

Linking vowels define paradigm classes in Hungarian

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abstract: In both nominal and verbal paradigms of Hungarian a vowel may occur between the stem and the suffix. The presence and the quality of this vowel is determined by a wide array of phonological, morphological, lexical, even syntactic and semantic factors. In this paper we argue that this vowel functions as a paradigmatic class marker and that this status is responsible for the differences in the behaviour of linking vowels and other vowels in suffixes.

keywords: linking vowel, thematic vowel, paradigm class, declension, conjugation, vowel harmony, Hungarian

Most theoretical approaches to morphophonology share the assumption that morphophonological systems are not homogeneous in that morphemes may differ in status lexically (that is, arbitrarily). Different models handle this difference in formally different ways: with different segmental boundaries (e.g., Chomsky & Halle 1968), by circumscribing different phonological domains for phonological processes (e.g., Kaye 1995) and/or lexically assigning morphological and phonological rules to different levels (e.g., Kiparsky 1982, 1985). The description and analysis of Hungarian morphophonological phenomena also requires distinction between more than one affix-specific level. Generally, we need to distinguish a synthetic (Level 1) and an analytic (Level 2) system, which host different morphophonological processes/patterns (e.g., Siptár & Törkenczy 2000). For a detailed analysis of the data it may be necessary to refer to further systems in addition to these two prototypical systems of affixation. It must be noted that any such division within a system is necessarily arbitrary since in this case the status of a morpheme is not uniquely determined by its morphological or surface phonological properties (although there may be weaker or stronger correlations between these properties and membership in a particular system).

In this paper we use the complex behaviour of linking vowels to show that in the grammar of Hungarian it is necessary to distinguish two such morphological systems whose scopes roughly correspond to those of the analytic vs. synthetic domains. Rebrus et al. (in press) argue that the complex behaviour of linking vowels does not lend itself readily to the usual morpheme-based input–output approach in which the concatenation of (the abstract representation of) morphemes and the application of phonological rules to these objects generates the grammatical (surface) forms. Instead, a paradigm-based approach may be advantageous which is based on full word forms and in which allomorphic relations within and across paradigms are expressed by similarities (analogical connections) between these word forms (e.g., Blevins 2016, Blevins & Blevins 2009). Such an approach applied to the problem of linking vowels must explain what systemic analogical connections obtain between

the relevant forms and how these connections are manifested in the quality of linking vowels and other vowels in suffixes.

In this paper we argue that a *paradigmatic system* is responsible for the quality of linking vowels which is partially independent of vowel harmony while quality of the other, non-linking vowels of harmonically alternating suffixes is governed by a *harmonic system*. Forms that are under the purview of the paradigmatic system are based on word forms, that is, principal parts with linking vowels displaying quaternary, non-high vowel alternation (“thematic vowels” such as the linking vowel *-o~a~e~ö-*¹ of plural nominals). By contrast, forms with ternary suffixes, which are subject to backness and rounding harmony, are the basis of, that is, the principal parts for, word forms that are subject to the harmonic system (e.g., allative *-hez~höz~hoz*). Every suffix is in analogical relationships through one (and in some cases both) of these systems; the quality of alternating vowels is determined in this way. The detailed analysis of the data also reveals that it need not be based on the notion “linking vowel” as an analytical unit. The plausibility of this assumption is supported by at least three facts: (i) precisely defining such an abstract category would be problematic anyway due to the fuzzy status of being a linking vowel, (ii) the speaker needs to take into account the entire paradigmatic system in order to identify it as a linking vowel and (iii) the division of labour between the two systems in determining vowel quality is not always distributed on the basis of whether the target is a linking vowel or not. For instance, some vowel-initial suffixes whose vowel is a non-linking one mimic the behaviour of linking vowels, i.e., are subject to the paradigmatic system. In the case of third person possessive suffixes, some allomorphs of the same suffix are subject to the paradigmatic system while the others are subject to the harmonic one, which explains the striking asymmetry in variation these suffixes show with vacillating stems (Rebrus et al. 2017). Furthermore, there is a suffix (the superessive) where the linking vowel of the same allomorph is codetermined by both systems, which can be attributed to a mismatch between the morphological status (as a case marker) and morphophonological status (being preceded by a linking vowel) of the suffix. We will consider these issues and some further complexities of multiple suffixation. We will also discuss rounding harmony and its role in resolving (partial) underdeterminedness in the harmonic system.

