The Root-Like Nature of Words with Truncated Stems

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1   Morphology and phonotactics

Phonotactic patterns in monomorphemic word forms (i.e., free roots) and polymorphemic word forms (here, suffixed words, but not compounds) can be considerably different. This is true of phonotactic regularities holding between consonants (CC), vowels (VC_0V) and vowels and consonants (VC_1, C_1V). For example, in English nasal+plosive CC clusters must be homorganic in roots (*ember* [mb], *window* [nd], *finger* [ŋg], *lamp* [mp], *hunt* [nt], *ink* [ŋk]) but do not have to be so across a morpheme boundary (*encase* [n-k], *lambkin* [m-k], *dreamt* [m-t], *banged* [ŋ-d]). Likewise, vowels before a root final consonant cluster must be short if the cluster is not coronal (*apt, strict, lapse, sex*), but can be long or diphthongal if the VCC cluster is polymorphemic (*seeped* [ɪjp-t], *baked* [ɛjk-t], *apes* [ɛjp-s], *nukes* [ʉwk-s]).[1] Similar differences between monomorphemic and polymorphemic phonotactics can be observed in Hungarian, too. The general homorganicity requirement on nasal plus stop clusters in roots hold here as well (*e*[mb]*er* 'human being', *po*[nc]) 'carp', *ra*[ŋg] 'rank'), but when the cluster is polymorphemic it is not necessarily homorganic (*tö*[m-t]*-em* 'stuff-PAST-1SG', *háro*[m-k]*or* 'three-TEMP', *lá*[ɲ-t] 'girl-ACC'. As for constraints between vowels and consonants, in a root the only long vowels that are permitted before a sonorant-initial consonant cluster are [aː] and [eː] ([eːrts] 'ore' *r*[aːmp]*a* 'ramp', *ʃ*[aːŋk] 'donut' [aːrp]*a* 'barley') while any long vowel is possible if a morpheme boundary breaks up the VCC sequence (*s*[iːn-t] 'rail-ACC', *k*[oːr-b]*an* 'disease-INE', *ʃ*[øː-bb] 'main-CMPR', *t*[yː-ŋk]*ént* 'needle-ESF'. Vowels in consecutive syllables (VC_0V) also behave differently: the string [+back]$C_0ε$ is excluded polymorphemically (in ordinary suffixation, see §3), since [ε] always alternates harmonically in suffixes (Siptár & Törkenczy 2000), but the same sequence is permitted within roots (*m*[aː]*gn*[ε]*s* 'magnet', *p*[uː]*d*[ε]*r* '(facial) powder', *ʃ*[o]*t*[ε]*l* 'arm-chair').

Two broad types of morpheme combination have been distinguished in the literature: type 1, known as synthetic or cohering or Level-1 or root-level or weak (+)-boundary affixation, vs. type 2, known as analytic or non-cohering or Level-2 or word-level or strong (#)-boundary affixation (e.g., Kiparsky 1982, Bermúdez-Otero 2011). On the one hand, it has typically been assumed that type 2 affixation is phonotactically looser than type 1 affixation and sets of affixes belong to one or the other of these types, and on the other, it has been occasionally suggested that there is no phonotactic/phonological difference between roots and polymorphemic forms with type 1 affixes (e.g., Kaye 1995).

Neither of these assumptions is generally true. The Hungarian examples above show that even root phonotactics is not necessarily stricter than polymorphemic phonotactics: VCC strings are more restricted in roots than polymorphemically but constraints on VC_0V strings are looser in roots than when the strings are polymorphemic. In this paper we focus on front/back harmony (a type of constraint on VC_0V strings) and discuss the properties of a single, unique morphological operation (diminutive truncation) which produces outputs that are like roots phonotactically and morphophonologically.

2   Vowel harmony and morphology

Two different morphologies can be distinguished in Hungarian. Generally, morphological operations are input-driven, that is, there is no upper limit on the size of words realised by strings of morphemes; we will refer to this morphology as *ordinary*. Stems and affixes can alternate, which may involve the quantity and/or quality of consonants and vowels, but in this type of morphology, segment–zero alternation is

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[1] There exist some exceptions to this generalisation: e.g., *chamber, hoax, traipse, James.*

limited to a single segment, i.e., only one vowel or one consonant may be deleted. The other type is output-driven, that is, templatic, where the size of word forms is limited, which can lead to the truncation of the stem. This type of morphology is restricted to diminutives in nominals,[2] the subject of this paper. As opposed to ordinary morphology where the size of the output is not, but the number of deletable segments is limited (to one), in *truncative* morphology, the size of the output word form is limited to two syllables and therefore in principle there can be no upper limit to the number of deletable segments.

Interestingly (and crucially to our argument), the two types of morphologies are different in the way they behave with respect to front/back harmony. Front/back harmony is stem-controlled in Hungarian. In ordinary morphology, suffixes alternate in backness unless they have a neutral vowel, [i], [iː], or [eː].[3] As shown in (1), harmonically back stems require the back-vowelled alternant of a suffix, front stems require the front-vowelled alternant. Suffixes containing nonalternating neutral vowels may follow both back and front stems. Generally, the vocalic makeup of a stem determines its harmonic class, but see (1b), where it is lexically determined by the stem. To facilitate the comparison with truncative diminutive forms, which are overwhelmingly two syllables long, we here limit the discussion to two-syllable words.[4]

