis is a derivational one: how to prevent non-alternating final long *á* and *é* from undergoing word-final low vowel shortening (e.g. *lé* 'juice', *csokoládé* 'chocolate', *burzsoá* 'bourgeois'). True, the number of these words is low, but, nevertheless, shortening has to be blocked somehow. One possibility is marking these words with arbitrary diacritics in the lexicon.[106] The autosegmental notation allows for a distinction between alternating and non-alternating final long vowels representationally without having to resort to exception features or postulating extra underlying segments.[107]

```
(64)    a. X     b. X  X     c. X  X     d. X  X
           |         \ /        |              |
           V          V         V              V
```

The representation (64a) would be used for non-alternating short low vowels (e.g. *hat* 'six', *nem* 'gender'), (64b) for non-alternating long low vowels (*lé*, *csokoládé*, *burzsoá*), and (64c)

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[105]This analysis has been proposed by e.g. Szépe (1969), Hetzron (1972), Abondolo (1988), Jensen and Stong-Jensen (1989a).

[106]Or the diacritic may be 'phonologized': Abondolo (1988) postulates different underlying vowels in these items.

[107]Similar representations have been proposed by Jensen and Stong-Jensen (1989a), Péter Rebrus (personal communication), and Ritter (1995); see also Rebrus (2000*a*).

or (64d) for alternating long low vowels (*ap**a**, tev**e***). In this case the alternation between long and short low vowels is handled by a rule that spreads the root node of a low vowel to an adjacent floating X slot stem-finally before a suffix (either to the left (if the representation is (64d)) or to the right (if the representation is (64c)). In this treatment, there is a constraint specific to [+ $open_1$] vowels: those represented as (64a) cannot occur stem finally in the lexicon. *fa* and *ma* would be exceptions to the minimal stem/word constraint and the scarcity of final low vowels represented as (64b) would be an accident. The underlying distribution of low vowels would be analogous to that of mid vowels.

It is not our main concern here to decide which analysis handles the low vowel alternations discussed best.[108] The point is that *phonotactically* they are equivalent. The main difference between them is which other class of vowels the final low vowels are grouped together with: if the first analysis is chosen low vowels pattern with high vowels in the conservative dialect; in the latter they pattern with mid vowels. As high vowels in the innovative dialect behave differently from both, the choice between the alternative analyses cannot be made on phonotactic grounds. In the present dissertation I follow Siptár & Törkenczy (2000) and assume that the lengthening analysis is correct. Thus, long and short low vowels can occur freely stem-finally.

To sum up, mid vowels are constrained by (58) and (vacuously) the minimal word/stem requirement (62). (58) holds for all representations, derived or underived. The underlying distribution of low vowels is only constrained by the minimal word/stem requirement. High vowels behave like low ones in the conservative dialect: underlying representations have to conform to (62). In the innovative dialect, however, the minimal word/stem constraint plays an active role. As we have seen above, in this dialect, stem-final long high vowels are banned (cf. 65) *unless* the representation required by (65) should violate the minimal stem/word constraint (62).

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[108]For a detailed discussion cf. Nádasdy and Siptár (1998), Siptár (1998) and Siptár & Törkenczy (2000).

(65)

```
 *N
  /\
 X  X
  \/        ]stem
[-open2]
```

In innovative ECH (65) is a *static* constraint in the sense that there are no alternations between long and short high vowels in this environment. In the intermediate dialect it is possible to argue that there is a rule (66) which shortens stem-final long [-$open_2$] vowels optionally because both alternants may surface:

(66)

```
   N                N
  /\                |
 X  X      →        X     /  _  ]stem
  \/                |
[-open2]         [-open2]
```

This rule is blocked if the output should violate the minimal word/stem constraint, which acts as a filter, or a ‘derivational constraint’ (Kisseberth 1970). There is no alternation evidence in the innovative dialect: stem-final high vowels are simply *always* short except in monosyllables. There is no satisfactory way to express this relationship between (65) and (62) in the present framework. Restricting (65) to stems which are longer than monosyllabic ‘does the job’, but it should be noted that this way the minimal stem/word requirement is ‘built into’ this constraint (and thus is stated twice).[109]:

(67)

```
*  σ   σ
       |
       N
      /\
     X  X    ]stem
      \/
   [-open2]
```

[109]In Optimality Theory (Prince and Smolensky 1993) such a relationship can be expressed in a straightforward manner: the minimal stem/word constraint dominates (65).

Given (67), long high vowels are excluded finally *only* in polysyllabic stems and final short high vowels are banned by the minimal stem/word constraint in monosyllabic ones.

To sum up, (i) all final vowels are subject to the minimal stem/word constraint, (ii) mid vowels are also constrained by (58), (iii) high vowels are input to the (optional) rule (66) in the intermediate dialect and (iv) have to meet (67) in the innovative dialect.

3.4.2. VVCC: the complexity of the rhyme

In the previous section we discussed the behaviour of open syllables and pointed out that the distribution of vowels is different in medial and final open syllables. Let us now examine the behaviour of closed syllables.

In general, any vowel seems to be possible in a closed syllable (cf. section 3.2.3). However, there are restrictions holding in this environment depending on (i) the position of the syllable in the word and (ii) the morphological complexity of the word. (68) shows the distribution of long and short vowels in word-final syllables closed by a single consonant, in word-final syllables closed by more than one consonant, and word-medially when these syllables occur monomorphemically, i.e. undivided by a morpheme boundary:

(68)[110]		VC##	VCC##	VC.C
	i	hit ‘belief’	ring ‘sway’	inger ‘stimulus’
	ü	sün ‘hedgehog’	csüng ‘hang’	kürtő ‘funnel’
	ö	sör ‘beer’	gyöngy ‘pearl’	ördög ‘devil’
	e	nem ‘gender’	szent ‘saint’	persze ‘of course’
	u	fut ‘run’	must ‘grape juice’	undor ‘disgust’
	o	lop ‘steal’	gyors ‘fast’	boglya ‘stack of hay’
	a	hat ‘six’	tart ‘hold’	apró ‘tiny’
	iː	sír ‘grave’	–	–
	üː	bűn ‘sin’	–	–
	öː	bőr ‘skin’	–	–
	eː	kém ‘spy’	érc ‘ore’	érték ‘value’
	uː	rút ‘ugly’	–	–
	oː	kór ‘disease’	–	–
	aː	láp ‘marsh’	márt ‘dip’	árpa ‘barley’

[110](68) abstracts away from a few exceptional items.

VCC#: *tószt* [oː] ‘toast’, *avítt* [i(ː)] ‘obsolete’, *blazírt* [i(ː)] ‘blasé’, *bornírt* [i(ː)] ‘narrow-minded’, *fasírt* [i(ː)] ‘meatball’, *múlt* [u(ː)] ‘past’. Note that in the words *őrs* [ö] ‘squad’, *gyűjt* [ü] ‘gather’, *gyújt* [u] ‘light’, *nyújt* [u] ‘stretch’, *sújt* [u] ‘hit’ the vowels spelt long are pronounced short in ECH.

VC.C: *ízlés* [i(ː)] ‘taste’, *sínyli* [i(ː)] ‘suffer’ (3sg pres. def), *nőstény* [öː] ‘female’, *tőzsde* [öː] ‘stock exchange’, *csúzli* [uː] ‘slingshot’, *kóstol* [o(ː)] ‘taste’, *bógnizik* [oː] ‘make curves in skating’, *bókl ászik* [oː] ‘loiter’, *kókler* [oː] ‘impostor’, *kóstál* [o(ː)] ‘cost’, *lófrál* [oː] ‘hang around’, *sóska* [oː] ‘sorrel’, *ósdi* [oː] ‘old’, *ótvar* [oː] ‘eczema’, *pózna* [oː] ‘pole’, *ródli* [oː] ‘sledge’, *ócska* [oː] ‘worthless’ *-ódzik/-ődzik* <reflexive>. Note that in the word *őrjöng* [ö] ‘go berserk’ the vowel spelt long is pronounced short in ECH.

‘Epenthetic’ stem forms like *pótlás* [poːtlaːš]’replacement’, *ólmoz* [oːlmoz] ‘lead’ (verb), etc. are only apparent counterexamples since they do no contain a cluster underlyingly: /poːtV$_d$laːš, oːlV$_d$moz/ (cf. 4.1.4.2).

As can be seen in (68), (i) any short vowel is possible in a closed syllable, and (ii) of the long vowels, only /eː/ and /aː/ can occur in non-word-final closed syllables and word-final syllables closed by more than one consonant (cf. Törkenczy 1989). This poses two questions: (a) why is there a difference between word-final syllables closed by a single consonant and the other kinds of closed syllables?; and (b) why do /eː/ and /aː/ behave differently from the other long vowels?

One might want to answer question (a) by utilising the notion of extrasyllabicity/extrametricality. If we say that a single word-final consonant is extrametrical in Hungarian at the point where the constraint against long vowels (except /eː/ and /aː/) in closed syllables applies, then it is understandable why there is an asymmetry between word-final VVC sequences vs. word-final and word-medial VVCC sequences. In the first case the word-final consonant is extrasyllabic and therefore the word-final syllable is not closed: *rút* /ruː< t> /. If there is more than one word-final consonant, then rendering the final one extrametrical still leaves a closed syllable behind and thus the constraint on long vowels applies: *VVC< C> . A word-medial vowel followed by two consonants is necessarily subject to the constraint because word-medial consonant clusters are necessarily heterosyllabic[111] and extrametricality cannot apply here because of the Peripherality Condition (Hayes 1980, 1982).[112]

However, the discrepancy between the behaviour of final VVC vs. medial and final VVCC clusters disappears if polymorphemic clusters are considered as well. *Any* long vowel is possible before a cluster if there is a morpheme boundary after the vowel or between the

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[111]Recall that there are no complex onsets in Hungarian (cf. section 3.2.2). As expected/predicted, the constraint discussed applies even in cases when the second member of the interconstituent cluster is more sonorous than the first one: hypothetical (monomorphemic) */muːrta/ and */muːtra/ are equally impossible.

[112]The state of affairs described is reminiscent of that in English where word-final single consonants can be preceded by long vowels, but—disregarding clusters that contain Level 2 suffixes—word-final clusters and some word-medial ones may not. Of course there are important differences (in English *all* long vowels behave in the same way; there are complex onsets (hence *some* medial clusters may follow long vowels: ***April*** /ˈeɪprɪl/); coronal clusters behave differently from non-coronal ones: ***pint*** /paɪnt/; etc). The analysis sketched above is thus analogous to those presented in Myers (1987), Borowsky (1988, 1989), Jensen (1993), Rubach (1996).

consonants making up the cluster:

(69)[113]	**VCC##**	**VC.C**
iː	sí r-t	szí v-tam
üː	bűn-t	bűn-ben
öː	fő-bb	bőr-ben
eː	kér-t	kér-ték
uː	túr-t	túr-tak
oː	kór-t	kór-nak
aː	vár-t	vár-tam

It makes no difference if the intervening morpheme boundary is the edge of an analytical (e.g. *bűn-ben)* or a non-analytical domain (*bűn-t*): the constraint only holds within morphemes. This suggests that the phenomenon discussed is not a constraint on the complexity of the rhyme, but rather on morpheme shape. In other words, it is an MSC and not an SSC. Thus, instead of an extrametricality/extrasyllabicity analysis of the type sketched above,[114] we propose that the distribution of preconsonantal long vowel is simply governed by the MSC (70a) (for a full list of the exceptional morphemes that violate ()70a), see note ` 110. The constraint seems to be even stricter if the tautomorphemic consonants following the vowel form a geminate: in this case even /eː, aː/ appear to be ill-formed (cf. Törkenczy 1989) —this constraint is formulated below as (70b).

(70) a. *VVCC
domain: morpheme
condition: VV ≠ /eː, aː/

---

[113]Glosses: *bőrben* 'skin' (iness.), *bűnben* 'sin' (iness.), *bűnt* 'sin' (acc.), *főbb* 'main' (comp.), *kért* 'ask' (3sg past indef.), *kérték* 'ask' (3pl past def.', *kórnak* 'disease' (dat.), *kórt* 'disease' (acc.), *sí rt* 'grave' (acc.), *szí vtam* 'suck' (1sg past), *túrt* 'dig' (3sg past indef.), *túrtak* 'dig' (3pl past indef.), *várt* 'wait' (3sg past indef.), *vártam* 'wait' (1sg past).

[114]Which is further weakened by the fact that—unlike in English—there is no phenomenon *other than* preconsonantal vowel length motivating word-final extrametricality.

b.[115] *VVCC

domain: morpheme

condition: CC= geminate

Let us now examine the second question, i.e. why it is just /eː/ and /aː/ that are unconstrained by (70a). We have analysed the short – long pairs [ɔ – aː], [ɛ – eː] on a par with the other short – long pairs in the system, i.e. we have assumed that underlyingly, just like the other vowel pairs, they only differ in quantity, not in quality (cf. sections 3.4.1). Note, however, that they are special (i.e. differ from all the other pairs in the system) in that they are the only

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[115]There are very few true exceptions. An exhaustive list of suspicious monomorphemic items (found in our database) is given below:

/aː/ *alássan* ‘please/at your service’, *állomás* ‘station’, *állat* ‘animal’, *állag* ‘condition’, *állam* ‘state’, *állandó* ‘constant’, *állapot* ‘condition’, *állás* ‘job’, *mállik* ‘peel off’, *inkább* ‘rather’, *istálló* ‘stable’, *kipállik* ‘chap’, *áll* ‘chin’, *koráll* ‘coral’, *majoránna* ‘marjoram’, *száll* ‘fly’, *szakáll* ‘beard’, *szállít* ‘transport’, *váll* ‘shoulder’, *vállal* ‘undertake’;

/eː/ ***béllet*** ‘archivolt of a recessed portal in a gothic church’, *éjjel* ‘night’, ***épp*** ‘just’, ***éppen*** ‘just’, *héjja* /heːj(ː)a/ ‘kite’, ***-képp*** ‘as’ <suffix>;

/iː/ ***avítt*** ‘old-fashioned’;

/oː/ *-ódzik* <verbal ending>: e.g. *vakaródzik* [vɔkɔroːdzːik] ‘scratch’;

/öː/ *-ődzik* <verbal ending>: e.g. *dörgölődzik* [dörgölöːdzːik] ‘rub against’, ***előtt*** ‘before’, (***kőttes*** ‘cake made of raised dough’).

In most of these morphemes the geminate is a sonorant, especially /l/, preceded by /aː/. Note that most of the morphemes listed are usually pronounced in a ‘regularised’ form, i.e. with a non-geminate consonant following the long vowel: *állat* [aːlɔt], *inkább* [iŋkaːb], *majoránna* [mɔjoraːna], *éjjel* [eːjɛl], etc. The verbal endings *-ódzik* and *-ődzik* also have alternative forms with intervocalic /z/, in which case they do not violate (70b): *vakarózik* [vɔkɔroːzik], *dörgölődzik* [dörgölöːzik]. The truly exceptional items above, i.e. those that —in my native judgement/intuition —cannot be regularised have been emboldened. Of these, *béllet* is extremely rare/technical. The rest all have obstruent geminates after the long vowel. *Kőttes* is only included for the sake of completeness: it is a dialectal word that is not part of ECH.

pairs whose members are considerably[116] different in quality at the surface. One may try to explain the special behaviour of /eː, aː/ with respect to (70a) by connecting it with the special character of the pairs [ɔ – aː] , [ɛ – eː].[117] We assume in this dissertation (following Siptár & Törkenczy 2000) that [ɔ – aː] and [ɛ – eː] are underlyingly [DOR, + open1, + open2] and [COR, + open1, + open2], respectively. The surface quality differences (rounding (and height) in the case of [ɔ – aː] and height in the case of [ɛ – eː]) are the result of phonetic implementation conditioned by the underlying quantity difference: long /eː/ is interpreted phonetically as mid ([eː]) and short /a/ as rounded ([ɔ]). There is no *theoretical* reason not to do this the other way round (cf. Törkenczy 1994, Polgárdi 1997). One could assume that the underlying difference between the members of the pairs discussed is qualitative (/ɔ – a/ , /ɛ – e/) and the surface difference in length is a matter of phonetic implementation which is conditioned by the underlying quality difference (/a/ and /e/ will appear as long at the surface). This move has advantages and disadvantages. On the positive side, the exceptional behaviour of [eː] and [aː] with respect to (70a) is no longer a mystery: these vowels are not constrained by (70a) because (70a) is a constraint on long vowels and [eː] and [aː] are not long underlyingly. (70a) could be restated without its condition and could be collapsed into a single constraint with (70b). However, in my view, the negative effects are more serious: (i) the vowel inventory would become asymmetrical (only high and *some* mid vowels would have long counterparts); (ii) it would be no longer possible to express Low Vowel Lengthening as a uniform process: it would have to be lowering or raising (depending on which vowel we take as underlying) for /ɛ/ ~ /e/, but rounding or unrounding for /ɔ/ ~ /a/; (iii) as /ɛ/ ~ /e/ and /ɔ/ ~ /a/ could not be analysed as length alternations, the alternations *nyár* 'summer' ~ *nyar-at* 'summer' (acc.), *tél* 'winter' ~ *tel-et* 'winter' (acc.) could not be treated as the same process (Stem Vowel Shortening (cf. Siptár & Törkenczy 2000)) as that involving other vowels, e.g. *víz* 'water' ~ *viz-et* 'water' (acc.). Therefore, we shall not reanalyse the representation of the

[116]There are small differences of height between the surface reflexes of the members of some other pairs, notably /oː – o/ and /öː – ö/, the long segments being slightly more closed than the short ones, cf. Siptár & Törkenczy (2000).

[117]These pairs of vowels are unlike the rest in other ways as well, e.g. they are the only ones that alternate stem finally (cf. the discussion of Low Vowel Lengthening sections 3.4.1). It is an interesting idea to suppose that all these phenomena are related and may have a common explanation, but we will not pursue it in this dissertation.

vowels [ɔ – aː], [ɛ – eː] in the way described above (for an additional piece of evidence, cf. section 3.3.1.). This means that the condition on (70a) remains a stipulation.

3.4.3 Word-class-specific constraints: the phonotactics of verbs

I have pointed out in section 2.1 that phonotactics may be specific to a subpart of the lexicon (a stratum/sublexicon) and that such a state of affairs occurs in Hungarian. In this section I shall discuss the phonotactic constraints that apply to a well-identifiable stratum of the Hungarian lexicon, the sublexicon of verbs.[118] There is a phonotactic difference between verb stems and non-verb stems. A non-verb stem is not identifiable as a non-verb on the basis of the string of segments it consists of alone (by a native speaker), while a verb *may* be identified as a verb. This is a unidirectional relationship: some strings could not be monomorphemic verb stems, but there are strings that could equally be monomorphemic verb stems or non-verb stems: *nyom* 'trace$_N$', *nyom* 'push$_V$'; *part* 'shore$_N$', *tart* 'hold$_V$'; *domb* 'hill$_N$', but */domb/$_V$.

The primary cue to phonotactic 'verb-ness' is the stem-final coda.[119] We shall first consider monomorphemic free[120] verb stems.

A monomorphemic free verb stem can end in any single consonant except /t^y, t^s, č,

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[118]Note that it is no longer possible to add monomorphemic verb stems to the Hungarian lexicon. All new verbs (loans or otherwise) that enter the lexicon must have a verbal suffix (typically *-ol/-el/-öl*: *sztrájk**ol*** 'go on strike', *download**ol*** [dɔunloːdol] 'download$_V$'). Thus, monomorphemic verb stems are a closed system.

[119]It is often claimed that monomorphemic verb stems cannot end in a vowel in Hungarian (e.g. Vago 1980, 1989, Kiefer 1994). This is based on the fact that *all* monomorphemic verb stems that end in a vowel in isolation are 'v-adding' stems, i.e. they end in /v/ before a vowel-initial suffix: *lő* 'shoot' ~ '*lö**v**-ök* 'shoot' (1sg pres. indef.) (as opposed to vowel-final nominal stems, which may be 'v-adding' stems or 'non-v-adding' major stems: ***ló*** 'horse' ~ *lo**v**-ak* 'horses', *mel**ó*** 'job' ~ *mel**ó**-k* 'jobs'). If we assume that a stem-final /v/ underlies the [v] ~∅ alternation (as is usual in the relevant analyses), then it follows that, underlyingly, verb stems can only end in a consonant. In the present analysis, however, we consider the [v] ~∅ alternation non-phonological (suppletive), cf. section 4.2.1. Consequently, it does not hold that all verb stems end in a consonant since both the /v/-final and the vowel-final alternants of the relevant verb stems are present in the lexicon.

[120]This excludes *-ik*-verbs and defective verbs.

ǰ, ž, x/.[121] Of these the lack of final /ǰ/ is not surprising since there are hardly any items in the lexicon with final short /ǰ/: *bridge* /briǰː/, ?/briǰ/ 'bridge (card game)'. Disregarding /ǰ/, non-verbs/nouns can end in any single consonant, so the other gaps are specific to verb stems. Some generalisations could be made but it is unclear whether that the gaps in the case of verbs are accidental or not. For instance, we could claim that there is a constraint banning affricates at the end of a monomorphemic verb stem, but then it seems that long affricates (as opposed to short ones) *are* possible in the same position: *metsz* [mɛtˢː] 'cut', *edz* [ɛdᶻː] 'train'.[122] However, there are only three monomorphemic verb stem that end in a long affricate: *metsz*, *edz* and *pedz* 'begin to understand'. Since the geminates do exist, we take a 'soft' approach and consider that affricates are possible at the end of a verb stem (i.e. the gaps are accidental). Similarly, we take the lack of /tʸ, ž/ accidental because their voiced/voiceless counterparts /dʸ, š/, respectively, exist as non-branching codas in verbs (e.g. *hagy* 'leave', *ás* 'dig'). The lack of /x/ is specific to the verb and it is excluded as a geminate coda as well.[123] This is due to a constraint that excludes /x/ from the coda in the verb sublexicon:

(71) *(verb sublexicon)*
/x/ is not licensed in the coda.

Apart from the effect of (71) single codas are not radically more restricted in monomorphemic free verb stems than in non-verbs.

The situation is strikingly different if we examine verb stems that end in a consonant cluster. We claimed in section 3.2.4.3 that monomorphemic final three-term consonant clusters are exceptional/irregular. There are very few monomorphemic words that do contain these

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[121] Examples: /p/ *kap* 'get', /t/ *hat* 'inflence', /k/ *rak* 'load', /b/ *dob* 'throw', /d/ *ad* 'give', 'dʸ' '*hagy*' 'leave', /g/ *rág* 'chew', /f/ *döf* 'thrust', /s/ *vesz* 'take', /š/ *mos* 'wash', /v/ *szí v* 'suck', /z/ *néz* 'look', /m/ *nyom* 'push', /n/ *ken* 'smear', /nʸ/ *hány* 'vomit', /l/ *él* 'live', /r/ *szűr* 'filter', /j/ *fúj* 'blow'.

[122] Note that the affricate [dᶻː] is the surface reflex of the underlying cluster /dz/, cf. Siptár & Törkenczy (2000), Siptár (2002).

[123] Geminate /žː/ is also unattested in the coda generally, not just in verbs, geminate coda /xː/ occurs only in non-verbs, e.g. *pech* /pexː/ 'bad luck'.

clusters (see the complete list in (23) above). It must be noted that *none* of these exceptional items are verbs. (72) below shows the complete list of two-term clusters (including geminates) that monomorphemic free verb stems can end in together with the number of stems (in angled brackets) that contain each type of final cluster:

(72)	dː	< 1>	nz	< 1>
	d^{z}ː	< 2>	ŋg	< 51>
	gː	< 3>	(nl	< 1>)
	t^{s}ː	< 1>	lt	< 14>
	st	< 117>	ld	< 7>
	št	< 1>	(lg	< 1>)
	zd	< 2>	lː	< 34>
	žd	< 1>	rt	< 8>
	mt	< 1>	rd	< 2>
	(mz	< 1>)	rː	< 2>
	nt	< 100>	jt	< 19>
	nd	< 4>		

Examples:[124] *fedd* 'scold', *edz* 'train', *függ* 'hang', *metsz* 'cut', *oszt* 'distribute', *fest* 'paint', *kezd* 'begin', *esd* 'beg', *teremt* 'create', (*nemz* 'beget'), *önt* 'pour', *mond* 'say', vonz 'attract', *zeng* 'resound', (*ajánl* 'recommend'), *olt* 'put out (fire)', *küld* 'send', (*uralg* 'rule'), *vall* 'confess', *tart* 'hold', *hord* 'wear', *varr* 'sew', *hajt* 'drive'.

The parenthesized clusters in (72) above are only apparent (and are only included because they are cited in the literature). *Nemz* and *uralg* (the only stems with final /mz/ and /lg/) are obsolete in ECH as free stems and *ajánl* normally does not contain a final cluster [ɔjaːl(ː)]. We have already pointed out in section 3.2.4 that *teremt* is irregular (and may not even be monomorphemic (?)).

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[124]For a complete list of verb stems representing the less populous types see Appendix Bii.

If we disregard these items, it becomes obvious that monomorphemic branching codas in the verb sublexicon are subject to much stricter constraints than (monomorphemic) branching codas in general. Here a monomorphemic branching coda must be a cluster that respects Sonority Sequencing (its right-hand term must be less sonorous than its neighbour on the left)[125] and/or is homorganic (it is a partial or a full geminate). Specifically, such a cluster may be one of the following kinds: (i) it respects Sonority Sequencing, but is not strictly homorganic (/št, žd, jt/), or (ii) it respects Sonority Sequencing and is strictly homorganic (/st, zd, nt, nd, nz, ŋg, rt, rd, lt, ld/), or (iii) it is unlicensed by Sonority Sequencing and is strictly homorganic (/dː, t^sː, d^zː, gː, lː, rː/). The generalisation that can be made is that clusters in set (i) are coronal while clusters in sets (ii) and (iii) are non-labial. This suggests that a branching coda in a monomorphemic free verb stem must be a coronal cluster if it is *only* licensed by government, but may be coronal or dorsal if it is licensed by place-binding or root-binding.

Assuming the general condition on the licensing of coda clusters (9 section 3.2.4) and the universal right-to-left direction of government in the coda, this is captured by the following constraints:[126]

(73) *Branching Coda Constraint (verb sublexicon)*

a. In a coda cluster C1C2 government can only apply iff C1 and C2 are both COR.
b. In a coda cluster C1C2 (root or place) binding can only apply if C1 and C2 are both COR or DOR

(73) does not permit a branching codas like /lk, rv/ (non-verb examples: *halk* 'silent', *érv* 'argument') for verbs because they are unlicensed by government (they are non-coronal) and they are not licensed by binding (their terms do not share a root or a place node). Similarly, /pː, mb/ (non-verb examples: *csepp* 'drop', *domb* 'small hill') ~~a~~lthough the do have a shared

[125]This is true of *regular* non-verb stems too, but in the verb sublexicon it is also *exceptionless*.

[126]Recall that the restriction that both members of the coda cluster should be coronal only applies in the case of *subminimal government* generally (i.e. outside the verb sublexicon) and not when the cluster is licensed by government (non-subminimal) or root-binding. Also, LAB segments are not excluded from binding generally. Compare (16) section 3.2.4.

root note and a shared place node, respectively —are not well formed branching codas in a verb because they are not licensed by government according to (73a) and they are also not licensed by binding since they are LAB (73b).

Not all the branching codas permitted by (73) are well-formed. Some further restrictions apply. It can be seen in (72) that the second position can only be filled by a sonorant it shares its root-node with the first (i.e. if it root-binds the first (= it is a geminate)): clusters like /jl, rn, rn^y, ln/ (non-verb examples: *fájl* 'file', *konszern* 'concern', *szörny* 'monster') are not well-formed branching codas in this stratum although they are licensed according to (73) by government and/or place-binding. This can be stated as:

(74) *(verb sublexicon)*

In a coda cluster C1C2 if C2= [+ son], then C2 must root-bind C1.

Affricates only seem to be possible as geminates in the branching coda. They cannot occur in the first position in a branching coda when not root-bound, or in the second position when not root-binding the first: clusters like /t^{s}k, rt^s, nt^s/ (non-verb examples: *barack* 'peach', *perc* 'minute', *tánc* 'dance') are not well-formed branching codas. The lack of non-root-bound affricates (in the first position) is expected (and is not specific to the verb stratum)[127] since they are not licensed by government in this position by the general coda constraint (9 section 3.2.4). The lack of non-root-binding affricates (in the second position) requires an additional constraint because clusters like /rt^s, nt^s/ are licensed according to (73) by government and/or place-binding. This can be stated as:

(75) *(verb sublexicon)*

In a coda cluster C1C2 if C2 is an affricate, i.e. C2 branches under its root node, then C2 must root-bind C1.

The occurrence of palatals is extremely restricted in the branching coda of a free verb stem:

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[127]What *is* special in this stratum is that there are no exceptions to the general constraint. Recall that we have considered words like *barack* exceptional, see section 3.2.4.

only [+ continuant] palatals (/š, ž, j/) can occur and only when governed (i.e. in C1 position). [-continuant] palatals (/t^y, d^y, n^y/) do not occur at all and [+ continuant] palatals cannot occur in C2 position or as geminates. Codas like /n^{y}t^y, rd^y, rn^y, rš, jž, t^{y}ː, d^{y}ː, n^{y}ː, šː, jː/ (non-verb examples: *ponty* 'carp', *tárgy* 'object', *szörny* 'monster', *vers* 'poem', *pajzs* 'shield', *pötty* 'polka dot', *meggy* 'sour cherry', *genny* 'pus', *friss* 'fresh', *gally* 'branch) are not permitted. This can be stated as:[128]

(76) *(verb sublexicon)*

In a coda cluster a [DOR, -ant] segment must be [-cont] and governed.

There are some branching codas that do not occur, but are permitted by (71), (73), (74), (75), (76). We consider these accidental gaps. Some of the accidentally missing coda clusters, although not found in monomorphemic free verb roots, actually occur *undivided by a morpheme boundary* finally in free suffixed verbs: e.g. [ŋk] *kapar-u**nk*** 'scratch' (1pl pres indef.), [tː] *vezet-e**tt*** 'drive' (3sg past indef.). By contrast, no *morphologically undivided* coda cluster occurs verb-finally that should violate the constraints discussed above (e.g. *-bb* [bː] could not be a verbal suffix; non-verb-example: comparative *-bb nagy-o**bb*** 'bigger'). This supports the accidental gap interpretation of the unattested clusters that are permitted by (71), (73), (74), (75) (76).

We have seen that the constraints that apply to branching codas in the verb sublexicon are more restrictive than the general constraints on branching codas. The same effect can be seen in the case of intervocalic clusters (albeit in a weaker form).

There are no monomorphemic verbs with an intervocalic consonant cluster consisting of more than three consonants. There are a few examples in our database of verb stems that seem to contain an intervocalic three-term cluster that is undivided by a morpheme boundary. An exhaustive list is given in (77):

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[128]Note that the specifications [+ continuant] and [-continuant] must be interpreted restrictively in the formulation of this constraint: it does not refer to palatal contour segments (palatal affricates), which contain both specifications, and whose distribution is constrained by (75).

(77)[129]	ksp	*exponál*
	str	*kasztrál*, *nosztrifikál*, *regisztrál*
	štr	*kimustrál, ministrál*
	mpr	*impregnál, imprimál, improvizál*
	mdl	*vámdliz*
	nsp	*transzponál*
	nšp	*inspiciál*
	nt^{s}v	*kifí runcvancigol* (?)
	ŋkr	*inkriminál*
	rtr	*pertraktál*

Note that in (77) *all* 'monomorphemic' verbs end in -*Vl* (or in one case), -*Vz*. These endings are (identical with) denominal verb-forming derivational suffixes that productively attach to clearly identifiable stems: e.g. *kasza* 'scythe$_{N}$'– *kaszá-**l*** 'scythe$_{V}$, *dob* 'drum$_{N}$' – *dob-**ol*** 'drum$_{V}$', *gumi* 'rubber$_{N}$' – *gumi-**z*** 'rubberize'. Even though the verbs in (77) do not have such an easily identifiable nominal root+ verb-forming suffix structure (**expona* – *exponál* 'release the shutter of a camera'), it is reasonable to assume that they follow the same pattern: they consist of a nominal 'phantom stem' and a *denominal* verb-forming derivational suffix.[130] Under this analysis there are no examples of monomorphemic verbs with three-member intervocalic consonant clusters. Recall that we consider monomorphemic intervocalic CCC clusters phonotactically ill-formed in general, and thus *all* monomorphemic lexical items with an intervocalic cluster of more than two members are exceptional/irregular (cf. section 3.3.2.2). Thus, the restriction is not specific to verbs, but again, verb stems do not even offer

[129] Glosses: *exponál* 'release the shutter of a camera', *kasztrál* 'castrate', *nosztrifikál* 'validate a foreign diploma', *regisztrál* 'register$_{V}$', *kimustrál* 'discard', *ministrál* 'assist a pries at mass', *impregnál* 'impregnate', *imprimál* 'pass the proofs for the press', *improvizál* 'improvise', *transzponál* 'transpose', *inspiciál* 'inspect', *inkriminál* 'incriminate', *pertraktál* 'discuss in detail'. *Kifí runcvancigol* 'figure out, calculate' and *vámdliz* '?' are only included because they can be found in the database. I have been unable to establish if *fí runcvancig* and *vámdli* exist as nouns (they are not in the database) and what *vámdliz* means.

[130] They are like the 'phantom stems' in *in**sist**, con**sist**, re**sist***, etc. in English, cf. Chomsky & Halle (1968), Aronoff (1976).

irregular counterexamples to the generalisation.

Let us examine two-member intervocalic clusters in verb stems. Table VII below shows the intervocalic CC clusters in monomorphemic verbs attested in the database and compares them to the attested CC clusters in monomorphemic non-verbs. The notation used is a variant of the usual one employed in this dissertation: a blank space in an intersection of a row and a column means that the relevant cluster is unattested or only occurs when the two consonants are separated by an analytic morphological domain boundary; a '+ ' occurs if it is attested in monomorphemic items and the number of such items in the database is n> 15; numbers have been used to indicate the number of monomorphemic items in the database when the cluster in question is attested in monomorphemic items and the number of such items is n≤15. *Colons* separate data about non-verbs from data about verbs: non-verb data appear on the left of the colon (*non-verb:verb*). The symbol '-' is used to indicate the lack of a cluster if the same cluster is attested on the other side of the colon ('-**:n**', or '**n:**-'), i.e. if the cluster is attested in a monomorphemic verb *or* non-verb. For ease of reference intervocalic clusters that occur in monomorphemic verb stems (i.e. those with a number or a '+ ' on the right of the colon: '**:n**' or '**:+** ') have been encircled (in any colour). The circle is red if the number of such items in the database is n> 15 (i.e. if a '+ ' appears on the right of the colon: '**:+** '); and the circle is black if the number of such items in the database is n≤15 (i.e. if a number appears on the right of the colon: '**:n**') *while* the number of non-verb items is greater than the number of verb items (i.e. '**+ :n**' or '**m:n**' **where m> n**). The circle is blue if the number of verb items is greater than the number of non-verb items and the number of non-verb items is zero (i.e. '-**:n**'); and the circle is green if the number of verb items is greater than the number of non-verb items and non-verb items do exist (i.e. '**m:n**' where m< n and m≠0).

Some explanation is in order about the data included in Table VII before we examine it. I have included all verb stems in the database that can be regarded *suspicious* of having an internal monomorphemic intervocalic CC cluster. I have relied on following guidelines to judge what is suspicious:

(78) In order to qualify as a verb-stem-internal cluster ('vsi-cluster'), an intervocalic cluster must meet one or more of the following partially overlapping, partially conflicting criteria:

(a) The VCCV string must be contained in a verb stem: the CC cluster cannot be divided or immediately preceded/followed by the edge of a productive suffix (and the stem must have more-or-less non-transparent, non-compositional meaning).

Example: this rules out /kt/ in ***buktat*** 'flunk' (because *-tat* is a productive suffix whose edge breaks up the cluster: ***buk-tat***), and /kl/ in *csuklik* 'hiccup'(because *-ik* is a productive suffix whose edge immediately follows the cluster: *csu**kl**-ik*).

(b) The verb-stem that contains the cluster may or may not have an internal stem, but if it does, then the pre-ending (ghost) stem (i) may only have bound forms (in the given meaning) or (ii) must be suppletive if one of its allomorphs is free.