1 Linking vowels and problems

There are seven contrasting short vowels in standard Budapest Hungarian: high *i*, *ü*, *u*, mid *ő*, *o*, and low *e*, *a*. With the exception of *i* each of these vowels may occur as

¹ We use spelling symbols to transcribe words, however, in the case of palatals and sibilants we replace consonant digraphs by letters with a háček, and represent [s] as *s*. Accent marks indicate vowel length, short *e* [ɛ] is lower than long *é* [e:] both phonetically and in its phonological behaviour. We do not indicate voice and place assimilation in morphologically complex clusters. Swung dashes between vowels and suffixes represent alternation, slashes represent vacillation.

a *linking vowel*.² A linking vowel alternates with zero: on the one hand, it does not occur in all forms of a stem, most notably, it is absent at the end of the exponentless (unsuffixed) stem, be it monomorphemic or derived, and on the other hand, it does not occur in all manifestations of a given exponent when combined with different stems. Thus the *u* in *falu-nk* ‘village-POSS.1PL’ is not a linking vowel since it is present in the unsuffixed form of the stem (cf. *falu* ‘village’, also *falu-t* ‘-ACC’, etc.), while it *is* in *fal-u-nk* ‘wall-POSS.1PL’ (cf. *fal* ‘wall’, *fal-a-t* ‘-ACC’, *a* is of course a linking vowel in the latter word). Likewise, the *u* is not a linking vowel in the essive-modal marker, e.g., *angol-ul* ‘English-MESS, i.e., in English’, since a high rounded vowel always occurs in this suffix (cf. *franciá-ul* ‘French-’, *bantu-ul* ‘Bantu-’, *izlandi-ul* ‘Icelandic-’) just like the suffix-internal *o* of the allative suffix, e.g., *angol-hoz*. Throughout this paper we will refer to vowels like *u* in *angol-ul* and *o* in *angol-hoz*, which are an inherent part of the suffix and do not alternate with zero, as *suffix vowels* to distinguish them from linking vowels.

A linking vowel occurs at the edge of morphs, after the stem and before the suffix. Thus, although it alternates with zero, the *o* in *malom* ‘mill’ (cf. *mal-m-a* ‘-POSS.3SG’) or *cukor* ‘sugar’ (cf. *cukr-uk* ‘-POSS.3PL’) is not a linking vowel, since it does not occur at the edge of the stem (and it is present in the unsuffixed form). The *a* at the end of *néma* ‘mute’ is not a linking vowel either, despite the fact that it is at the edge of the morph and it alternates with zero (cf. *ném-ul* ‘mute-VRBZ’), since a linking vowel does not occur in the exponentless stem.

We list word forms that do not contain a linking vowel in (1a) and others that do in (1b). Here we gloss the linking vowel as LV, but will not do so in further data.

(1) a. linking vowel absent	b. linking vowel present
<i>karó-nk</i> ‘pole-POSS.1PL’	<i>kar-<u>u</u>-nk</i> ‘arm-LV-POSS.1PL’
<i>nő-i-k</i> ‘woman-PL-POSS.3PL’	<i>nej-<u>ü</u>-k</i> ‘wife-LV-POSS.3PL’
<i>kapu-k</i> ‘gate-PL’	<i>lap-<u>o</u>-k</i> ‘sheet-LV-PL’
<i>köt-tök</i> ‘bind-2PL’	<i>költ-<u>ö</u>-tök</i> ‘spend-LV-2PL’
<i>hiú-bb</i> ‘vain-CMPR’	<i>új-<u>a</u>-bb</i> ‘new-LV-CMPR’
<i>vér-t</i> ‘blood-ACC’	<i>dér-<u>e</u>-t</i> ‘sparse-LV-ACC’

Several analytical difficulties afflict the notion of linking vowels. They are not morphemes that carry an identifiable meaning, nevertheless they can modify the meaning of the whole form. Accordingly, they can be affiliated either with the suffix, an analysis suggested by, e.g., Siptár & Törkenczy’s (2000), or with the stem, which is what Abondolo (1988) or Rebrus (1996) suggest. It is also possible to treat linking vowels as not being part of either the stem or the suffix, but an epenthetic vowel, a phonotactic repair, which is inserted for phonological reasons (Vago 1980, Siptár & Törkenczy 2000, etc.). In our view the decision about the morphological affiliation of the linking vowel does not have to be made at all, in fact, morphological segmentation is unnecessary (Rebrus et al. in press; for the whole-word view of

² It is possible to analyse *i* as a linking vowel in infinitive forms (Kálmán & Rebrus 2009, Siptár 2011).

morphophonology see Blevins 2016). As we will show, the presence and the quality of a linking vowel is influenced by both the preceding stem and the following suffix, therefore connecting it unilaterally to either is not viable. Throughout this paper we use *linking vowel* as a descriptive term, without attributing any theoretical or analytic status to it.