(1) Suffixed forms

	BACK STEM + SUFFIX	FRONT STEM + SUFFIX
a. harmonic stem + harmonising suffix		
	back+back	**nonneutral front+nonneutral front**
	kor-n**ɑ**k 'age-DAT'	kør-n**ɛ**k 'circle-DAT'
	uːr-**to**ːl 'lord-ABL'	yːr-t**ø**ːl 'space-ABL'
	hɑj-**u**k 'hair-POSS.3PL'	hɛj-**y**k 'place-POSS.3PL'
b. neutral stem + harmonising suffix		
	neutral+back (antiharmonic roots)	**neutral+front**
	ʃiːr-**o**k 'grave-PL'	hiːr-**ɛ**k 'news-PL'
	tseːl-r**ɑ** 'target-SUBL'	seːl-r**ɛ** 'edge-SUBL'
c. stem + invariant neutral vowelled suffix:[5] no harmonic alternation		
	back+neutral	**front+neutral**
	kor-**i**g 'age-TERM'	kør-**i**g 'circle-TERM'
	hɑj-**e**ː 'hair-POSSR'	hɛj-**e**ː 'place-POSSR'

Suffixed forms imitate the vocalism of monomorphemic words in many, but not in all respects. Both suffixed and unsuffixed words may contain exclusively back or exclusively front vowels, shown in (1a) and (2a), respectively. Neutral vowels cooccur with both back and front vowels, as in (1b–c) and (2b–c). Back vowel(s) and [ɛ] or [ø] or [y][6] do not cooccur in a suffixed word form (or do so only vanishingly rarely). However, we do find such vowel combinations in monomorphemic word forms, resulting in two new categories: a larger set, (2d), which contains almost exclusively loans and a sparsely populated one, (2e), which contains only recent loans.

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[2] Templaticity also occurs in verbal frequentatives and other deverbal derivates, but verb stems are typically not truncated. When they do not fit the size of the relevant template they simply do not occur with the relevant suffix (Rebrus & Szigetvári 2025).

[3] Hungarian backness harmony is a system where some neutral vowels can alternate harmonically: in some suffixes neutral [eː] alternates with back [aː] (Törkenczy et al. 2013, Ozburn 2019).

[4] We disregard the rare cases of antiharmonic roots with non-neutral [ɛ], e.g., the bound stems [hɛrʊ-] 'wilt', [dɛrɛk-] 'waist', and the harmonically vacillating stem %[ʃpɛjz] 'larder'.

[5] In ordinary morphology back or front vowelled invariant suffixes also rarely occur (e.g., [-kor] TEMP, [-aːl], VRBZ, [-feːlɛ] '-type', [-sɛryː] '-kind'), which show non-canonical behaviour in other respects, too, see Rebrus & Törkenczy (2019). We here ignore these suffixes.

[6] Except in examples we omit vowel length because it is only the quality of vowels that is relevant in vowel harmony.

(2) Monomorphemic roots

	ROOT CONTAINING BACK VOWEL	ROOT CONTAINING ONLY FRONT VOWELS

a. harmonic roots (very frequent)

back+back   **nonneutral front+nonneutral front**
orsaːɡ 'country'   tykør 'mirror'
kɑpu 'gate'   tøːkɛ 'stock'
oros 'Russian'   ɛrɛs 'eaves'

b–c. stems with a neutral vowel (very frequent)

neutral+back   back+neutral   **neutral+front   front+neutral**
kiːɟoː 'snake'   forint 'forint'   siɡɛt 'island'   køːriʃ 'ash-tree'
peːldɑ 'example' tɑɲeːr 'plate'   feʃyː 'comb'   ɛɡeːr 'mouse'

d. harmonically mixed stems with [ɛ] (mainly loanwords; frequent)

[ɛ]+back   back+[ɛ]   **n/a**
tɛɑ 'tea'   fotɛl 'arm-chair'

e. harmonically mixed stems with [y] or [ø] (only recent loans; very rare)

[y]/[ø]+back   back+[y]/[ø]   **n/a**
nyɑns 'nuance' ʃoføːr 'driver'

We summarise the vocalic patterns of bisyllabic nouns and their type frequencies in (3). We only consider roots and inflected polymorphemic forms where both the stem and the suffix contain one vowel (there are no subsyllabic roots and we do not count forms with strictly consonantal or polysyllabic suffix alternants). The frequencies of forms are calculated from data in the Hungarian Webcorpus (Halácsy et al. 2004). A thick line separates the frequent patterns from the infrequent or unattested ones. Note that the difference between the vocalism of monomorphemic and polymorphemic word forms is found in (3ii), highlighted in the table: monomorphemic Bɛ and ɛB words are significantly more frequent than their polymorphemic counterparts (of which the former order is unattested and the latter is highly infrequent).

(3) Types of harmonic and disharmonic vowel sequences in bisyllabic nouns & their type frequencies
(B={ɑ/a, o, u}, F={i, e, ɛ, ø, y}, N={i, e})

	Harmony types	**monomorphemic** (within roots)		**ordinary polymorphemic forms** (monosyllabic stem+inflectional suffix sequences)			
i	back+back (BB) front+front (FF)	very frequent	5.3k 4.0k	very frequent	11k 12k	regular sfx. harmony	B+B F+F
	back+neutral (BN) neutral+back (NB)	very frequent	1.5k 1.4k	very frequent frequent	3.2k 450	invariable N-suffixes antiharmonic roots	B+N N+B
ii	back+semineutral (Bɛ) semineutral+back (ɛB)	frequent	250* 280	**unattested** **very rare**	0 7	no invariable ɛ-sfx. invariable B-suffix	B+ɛ ɛ+B
iii	back+non-neutr. front (By, Bø) non-neutr. front+back (yB, øB)	**very rare**	17** 13**	**unattested** **very rare**	0 2	no invariable. y/ø-sfx. invariable B-suffix	B+y/ø y/ø+B