Example: this rules out /pr/ in ***apr**-í t* 'chop up' (because the stem has a free allomorph *apró* 'small'), /mp, st/ in ***komposzt**-ál* 'compost$_V$'(because *komposzt* 'compost$_N$' is a free morpheme), and /rm/ in ***karm**-ol* 'claw$_V$' (because the stem has a free allomorph *karom* 'claw$_N$').

(c) The cluster must be truly morpheme-internal (wholly contained) within a strict or extended *verb* stem.

Example: this rules out /ng/ in *angoloz* 'study English' (because, although the cluster is wholly contained within a monomorphemic stem, it is not a verb stem: [*a**ng**ol*]$_N$ *oz*]$_V$)

(i) verb stem = strict verb root

The VCCV string must be strictly verb-root-internal: the CC cluster may not be preceded/divided/followed by the edge of even an unproductive suffix/ending.

Example: this accepts /lv/ in *o**lv**as* 'read' (because it is a monomorphemic root and does not contain even a ghost stem), but rules out /pt/ in *ka**pt**at* 'climb with difficulty' and /ks/ in *maximál* 'maximize' (because they are extended verb stems, i.e. they contain ghost stems <u>*kap*</u>*-tat*[131], <u>*maxim*</u>*-ál* or <u>*maximá*</u>*-l*)

(ii) verb stem = extended verb root (the ghost stem must be verbal)

The CC cluster may be part of a ghost stem, but cannot be part of a non-verbal ghost stem: The cluster may be preceded/divided/followed by the edge of an unproductive suffix/ending iff the unproductive suffix/ending is deverbal (verb→verb).

<u>Example</u>: this accepts /lv/ in ***olvas*** (because it is a monomorphemic root and does not contain even a ghost stem) and /pt/ in *ka**pt**at* (because the ghost stem in <u>*kap*</u>*-tat* is verbal, i.e. the unproductive verb-forming ending *-tat* is a deverbal one), but rules out /ks/ in *ma**x**imál* (because the ghost stem in <u>*maxim*</u>*-ál* or <u>*maximá*</u>*-l* is non-verbal i.e. the unproductive verb-forming ending *-(V)l* is not a deverbal one)

(iii) verb stem = extended verb root (the ghost stem may be non-verbal)

The CC cluster may be part of a non-verbal ghost stem: The cluster may be preceded/divided/followed by the edge of an unproductive suffix/ending.

<u>Example</u>: this accepts /lv/ in ***olvas*** 'read', /pt/ in *ka**pt**at* 'climb with difficulty' and /ks/ in *ma**x**imál*

I have included all suspicious/potential intervocalic vsi-clusters in Table VII. All verb stems containing a suspicious/potential intervocalic vsi-cluster must meet the criteria (78a, b) in order to qualify. Those that do have been sorted into three sets: 'strictly suspicious' ('strict'), 'moderately suspicious' ('moderate') and 'loosely suspicious' ('loose'). A *strict* intervocalic vsi-cluster is one that can be found in at least one verb that meets the criteria (78a, b, ci) (e.g. /lv/ *olvas*). A *moderate* intervocalic vsi-cluster is one that can be found in at least one verb that meets the criteria (78a, b, cii) (e.g. /pt/ *kaptat*). A *loose* intervocalic vsi-cluster is one that can

[131] I take the unproductive ending *-tat* here to be different from the productive causative *-tat/-tet* suffix.

be found in at least one verb that meets the criteria (78a, b, ciii) (e.g. /ks/ *maximál*).[132] In Table VII, the markings for strict and moderate intervocalic vsi-clusters have been highlighted by shading.[133] The examples that follow Table VII are always the 'best' ones in the sense that a strict example has been given for a cluster is there is one, a moderate example has been given if there is not a strict example, but a moderate one exists and finally, a loose example is only provided if there are no strict or moderate examples. **Strict** examples have been set in bold, <u>moderate</u> examples have been underlined and endings have been CAPITALISED.

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[132]These sets are in a relationship of inclusion: a strictly suspicious cluster is also moderately suspicious and loosely suspicious, etc. Since it makes no difference in the discussion we shall refer to the strict, moderate and loose sets as if they were complementary.

[133]The distinction between the moderate and the loose set is an extremely difficult (if not impossible) one to make (consistently) since only non-productive endings added to ghost stems qualify for being sorted into deverbal and non-deverbal. I took an (arbitrary,) authoritarian and procedural approach to this problem. I have sorted the suspicious verb-forming endings into three sets. I have considered an unproductive ending consistently **deverbal** if it is listed as such in all the four (very different) sources I have used (Kiefer 1998, Rebrus 2000*a,* Tompa 1961, Velcsovné 1988). Similarly, I have considered an unproductive ending consistently **non-deverbal** if it is listed as such in all the four sources. Finally, I have made no decision and judged an ending **uncertain** if it was not possible to make a decision. The latter state of affairs often occurs when the stem is bound: *-kVdik* in $[$*tanár*$]_{\mathrm{N}}$*kodik*$]_{\mathrm{V}}$ 'work as a teacher' is obviously non-deverbal since *tanár* 'teacher' is a noun, it is deverbal in $[$*emel*$]_{\mathrm{V}}$*kedik*$]_{\mathrm{V}}$ 'rise' since *emel* 'lift' is a verb, but in $[$*incsel*$]_{?}$ *kedik*$]_{\mathrm{V}}$ 'tease' it is uncertain since *incsel-* does not occur elsewhere/is bound. Similar examples: *-í t*: $[$*meleg*$]_{\mathrm{ADJ}}$ *í t*$]_{\mathrm{V}}$ 'warm up'(*meleg* 'hot'), $[$*áll*$]_{\mathrm{V}}$ *í t*$]_{\mathrm{V}}$ 'make stop' (*áll* 'stop$_{\mathrm{V}}$'), but $[$*sand*$]_{?}$ *í t*$]_{\mathrm{V}}$ 'squint', $[$*közvet*$]_{?}$ *í t*$]_{\mathrm{V}}$ 'mediate'; *-ul/-ül*: $[$*tan*$]_{\mathrm{N}}$ *ul*$]_{\mathrm{V}}$ 'study' (*tan* 'teaching$_{\mathrm{N}}$'), $[$*nyom*$]_{\mathrm{V}}$ *ul*$]_{\mathrm{V}}$ 'push ahead' (*nyom* 'push'), but $[$*izg*$]_{?}$ *ul*$]_{\mathrm{V}}$ 'be anxious'. Thus, *-kodik/-kedik/-ködik*, *-í t*, and *-ul* are judged uncertain. I have considered an item to contain a cluster that is a member of the <u>moderate</u> set if its ending was consistently deverbal, I have judged it <u>loose</u> it its ending was consistently non-deverbal *or* uncertain. The list of the relevant non-productive endings sorted is the following (only those variants have been included that have been found in the database in stems with a suspicious vsi-cluster): **deverbal endings**: *-(k)ódik, -(k)ózik, -(k)őzik, -(t)at/-(t)et, -ad/-ed, -an/-en, -ant/-ent, -aszt/-eszt, -dogál/-degél, -dos, -ell/-all, -gat/-get, -int, -lal/-lel, -ó(d)zik, -ódik/-ődik, -og/-eg/-ög, -ong/-eng/-öng*; **non-deverbal endings:** *-ál/-él/-l, -ol/-el/-öl/-al/-l, -oz/-ez/-öz/-az/-z*; **uncertain endings:** *-(k)odik/-(k)odik/-(o)dik, -(k)ozik/-(k)ezik/-(k)özik, -ász(ik)/-ész(ik), -í t, -ul/-ül.*

TABLE VII *Intervocalic CC clusters in monomorphemic non-verbs and verbs*[134]

	p	t	tʸ	k	b	d	dʸ	g	tˢ	č	ǰ	f	s	š	v	z	ž	m	n	nʸ	l	r	j	x
	+	5			—	—	—	—			—					—	—				3	3		
		14	—	+	—	—	—	—	—	—	—		—	—		—	—			—		3	—	4:1
			+		—	—	—	—			—				1	—	—						—	1:-
		12		+	—	—	—	—			—					—	—	+ :2	8:-	2:-	+ :9	+ :1	6:-	6:-
	—	—	—	—	+				—	—		—	—	—		2						7		—
	—	—	—	—		2	—		—	—		—	—	—	+ :-	+ :-	—			—			—	—
	—	—	—	—			5		—	—		—	—	—									—	—
	—	—	—	—				14	—	—		—	—	—							2			—
					—	—	—	—	13		—					—	—	1						
					—	—	—	—		9	—					—	—							
	—	—	—	—					—	—		—	—	—										—
					—	—	—	—			—	+				—	—				2			
		+		+	—	—	—	—			—		+			—	—	3						
	6	14		10	—	—	—	—			—					—	—	5			4		—	-:4
	—	—	—	—					—	—		—	—	—										—
	—	—	—	—				4	—	—		—	—	—		8					2		—	—
	—	—	—	—				2	—	—		—	—	—							1		—	—
	+	1			13					-:2		14:1	1:-	1:-	4:-	3:-	2:3	+ :9	8:-	3:-	+ :5	3:-	3:-	3:-
	—	+	—	+	—	+	—	+	13	7		8			8			—		—	2		—	2:1
															1					8			—	6:-
		10		+		8		6							8				1		+	—	—	9:-
r	+ :10	+ :+	+ :6	+ :+	+ :4	+ :+	6:1	+ :+	+ :10	+ :1		+ :5	+ :3	+ :5	+ :7	+ :4	+ :6	+ :14	+ :2	+ :7	+ :5	+ :+	+ :15	+ :1
		6						4										4:2	7:2	4:-	+ :5	4:-	7:4	10:1
																								-:1

[134] For an exhaustive list of verbs containing these clusters, see Appendix B (iii).

Examples: ***lappang*** ‘incubate’, *kapTAT* ‘climb with difficulty’, *klopfOL* ‘tenderize meat by beating’, *abszolvÁL* ‘complete’, *átcaplAT* ‘pop over to’, *töprENG* ‘speculate’; *suttOG* ‘whisper’, *vetKŐZIK* ‘undress’, *ötvÖZ* ‘alloy’, ?*csatlAKOZIK* ‘join’, *kotrÓDIK* ‘shove off’, *rothAD* ‘rot’; *kettyINT* ‘copulate’, *bütykÖL* ‘fix’, *kotyvASZT* ‘concoct’, *fitymÁL* ‘belittle’; *bakTAT* ‘trudge’, *csökkEN* ‘reduce’, *akceptÁL* ‘appreciate’, *fixí rOZ* ‘eye’, *kuksOL* ‘crouch’, *likvidÁL* ‘liquidate’, *lakmárOZIK* ‘feast on’, *zaklAT* ‘harass’, *akkreditÁL* ‘accredit’; *meghibbAN* ‘go mad’, *tobzÓDIK* ‘luxuriate’, *lebzsEL* ‘idle’, *öblÍ T* ‘rinse’, *ébrED* ‘wake up’; *idDOGÁL* ‘drink a little’, *addresszÁL* ‘address’; *buggyAN* ‘go bad’; *szökdécsEL* ‘jump about’, *nyaggAT* ‘nag’, *vegzÁL* ‘annoy’, *regnÁL* ‘reign’, *fogLAL* ‘occupy’, *emigrÁL* ‘emigrate’; *lubickOL* ‘splash about’, *moccAN* ‘move’, ***kecmerEG*** ‘fumble’; *pocskondiáZ* ‘disparage’, *becsiccsENT* ‘become tipsy’, *becsmérEL* ‘slander’; menedzsEL ‘manage’; *puffAD* ‘become bloated’, *caflAT* ‘shamble’; *diszponÁL* ‘dispose of sg’, *vesztEGET* ‘bribe’, *viszkET* ‘itch’, *bosszANT* ‘annoy’, piszmOG ‘fiddle with sg’, *észlEL* ‘percieve’; *tespED* ‘languish’, ***sisterEG*** ‘sizzle’, *áskálÓDIK* ‘scheme’, *eltussOL* ‘cover up’, ***ismer*** ‘know’, *koslAT* ‘court’, *poshAD* ‘become stagnant’; *mozdÍ T* ‘move’, *igazGAT* ‘direct’, *közvetÍ T* ‘mediate’, *duzzOG* ‘sulk’, ?*í zLEL* ‘taste’; *pezsdÍ T* ‘liven up’, *rebesGET* ‘rumour’, *prézsmitÁL* ‘preach’, ?*vizslAT* ‘examine’; ***hömpölyÖG*** ‘surge’, ?*nyomtat* ‘print’, ***csámborOG*** ‘wander aimlessly’, *csámcsOG* ‘eat noisily’, *somfordÁL* ‘slink’, *hemzsEG* ‘swarm’, *brummOG* ‘growl’, *emlEGET* ‘mention repeatedly’; **henterEG** ‘roll about’, lankAD ‘’, ***sündörÖG*** ‘slink’, *engED* ‘allow’, *hencEG* ‘boast’, ***kuncsorOG*** ‘beg’, ***ténferEG*** ‘hang around’, *vonszOL* ‘drag’, *szenvED* ‘suffer’, *inzultÁL* ‘insult’, *avanzsÁL* ‘rise in rank’, ?*kí nlÓDIK* ‘suffer’, *inhalÁL* ‘breathe in medicine’; *szontyolODIK* ‘become sad’, *göngyÖL* ‘wrap’, *senyvED* ‘suffer’, *sunnyOG* ‘slink’; *kolportÁL* ‘spread rumours’, *álTAT* ‘delude’, ***alkot*** ‘create’, *kiakolbódÍ T* ‘kick sb out’, ***oldalOG*** ‘slink’, *találGAT* ‘guess’, ?*lefalcOL* ‘escape’, ***olvas*** ‘read’, *alkalmAZ* ‘employ’, ?***volna*** < function word expressing unreal condition> , ***ballag*** ‘amble’; *torpAN* ‘stop suddenly’, ***történik*** ‘happen’, *hortyOG* ‘snore’, *serkENT* ‘stimulate’, *dorbézOL* ‘carouse’, *kérdEZ* ‘ask’, *meggárgyUL* ‘go soft in the head’, *kergET* ‘chase’, *sercEG* ‘sizzle’, *szürcsÖL* ‘drink noisily’, *morfondí rOZ* ‘ponder’, *forszí rOZ* ‘insist’, ***társalOG*** ‘discuss’, ?***örvend*** ‘be glad’, *borzONG* ‘shiver’, *horzsOL* ‘scratch’, *förmED* ‘snarl’, *internÁL* ‘relocate by force’, *görnyED* ‘bend’, *birLAL* ‘hold < legal> ’, *virrASZT* ‘stay awake’, *gerjED* ‘become aroused’, *archaizÁL* ‘make sg archaic’;

selypÍ T 'lisp', ***kujtorOG*** 'loiter', *hajkurÁSZIK* 'chase after sg', *bolydUL* 'stir', *bolyGAT* 'disturb', *majszOL* 'munch', *hajsókÁL* 'swing', ?*jajveszékEL* 'wail', ?*lejmOL* 'bum', *ajnárOZ* 'adore', *fejlESZT* 'develop', vijjOG 'screech', ?*megújhODIK* 'be reborn'; kehhENT 'cough';

It can be seen in Table VII that, although the set of intervocalic CC clusters that can be found in a monomorphemic verb stem (strict, moderate or loose) is similar to the set of intervocalic CC clusters in non-verb stems, verb stems are phonotactically more restrictive than non-verb stem in a 'weak' (frequency-related) sense. The intervocalic CC clusters found in verbs do follow the general pattern for interconstituent clusters (i.e. they conform to the general interconstituent constraints we have stated in section 3.3.2 ((35), (37), (42), (43), (48), (51), (52), (53)) and no additional, more restrictive phonotactic constraints can be formulated with a sufficient degree of generality in terms of natural classes. The higher restrictiveness of verb phonotactics manifests itself in the 'population' (type frequency) of clusters within the phonotactic space permitted by the general constraints.[135]

The following generalisations can be made: (a) the number of the types of clusters that can be found in verbs is significantly lower than those found in non-verbs. Of the total 249 attested monomorphemic intervocalic CC clusters, 242 are attested in non-verbs and only 145 are attested in verbs; (b) It is extremely rare for an attested intervocalic CC cluster to be found in more verb stems than non-verb stems, i.e. *nv*< *v* (where *nv* is 'non-verb' and *v* is 'verb'). Of the total 249 attested monomorphemic intervocalic CC clusters, there are only 12 clusters of this kind, 7 of which are only attested in verbs (numbers in parentheses refer to the *nv*:*v* ratio): /t^{y}v (–:1), t^{s}m (–:1), sx (–:4), mč (–:2), jp (–:1), jš (–:1), xx (–:1)/, /d^{y}ː (2:5), gd (1:2), čː (1:9), mž (2:3), jg (3:4)/, and the difference in favour of verbs is typically very small (8 times out of the 12 cases *v*–*nv*= 1); (c) By contrast, it is very often the case that an attested

[135]Note that frequency (type or token) has no (clear) formal/theoretical status in a generative model of phonology (derivational generative phonology, Optimality Theory or Government/CV/VC Phonology) —even though it is sometimes referred to in various generative analyses. Thus, inasmuch as the observations made here are correct and relevant to phonotactics, they actually point/lead outside the model used in this dissertation. Frequency *is* accommodated by other frameworks, e.g. in pre-generative (structuralist) phonology (e.g. Spang-Hanssen 1959) and recently, in laboratory phonology (e.g. Hay, Pierrehumbert and Beckman 2003, Pierrehumbert 1994) and the (re)emerging functional approach (Bybee 2001, Bybee & Hopper 2001, Rebrus & Trón 2002, Trón & Rebrus 2000, 2001).

cluster is found in more non-verb stems than verb stems (or that it occurs in non-verb stems only), i.e. *nv*> *v*. Of the 249 attested intervocalic CC clusters 209 occur in a higher number of non-verb stems than verb stems, of which 104 are only attested in non-verbs. Also the difference in favour non-verbs is typically not small: in 92 cases out of the 209 attested clusters the difference in favour of non-verb stems is at least 10 ($nv-v \geq 10$, where non-occurrence is counted as zero); (d) There are a significantly greater number of 'populous' cluster types (i.e. a 'populous' cluster type is a cluster found in a relatively high number of stems) in the case of non-verbs than in the case of verbs. Of the 249 attested intervocalic CC clusters there are 124 relatively populous non-verb clusters (clusters with at least 10 tokens: *nv:* where $nv \geq 10$) and only 36 relatively populous verb clusters (*:v* where $v \geq 10$). Interestingly, the distribution of the *populous* intervocalic CC clusters in the phonotactic space is somewhat different for verbs and non-verbs. In the case of non-verbs the populous clusters are distributed more or less evenly in the phonotactic space delimited by the constraints stated in section 3.3.2 ((35), (37), (42), (42), (48), (51), (52), (53)). By contrast, in the case of verb stems, populous clusters tend to be geminates, s/š+ stop clusters[136] and sonorant+ obstruent clusters, but not obstruent+ sonorant clusters (which can be populous in non-verbs). This may suggest that, although the Syllable Contact Law does not hold in Hungarian in general, the phonotactics of verbs is skewed towards it because the populous intervocalic clusters tend to conform to it.[137]

These effects become even stronger the stricter one is in circumscribing what qualifies as an intervocalic cluster in a monomorphemic verb: of the 249 attested intervocalic CC clusters in Table VII 145 are attested in verbs under the loose interpretation. Of these only 84 are strict or moderate vsi-clusters (highlighted by shading in Table VII[138]), of which only 19 are strict vsi-clusters. An exhaustive list of the strict vsi-clusters together with all the strictly suspicious stems is given in (79):

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[136]Stop+ stop is also populous in verbs provided that /t/ and /k/ combine.

[137]Note that this does not imply that there are no clusters in verbs that violate the Syllable Contact Law, just that those types of clusters are not populous in verbs.

[138]Note that the highlighted numbers in Table VII are misleading to a degree because not *all* verb stems exemplifying a given type of moderate or strict cluster necessarily contain a moderate or strict vsi cluster. The number is highlighted if the cluster is attested in at least *one* moderately or strictly suspicious verb stem.

(79) a. t^sm ke**cm**erEG ‘fumble’
št si**st**erEG ‘sizzle’
šm i**sm**er ‘know’
mp he**mp**erEG ‘roll about’, so**mp**olyOG ‘sneak’, hö**mp**ölyÖG ‘surge’
nt he**nt**erEG ‘roll about’, tá**nt**orOG ‘stagger’
mb csá**mb**orOG ‘wander aimlessly’, i**mb**olyOG ‘waver’
nd sü**nd**örÖG ‘slink’
nč ko**ncs**orOG ‘beg’, ku**ncs**orOG ‘beg’
nf té**nf**erEG ‘hang around’
lk a**lk**ot ‘create’, a**lk**uszIK? ‘bargain’
ld o**ld**alOG? ‘slink’
lv o**lv**as ‘read’
ln vo**ln**a? < function word expressing unreal condition>
rt ta**rt**ózTAT? ‘delay’, tö**rt**énIK ‘happen’, zsö**rt**ölŐDIK ‘grumble’
rš tá**rs**alOG ‘discuss’
rv ö**rv**end? ‘be glad’
jt ku**jt**orOG ‘loiter’

b.[139] p: la**pp**ang ‘incubate’
l: ba**ll**ag ‘amble’, vá[l(:)]al

Thus, we have seen that the phonotactics of monomorphemic verb stems is more restrictive than the phonotactics of non-verb stems, which manifests itself (i) in the stricter constraints that apply to the coda and (ii) the frequency effects intervocalic consonant clusters display.

It would be desirable to connect (i) of the above to a difference between possible morphologically complex codas available for nouns and for verbs. If we examine word-final codas that consist of a stem-final consonant and a consonant that realises a synthetic suffix, we

[139] Many of the strict and moderate verb stems with an intervocalic geminate have an ‘onomatopoeic’ ‘expressive’ or ‘mimetic’ character (cf. Appendix B). We shall not pursue this idea here, but it is possible that these kinds of words have a special phonotactic makeup, perhaps they form another phonotactic stratum (cf. Fudge 1970, Itô & Mester 1995).

find that the codas of this structure that can occur at the end of verbs is a subset of those that can occur at the end of nouns. The suffixes in question are the past tense suffix in the case of verbs and the accusative in the case of nouns. Both of them are realised as /t/ when they can form a branching coda with a stem-final consonant, otherwise they are preceded by a 'linking' vowel (see the details in section 4.1.2.2). The coda clusters that can be formed in this way are given below for nouns and for verbs:

(80)

	nouns (accusative)	verbs (past)
	st	-
	št	-
	nt	nt
	n^yt	n^yt
	lt	lt
	rt	rt
	jt	jt

As can be seen in (80) the phonotactics of morphologically complex branching codas are very similar in nouns and verbs except that it is more restrictive in verbs, because in a verb the first consonant must be a sonorant: /st, št/ can only occur as codas of this kind in a noun: *csempész-t* 'smuggler' (acc.) vs. *csempész-ett*, **csempész-t* 'smuggle' (3sg past indef.); *les-t* 'raised hide' (acc.) vs. *les-ett*, **les-t* 'spy on sb.' (3sg past indef.). Notice, however, that although the relationship between non-verb and verb phonotactics is the same in morphologically simplex branching codas and morphologically complex branching codas (in both cases it is the verb phonotactics that is more restrictive), in this case it is not possible to derive the behaviour of the morphologically complex branching codas in verbs from that of the morphologically simplex ones since /st, št/ are well-formed final codas in monomorphemic verbs: /st/ *oszt* 'distribute', /št/*fest* 'paint' (and /st/ is even the most populous type, cf (72) above). Thus, the restriction on morphologically complex branching codas in verbs must be an extra stipulation.

3.5. Sequence constraints

We have noted that, in addition to SSCs and MSCs, the phonotactic pattern may also be determined by Sequence Constraints, i.e. constraints that apply irrespective of the syllabic (prosodic) or morphological affiliation of segments.

A sequence constraint briefly mentioned in section 3.2.4.2 that the segments of the segments /s, š, t^s, č, z, ž, ǰ/ should combine to form CC clusters (including fake geminates). A CC cluster that contains one of these segments in both its positions is excluded independently of the syllabic affiliation of the consonants the clusters consist of (cf. Törkenczy 1994*a*).[140] Assuming that the segments involved are specified as [+ strident] (redundantly, by Stridency Spell-out, which specifies [COR, −son, + cont] segments (including affricates) as [+ strid]; cf. Siptár & Törkenczy 2000) this can be formulated as (81):

(81) The feature [+ strid] may not be associated with adjacent segments that have independent root nodes
domain: analytical domain

Since the OCP bans adjacent identical feature specifications within a morpheme (81) rules out strident clusters other than true geminates (which have a single root node associated with two timing slots on the skeletal tier). Apart from a handful of exceptions[141] (81) is only violated by (underlying) clusters occur when divided by an analytic domain boundary: ⟦⟦húsz⟧⟦centis⟧⟧ '20-centimetre long', ⟦⟦tenyész⟧⟦csődör⟧⟧ 'stud', ⟦⟦hős⟧⟦cincér⟧⟧ 'oak cerambix', ⟦⟦has⟧⟦csikarás⟧⟧ 'stomach-ache', ⟦⟦kis⟧szerű⟧ 'petty', ⟦⟦rács⟧⟦szerkezet⟧⟧ 'grid structure', ⟦⟦gáz⟧⟦cső⟧⟧ 'gas pipe', ⟦⟦kéz⟧⟦szorítás⟧⟧ 'handshake', ⟦⟦darázs⟧⟦csípés⟧⟧ 'wasp-bite', etc. Since an analytical domain is the largest domain within which phonotactic constraints apply, (81) is truly a sequence constraint since it has to refer neither to the syllable to the morpheme as domains.

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[140]That is $7^2 = 49$ clusters some of which would undergo various assimilations involving voicing and place.

[141]See section 3.2.4.2 for an exhaustive list.

Chapter 4.

‘Dynamic’ phonotactics: Phonotactically motivated processes

4.1. Vowel~zero alternations

Hungarian has an intricate system of vowel~zero alternations. We shall see as we proceed that not all of them can be analysed in the same way phonologically. Henceforward, we shall informally refer to any vowel that alternates with zero as ‘unstable’ and denote it with the symbol V_u. This term is meant to be neutral with respect to whether a given vowel~zero alternation is considered to be the result of epenthesis, vowel deletion or some other phonological mechanism. In this section first we examine the distribution and the quality of unstable vowels and then we present an analysis of vowel~zero alternations.

The unstable vowels may occur stem-internally, i.e. inside a stem, and stem-externally, i.e. between a stem and a suffix.

4.1.1. Stem-internal unstable vowels: ‘epenthetic’ stems

The stem-internal occurrence of unstable vowels is restricted to a non-productive class of stems traditionally called ‘epenthetic’ (e.g. Vago 1980a),[1] e.g. *bok**o**r* ‘bush’ (compare *bokr-ok* ‘bush’ (pl.)). Although we shall refer to them by the traditional name, we make no claim here about (and actually will argue against) their epenthetic character. In general, the unstable vowel of these stems is phonetically expressed if they occur in isolation, or before consonant-initial

[1]Although it is a non-productive class, it is rather populous: it contains about 150 verbs and 250 noun stems (some of which are morphologically complex). There are also a few adjectives and numerals that are ‘epenthetic’.

suffixes, but it does not appear at the surface if a vowel-initial suffix follows the stem.[2] This is shown in (1):

(1)	_#	_C-initial suffix	_V-initial suffix
	bokor	bokor-ban 'bush' (iness.)	bokr-ok
	retek 'radish'	retek-ben 'radish' (iness.)	retk-ek 'radish' (pl.)
	kölyök 'kid'	kölyök-ben 'kid' (iness.)	kölyk-ök 'kid' (pl.)

The unstable vowels in 'epenthetic' stems are regularly short and mid ([–open$_1$, + open$_2$]) whose frontness and rounding is determined by vowel harmony.[3] Thus, they exhibit a ternary alternation: *o/ö/e* (see the examples in (1)) when they are phonetically realized. The front unrounded alternant is phonetically low, but this is due to phonetic implementation (see Siptár & Törkenczy 2000). There are only seven 'epenthetic' stems in which the height of the unstable vowel is irregular (high or low). These are shown in (2):

(2)	**a**	*vacak* 'something worthless'	*vack-ot* 'something worthless' (acc.)
		kazal 'haystack'	*kazl-at* 'haystack' (acc.)
		ajak 'lip'	*ajk-at* 'lip' (acc.)
		fogazz 'teethe!'	*fogz-ás* 'teething'
	i	*őriz* 'guard' (3sg pres indef)	*őrz-i* 'guards' (3sg pres def)'
	ü	*becsül* 'estimate' (3sg pres indef)	*becsl-és* 'estimate' (noun)
	u	*bajusz* 'moustache'	*bajsz-ot* 'moustache' (acc.)

[2]Some-vowel initial suffixes behave differently (e.g. terminative *-ig*, causal-final *-ért*: *bokor-ig, bokor-ért* and not **bokr-ig, *bokr-ért*). These will be discussed in section 4.1.4.6.

[3]In a few 'epenthetic' stems with a back unstable vowel, the vowel in the syllable preceding the unstable vowel is front *i, í,* or *é* e.g. *szirom* 'petal', *szirm-ok* 'petal' (pl.), *kínoz* 'torture' (3sg pres indef), *kínz-ás* 'torture' (noun), *céloz* 'aim' (3sg pres indef), *célzás* 'aiming'. These behave exactly like other antiharmonic stems with respect to vowel harmony and have analogous underlying representations (i.e. they have an unlinked DOR that can link up to the unstable vowel if it is realized, cf. Siptár & Törkenczy 2000).

Stem-internal unstable vowels always occur in the last syllable of the stem, but the only vowel of a monosyllabic stem may not be unstable. If we examine the final $C_iV_uC_j$ string of ‘epenthetic’ stems (where V_u denotes the unstable vowel, and C_i and C_j are consonants of any kind flanking the unstable vowel), it becomes clear that here the vowel~zero alternation is not phonotactically motivated. The reason is that the stem-final consonant cluster C_iC_j that appears in the stem alternant whose unstable vowel is phonetically unexpressed is not always a phonotactically ill-formed final cluster (cf. Törkenczy 1992). Of course, there are consonants separated by a stem-internal unstable vowel that would make up an ill-formed cluster finally (e.g. the cluster /kr/ that occurs in *bo**kr**-ok*, for instance), but this is not always the case. (3) shows some examples where the C_iC_j cluster corresponding to the consonants flanking the unstable vowel in an ‘epenthetic’ stem is a possible word-final cluster:

(3)[4]

$\mathbf{C_iV_uC_j}$		$\mathbf{C_iC_j\#}$
viszonoz	viszonz-om	vonz
telek	telk-ek	halk
füröd-nek	fürd-és	kard
szerez	szerz-ünk	borz
torony	torny-ok	szörny
majom	majm-ok	slejm
bagoly	bagly-ok	fogj

Note that most of the C_iC_j clusters in (3) are not only well-formed as word final clusters, but are perfectly well-formed syllable codas as well (/gj/ as in *fogj* is the only one that is not a well-formed branching coda, although it is a well-formed word-final cluster with /j/ in the

[4]Glosses: *viszonoz* ‘reciprocate’ (3sg pres indef), *viszonz-om* (1st pres indef), *vonz* ‘attract’ (3sg pres indef), *telek* ‘land’, *telk-ek* ‘land’ (pl.), *halk* ‘quiet’, *füröd-nek* ‘bathe’ (3pl pres indef), *fürd-és* ‘bathing’, *kard* ‘sword’, *szerez* ‘acquire’ (3sg pres indef), *szerz-ünk* ‘acquire’ (1pl pres indef), *borz* ‘badger’, *torony* ‘tower’, *torny-ok* ‘tower’ (pl.), *szörny* ‘monster’, *majom* ‘monkey’, *majm-ok* ‘monkey’ (pl.), *slejm* ‘phlegm’, *bagoly* ‘owl’, *bagly-ok* ‘owl’ (pl.), *fogj* ‘hold!’

appendix).[5]

Naturally, not all well-formed codas or word-final consonant clusters appear divided by an unstable vowel in these stems. Nevertheless, intuitively, even the non-occurring types seem possible. For example, there is no ‘epenthetic’ stem with /n/ as C_i and /č/ as C_j in its $C_iV_uC_j$ string—but such a stem is perfectly possible phonologically: hypothetical *penecs* could be an ‘epenthetic’ stem with *pencs-* as an alternant before vowel-initial suffixes. Thus, we conclude that vowel~zero alternation is not phonotactically motivated stem-internally. Still, there are certain phonotactic restrictions on the shape of ‘epenthetic’ stems: (i) their unstable vowel is never preceded or followed by a consonant cluster (*CCV_uC, *CV_uCC);[6] (ii) the consonants flanking the unstable vowel are never identical (*$C_iV_uC_j$ if $C_i = C_j$)[7]; and (iii) if they are both obstruents, they are either both voiced or both voiceless *$C_iV_uC_j$, if C_i, C_j = [-son] and only one of them has a laryngeal node).

It is a lexical property of a stem if it is ‘epenthetic’ or not, i.e. whether it has an unstable vowel or not. There are near-identical pairs of stems such that one of the members of a given pair has an unstable vowel where other member has a stable one. Compare the ‘epenthetic’ stems in (4a) with those in (4b) whose last vowel is stable:

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[5]We have not included occurring *irregular* C_iC_j# clusters (cf. section 3.2.4.2) in (3) that also occur in $C_iV_uC_j$ strings. Several such examples exist: e.g. /tk/ *retek, retk-ek, Detk* < place name> ; /čk/ *mocsok* ‘filth’, *mocsk-os* ‘filthy’, *Recsk* (place name); /sk/ *piszok* ‘dirt’, *piszk-os* ‘dirty’, *maszk* ‘mask’.

[6]There is a single exception: the vowel of the denominal verb-forming suffix *-Vz* is unstable after the cluster-final stem *hang* ‘sound’: *hang-oz-tat* ‘proclaim’ (3sg pres indef), *hang-z-om* ‘sound’ (1sg pres indef). The same suffix-initial vowel is always stable after other cluster-final stems: *folt-oz-om* ‘patch’ (1sg pres indef), *rend-ez-em* ‘put in order’ (1sg pres indef), *bors-oz-om* ‘pepper’ (1sg pres indef) and not **folt-z-om, *rend-z-em, *bors-z-om*.

[7]It has been suggested (P. Rebrus, personal communication) that this latter constraint is more general and requires that C_i and C_j should not be homorganic. Given the feature system used in this dissertation, this claim is not true. In the following examples of epenthetic stems the consonants flanking V_u have the same place: /tV_ur/ *bátor* ‘brave’, /sV_un/ *vászon* ‘canvas’, /tV_ul/ *ismétel* ‘repeat’, /zV_dl/ *közöl* ‘inform’ etc.

(4)	**$-C_iV_uC_j$**			**$-C_iVC_j$**	
a.	terem ‘hall’	term-ek ‘halls’	b.	perem ‘edge’	perem-ek ‘edges’
	vödör ‘bucket’	vödr-ök ‘buckets’		csődör ‘stallion’	csődör-ök ‘stallions’
	szobor ‘statue’	szobr-ok ‘statues’		tábor ‘camp’	tábor-ok ‘camps’
	torony ‘tower’	torny-ok ‘towers’		szurony ‘bayonet’	szurony-ok ‘bayonets’

The data described above suggest that—unless arbitrary lexical marking is involved—stem-internal vowel~zero alternation is neither due to epenthesis nor to the deletion of a vowel represented on a par with vowels that do not alternate with zero.[8]

The unstable vowel cannot be epenthetic because if the vowelless alternant of an ‘epenthetic’ stem is taken to be underlying, the epenthesis site cannot be predicted, i.e. the clusters that are supposedly broken up by epenthesis cannot be distinguished from those that are not (compare ‘epenthetic’ *torony* and non-alternating cluster-final *szörny*).

Stems like *csukl-ik* ‘hiccup’ (pres 3sg indef), *bűzl-ik* ‘stink’ (pres 3sg indef), *vedl-ik* ‘slough’ (pres 3sg indef), etc. provide a further argument against the epenthesis analysis. These are bound stems that end in ill-formed coda clusters. They can only occur before (surface) vowel-initial suffixes, and their stem-final clusters are never broken up. Before (surface) vowel-initial suffixes, they look like ‘epenthetic’ stems (compare *csukl-ás* ‘hiccup’ (noun) with ‘epenthetic’ *vezekl-és* ‘penitence’). However, their paradigms are defective in that they simply do not have the forms in which a suffix (or the lack of it) would render the stem-final cluster unsyllabifiable. Crucially, their stem-final clusters cannot be repaired by epenthesis (**csukol-j* ‘hiccup!’ (imp.)). In contrast to these defective stems, ‘epenthetic’ ones do have the corresponding forms (*vezekel-j* ‘repent!’ (imp.)). If we want to distinguish defective stems from ‘epenthetic’ ones representationally, both types cannot be cluster-final, because then, the ill-formed final clusters that are to be broken up by epenthesis cannot be distinguished from those that are not.