Linking vowels are all subject to the prevalent front/back harmony system of Hungarian. As regards the height of linking vowels, some suffixes are preceded by the stably high linking vowels *-ü-* and *-u-*, others by the stably low *-e-* and *-a-*. There are, however, many suffixes that are opportunistic, the mid or low quality of the linking vowel before these is controlled by the preceding stem. In the remaining part of this section, we discuss only these linking vowels, which are of variable height.

Whether a linking vowel occurs in a given word form may depend on phonological and lexical factors, as well as the category of the stem. For example, before the accusative suffix the linking vowel is missing after the coronal *n* (*sán* ‘sledge’, *sán-t* ‘-ACC’), but appears after the noncoronal *m* (*sám* ‘number’, *sám-o-t* ‘-ACC’). In a few cases we encounter free variation (*briliánš* ‘brilliant’, *briliánš-t/briliánš-o-t*). Beside purely phonological differences between stems, we also find lexically conditioned behaviour (the accusative form of *gáz* ‘gas’ is *gáz-t*, but that of *ház* ‘house’ is *ház-a-t*). Some stems and suffixes where the difference in behaviour is category dependent are shown in (2).

(2) linking vowel absent	linking vowel present	categories
a. <i>ňom-tok</i> ‘push-2PL’	<i>ňom-o-tok</i> ‘trace-POSS.2PL’	verb vs. noun
b. <i>gond-nak</i> ‘trouble-DAT’	<i>mond-a-nak</i> ‘say-NDF.3PL’	noun vs. verb
c. <i>fiú-k</i> ‘boy-PL’, * <i>fiú-a-k</i>	<i>hiú-(a)-k</i> ‘vain-PL’	noun vs. adj.

We see that even with homophonous suffixes in some cases it is the verb that lacks the linking vowel and the noun has it, (2a), while in other cases it is the other way around, (2b). Vowel-final adjectives are more likely to contain a linking vowel than nouns: the linking vowel is impossible after *fiú*, but optional after *hiú*, (2c).³

As noted above, it is not only the presence but also the quality of the linking vowel that is subject to morphological and lexical conditions (we do not discuss syntactic and semantic factors in this paper, but see Rebrus & Szigetvári 2022). Examples are given in (3). The morpheme “responsible” for the *difference* in the quality of the linking vowels is emboldened.

³ There is an obligatory linking vowel both after the noun *férfi* ‘man’ ~ *férfi-a-k* ‘-PL’ and (polymorphemic) adjectives like (*barna*) *haj-ú* : ‘(brown) hair-ADJZ’ ~ (*barna*) *haj-ú-a-k* ‘-PL’.

(3) mid/rounded linking vowel	low/unrounded linking vowel
a. <i>šark-o-k</i> ‘corner-PL’	<i>šark-a-k</i> ‘heel-PL’
b. <i>diák-o-t</i> ‘student-ACC’	<i>diá-k-a-t</i> ‘slide-PL-ACC’
c. <i>főz-n-ö-m</i> ‘cook-INF-1SG’	<i>főz-t-e-m</i> ‘cook-PST-1SG’
d. <i>jácc-o-k</i> ‘play.INDV-NDF.1SG’	<i>jácc-a-k</i> ‘play.SBJV-NDF.1SG’
e. <i>boldog-o-k</i> ‘happy-PL’	<i>boldog-a-k</i> ‘id.’
<i>öröm-ö-t</i> ‘joy-ACC’	<i>öröm-e-t</i> ‘id’
f. <i>dönt-ö-tök</i> ‘decide-NDF.2PL’	<i>dönt-e-nek</i> ‘decide-NDF.3PL’
g. <i>betű-k-ö-n</i> ‘letter-PL-SUP’	<i>betű-k-e-t</i> ‘letter-PL-ACC’
h. <i>vár-j-o-n</i> ‘wait-SBJV-NDF.3SG’	<i>vár-j-a-k</i> ‘wait-SBJV-NDF.1SG’