* only loans, ** only recent loans

We have referred to words consisting of only back or only front vowels as harmonic. The combination of a back and a neutral vowel will also be considered as harmonic here, these are type (3i).[7] The rest fall into two further types: words containing the combination of a back and a "semineutral" vowel, that is, [ɛ], as in (3ii), are not strictly harmonic, but not fully disharmonic either, while those containing a back and nonneutral front vowel, that is, rounded [y] and [ø], as in (3iii), are disharmonic. It is the frequency differences shown in (3) and harmony phenomena other than phonotactics (transparency, the absence of invariable suffixes) that distinguish type (3ii) from both (3i) and (3iii). In the case of roots it is types (3i) and (3ii) whose frequency distribution is similar, while in the case of ordinary polymorphemic forms it is

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[7] This harmony type can be further divided into various subtypes (BB, FF vs. BN, NB), or even further subtypes according to the quality of N vowels ([i] vs. [e]) if needed, for instance, when other aspects of harmony such as the transparency of neutral vowels is considered, cf. Ringen & Kontra 1989, Hayes & Cziráky Londe 2006. Since transparency is not the main issue here we need not go into such detail.

types (3ii) and (3iii) that have a similar frequency pattern.

To account for the different behaviour of these three harmonic types we posit two *phonological* layers which are subject to harmonic constraints of different strengths, visualised in (6) and (7) in §4. The stricter one is the HARMONIC layer containing only word forms that are harmonic, that is, they only have front vowels or only back vowels and neutral vowels, this is harmony type (3i). Focussing on two-vowel patterns — since as we have already mentioned above the truncative diminutive forms to be discussed are all bisyllabic — this means the vowel patterns FF, BB, BN, NB (both monomorphemic roots and ordinarily suffixed word forms are considered). The looser one is the WEAKLY HARMONIC layer containing words of back vowels and [ɛ], that is, Bɛ and ɛB, harmony type (3ii), in addition to words of the HARMONIC layer. The rare types of disharmonic word forms, that is, words in which back vowels and front rounded vowels combine (By, yB, Bø, øB) do not belong to either of these layers but of course are part of the full set of words in the lexicon. Thus, these phonological layers are in a subsumptive (i.e., subset) relationship: the WEAKLY HARMONIC layer contains the HARMONIC layer, while the complete set of words of the language, which is harmonically unconstrained, contains the WEAKLY HARMONIC layer and, as a consequence, the HARMONIC layer. This relationship between layers is of the same kind as the one proposed for the Japanese lexicon by Itô & Mester 1995, 1999, 2009. There is an important difference though: in Japanese the layers are associated with lexical sets of words (e.g., Yamato, Sino-Japanese, Foreign) while in Hungarian they are associated with morphological operations, see §4 below.[8]

3   Nominal diminutive forms

Diminutive forms can be derived from noun, adjective, and numeral stems by both ordinary (that is, nontruncative) and templatic (truncative) morphology. We have shown examples of ordinary morphology in (1). In ordinary morphology, unless they have a neutral vowel ([i], [iː], [eː]), suffixes regularly alternate harmonically and there is no length restriction on the resulting derived or inflected stem. Ordinary diminutives, a subcase of ordinary morphology, are exemplified below in (4), where the suffixes alternate harmonically as expected ([-kɑ]~[-kɛ], [-tʃkɑ]~[-tʃkɛ). Since all these word forms are diminutives of a noun (occasionally an adjective or numeral) stem, we omit the gloss for the suffixes for the sake of brevity in (4) and (5).[9]

(4)   Ordinary diminutive word forms

	one-syllable stem	two-syllable stem	longer stem
-kɑ~kɛ	(laːɲ-kɑ 'girl-')	mɑlɑts-kɑ 'pig-'	kɑtɑlin-kɑ 'Catherine-'
	tsim-kɛ 'label'	tɛreːz-kɛ 'Theresa-'	ɛlɛmeːr-kɛ 'Elmer-'
-tʃkɑ~tʃkɛ	soː-tʃkɑ 'word-'	ɑnnaː-tʃkɑ 'Anna-'	gorillaː-tʃkɑ 'gorilla-'
	nøː-tʃkɛ 'woman-'	tsipøː-tʃkɛ 'shoe-'	teriːtøː-tʃkɛ 'cover-'
	dɑl-otʃkɑ 'song-'	pɑtɑk-otʃkɑ 'stream-'	diktaːtor-otʃkɑ 'dictator-'
	keːp-etʃkɛ 'picture-'	sigɛt-etʃkɛ 'island-'	tørteːnɛt-etʃkɛ 'story-'

As the examples in (4) show, ordinary morphology does not impose a limit on the length of the resulting word forms: they are added to stems of any length keeping those stems in their integrity. In addition, the diminutive suffixes involved have two harmonic alternants, one with a back vowel selected by back harmonic stems and another with a front vowel selected by front harmonic stems and the resulting forms are of the harmonic type, (3i).

Another type of diminutive forms is shown in (5).[10] In this case stems are potentially truncated. The material omitted in the output forms is enclosed in angle brackets (e.g., mɑgd⟨olnɑ⟩-uʃ means the stem [mɑgdolnɑ] is truncated and suffixed with the suffix [-uʃ] yielding the form [mɑgduʃ]).

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[8] Similarly to the case of Japanese, membership in a lexical layer corresponds to etymological source: the strictest layer contains the earliest, Finno-Ugric, Old Turkic, Early Old Hungarian items, the majority of weakly harmonic words were loans borrowed in or after the Middle Hungarian period, and rare disharmonic ones are international words borrowed recently (mostly from French via German or from Ancient Greek). Likewise, suffixes that show harmonic alternations date from the Old Hungarian period, while the rare non-neutral vowelled invariant ones are later developments.

[9] We do not indicate place or voicing assimilation occurring at morpheme boundaries.

[10] For a more extensive discussion of these forms, see Rebrus & Szigetvári 2021.