On the other hand, the vowelless alternant of an ‘epenthetic’ stem cannot be derived by deletion from an underlying CVC-final form (where V is represented like other vowels)

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[8]Both epenthesis and deletion have been proposed in the literature (cf. Vago 1980a, Jensen and Stong-Jensen 1988, 1989b (epenthesis); Kornai 1990 (vowel deletion)).

because (a) it would not be possible to distinguish CVC-final stems that exhibit vowel~zero alternation from those that do not (compare ‘epenthetic’ *torony* and non-alternating *szurony*), and (b) it would not be possible to explain why the quality/quantity of the unstable vowel is predictable.

Any successful analysis will have to be able to make a three-way distinction between triplets of stems like *torony* - *szurony* - *szörny*, and must distinguish ‘epenthetic’ stems from ‘defective’ CC-final ones like *csukl-*.

4.1.2. Stem-external vowel~zero alternations: stem-final unstable vowels and ‘linking’ vowels

Several (types of) suffixes are involved in stem-external vowel~zero alternation. Given that we have defined stem-external vowel~zero alternation as occurring at the boundary between a stem and a suffix, there are two logical possibilities: (a) the stem-final vowel may be unstable, or (b) the suffix-initial vowel may be unstable.[9] Both (a) and (b) occur in Hungarian.

4.1.2.1. Stem-final vowel~zero alternations

Stem-final vowel~zero alternations only occur before the deadjectival verb-forming suffixes *-ít (barn-ít* ‘make brown’, cf. *barna* ‘brown’*), -ul/-ül (laz-ul* ‘become loose’, cf. *laza* ‘loose’*)*, and *-odik/-edik/-ödik (szomor-odik* ‘become sad’, cf. *szomorú* ‘sad’; *feket-edik*[10]

[9]Unstable vowels do not occur in non-initial position in a suffix. Noun-forming (derivational) *-alom/-elem* might be considered a suffix with an internal unstable vowel: *vigalom* ‘merry-making’, *vigalm-at* ‘merry-making (acc.)’, cf. *víg* ‘merry’; *félelem* ‘fear’, *félelm-et* ‘fear (acc.)’, cf. *fél* ‘be frightened’. This suffix, however, is no longer productive and the morphological complexity of the stems containing it has become obscured. Therefore we do not consider this ‘ending’ a suffix in the stem in which it occurs. (It would also be irregular if analyzed as a suffix since it is clearly derivational, not adjective-forming, but nevertheless it is lowering (cf. section 4.1.3 below)).

[10]The fact that the form is *feketedik* and not **feketédik* is evidence that it is indeed the stem-final vowel that deletes and not the suffix-initial one. If the suffix-initial vowel had deleted,

'become black', cf. *fekete* 'black') and the denominal noun-forming suffix *-ász/-ész* (*erd-ész* 'forester', cf. *erdő* 'forest', *szől-ész* 'viniculturist', cf. *szőlő* 'grape').[11] As can be seen, stems lose their final vowel before these suffixes. It is the special property of these suffixes (and not of the stems) that they cause the loss of the stem-final vowels since the same stems retain their final vowels before other vowel-initial suffixes. Consider the comparative forms *barná-bb, lazá-bb, szomorú-bb, feketé-bb,* etc. where the stem-final vowels are retained and the initial unstable vowel of the comparative suffix *-*V_u*bb* does not appear at the surface.[12] In the case of stem-final vowel~zero alternation there is no restriction on the quality or quantity of the unstable vowel. It can be high (*gömböly-ödik* 'become spherical', cf. *gömbölyű* 'spherical'), mid (*fak-ít* 'make pale', cf. *fakó* 'pale'), or low (*laz-ul* cf. *laza*), and it may equally be short or long.[13] The unpredictability of the unstable vowel suggests that the mechanism responsible for this alternation is deletion.

4.1.2.2. Suffix-initial vowel~zero alternation

Suffix-initial vowel~zero alternation is more common and more complex than the stem-final one. It is not restricted to a handful of suffixes: many suffixes begin with an unstable vowel

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then the stem-final *e* would have had to lengthen by Low Vowel Lengthening (cf. Siptár & Törkenczy 2000) giving **feketédik.*

[11]There are a few sporadic examples of stem-final vowel~zero alternation with other suffixes too, cf. Rebrus (2000*a*)

[12]Note that there are four stems that irregularly lose their stem-final vowels before the comparative suffix and some other vowel-initial suffixes: *könnyű* 'easy' *(könny-ebb* 'easier', *könny-en* 'easily'*), ifjú* 'young' *(ifj-abb* 'younger', *ifj-an* 'as a youth'*), hosszú* 'long' *(hossz-abb,* 'longer', *hossz-an* 'at length'*), lassú* 'slow' *(lass-abb* 'slower', *lass-an* 'slowly'*).* There are also three exceptional nominal stems that lose their final vowels before some vowel-initial suffixes: *borjú* 'calf' (*borj-ak* 'calf' (pl.)), *varjú* 'crow' (*varj-ak* 'crow' (pl.)), *ifjú* 'youth' *(ifj-ak* 'youth' (pl.)*).*

[13]Note that the adjective-forming suffixes discussed here (a) may not be added to any adjective and (b) after some vowel-final adjectives a *-s-* ([š]) is inserted before the suffix, e.g. *olcsó-s-ít* 'make cheap', *karcsú-s-ít* 'make slim', *állandó-s-ul* 'become constant'.

(called a 'linking' vowel traditionally).[14] Two types of suffixes may be distinguished depending on what motivates the suffix-initial vowel~zero alternation.

Type A. The initial unstable vowel of Type A suffixes is only unrealized when they are added to a vowel-final stem; a phonetically realized vowel is always present after a consonant-final stem, regardless of the identity of the stem-final consonant. Suffixes of this type include *-ok/-ek/-ök* 'pl', *-on/-en/-ön* 'spr', *-om/-em/-öm* '1sg poss', etc. Verb roots end in a consonant before vowel-initial suffixes in Hungarian. Therefore, on the basis of the presence/absence of vowel~zero alternation alone, in principle, a verbal suffix with an initial stable vowel is indistinguishable from a Type A suffix added to a verb root, since the latter would also not display vowel~zero alternation. We shall consider vowel-initial verbal suffixes as Type A if their initial vowel is short *o/e/ö* (i.e. the typical unstable vowel), e.g. *-ok/-ek/-ök* '1sg pres indef', *-od/-ed/-öd* '2sg pres def', *-om/-em/-öm* '1sg pres def'. This is confirmed by their behaviour after a relative verb stem that ends in a vowel; compare *lát-**om*** 'see' (1sg pres def) and *lát-ná-**m*** 'see' (1sg pres cond def); *ül-**ök*** 'sit' (1sg pres indef) and *ül-né-**k*** 'sit' (1sg pres cond indef). The behaviour of Type A suffixes is illustrated in (5):

(5)		**pl**	**spr**	**1sg poss**
C-final stem	lány 'girl'	lány-ok	lány-on	lány-om
V-final stem	holló 'raven'	holló-k	holló-n	holló-m

In these suffixes the presence of a realized unstable vowel is not motivated by the phonotactics of final consonant clusters, i.e. the vowel is not there to 'repair' otherwise ill-formed clusters. This can be seen in (6) where the realized suffix-initial unstable vowel appears to 'break up' well-formed word-final clusters all of which are also well-formed codas.

[14] The literature is divided concerning the morphological affiliation of these vowels: there is no agreement as to whether linking vowels are part of the stem, or part of the suffix, or a separate entity between the stem and the suffix (see Antal (1977), Papp (1975) and Rebrus (2000*a*) and references therein). I will consider them to be part of the suffix.

(6)

	C_i-V_uC_j	-C_iC_j
	dal-ok ‘song’ (pl.)	halk ‘quiet’
	bor-ok ‘wine’ (pl.)	park ‘id.’
	tan-ok ‘tenet’ (pl.)	tank ‘id.’
	kér-ed ‘ask’ (2sg pres. def.)	térd ‘knee’
	ostor-oz ‘whip’ (3sg pres. indef.)	borz ‘badger’
	csalán-os ‘nettle’ (adj.)	gáláns ‘gallant’

As there is no phonotactic interaction between the consonants flanking the unstable vowel, it is reasonable to assume that the mechanism responsible for the vowel~zero alternation here is not epenthesis.

Type B. The vowel~zero alternation in Type B suffixes is phonotactically motivated. The accusative (-$V_u t$) is the suffix that unquestionably belongs here. In this suffix the unstable vowel is phonetically unrealized if the suffixal consonant can syllabify as (part of) a well-formed coda, i.e. no linking vowel appears after vowels (7a), and stem-final consonants with which *t* can form a branching coda (7b). Otherwise (7c), there is a vowel preceding the *t* at the surface:[15]

(7)

a.	b.	c.
holló-t ‘raven’	ón-t ‘tin’	nyom-ot ‘trace’
kocsi-t ‘cart’	lány-t ‘girl’	pad-ot ‘bench’
tevé-t ‘camel’	dal-t ‘song’	kép-et ‘picture’
kapu-t ‘gate’	sör-t ‘beer’	tök-öt ‘pumpkin’‘
fő-t ‘head’‘	baj-t ‘trouble’	hegy-et ‘hill’
tű-t ‘needle’	rés-t ‘gap’	ív-et ‘arc’
anyá-t ‘mother’	kosz-t ‘dirt’	zsiráf-ot ‘giraffe’
sí-t ‘ski’	gőz-t ‘steam’	doh-ot ‘must’
menü-t ‘menu’	varázs-t ‘magic’	rab-ot ‘prisoner’

Interestingly, a linking vowel is present after an ‘epenthetic’ stem even if the final consonant

[15] In some marked cases the *-t* can also syllabify as an appendix, cf. section 3.2.4.3.

can form a licit coda with the following *t*—compare (8a) and (8b).

(8)

	a. **non-epenthetic stems**	b. **'epenthetic' stems**
	ón-t	haszn-ot 'profit'
	lány-t	torny-ot 'tower'
	dal-t	öbl-öt 'bay'
	sör-t	ökr-öt 'ox'
	baj-t	bagly-ot 'owl'
	rés-t	–
	kosz-t	bajsz-ot 'moustache'
	gőz-t	–
	varázs-t	–

Some of the words in (8b) have alternative forms without the linking vowel, in which case the stem internal unstable vowel is phonetically expressed, e.g. *bajusz-t/bajsz-ot, öböl-t/öbl-öt.* The conditions on this variation are idiosyncratic and often unclear (some stems do not show any variation, others only with certain suffixes and not with others; there is variation across speakers, etc).[16]

Disregarding the few exceptional cases discussed in 3.2.4.3, regularly, the accusative attaches to stems that end in a consonant cluster with a linking vowel (e.g. *rajz-ot* 'drawing' acc.). This follows from the fact that coda in Hungarian is maximally binary branching. It has to be pointed out, however, that stem-final geminates are peculiar in that some of them behave as if they were single consonants: there is no linking vowel after the stem-final geminates /ss, šš, zz, nn, $n^y n^y$, ll, rr, jj/, i.e. those geminates whose short counterparts can form a licit coda with /t/ (e.g. *idill-t* [idilt] 'idyll' (acc.), finn-t [fint] 'Finnish,' (acc.), plüss-t [plüšt] 'plush' (acc.), dzsessz-t [ǰɛst] 'jazz' (acc.)).[17]

[16]Type A suffixes typically do not cause this kind of variation in 'epenthetic' stems. The unstable vowel of the stem is not realized before such a suffix: *bagly-ok* 'owls' and not **bagoly-ok*.

[17]The geminates later degeminate by post-lexical degemination (cf. Siptár & Törkenczy 2000).

Note that, although geminates are well-formed branching codas, there is a linking vowel present when the accusative is added to a *t*-final stem: *bot-ot* 'stick' (acc.)*, rét-et* 'meadow' (acc.)*, öt-öt* 'five' (acc.)*,* and not **bot-t, *öt-t, *rét-t.*

The past tense suffix also belongs to Type B in that the realization of its unstable vowel is also phonotactically motivated, but in some respects it behaves differently from the accusative. The differences are as follows:

(a) Its consonantal part is realized as geminate *-tt* when it is not adjacent to another consonant (regardless whether the preceding vowel is part of the stem[18] or if it is an unstable vowel that appears at the surface: *lő-tt* 'shoot' (3sg past indef)*, dob-ott* 'throw' (3sg past indef). This is usually explained as a result of the difference between the representation of the accusative and the past suffix (e.g. Vago 1980a).

(b) The conditions on when the unstable vowel appears at the surface after consonant-final stems are somewhat different: it can only be unexpressed if the stem-final consonant and *-t* can form a licit branching coda *whose first term is a sonorant.* Thus, as opposed to the accusative (9a), only a subset of the possible complex codas are available for syllabification for the past tense suffix (9b):

(9)	a. **accusative**	b. **past**	
	ón-t	ken-t 'smear'	
	lány-t	hány-t 'vomit'	
	dal-t	él-t 'live'	
	sör-t	vár-t 'wait'	
	baj-t	fúj-t 'blow'	
	rés-t		kés-ett 'be late'
	kosz-t		csempész-ett 'smuggle'
	gőz-t		főz-ött 'cook'
	varázs-t		–

[18]Note that 'v-adding' stems behave differently before the accusative and the past tense suffix. The final *v* of these stems does not appear before the past tense suffix (e.g. *lő-tt* 'shoot' (3sg past indef)*, fő-tt* 'cook' (3sg past)*, rí -tt* 'cry' (3sg past)), but it does before the accusative (e.g. *lov-at* 'horse' (acc.)*, köv-et* 'stone' (acc.)). Cf. section 8.2.1 on 'v-adding' stems.

This additional restriction can be seen as an idiosyncratic property of the past tense suffix which is not related to the phonological mechanism governing the behaviour of the unstable vowel in Type B suffixes cf section 3.4.3.[19]

(c) The suffix-initial vowel~zero alternation of the past tense morpheme is not only sensitive to the phonological material that precedes the suffix, but also to that which follows it: there is no linking vowel at the surface if the suffix is followed by a vowel(-initial suffix).[20]

(10)		**3sg past indef.**	**3sg past def.**
	nyom 'push'	nyom-ott	nyom-t-a
	rak 'put'	rak-ott	rak-t-a
	vés 'chisel'	vés-ett	vés-t-e

The linking vowel is *sometimes* present after cluster-final stems even if a vowel-initial suffix follows the past suffix. Three types of behaviour may be distinguished: (i) after some CC-final stems the linking vowel is optional (11a); (ii) after others it is compulsory (11b); and some CC-final stems do not permit a linking vowel in this environment (11c):

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[19]Another idiosyncratic property of the past tense suffix is that no linking vowel appears after two irregular (bound) verb stems: *feküd-* 'lie' and *alud-* 'sleep' (*feküd-t* '3sg past', *alud-t* '3sg past') and after verbs that belong to a class of stems ending in *ad/ed*: e.g. *szalad-t* 'run' (3sg past), *marad-t* 'remain' (3sg past), *mered-t* 'stand out' (3sg past), *reped-t* 'burst' (3sg past). These are pronounced with final geminate [tt] as a result of Voicing Assimilation, cf. section Siptár & Törkenczy (2000). Note that some verbs ending in *ad/ed* do not belong to this class: e.g. *ad-ott* 'give' (3sg past), *fed-ett* 'cover' (3sg past), *fogad-ott* 'receive' (3sg past), *szenved-ett* 'suffer' (3sg past), *tagad-ott* 'deny' (3sg past). Essentially, the linking vowel does not appear if the final *ad/ed* string can be regarded as a suffix (cf. Rebrus 2000*a,* compare Rebrus & Trón in print).

[20]It is not possible to test whether this behaviour of the past tense suffix is really different from that of the accusative since the latter may not be followed by another suffix.

(11)		**3sg past indef**	**3pl past indef**	
a.	fing ‘fart’	fing-ott	fing-ott-ak / fing-t-ak	
	mond ‘say’	mond-ott	mond-ott-ak / mond-t-ak	
	told ‘lengthen’	told-ott	told-ott-ak / told-t-ak	
b.	fest ‘paint’	fest-ett	fest-ett-ek	*fest-t-ek
	látsz-ik ‘seem’	látsz-ott	látsz-ott-ak	*látsz-t-ak
	csukl-ik ‘hiccup’	csukl-ott	csukl-ott-ak	*csukl-t-ak
	old ‘solve’	old-ott	old-ott-ak	*old-t-ak
c.	küld ‘send’	küld-ött	küld-t-ek	*küld-ött-ek
	kezd ‘begin’	kezd-ett	kezd-t-ek	*kezd-ett-ek
	fedd ‘scold’	fedd-ett	fedd-t-ek	*fedd-ett-ek

The phonological shape of a given verb stem only partly determines its behaviour. The linking vowel must be present after the stem-final cluster if it ends in a *t* (e.g. *fes**t**-ett-ek*) or if it is not a possible branching coda (e.g. *csu**kl**-ott-ak*). Otherwise, it is phonologically unpredictable whether a linking vowel is compulsory, optional, or disallowed after a given CC-final verb stem in this environment. Indeed, after some stem-final clusters (e.g. /ld/), all three kinds of behaviour are attested, i.e. some stems have both forms (*áld-t-ak/áld-ott-ak* ‘bless’ (3pl past indef.)) while others have only one, either with or without the linking vowel (*küld-t-ek/*küld-ött-ek* ‘send’ (3pl past indef.) vs. **száguld-t-ak/száguld-ott-ak* ‘speed’ (3pl past indef.)). This suggests that *phonotactically* the strings VC1C2VttV and VC1C2tV are both well-formed provided that C2 ≠ /t/ and C1C2 is a well-formed coda. Individual CC-final stems that end in a well-formed coda[21] whose second term is not /t/ must bear an arbitrary lexical mark as to

[21] Verb stems may end in clusters that are not well-formed codas. With one exception (*metsz* ‘etch’ (3sg pres indef)) they are bound stems. These stems are defective (cf. section 4.1.1) and typically belong to the *-ik* class of verbs that have the suffix *-ik* in present indefinite 3rd person singular instead of zero (cf. Károly 1957, Hetzron 1975, Törkenczy 2000*b*, 2001*b*, 2002*ab*, Rebrus and Törkenczy 1999). Examples include *bű**zl**-ik* ‘stink’, *ve**dl**-ik* ‘slough’, *ára**ml**-ik* ‘flow’, *vona**gl**-ik* ‘writhe’, *ha**bz**-ik* ‘foam’, já**tsz**-ik ‘play’, etc. (It must be pointed out that not all *-ik* verbs end in clusters that are ill-formed as a coda, e.g. *álmo**d**-ik* ‘dream’, *hu**ll**-ik* ‘fall’,

which string they require or whether they permit both.

The past participle *-Vtt/-t* behaves similarly to the past tense suffix as the conditions on the appearance of the unstable vowel are usually the same: *köt-ött* 'bind', *megtér-t* 'convert' (3sg past indef or past participle), *köt-ött-ek, megtér-t-ek* (3pl past indef or past participle+ pl). Compare Ő *megtért* '(S)he converted' and Ő *megtért ember* '(S)he is a converted person'. Note, however, that the past participle is sometimes irregular in that the linking vowel shows up unexpectedly even if the conditions for its non-occurrence are met: e.g. *ír-ott* 'written' vs. *ír-t* 'write' (3sg past indef), *ad-ott-ak* 'give' (past participle+ pl) vs. *ad-t-ak* 'give' (3pl past indef). This behaviour is phonologically unpredictable and is a lexical property of the stem.

There are suffixes in Hungarian whose initial unstable vowel is followed by a consonant cluster (e.g. associative *-ostul/-estül/-östül*, distributive *-onként/-enként/-önként*, distributive-temporal *-onta/-ente/-önte*, diminutive *-ocska/-ecske/-öcske*, and *-osdi/-esdi/-ösdi* [-oždi/-ɛždi/-öždi] 'game of/about'). They behave like Type A suffixes with respect to vowel~zero alternation, i.e. they attach to all consonant-final stems with a linking vowel (e.g. *dob-ostul* 'together with the drum', *fej-enként* 'per head', *nap-onta* 'every day', *tök-öcske* 'little pumpkin', *indián-osdi* 'game in which children play (American) Indians'), but have no linking vowel after vowel-final stems (e.g. *kutyá-stul* 'together with the dog', *falu-nként* 'village by village', *falu-cska* 'little village', *katoná-sdi* 'game in which children play soldiers'). Note, however, that since internal and final CCC clusters are ill-formed[22], the alternation may equally be seen as phonotactically motivated, in which case they may be regarded as Type B suffixes.

Since in the case of Type B suffixes there *is* phonotactic interaction between the stem-final consonant and the suffixal one, the mechanism underlying the vowel~zero alternation and/or the representation of these suffixes must be different from that of Type A

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*csikla**nd**-ik* 'tickle', etc.) There are two defective stems that are not *-ik* verbs (both are used in the definite conjugation only): *kétl-* 'doubt' and *sínyl-* 'suffer'; e.g. *kétl-em* (1sg pres def), *sínyl-i* (3sg pres def). Special thanks are due to Attila Novák and Nóra Wenszky for these two elusive items.

[22]Except some final CCC clusters whose final consonant is syllabified into the appendix (cf. section 3.2.4.3.) and also CCC clusters in general that are divided by an analytic morphological domain boundary (cf. section 3.2.2.). On internal CCC clusters created by the past suffix cf. section 4.1.4.4.

suffixes.

Disregarding the special case of lowering (to be discussed in section 4.1.3 below), in suffix-initial vowel~zero alternation, the quality of the unstable vowel is identical to that involved in stem internal vowel~zero alternation. There is a single suffix the height of whose unstable vowel is irregularly high instead of mid: possessive 1pl *-unk/-ünk* (e.g. *bot-**unk*** 'our stick' vs. *fá-**nk*** 'our tree').

4.1.3. Lowering

We have seen above that the quality of the unstable vowel is regularly mid both stem-internally and suffix-initially. In the latter case, however, the linking vowel is sometimes low instead of mid (compare lowered *ház-**ak*** 'house' (pl.) with unlowered *gáz-**ok*** 'gas' (pl.)). We shall refer to this phenomenon as the lowering of unstable vowels. The back alternant of a lowered linking vowel is low *a* [ɔ] instead of *o* [o]. The front alternant is low [ɛ] whose lowness is not the result of phonetic implementation (which interprets mid *e* as low as well, cf. Siptár & Törkenczy 2000), but is due to lowering. Since lowering makes the linking vowel low, rounding harmony cannot apply to it because Hungarian has no low front rounded vowels (compare lowered *szüz-**ek*** 'virgin' (pl.) with unlowered *bűz-**ök*** 'smell' (pl.)). Therefore, the lowered linking vowel only shows the binary alternation *a/e* instead of the usual unlowered ternary one *o/e/ö* (cf. Siptár & Törkenczy 2000). In ECH the lowering effect on the quality of the linking vowel can be detected after stems whose last nucleus is back or antiharmonic (e.g. *ház-**ak***, *hid-**ak*** 'bridge' (pl.)) and after stems whose last nucleus is a front rounded vowel (e.g. *szüz-**ek**, tőgy-**ek*** 'udder' (pl.)). After a (non-antiharmonic) stem whose last nucleus is a front unrounded vowel, this lowering effect can only be detected in dialects that retain the distinction between mid [e] and low [ɛ] at the surface; compare *kép-et* [keːpɛt] 'picture' (acc.) and *gyep-et* [dʸepet] 'lawn' (acc.). This distinction is lost in ECH. The lowered and the unlowered front unrounded linking vowel are equally realized as [ɛ]: [keːpɛt, dʸɛpɛt]. Thus, vowel quality is not a clue for lowering after these stems. There is, however, a lowering effect that is (partially) independent of vowel quality. After stems that cause lowering (henceforward 'lowering stems'), Type B suffixes occur with a (lowered) linking vowel even if the stem ends in a consonant that they can normally attach to *without* a linking vowel. Thus, the following generalization seems to hold:[23]

(12) Lowering requires a phonetically expressed unstable vowel.

This is shown with the accusative in (13):[24]

(13)	**normal stem**	**lowering stem**
	ón-t	tehen-et 'cow'
	lány-t	hány-at 'how many'
	dal-t	hal-at 'fish'
	sör-t	ár-at 'price'
	baj-t	haj-at 'hair'
	rés-t	has-at 'stomach'
	kosz-t	mesz-et 'lime'
	gőz-t	méz-et 'honey'
	varázs-t	darazs-at 'wasp'

Note that this lowering effect makes it possible to detect lowering even when the quality of the linking vowel is not a clue, i.e. in ECH after stems whose last nucleus is a front unrounded vowel, e.g. *mesz-et, méz-et*, provided they also end a consonant that could form a licit branching coda with a following *t*.

Normally, both Type A and Type B suffixes attach to vowel-final stems without a linking vowel. Given (12), however, a linking vowel is expected to occur after vowel-final lowering stems as well. (14) shows the behaviour of the plural and the modal (both Type B)

[23]There are a few irregular stems that *are* lowering, but nevertheless, the accusative attaches to them without a phonetically expressed unstable vowel, e.g. *báj* 'charm' *(báj-**ak*** 'pl', *bá**j-t*** (acc.)*), szakáll* 'beard' *(szakáll-**ak*** (pl.)*, szakáll-(a)t* (acc.)*), (hegy)oldal* '(hill)side' *((hegy)oldal-**ak*** (pl.)*, (hegy)olda**l-t*** (acc.)*)*. For a complete list cf. Papp (1975).

[24]The past morpheme does not show this effect. This, however, is due to the fact that there happen to be no lowering verb stems.

after vowel-final lowering stems:[25]

(14)	**plural**	**modal**
	városi-ak	sátáni-an
	pesti-ek	emberi-en
	szomorú-ak	szomorú-an
	keserű-ek	keserű-en
	bántó-(a)k	bántó-(a)n
	sértő-(e)k	sértő-(e)n

As can be seen, the generalization expressed in (12) holds for the items in (14). The only special property of vowel-final lowering stems is that the linking vowel of the plural and the modal suffix is optional after mid vowels. Note that there is no linking vowel if the stem-final vowel is *e, a, é, á*: *fekete* 'black'*: feketé-k, feketé-n; durva* 'rough'*: durvá-k, durvá-n; ordenáré* 'vulgar'*: ordenáré-k, ordenáré-n; burzsoá* 'bourgeois'*: burzsoá-k, burzsoá-n.*[26] Arguably, this is independent of lowering because the lack of a low linking vowel here can be viewed as an OCP effect. Given the representations of the relevant vowels (cf. Appendix A), forms like **feketé-ek* or **durvá-ak* would be OCP violations. Thus, one could suggest that, with some idiosyncratic variation, generally, (12) also holds for vowel-final stems unless another constraint (such as the OCP) is violated.

However, the behaviour of some other suffixes with initial unstable vowels (such as the accusative and the superessive) appears to be different in that they attach to the same stems without a linking vowel:

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[25]Glosses: *városi* 'urban'*, pesti* 'Budapest$_{adj}$'*, sátáni* 'satanic'*, emberi* 'human'*, szomorú* 'sad'*, keserű* 'bitter'*, bántó* 'annoying'*, sértő* 'insulting'

[26]The length of the stem final vowels in forms like *feketé-k, durvá-k* etc. is due to Low Vowel Lengthening (cf. Siptár & Törkenczy 2000).

(15)	**accusative**	**superessive**
	városi-t	városi-n
	pesti-t	pesti-n
	sátáni-t	sátáni-n
	emberi-t	emberi-n
	szomorú-t	szomorú-n
	keserű-t	keserű-n
	bántó-t	bántó-n
	sértő-t	sértő-n

One may try to salvage (12) as a general statement in the following way. The stems in (14) are all adjectives. If we assume that (in contrast to the plural and the modal) case endings can only attach to nouns, then the stems in (15) must be nominal stems since the superessive and the accusative are case endings. Most adjectives are lowering, but only some nouns are, and usually a noun stem corresponding to a lowering adjectival stem is non-lowering.[27] Compare, for instance, *vörös-ek* 'red' (pl.) and *vörös-ök* 'communist' (pl.), *komikus-ak* 'comical' (pl.) and *komikus-ok* 'comedian' (pl.), *szárnyas-ak* 'winged' (pl.) and *szárnyas-ok* 'poultry' (pl.), etc. One could claim then that the stems in (15) are simply non-lowering nouns that have corresponding adjectives that are lowering. Given this assumption, their behaviour in (15) conforms to (12).[28]

Unfortunately, however, the argument above is untenable. (i) There is evidence that case endings *can* attach to adjectives since they can follow (overt) adjective-forming derivational suffixes: e.g. *só-s-at* 'salty', (acc.) (where *-s* is a denominal-adjective forming derivational suffix).[29] (ii) The initial unstable vowel of some suffixes is unexpressed even after

[27]It has to be pointed out that adjectives are not turned into nouns by zero derivation, but some adjectives have lexicalized nominal counterparts. Thus, not every adjective has a corresponding (homophonous) noun.

[28]This line of reasoning has been pointed out to me by Péter Rebrus (personal communication).

[29]Note that it is not possible to analyse *sósat* as *só-s-⌀-at* (where *-⌀* is a deadjectival noun-forming derivational suffix) because derivational suffixes are non-lowering unless they are

vowel-final stems that are unquestionably adjectives (and lowering). Consider the comparative suffix -V_u*bb*, which is a Type A suffix just like the plural (e.g. *piros-abb*), and can only attach to adjectives, but whose unstable vowel never appears phonetically after lowering (or non-lowering) vowel-final stems (compare *szomorú-bb, keserű-bb*, **szomorú-abb, *keserű-ebb* with *szomorú-ak, keserű-ek*, **szomorú-k, *keserű-k*).

To sum up, (12) must be restricted to consonant-final stems:

(16) Lowering requires a phonetically expressed unstable vowel.
Condition: V_u is preceded by a C

After vowel-final lowering stems, suffixes with an unstable initial vowel behave idiosyncratically. Some suffixes attach to these stems with a (lowered) linking vowel, others without a linking vowel. As it is unpredictable which suffix will behave in which way, lexical marking must be involved. It must be pointed out, though, that the behaviour of linking vowels after vowel-final stems is not completely unrelated to lowering since —although the linking vowel does not always appear after a vowel-final lowering stem —*if* a linking vowel does appear after a vowel-final stem, it is always a lowered one (i.e. there is never a linking vowel after a vowel-final non-lowering stem).

Nominal vowel-final stems are non-lowering in general. The only exceptions are *férfi* 'man' and *-fi* '-man' (as in e.g. *hadfi* 'warrior'): *férfi-ak* 'man' (pl.) in which the linking vowel is present (compare *férfi-t* (acc.)).

According to its source, two types of lowering may be distinguished (cf. Rebrus and Polgárdi 1997):

(a) The source may be the preceding stem, i.e. after stems belonging to an arbitrary (closed) class (that of 'lowering stems', cf. Vago 1980a) the immediately following linking vowel is low. Data in (17) show that it is indeed the stem that is the source of lowering in this case, since the linking vowel of one and the same initial suffix shows up as mid after non-

adjective-forming (see the discussion at the end of this section).

lowering stems and as low after lowering ones:[30]

(17)

			plural	accusative	gloss
a.	**normal stems**	bot	bot-ok	bot-ot	'stick'
		gyep	gyep-ek	gyep-et	'lawn'
		köd	köd-ök	köd-öt	'fog'
b.	**lowering stems**	fog	fog-ak	fog-at	'tooth'
		kép	kép-ek	kép-et	'picture'[31]
		szög	szög-ek	szög-et	'nail'

Some suffixes cause lowering as well, i. e. there are suffixes that turn any stem into a lowering one: *gáz-ok-**at*** 'gas-pl-acc', *bűn-öm-**et*** 'sin-my-acc'. Compare *hat-od-**ot*** 'sixth' (acc.) where the fraction forming suffix *-od/-ed/-öd* does not cause lowering. We shall return to the problem of multiple suffixation and lowering below.

(b) Some suffixes appear to be 'self-lowering' in that the source of the lowering of the suffix-initial unstable vowel is the suffix itself. The suffixes involved are *-sz/-asz/-esz* (2sg pres. indef.), *-ni/-ani/-eni* (inf.) and *-lak/-lek/-alak/-elek* (1sg^{s} 2sg/pl^{o}), *-nak/-nek/-anak/-enek* (3pl pres. indef.), and *-na/-ne/-ana/-ene* (cond.). The initial linking vowel of these suffixes is low even after stems that are demonstrably non-lowering. This is shown in (18) where the non-self-lowering suffix *-k/-ok/-ek/-ök* (1sg pres. indef.) is included to show the contrast with their behaviour:

[30]The linking vowel of the superessive behaves differently: it remains mid (and displays a ternary alternation) even after lowering stems: *ház-on* 'house' (spr.), *méz-en* 'honey' (spr.), *szűz-ön* 'virgin' (spr.).

[31]Here, the lowering effect can only be detected in dialects that retain the distinction between mid [e] and low [ɛ].

(18)	**2sg pres indef**	**infinitive**	**1sg^{s} 2sg/pl^{o} pres**	**(1sg pres indef)**
mond ‘say’	mond-(a)sz	mond-ani	mond-(a)lak	(mond-ok)
sért ‘hurt’	sért-esz	sért-eni	sért-(e)lek	(sért-ek)
küld ‘send’	küld-esz	küld-eni	küld-(e)lek	(küld-ök)

In general, the initial unstable vowel of these suffixes appears if the stem ends in more than one consonant.[32] Note, however, that they often behave idiosyncratically. In some forms the linking vowel is (unexpectedly) optional (e.g. *mond-(a)sz* vs. *sért-esz*). After some stems ending in a geminate, the linking vowel does not appear (e.g. *áll-ni* ‘to stand’ vs. *hall-ani* ‘to hear’). On the other hand, it does appear after some stems that end in a long vowel followed by a single consonant (*bocsát-ani* ‘to forgive’ vs. *lát-ni* ‘to see’). We argued in section 3.2.4.3 that—despite the phonological conditioning—the selection of the allomorphs of 2sg pres indef *-sz* is morphological rather than phonological. Similarly, we suggest that it is allomorphy that is involved in what appears to be low vowel~zero alternation in ‘self lowering’ suffixes. Considering the selection morphological has significant advantages. It makes it possible to maintain the generalization in (16) and this way phonological lowering will always have a local source: the preceding (relative or absolute) stem. Also, if the alternation is morphological, idiosyncrasies of the kind described above are more likely to occur.

Since ‘self-lowering’ is non-phonological, phonological lowering always spreads from the stem. Lowering can only influence the linking vowel *immediately* following the lowering stem. Consider *nyolc-ad-ot* ‘eighth’ (acc.) where *nyolc* is a lowering stem, but the accusative surfaces with an unlowered vowel (*-**o**t*). As we have pointed out above, the source of lowering may be the relative stem, i.e. some suffixes may be lowering, and can turn a non-lowering stem into a lowering one. While lowering is a lexical property of (nominal) stems,[33] it is not (completely) unpredictable which suffix is lowering and which one is not. The claim

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[32]These suffixes (and *-tok/-tek/-tök/-otok/-etek/-ötök* (2pl pres. indef.) which behaves in the same way with respect to vowel~zero alternation, but is not self-lowering) have been analysed to form a separate class intermediate between analytic and synthetic (quasi-analytic suffixes). The special behaviour of these suffixes is considered idiosyncratic (non-phonological allomorphy) in the present analysis. For a different approach cf. Rebrus & Törkenczy (1999), Rebrus (2000*b*), Törkenczy (1998*b*), Törkenczy & Siptár (1999*a*).