The homophonous pair in (3a) shows that the quality of the linking vowel may depend on a lexical property of the stem: *šark-* ‘corner’ selects the mid linking vowel *-o-*, *šark*⁴ ‘heel’ selects the low linking vowel *-a-*. Hence the traditional name for the latter type: it is a lowering stem (e.g. Vago 1980). The stem *diák* in (3b) is not a lowering stem, but the homophonous plural form *diá-k* is lowering, because the plural suffix *-k* is a lowering suffix. The verbal past tense suffix is also lowering, while the infinitive suffix is not, as illustrated in (3c). We usually observe lowering in subjunctive forms. The effect is opaque if the stem ends in a consonant + sibilant cluster since in this case the indicative and subjunctive stems are homophonous, see (3d). An adjective and a noun are shown in (3e), both exhibit free variation with respect to lowering. In (3f) and (3g) it is the suffix *after* the linking vowel that “causes” lowering. The same verb stem is followed by a mid linking vowel before the nondefinite 2nd person plural suffix, but a low linking vowel before the nondefinite 3rd person plural suffix. The words in (3g) show that this effect of the suffix can win over the lowering effect of the stem, which in this case ends in the lowering plural suffix: the superessive suffix overrides it but the accusative does not. Likewise, the lowering of the subjunctive demonstrated in (3d) is suppressed by the nondefinite 3sg morph in (3h) while it is not suppressed by the nondefinite 1sg morph. That is, we observe an intricate interplay between lowering caused by roots to their right and by suffixes to both their left and their right.

It is noteworthy that there exist systematic correspondences between linking vowels on the one hand and other vowels found in the same position that are not linking vowels. For example, the yodless alternant of the 3rd person possessive suffix *-a* (which does not alternate with zero and hence is not a linking vowel by our definition) is typically available after lowering stems, mimicking the low linking vowel (*ág-a* ‘branch-POSS.3SG’, cf. *ág-a-k* ‘-PL’), while after nonlowering stems, other things being equal, another, yodful allomorph of this suffix is found (*tag-ja* ‘member-POSS.3SG’, cf. *tag-o-k* ‘-PL’). Similarly, the initial vowel of the fractional suffix *-od~öd~ad~ed* does not qualify as a linking vowel, since it does not alternate with zero: vowel-final cardinal numeral stems are either truncated before it (*kettő* ‘two’, *kett-ed*) or select a unique consonant-final allomorph (*millió* ‘million’,

⁴ The base form of both nouns is *šarok*.

milliom-od).⁵ Nevertheless, nonlowering numeral stems are followed by the nonlow-initial allomorphs of this suffix (*öt-öd* ‘five-FRAC’, *hat-od* ‘six-FRAC’; cf. *öt-ö-t* ‘-ACC’, *hat-o-t*) and the lowering numeral stems are followed by the low-initial allomorph (*hus-ad* ‘twenty-FRAC’, cf. *hus-a-t*), following the same pattern as linking vowels.

We have already mentioned and the examples introduced so far also show that the quality of the linking vowel is influenced by vowel harmony: stems containing back vowels are followed by a back linking vowel, those containing front vowels are followed by a front linking vowel. Roots that contain a back vowel followed by a front unrounded vowel often vacillate in their harmonic property. Thus, the non-linking vowel in suffixes (which, recall, we dubbed *suffix vowel*), like that in the allative form of *hotel*, vacillates. This uncertainty can be reflected in the choice of the linking vowel too: *hotel-e-k* or *hotel-o-k*, (4a). However, there exist other lexical classes with a vacillating suffix vowel whose linking vowel does not vacillate: it is either exclusively back, (4b), or exclusively front, (4c).