(5) Truncative diminutive word forms

	one-syllable stem	two-syllable stem	longer stem
-kɑ	(laːɲ-kɑ 'girl-')	joːʒ⟨ɛf⟩-kɑ 'Joseph-'	bor⟨bɑlɑ⟩-kɑ 'Barbara-'
	(taːl-kɑ 'plate-')	tɛr⟨eːz⟩-kɑ★ 'Theresa-'	tsɛr⟨uzɑ⟩-kɑ★ 'pencil'
-oː	baːc-oː 'elder brother'	jaːnoʃ~jɑn-oː 'John-'	kɑt⟨ɑlin⟩-oː 'Catherine-'
	ɑp-oː 'father-'	sɛnd⟨vitʃ⟩-oː★ 'sandwich'	tɛl⟨ɛfon⟩-oː★ 'telephone-'
-uʃ	ɑɲ-uʃ 'mother-'	kuc⟨ɑ⟩-uʃ 'dog-'	mɑgd⟨olnɑ⟩-uʃ 'Magdalene-'
	tsits-uʃ 'cat-'	mɛɲ⟨heːrt⟩-uʃ★ 'name'	pɛl⟨ɛɲkɑ⟩-uʃ★ 'diaper-'
-i	haʃ-i 'belly-'	dok⟨tor⟩-i 'doctor-'	ɑnd⟨rɛɑ⟩-i 'Andrea-'
	ʒol⟨t⟩-i 'male name-'	mik⟨loːʃ⟩-i 'Nicholas-'	tʃɛr⟨ɛʃɲɛ⟩-i 'cherry-'
-ɛs	botʃ-ɛs★ 'sorry-'	tʃɑb⟨ɑ⟩-ɛs★ 'male name-'	paːl⟨iɲkɑ⟩-ɛs★ 'brandy-'
	ɟør⟨ɟ⟩-ɛs 'George-'	pør⟨kølt⟩-ɛs 'stew-'	tsig⟨ɑrɛttɑ⟩-ɛs 'cigarette-'

The diminutives in (5) are different from the ordinary type illustrated in (4) in two important respects. For one thing, the output is uniformly two syllables long, which is achieved by truncating any stem longer than one syllable by deleting any number of syllables and adding a monosyllabic suffix: [tsigɑrɛttɑ] → [tsig-ɛs].[11] The other difference between these forms and those produced by ordinary morphology in (4) is that the truncating suffixes have a single alternant and the output may be harmonic like [bor-kɑ] or weakly harmonic like [tɛr-kɑ], the latter type marked by a star (★) in (5). A pertinent and particularly striking illustration of this difference is the fact that the back variant of the ordinary harmonically alternating diminutive suffix [-kɑ/kɛ] in (4) is homophonous with the truncative and invariant suffix [-kɑ] in (5), cf. the ordinary suffixed diminutive form [tɛreːz-k**ɛ**] vs. the truncative diminutive [tɛr-k**ɑ**], both of the same base. Since the diagnostic properties for distinguishing ordinary and templatic diminutives are truncation and harmony, we cannot decide for a diminutive form created by this suffix from a monosyllabic (nontruncated) back stem whether it belongs to ordinary or truncative morphology. This is indicated by parenthesising the relevant forms in (4) and (5).

4   Morphological operations and phonological layers

In order to account for the different (morpho)phonological properties (the vocalic phonotactics) of truncative diminutives vs. forms created by ordinary morphology, we propose that morphological operations are assigned to specific phonological layers in the sense that the output of these operations must conform to the phonological (phonotactic) constraints of the layer they are assigned to. There are three relevant morphological operations: (a) concatenation (as in ordinary morphology), (b) truncation combined with suffixation (as in truncative diminutives) and (c) the identity operation (cf. Kiparsky 1982), which associates monomorphemic items (roots) with a phonological layer. Ordinary morphology is associated with the HARMONIC layer, subject to the strictest constraints on harmony and thus only harmonic forms are part of this layer of the lexicon. Truncation with suffixation is associated with the harmonically looser, WEAKLY HARMONIC layer: since this layer subsumes the harmonic layer, truncative diminutives may be harmonic or weakly harmonic, see (5). Crucially for our main argument here, the identity operation is also associated with the WEAKLY HARMONIC layer, thus truncation results in forms that are root-like. The difference between the outputs of ordinary concatenative morphology and monomorphemic forms can be seen in the type frequencies in (3) and (7): monomorphemic roots are (very) frequent in harmony types (3i) and (3ii) while forms by ordinary morphology are highly infrequent in the latter type. Truncative diminutives are frequently weakly harmonic or harmonic and thus are phonotactically like roots, see (6).

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[11] In some cases a consonant is deleted even from a one-syllable stem: [ʒolt] → [ʒol-i]. Also note that some of the one-syllable stems in (6) are bound stems: [ɑp-jɑ] 'father-POSS.3SG' → [ɑp-oː].

(6) Harmonic layers: roots, ordinary and truncative morphology (frequent forms)

WEAKLY HARMONIC

MONOMORPHEMIC ROOTS

| kapu | kiːɟoː | tɛɑ |
| tykør | forint | fotɛl |

HARMONIC

ORDINARY MORPHOLOGY

| hɑj-uk | ʃiːr-ok |
| hɛj-yk | kor-ig |

TRUNCATIVE MORPHOLOGY

| bor-kɑ | tsits-uʃ | tɛr-kɑ |
| pør-ɛs | dok-i | paːl-ɛs |

Sporadically, there are forms in the lexicon that are external to the WEAKLY HARMONIC layer. These disharmonic forms of extremely low type frequency are typically roots or truncative diminutives rather than forms by ordinary suffixation. This is shown with examples in (7).