[33]See, however, the part-of-speech distribution of lowering to be discussed below.

in Vago (1980a) that lowering is positionally predictable, i.e. that the unstable vowel of first position suffixes (relative to the absolute stem) may or may not lower (depending on whether the absolute stem is lowering or not), but it is always low later (i.e. when not immediately adjacent to the stem[34]) can be shown to be incorrect: for instance, the unstable vowel of the accusative does not lower after the fraction forming suffix: *hat-od-**ot*** 'sixth' (acc.), see Kornai (1990). According to Rebrus and Polgárdi (1997) derivational suffixes are non-lowering and inflectional ones are lowering. They point out contrasting pairs of examples like *un-tat-**om*** 'make sb bored' (1sg pres) and *un-t-**am*** 'be bored' (1sg past). In the former word, the causative derivational suffix (*-tat*) does not make the unstable vowel of the personal suffix low, but in the latter, the inflectional past tense suffix does. While it is true that inflectional suffixes are all lowering,[35] the correlation between lowering and derivational suffixes is more complicated. Superficially, it seems that Rebrus and Polgárdi's claim does not hold for all derivational suffixes: they may be lowering or non-lowering—compare *só-s-**ak*** 'salty' (pl.) (where *-s* is a denominal adjective forming derivational suffix) and *harc-os-**ok*** 'warrior' (pl.) (where *-Vs* is a noun-forming derivational suffix). This, however, is due to a factor independent of the inflectional/derivational character of suffixes. It can be explained with reference to the part-of-speech distribution of lowering. Note that the derivational suffix above that appears to be lowering is adjective-forming. In fact, all the derivational suffixes that lower are adjective-forming as well (e.g. *tanul-ékony-**ak*** 'teachable' (pl.), *ír-ott-**at*** 'written' (acc.)).[36] As adjectives are generally lowering,[37] we claim that these suffixes lower *because* they are adjective-forming. The distribution of lowering items in other word classes is the following. Nouns and pronouns include a large (but closed) set of lowering stems. It is unpredictable which nominal stems are lowering so they must be marked as such in the lexicon. New items

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[34]This amounts to the claim that all suffixes are lowering.

[35]The lowering effect of inflectional suffixes that are never followed by another suffix (e.g. case endings) never actually manifests itself, but we assume that they are lowering as well.

[36]The privative suffix *-(V)tlan/-(V)tlen/-talan/-telen* and *-van/-ven* '-ty' are exceptional. The former is adjective forming, but does not lower: e.g. *tanul-atlan-**ok*** 'uneducated' (pl.), and the latter is derivational, not adjective forming, but does lower: e.g. *nyolc-van-**at*** 'eighty' (acc.).

[37]There are a few (irregular) exceptions, e.g. *nagy-ok* 'big' (pl.), *agg-ok* 'old' (pl.).

entering the language are invariably of the unmarked, non-lowering type (e.g. *szponzor-ok* 'sponsors', *kűr-ök* 'free exercises [in figure skating]'). Absolute verb stems are never lowering. The attested distribution of lowering in stems and suffixes follows if we assume that they are non-lowering by default, but some are marked as lowering individually/idiosyncratically, while others are assigned lowering status by two morphological redundancy rules:

(19) a. Inflectional suffixes are lowering.
b. Adjectives are lowering.

In addition, stems that belong to certain (more-or-less irregular) morphological classes are always lowering. For instance nominal 'v-adding' stems and 'shortening' stems all lower: e.g. *ló* 'horse' *lov-at* 'horse' (acc.), *madár* 'bird' *madar-at* 'bird' (acc.).[38] Thus, (19) may be extended with rules referring to specific morphological classes. To sum up, lowering is partly predictable on a morphological basis.

Trón & Rebrus (2001) argue that there is a correlation between the complexity or 'markedness' of stem-final clusters and the lowering character of (noun) stems. They claim that 'the more marked a certain cluster is, the more likely it is that it is lowering' (p. 25). While this seems to be true in some cases (e.g. all noun stems that end in /rj/ (which is definitely marked since it monomorphemically violates Sonority Sequencing) lower: *fürj-**et*** 'quail' (acc.), *sarj-**at*** 'descendant' (acc.)), it is far from being exceptionless[39] and would require a rather delicate (arbitrary?) ranking of constraints into a markedness or complexity scale to make it work. Stem-final /kt/ (*akt-**ot*** 'nude' (acc.)) /tˢk/ (*barack-**ot*** 'peach' (acc.), *palack-**ot*** 'bottle' (acc.), *tarack-**ot*** 'howitzer' (acc.)), /pf/ (*copf-**ot*** 'plait' (acc.)), /pš/ (*taps-**ot*** 'applause' (acc.)) do not lower —although, presumably, they are complex/marked clusters. /dv/

[38]Note that 'epenthetic' stems are not involved in such an implicational relationship. They may be lowering or non-lowering: compare *marok* 'fist' *mark-om* 'my fist' with *farok* 'tail' *fark-am* 'my tail'.

[39]Note that this is not necessarily a problem for Trón & Rebrus (2001) since their approach does not work with black-and-white constraints, see also Rebrus & Trón (2002).

—also a marked cluster—sometimes lowers (*kedv*-***et*** ‘mood’ (acc.), *nedv*-***et*** ‘fluid’ (acc.)),[40] sometimes does not (*üdv*-***öt*** ‘salvation’ (acc.)). The same is true of /ld/—presumably a non-complex/less marked cluster: *hold*-***at*** ‘moon’ (acc.), *föld*-***et*** ‘ground’ (acc.), but *zsold*-***ot*** ‘soldier’s pay’ (acc.). Finally, *all* monomorphemic CCC clusters, which are certainly marked in Hungarian, are non-lowering: /mps/ *mumpsz*-***ot*** ‘mumps’ (acc.), /nst/ *dunszt*-***ot*** ‘steam’ (acc.), /rst/ *karszt*-***ot*** ‘karst’ (acc.), /šč/ *borscs*-***ot*** < Russian soup> (acc.).[41]

Only an unstable vowel may be the target of lowering. Stable suffix initial vowels never lower. As pointed out above, the superessive suffix is special because it is unstable, but it does not lower. The three types of suffixes are illustrated in (20). The plural is lowerable and unstable, the causal-final is non-lowerable and stable and the superessive is non-lowerable and unstable:[42]

(20)	**plural**	**causal-final**	**superessive**	**gloss**
normal stem	fá-k	fá-ért	fá-n	‘tree’
	gáz-ok	gáz-ért	gáz-on	‘gas’
lowering stem	ház-ak	ház-ért	ház-on	‘house’

[40]This is undetectable (or, equivalently, they are non-lowering) in ECH.

[41]This is certainly related to the fact that all these words are recent loans and lowering stems are a closed class.

[42]The fourth type does not exist: there are no suffixes with an initial lowerable stable vowel.

4.1.4. Analysis

4.1.4.1. Syllabification—full vowels and defective vowels

Hungarian vowel~zero alternation is partly due to an underlying difference between *full vowels* *(V_f)* and *defective vowels (V_d)*. Defective vowels are empty in the sense that they only consist of a skeletal slot without any segmental melody.[43] By contrast, full vowels *minimally* have a VOCALIC node (and a ROOT node). This is shown in (21) below (where non-essential structure between the ROOT and the VOCALIC node is suppressed and the symbol △ denotes a structure of any complexity, or nil):

(21) a. full vowel

```
   N
   |
   X
   |
  root
   |
 vocalic
   △
```

b. defective vowel

```
   N
   |
   X
```

Note that defective vowels (as opposed to full ones) will have to be marked underlyingly in some way to syllabify as nuclei since otherwise the syllabification algorithm will not be able to identify them as such. We simply assume that they are prelinked to nucleus nodes.

Defective vowels are not interpreted phonetically unless they receive a vocalic node (i.e. are turned into full vowels) in the course of the derivation. This default process only targets a *licensed* V_d, i.e. one that is incorporated into a syllable, and turns it into a minimally full vowel. Default V achieves this by assigning [+ $open_2$] to licensed defective vowels. Higher nodes (including the vocalic node and the root node) are automatically appended to ensure well-formedness (Sagey 1986, Clements and Hume 1995). This is shown in (22), where

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[43] On empty vowels see Anderson (1982), Spencer (1986), Kenstowicz and Rubach (1987), Kaye, Lowenstamm and Vergnaud (1990), Kaye (1990), Charette (1991).

irrelevant structure has been suppressed.[44]

(22) *Default V*

```
σ           σ
|           |
N     →     N
|           |
X           X
            |
          (root)
            |
         (vocalic)
            |
        [+ open2]
```

Vowel Harmony and the other default processes apply to the to the output of Default V to derive the correct surface vowel quality.

In accordance with standard assumptions about prosodic licensing, we assume that prosodically unlicensed material does not receive phonetic interpretation (cf. for instance Selkirk 1981, Itô 1986, 1989). Thus, unsyllabified defective vowels might persist up to the level of surface representation without being phonetically realized (i.e. they need not be stray-erased). Alternatively, they may be assumed to delete at some point in the derivation (possibly at the end of Block 1 or lexical phonology). Note that, if unsyllabified V_d-s persist in the postlexical phonology, then the locality conditions of postlexical processes (e.g. Degemination, Voicing Assimilation) have to be determined in such a way that they ignore defective vowels since in a string $C1V_dC2$, C1 and C2 should count as adjacent for assimilation. In section 4.1.4.5. below we argue that they are invisible in Block 2. We express this by sipulating that they are erased at the end of Block 1. This will also simplify the statement of postlexical phonological rules.

We also assume that defective vowels are restricted in occurrence compared to full ones. Notably, they can only occur in singly closed syllables. Thus, the following constraints

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[44]The parentheses enclosing the root node and the vocalic node in (22) indicate that these nodes have been automatically appended. In this figure encircling indicates that a node dominates no structure.

are added to the well-formedness conditions defining the Hungarian syllable template:

(23) a. $* V_d]_\sigma$ b. $* V_dCC]_\sigma$

Disregarding non-essential structure, full vowels minimally have a vocalic node. Minimally full vowels receive place and aperture values by vowel harmony and default processes (in the way described in Siptár & Törkenczy 2000, Siptár 2002)

In addition to the lexical difference between full and defective vowels, vowel~zero alternation is also due to syllabification. We follow Itô (1986, 1989) and assume that syllabification is a template-matching algorithm. Template matching is directional (left-to-right or right-to-left), maximal (i.e. the syllable template is filled up with segmental material maximally) and is constrained by the Onset Principle (i.e. onsetless syllables are avoided if possible). Syllabification and epenthesis are not separate processes in that syllabification can build degenerate syllables, i.e. syllables that contain nodes dominating empty X-slots. Thus, syllabification may overparse segmental material by inserting empty positions. However, we only allow overparsing by empty *nuclear* positions. (24) is intended as a language-specific restriction on syllabification in Hungarian:[45]

(24) Empty onset or coda positions may not be created in the course of syllabification.

Syllabification may be non-exhaustive (cf. Hyman 1990, Kenstowicz 1994). We assume that this can happen under the special condition given below:

(25) *Non-exhaustiveness*: Defective vowels may remain unparsed into syllables.

Thus, a representation is well-formed even if it contains unparsed defective vowels.

As a result of (24) and (25) syllabification will skip *lexical* empty nuclear positions (defective vowels) should it be impossible for them to syllabify in a singly closed syllable.

[45]Compare Itô's analysis of Axininca Campa (Itô 1989) where syllabification inserts empty onset positions as well.

This can happen word-finally, prevocalically, or before a single consonant followed by a full vowel:

(26) a. $\ldots CV_fCV_d\# \rightarrow \ldots\{CV_fC\}V_d\#$
b. $..V_fCV_dV_f \rightarrow ..V_fC\}V_d\{V_f\}$
c. $..V_fCV_dCV_f \rightarrow ..V_fC\}V_d\{CV_f\}$

As is shown in (26) (where the syllable edges are indicated by curly brackets) the empty nuclear positions in question remain unaffiliated syllabically. They are not 'rescued' by syllabification creating a coda position after them because this is excluded by (24).[46] Non-exhaustiveness together with the Onset Principle (cf. Itô 1989) ensures that $..V_fCV_dCV_f..$ strings syllabify as in (26c) rather than like this $*..V_f\}\{CV_dC\}\{V_f..$, i.e. since defective vowels may be left unparsed, it is more important to obey the Onset Principle than to parse a defective vowel.

An empty nuclear position created by syllabification is representationally identical with a lexically empty position. Both are defective vowels in the sense defined above and may be turned into full vowels by (22).

In Hungarian, syllabification proceeds from right to left and is continuous, i.e. it (re)applies after morphological and phonological operations. Resyllabification is permitted, i.e. prosodic structure is erased if the nucleus is deleted along with its X-slot (cf. Hayes 1989) and the coda of a stem-final syllable becomes available for (re)syllabification if a vowel-initial suffix is added (compare Levin 1985).[47]

In addition to prosodic structure, vowel~zero alternation is also sensitive to morphological structure. In section 2.2. a distinction was made between analytic and synthetic suffixation and it was pointed out that phonotactic constraints do not apply across the boundary of an analytic domain. The distinction between these two kinds of suffixes is crucial in the interpretation of vowel~zero alternation. We assume that both Type A and Type B suffixes are

[46]A constraint disallowing completely empty syllables (i.e. syllables that have a defective vowel and an empty onset and/or coda) would have the same effect as (24).

[47]Analytic suffixes behave differently, see the discussion below.

synthetic; the behaviour of analytic suffixes (e.g. *-ig, -ért, -d*, etc.) will be discussed in section 4.1.4.5.

4.1.4.2. Major stems and 'epenthetic' stems—Type A and Type B suffixes

In section 4.1 we saw that vowels can alternate with zero stem-internally, stem-finally and suffix-initially. Of these, stem-final vowel~zero alternation is phonologically irregular in that (i) only an arbitrary set of suffixes trigger it in all the stems to which they are attached (cf. section 4.1.2.1), and (ii) an arbitrary set of stems undergo it before an arbitrary set of suffixes (only some of which belong to the set referred to in (i), cf. section 4.1.2.1 Note 12). Therefore, we assume that stem-final vowel~zero alternation is essentially morphological and we shall disregard it in the analysis below.

The stems and suffixes showing regular (phonological) vowel~zero alternation have the following underlying representations. We claim that 'epenthetic' stems do not end in consonant clusters (C_iC_j) as is usually assumed (e.g. Vago 1980*a*, Jensen and Stong-Jensen 1988, 1989, Törkenczy 1994*a*, 1995), but contain a defective vowel in their final syllable that ends in a single consonant: -$C_iV_dC_j$# (compare Törkenczy 1992 and Ritter 1995).[48] Thus, the three-way distinction between the last syllables of the triplets described in section 4.1.1. is made representationally in the following way: -CV_dC (*torony* 'tower'), -CV_fC (*szurony* 'bayonet'), -CC (*szörny* 'monster'). Type A suffixes have an underlying initial full vowel (e.g. -V_fk 'pl') and Type B suffixes are underlyingly consonant-initial (e.g. *-t* 'acc').

Let us now examine the relationship between vowel~zero alternation and syllabification. Figure (27) shows how consonant-final non-lowering non-epenthetic stems (i.e. major stems) are syllabified when Type A suffixes (27a) and Type B suffixes are attached to them:[49]

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[48]Both these treatments are formulated in a Government Phonology framework.

[49]In the transcriptions the vowels denoted by phonetic characters and the symbol V_f are all full vowels. V_f is a *minimal* full vowel (i.e. one that at least has a VOCALIC node (and a ROOT node)). The real difference in syllabification is between all full vowels vs. V_d.

(27) a. ke:p-V_fk {ke:}{pV_fk} *képek* ‘picture’ (pl.)
bor-V_fk {bo}{rV_fk} *borok* ‘wine’ (pl.)

b. ke:p-t {ke:}{pV_dt} *képet* ‘picture’ (acc.)
bor-t {bort} *bort* ‘wine’ (acc.)

The syllabifications follow from the Hungarian syllable templates and right-to-left template matching and non-exhaustiveness. Type A suffixes are insensitive to the identity of the stem-final consonant because they are vowel-initial and thus they can always form a well-formed syllable with the stem-final consonant. Type B suffixes, on the other hand, are phonotactically sensitive to the stem-final consonant. The reason is that they are consonant-initial and unsyllabifiable in themselves: accusative *-t* syllabifies with the stem-final consonant just in case they can form a licit coda (*bo**rt***). Syllabification creates a degenerate syllable, i.e. a syllable with an empty nuclear position V_d if the cluster is not syllabifiable as the coda of the last syllable of the stem (*ké**pV_dt***). Thus, the vowel~zero alternation (‘epenthesis’ in this case) is due to syllabification.

The behaviour of Type A suffixes after vowel-final stems shows that, in addition to syllabification, there is a rule which is responsible for the vowel~zero alternations. This rule eliminates hiatus by (i) deleting a defective vowel when it is adjacent to a full one, and (ii) deleting a full vowel (together with its X-slot) when it follows another full vowel. It is necessary to delete the X-slot too, because simply deleting the segmental melody would only turn a full vowel into a defective one. This rule can be formulated as in (28ab) where V is the vocalic node.

(28) *Hiatus*

a.
$$\begin{array}{ccccc} \text{N} & & & \text{N} & \\ | & & & | & \\ \text{X} & \rightarrow \varnothing & \% & \text{X} & \text{(mirror image)} \\ & & & | & \\ & & & \text{V} & \end{array}$$

b.

$$\begin{array}{ccccc} N & & & & N \\ | & & & & | \\ X & \rightarrow & \varnothing & / & X\ \_ \end{array}$$

The rule is formulated in as general a form as possible. (28b) deletes the second one of any two adjacent nuclei. It is the elsewhere part of (28) and thus only applies if the more specific (28a) cannot. There are four possible ways in which a full vowel and a defective one may combine in hiatus: $\underline{V}_dV_f$, $V_f\underline{V}_d$, $V_f\underline{V}_f$ and $V_d\underline{V}_d$, where the underlined vowel is the one which is deleted by (28).[50] (28) shows derived environment effects (cf. Vago 1980a). It does not delete a postvocalic vowel in monomorphemic items, where hiatus is tolerated: e.g. [oa:zis] *oázis* 'oasis'.[51] Note that analytic vowel-initial suffixes retain their initial vowel: e.g. *kapu-ig* 'to the gate'. Their behaviour will be discussed later in this chapter. For obvious reasons, (28) does not apply to vowel-final stems suffixed by a Type B suffix. These suffixes simply syllabify with the stem-final vowel: kapu-t → {ka}{put} *kaput* 'gate' (acc.). Type A suffixes, on the other hand, lose their initial full vowel by (28) and then syllabify with the stem-final vowel: kapu-V_fk → {ka}{pu}{V_fk} → {ka}{puk} *kapuk* 'gate' (pl.). The deletion of defective vowels in hiatus will be discussed in detail below in section 4.1.4.3.

Multiple suffixation may create strings of Type A and Type B suffixes.[52] Type B suffixes do not combine with other Type B suffixes (*TB+ TB). All the other possible combinations of a Type A and a Type B suffix are attested: TA+ TA (*nagy-obb-ak* 'big' (comp.+ pl.)), TA+ TB (*kép-ek-et* 'picture' pl+ acc.) and TB+ TA (*kap-t-am* 'get' (past+ 1sg)). Figure (29) shows how the first two sequences syllabify when attached to major stems:[53]

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[50] Of the four combinations V_dV_d does not arise.

[51] On postlexical hiatus filling see Siptár & Törkenczy (2000).

[52] In the discussion of syllabification we shall first temporarily disregard the representation and the syllabification of lowering stems and suffixes for expository reasons. We shall deal with lowering in detail later in section 4.1.4.3. Due to the representation of lowering stems/suffixes some of the syllabifications that follow will have to be modified.

[53] We shall discuss the third type of suffix combination (TB+ TA) together with the past tense suffix later in section 4.1.4.4. The double consonant in (29) means a true geminate (i.e. two timing slots associated with a single root) and not adjacent identical melodies.

(29) TA+ TA nad^y-V$_f$bb-V$_f$k {na}{d^{y}V$_f$b}{bV$_f$k} *nagyobbak*

TA+ TB ke:p-V$_f$k-t {ke:}{pV$_f$}{kV$_d$t} *képeket*

The syllabification of these forms is straightforward. In the second example a degenerate syllable is created because /kt/ is not a possible (regular) coda.

In the examples discussed above empty nuclear positions (defective vowels) are created in the course of syllabification. We have also pointed out, however, that defective vowels are underlyingly present in ‘epenthetic’ stems. The vowel~zero alternation in epenthetic stems is not the result of overparsing by syllabification, but to the special constraints (23ab) on syllables whose nucleus is a defective vowel. Figure (30) shows how the words *szurony, szörny,* and *torony* syllabify in isolation (30a), when suffixed by Type A suffixes (30b) and Type B suffixes (30c):

(30)	a.	suron^y	{su}{ron^y}	*szurony*
		sörn^y	{sörn^y}	*szörny*
		torV$_d$n^y	{to}{rV$_d$n^y}	*torony*
	b.	suron^y-V$_f$k	{su}{ro}{n^{y}V$_f$k}	*szurony-ok*
		sörn^y-V$_f$k	{sör}{n^{y}V$_f$k}	*szörny-ek*
		torV$_d$n^y-V$_f$k	{tor}V$_d${n^{y}V$_f$k}	*torny-ok*
	c.	suron^y-t	{su}{ron^{y}t}	*szurony-t*
		sörn^y-t	{sör}{n^{y}V$_d$t}	*szörny-et*
		torV$_d$n^y-t	{tor}V$_d${n^{y}V$_d$t}	*torny-ot*

Szörny can syllabify as a CVCC syllable because the final consonant cluster can form a licit coda. There is no difference between the syllabification of *szurony* and *torony* in isolation because the defective vowel in the latter can syllabify in a singly closed syllable (30a). However, the same two stems do not syllabify in the same way when suffixed with a Type A suffix. As can be seen in (30b) the last vowel of *szurony* can syllabify as the nucleus of an open syllable in *szur**o**nyok* (since it is a full vowel). By contrast, the second vowel of *tor**o**ny* cannot syllabify in the suffixed form because (a) right-to-left template matching and the Onset Principle require the stem-final consonant to syllabify as an onset, and (b) the vowel preceding the stem-final consonant is a defective one and (23a) disallows V_d in open syllables. Thus, this vowel of the stem remains syllabically unaffiliated (it is skipped by syllabification). Therefore (22) does not apply to it, and consequently, it will not be interpreted phonetically and the form surfaces as [torn^{y}ok]. Consider (30c). The accusative, a Type B suffix, can syllabify as a coda in *szuronyt* because /n^{y}t/ is a well-formed coda. An empty nuclear position preceding it is created by syllabification when it is attached to *szörny* because codas are maximally binary branching. Syllabification will always create an empty nuclear position before a Type B suffix when it is added to an 'epenthetic' stem. If the 'epenthetic' stem ends in a consonant with which the suffixal consonant cannot form a licit coda, then the reason is the same as in the case of similar major stems (compare *retV*$_d$***k-et*** 'raddish' (acc.) and *é**nek-et*** 'song' (acc.)). Overparsing by syllabification occurs even if the 'epenthetic' stem ends in a consonant with which the suffixal consonant could form a licit coda because of (23b) since the stem-final consonant is preceded by a defective vowel (e.g. *bokV*$_d$***r-ot*** 'bush' (acc.), *torV*$_d$***ny**-ot*—compare *tábo**rt**,* 'camp' (acc.), *szuro**nyt***). The V_d of the stem cannot syllabify in a syllable doubly closed by the stem-final consonant and the suffixal consonant (*{to}{rV_dn^{y}t}), but it cannot syllabify in the syllable preceding the degenerate syllable created by syllabification either because that syllable would have to be open (*{to}{rV_d}{n^yV_dt}). So it remains unsyllabified and is not interpreted phonetically ({tor}V_d{n^yV_dt} *torny-ot*).[54]

The syllabification of multiply suffixed 'epenthetic' stems is unproblematic and follows from the mechanism discussed above:

[54]It is sometimes claimed (e.g. Vago 1980a, Törkenczy 1992) that alternative forms exist in the accusative if the last consonant of the 'epenthetic' stem can form a licit coda with the following *-t*: e.g. *öböl-t/öbl-öt* 'bay' (acc.). As pointed out in 4.1.2.2, this is not true of *all* 'epenthetic' stems: only *some* show this variation (cf. Papp 1975). We assume that for those that do, there are two entries in the lexicon: an 'epenthetic' one and a major one. Given this assumption, syllabification will yield the alternative forms: {ö}{b$V_f$lt} *öböl-t* vs. {öb}V_d{lV_dt} *öbl-öt*. The selection of one or the other entry is often idiosyncratic. Moreover, different suffixes may select different entries: *öböl-t/öbl-öt* 'bay' (acc.) vs. *öbl-ök* but **öböl-ök* 'bay' (pl.)

(31)	TA+ TA	ba:tV_dr-$V_f$bb-V_fk	{ba:t}V_d{rV_fb}{bV_fk}	*bátrabbak*
	TA+ TB	bokV_dr-V_fk-t	{bok}V_d{rV_f}{kV_dt}	*bokrokat*

4.1.4.3. Syllabification and lowering

We noted in section 4.1.3. above that Lowering (a) determines the quality of unstable suffix-initial vowels and (b) interacts with syllabification (cf. (16)). We also saw that the source of lowering in the representation of a stem or a suffix may be an unpredictable 'mark' or one which is morphologically predictable (cf. (19)). We claim that, representationally, this mark consists of two distinct (though always coocurring) characteristics. A lowering stem/suffix has a final *floating* [+ open$_1$] feature and a morpheme-final defective vowel V_d as shown in (32):

(32)

$$
\begin{array}{lll}
 & \mathrm{N} & \\
 & | & \\
\mathrm{X} & \mathrm{X} & \\
| & &]_{\mathrm{stem}} \\
\mathrm{root} & & \\
\triangle & & \\
 & [+\ \mathrm{open}_1] &
\end{array}
$$

Thus, specially marked nouns and pronouns, all adjectives, and all inflectional suffixes end in a structure shown in (32). This means that some of the representations discussed above have to be modified because they are, or they contain, such formatives. For instance, *szörny* must be represented as /sörn^yV_d/ instead of /sörn^y/ because it is an (unpredictably) lowering noun and *bor-t* must be /bortV_d/ and not /bort/ because the final suffix is inflectional and therefore lowering). Naturally, the syllabification of such forms is also different, but given our assumptions about the syllabification and the interpretation of defective vowels, these modified representations will not change the outcome of the derivations, i.e. the phonetically realized forms. In the two examples above, for instance, the final defective vowel does not syllabify because it cannot occur in an open syllable, so these forms are parsed as /{sörn^y}V_d/ and /{bort}V_d/, and thus the correct surface forms ([sörn^y] and [bort]) are derived. We shall discuss some more complex cases below.

We interpret lowering as a process that spreads the floating [+ $open_1$] feature locally to a (full or defective) vowel which is *licensed* (i.e. incorporated into a syllable) and is at the edge of a morpheme. Lowering applies regardless whether the licensed vowel is morpheme-initial or morpheme-final. The spreading process is local and non-iterative, i.e. it targets a single V. If the target is a full vowel, the floating feature can spread to its aperture node. In the case of defective target vowels, we assume that the nodes necessary for preserving well-formedness (e.g. root, vocalic, aperture) are automatically created in the course of the spreading to the empty skeletal position (cf. Sagey 1986, Clements and Hume 1995). This is indicated by parentheses enclosing the relevant nodes.

(33) Lowering

σ
|
N
|
X
(root)
(vocalic)
(aperture)
[+ $open_1$]

Condition: the target is peripheral in a morpheme

Whether the target of Lowering is V_d or V_f, the output of the process is a structure shown in (34) (where irrelevant nodes are omitted). Crucially, this means that (in addition to its lowering effect) Lowering turns a defective vowel into a full one:

(34)

$$\begin{array}{c}\sigma\\ |\\ \mathrm{N}\\ |\\ \mathrm{X}\\ |\\ \text{root}\\ |\\ \text{vocalic}\\ |\\ \text{aperture}\\ |\\ [+\ \text{open}_1]\end{array}$$

Spreading is a feature filling process, therefore Lowering is blocked if the target vowel has an aperture specification which is incompatible with the feature that is being spread.

Let us now examine how lowering interacts with syllabification.[55] As pointed out above, a word-final defective vowel is not realized phonetically because it cannot be syllabified. Therefore, in this position, a floating [+ open$_1$] feature does not surface since (33) cannot apply to a syllabically unparsed V_d. (35) shows this with monomorphemic lowering stems and inflectional suffixes (Type A and Type B) attached to non-lowering stems:[56]

(35)	fog$_{OP}$V$_d$	→	{fog$_{OP}$}V$_d$	[fog]	*fog* 'tooth'
	hal$_{OP}$V$_d$	→	{hal$_{OP}$}V$_d$	[hɔl]	*hal* 'fish'
	bor-V$_f$k$_{OP}$V$_d$	→	{bo}{rok$_{OP}$}V$_d$	[borok]	*borok* 'wine' (pl.)
	bor-t$_{OP}$V$_d$	→	{bort$_{OP}$}V$_d$	[bort]	*bort* 'wine' (acc.)

Recall that Type B suffixes (such as the accusative) always show up with a (lowered) linking vowel after lowering stems regardless whether the stem final consonant can or cannot form a

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[55]For expository purposes we shall use the following special symbols in the representations below: Subscripted '$_{OP}$' before V_d stands for the floating [+ open$_1$] feature. V_{FOP} denotes the lowered full vowel that is the result of (33). It must be borne in mind, however, that the linear representations used are just shorthand for the corresponding non-linear ones in the same way as phonetic symbols are for the appropriate feature trees.

[56]The placement of $_{OP}$ relative to a syllable boundary is irrelevant and is not meant to indicate whether the floating feature is inside or outside a syllable.

licit coda with the suffixal *-t*. The reason is that lowering stems are vowel-final. In both cases the stem-final defective vowel can syllabify with the *-t* and, consequently, can be the target of Lowering, which turns it into a low full vowel (36a). This contrasts with the behaviour of *-t* after major stems where the defective vowel only appears as a result of overparsing by syllabification after stem-final consonants that cannot form a licit coda with the suffixal consonant (36b):

(36)	a.	$n^{y}ak_{OP}V_d$-$t_{OP}V_d$	→	$\{n^{y}a\}\{kV_{FOP}t_{OP}\}V_d$	[nʸɔkɔt]	*nyakat* 'neck' (acc.)
		$fal_{OP}V_d$-$t_{OP}V_d$	→	$\{fa\}\{lV_{FOP}t_{OP}\}V_d$	[fɔlɔt]	*falat* 'wall' (acc.)
	b.	bak-$t_{OP}V_d$	→	$\{ba\}\{kV_dt_{OP}\}V_d$	[bɔkot]	*bakot* 'buck' (acc.)
		dal-$t_{OP}V_d$	→	$\{dalt_{OP}\}V_d$	[dɔlt]	*dalt* 'song' (acc.)

Thus, the generalization stated in (16) follows from the representation of lowering stems, the syllabification algorithm and the special constraints on the syllabification of defective vowels.

We have seen that Type A suffixes show up with a low linking vowel after lowering stems. Since Type A suffixes underlyingly begin with a full vowel, the stem-final V_d of lowering stems is deleted by Hiatus and the floating [+ $open_1$] feature of the stem can spread to the licensed suffix-initial V_f.

(37)	*fog-ak* 'tooth' (pl.).	*fog-atok* 'your tooth'
	/$fog_{OP}V_d$-$V_fk_{OP}V_d$/	/$fog_{OP}V_d$-$V_ftok_{OP}V_d$/
syllabification	$\{fog_{OP}\}V_d\{V_fk_{OP}\}V_d$	$\{fog_{OP}\}V_d\{V_f\}\{tok_{OP}\}V_d$
Hiatus	$\{fog_{OP}\}\{V_fk_{OP}\}V_d$	$\{fog_{OP}\}\{V_f\}\{tok_{OP}\}V_d$
syllabification	$\{fo\}\{g_{OP}V_fk_{OP}\}V_d$	$\{fo\}\{g_{OP}V_f\}\{tok_{OP}\}V_d$
Lowering	$\{fo\}\{gV_{FOP}k_{OP}\}V_d$	$\{fo\}\{gV_{FOP}\}\{tok_{OP}\}V_d$
	[fogɔk]	[fogɔtok]

As pointed out above, a suffix-initial V_f does not lower (i.e. it cannot receive the spreading feature), if it has an aperture feature which is incompatible with the feature spread by Lowering. That is the reason why the suffix-initial vowels of two Type A suffixes, superessive *-on/-en/-ön* and possessive 1pl *-unk/-ünk,* do not lower after lowering stems: e.g. *fal-on* 'on the wall' and *fal-unk* 'our wall'. The initial V_fs of both these suffixes are underlyingly specified as [- $open_1$] (cf. Siptár & Törkenczy 2000) and thus cannot receive the spreading [+ $open_1$] feature.

Lowering may be unordered with respect to Hiatus as both possible orderings yield the correct results. Note that Lowering *can* spread [+ $open_1$] past an unlicensed V_d onto the closest potential target (the suffix-initial V_f) because defective vowels have no melodic structure. Compare the two ways of ordering Hiatus and Lowering in (37) and (38):

(38)	*fog-ak* 'tooth' (pl.)
	$/fog_{OP}V_d\text{-}V_fk_{OP}V_d/$
syllabification	$\{fog_{OP}\}V_d\{V_fk_{OP}\}V_d$
Lowering	$\{fog\}V_d\{V_{FOP}k_{OP}\}V_d$
Hiatus	$\{fog\}\{V_{FOP}k_{OP}\}V_d$
syllabification	$\{fo\}\{gV_{FOP}k_{OP}\}V_d$
	[fogɔk]

Multiply suffixed forms of lowering stems are also derived in a straightforward manner. (39) shows how the accusative plural of a lowering major stem (*fog* 'tooth') and an 'epenthetic' lowering stem (*sátor* 'tent') is derived.

(39)	*fog-ak-at* 'tooth' (pl. acc.)	*sátr-ak-at* 'tent' (pl. acc.)
	$/fog_{OP}V_d\text{-}V_fk_{OP}V_d\text{-}tV_d/$	$/\check{s}a{:}tV_dr_{OP}V_d\text{-}V_fk_{OP}V_d\text{-}t_{OP}V_d/$
syllabification	$\{fog_{OP}\}V_d\{V_f\}\{k_{OP}V_dt_{OP}\}V_d$	$\{\check{s}a{:}\}\{tV_dr_{OP}\}V_d\{V_f\}\{k_{OP}V_dt_{OP}\}V_d$
Hiatus	$\{fog_{OP}\}\{V_f\}\{k_{OP}V_dt_{OP}\}V_d$	$\{\check{s}a{:}\}\{tV_dr_{OP}\}\{V_f\}\{k_{OP}V_dt_{OP}\}V_d$
syllabification	$\{fo\}\{g_{OP}V_f\}\{k_{OP}V_dt_{OP}\}V_d$	$\{\check{s}a{:}t\}V_d\{r_{OP}V_f\}\{k_{OP}V_dt_{OP}\}V_d$
Lowering	$\{fo\}\{gV_{FOP}\}\{kV_{FOP}t_{OP}\}V_d$	$\{\check{s}a{:}t\}V_d\{rV_{FOP}\}\{kV_{FOP}t_{OP}\}V_d$
	[fogɔkɔt]	[šaːtrɔkɔt]

As can be seen in the derivations, syllabification is continuous, i.e. potentially, it reapplies after each phonological rule. Both Hiatus and Lowering show derived environment effects: the former can only apply if its target is in another morpheme and the latter at the edge of a morpheme in the environment of another one. Neither applies intramorphemically. However, there is no evidence that their *application* is cyclic: they only ever need to apply once in the course of the derivation (naturally, they may have multiple targets). Rules of this kind challenge the traditional claim in Lexical Phonology that only cyclic rules are subject to the derived environment constraint on rule application.[57] In fact, we know of no phonological rules in Hungarian that must be considered cyclic on grounds other than the derived environment constraint.[58] Therefore—although the phonological rules belong to blocks (Block 1 and Block 2) and each suffix is marked according to whether it is analytic or synthetic—we assume that

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[57]Similar rules have been identified in a number of other languages, e.g. Finnish and Ondarroan Basque, cf. Hualde (1989) and Cole (1995).