(4) lexical class	allative suffix vowel	plural linking vowel
a. vacillating LV: <i>hotel</i>	-hez/hoz	-e-k/-o-k
b. nonvacillating back LV: <i>haver</i> ‘pal’	-hez/hoz	-o-k
c. nonvacillating front LV: <i>koncert</i> ‘concert’	-hez/hoz	-e-k

That is, linking vowels are harmonically less variable than (non-linking) suffix vowels, since linking vowels often do not vacillate in backness harmony even where suffix vowels do. This asymmetry in harmonic behaviour (which is typically unnoticed and/or unanalysed in the literature on Hungarian vowel harmony) is one of the motivations for regarding most⁶ linking vowels as markers of paradigm classes. Another type of asymmetry between linking vowels and suffix vowels also shows up elsewhere in the morphophonology partially independently of vowel harmony. Suffixes whose linking vowel is normally subject to both backness harmony and rounding harmony (i.e., show a three-way alternation *o~e~ö*) behave in an unexpected way after a lexically identifiable set of stems (traditionally called “lowering stems”). Harmonising suffixes after back harmonic lowering stems have -a- instead of -o- and front rounded ones have -e- instead of -ö- (i.e., they fail to undergo rounding harmony). Crucially, this “anomaly” only affects linking vowels but not suffix vowels.⁷ Compare the behaviour of the internal (suffix) vowel of allative *-hoz~hez~höz* and initial (linking) vowel of plural *-ok~ak~ek~ök* with lowering stems and normal ones below:

⁵ Marginally such “numerals”, the names of Greek letters, may even retain (and if low, lengthen) their stem final vowel before the similarly behaving ordinal suffix *-odik~ödik~adik~edik*: *alfa* ‘alpha’, *alfá-adik* ‘-ORD’; *pi* ‘pi’, *pi-edik*.

⁶ We discuss the few linking vowels that are not markers of paradigms in §4.

⁷ We discuss the problematic behaviour of the superessive in §6.3.

(5) lexical class		allative	plural
		suffix vowel	linking vowel
normal stem	<i>tag</i> ‘member’	<i>-hoz</i>	<i>-o-k</i>
	<i>rög</i> ‘clod’	<i>-höz</i>	<i>-ö-k</i>
“lowering” stem	<i>ág</i> ‘branch’	<i>-hoz</i>	<i>-a-k</i>
	<i>sög</i> ‘nail’	<i>-höz</i>	<i>-e-k</i>

Once again we can observe that alternating suffix vowels neutralise the lexical distinctions expressed by linking vowels. The completely parallel distribution of different phenomena in (4) and (5) provides a further argument for the claim that linking vowels and suffix vowels display different morphophonological patterning, i.e., they are under the purview of two different (but interacting) systems, the former a more morphologised paradigmatic system and the latter a more phonologised harmonic system. In the end, both systems are lexical in the sense that the behaviour of the suffixes cannot be entirely defined by phonological properties of the stem and/or the suffix. We argue that linking vowels are paradigm class markers, essentially thematic vowels, as they are traditionally treated in paradigm-based systems.

2 Paradigm classes

Word forms in Latin nominal and verbal paradigms differ in the exponents of the same morphosyntactic category. Grammarians therefore distinguish paradigm classes, traditionally called declensions for nominal and conjugations for verbal paradigms. In (6) we illustrate some forms of nouns that belong to different declensions.

(6)	decl. I (-a-)	decl. II (-o-)	decl. IV (-u-)	decl. V (-e-)
	‘palm’	‘finger’	‘hand’	‘day’
-SG.ACC	<i>palm-a-m</i>	<i>digit-u-m</i> = <i>man-u-m</i>		<i>di-e-m</i>
-SG.DAT	<i>palm-a-[j]</i>	<i>digit-ō</i>	<i>man-u-ī</i>	<i>di-ē-ī</i>
-PL.ACC	<i>palm-ā-s</i>	<i>digit-ō-s</i>	<i>man-ū-s</i>	<i>di-ē-s</i>
-PL.DAT	<i>palm-īs</i> = <i>digit-īs</i>		<i>man-ī-bus</i>	<i>di-ē-bus</i>

Paradigm classes are referred to by the vowel that typically appears before suffixes, thus declension I is identified as the -a- class, declension II as the -o- class, declension IV as the -u- class, and declension V as the -e- class. We can see that there are cases, like the singular accusative in the -o- class in our sample, where a change in Classical Latin from *-om* to *-um* (and also from *-os* to *-us* in the nominative case, not shown in (6)) alters the vowel (Sihler 1995: 65, Cser 2020: 141), thereby neutralising the difference between the -o- and the -u- classes, creating a syncretism of endings (shaded in (6) and the tables below). In other cases, specifically the plural dative, the vowel identifying the paradigm class is masked in the first three paradigm classes (but not in declension V) by a fixed vowel, which results in another case of syncretism.