(7) Outside the harmonic layers: rare disharmonic forms[12]

UNCONSTRAINED

WEAKLY HARMONIC

MONOMORPHEMIC ROOTS

| *very frequent* | ***frequent*** |

nyɑns
ʃoføːr

HARMONIC

ORDINARY MORPHOLOGY

very frequent

TRUNCATIVE MORPHOLOGY

| *very frequent* | *frequent* |

%ʃyn-koː

| dɛrɛk-ɑ | ʃok-feːlɛ | ← ***very rare*** |
| øt-kor | kor-sɛ**r**yː | ← *very rare* |

↑
very rare

As seen in (7), all three morphological operations may extend beyond the WEAKLY HARMONIC layer, outside of which we find only a few disharmonic forms. The relevant difference between ordinary morphology on the one hand and truncative morphology and monomorphemic roots on the other is that the former is very rare outside the HARMONIC layer, that is, even in the WEAKLY HARMONIC layer, which is freely accessible for both truncative morphology and monomorphemic roots.

(8) Associations between morphological types and harmonic layers

ordinary morphology: concatenation   →   HARMONIC layer (rarely: unconstrained)

monomorphemic roots: identity

truncative morphology: template

WEAKLY HARMONIC layer (rarely: unconstrained)

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[12] Glosses: [nyɑns] 'nuance', [ʃofør] 'chauffeur', [ʃyn-koː] 'hedgehog-DIM', [dɛrɛk-ɑ] 'waist-POSS.3SG', [ʃok-feːlɛ] 'diverse, lit. many-type', [øt-kor] 'five-TEMP', [kor-sɛryː] 'modern, lit. era-like'.

5 Harmonic Uniformity

Let us now address an independent aspect of vowel harmony in which truncative diminutives are rootlike. Paradigmatic uniformity constraints ensure that members of a paradigm are phonologically similar to each other. Such constraints are invoked to explain when otherwise applicable phonological constraints nevertheless fail to apply (e.g., Steriade 2000, Kenstowicz 2005).

Harmonic Uniformity (HarUni) is a paradigm uniformity constraint on multiply suffixed word forms in Hungarian (Rebrus & Szigetvári 2016, Rebrus & Törkenczy 2017, Rebrus et al. 2023): it is not the stem that determines the harmonic properties of a word, but its *root*, thus all members of an extended paradigm (including derived forms in addition to inflected ones, cf. Steriade 2000) uniformly contain either front or back alternants of suffixes or both front and back alternants that vacillate. Most often HarUni applies vacuously, both the stem and the root of the word would be expected to select a suffix with the same alternant (e.g., in the case of a B+B or a F+F stem), but there are cases when they would not. Consider the examples in (9).

(9) The length of harmonic and antiharmonic stems

	front harmonic	**antiharmonic**
monosyllabic	hiːr-nɛk 'news-DAT'	ʃiːr-nɑk 'grave-DAT'
	seːl-nɛk 'edge-DAT'	t͡seːl-nɑk 'goal-DAT'
polysyllabic	ʒilip-nɛk 'sluice-DAT'	—
	steːleː-nɛk 'stele-DAT'	
	viteːz-nɛk 'knight-DAT'	
	ribizli-nɛk 'currant-DAT'	

All the roots in (9) contain neutral vowels ([i] or [e]) exclusively. Antiharmonic roots select back harmonic alternants of alternating suffixes, although they contain a front unrounded vowel. It is only monosyllabic roots that can be antiharmonic, polysyllabic roots containing neutral vowels are harmonic (this is referred to as the polysyllabic split by Rebrus & Törkenczy 2015, 2016). However, an antiharmonic root followed by a suffix containing a further neutral vowel results in a polysyllabic stem, which, due to HarUni, and contra the polysyllabic split, is also antiharmonic. Examples for the suffixation of both harmonic and antiharmonic polymorphemic stems are provided in (10).

(10) Multiple suffixation of monosyllabic roots
harmonic roots
a. friʃʃ 'fresh', friʃʃ-ɛk '-PL', friʃʃ-iːt-ɛk '-VRBZ-NDEF.1SG'
b. diːs 'decor', diːs-ɛk '-PL', diːs-iːt-ɛk '-VRBZ-NDEF.1SG', diːs-iːt-eːk-ɛk '-VRBZ-NMZ-PL'
c. seːl 'edge', seːl-nɛk '-DAT', seːl-eː '-POSR', seːl-eː-nɛk '-POSR-DAT'
antiharmonic roots
d. hiːg 'thin', hiːg-**ɑ**k '-PL', hiːg-iːt-**o**k '-VRBZ-NDEF.1SG'
e. ind-iːt[13] 'start-VRBZ', ind-iːt-**o**k '-NDEF.1SG', ind-iːt-eːk-**o**k 'motivations, lit. start-VRBZ-NMZ-PL'
f. t͡seːl 'goal', t͡seːl-n**ɑ**k '-DAT', t͡seːl-eː '-POSR', t͡seːl-eː-n**ɑ**k '-POSR-DAT'

To summarise, a monomorphemic stem containing two neutral vowels cannot be antiharmonic, but a stem may be so if the first syllable is itself a morpheme, the root, and the second one is another morpheme, a suffix. If that monosyllabic root is antiharmonic, then the bisyllabic stem created from it will be so too, according to HarUni, cf. (10d–f).[14]

Harmonic Uniformity applies in ordinary morphology, but, decisively for our argument, it does not in forms whose stem has been truncated. This is clearly revealed by comparing the ordinary and truncative forms in (11). HarUni affects the former, therefore the back alternant of the suffix is selected by a polysyllabic and polymorphemic stem containing two neutral vowels, like [hiːg-iːt]. The phonologically