[58]Jensen and Stong-Jensen (1989a) argue for cyclic epenthesis in Hungarian to account for the behaviour of 'epenthetic' stems. However, their arguments do not contradict our claim because (i) essentially, they are based on their epenthesis process blocking in a non-derived context; and (ii) the arguments do not carry over to the present analysis because they are crucially dependent on the assumption that it is epenthesis that is responsible for the vowel~zero alternation in 'epenthetic' stems, Type A, and Type B suffixes alike. This is a view that we reject for the reasons discussed in 4.1.1.

the derivation proceeds in a non-cyclic way.[59]

If lowering stems that are phonetically vowel-final in isolation are represented on a par with the lowering stems discussed above, then they must end in a sequence of a full vowel and a defective vowel underlyingly ($CV_{f\ OP}$ V_d). The syllabification algorithm and the rules discussed predict that both Type A and Type B suffixes attach to these stems with a phonetically expressed lowered linking vowel. Type A suffixes are underlyingly vowel-initial. When they are added to these stems, an underlying sequence of three vowels is created: -$CV_{f\ OP}$ V_d+ V_fC.[60] Hiatus deletes the stem-final V_d, and the two full vowels syllabify in the following way: -$\{CV_{f\ OP}\}\{V_fC\}$.[61] Lowering can apply to the suffix-initial V_f giving -$\{CV_f\}\{V_{FOP}C\}$. Type B suffixes are consonant-initial. Thus, suffixation by a Type B suffix

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[59]It must be pointed out that as long as only synthetic suffixes are attached to the stem, it makes no difference if we assume that the whole 'preassembled' suffixed stem is subjected to the relevant phonological rules, or that the rules are (re)applied gradually (i.e. 'cyclically') as each suffix is considered, over the suffixed form. This can be seen in the derivation below, in which we adopt the Halle and Vergnaud (1987) approach to cyclicity:

	$fog_{OP}V_d$-$V_fk_{OP}V_d$-$t_{OP}V_d$
cycle1	
syllabification	$\{fog_{OP}\}V_d$-$V_fk_{OP}V_d$-$t_{OP}V_d$
Hiatus	n.a.
Lowering	n.a.
cycle2	
syllabification	$\{fog_{OP}\}V_d\{V_fk_{OP}\}V_d$-$t_{OP}V_d$
Hiatus	$\{fog_{OP}\}V_fk_{OP}V_d$-$t_{OP}V_d$
syllabification	$\{fo\}\{g_{OP}V_fk_{OP}\}V_d$-$t_{OP}V_d$
Lowering	$\{fo\}\{gV_{FOP}k_{OP}\}V_d$-$t_{OP}V_d$
cycle3	
syllabification	$\{fo\}\{gV_{FOP}\}\{k_{OP}V_dt_{OP}\}V_d$
Hiatus	n.a.
Lowering	$\{fo\}\{gV_{FOP}\}\{kV_{FOP}t_{OP}\}V_d$
	[fogɔkɔt]

[60]In the representations that follow the *irrelevant* suffix-final floating [+ $open_1$] feature and V_d are disregarded.

[61]Note that Hiatus must be non-iterative, because it would delete the suffix-initial V_f if it could apply to its own output.

creates the string -$CV_{f\ OP}\ V_d$+ C. Note that Hiatus cannot delete the stem-final V_d because the vowel sequence is not derived. Syllabification yields -{$CV_{f\ OP}$}{V_dC} and via Lowering the derived representation is the same as in the case of Type A suffixes: -{CV_f}{$V_{FOP}C$}. Thus, the prediction is that Type A and Type B suffixes behave in the same way when added to surface vowel-final lowering stems: a lowered linking vowel shows up before both types of suffixes.

This prediction is not borne out. Some suffixes never have a linking vowel after a surface vowel-final lowering stem (e.g. accusative, superessive, comparative), others do (e.g. plural, modal).[62] This difference in behaviour only partially correlates with the distinction between Type A and Type B suffixes. In 4.1.3. above we pointed out that the unpredictability of behaviour indicates that lexical marking must be involved. We suggest that the source of this idiosyncratic behaviour is allomorphy. Surface vowel-final lowering stems have two lexical allomorphs: a 'normal'[63] one that (like all lowering stems) ends in a defective vowel, and another one whose final defective vowel is missing. By default, suffixes select the 'normal' allomorph. Some suffixes, however, are marked to select the other allomorph. When subjected to phonology, the former concatenations will surface with a lowered linking vowel while the latter ones will not have a linking vowel. Under this interpretation, a linking vowel is *phonologically* required after all lowering stems. Some lowering stems are special in that they have non-lowering lexical allomorphs as well,[64] and some suffixes are *morphologically* irregular because they select the non-lowering allomorphs of these stems.

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[62]*Modulo* the OCP effect and the optionality of the linking vowel after mid vowels as discussed in 4.1.3.

[63]I deliberately avoid using the word 'regular' here, since lowering stems are marked compared to non-lowering ones. 'Normal' is intended to mean 'representing the norm for lowering stems'.

[64]We have no explanation why all surface vowel-final lowering stems belong to this set. It must be pointed out, however, that the set contains some surface consonant-final lowering stems as well, cf. note 23. It is an interesting fact that, in contrast to consonant-final inflectional suffixes, vowel-final ones do not lower: *lány-ai-m* 'my daughters' and not **lány-ai-am*. The latter is predicted if Hiatus and Lowering apply to the underlying representation */$la{:}n^y$-$ai_{OP}V_d$-$V_fm_{OP}V_d$/, whereas the correct output is derived if the UR is /$la{:}n^y$-ai-$V_fm_{OP}V_d$/. It is as if a hiatus consisting of a full vowel and a defective one were dispreferred *within a morpheme*.

4.1.4.4. The past suffix

We saw in section 4.1.2.2. that the behaviour of the other Type B suffix, the past tense morpheme, is more complex than that of the accusative. This suffix displays vowel~zero alternation *as well as* an alternation involving its consonant(s): *-Vtt~-t* (*lop-ott* '(s)he stole', *fal-t* '(s)he devoured', *lop-t-am* 'I stole'). The length of the suffix-final consonant depends on the presence/absence of the linking vowel: it appears as a geminate after a phonetically expressed linking vowel (*lop-ott*).[65] Recall, however, that the occurrence of the linking vowel depends on (i) the identity of the stem-final consonant (there is no linking vowel if *nongeminate* (!) *t* can form a licit coda[66] with the stem-final consonant (*fal-t*)), and (ii) whether a vowel-initial (non-analytic) suffix follows (there is no linking vowel if it does (*lop-t-am*)).

The interdependence of the length of the suffixal consonant and the conditions on the occurrence of the linking vowel raises some questions about the representation of the past suffix. Since it is a Type B suffix, it is consonant-initial. When the suffix-initial linking vowel appears, it is a V_d that is the result of overparsing by syllabification. This is doubly problematic if we assume that the suffixal consonant is an underlying geminate.[67] First, it is hard to see how the linking vowel could be absent after (some) consonant-final stems if the suffix is underlyingly -CC. As codas are maximally binary branching, it could not syllabify

---

[65]In the following discussion we abstract away from the effects of postlexical Degemination (cf. Siptár & Törkenczy 2000, Siptár 2000, 2001*b*, 2002), which may shorten a geminate past *-tt*, compare *Eve*[t] *körté.* '(S)he ate some pears' and *Eve*[tː] *epret.* '(S)he ate some strawberries'.

[66] (i) Recall that only *some* licit codas are available for the past tense suffix to syllabify. I disregard this complication here (cf. 4.1.2.2.) and assume that there must be a stipulation specific to the past suffix that disallows its syllabification into a complex coda whose first term is an obstruent. It would be desirable to derive this effect from the representation of the past suffix and/or (more) general conditions on syllabification (cf. 3.4.3). At present, I do not see how this could be done. (ii) Note that, similarly to the accusative (cf. 4.1.2.2.), after *t*-final verbs a linking vowel appears ever though geminate /tt/ is a well-formed coda: *üt-ött* 'hit' (3sg past indef) and not **üt-t*. For a discussion of this problem cf. 4.1.4.6.

[67]This consonant would degeminate postconsonantally later. Since the past suffix must be distinguished from the accusative (whose suffixal consonant never shows up as a geminate), the former cannot be a single consonant underlyingly.

into the coda of the final syllable of a consonant-final stem regardless of the identity of the coda consonant—the expected string that results from syllabification would be C-V_dCC. Second, given (23b), it is not even possible to overparse a final CCC string in this way, since a defective vowel is not licensed to occur in a doubly closed syllable (*C-V_dCC). Furthermore, the non-occurrence of the linking vowel before vowel-initial suffixes (*lop-t-am*) would also be a problem. As the geminate could not syllabify as the onset of the syllable whose nucleus is the suffix-initial vowel (*{lop}V_d{tt-V_fm}), the V_d that is the result of overparsing by syllabification preceding the past tense suffix would not be skipped since it could syllabify in a syllable closed by the first half of the geminate ({lo}{pV_dt}{t-V_fm}). This wrongly predicts that the linking vowel surfaces even before vowel-initial suffixes: *[lopottɔm].

To sum up, the past suffix behaves as a single /t/ in the derivation when the presence/absence of the linking vowel is determined by syllabification, but appears as a geminate if the linking vowel occurs at the surface. We can express this by assuming that the length of the suffixal consonant is the result of gemination. Since the past suffix has to be distinguished from similar suffixes (i.e. the accusative) whose suffixal consonant does not geminate in the same context, we suggest that its underlying representation is the following:

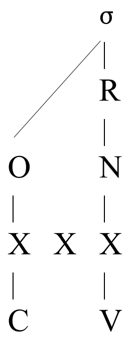
(40)
```
          N
          |
X    X    X
|
t      [+ open1]
```

Thus, the past suffix is a /t/ whose root node is associated to a *single* timing slot followed by an empty timing slot (i.e. a timing slot devoid of melodic content). It ends in a floating [+ $open_1$] feature and a V_d because it is lowering (since it is an inflectional suffix: *lop-t-**am***). We assume that an empty timing slot is completely invisible to syllabification: it may remain unparsed such that (i) it may be left 'outside' syllables (41a), or (ii) it may be 'inside' a syllable, but unassociated to a subsyllabic constituent (41b).[68]

[68]This presupposes that the syllabification algorithm looks at root nodes when the syllable trees are erected. Then, a timing unit without a root node is skipped (i.e. invisible). Note that defective vowels are different. They may be skipped by syllabification (because of the special constraints they are subject to), but they may not occur unparsed within a syllable because they

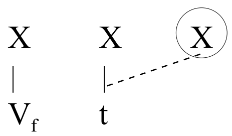
(41) a. $]_\sigma$ X $[_\sigma$

b.



Empty timing slots that are unparsed at the end of the derivation are not interpreted phonetically. They become visible to syllabification if they receive content. Then, as other ordinary segments they will be (and must be) parsed. We suggest that this is what happens to the past tense suffix in some contexts. Specifically, its empty timing slot may be filled by spreading from the preceding segment. This process spreads the root node of the /t/ onto a following empty timing slot if the /t/ is preceded by a full vowel:

(42) /t/-spread



(42) applies after Default V (22) has applied. Note, however, that it does not have to be ordered with respect to (22). If we assume that (42) applies whenever it can, it will automatically only apply after (22) (if (22) does apply).

Figure (43) below shows the behaviour of the past suffix after stems ending in a single consonant when the stem-final consonant cannot form a licit coda with the suffixal consonant (43a), and when it can (43b):[69]

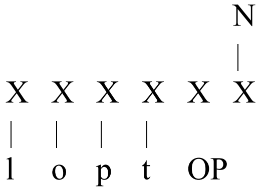
---

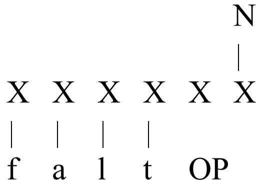
are prelinked to a nucleus node.

[69]To simplify non-essential features of the derivations that follow, OP stands for floating [+ $open_1$] and V_{FOP} is the lowered full vowel that results from spreading by Lowering.

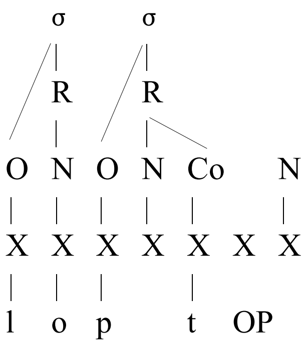
(43) a. *lop-ott* ‘steal’ (3sg past indef.) b. *fal-t* ‘devour’ (3sg past indef.)

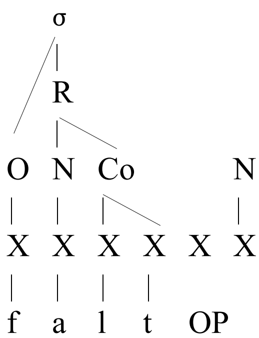
UR





Syllabification

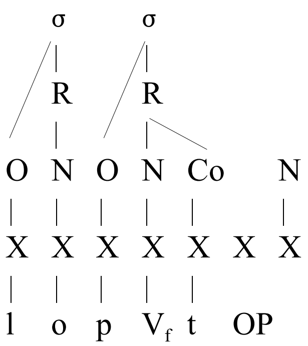




Hiatus n.a. n.a.

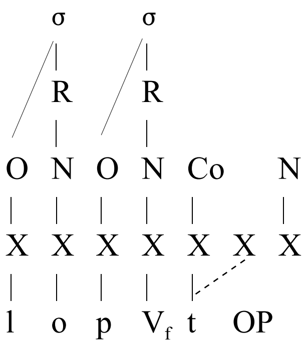
Lowering n.a. n.a.

Default



n.a.

Spread /t/



n.a.

Syllabification

σ σ
R R
O N O N Co N
X X X X X X X
l o p V_f t OP

n. a.

[lopotː] [fɔlt]

As can be seen in (43a) the suffixal consonant cannot syllabify into the coda of the stem-final syllable, therefore a degenerate syllable is created by syllabification. The licensed V_d of this syllable becomes a full vowel by Default V and thus the suffixal /t/ can spread to the empty X slot on its right (*lop-o**tt***). No degenerate syllable is created, however, if the suffixal consonant *can* form a coda with the stem-final one (43b). In this case /t/-spread cannot apply since its structural description is not met, and the past suffix surfaces as a nongeminate [t] (*fal-**t***). Comparable forms of cluster-final stems (e.g. *dong-ott* 'buzz' (3sg past indef.)', *csukl-ott* 'hiccup' (3sg past indef.)) derive like (43a).

The derivation of multiply suffixed forms of the same stems (i.e. when the past suffix is followed by a Type B suffix) is shown in (44).

(44) a. *lop-t-am* 'steal' (sg1 past) b. *fal-t-am* 'devour' (1sg past)

UR

a.
N N
X X X X X X X X X
l o p t OP V_f m OP

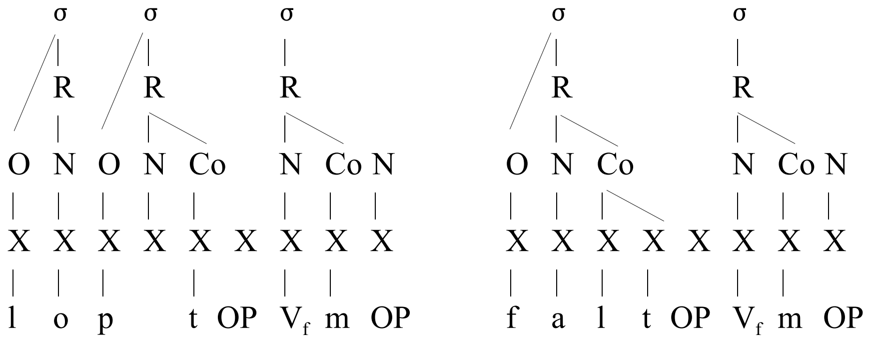
b.
N N
X X X X X X X X X
f a l t OP V_f m OP

Syllabification

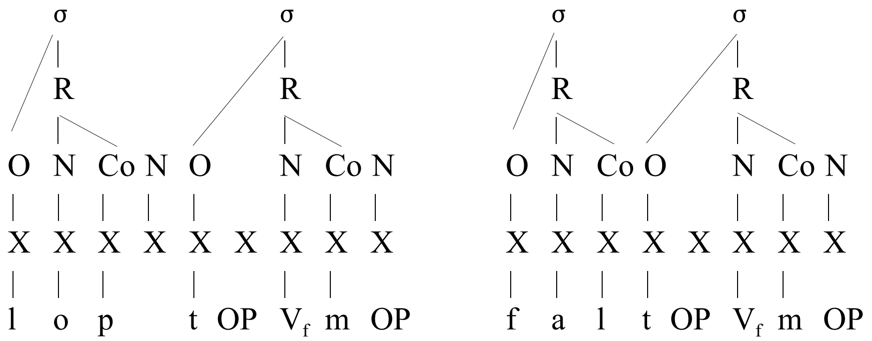
a.
σ σ σ
R R R
O N O N Co N N Co N
X X X X X X X X X X
l o p t OP V_f m OP

b.
σ σ
R R
O N Co N N Co N
X X X X X X X X X
f a l t OP V_f m OP

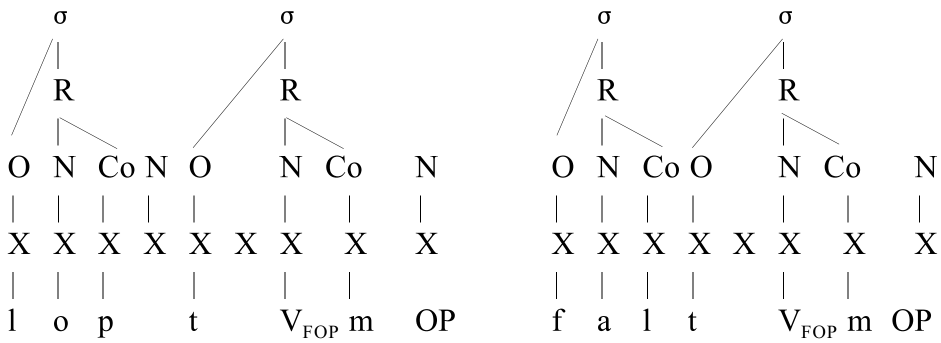
Hiatus



Syllabification



Lowering



Default n.a n.a.

Spread /t/ n.a n.a.

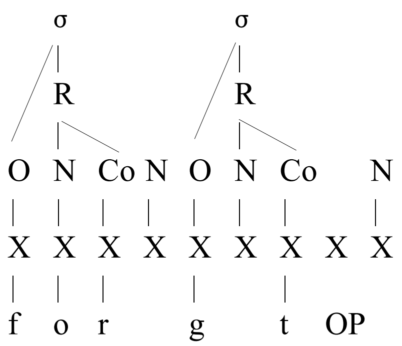
[loptɔm] [fɔltɔm]

Note that when Hiatus deletes the defective vowel before the full vowel of the Type B suffix, crucially, the /t/ can syllabify ‘across’ the empty timing slot as the onset of the initial syllable of the following suffix. Thus, /t/-spread cannot apply because its structural description is not met and the past suffix surfaces as a nongeminate [t] (*lop-**t**-am, fal-**t**-am)*. The difference between the two stems is that in the case of *lop-t-am* the stem-final consonant is followed by an unsyllabified V_d which is the result of overparsing by an earlier round of syllabification.

This V_d eventually cannot syllabify (because it is not licensed to occur in an open syllable) and is not interpreted phonetically.

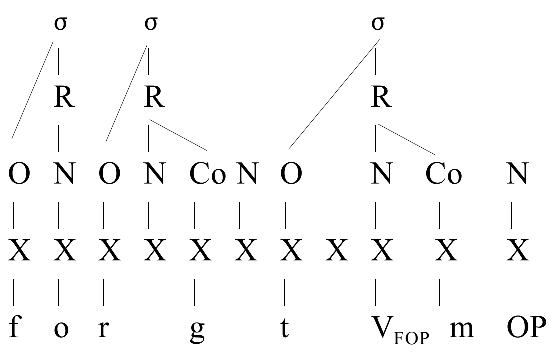
'Epenthetic' stems whose final consonant cannot form a licit coda with the /t/ of the past suffix (e.g. *forog* 'revolve') behave similarly to the comparable major stems in (43a) and (44a). The only difference in their behaviour is due to the underlying defective vowel in the final syllable of 'epenthetic' stems. (45) shows the (intermediate) representation of *forg-ott* 'revolve' (3sg past indef.) which is the result of syllabification:

(45)



When Default V applies to this representation, it turns the licensed V_d into V_f, and the /t/ can spread to the available empty position on its right. The unsyllabified V_d-s do not receive phonetic interpretation, thus the surface form is [forgot:]. (46) shows a multiply suffixed form of the same stem (*forog-tam* 'revolve' (1sg past.)) after Hiatus and syllabification (and Lowering).[70]

(46)



[70]Note that the defective vowel between the stem final consonant and the past suffix is the result of a round of syllabification before Hiatus because the two consonants cannot form a licit branching coda.

The stem-internal licensed V_d becomes a full vowel when Default V applies to this representation. As /t/-spread cannot apply, the surface form is [foroktɔm].[71]

Given our assumptions about syllabification, the prediction for 'epenthetic' stems that end in a consonant with which /t/ *can* form a licit coda (e.g. /rabV_dl/ 'rob', /šodV_dr/ 'roll', /ugV_dr-/[72] 'jump', /omV_dl-/ 'collapse') is that they should form their singly and multiply suffixed past forms like the 'epenthetic' stems discussed above: -C}V_d{C$V_f$tt}V_d# (like *forgott*) and -{CV_fC}V_d{tV_{FOP}- (like *forogtam*).[73] This prediction is only borne out in the case of *some* past forms of *some* of these 'epenthetic' verbs. In (47) below we have charted the possible singly and multiply suffixed past forms of representative 'epenthetic' stems that end in the right consonants for branching codas. The present form and the nominalized one are included for comparison. We have capitalized the forms that are *not predicted* given the represetation of 'epenthetic' stems and the syllabification algorithm.

(47)

stem	3sg past indef.	1sg past	1sg pres def	nominalized form
rabV_dl 'rob'	*RABOL-T*	*rabol-t-am*	*RABOL-OM*	–
	–	–	*rabl-om*	*rabl-ás*
ugV_dr- 'jump'	–	*ugor-t-am*	–	–
	ugr-ott	*UGR-OTT-AM*	*ugr-om*	*ugr-ás*
omV_dl- 'collapse'	*OMOL-T*	*omol-tam*	–	–
	oml-ott	*OML-OTT-AM*	*oml-om*	*oml-ás*

[71]The [k] is the result of Voicing Assimilation, cf. Siptár & Törkenczy (2000).

[72]/ugV_dr/ and /omV_dl-/ are bound stems (of the *-ik* class): *ugr-ik, oml-ik* (3sg pres) vs. *ugor-j, omol-j* (imp.)

[73]The reason is that syllabification will overparse the string consisting of the stem-final consonant and the suffixal /t/ in spite of the fact that they could form a branching coda because the V_d that occurs in the last syllable of the stem is disallowed in a doubly closed syllable (cf. the discussion of the accusative of 'epenthetic' nouns in section 4.1.4.2.).

It must be pointed out that (i) all these ‘epenthetic’ stems seem to have unexpected forms, sometimes as the only form at a given point in the paradigm, sometimes as an alternative to an expected one; (ii) the unexpected forms are not confined to the past paradigm; (iii) it is unpredictable which forms of which stems will be unexpected.[74] We suggest that the reason for this complex state of affairs is that not all forms of these stems derive from the same underlying representation. Parallel underlying representations exist for these verbs (cf. Törkenczy 2002*b*), one of which is ‘epenthetic’.[75] For instance, *rabol* has an underlying major stem too, which has a full vowel in the last syllable (CV_fC), hence *rabol-t* (and *rabol-om*). It is unpredictable which forms are derived from which UR(s) and whether only one, or more than one parallel UR is available for the same form (as in *omol-t/oml-ott*).[76] The parallel UR is not necessarily CV_fC-final. Forms like *ugr-ott-am* and *oml-ott-am* are derivable neither from a CV_dC-final nor from a CV_fC-final UR. We propose that these forms derive from an underlying stem that ends in a CC cluster which is not a possible coda.[77] Thus, some of the lexemes discussed show allomorphy to such an extent that they may have as many as three parallel UR variants from which the different forms are derived.

We noted above that the singly suffixed past forms of cluster-final stems can be handled in a straightforward way. Multiply suffixed cluster-final stems, on the other hand, present a problem.

Multiply suffixed forms of stems ending in clusters that are not well-formed codas

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[74] (i) The fact that variation should occur *does* seem to be predictable for a certain class of verbs when suffixed with a certain type of suffixes: epenthetic *-ik* verbs stems have alternative forms before *-sz/-asz/-esz* (2sg pres. indef.), *-ni/-ani/-eni* (inf.) and *-lak/-lek/-alak/-elek* (1sg^s 2sg/pl^o), *-nak/-nek/-anak/-enek* (3pl pres. indef.), *-na/-ne/-ana/-ene* (cond.) and *-tok/-tek/-tök/-otok/-etek/-ötök* (2pl pres. indef.), i.e. quasi-analytic suffixes (see note 32 above): e.g. *für**ö**d-ni/fürd-eni* ‘bathe’ (inf.). See Rebrus & Törkenczy (1998, 1999), Rebrus (2000*b*), Törkenczy (2002*b*).
(ii) It is interesting to note that the nominalized form is always the expected one.

[75] The fact that there is variation among native speakers as to which alternative forms they find acceptable confirms this interpretation.

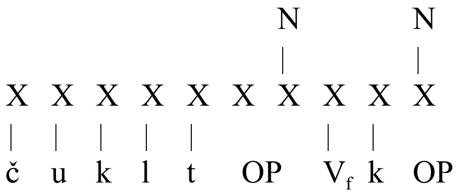
[76] Compare the almost identical *boml-ott* ‘unfold’ (3sg past indef.), which has no alternative **bomol-t.*

[77] That is, the UR of the stem of these forms is like the bound stem /čukl-/ *csukl-ik* ‘hiccup’ (cf. the discussion below), whose stem-final cluster is never separated by a vowel.

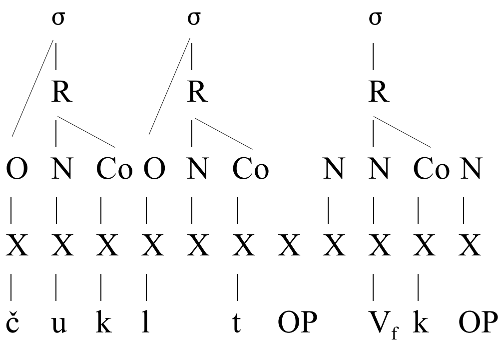
(i.e. defective stems, e.g. /čukl-/ *csu**kl**-ott-am* 'hiccup' (1sg past), /bü:zl-/ *bű**zl**-ött-em* 'stink' (1sg past)*,* /vedl-/ *ve**dl**-ett-em* 'slough' (1sg past), cf. Károly (1957), Hetzron (1975), Törkenczy (2000*b*, 2001*b*, 2002*ab*), Rebrus and Törkenczy (1999), derive in the following way:

(48) *csukl-ott-ak* 'hiccup' (3pl past indef.)

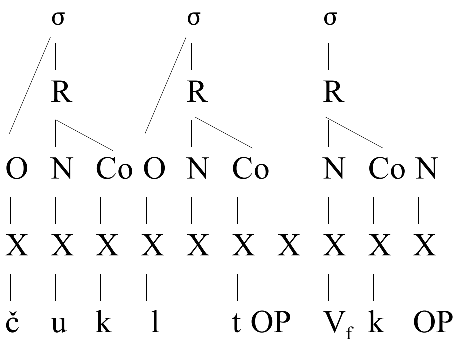
UR



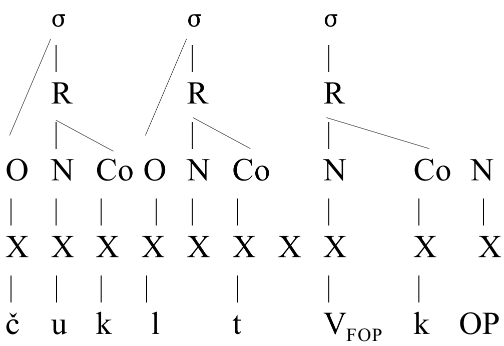
Syllabification



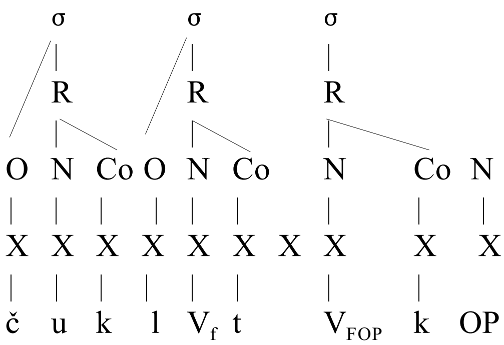
Hiatus



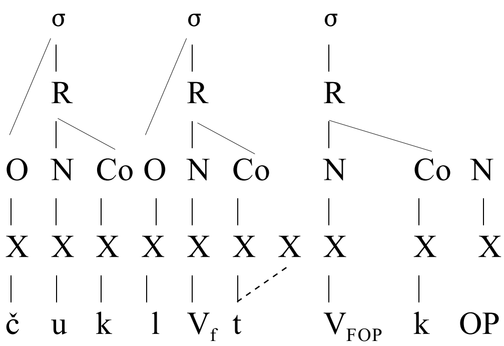
Lowering



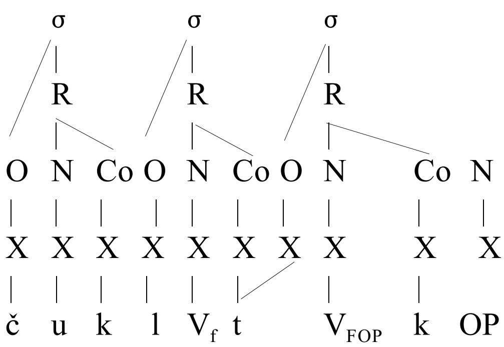
Default



Spread /t/



Syllabification



[čuklot:ɔk]

The interesting point in this derivation is the output of Hiatus. If syllabification applied to the output of Hiatus to syllabify the /t/ into the onset of the last syllable of the word, the rest of the word could not be syllabified. The defective vowel preceding the /t/ could remain unparsed, but the consonant before it could not be syllabified into the coda on its left since they do not make up a licit coda (*{čukl}V_d{t…). Thus, the whole CV_d string before the /t/ would have to remain unparsed (*{čuk}lV_d{t…). This is excluded by non-exhaustiveness, which we restate here in a stricter form:[78]

[78] Compare (25).

(49) *Non-exhaustiveness*

Only defective material (i.e. defective vowels and empty positions) may remain unparsed into syllables.

Another option would be for syllabification to overparse the stem-final cluster, but this is not possible either, since overparsing is a structure changing operation and thus can only happen in a derived environment (*{ču}{kV_dl}V_d{t…).[79] Thus, syllabification cannot apply to the output of Hiatus and the derivation proceeds as shown in (48).

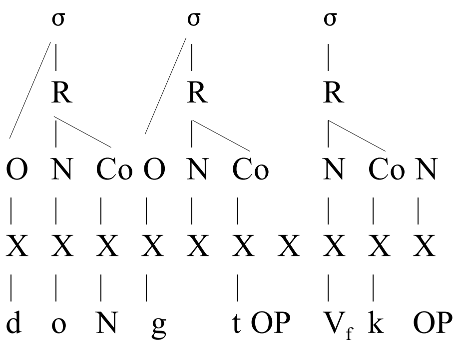
For multiply suffixed forms of cluster-final stems that end in a well-formed coda (e.g. *dong-t-ak* 'buzz' (3pl past indef.)), the syllabification algorithm predicts that that they should follow the derivation of *lop-t-am* (cf. (44a)). That is, after Hiatus the past /t/ syllabifies as the onset of the syllable whose nucleus is the full vowel of the suffix following it. The stem-final consonants can syllabify as a coda and the defective vowel following them remains unparsed; /t/-spread cannot apply. This is shown in (50):

(50) *dong-t-ak* 'buzz' (3pl past indef.)

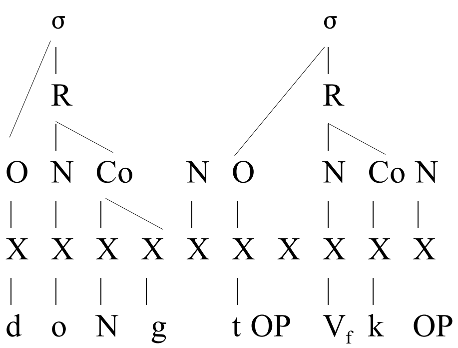
```
UR                                    N     N
                                      |     |
                  X  X  X  X  X  X  X  X  X  X
                  |  |  |  |  |        |  |
                  d  o  N  g  t   OP   Vf k  OP

Syllabification     σ      σ        σ
                   /|     /|        |
                  / R    / R        R
                 /  |\  /  |\       |\
                  O  N  Co O  N  Co    N  N  Co N
                  |  |  |  |  |  |     |  |  |  |
                  X  X  X  X  X  X  X  X  X  X  X
                  |  |  |  |     |        |  |
                  d  o  N  g     t  OP    Vf k  OP
```

[79]This is why the stem-final clusters of these stems are never broken up and why these stems have a defective paradigm, cf. section 4.1.1.

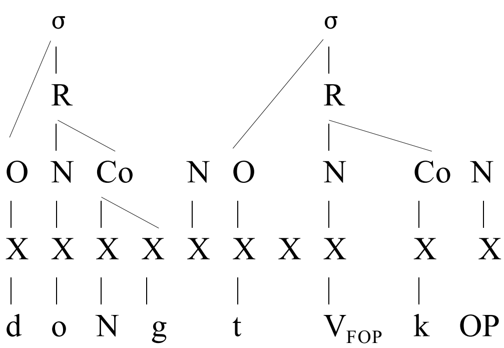
Hiatus



Syllabification



Lowering



Default n. a

Spread /t/ n. a

[doŋktɔk][80]

The prediction is correct for the stem *dong*, but recall that there are other stems ending in a branching coda that (i) either have an alternative multiply suffixed past form alongside the expected one (e. g. *fing* 'fart': *fing-tak/FING-OTT-AK*, *told* 'lengthen'*: told-t-ak/TOLD-OTT-*

---

[80]The first [k] is the result of Voicing Assimilation.

AK) or (ii) only have a different form (*OLD-OTT-AK,* but **old-t-ak*). These unpredicted forms (which are capitalized in the previous sentence) are always of the same shape: they have a linking vowel after the stem (and consequently a geminate /tt/). The unexpectedness of these forms consists in the unmotivated occurrence of the linking vowel after the stem. The V_d (which results from a previous round of syllabification) is eventually unparsed after some stems (e.g. *dong*: ..Ng}V_d{t...)—which is the predicted case—, after others it *may* be parsed (e.g. *fing*: ..Ng}V_d{t... / ..N}{gV_dt}...) or *must* be parsed (e.g. *old*: ..l}{dV_dt}...). I do not really have an explanation for these forms and can only offer some speculation as to why the defective vowel behaves in this way after these stems. First of all, obviously, lexical marking must be involved since all these stems have well-formed codas, and the defective vowel may be parsed or unparsed after the same coda clusters in different stems (compare *fi**ng*** and *do**ng**,* ***old*** and *to**ld***) and therefore, the occurrence of the linking vowel cannot be predicted on the basis of the melodic content of the coda clusters.[81] It is certainly the stems that have to be marked in some way. Second, the reason why this differential behaviour is only observed after cluster-final stems must be related to the status of internal CCC clusters. We have pointed out in section 3.2.2. that, apart from sporadic irregular monomorphemic examples, internal CCC clusters only occur if they are not within the same analytic domain. There is one systematic set of counterexamples to this generalization: multiply suffixed past forms of verb stems that end in a branching coda, such as [doŋ**kt**ɔk] (recall that the past suffix is synthetic). The internal CCC cluster of these forms always consists of a branching coda followed by an onset.[82] However, one could argue that the data above suggest that *internal* branching codas are dispreferred. This would make the unexpected forms above the regular case, and the stems that allow the underparsing of a V_d after a branching coda would have to be lexically marked. In the present treatment we leave this question open.

To conclude, we summarize the different types of (singly and multiply suffixed past forms of) verb stems discussed in this section. Only those forms of the stems are included in (51) that are predicted on the basis of the UR identified. The notation is as follows: C_α is a

---

[81]The stems with /t/-final clusters will be discussed in section 4.1.4.6.

[82]Domain-internal CCC clusters cannot have a different structure (*C.CC) since branching onsets are disallowed in Hungarian. On monomorphemic words with internal CCC clusters cf. section 4.1.4.5.

consonant such that /C_αt/ is a well formed coda; C_β is a consonant such that /C_βt/ is not a well formed coda; $C_\gamma C_\delta$ is a well-formed coda; and $C_\kappa C_\lambda$ is not a well-formed coda. The parenthesized question marks are meant to show our indecision about which of the forms syllabification should predict (both forms are attested!). CV_dC final stems are the ones that are traditionally called 'epenthetic' and $C_\kappa C_\lambda$ final stems are 'defective'.

(51)

stem-final string in UR		singly suffixed past form	multiply suffixed past form
CV_fC	CV_fC_α	*fal-t*	*fal-t-am*
	CV_fC_β	*lop-ott*	*lop-t-am*
CV_dC	CV_dC_α	*ugr-ott*	*ugor-t-am*
	CV_dC_β	*forg-ott*	*forog-t-am*
CC	$C_\gamma C_\delta$	*dong-ott*	*dong-t-am* (?) / *old-ott-am* (?)
	$C_\kappa C_\lambda$	*csukl-ott*	*csukl-ott-am*

4.1.4.5. Analytic affixes and appendices

When Block 1 syllabification happens and the alternations dependent on syllable structure are calculated, material in one (dependent or independent) analytic domain is not visible to that in the other. This can be seen in (52) below where 'epenthetic' stems are shown in isolation, followed by a vowel-initial analytic suffix (terminative *-ig*), and by a vowel-initial synthetic suffix (plural *-V_fk*):

(52)	**_#**	**_V-initial analytic suffix**	**_V-initial synthetic suffix**
	bokor 'bush'	bokor-ig	bokr-ok
	retek 'radish'	retek-ig	retk-ek
	kölyök 'kid'	kölyök-ig	kölyk-ök

(52) shows that the underlying defective vowel of 'epenthetic' stems is phonetically expressed before terminative *-ig* (and other vowel-initial analytic suffixes)[83] in spite of the fact that the stem-final consonant syllabifies as the onset of the suffix-initial syllable at the surface. We attribute this to Default V having applied in Block 1 (while syllabification applies in both blocks). This means that all the licensed V_d-s are turned into full vowels before Block 2 syllabification applies, which can then syllabify the stem-final consonant as an onset since the

[83]Other suffixes of this type are causal-final *-ért* (*bokor-ért* 'for the bush'), anaphoric possessive *-é* (*bokor-é* 'that of the bush'), adverb-forming *-ul/ül* (*bantu-ul* 'in Bantu').

syllable which is opened up by this operation no longer contains a defective vowel. Compare the syllabification of *bokor-ig* and *bokr-ok*:[84]

(53)	⟦ ⟦ bokV_dr ⟧ ig ⟧	⟦ bokV_dr-V_fk ⟧
Block 1		
Syllabification	⟦ ⟦ {bo}{kV_dr} ⟧ {ig} ⟧	⟦ {bok}V_d{rV_fk}⟧
Default V	⟦ ⟦ {bo}{kV_fr} ⟧ {ig} ⟧	n.a.
Block 2		
Syllabification	⟦ {bo}{kV_f}{rig} ⟧	n.a.
	[bokorig]	[bokrok]

Consonant-initial analytic suffixes (e.g. inessive *-ban/-ben*, dative *-nak/-nek*, ablative *-tól/-től*, delative *-ról/-ről* etc.) behave in the same way, except that Block 2 syllabification cannot syllabify the stem-final consonant as (part of) the onset of the suffix-initial syllable (*bo.kor.ban* 'in the bush', *re.tek.ről* 'about horseradish').[85]

We have noted (cf. sections 3.3.1 and 4.1.2.2.) that hiatus is possible morpheme-internally (*kies* /kieš/ 'picturesque'), when the two vowels are in different independent and/or dependent analytic domains (⟦ ⟦ *ki* ⟧ ⟦*esik*⟧ ⟧ /kiešik/ 'fall out' (verb), ⟦ ⟦ *kapu* ⟧ *ig* ⟧ /kapuig/ 'up to the gate'),[86] but is not possible when the second vowel is initial in a synthetic suffix. In the last case, Hiatus deletes the suffix-initial vowel (cf. 4.1.4.2.). This pattern can be accounted for if we assume that Hiatus is only a Block 1 rule (where it is subject to the derived environment constraint), and does not apply in Block 2:

---

[84]Recall that Block 1 rules apply within analytic domains and then the whole word is submitted to the Block 2 rules cf. section 2.2. The fact that the internal brackets are not shown in the Block 2 stage of the derivation is not meant to imply that they have been erased. It is simply that the derivation interprets the larger domain at this stage.

[85]We assume that appendices are not maximized to the detriment of a preceding coda, hence **re.te.kről*.

[86]Even sequences of identical vowels are possible under these conditions: *kiismer* /kiišmer/ 'learn all about', *taxiig* /taksiig/ 'up to the taxi', *bantuul* /bantuul/ 'in Bantu'.

(54)	⟦ kieš ⟧	⟦ ⟦ kapu ⟧ ig ⟧	⟦ kapu-V_fk ⟧
Block 1			
Syllabification	⟦ {ki}{eš} ⟧	⟦ ⟦ {ka}{pu} ⟧ {ig} ⟧	⟦ {ka}{pu}{V_fk} ⟧
Hiatus	n.a.	n.a.	⟦ {ka}{pu}k ⟧
Syllabification	n.a.	n.a.	⟦ {ka}{puk} ⟧
Block 2			
Syllabification	⟦ {ki}{eš} ⟧	⟦ {ka}{pu}{ig} ⟧	⟦ {ka}{puk} ⟧

Vowel-initial analytic suffixes can be used to argue for the stray erasure of defective material (defective vowels and empty skeletal slots) at the end of Block 1. We have seen above that Block 2 syllabification parses the last consonant of underlyingly consonant-final stems (e.g. *pad* ‘bench’) as an onset when a vowel-initial analytic suffix follows: {pa}{dig} *pad-ig* ‘up to the bench’. Lowering stems (e.g. *vad* ‘beast’—compare *vad-ak* ‘beast’ (pl.)) are expected to syllabify in a different way if defective vowels are visible in Block 2 derivation. The reason is that lowering stems end in a defective vowel (/$vad_{OP}V_d$/), and defective vowels may only remain unparsed outside a syllable, i.e. an unparsed V_d cannot occur within a syllable that has a nucleus.[87] Consequently, the consonant preceding the final V_d of a lowering stem cannot syllabify ‘across’ the V_d to become the onset of the analytic vowel-initial suffix[88]; *vad-ig* ‘up to the beast’ is predicted to syllabify as {vad}V_d{ig}. However, for native speakers, there is no difference between the syllabification of *padig* and *vadig*—both syllabify the intervocalic consonant into the second syllable. In order to avoid the unnecessary and counterintuitive difference between the syllabification of these items, we shall assume that defective vowels are erased at the end of Block 1 derivation. The two words will then be identical when Block 2 syllabification happens and will syllabify in the same way: {pa}{dig}, {va}{dig}.

Although syllabification applies in both blocks, it is subject to different conditions in them. Block 1 syllabification can build syllable structure on the segmental melody, but it is subject to the derived environment constraint, so it can only overparse it (i.e. insert defective vowels) in a derived environment created by a synthetic suffix. Furthermore,

[87]Compare the different behaviour of an empty skeletal slot, cf. 4.1.4.4.

[88]The stem-final V_d cannot be deleted by Hiatus because Hiatus only applies in Block 1.

syllabification is based on the core template in Block 1, and appendices (i.e. the extended syllable template) only become available in Block 2.[89] This accounts for the behaviour of subsyllabic analytic suffixes such as the definite imperative *-d* discussed in section 3.2.4.3. Recall that this suffix always attaches to a stem without a linking vowel, regardless of what the stem-final segment is: *nyom-d* ‘push’ (imp. def.)—compare *nyom-ot* ‘trace’ (acc.). As *-d* is analytic, a word in which it occurs has a dependent analytic domain containing the suffix only: ⟦ ⟦ *nyom* ⟧ *d* ⟧. When Block 1 syllabification applies in the dependent domain, it cannot create a V_d preceding the suffix because—as the suffix is the only phonological material in the domain—the environment is not derived, and thus overparsing is excluded by the derived environment constraint.[90] Thus, the suffix remains unparsed by Block 1 syllabification and will only syllabify in Block 2. Here, however, overparsing will not happen because the extended syllable template is available and *-d* can syllabify as an appendix (indicated with an ‘A’ subscripted to the segment in question):

[89]Block 1 rules (including syllabification) must be allowed to apply to dependent analytic domains as well as non-dependent ones (i.e. the material in a dependent domain cannot ‘wait’ uninterpreted until Block 2 rules apply to the larger domain) because synthetic suffixes may follow analytic ones, and processes that target material within a domain consisting of a stem and a synthetic suffix also target that within a dependent domain consisting of an analytic suffix and a synthetic suffix. For instance, (i) overparsing by syllabification can take place in the accusative of nouns ending in an analytic suffix (such as *-ság/-ség* ‘-hood’ or deverbal noun-forming *-vány/-vény*): ⟦ ⟦ *lány* ⟧ *ság-**ot*** ⟧ ‘maidenhood’ (acc.) vs. ⟦ ⟦ *lát* ⟧ *vá**ny-t*** ⟧ ‘spectacle’; (ii) Lowering applies after analytic lowering suffixes (e.g. *-van/-ven*): ⟦ ⟦ *hat* ⟧ *van-**at*** ⟧; (iii) Hiatus (which is Block 1 only since it does not delete the initial vowel of vowel-initial analytic suffixes) applies after a vowel-final analytic suffix such as diminutive *-ka/ke*: ⟦ ⟦ *malac* ⟧ *k**á-k*** ⟧ ‘piglets’ (where the length of the suffix-final vowel is due to Low Vowel Lengthening (cf. Siptár & Törkenczy 2000)).

[90]Compare Jensen and Stong-Jensen (1989b).

(55)	⟦ ⟦ n^yom ⟧ d ⟧	⟦ n^yom-t ⟧
Block 1		
Syllabification	⟦ ⟦ {n^yom} ⟧ d ⟧	⟦ {n^yo}{mV_dt} ⟧
Default V	n. a.	⟦ {n^yo}{mV_ft} ⟧
Block 2		
Syllabification	⟦ {n^yomd_A} ⟧	n. a.
	[n^yomd]	[n^yomot]

Subsyllabic analytic suffixes do not always have to syllabify as appendices. After vowel-final stems they can syllabify as a coda in Block 2 (e.g. *lő-j* {lö:j}).[91]

The derived environment constraint on overparsing by syllabification in Block 1 together with the availability of the extended syllable template in Block 2 can account for the licensing of initial consonant clusters and 'impossible' final ones in monomorphemic words (e.g. /št/ ***st****oppol* 'hitchhike', /pr/ ***pr****ém* 'pelt', /pš/ *ta****ps*** 'clapping', /kt/ *a****kt*** 'nude', /rj/ *fé****rj*** 'husband', cf. Chapter 3). The peripheral consonant in these clusters remains unsyllabified by Block 1 syllabification[92] (as they are not derived, overparsing is excluded), and the unparsed

[91] Verb stems that can appear as vowel-final have /v/-final allomorphs before underlyingly vowel-initial suffixes. We assume that both allomorphs are listed in the lexicon.

[92] This appears to violate non-exhaustiveness as formulated in (49). Note, however, that (49) was designed to prevent the resyllabification of an already syllabified form such as {čuk}{lV_dt}…, while here we have to do with the underparsing of non-defective material in an unsyllabified form. Let us suppose that the vacuous application of the syllabification algorithm is the same as non-application. Then, the application of syllabification may mean the (i) full parsing/reparsing, (ii) overparsing, or (iii) underparsing of a string. In the case of the already syllabified string {čuk}{lV_dt}… application would result in (ii) (*{ču}{kV_dl}V_d{t…) or (iii): *{čuk}lV_d{t…. Of these, (ii) is excluded by the derived environment constraint and (49) is intended to exclude (iii). Non-application, however, would still 'yield' a licit syllabified form ({čuk}{lV_dt}…). The case of monomorphemic clusters under consideration is different: here, non-application is not possible because it would leave the whole morpheme unsyllabified. Overparsing is excluded for the same reason as above, and thus the minimal underparsing of non-defective material is the only option left ({fe:r}j). Thus,

consonants can syllabify as an appendix in Block 2:

(56)	⟦ preːm ⟧	⟦ feːrj ⟧
Block 1		
Syllabification	⟦ p{reːm} ⟧	⟦ {feːr}j ⟧
Default V	n. a.	n. a.
Block 2		
Syllabification	⟦ {$\text{p}_\text{A}$reːm} ⟧	⟦ {feːrj_A} ⟧
	[preːm]	[feːrj]

It is an advantage of this treatment that clusters containing a subsyllabic analytic suffix and identical monomorphemic clusters receive the same analysis in terms of syllable structure: compare *kér-j* {keːrj_A} 'ask' (imp. indef.) and *férj* {feːrj_A} 'husband'.

Appendices are thus available for syllabification for consonants peripheral in an (independent or dependent) analytic domain if they are left unparsed by Block 1 syllabification. It is to be noted, however, that the licensing of morpheme-internal clusters consisting of more than two consonants is still unaccounted for. In section 3.3.2.2. we argued that these clusters are irregular.[93] Nevertheless, they are not broken up by overparsing and they are not simplified

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the appropriate version of Non-exhaustiveness must ban the underparsing of non-defective material in the first case, but must permit it in the second one. (49') is a possible formulation:

(49') Non-exhaustiveness: Syllabification may leave phonological material unparsed. Non-defective material may only be left unparsed as a last resort (where defective material is V_d or an empty timing slot).

This is obviously the kind of problem that could be given an optimality theoretic interpretation (there is a conflict of constraints: it is more important to at least partially parse a morpheme than to obey the requirement that bans the unparsing of non-defective material).

[93]Internal clusters of more than three consonants cannot be analyzed as a coda+ onset sequence. Internal CCC clusters cannot be syllabified as a simplex coda plus an onset because the onset may not branch. In section 4.1.4.4. we saw that multiply suffixed past forms of cluster-final stems suggest that the well-formedness of domain-internal branching codas is questionable. They are probably ill-formed (or at least marked). Morpheme internally they certainly seem to be ill-formed since morpheme-internal C1C2C3 clusters where C1C2 could be a licit coda are just as irregular/rare as those in which it could not.

by deletion in the lexical phonology.[94] The fact that they are not overparsed is due to the derived environment constraint, but it is not yet clear how they are licensed, since, morphologically, they are not peripheral in an analytic domain. We suggest here that the reason is a mismatch between purely morphological domains and phonologically relevant ones (cf. Törkenczy & Siptár 1999). Although the words containing these clusters are monomorphemic, phonologically, they are treated in Hungarian as if they were compounds, i.e. a morphologically unitary domain is phonologically analyzed as if it were two independent domains. The actual point at which the division of the morphological domain is made may vary from speaker to speaker, but is always in the middle of the cluster. Thus, every word containing a cluster longer than two consonants has more than one (re)analysis [95].

(57)[96]

templom	⟦ ⟦ tem ⟧ ⟦ plom ⟧ ⟧	or	⟦ ⟦ temp ⟧ ⟦ lom ⟧ ⟧		
export	⟦ ⟦ ek ⟧ ⟦ sport ⟧ ⟧	or	⟦ ⟦ eks ⟧ ⟦ port ⟧ ⟧		
puzdra	⟦ ⟦ puz ⟧ ⟦ dra ⟧ ⟧	or	⟦ ⟦ puzd ⟧ ⟦ ra ⟧ ⟧		
asztma	⟦ ⟦ as ⟧ ⟦ tma ⟧ ⟧	or	⟦ ⟦ ast ⟧ ⟦ ma ⟧ ⟧		
lajstrom	⟦ ⟦ laj ⟧ ⟦ štrom ⟧ ⟧	or	⟦ ⟦ lajš ⟧ ⟦ trom ⟧ ⟧	or	⟦ ⟦ lajšt ⟧ ⟦ rom ⟧ ⟧

Block 1 syllabification can only partially syllabify the material in each independent analytic domain[97] (⟦ ⟦ {ek} ⟧ ⟦ s{port} ⟧ ⟧ or ⟦ ⟦ {ek}s ⟧ ⟦ {port} ⟧ ⟧) and Block 2 syllabification can incorporate the unsyllabified peripheral consonants into extended syllables (⟦ ⟦ {ek} ⟧ ⟦ {$s_A$port} ⟧ ⟧ or ⟦ ⟦ {eks_A} ⟧ ⟦ {port} ⟧ ⟧).

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[94]Compare Kassai's empirical results (Kassai 1999*abc*).

[95]A probable scenario is that native speakers try to syllabify these words in the usual way ({laj}št{rom}) and make the division somewhere in the unsyllabifiable portion (the number of ways depends on how many consonants would be left unsyllabified).

[96]Glosses: *templom* 'church', *export* 'id.', *puzdra* 'arrowcase', *asztma* 'asthma', *lajstrom* 'list'.

[97]Overparsing is excluded since the string within the domain is not derived. Note that in some cases both domains of the reanalysed word may be fully syllabified in Block 1, e.g. ⟦ ⟦ {temp} ⟧ ⟦ {lom} ⟧ ⟧.

The fact that different native speakers may syllabify these words differently and even the same native speaker may find more than one syllable division possible shows that they are, or can be, reanalyzed as compounds in different ways. With some items, one syllabification is much more likely than the alternative one(s): e.g. most (if not all) speakers would syllabify *asztma* as /ast.ma/ rather than /as.tma/. This suggests that everybody analyzes this word as ⟦ ⟦ ast ⟧ ⟦ ma ⟧ ⟧, which is unexpected in the present account. In most cases, however, all the predicted syllabifications seem equally possible: laj.štrom = lajš.trom = lajšt.rom.

The above treatment of monomorphemic words containing clusters longer than two consonants is compatible with all other facts of Hungarian phonology.[98] Its weakness is that there is very little internal independent motivation supporting it. In principle, evidence might come from backness/frontness harmony. As compound members do not have to harmonize (cf. Siptár & Törkenczy 2000), we would expect that there should be disharmonic stems among those that contain these overlong clusters. This appears to be true (e.g. *angström* 'id.', *ösztrogén* 'oestrogen'). It has to be pointed out, however, that (i) real disharmony is just as rare among these words as in words that do not contain clusters longer than two consonants (e.g. *sofőr* 'driver'), and (ii) most of the words with CCC clusters whose vowels do not agree in backness contain /e/ as a non-harmonizing vowel, which is neutral. If /e/ is neutral, then these words are not disharmonic.[99] Thus, the 'evidence' is inconclusive. It must be pointed out that the 'evidence' would not be better even if /e/ *were* harmonic. The reason is that we would then have a lot of disharmonic words with /e/ that do not contain a CCC cluster (e.g. *betyár* 'highwayman', *haver* 'friend'), i.e. disharmony would be just as frequent in these words as it is in those that have a cluster consisting of more than two consonants (e.g. *export* 'id.', *komplett* 'complete').

[98]Stress, for instance, is not a problem: both compound and non-compound words have initial stress.

[99]The status of /e/ is controversial in the literature (cf. Nádasdy and Siptár 1994, Siptár & Törkenczy 2000). Some authors consider it harmonic rather than neutral (cf. Ringen 1988ab, Ringen and Vago 1995).

4.1.4.6. OCP effects, residual problems

In this section we discuss some residual problems concerning the vowel~zero alternations analysed above.

4.1.4.6.1. ‘Epenthetic’ stems

In section 4.1.1. I argued that the phonological mechanism responsible for the vowel~zero alternation in ‘epenthetic’ stems is not epenthesis, i.e. it is not phonotactically motivated. Nevertheless, I pointed out that there are certain phonotactic restrictions that hold between the consonants flanking the defective vowel of these stems. These are static well-formedness constrains that disallow morpheme-shapes that do not conform to them. They are repeated in (58) below:

(58) a. $*C_iV_uC_j$ if $C_i = C_j$
b. $*C_iV_uC_j$, if C_i, C_j = [-son], and only one of them has a laryngeal node[100]
c. $*CCV_uC$, $*CV_uCC$

Such constraints may appear unexpected since the consonants involved are non-adjacent. I suggest that all three constraints can be attributed to the transparency of the intervening defective vowel. Although the consonants flanking the defective vowel are not string-adjacent on the skeletal tier, their root nodes *are* adjacent since a V_d has no material below its X slot. Thus, constraints that apply to features and nodes below the skeleton can hold between consonants that are separated by a defective vowel.

Therefore, (58a) can be attributed to the OCP. On the root tier two identical consonants that are separated by a V_d would be a fake geminate (cf. e.g. Perlmutter 1995) and

[100]There seems to be a single exception, the ‘epenthetic’ verb *képez* ‘train’ [keː**p**ɛ**z**]: *képzés* ‘training’ [keː**bz**eːš], cf. Novák (1999).

would be banned by the OCP intramorphemically. Thus, the underlying representation of an 'epenthetic' stem could not contain the string in (59a) (where C_α is a consonantal root node dominating a particular feature tree):[101]

(59) a.

```
        N
        |
   X    X    X
   |         |
   Cα        Cα
```

b.

```
        N
        |
   X    X    X
    \       /
        Cα
```

The structure in (59b) could not occur in an 'epenthetic' stem either. Although (59b) conforms to the OCP and is well-formed, the defective vowel 'embedded' in the true geminate could *never* surface since Default V ((22)) could not apply to the V_d of (59b) because of the No-Crossing Constraint (NCC) ~~a~~ geminate integrity effect, cf. e.g. Kenstowicz and Pyle (1973), Schein and Steriade (1986), Yip (1987), Clements and Hume (1995). In order for (22) to specify the V_d in (59b) association lines would have to cross, which is banned by the NCC (e.g. Goldsmith 1976). Thus, an 'epenthetic' stem that has identical consonants separated by a V_d cannot be represented.[102]

Although the transparency of V_d plays a role in the other two phonotactic restrictions

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[101]This presupposes a 'strict' interpretation of the OCP in which it can be determined by inspecting a *single* tier whether a given configuration is an OCP violation or not (e.g. McCarthy 1988: 'Adjacent identical elements are prohibited.') rather than a 'loose' one under which the structural tier (such as the skeleton) to which the features/nodes concerned are anchored has to be examined as well (cf. Hewitt and Prince 1989: 'No melodic element may be structurally adjacent to an identical element'). Under the loose interpretation (59) would not be an OCP violation because the two C_α-s are not structurally adjacent (they are tier-adjacent, but their structural anchors, the X-slots in this case, are non-adjacent).

[102]It must be pointed out that, apparently, identical place nodes can occur on the two sides of a V_d in an 'epenthetic' stem (cf. 4.1.1. note 7). I have no explanation for this.

(58bc) as well, they cannot be derived from general constraints like the OCP or the NCC. (58b) is identical with the constraint which requires that adjacent obstruents must agree in voicing (cf. Siptár & Törkenczy 2000), i.e. that they either must share a laryngeal node, or neither should have one. What it shows is that for this constraint, adjacency must be defined on the laryngeal tier. (58c) is more problematic. It is easy to see why 'epenthetic' stems cannot end in more than one consonant (*CV_uCC). (a) This string would be unsyllabifiable if the stem is in isolation, or if it is followed by a consonant-initial suffix because of the restriction on the syllabification of a defective vowel ((23b)); (b) in a hypothetical stem ending in this string, the first one of the two stem-final consonants would always syllabify as a coda when a synthetic vowel-initial suffix follows: ..CV_uC}{C-V.. (as onsets may not branch). This means that the V_d would *always* surface since it would be parsed in a closed syllable and Default V would apply to it—consequently such a stem would not show vowel~zero alternation, which is what 'epenthetic' stems do by definition. The problem is that there is no similar reason for why consonant clusters do not *precede* the V_d in 'epenthetic' stems (*CCV_uC). Epenthetic stems containing this string could be syllabified in isolation (..C}{CV_uC}) and would display vowel~zero alternation, i.e. the defective vowel would not surface when a vowel-initial synthetic suffix is attached to the stem (...CC}V_u{C-V..).[103] It is not clear how the constraint could be explained.[104] We tentatively suggest that it may derive from the constraint excluding three adjacent consonants in Hungarian (which would then have to be formulated in terms of root nodes rather than X-slots), but here we leave this question open.

4.1.4.6.2. /t/-final stems

In the discussion of the accusative and the past tense suffix, both of whose consonantal melody is /t/, and which may receive a defective vowel by overparsing (both are Type B suffixes), we noted that such a linking vowel appears even if the stem ends in /t/ in spite of the fact that

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[103]Unless the cluster is impossible as a coda.

[104]In GP a principled explanation of similar phenomena in French was proposed by Charette (1990, 1991).

geminates are licit codas (cf. sections 4.1.2.2. and 4.1.4.4.). Consider the examples below:

(60)	**accusative**		**past (3sg indef)**	
	rét-et	'field'	vét-ett	'do wrong'
	hat-ot	'six'	hat-ott	'effect'
	szövet-et	'fabric'	szövet-ett	'make weave'
	lapát-ot	'shovel'	matat-ott	'fumble'

The question is why these forms have a linking vowel, i.e. why syllabification overparses the string consisting of the stem final consonant and the suffix when the suffixal consonant could be syllabified into the stem-final syllable as part of a well-formed branching coda: e.g. **rét-t* 'field' (acc.), **vét-t* 'do wrong' (3sg past indef), etc.

The accusative of /t/-final *lowering* stems (e.g. *hát-at* 'back' (acc.)) and the accusative forms or the singly suffixed past forms of *Ct*-final stems (e.g. *ezüst-öt* 'silver' (acc.), *ébreszt-ett* 'wake sb. up' (3sg past indef)) do not require a special explanation. They behave like all the other lowering stems and cluster-final stems (see sections 4.1.4.3 and 4.1.4.4.). It is the accusative and the past forms of non-lowering non-cluster-final stems like those in (60) that are problematic.

It would be desirable to avoid stipulating constraints that are specific to these stems and are not directly related to the general syllable template, and to be able to motivate the occurrence of the linking vowel with some general principle. It is tempting to find this principle in the OCP. I shall discuss a possible OCP-based account, but will point out that ~~be~~cause of some arbitrary complexities of the data and certain theoretical difficulties ~~it~~ is not possible to give an account which connects the OCP and syllabification/overparsing.

The fact that a linking vowel shows up in the accusative and the singly suffixed past forms of /t/-final stems can be interpreted as a repair of an OCP violation (which consists in the juxtaposition of two identical root nodes as a result of suffixation) if we assume that (i) the OCP is not only a constraint on lexical representations, but is effective in the derivation as well; and (ii) the OCP violation created by synthetic suffixation is not repaired by merging the identical root nodes into a true geminate. Given these two assumptions we could motivate why overparsing happens: fake geminates may not be parsed as a branching coda (e.g. re:t-$t_{OP}V_d$

→ {reː}{tV_dt}$_{OP}$$V_d$ [reːtet] 'field' (acc.)). This solution is attractive because it is in conformity with the fact that, *typically*,[105] true geminates are not created by concatenation in Block 1: in this block they are either underlying (*cigare**tt**a* /tˢigaretːa/ 'cigarette') or the result of spreading (e.g. *ha**t-t**al* /hat-val/ → [hɔtːɔl] 'with six', *ad-o**tt*** /adotː/ cf. 4.2.1 and 4.1.4.4).[106]

There are two problems, however: the first one concerns some data we have not examined yet and the second one is theoretical.

As shown in (60), the linking vowel is always present in the accusative and the singly suffixed past forms of /t/-final stems. The multiply suffixed past forms of /t/-final verbs (in which the past suffix is followed by another (vowel-initial) suffix[107]) behave in a complex and ad hoc way.

The generalization is the following: in these forms the past suffix appears without a linking vowel if the stem ends in the string *at/et*:

(61)		**singly suffixed form (3sg past indef)**	**multiply suffixed form (1sg past)**	**gloss**
	a.	ápolgat-**o**tt	ápolg<u>at</u>-t-am	'nurse repeatedly'
		emelget-**e**tt	emelg<u>et</u>-t-em	'lift repeatedly'
		várat-**o**tt	vár<u>at</u>-t-am	'make wait'
		dolgoztat-**o**tt	dolgozt<u>at</u>-t-am	'make work'

[105]The only exception, some multiply suffixed past forms, will be discussed below.

[106]By contrast, analytic suffixation may freely create (fake) geminates: ⟦ ⟦ *meg*⟧ ⟦*gátol*⟧ ⟧ [mɛgːaːtol] 'prevent', ⟦ ⟦ *ad* ⟧ *d* ⟧ [ɔdː] 'give' (imp. indef.), ⟦ ⟦ *bab* ⟧ *ban* ⟧ [bɔbːɔn] 'in (the) bean'. Note that true geminate consonants and fake ones are phonetically indistinguishable (both have a single release stage). Affricates are the only exception, because the first half of a fake geminate affricate may (optionally) be released too (e.g. [tˢtˢ]) while the first half of a true one may not (e.g. [tˢː] but *[tˢtˢ]). Compare (true) *viccel* [vitˢːɛl, *vitˢtˢɛl] 'joke', *gleccser* [glɛčːɛr, *glɛččɛr] 'glacier' with (fake) *bohóc-cipő* [bohoːtˢːipöː, bohoːtˢtˢipöː] 'clown shoe', *apacs csónak* [ɔpɔčːoːnɔk, ɔpɔččoːnɔk] 'apache boat'.

[107]Note that the accusative may not be followed by another suffix.

b.	faggat-**o**tt	faggat-t-am	'interrogate'
	dédelget-**e**tt	dédelget-t-em	'pamper'
	ugat-**o**tt	ugat-t-am	'bark'
	matat-**o**tt	matat-t-am	'rummage'

Otherwise, the past suffix shows up with a linking vowel:

(62)	**singly suffixed form (3sg past indef)**	**multiply suffixed form (1sg past)**	**gloss**
a.	vakí t-**o**tt	vakí t-**o**tt-am	'blind'
	hűsí t-**e**tt	hűsí t-**e**tt-em	'cool'
	taní t-**o**tt	taní t-**o**tt-am	'teach'
b.	bocsát-**o**tt	bocsát-**o**tt-am	'allow'
	tát-**o**tt	tát-**o**tt-am	'open wide'
	fűt-**ö**tt	fűt-**ö**tt-em	'heat'
	fut-**o**tt	fut-**o**tt-am	'run'
	köt-**ö**tt	köt-**ö**tt-em	'tie'
	süt-**ö**tt	süt-**ö**tt-em	'bake'

There are four exceptions to the generalization above. Two of them have a linking vowel in the multiply suffixed form although the verb stem ends in *at/et* (63a), and the other two do not have a linking vowel in the same form although the verb stem does not end in *at/et* (63b):

(63)	**singly suffixed form (3sg past indef)**	**multiply suffixed form (1sg past)**	**gloss**
a.	hat-**o**tt	hat-**o**tt-am	'effect'
	vet-**e**tt	vet-**e**tt-em	'sow'

b. lát-**o**tt   lát-t-am   ‘see’
   alkot-**o**tt   alkot-t-am   ‘create’

It is difficult to make sense of this pattern. It is not clear why verbs ending in *at/et* should behave differently from other /t/-final verbs. Note that it is not the morphological make-up of the stems that distinguishes those in (61) from those in (62). While in many of the relevant verb stems the *at/et* string is (part of) a derivational suffix (cf. (61a); *ápol-gat, vár-at, dolgoz-tat*, etc.), no such morphological complexity is obvious in others (cf. *faggat*, *ugat*, *matat* (61b)) and, furthermore, there *are* stems that end in a suffix among the /t/-final stems that do not end in *at/et* (cf. (62a); *vak-ít, hűs-ít, tan-ít*), too.[108] Thus, the reason for the differential behaviour is not morphological. There appears to be an arbitrary division in the set of /t/-final verbs.

If we want to keep the OCP as an explanation we have to assume that the merging of identical root nodes juxtaposed by suffixation in Block 1 *is* possible for the set of stems that end in *at/et.* This merging, however, is only possible if another suffix follows the past suffix. The singly suffixed past forms of all *at/et*-final stems, including the ones that allow merging in their multiply suffixed forms, have a linking vowel.

Even if we make some provision for the above complications, there are also theoretical problems with the idea that the OCP drives overparsing here.

(i) It is difficult to conceive overparsing, i.e. the insertion of a defective vowel by syllabification as a process that repairs an OCP violation. The reason is that the ‘repair’ would not eliminate the OCP violation: as defective vowels do not have phonological material below their skeletal point, the two identical root nodes (that of the stem final /t/ and the suffix-initial one) whose skeletal points the V_d separates as a result of overparsing would remain adjacent. This is a problem for all the three forms under consideration (the accusative, the singly and the multiply suffixes past forms of /t/-final stems). A possible way out is to say that here the ‘loose’ interpretation of the OCP is in force. In this case overparsing *would* be a repair since

[108] *-(V)gat/-(V)get* is the frequentative/diminutive suffix, *-(t)at/-(t)et* is the causative suffix and *-ít* is a denominal/deadjectival verb-forming suffix.

it would separate the structural anchors (the X slots) of the identical root nodes. Thus, they would no longer be in violation of the OCP (see note 101). This, however, would be in contradiction with the way the OCP is supposed to work in 'epenthetic' stems: there, crucially, the 'strict' interpretation is required (cf. 4.1.4.6.1). Allowing different interpretations of the same supposedly general principle within the same language ('"strict" in the lexicon, but "loose" in the derivation') would make the principle so unrestrictive that it would lose much/all of its explanatory power.

(ii) It might be argued that the 'loose' interpretation is possible in the derivation because overparsing is crucial in the elimination of the OCP violation. Default V will eliminate the violation even in the strict sense of the OCP and the V_d created by overparsing is necessary for Default V to apply. It must be pointed out, however, that not all V_d-s created by overparsing can syllabify. As Default V does not apply to those that do not, the OCP will be violated in the strict sense if the unsyllabified vowel is flanked by identical consonants. The syllabification algorithm predicts this state of affairs in the multiply suffixed past forms of the verb stems being discussed, which are supposed to derive like *loptam* as shown in (44) in section 4.1.4.4. Here the V_d created by overparsing between the verb stem and the initial /t/ of the past suffix eventually cannot syllabify. Thus, these forms violate the OCP in the strict sense even after Default V applies.[109]

Thus, we conclude that OCP-motivated overparsing is not a tenable account of the behaviour of the multiply suffixed forms of /t/-final stems. The OCP does play a role, however, but the repair is not overparsing. Let us assume a strict interpretation of the OCP and that in Hungarian it applies to underlying forms and to derived representations in Block 1 (but not in Block 2 and postlexically). OCP violations can be repaired in two ways: epenthesis (64) and merging (65) (where nonessential structure is suppressed and $root_V$ is the root node of a vowel):

[109]The stray erasure of defective material at the end of Block 1 creates an OCP violation in the loose sense too.

(64) $$\varnothing \rightarrow \begin{array}{c} \mathrm{X} \\ | \\ \mathrm{root}_{V} \\ | \\ \mathrm{vocalic} \\ | \\ [+\ \mathrm{open}_{2}] \end{array} \; / \; \begin{array}{c} \mathrm{X} \\ | \\ \mathrm{root}_{\alpha} \end{array} \_ \begin{array}{c} \mathrm{X} \\ | \\ \mathrm{root}_{\alpha} \end{array}$$

(65) $$\begin{array}{ccc} \mathrm{X} & \mathrm{X} & \\ | & | & \\ \mathrm{root}_{\alpha} & \mathrm{root}_{\alpha} & \mathrm{root}_{V} \end{array} \rightarrow \begin{array}{ccc} \mathrm{X} & & \mathrm{X} \\ & \diagdown \; \diagup & \\ & \mathrm{root}_{\alpha} & \quad \mathrm{root}_{V} \end{array}$$

Both rules are triggered by the OCP. (64) inserts a full vowel, and thereby can eliminate a violation. (65) achieves the same by creating a true geminate. We assume that these rules do not apply across an analytic boundary and that they are ‘morphological’ in the sense that they apply to the precompiled stem before phonological rules apply. Only (64) can apply to the accusative and the singly suffixed forms of /t/-final stems because (65) requires that there should be an adjacent vowel root node after the root of the second consonant in the input. (64) and (65) are in an elsewhere relationship, with (65) being the more specific rule. This predicts that only (65) applies to the multiply suffixed past forms. This is correct for items like those in (61) but not for those in (62). Therefore the latter stems (and *hat* and *vet*) have to be marked in the lexicon so that (65) may not apply to them, in which case (64) will.[110]

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[110] For a very different recent analysis of the same set of data, see Rebrus & Trón (in print).