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[13] The root [ind-] is bound, but cf. the intransitive form [ind-**u**l] 'start-VRBZ' ([ind-iːt] is transitive).
[14] There are further manifestations of HarUni involving transparency, and other generalisations (e.g., the selection of yodless harmonic allomorphs in possessive forms cf. Rebrus et al. 2017).

similar stems [rib-i] 'slut-DIM' and [ʃim-i] 'caressing-DIM', both polysyllabic and both containing two neutral vowels, are apparently morphologically similar, too: they are both polymorphemic. Nevertheless, they do not select a back vowel ([rib-i-rɛ] 'slut′-DIM-ALL', [ʃim-i-rɛ] 'caressing′-DIM-ALL') despite the fact that their roots, [ribɑnts] 'slut' and [ʃim-ogɑt-aːʃ] 'caressing, lit. smooth-VRBZ-NMZ', do so. This violation of HarUni occurs because the roots of [rib-i] and [ʃim-i] are truncated (indicated by the prime symbol in the headline of (11)). In effect then, these stems pattern with monomorphemic stems despite being morphologically complex.

(11) Harmonic Uniformity in ordinary morphology and its absence in truncative morphology

	ordinary morphology		truncative morphology		monomorph.
	root₁+sfx	root₁+sfx+sfx	root₂+sfx	root₂′+sfx+sfx	root₃+sfx
harmonic	N+**F** ⇒	N+N+**F**	NB+**B** ⇛	N⟨B⟩+N+**F** ⇐	NN+**F**
	diːs-ɛk	diːs-iːt-ɛk	ribɑnts-rɑ	rib-i-rɛ	tigriʃ-rɛ
antiharmonic	N+**B** ⇒	N+N+**B**	N+**BB**+**B** ⇛	N⟨BBB⟩+N+**F**	(*NN+B)
	hiːg-ɑk	hiːg-iːt-ok	ʃim-**ogɑt**-aːʃ	ʃim-i-rɛ	—
		↑		↑	
		HarUni		no HarUni, root-like harmony	

It is not only in the case of antiharmonic roots that a suspension of HarUni is observed. The harmony of Bɛ roots typically vacillates, that is, such a root can be followed by either the front or the back allomorph of harmonically alternating suffixes. Accordingly, the dative form of the name [aːgnɛʃ] may be both [aːgnɛʃ-nɛk] and [aːgnɛʃ-nɑk]. However, the truncative diminutive form of this name does not vacillate, it is exclusively back harmonic: [aːg-i-nɑk/*nɛk]. This is the expected behaviour of a Bi root (like [kaːdi-nɑk/*nɛk] 'qadi-DAT'), but not of a stem ([aːg-i]) whose root ([aːgnɛʃ]) is harmonically vacillating, since HarUni would require the derivate to vacillate, too, (12a). In the reverse direction, a nonvacillating back base, like the name [ʒolt] is back harmonic: ([ʒolt-nɑk]), as is its diminutive form [ʒol-i-nɑk]. Another diminutive form of the same name, [ʒol-ɛs], is nevertheless harmonically vacillating ([ʒol-ɛs-nɛk] or [ʒol-ɛs-nɑk] both occur), contra HarUni, but as is expected of a Bɛ root (like [notɛs-nɛk/nɑk] 'notebook-DAT'), (12b). Note that the first diminutive form, [ʒol-i], is expected to be back harmonic because of HarUni, but that is suspended here. Yet, Bi roots are generally back harmonic, hence [ʒol-i] is back harmonic, too. The name [kristɑ] is also back harmonic and does not vacillate. Its diminutive form [krist-i] is front harmonic, like a regular polysyllabic monomorphemic form, e.g., [kifli] 'bread roll', that is, it does not conform to HarUni either, (12c). The last name, in (12d), [fɛrɛnts], is front harmonic, but its diminutive, [fɛr-koː] is back harmonic, which again is against HarUni, but the norm for a root containing the same vowel pattern, like [mɛtroː] 'metro'.

(12) The nonapplication of Harmonic Uniformity in truncative morphology

		ordinary morphology root₁+sfx		truncative morphology root₁′+sfx+sfx		monomorphemic root root₂+sfx	harmonic constraints:
a.	**vacillating base**	Bɛ+**B/F**	⇛	B⟨ɛ⟩+i+**B**	⇐	Bi+**B**	← obligatory transparency of [i]
		aːgnɛʃ-nɑk/nɛk		aːg-i-nɑk/*nɛk		kaːdi-nɑk/*nɛk	
b.	**non-vacillating back base**	B+**B**	⇛	B+ɛ+**B/F**	⇐	Bɛ+**B/F**	← optional transparency of [ɛ]
		ʒolt-nɑk		ʒol-ɛs-nɑk/nɛk		notɛs-nɑk/nɛk	
c.		NB+**B**	⇛	N⟨B⟩+N+**F**	⇐	NN+**F**	← polysyllabic split
		kristaː-nɑk		krist-i-nɛk		kifli-nɛk	
d.	**non-vacillating front base**	FF+**F**	⇛	F⟨F⟩+B+**B**	⇐	FB+**B**	← opacity of back vowels
		fɛrɛnts-nɛk		fɛr-koː-nɑk		mɛtroː-nɑk	
				↑			
				no HarUni, root-like harmony			

It must be admitted that [fɛr-koː] would also be back harmonic if it were derived by ordinary morphology, since back vowels are obligatorily opaque, that is, never transparent: a front stem suffixed with an invariant back suffix will also be back harmonic ([ɛɟ-kor-toːl] 'one-TEMP-ABL'). This means that in their harmonic behaviour these (and all other) truncative diminutive forms pattern with monomorphemic roots (in some cases polymorphemic words also exhibit the same behaviour), but not (necessarily) with their own root, although this would be required by HarUni.