4.2 Alternations involving consonants

4.2.1. Alternating v-suffixes: *-val/-vel*, *-vá/-vé*

There are two suffixes (instrumental *-val/-vel*: *só-<u>val</u>* ‘with salt’ and translative *-vá/-vé*: *só-<u>vá</u>* ‘(turn) into salt’) which begin with a [v] after vowel-final stems, but after stems ending in consonants, the segmental content of their initial consonant is identical with that of the stem-final consonant. The stem-final consonant and the initial consonant of the suffix are realized as a geminate only if the stem ends in a single consonant (cf. (66a)). These suffixes will be referred to as ‘alternating v-suffixes’. There are ‘non-alternating v-suffixes’ as well (such as *-van/-ven* ‘-ty’: *hat-<u>van</u>* ‘sixty’, deverbal noun-forming *-vány/-vény*: *lát-<u>vány</u>* ‘sight’, deverbal adverb-forming *lő-<u>ve</u>* ‘in the state of being shot’, *-va/ve: lop-<u>va</u>* ‘stealthily’), which are [v]-initial after vowel-final stems, but whose initial /v/ is unchanged/retained even after consonant-final stems (cf. (66b)).

(66)[111] a. **alternating v-suffix**

V_	VC_	CC_
nő-vel	csap-pal [pː]	domb-bal [mb]
Feri-vel	méz-zel [zː]	vers-sel [rš]
falu-val	léc-cel [t^{s}ː]	lánc-cal [nt^{s}]
lé-vel	kar-ral [rː]	férj-jel [rj]

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[111]Glosses: *csap* ‘tap’, *domb* ‘hill’, *falu* ‘village’, *Feri* < name> , *férj* ‘husband’, *fest* ‘paint’, *kar* ‘arm’, *lánc* ‘chain’, *lé* ‘juice’, *lő* ‘shoot’, *lop* ‘steal’, *méz* ‘honey’, *néz* ‘watch’, *nyom* ‘push’, *nyű* ‘wear down’, *old* ‘solve’, *rí* ‘cry’, *ró* ‘scold’, *nő* ‘woman’, *szem* ‘eye’, *tart* ‘hold’, *vers* ‘poem’, *zár* ‘lock’, *zeng* ‘resound’

b. **non-alternating v-suffix**

V_	VC_	CC_
lő-ve	lop-va [pv]	old-va [ldv]
ró-va	néz-ve [zv]	zeng-ve [ŋgv]
nyű-ve	nyom-va [mv]	tart-va [rtv]
rí -va	zár-va [rv]	fest-ve [štv]

The crucial analytical problem is how to distinguish the alternating v-suffixes from the non-alternating ones. The classical generative analysis was to set up an abstract underlying segment (usually /w/) as the initial consonant of the alternating v-suffixes while the non-alternating ones were considered underlyingly /v/-initial (cf. Szépe 1969, Vago 1980*a*). Autosegmental representation makes it possible to avoid this excessive abstractness. While the non-alternating suffixes are underlyingly /v/-initial, the alternating ones can be assumed to begin with an empty position that receives melody (by spreading) from the final consonant of the stem to which the suffix is attached. The result of the spreading is a geminate (*csap-pal* [čɔpːɔl]) which degeminates if the stem is cluster-final by an independently motivated process of general postlexical degemination that applies in the environment of another consonant (*domb-bal* (intermediate) dombːɔl → [dombɔl]). After vowel-final stems the position remains empty and is later specified as /v/ by default (*nő-vel* [nöːvɛl]). This idea is pursued by Vago (1989).[112]

Here, we propose a different analysis which obviates the need for the default rule and can explain some asymmetries in the working of the putative general degemination rule. We retain the basic idea of the autosegmental analysis, i.e. that the alternation is due to spreading melody from the stem-final consonant to a suffix-initial empty position, but we claim that the rule that spreads the stem-final melody is the same rule that applies to derive the geminate of the past tense suffix, i.e. we generalize /t/-spread (42) as (67), where C is any consonantal root:

[112]Vago uses moraic syllable structure (i.e. there is no skeletal tier), consequently, for him, empty positions are empty root nodes and not empty timing slots.

(67) C-spread

$$\begin{array}{ccc} X & X & X \\ | & | & \\ V_f & C & \end{array}$$

As (67) spreads the root node of a consonant to a following empty position only if the consonant is preceded by a full vowel, no rule of degemination is needed to account for cases like *domb-bal* [dombɔl]. In these cases (67) does not apply since its structural description is not met. This would explain why the putative degemination process is compulsory in this case while in other cases it is often optional and/or speech-rate dependent. What is compulsory is really the lack of gemination (i.e. spreading); it is only postlexical degemination, which is necessary for independent reasons and does not apply to the case at hand, which can be optional (cf. Nádasdy 1989*a*, Siptár & Törkenczy 2000, Siptár 2000, 2001*b*, 2002).

Assuming that (67) is responsible for the 'complete assimilation', I now examine the two related questions: how are alternating and non-alternating v-suffixes to be distinguished and what is the source of the surface [v] in the alternating suffixes after vowel-final stems. In principle the two kinds of v-suffixes may be distinguished (i) representationally, (ii) in terms of domains (i.e. the analytic vs. synthetic distinction), or (iii) with reference to a combination of (i) and (ii).

Let us assume (following Szépe 1969, Vago 1980a, 1989) that non-alternating v-suffixes have an underlying initial /v/ (68a). Suppose that alternating v-suffixes are different in that they begin with an empty timing slot (68b).

(68) a. *-va/-ve*

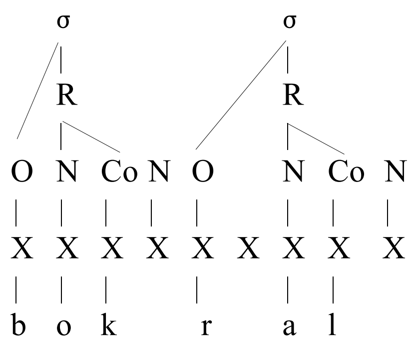
$$\begin{array}{cc} X & X \\ | & | \\ v & V_f \end{array}$$

b. *-val/-vel*

$$\begin{array}{ccc} X & X & X \\ & | & | \\ & V_f & l \end{array}$$

The non-alternating v-suffixes are certainly analytic, since they may be attached to any stem, regardless of the identity or the number of the stem-final consonants (cf. (67b)). Alternating v-suffixes, on the other hand, do display phonotactic interaction with the stem-final consonant and the maximum number of consonants that can arise as a result of the affixation is two. This suggests that they are synthetic. However, with these assumptions, i.e. that alternating v-initial suffixes are synthetic and begin with an empty timing slot, the analysis runs into serious difficulties. Recall that, as opposed to defective vowels, empty X-slots are invisible to syllabification until they receive segmental content, and as such they can float 'inside' a syllable, i.e. if an empty X-slot is preceded by a consonant and followed by a vowel, the consonant can syllabify 'across' the empty X-slot as an onset (cf. section 4.1.4.4). This invisibility is not a problem when an alternating v-suffix is attached to major stems like *csap*. The stem-final consonant could first syllabify as an onset to the suffixal vowel, but after the spreading, the stem-initial position would become visible and the resulting geminate would syllabify as an onset+ coda sequence (*csap.pal*). The problem arises when the alternating suffix is attached to an 'epenthetic' stem e.g. *bokor* 'bush'. The (intermediate) representation of the suffixed form would be the following after syllabification :

(69)



The stem-final consonant would syllabify as an onset ('across' the invisible X) and the stem-internal V_d of the 'epenthetic' stem would remain unparsed (since it cannot syllabify in an open syllable). The problem is that Default V (22) would not target the unparsed stem-internal V_f and consequently (67) could not apply because its structural description is not met (the spreading consonant is not preceded by a V_f). Thus, the predicted surface form would be *[bokrɔl] instead of the correct [bokoːɔl] (*bokorral* 'bush' (instr.)).

Assuming that alternating v-initial suffixes are analytic (and allowing (67) to apply both in Block 1 and Block 2) does not help either. The reason is that since Block 1 rules apply in the dependent domain too (cf. sections 2.2 and 4.1.4.5), the suffix-initial empty position would be deleted by the convention that defective material is erased at the end of Block 1 derivation (cf. 4.1.4.5). Thus, the (67) would have no chance to apply in Block 2.

In order to avoid these problems we propose that the difference between the two kinds of suffixes is not representational, but simply a difference of domains: both of them begin with an underlying /v/ (whose root node is associated to a timing slot) but alternating v-suffixes are synthetic while non-alternating ones are analytic (⟦ hat-val⟧ *hat-tal* 'with six' vs. ⟦ ⟦ hat⟧ van⟧ *hat-van* 'sixty'). We maintain that the assimilation is the result of spreading by (67), but claim that the empty timing slot targeted by (67) in the alternating suffixes is not underlying but derived by (70):

(70) *v-delink*

$$\begin{array}{cc} X & X \\ | & \nmid \\ C & v \end{array}$$

v-delink is a Block 1 rule that feeds (67). As it is a Block 1 rule, it is subject to the Derived Environment Constraint. Therefore, it does not apply in monomorphemic words containing postconsonantal /v/, e.g. *tviszt* 'twist', *szvetter* 'sweater', *özvegy* 'widow', *olvas* 'read', *szarv* 'horn', *könyv* 'book'. Neither can it apply to analytic /v/-initial suffixes (or in compounds whose second member is /v/-initial) since their initial /v/ is not postconsonantal within the analytic domain even when they are preceded by a consonant-final stem, e.g. ⟦ ⟦ *hat* ⟧ *van* ⟧, ⟦ ⟦ *lop*⟧ *va* ⟧, ⟦ ⟦ *ár* ⟧ ⟦ *ví z* ⟧ ⟧ 'flood', ⟦ ⟦ *át* ⟧ ⟦ *vág* ⟧ ⟧ 'cut through'. Assuming that the timing slot remains to be linked to the onset node after (70) delinks the /v/, i.e. that the onset 'branch' is only removed if the timing slot is also erased or if the nucleus is deleted (cf. Hayes 1989), (70) need not be ordered with respect to Default V (22). This is a crucial assumption, since if the X becomes dissociated from the syllable as a result of (70), then it becomes invisible to syllabification and we are back to the problem with the 'epenthetic' stems discussed above. This could only be remedied by ordering (70) after (22), because after Default V, 'epenthetic' stems can behave like major stems ending in VC (like *csap* as described above).

If the /v/ is underlying in alternating v-suffixes, there is no need for a default rule to insert it after vowel-final stems.[113] (70) simply does not delink it in these cases and thus C-spread is inapplicable (*nő-vel*).

Lowering stems behave just like non-lowering ones: (70) applies when they are followed by an alternating v-suffix; compare non-lowering *csap* (*csap-ok* 'taps') *csa*[pː]*al* 'with a tap' and lowering *fal* 'wall' (*fal-ak* 'walls') *fa*[lː]*al*. This suggests that (70) must be slightly modified to permit the delinking of the suffix-initial /v/ even if there is an intervening V_d between it and the last consonant of the stem:

(71) *v-delink*

$$\begin{array}{ccc} X & (V_d) & X \\ | & & \nmid \\ C & & v \end{array}$$

(67) must be modified in a similar way to optionally permit a V_d before the source and the target of the spreading. Note that the spreading does not result in line-crossing because defective vowels do not have root nodes.[114]

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[113]This is a desirable consequence since a default rule that inserts /v/ would only ever apply to the two alternating v-suffixes. This is hardly the general scope one would expect from a rule which in essence would mean '/v/ is the default consonant in Hungarian'. In Vago (1989) the default rule is made somewhat more general as it also applies in 'v-adding' stems too. These stems end in a vowel in isolation, but have a stem-final [v] before vowel-initial synthetic suffixes: *ló* 'horse' ~ *lov-ak* 'horses', *lő* 'shoot' (3sg pres. indef.) ~ *löv-ök* 'shoot' (1sg pres. indef.)). In the present treatment this is considered to be suppletive allomorphy, i.e. the phonology does not derive the allomorphs from a single underlying representation. There are only a small number of stems that show this /v/~∅ alternation (n= 19), which is sometimes (unpredictably) accompanied by changes in the quality and/or the quantity of the vowel in the stem-final syllable: compare *l*[öː] 'shoot' (3sg pres. indef.) ~ *l*[ö]*v-ök* (1sg pres. indef.): change in vowel quantity, but no change in quality, and *f*[öː] 'cook' (3sg pres. indef.) ~ *f*[öː]*v-ök* (1sg pres. indef.): no change in vowel quantity and quality; *l*[oː] ~ *l*[o]*v-ak* 'horses': change in vowel quantity, but no change in quality, and *t*[oː] 'lake' ~ *t*[ɔ]*v-ak* 'lakes': change in both vowel quantity and quality. Several forms have an alternative form in which the stem behaves as a regular vowel-final major stem: e.g. *szó* 'word' ~ *szav-ak/szó-k* 'words', *falu* 'village' ~ *falv-ak/falu-k* 'villages', etc. All this suggests that the alternation these stems display is non-phonological.

[114]In essence, the modified rules say that defective vowels are invisible to the two operations. Note that we could not attribute this invisibility to the convention that erases

(72) *C-spread*

$$\begin{array}{lll} X & X\ (V_d) & X \\ | & | & \\ V_f & C & \end{array}$$

To sum up, v-delink (71) and C-spread (72) apply when an alternating v-suffix is attached to a stem ending in a single consonant, and the resulting geminate syllabifies as a coda+ onset sequence in Block 1 (*csap.pal*). v-delink and C-spread do not apply in monomorphemic words like *olvas*, in analytic v-initial suffixes as in *hat-van*, and in alternating v-suffixes after vowel-final stems (*nő-vel*). In these words the /v/ syllabifies as an onset in Block 1: *ol.vas, hat.van, nő.vel.* v-delink applies but C-spread does not when an alternating v-suffix follows a cluster-final stem (including those ending in a geminate): /domb-val/ → /domb-⊗al/. The stem-final consonant syllabifies as an onset in Block 1 'across' the floating X which is erased at the end of Block 1 derivation. Lowering stems (*fal, talp* 'sole') behave analogously, except that the last consonant of those ending in a (surface) cluster can only syllabify as an onset in Block 2 after the stem-final V_d has been erased (by convention).

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defective material at the end of Block 1 because (i) the rules show derived environment effects and (ii) Block 2 application of (71) would neutralize the difference between alternating and non-alternating v-suffixes. This raises the question whether the convention should be 'split' in such a way that it could differentiate between defective vowels and empty slots. We do not pursue this option here.

4.2.2. *h*-alternations

There are two alternations involving the sound [h].[115] It can alternate (a) with zero: [h]~[⌀] (e.g. *cseh* [čɛ] 'Czech' vs. *cseh-es* [čɛhɛš] 'Czech-like'), or (b) with a voiceless velar fricative: [h]~[x] (*doh* [dox] 'musty smell' vs. *doh-os* [dohoš] 'musty'). It is unpredictable whether a morpheme that has an allomorph with a final [h] (e.g. [čɛ**h**-ɛš, do**h**-oš]) displays alternation (a) or (b). In all these words [h] appears prevocalically/in onset position. Otherwise (preconsonantally and word-finally), we get zero in the former set of items (henceforward *cseh*-type words) and [x] in the latter set (henceforward *doh*-type words). This is shown in (73) below:

(73)	***cseh* type**			***doh* type**		
	cseh	[čɛ]	'Czech'	doh	[dox]	'musty smell'
	cseh-től	[čɛtö:l]	'Czech' (abl.)	doh-tól	[doxto:l]	'musty smell' (abl.)
	cseh-es	[čɛhɛš]	'Czech-like'	doh-os	[dohoš]	'musty'

The context beyond the word is irrelevant, i.e. we do not get alternants with [h] preceding vowel-initial words in either type: *cseh asszonyok* [čɛɔs:onʸok, *čɛhɔs:onʸok] 'Czech women', *doh okozta* [doxokostɔ, *dohokostɔ] 'musty smell caused [it]'.

[h] and [x] never contrast in Hungarian. [h] cannot occur as a geminate, only [x] can (e.g. *fach* [fɔx:] 'pigeon-hole', *pech* [pɛx:] 'misfortune', *ahhoz* [ɔx:oz][116] 'to that', *Bachot* [bɔx:ot] 'Bach' (acc.). [x] occurs preconsonantally and word-finally (e.g. *doh* [dox], *doh-tól* [doxto:l] 'from [the] musty smell', *ihlet* [ixlɛt] 'inspiration', *jacht* [jɔxt] 'yacht'), while [h] only occurs in prevocalic position (e.g. *doh-os* [dohoš], *cseh-es* [čɛhɛš], *hol* [hol] 'where', *néha*

[115]We are abstracting away from two minor variations on the general pattern: the (postlexical) voicing of [h] between sonorants and vowels (e.g. *konyha* [konʸɦɔ] 'kitchen', *csehes* [čɛɦɛš] 'Czech-like'), and the (postlexical) fronting of [x] after front vowels (e.g. *pech* [pɛx̟:] 'misfortune'). See Siptár (1994*b*), Siptár Péter & Szentgyörgyi Szilárd (2002*ab*, to appear).

[116]*Ahhoz* can also be pronounced [ɔhoz].

[neːhɔ] ‘sometimes’, *nátha* [naːthɔ] ‘flu’).

Traditionally, the *cseh* type is considered to be the native pattern (cf. Deme 1961). This assumption was taken over by most generative accounts of the phenomenon (e.g. Vago 1980*a*, Siptár 1994*b*, Törkenczy 1994*a*). As there are no systematic constraints on the occurrence of vowels preceding the [h] in *cseh*-type words, and stems can end in the same set of vowels that can occur before a [h], *h*-deletion (rather than *h*-insertion) was assumed to apply in these words (preconsonantally and finally, or (equivalently) in the coda). Because of the complementary distribution between [h] and [x], *doh*-type morphemes were assumed to end in the same underlying segment as *cseh*-type morphemes and therefore had to be marked in the lexicon so as not to undergo the deletion rule (i.e. the *doh* type was considered exceptional). In these treatments, typically, /h/ is assumed to be underlying and all instances of surface [x] are derived by rule (but, in principle, this could be the other way round).

We claim that in present-day ECH it is the *doh* type that is the systematic pattern (cf. Siptár 1998*b*) rather than the *cseh* type, which we suggest is not phonological (anymore) and is best considered as suppletive allomorphy. The principal reason is that it is the *doh* type that is productive in the sense that (a) in ECH there is a tendency for *cseh*-type morphemes to be reclassified as *doh*-type items while the reverse is unattested (e.g. *méh* [meː]/[meːx] ‘bee’, but *eunuch* ‘id.’ [ɛunux], *[ɛunu]); and (b) new *h*-final items (loans and acronyms) are always of the *doh* type (e.g. *Hezbolla**h*** [hɛd^{z}bolːɔx(ː)] ‘id.’, *APEH* [ɔpɛx(ː)] < name of the tax office> , *BAH* [bɔx(ː)] < name of an intersection in Budapest> , etc.). Thus, while *doh*-type morphemes are an open class, there is only a single lexical item (*cseh*) that consistently represents the *cseh* type for all ECH speakers. The rest of the morphemes that are traditionally considered to belong to the *cseh* class show variation across ECH speakers or even within the speech of one and the same speaker (*juh* ‘sheep’, *méh* ‘bee’, *céh* ‘guild’, *düh* ‘anger’, *rüh* ‘scabies’, *éh-* ‘hunger’, *oláh* ‘Wallachian’), or have been reclassified as *doh*-type morphemes (*méh* ‘womb’, *?keh* ‘wheeziness’) or as vowel-final ones (*pléh* ‘tin’).[117]

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[117]Of the items that show variation some may be *doh* type only or *cseh* type only for a particular ECH speaker. In my own speech most of them clearly belong to the *doh* class (e.g. *méh* ‘bee’ [meːx], *méh-ek* [meːhɛk] (pl.), *méh-et* [meːhɛt] (acc.), *méh-től* [meːxtöːl] (abl.)). It can also happen that for the same speaker some forms of a given morpheme show *doh*-like behaviour while other forms of the same morpheme are *cseh*-like: for many ECH speakers *düh* behaves in this way: *düh* [düx], *düh-től* [düxtöːl, dütöːl] (abl.), *dühroham* [dürohɔm,

We conclude that only the *doh*-type alternation is phonological synchronically, and *cseh*-type morphemes have two underlying allomorphs, a consonant-final and a vowel-final one, whose selection is morphological. *Doh*-type stems, on the other hand, are always consonant-final. Given the complementary distribution of [h] and [x], a decision has to be made as to which of the two segments is underlying in these stems. We suggest that /x/ is the underlying segment since in this case the rule can be formulated as the delinking of the C-place node of /x/ in onset position. This is less arbitrary than the strengthening of /h/ into [x] since, if /h/ were taken to be underlying, and it were assumed to acquire DOR (and a C-place node) in the coda, then it would be impossible to identify the source of the DOR feature assigned by the rule as it is not (necessarily) present in the environment of the putative /h/-s in the relevant stems (cf. Siptár 1998*b*).[118]

The 'weakening' rule can be formulated as follows:

(74)
```
Onset
  |
  X
  |
[-son]
  ╪    \
C-place   [+ cont]
  |
 DOR
```

*düxrohɔm] 'a fit of anger'. Note that *éh-* is a bound stem that only occurs with (some) derivational suffixes and in compounds (e.g. *éh-es* [eːhɛš] 'hungry', *éh-ség* [eːxšeːg, eːšeːg] 'hunger', *éhkopp* [eːxkopː] '[go] hungry'). Inasmuch as *keh* occurs in ECH at all in isolation and before analytic suffixes, it is a *doh*-type stem (*?keh* [kex], *?keh-től* [kɛxtöːl] (abl.), *keh-es* [kɛhɛš] 'wheezy'). *Pléh* behaves exactly like vowel-final *vécé* 'loo': compare *pléh* [pleː], *pléh-k* [pleːk] (pl.), *pléh-t* [pleːt] (acc.), *pléh-től* [pleːtöːl] (abl.) vs. *vécé* [veːtˢeː], *vécé-k* [veːtˢeːk] (pl.), *vécé-t* [veːtˢeːt] (acc.), *vécé-től* [veːtˢeːtöːl] (abl.). For most speakers *oláh* is vowel-final, but, exceptionally, (for some speakers) Type A suffixes attach to it with a linking vowel: *oláh* [olaː], *oláh-t* [olaːt] (acc.), but *oláh-**ok*** [olaːok] (pl.) (see Papp 1975).

[118]It is to be pointed out that putative /h/ → [x] is also unnatural in the sense that it is 'strengthening' in the *coda*, i.e. in a lenition site. /x/ → [h] is somewhat better because here the 'weakening' often happens in intervocalic position, which is a typical lenition site (cf. Harris 1990, 1997). Note, however, that in this account, the latter event also happens in *initial onsets* where lenition typically does not take place. This is just as problematic as the strengthening in the coda in the alternative analysis.

The output of (74) is a placeless fricative. In order for [h] to be derived from the underlying /x/, we have to assume that a placeless [+ cons, − son, + cont] segment is phonetically implemented as [-cons, − son, + cont], i.e. an obstruent glide. This means that implementation in this case should be feature changing. In order to avoid this, we can assume that the segment underlying [h] and [x] is unspecified for [cons]. Given this assumption, (74) derives a placeless non-sonorant continuant (which is not specified for [cons]). The correct surface realizations are derived if we assume two implementation rules: (i) [-son, + cont, DOR] segments have to be implemented as [+ cons] and (ii) placeless non-sonorants as [− cons].

The non-application of (74) to a geminate /xx/[119] (i.e. the impossibility of surface [hː]) is an instance of geminate inalterability (cf. Kenstowicz and Pyle 1973, Perlmutter 1995). As the (74) explicitly refers to the timing tier, it is to be interpreted exhaustively, i.e. it does not apply to an input in which the segmental content is multiply linked to two timing slots (and is in coda and onset position at the same time), cf. Hayes (1986), Schein and Steriade (1986). This behaviour of geminate [xː] reveals another advantage of the /x/-based account over the /h/-based one. If /h/ were the underlying segment, surface [xː] would have to be derived from an underlying geminate /hh/. The rule that derives surface [x] from a coda /h/ would not apply to a geminate /hh/ because of geminate inalterability (the same reason as above). Note, however, that while non-application yields the correct surface result in the /x/-based account (since the unchanged underlying segmental melody is the attested surface melody), in the /h/-based account an extra rule (specific to /hh/) is needed to make sure that geminate /hh/ surfaces as [xː].

Thus, we conclude that /h/ is not an underlying segment in Hungarian. All instances of [h] are derived from /x/ (or more precisely /X/, which is unspecified for [cons]) by (74).

The rule is not postlexical because it does not apply across a word boundary (*doh okozta* [doxokostɔ, *dohokostɔ] 'musty smell caused [it]'). Given our assumptions about Block 1 and Block 2 derivation, this means that (74) is a Block 2 rule since it has to apply in nonderived environments (as well), e.g. in *holló* [holːoː] 'raven', *tehén* [tɛheːn] 'cow' and it is not a structure building rule. Assuming that (74) is a Block 2 rule makes the prediction that

[119]This notation is just shorthand for a single root node associated to two timing slots.

[h] (not [x]) occurs preceding vowel-initial analytic (i.e. Block 2) suffixes (like *-ig, -ért*, *-é*, *-ul/ül*, cf. Section 4.1.4.5.) in *doh*-type words since the stem-final /x/ is syllabified as an onset before a vowel-initial suffix in Block 2. If (74) were a Block 1 rule, [x] would be expected before vowel-initial analytic suffixes in these words because at the point when it applies, the stem-final consonant is still in the coda. It must be pointed out that native speaker intuitions/judgements (including my own) are uncertain on this point. While there are speakers who (claim to) pronounce *doh-ért* 'for musty smell' as [doxeːrt], others feel/make no difference between the pronunciation of the *h* in *bo**h**ém* 'bohemian' (monomorphemic), *do**h**-ot* (stem+ synthetic suffix) and *do**h**-ért* (stem+ analytic suffix). As no experimental evidence or large scale survey is available, we merely point out that the former pronunciation would be problematic since it would involve the application of a Block 1 rule in a nonderived environment.

4.2.3. Fast Cluster Simplification

Clusters consisting of more than two consonants may be simplified in fast speech (cf. Dressler and Siptár 1989, Siptár 1991, Törkenczy & Siptár 1999*ab*). Fast Cluster Simplification (FCS) is an optional postlexical deletion process that targets consonants flanked by consonants, i.e. it deletes the middle one of a sequence of three consonants, as the examples show below:

(75)	lambda	[lɔmbdɔ, lɔmdɔ]	'id.'
	asztma	[ɔstmɔ, ɔsmɔ]	'asthma'
	röntgen	[röndgɛn, röŋgɛn]	'X-ray'
	dombtető	[domptɛtöː, domtɛtöː]	'hilltop'

The first approximation of the rule expressing this process can be stated as (76):[120]

(76)

$$\begin{array}{c} X \\ | \\ C \end{array} \rightarrow \varnothing \;/\; \begin{array}{c} X \\ | \\ C \end{array} \_\_ \begin{array}{c} X \\ | \\ C \end{array}$$

FCS is postlexical as it can apply in monomorphemic words (e.g. *asztma, röntgen*) and across any boundary including synthetic (77a) and analytic (77b) affix boundary, and that between words in compounds (77c) and phrases (77d) (in (77) below the hyphens in the orthographical forms indicate affix boundaries and those between the constituents of compounds, and do not appear in normal spelling):

[120]I assume that by the time FCS applies postlexical Degemination has already applied, so at this stage words like ⟦ ⟦ *sakk* ⟧ ⟦ *tábla* ⟧ ⟧ 'chessboard', ⟦ ⟦ *test* ⟧ ⟦ *tartás* ⟧ ⟧ 'posture' ⟦ ⟦ *kis* ⟧ ⟦ *stí l*ű ⟧ ⟧ 'petty' only have intervocalic CC clusters and thus they do not fall under the purview of FCS.

(77)	a.	feszeng-t-em	[fɛsɛŋktɛm, fɛsɛŋtɛm[121]]	‘feel uncomfortable’ (1sg past)
		őrjöng-tek	[örjöŋktɛk, örjöŋtɛk]	‘go berserk’ (3pl past indef)
	b.	rend-ben	[rɛndbɛn, rɛmbɛn]	‘in order’
		paraszt-nak	[pɔrɔstnɔk, pɔrɔsnɔk]	‘for a peasant’
	c.	lomb-korona	[lombkoronɔ, lomkoronɔ]	‘foliage of a tree’
		test-nevelés	[tɛštnɛvɛleːš, tɛšnɛvɛleːš]	‘PE’
	d.	dob-d ki	[doptki, dopki]	‘throw (it) out’
		most pedig	[moštpɛdig, mošpɛdig]	‘and now’

Fast Cluster Simplification does not apply to all CCC clusters. For instance, it does not apply to the clusters shown in (78) below:

(78)	ámbra	[aːmbrɔ, *aːmrɔ]	‘ambergris’
	eszpresszó	[ɛspresːoː, *ɛsresːoː]	‘espresso’
	centrum	[t^sɛntrum, *t^sɛnrum]	‘centre’
	templom	[tɛmplom, *tɛmlom]	‘church’

The differential behaviour of words like those in (75) and (78) has been used to suggest that FCS is a syllable structure conditioned process. It has been claimed that it applies if C2C3 of a C1C2C3 cluster is not a well-formed onset (e.g. *lam**bd**a*), but it does not it C2C3 is a well-formed onset (e.g. cen**tr**um). In order to account for this pattern one could assume that there is an optional postlexical resyllabification process that moves the last consonant of a branching

[121]Apparently, the homorganicity requirement in nasal+ stop clusters (within an analytic domain) is not surface true (i.e. the output of FCS may violate it), though note that [n] is required to assimilate if FCS should create a [n]+ non-homorganic stop cluster: *röntgen* [röŋgɛn, *röngɛn], *rendben* [rɛmbɛn, *rɛnbɛn]. Curiously, [ŋ], an allophone of /n/, does not assimilate under the same circumstances: *feszengtem* [fɛsɛŋtɛm, *fɛsɛntɛm], *őrjöngtek* [örjöŋktɛk, *örjöntɛk].

coda into the onset of the following syllable. This process would be subject to the general well-formedness conditions and would be expected to block if the resulting onset is ill-formed—hence the FCS effect (cf. Dressler and Siptár 1989, Siptár 1991, Ács and Siptár 1994). This interpretation would be problematic for the present analysis since we claim that onsets may not branch in Hungarian (see Section 3.2.2). It is to be pointed out, however, that this position can be shown to be untenable (cf. Törkency and Siptár 1999*ab*): contrary to what is predicted by the above interpretation, FCS is not possible if C3 is a *continuant* even if C2C3 is *not* a possible branching onset (granting—for the sake of argument—that branching onsets exist in Hungarian and assuming that (most) occurring word-initial clusters are well-formed onsets):

(79)	handlé	[hɔndleː, *hɔnleː]	‘second-hand dealer’
	pántlika	[paːntlika, *paːnlika]	‘ribbon’
	kompjúter	[kompjuːtɛr, *komjuːtɛr]	‘computer’
	aktfotó	[ɔktfotoː, *ɔkfotoː]	‘nude photograph’
	pemzli	[pɛmzli, *pɛmli]	‘brush’ (n.)
	hangsor	[hɔŋkšor, *hɔŋšor]	‘sound sequence’

(79) shows that FCS does not apply if C3 is [+ cont] irrespective of the syllabic affiliation of the consonants in the cluster: compare *hangsor* [hɔŋkšor, *hɔŋšor] and *hangtalan* [hɔŋktɔlɔn, hɔŋtɔlɔn] ‘soundless, silent’. Therefore, we conclude that FCS is not sensitive to syllable structure (and is not a problem for our claim that onsets may not branch in Hungarian).

Thus, the reason why FCS does apply to the relevant clusters in (75), but does not apply to those in (78) and (79) is that in the former set of words the C3 of the C1C2C3 clusters is [- cont] while in the latter two it is [+ cont].[122]

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[122]There are sporadic examples in which FCS seems to apply although C3 is a continuant: e.g. *szoftver* [softvɛ(ː)r, sofvɛ(ː)r] ‘software’, *szendvics* [sɛndvič, sɛnvič] ‘sandwich’, *testvér* [tɛštveːr, tɛšveːr] ‘brother’, *mumpsz* [mumps, mums] ‘mumps’. There are two things to be noted here: (i) Some of the forms that appear to show FCS are actually lexicalized and are not the result of deletion at all. For instance, for many speakers *mumpsz* is [mums] regardless of the tempo. Note that the same cluster cannot be simplified in other items: *kolompszó* [kolompsoː, *kolomsoː] ‘sound of the cattle bell’; (ii) Most of the problematic examples that we have found have [v] as C3. One could use this fact to suggest that FCS is gradient rather than absolute: it is more likely to apply if C3 is [v] than with other continuants. Compare

There are two further conditions on the application of FCS. It does not apply if C1 is a continuant sonorant:

(80)	talpnyaló	[tɔlpn^{y}ɔloː, *tɔln^{y}ɔloː]	‘lackey’
	bazaltkő	[bɔzɔltköː, *bɔzɔlköː]	‘basalt stone’
	partner	[pɔrtnɛr, *pɔrnɛr]	‘id.’
	szerbtől	[sɛrptöːl, *sɛrtöːl]	‘from (a) Serb’
	sejtmag	[šɛjtmɔg, *šɛjmɔg]	‘cell nucleus’
	fajdkakas	[fɔjdkɔkɔš, *fɔjkɔkɔš]	‘blackcock’

It is not just the continuancy of C1 that matters here: note that FCS *can* apply if C1 is [+ son, −cont] (e.g. *röntgen* [röndgɛn, röŋgɛn]) or if it is [−son, + cont] (e.g. *asztma* [ɔstmɔ, ɔsmɔ]).[123]

FCS cannot apply either if C2 is a fricative or an affricate:[124]

dombtető ‘hilltop’, *dombvidék* ‘hilly region’ and *dombról* ‘from the hill’. In *dombtető* FCS is definitely possible [domtɛtöː], in *dombról* it is definitely not [*domroːl]; *dombvidék* [domvideːk] is intuitively somewhere in between. I leave this problem for further research.

[123]Naturally, it can also apply if C1 is [−son, −cont]: *receptkönyv* [rɛt^{s}ɛptkön^{y}v, rɛt^{s}ɛpkön^{y}v] ‘book of recipes’.

[124]In essence, this means that the target must be a plosive. It is not possible to test the behaviour of the various sonorants as C2 because they are either (i) unattested as C2, or (ii) if attested, are preceded by [+ cont] sonorants, which in itself blocks FCS (e.g. *modernkedik* [modɛrnkɛdik, *modɛrkɛdik] ‘act modern’ (3sg pres.), *szörnyben* [sörn^{y}bɛn, *sörbɛn] ‘in (a) monster’, *filmtől* [*filtöːl] ‘from (a) film’). [ç] and [ʝ] (which are—with a handful of exceptions—always the post-consonantal surface reflexes of imperative *-j*) present a further complication: they also seem to be omissible in environments where FCS otherwise blocks. Compare *Do**bj n**eki egy törölközőt!* ‘Throw her/him a towel! ‘and *Do**bj r**á egy törölközőt!* ‘Throw a towel on her/him!’. In fast speech deletion of C2 is possible in both cases ([dobʝnɛki/dobnɛki, dobʝraː/dobraː]) in spite of the fact that in the second FCS cannot apply since the target is followed by a continuant ([r]). We tentatively suggest that [ç] and [ʝ] are deleted by a separate optional process that targets [ç] and [ʝ] exclusively between any two consonants. Further empirical research is definitely in order.

(81)	szenvtelen	[sɛɱftɛlɛn, *sɛntɛlɛn]	‘indifferent’
	könyvtár	[kön^{y}ftaːr, *kön^{y}taːr]	‘library’
	eksztázis	[ɛkstaːziš, *ɛktaːziš]	‘extasy’
	Amszterdam	[ɔmstɛrdɔm, *ɔmtɛrdɔm]	‘Amsterdam’
	inspekció	[inšpɛkcioː, *inpɛkcioː]	‘inspection’
	obskurus	[opškuruš, *opkuruš]	‘obscure’
	lánctalp	[laːnt^{s}tɔlp, *laːntɔlp]	‘caterpillar track’
	táncdal	[taːnd^{z}dɔl, *taːndɔl]	‘popular song’
	parancsnok	[pɔrɔnčnok, *pɔrɔnnok]	‘commander’
	narancsból	[nɔrɔnǰboːl, *nɔrɔnboːl]	‘from (an) orange’

To sum up, FCS (75) is subject to three conditions: (i) C2, the target consonant, cannot contain the feature specification [- son, + cont], (ii) C3 must be [- cont] and (iii) C1 cannot be [+ son, + cont]. All three conditions must be satisfied in order for FCS to apply. This can be stated as (82)

(82)

$$\begin{array}{ccccccc} X & & & X & & X \\ | & \rightarrow \varnothing & / & | & \_\_ & | \\ C_\alpha & & & C_\beta & & [-\text{cont}] \end{array}$$

Condition: $C_\alpha \neq [-\text{son}, +\text{cont}]$
$C_\beta \neq [+\text{son}, +\text{cont}]$

Substrings of clusters longer than three consonants behave in the same way as clusters containing exactly three consonants. For instance, FCS cannot apply to the four term cluster in *foxtrott* [fokstrotː] ‘foxtrot’ because of the two potential targets (C2 and C3 of $C1\underline{C2C3}C4$), the first one cannot delete as it is [- son, + cont] ([*foktrotː]), and the second one cannot delete since it is followed by a [+ cont] segment ([*foksrotː]). By contrast, FCS can apply to C3 of the $C1C2\underline{C3}C4$ cluster in *karsztból* ‘from (a) karst formation’ [kɔrzdboːl, kɔrzboːl] since all the thee conditions are met (C2 cannot delete because it is [- son, + cont] and is preceded by a [+ son, + cont] segment [*kɔrdboːl]).

Like other fast-speech processes, the conditions are relaxed gradually and FCS generalizes to other CCC clusters as the tempo of speech increases (cf. Siptár 1991).[125]

FCS is a phonotactically motivated process but it is not conditioned by syllable structure. This suggests/confirms that phonotactics cannot be reduced to SSCs or syllabic organisation. We have already noted that some phonotactic regularities cannot be accounted for without reference to MSCs (cf. section 3.4). FCS, however, is a phonotactically motivated process unrelated either to syllable structure or to morpheme structure. It is only expressible in terms of string adjacency.[126]

Note that, although FCS is a phonotactically motivated process, it is not 'teleological' in the sense that it does not apply to avoid or repair an ill-formed string. The surface string that may not be an output resulting from FCS may be perfectly well-formed phonotactically (and attested otherwise): *eksztázis* [ɛkstaːziš] → *[ɛ**kt**aːziš] although *akta* 'document' [ɔ**kt**ɔ]; and *vice versa* the surface string that may be the output of FCS may not be attested otherwise, i.e. when it is not the output of FCS: *feszengtem* [fɛsɛŋ**t**ɛm] although otherwise *[ŋC] if C≠[k,g].[127]

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[125]Because of the lack of evidence, the exact way in which it happens must be the subject of future research.

[126]A similarly phonotactically motivated, but not syllable structure conditioned process that involves vowels rather than consonants optionally shortens [aː, eː] before consonant clusters if the second consonant of the cluster following [aː, eː] is [−cont] (cf. Törkenczy & Siptár (1999*a*). Compare (a) and (b) below:

a. Márta < name> [maːrtɔ, martɔ]
férges 'worm-eaten' [feːrgɛʃ, fergɛʃ]

b. Mátra < place name> [maːtrɔ, *matrɔ]
végre 'at last' [veːgrɛ, *vegrɛ]
vádli 'calf (of leg)' [vaːdli, *vadli]
hétfő 'Monday' [heːtføː, *hetføː]
vánszorog 'crawl' [vaːnsorog, *vansorog]

[127]Côté (2000) attempts to explain the constraints on this process (and ultimately all phonotactically motivated processes) with reference to perception cues.

Appendix A.

The feature composition of underlying segments

For ease of reference I list here the underlying segments in stems and suffixes in Hungarian together with their feature compositions that I assume in the analysis presented in the dissertation. The feature compositions shown here are identical with those in Siptár and Törkenczy (2000) and the reader is referred to that work for arguments for them. The reader must also bear in mind that the actual representations assumed are feature-geometrical (see section 2.2) and the matrices below are just shorthand for the corresponding feature-trees.[1] Naturally, in the formulation of the rules and regularities discussed in the dissertation, clear and overt reference is made to the feature geometry whenever it is crucial. Note that length is not represented in the charts below since quantity is considered as a structural property (to be represented on the timing tier) and not a melodic one. The surface vowel-pairs [ɛ, eː] and [ɔ, aː] are assumed to be melodically identical underlyingly, i.e. /e/ and /a/ respectively.[2]

(i) Consonants (see Siptár and Törkenczy 2000: 93)

	LABIAL					DENTAL								PALATAL								VELAR		
	p	b	f	v	m	t	d	s	z	t^s	n	l	r	t^y	d^y	š	ž	č	ǰ	n^y	j	k	g	x
R	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
[cons]	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
[son]	–	–	–		+	–	–	–	–	–	+	+	+	–	–	–	–	–	–	+	+	–	–	–
[nas]					+						+									+				
[lat]												+												
[cont]	–	–	+	+		–	–	+	+	±		+	+	–	–	+	+	±	±		+	–	–	+
L		•		•			•		•						•		•		•				•	
LAB	•	•	•	•	•																			
COR						•	•	•	•	•		•	•	•	•	•	•	•	•	•	•			
[ant]						+	+	+	+	+		+	+	–	–	–	–	–	–	–	–			
DOR																						•	•	•

[1]This is why in the case of affricates (which are assumed to be contour segments) the symbol '±' appears in the line [cont]: this is meant to be interpreted as a '–' in the 'left half' of the feature tree and as a '+' in the 'right half' and not as a third '±' feature value.

[2]For a discussion of some consequences of this assumption, see section 3.4.2.

(ii) Vowels in stems (see Siptár and Törkenczy 2000: 157)

	i	ü	u	ö	o	e	a
COR	•					•	
LAB		•		•			
DOR			•		•		•
[$open_1$]	–	–	–	–	–	+	+
[$open_2$]	–	–	–	+	+	+	+

(iii) Vowels in suffixes (see Siptár and Törkenczy 2000: 158)

	NON-ALTERNATING			ALTERNATING				
	i	eː	o	ü/u	ö/o	e/a	ö/o/e	ö/o/e/a
COR	•	•						
LAB				•	•			
DOR			•					
$open_1$	–	–	–	–	–	+	–	
$open_2$	–	+	+	–	+	+	+	+

Appendix B.

Lists

Note: exhaustive lists are marked [full]; the number of tokens (stems) in a given type appers in angled brackets: < >

(i) Monomorphemic stems containing three-member medial clusters

pšk *obskurus* [full]

psl *kapszli, mopszli, snapszli* [full]

pst *absztinens, szubsztancia* [full]

pst^s *obszcén* [full]

ptr *dioptria* [full]

ksh *exhibicionizmus, exhortáció, exhumál* [full]

ksk *exkommunikál, exkurzió, exkuzál* [full]

ksl *dakszli* [full]

ksn *fakszni* [full]

ksp *expanzió, expediál, expedí ció, experimentál, exponál, exponens, export, expozí ció, expozí ció* [full]

kst *eksztázis, extempore, extenzí v, exteriőr, exterritoriális, szextáns, szextett, textil, textus* [full]

kst^s *excellenciás, excentrikus* [full]

ktr *bliktri, direktrisz, doktriner, elektro-, oktrojál, spektrum* [full]

fst *bifsztek* [full]

skr *diszkrét* [full]

skv *biszkvit, diszkvalifikál, moszkvai, paszkvillus* [full]

spr *eszpresszó, veszprém* [full]

sth *keszthelyi, poszthumusz* [full]

stm *asztma* [full]

str	*adminisztratív, aposztrofál, asztrahánprémes, asztrakán, asztro-, ausztrál, ballusztrád-motívum, bisztró, esztrenga, gasztronómia, illusztráció, illusztris, indusztriális, kasztrál, katasztrális, katasztrófa, kosztros, magisztrátus, nosztrifikál, osztrák, osztriga, pasztrána, pesztra, pisztráng, plasztron, regisztrál* [full]
štr	*alabástrom, capistráng, destruál, flastrom, istráng, kimustrál, klastrom, ministrál, mustra, ostrom,* [full]
štv	*testvér* [full]
vdb	*luftballon* [full]
zdr	*puzdra* [full]
mbl	*embléma* [full]
mbr	*ambrózia, ámbra, embrió, membrán, rembrandt-film* [full]
mfl	*pamflet, strimfli* [full]
mpl	*gimpli, krumpli, komplekszum, komplett, komplex, komplexum, komplexus, komplé, komplikál, plömplöm, stempli, szimpla, templom, trampli, zempléni* [full]
mpr	*impregnál, impresszárió, impresszió, impresszum, imprimatúra, imprimál, improduktív, improvizál, kompresszor, kompromisszum,* [full]
mpt	*szimptóma* [full]
mst	*amszterdami* [full]
mzl	*pemzli* [full]
nčk	*trencskót* [full]
ndg	*avantgard, röntgen* [full]
ndl	*handlé, mándli, pemdlizik, svindli, vámdliz* [full]
ndr	*pondró, slendrián, szalamandra, tundra, condra, hipochondria, mándruc, plundra* [full]
ndv	*szendvics* [full]
nfl	*infláció, influenza, konfliktus, konflis* [full]
nfr	*infra-* [full]
nsf	*transzformáció* [full]
nsk	*ruszinszkói* [full]
nsp	*transzparens, transzponál, transzport* [full]
nšp	*konspiráció, inspekció, inspiciál, inspiráció* [full]

nst *dinsztel, dunsztol, falanszter* [full]

nšt *installáció, instancia, instál, konstans, konstantinápolyi, konstatál, konstábler, konstelláció, konsternáció, konstitúció* [full]

nst^{s} *transzcendens* [full]

ntl *pántlika* [full]

ntr *antracén, antracit, antropológia, centralista, centrifuga, centrum, dzsentri, filantróp, hózentráger, intranzigens, intráda, intrika, koncentráció, kontra, kontraktus, kontraszt, kontrol, mizantróp, premontrei* [full]

nt^{s}v *kifíruncvancigol ?* [full]

ŋgl *Anglia, konglomerátum, ringli, ringlispíl, ringló, stangli, tinglitangli, zsonglőr* [full]

ŋgr *kongresszus, csongrádi, gangréna, kongregáció, kongrua* [full]

ŋgv *disztingvál, pingvin, szangvinikus* [full]

ŋkf *frankfurti* [full]

ŋkl *inklináció, inkluzíve, konklávé, konklzió, onkli* [full]

ŋkp *pingpong* [full]

ŋkr *bankrott, inkriminál, konkrét, pankráció, szinkron* [full]

ŋkt *adjunktus, konjunktúra* [full]

ŋkt^{s} *disztinkció, funkció, interpunkció, szankció* [full]

ŋkv *inkvizíció* [full]

lfr *wolfram* [full]

lft *elvtike* [full]

lgr *Belgrád* [full]

lkl *folklór* [full]

lsk *szilszkin* [full]

lšt *colstok* [full]

ltr *altruista, filtrál, poltron, ultra* [full]

rbl *kurbli, ferbli* [full]

rdr *gardrób, ordré* [full]

rdv *mordvin* [full]

rgl *kvargli, smirgli* [full]

rkl *cirkli, verkli* [full]

rkm *türkmén* [full]

rkt *infarktus* [full]

rpr *interpretáció* [full]

rpt^s *abszorpció* [full]

rsl *arszlán* [full]

ršl *ferslóg, gersli, virsli* [full]

ršp *perspektíva* [full]

ršr *marsruta* [full]

rtl *pertli, svartli* [full]

rtn *partner* [full]

rtr *hipertrófia, portré, pertraktál* [full]

rt^{s}l *sercli* [full]

rtv *körtve, partvis* [full]

rxm *durchmars* [full]

jbn *rósejbni* [full]

jdl *vájdling* [full]

jgl *bejgli* [full]

jšl *pájsli, pejsli* [full]

jst *majszter* [full]

xth *lichthof* [full]

(ii) Monomorphemic free CC-final verb stems

Note: some if the items containing the codas /st, nt, lː/ are/may be analysed as polymorphemic

dː < 1> *fedd* [full]

d^{z}ː < 2> *edz, pedz* [full]

gː < 3> *csügg, függ* [full]

t^{s}ː < 1> *metsz* [full]

st < 117> *aggaszt, akaszt, alátámaszt, alvaszt, apaszt, áraszt, bágyaszt, biggyeszt,*

		bomlaszt, borzaszt, …
št	< 1>	*fest* [full]
zd	< 2>	*kezd, küzd* [full]
žd	< 1>	*esd* [full]
mt	< 1>	*teremt* [full]
(mz	< 1>)	*nemz* [full]
nt	< 100>	*bánt, biccent, billent, bont, bosszant, bólint, böffent, buffant, buggyant, csahint,…*
nd	< 4>	*csikland, fecskend, mond, örvend* [full]
nz	< 1>	*vonz* [full]
ŋg	< 51>	*állong, bolyong, borong, borzong, búsong, csapong, cselleng, cseng, csüng, dong, dühöng, dülöng, eseng, feszeng, fetreng, forrong, hajlong, hőzöng, hullong, ing, jajong, kering, kong-bong, lappang, lázong, leng, lézeng, mereng, ömleng, ődöng, őrjöng, rajong, ráng, ring, setteng, sikong, szállong, szorong, teng, teng-leng, tolong, töpreng, ujjong, verseng, villong, visong, zajong, zeng, zsibong, zsong, zsong-bong* [full]
(nl	< 1>)	*ajánl* [full]
lt	< 14>	*félt, kelt, kiált, költ, olt, ölt, rikolt, sikolt, süvölt, tilt, tölt, üvölt, vált, volt* [full]
ld	< 7>	*áld, fold, küld, old, száguld, told, told-fold* [full]
(lg	< 1>)	*uralg* [full]
lː	< 34>	*áll, csekélyell, dall, drágáll, furcsáll, fuvall, gyengéll, hall, hátall, hosszall, hull, javall, kall, kell, kevesell, későll, koráll, lövell, nagyoll, nehezell, pall, restell, rivall, rosszall, rühell, sarkall, sokall, sugall, száll, szégyell, szökell, vall, vénell, vétkell* [full]
rt	< 8>	*árt, ért, gyárt, irt, kísért, márt, sért, tart* [full]
rd	< 2>	*hord, kérd* [full]
rː	< 2>	*forr, varr* [full]
jt	< 19>	*bujt, ejt, fejt, felejt, fojt, gyújt, gyűjt, hajt, lejt, nyújt, ojt, óhajt, rejt, sejt, sóhajt, sújt, szakajt, szalajt, veszejt* [full]

(iii) Verb stems containing intervocalic vsi-clusters

Note: **Strict** examples have been set in bold, moderate examples have been underlined and endings have been CAPITALISED.

(a) vsi-cluster= non-geminate

n= 735

pt	< 5>	*csí pTET, kapTAT, adoptÁL, akceptÁL, kooptÁL* [full]
pf	< 2>	*cupfOL?, klopfOL* [full]
ps	< 1>	*abszolvÁL* [full]
pl	< 3>	*átcaplAT, táplÁL, kopLAL* [full]
pr	< 3>	*deprimÁL, töprENG, reprodukÁL* [full]
tk		*vetKŐZIK, követKEZIK, kotkodácsOL, hagyatKOZIK* ….
tv	< 1>	*ötvÖZ*, [full]
tl	< 1>	*csatlAKOZIK*? [full]
tr	< 3>	*kotrÓDIK, fetrENG, patronÁL* [full]
th	< 1>	*rothAD* [full]
t^yk	< 3>	*bütykÖL, lötykÖL, ügyKÖDIK* [full]
t^yv	< 1>	*kotyvASZT* [full]
t^ym	< 1>	*fitymÁL*, [full]
kt	< 12>	*affektÁL, annektÁL, bakTAT, ikTAT, diktÁL, kecsegTET, lükTET, nyugTAT?, paktÁL, praktizÁL, rugTAT, vágTAT* [full]
kt^s	< 1>	*akceptÁL* [full]
ks	< 2>	*fixí rOZ, maximÁL* [full]
kš	< 1>	*kuksOL* [full]
kv	< 1>	*likvidÁL* [full]
km	< 2>	*lakmárOZIK, tukmÁL* [full]
kl	< 9>	*akklimatizÁL, csakliZ, csiklandOZ, deklamÁL, érdeklŐDIK, öklEL, proklamÁL, reklamÁL, zaklAT* [full]
kr	< 1>	*akkreditÁL* [full]

bz < 2> *képzEL, tobzÓDIK* [full]

bž < 2> *habzsOL, lebzsEL* [full]

bl < 3> *öblÍT, téblábOL, szublimÁL* [full]

br < 7> *babrÁL, celebrÁL, ebrudAL, ébrED, fabrikÁL, vibrÁL, zabrÁL* [full]

dr < 1> *addresszÁL* [full]

d^yb < 1> *lögybÖL* [full]

gd < 2> *szökdEL, szökdécsEL* [full]

gz < 5> *egzaminÁL, egzecírOZ, egzisztÁL, rögzÍT, vegzÁL* [full]

gn < 7> *agnoszkÁL, dezignÁL, ignorÁL, impregnÁL, regnÁL, stagnÁL, szignÁL* [full]

gl < 2> *fogLAL, tagLAL* [full]

gr < 3> *degradÁL, emigrÁL, integrÁL* [full]

t^sk < 7> *dömöckÖL, evickÉL, kéredzKEDIK, lubickOL, packáZ, peckEL, pöckÖL* [full]

t^sm < 1> ***kecmerEG*** [full]

čk < 4> *fröcskÖL, pacskOL, pocskondiáZ, tapicskÁL* [full]

čm < 1> *becsmérEL* [full]

fl < 2> *caflAT, bifláZ* [full]

fr < 1> *lófrÁL* [full]

sp < 2> *diszponÁL, koszpitOL* [full]

st < 23> *adjusztÁL, asszisztÁL, bizTAT?, dehonesztÁL, desztillÁL, egzisztÁL, engesztEL, gesztikulÁL, invesztÁL, készTET, magasztAL, marasztAL, molesztÁL, neheztEL?, osztOZIK, piszterkÁL, predesztinÁL, pusztUL, tapasztAL, tisztEL, vesztegEL, vesztEGET, vigasztAL* [full]

sk < 24> *agnoszkÁL, alkalmazKODIK?, bámészKODIK, baszkurÁL, császkÁL, csimpaszKODIK, ereszKEDIK, fuoreszkÁL, foszforeszkÁL, hunyászKODIK, iszkOL, kapaszKODIK, mászkÁL, maszkírOZ, merészKEDIK, motoszkÁL, nyerészKEDIK, piszkÁL, poroszkÁL, prüszkÖL, reszkET, rugaszKODIK, tuszkOL, viszkET* [full]

sm < 3> *eszmÉL, piszmOG, szöszmötÖL* [full]

sl < 1> *észlEL* [full]

šp < 6> *aspirÁL, hospitÁL, náspángOL, prosperÁL, respektÁL, tespED* [full]

št < 14> *böstörKÖDIK, instÁL, istápOL, karistOL, kóstÁL, kóstOL, lósTAT, protestÁL,*

		pustOL, restELL, rostokOL, ***sisterEG****, testÁL, tüsténKEDIK* [full]
<u>šk</u>	< 10>	*ágasKODIK, <u>áskálÓDIK</u>, bóbiskOL, diskurÁL, dúskÁL, kapiskÁL, miskárOL, paskOL, <u>roskAD</u>, viasKODIK* [full]
<u>šm</u>	< 5>	***ismer****, ismétEL, kasmatOL, <u>pusmOG</u>, <u>susmOG</u>* [full]
<u>šl</u>	< 4>	*búslaKODIK?, <u>koslAT</u>, pislANT, <u>pislOG</u>?* [full]
<u>šh</u>	< 4>	*<u>keshED</u>, <u>kushAD</u>, <u>peshED</u>, <u>poshAD</u>* [full]
vl	< 1>	*szívLEL?* [full]
zd	< 3>	*?buzdÍT, mozdÍT, rezdÍT* [full]
<u>zg</u>	< 4>	*birizgÁL, <u>izgAT</u>, izgUL, <u>igazGAT</u>* [full]
zv	< 1>	*közvetÍT* [full]
<u>zl</u>	< 2>	*?<u>hízLAL</u>, ?<u>ízLEL</u>* [full]
žd	< 2>	*?pezsdÜL, pezsdÍT* [full]
<u>žg</u>	< 2>	*<u>babusGAT</u>, <u>rebesGET</u>* [full]
žm	< 1>	*prézsmitÁL* [full]
<u>žl</u>	< 1>	?*<u>vizslAT</u>* [full]
mp	< 16>	*amputÁL, csimpaszKODIK, extemporÁL,* ***hemperEG****,* ***hömpölyÖG****, imponÁL, importÁL, kámpicsorODIK, kalimpÁL, kompenzÁL, korrumpÁL, pumpOL,* ***sompolyOG****, szimpatizÁL, temperÁL, tempírOZ* [full]
<u>mt</u>	< 1>	*<u>nyomtat</u>?* [full]
mb	< 13>	*ambicionÁL, bömbÖL,* ***csámborOG,*** *dörömbÖL, gémberEDIK, himbÁL,* ***imbolyOG,*** *kombinÁL, különbÖZIK, rombOL, tombOL, zörömbÖL, zsémbEL* [full]
<u>mč</u>	< 2>	*<u>csámcsOG</u>, <u>csemcsEG</u>* [full]
mf	< 1>	*somfordÁL* [full]
<u>mž</u>	< 3>	*<u>hemzsEG</u>, karimzsÁL, körömzsÉL* [full]
<u>ml</u>	< 5>	*<u>emlEGET</u>, emlÍT, kémlEL?, szemLÉL?, számLÁL?* [full]
<u>nt</u>	< 31>	*argumentÁL, bántalmAZ?, <u>bünTET</u>, fontOL, frekventÁL, garantÁL,* ***henterEG****, intéZ, integrÁL, interjúvOL, internÁL, interpolÁL, interpretÁL, interveniÁL, intonÁL, kántÁL, kommentÁL, kontemplÁL, kurrentÁL, lamentÁL, orientÁL, parentÁL, plántÁL, plántÁL, poentírOZ, prezentÁL, reprezentÁL, tántorÍT,* ***tántorOG****, <u>tünTET</u>, <u>vonTAT</u>* [full]

ŋk < 16> *bánKÓDIK, berzenKEDIK, bosszanKODIK, ellenKEZIK, ficánkOL, hetvenKEDIK, konkurrÁL, kunkOG, kunkorODIK, lankAD, pironKODIK, rimánKODIK, settenKEDIK, sopánKODIK, tehénKEDIK?, tüsténKEDIK* [full]

nd < 41> *andalÍT, apprehendÁL, bandukOL, csendÜL, gondOL, gondOZ, gründOL, indÍT, indUL, kirándUL, komendÁL, kondicionÁL, kondoleÁL, kondUL, landOL, lendÜL, lendÍT, menDEGÉL, ondolÁL, penderEDIK, pendÜL, pocskondiáZ, rándÍT, rándUL, rekomendÁL, rendEL, rendÜL, sandÍT, skandÁL, spendírOZ, **sündörÖG**, szenderEDIK, szundÍT, szundikÁL, tendÁL, tündöklik, ugrándOZIK, undorÍT, vindikÁL, zendÜL, zsendÍT* [full]

ŋg < 21> *ácsingÓZIK, barangOL, böngÉSZ, csatangOL, csilingEL, dangubÁL, döngÖL, engED, engedelmesKEDIK, engesztEL, flangÁL, kurjonGAT, langallik, marcangOL, náspángOL, pingÁL, pironGAT, rongÁL, szoronGAT, tángÁL, tengŐDIK* [full]

nt^s < 13> *boncOL, cincÁL, cincOG, hancúrOZIK, hencEG, koncOL?, koncentrÁL, kuncOG, poncOL, ráncigÁL, szincerizÁL, toloncOL?, vihäncOL* [full]

nč < 7> *dancsOL?, incselKEDIK, **koncsorOG**, **kuncsorOG**, lincsEL?, pancsOL?, trancsírOZ* [full]

nf < 8> *dezinficiÁL, inficiÁL, informÁL, konferÁL, konferÁL, konfirmÁL, konfundÁL, **ténferEG*** [full]

ns < 4> *konszolidÁL, lanszírOZ, unszOL, vonszOL* [full]

nv < 8> *invesztÁL, invitÁL, involvÁL, konveniÁL, konvergÁL, konvertÁL, konverzÁL, szenvED* [full]

nz < 4> *inzultÁL, kompenzÁL, kondenzÁL, konzultÁL* [full]

nž < 2> *avanzsÁL, revanzsÁL* [full]

nl < 2> *kínlÓDIK?, színlEL?* [full]

nh < 1> *inhalÁL* [full]

n^{y}t^y < 1> *szontyolODIK* [full]

n^{y}d^y < 2> *göngyÖL, kalangyÁL* [full]

n^{y}v < 1> *senyvED* [full]

lp < 1> *kolportÁL* [full]

lt	< 10>	*álTAT, alterÁL, erölTET, inzultÁL, költÖZIK, konzultÁL, kultivÁL, mélTAT, öltÖZIK?, váltOZIK* [full]
lk	< 17>	*álmélKODIK,* ***alkot, alkuszik?****, bővelKEDIK, bujálKODIK, emelKEDIK, foglalKOZIK, gyilkOL, hivalKODIK, kalkulÁL, kalkulÁL, lelkendEZ, sivalKODIK, találKOZIK, veselKEDIK, viselKEDIK, vulkanizÁL* [full]
lb	< 1>	*kiakolbódÍT* [full]
ld	< 8>	*áldOZ, foldOZ, fuldoklik?, haldoklik?, koldUL, nyeldekEL,* ***oldalOG****, üldÖZ* [full]
lg	< 6>	*dédelGET?, dolgOZIK, hallGAT, latolGAT?, találGAT, vulgarizÁL* [full]
lt^{s}	< 1>	*lefalcOL?* [full]
lv	< 8>	*abszolvÁL, alvAD, devalvÁL, élvEZ, involvÁL, megnyilvánUL, olvAD,* ***olvas*** [full]
lm	< 10>	*alkalmAZ, bántalmAZ?, cirkalmAZ, dalmahODIK, diadalmasKODIK, fogalmAZ, forgalmAZ, sugalmAZ, szolmizÁL, tartalmAZ* [full]
ln	< 1>	***volna*?** [full]
rp	< 10>	*cirpEL, hörpINT, hörpÖL, horpAD, horpASZT, interpellÁL, interpolÁL, terpESZT?, torpAD, torpAN* [full]
rt	< 25>	*abortÁL, amortizÁL, artikulÁL, csörTET, deportÁL, dezertÁL, disszertÁL, érteKEZIK, értelmEZ, értesÜL, exportÁL, fertőZ, firTAT, importÁL, irtÓZIK, kertEL, kolportÁL, konvertÁL, portÁL, szortírOZ,* ***tartóz****TAT, tartOZIK,* ***történik****, törTET,* ***zsörtöl****ŐDIK* [full]
rt^{y}	< 6>	*fortyAN, fortyOG, hortyOG, szörtyÖG, szortyOG, vartyOG* [full]
rk	< 30>	*acsarKODIK, babirkÁL, birKÓZIK, böstörKÖDIK, botorkÁL, butkOL, cirkÁL, cirkalmAZ, cirkulÁL, érKEZIK, férkŐZIK, fürkÉSZIK, hamarKODIK, horkAN, horkOL, iparKODIK?, ismerKEDIK?, kérKEDIK?, kurkÁSZ, markírOZ, pirkAD, piszterkÁL, pörkÖL, sarkALL, serkEN, serkENT, szemerkÉL, szerkESZT, szurkOL, zárKÓZIK* [full]
rb	< 4>	*dorbézOL, turbékOL, verbuvÁL, zurbOL* [full]
rd	< 28>	*cserdÍT, cserdÜL, csikordUL, csordÍT, csorDOGÁL, csordUL, csurdÍT, dördÜL, érdekEL, fordÍT, fordUL, gardírOZ, gördÍT, gördÜL, hördÜL, irdAL, kérdEZ, koordinÁL, mordUL, ordibÁL, perdÍT, perdÜL, serdÜL, somfordÁL,*

tördEL?, verdes?, zördÍT, zördÜL [full]

rd^y < 1> *meggárgyUL* [full]

rg < 23> *argumentÁL, dezorganizÁL, dörgÖL, gargalizÁL, gurguláZ, háborGAT, hánytorGAT, hergEL, horgAD, horgOL, kapirgÁL, kergET, kergÜL, konvergÁL, kuporGAT, kurGAT, nyargAL, organizÁL, organizÁL, sürGET, tekergŐDZIK, vergŐDIK, zarGAT* [full]

rt^s < 10> *exorcizÁL, farcinÁL, gürcÖL, hurcOL, percENT, percipiÁL, porcOG, sercEG, sercEN, varcOG* [full]

rč < 1> *szürcsÖL* [full]

rf < 5> *cserfEL?, köntörfalAZ?, morfondírOZ, perfektuÁL, perforÁL* [full]

rs < 3> *forszírOZ, persziflÁL, perszonifikÁL* [full]

rš < 5> *harsAN, harsOG, hersEG, mérsékEL,* ***társalOG****, versENG* [full]

rv < 7> *hervAD, hervASZT, nyervOG,* ***örvend?****, sorvAD, sorvASZT, szervEZ* [full]

rz < 4> *borzONG, borzAD, borzOL, toporzékOL* [full]

rž < 6> *dörzsÖL, horzsOL, morzsOL, perzsEL, porzsOL, torzsalKODIK* [full]

rm < 14> *alarmírOZ, dermED, dermESZT, dörmÖG, förmED, harmonizÁL, informÁL, körmÖL?, konfirmÁL, mormOG, mormOL, permutÁL, szármAZIK, zsurmOL* [full]

rn < 2> *garnírOZ, internÁL* [full]

rn^y < 7> *ernyED, ernyESZT, görnyED, kornyikÁL, szörnyED, vernyákOL, vernyOG* [full]

rl < 5> *birLAL, érLEL?, porlAD?, súrlÓDIK?, törlESZT* [full]

rj < 15> *burjánZik, erjED, erjESZT, gerjED, kimarjUL, kurjANT, kurjonGAT, őrjÍT, őrjÖNG, sarjAD, sarjadzik, sorjáZ, terjED, terjENG, terjESZT* [full]

rh < 1> *archaizÁL* [full]

jp < 1> *selypÍT* [full]

jt < 6> *sajtOL, rejtŐZIK, fejtEGET, kojtOL,* ***kujtorOG****, folyTAT* [full]

jk < 3> *hajkurÁSZIK, sulykOL, vájkÁL* [full]

jd < 11> *bolydUL, bujdokOL?, bujDOS?, bujDOSIK?, gajdOL, jajdUL, kajdÁSZ, sajdÍT, sajdUL, sejdÍT, zajdUL* [full]

jg < 4> *bolyGAT, stájgerOL, totojGAT, zajGAT* [full]

js < 2> *hajszOL, majszOL* [full]

jš < 1> *hajsókÁL* [full]

jv < 1> *jajveszékEL?* [full]

jm < 2> *bajmOL, lejmOL?* [full]

jn < 2> *ajnárOZ, sajnÁL* [full]

jl < 5> *bajlÓDIK, fájLAL?, fejlESZT, fejlŐDIK, hajlONG* [full]

jh < 1> *megújhODIK*? [full]

(b) vsi-cluster= geminate

n= 281

pː < 24> *csappAN, cseppEN, csippENT, cuppAN, cuppASZT, cuppOG, frappírOZ, huppAN, klappOL, koppAN, koppANT, lappAD,* ***lappang****, leppEG, röppEN, süppED, szeppEN, szippANT, töppED, toppAN, toppASZT, toppESZT, zsuppOL, zuppAN* [full]

tː < 14> *csattAN, csattANT, csattOG, csettEN, csettENT, kattAN, pattAN, pattOG, ragadTAT, rettEG, rettEN, rettENT, suttOG, tetTET* [full]

t^{y}ː < 16> *fittyED, karattyOL, kettyEN, kettyENT, kettyINT, kottyAN, lottyAN, pittyED, pottyAN, pottyANT, rittyENT, suttyAN, suttyANT, szottyAN, tottyAN, zöttyEN* [full]

kː < 35> *akkomodÁL, akkumulÁL, bukkAN, csökkEN, csökkENT, kukkAN, kukkANT, kukkOL, meghökkEN, meghökkENT, mukkAN, nyekkEN, nyikkAN, okkupÁL, pukkAN, pukkANT, pukkASZT, rekkEN, rikkAN, rikkANT, rokkAN, rukkOL, sikkAD, sikkANT, sikkASZT, smakkOL, szikkAD, szökkEN, szikkASZT, tikkAD, tikkASZT, vakkAN, vakkANT, zökkEN, zökkENT* [full]

bː < 19> *csobbAN, döbbEN, döbbENT, dobbAN, dobbANT, fellebbEZ, gubbASZT, lebbEN, lebbENT, libbEN, lobbAN, lobbANT, meghibbAN, rebbEN, robbAN, robbANT, rokkAN, zsibbAD, zsibbASZT* [full]

dː < 2> *edDEGÉL, idDOGÁL* [full]

d^{y}ː < 5> *biggyED, biggyESZT, buggyAN, buggyASZT, roggyAN* [full]

gː	< 14>	*aggASZT, aggAT, aggÓDIK, csüggED, csüggESZT, faggAT, guggOL, higgAD, higgASZT, nyaggAT, nyeggET, raggAT, szaggAT, szuggerÁL* [full]
t^{s}ː	< 13>	*biccEN, biccENT, bliccEL, döccEN, koccAN, koccANT, koccINT, moccAN, pöccEN, pöccENT, ruccAN, spriccEL, truccOL* [full]
čː	< 9>	*becsiccsENT, feccsENT, fröccsEN, fröccsENT, loccsAN, loccsANT, reccsEN, reccsENT, traccsOL* [full]
ǰː	< 1>	*menedzsEL* [full]
fː	< 17>	*böffEN, böffENT, buffAN, buffogAT, diffamÁL, kaffANT, kaffOG, laffOG, leffEG, összeröffEN, pöffEN, pöffENT, pöffeszkEDIK, puffAD, puffAN, puffASZT, röffEN* [full]
sː	< 27>	*adresszÁL, asszimilÁL, bosszankODIK, bosszANT, csosszAN, csusszAN, deklasszÁL, disszertÁL, dresszírOZ, grasszÁL, masszírOZ, nyisszAN, nyisszANT, passzÍT, passzOL, pisszEG, pisszEN, prüsszEN, prüsszENT, prüsszÖG, sisszENT, szisszEN, szusszAN, szusszANT, tüsszEN, tüsszENT, tüsszÖG* [full]
šː	< 2>	*tussOL, tessékEL?* [full]
zː	< 8>	*duzzAD, duzzASZT, duzzOG, izzAD, izzÍT?, rezzEN, rezzENT, zizzEN* [full]
mː	< 9>	*brummOG, cammOG, hümmÖG, kommentÁL, kommunikÁL, nyámmOG, nyammOG, stimmEL, zümmÖG* [full]
n^{y}ː	< 8>	*dünnyÖG, fonnyAD, fonnyASZT, gunnyASZT, konnyAD, sunnyOG, szunnyAD, vinnyOG* [full]
lː	< 37>	*alliterÁL?, apellÁL,* **ballag**, *billEG, billEN, billENT, brillírOZ, cizellÁL, csellENG, csillAN, csillANT, csillapÍT, csillapODIK, csillOG, desztillÁL, düllED, düllESZT, füllED, füllENT, füllESZT, fullAD, fullASZT, gyullAD, illAN, illEG-billEG, illEGET, illESZT, kallÓDIK, kellET, pallérOZ, pillANT, tallÓZIK,* **vállal**, *villAN, villOG, villONG, züllESZT* [full]
r	< 16>	*cserrEG, csörrEN, csörrENT, csurrAN, csurrANT, durrAN, durrANT, durrOG, herrEG, kurrOG, surrAN, surrOG, virrAD, virrASZT, zörrEN, zörrENT* [full]
jː	< 4>	*süllyED, süllyESZT, ujjONG, vijjOG* [full]
xː	< 1>	*kehhENT* [full]

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Note: The symbol ✌ appears before titles that contain a detailed/comprehensive description of the phonotactic pattern of Hungarian.

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