6   The viability of a root-like interpretation of truncative diminutives

The root-likeness of truncative diminutives is further motivated by various (partly independent) aspects of morphology and usage-based considerations. We list three of these in this section.

6.1   *Frequency of word forms*   One such motivation concerns the relationship between the base and the derived form in ordinary vs. truncative morphology. In truncative morphology the phonological distance between a free allomorph (occurring in the base) and the corresponding free or bound allomorph in the derived form is potentially much greater than in ordinary morphology measured by counting the segments or syllables in the longest common substring shared by the base and the derived form. As a result, the derived form resembles the base phonologically more in ordinary morphology than in truncative morphology. In addition, since any number of syllables can be "lost" from the base morpheme in truncative diminutives, whereas the base is essentially left intact by ordinary morphological operations,[15] the base is recoverable from the derived form with much more certainty in ordinary morphology making the derived form phonologically and therefore morphologically less clearly "related to" the base or part of the extended paradigm of the base in truncative diminutives. Furthermore, a base allomorph that occurs in the output of the morphological operation[16] is much more restricted in truncative morphology than in ordinary morphology: an allomorph that results from truncation only occurs in a diminutive form (typically in one, sometimes a few diminutives, and, of course, further forms derived from them by additional suffixes) while an ordinary base typically occurs in a wide range of functionally or morphosyntactically very different derived or inflected forms (again not counting forms with additional suffixes). For example, the truncated bound base [tɛr-] only occurs in a handful of diminutives ([tɛr-kɑ], [tɛr-ɑ], [tɛr-i], [tɛr-uʃ]) while the non-truncated[17] bound base [bokr-] of the free form [bokor] 'bush' occurs in many ordinary forms of a wide-range of functions or morphosyntactic values when the following suffix is vowel-initial (e.g., [bokr-ok] 'bush-PL', [bokr-ot] '-ACC', [bokr-om] '-POSS.1SG', [bokr-ɑ] '-POSS.3SG', [bokr-oz] '-VRBZ', [bokr-oʃ] '-ADJZ', etc.). We suggest that these properties conspire to make the output strings of diminutive truncation like roots (an independent base of their own paradigm, cf. Rebrus & Szigetvári 2016).

The monomorphemic interpretation of truncative diminutives is further supported by the frequency of monomorphemic forms in the lexicon. The output of truncation with suffixation is a bisyllabic stem, which we have argued is in many respects (morpho)phonologically very much like a monomorphemic root. As shown by (13) the probability of encountering monomorphemic items in the lexicon among bisyllabic nouns is significantly higher (54.1%) than among longer ones. The statistics of three- and four-syllable long ones is shown for comparison, where inflected forms, proper names and diminutives have been excluded from the count made by hand in the Hungarian Webcorpus (Halácsy et al. 2004).

(13) The probability of morphological complexity in nouns of varying length

length	root	all	root/all
2 syllables	4296	7948	54.1%
3 syllables	2278	14682	15.5%
4 syllables	1072	13991	7.7%

Assuming that native speakers are sensitive to the statistics of the lexicon (cf. Zuraw 2000, Ernestus & Baayen 2003, Hayes & Cziráky Londe 2006, Hayes et al. 2009), this distribution makes a monomorphemic

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[15] Modulo the effects of various (morpho) phonological rules (which may differ in generality).

[16] These output forms are usually bound in truncative morphology and usually free in ordinary morphology.

[17] Recall, the deletion of a single segment is possible in ordinary morphology.

interpretation of a bisyllabic item more likely when its internal morphological structure is less transparent and its phonological properties are similar to roots.

6.2 *Lexicalisation*   It is also noteworthy that while morphologically complex forms can occasionally be lexicalised, that is, acquire noncompositional meaning, this phenomenon appears to be more likely or wide-spread in the case of diminutive forms, especially but not exclusively in the case of common nouns. For example, [saːl] 'string' and [saːl-kɑ] 'splinter, lit. string-DIM', [pɑd] 'bench' and [pɑd-kɑ] 'roadside, lit. bench-DIM', [tsiːm] 'address' and [tsiːm-kɛ] 'label, lit. address-DIM', [moz-i] 'cinema, lit. moving-DIM'. In a number of cases native speakers are not even aware of the base of forms that look like and are indeed etymologically diminutives: [pɑ-tsi] 'horse-DIM', [mɑ-tsi] 'bear-DIM', [tsits-ɑ] 'cat-DIM', [noːz-i] 'nose-DIM', [ʃul-i] 'school-DIM', or look like but are not etymologically diminutives: [muci] 'swindle', [tuti] 'sure', [mɛloː] 'job', [biɟoː] 'thingy'. These facts square in well with the hypothesis that truncative forms are root-like, since lexicalisation is common in diminutive forms and (nominal) truncation only occurs in diminutive forms, too.

6.3 *Consonant clusters*   Truncation often affects the consonant or consonant cluster that follows the first vowel of the stem, at or near the truncation point. If there is a single consonant, it is never deleted before a vowel-initial diminutive suffix ([joːʒɛf][18] ~ [joːʒ-i], [joʒ-oː]; [kɑtɑlin] ~ [kɑt-i], [kɑt-ɑ], [kɑt-oː]). However, even a single consonant may be deleted before some consonant-initial suffixes ([joːʒɛf] ~ [jo-tsoː], [ʃɑroltɑ] ~ [ʃɑ-tsi]), but not before other consonant-initial suffixess ([juːlijɑ] ~ [jul-ʧi], [kɑtɑlin] ~ [kɑt-kɑ]). Consonant clusters always undergo simplification before consonant-initial suffixes ([borbaːlɑ] ~ [bor-kɑ], [bor-ʧɑ], including the absolute simplification of the cluster to zero: [nɑdraːg] 'trousers' ~ [nɑ-tsi]). In this brief overview we only consider the clusters before the most common diminutive suffix, [-i].

    Whether the consonant cluster before this suffix is simplified or retained in a truncated form depends on several factors, primarily its phonological makeup, that is, the category that the cluster belongs to. Homorganic nasal+plosive clusters (NT) are always retained. Clusters of other categories may be retained or simplified morpheme specifically (e.g., [norbɛrt] ~ [norb-i], [borbaːlɑ] ~ [bor-i]) and there are also categories in which all cluster types are simplified before diminutive [-i] (e.g., nasal+liquid, [imrɛ] ~ [im-i] or plosive+nasal, [aːgnɛʃ] ~ [aːg-i]). For the sake of simplicity, we limit the discussion to nongeminate plosive-final clusters in this paper, that is, NT, liquid+plosive (RT), fricative+plosive (ST), and nonhomorganic plosive+plosive clusters (PT). Some examples for diminutive forms with simplified and retained clusters are given in (14) with one type of cluster occupying each line.

(14) Retention and simplification of nongeminate plosive-final consonant clusters in truncative diminutive forms suffixed by [-i]

	cluster retained	**cluster simplified**
NT	ɑntɑl ~ ɑnt-i	—
	ɟøɲɟʋeːr ~ ɟøɲɟ-i	—
	hɑmburgɛr 'hamburger' ~ hɑmb-i	—
RT	aːrpaːd ~ aːrp-i	—
	norbɛrt ~ norb-i	borbaːlɑ ~ bor-i
	maːrtɑ ~ maːrt-i	børtøn 'prison' ~ bør-i
	olgɑ ~ olg-i	dolgozɑt 'composition' ~ dol-i
	—	turkaːloː 'second-hand shop' ~ tur-i
ST	gɑzdɑ 'master' ~ gɑzd-i	—
	izgɑlmɑʃ 'exciting' ~ izg-i	mozgoː 'moving' ~ moz-i 'cinema'
	iʃtʋaːn ~ iʃt-i	tɛʃtnɛʋeleʃ ~ tɛʃ-i 'P. E.'
	—	iʃkolɑ 'school' ~ iʃ-i

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[18] All the unglossed examples in this section are given names and their diminutive forms.

PT   mɑ**gd**olnɑ ~ mɑ**gd**-i   ru**gd**ɑloːzoː 'rompers' ~ ru**g**-i
—   ʃɑ**pk**ɑ 'cap' ~ ʃɑ**p**-i
—   zɑ**ʧk**oː 'sac' ~ zɑ**ʧ**-i

We can see that in many cases the same cluster is retained in some truncated stems and simplified in others. Nevertheless, the retention and simplification of these clusters is not totally random. The likelihood of their simplification correlates with their markedness: the more marked a cluster, the more likely it is to be simplified (Rebrus & Szigetvári 2022). Our markedness metric is the ratio of cluster types of a given cluster category that are found in roots to all potential cluster types in that category (see (15a)). The least marked category of clusters is NT, since all potential types ([mp], [mb], [nt], [nd], [nʦ], [ɲʧ], [ɲc], [ɲɟ], [ŋk], [ŋg]) occur in roots. In contrast, only half of all potential ST clusters are found in intervocalic position in roots (and only a sixth word finally, but this is not relevant for the present comparison, since these clusters, when retained, are between vowels in truncative diminutives). The percentage in (15b) is the ratio of cluster types that are retained in truncated stems to all cluster types of the given category found in the stems of truncative diminutive forms. When a cluster type exhibits both simplification and retention, like many of those in (14), it is counted with a weight of 0.5.[19]

(15) The ratio of cluster types in roots and in truncated stems

	least marked		↔	most marked
	NT	**RT**	**ST**	**PT**
a. **root internal:**	100%	95%	50%	38%
b. **truncative forms:**	100%	65%	56%	14%

All NT clusters (100%) are retained, they are never simplified by truncation. This is parallelled by the fact that all potential NT clusters are available in roots. At the other end of the scale, the majority of PT clusters are simplified during truncation (only 14% are retained) and, likewise, the majority of potential PT clusters do not actually occur in the language (only 38% occur). The other two categories, RT and ST are located between these two extremes both in markedness and in likelihood of cluster simplification in truncation. The decrease is monotonous in both respects. It is important to point out that the simplification of a given cluster does not depend on whether that cluster occurs in roots in the first place, after all, if a cluster does not occur in any root, there is nothing for truncation to simplify! Rather, it is the *likelihood* of cluster simplification that correlates with the markedness of the cluster category that the given cluster belongs to: the more marked a cluster is based on its occurrence in roots, the more likely it is that it simplifies in truncation. This correlation provides further corroboration for our claim that truncative morphology creates word forms that imitate roots, in the present case in the consonantal phonotactics of roots.

7   Conclusion

The properties of vowel harmony in truncative diminutive forms in Hungarian exhibit a root-like character. On the one hand, they have vowel sequences that are similarly harmonic or they have the same degree of disharmonicity, on the other, truncative diminutive forms do not observe Harmonic Uniformity, unlike other polymorphemic words. In addition, the consonantal phonotactics of truncative diminutives resembles roots in that while it is not fully predictable when a cluster is simplified in truncation, this still correlates with the frequency of the given cluster in roots. Furthermore, monomorphemic words are a minority among three-syllable and longer words, while they are a majority among two-syllable words,[20] which is the size of the template of truncative diminutive forms. All these factors liken truncative diminutives to roots.

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[19] For example, of 13 RT clusters found in truncated stems, 5 are always retained, 7 are variable, and 1 is always simplified. This gives the ratio (5 + 7 × 0.5) / 13 = 65%.
[20] And also obviously among one-syllable long words.

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