Verbal paradigms of Latin are also characterised by a presuffixal vowel. Unlike a nominal form, a verbal form may contain more than one inflectional suffix. The data in (7) show that syncretism is present in this case as well, since the vowel of a given paradigm class is not inherited after the first suffix: in past imperfective forms we uniformly find an *-a-* before the person suffix, although in present imperfective forms this vowel characterises only conjugation I. Furthermore, the vowel *before* the past imperfective suffix is also identical in conjugations II and III: it is uniformly *-ē-*. In future forms the first two classes contain the same vowel, *-i-*, before the person suffix. In the subjunctive mood, it is conjugations II and III that are syncretic.

(7)	conj. I (-a-)	conj. II (-ē-)	conj. III (-i-)
	'love'	'see'	'live'
-PRS.INDV.2SG	<i>am-ā-s</i>	<i>vid-ē-s</i>	<i>vīv-i-s</i>
-PST.INDV.2SG	<i>am-ā-b-ā-s</i>	<i>vid-ē-b-ā-s</i>	<i>vīv-ē-b-ā-s</i>
-FUT.INDV.2SG	<i>am-ā-b-i-s</i>	<i>vid-ē-b-i-s</i>	<i>vīv-ē-s</i>
-PRS.SBJV.2SG	<i>am-ē-s</i>	<i>vid-e-ā-s</i>	<i>vīv-ā-s</i>

We will see that the parallelism between the presuffixal vowels in the two languages is conspicuous and supports the argument based on distribution presented in the previous section. We contend that some of the presuffixal vowels traditionally referred to as linking vowels in Hungarian are paradigm class markers, rather like some of the presuffixal vowels in Latin just introduced. Examples of the parallel behaviour of these vowels in the two languages are given in (8) and (9). Following the paradigm-based tradition we label these paradigm classes by Roman numerals in (8). However, we will mostly identify the classes by their thematic vowel, since there is no tradition behind these numbers (for an alternative lexical grouping, see Elekfi 1994). (Person/number glosses in nominals refer to possessive suffixes.)

(8)	I	II	III	IV	V	linking V alternants
	-o- class	-a- class	-e(e)- class	-e(ö)- class	-ö- class	
	'arrow'	'grave'	'news'	'ear'	'circle'	
-PL	<i>šír-o-k</i>	<i>ňil-a-k</i>	<i>hír-e-k</i>	<i>fül-e-k</i>	<i>kör-ö-k</i>	4 (a~o~e~ö)
-1SG	<i>šír-o-m</i>	<i>ňil-a-m</i>	<i>hír-e-m</i>	<i>fül-e-m</i>	<i>kör-ö-m</i>	4 (a~o~e~ö)
-1PL	<i>šír-u-nk</i>	<i>ňil-u-nk</i>	<i>hír-ü-nk</i>	<i>fül-ü-nk</i>	<i>kör-ü-nk</i>	2 (u~ü)
-3SG	<i>šír-ja</i> / <i>kár-a</i>	<i>ňil-a</i> / <i>híd-ja</i>	<i>hír-e</i> / <i>lgél-je</i>	<i>fül-e</i>	<i>kör-e</i> / <i>kűr-je</i>	4 (a~ja~je~e)
-ACC	<i>šír-t</i>	<i>ňil-a-t</i>	<i>hír-t</i> / <i>jel-e-t</i>	<i>fül-e-t</i>	<i>kör-t</i>	3 (~a~e)
-SUP	<i>šír-o-n</i>	<i>ňil-o-n</i>	<i>hír-e-n</i>	<i>fül-ö-n</i>	<i>kör-ö-n</i>	3 (o~e~ö)

The four thematic vowels *a*, *o*, *e*, and *ö* define five paradigmatic classes, since class IV (-e(ö)-) exhibits syncretism with class III (-e(e)-) with the plural suffix and with class V (-ö-) with the superessive suffix and thus is different from both. The *-a-* and *-o-* classes are also syncretic in the superessive case, but the *-a-* class does not show neutralisation with any other class in the plural. The first and third person possessive suffixes are preceded by a vowel that exhibits only a two-way contrast

(*ü~u* and *e~a*).⁸ This leads to larger scale syncretisms, in fact, we do not consider these vowels to be thematic vowels. The presence of a thematic vowel before the accusative suffix is influenced by both the stem-final consonant(s) and the paradigmatic class of the stem: the thematic vowel always appears in the *-a-* and *-e(ö)-* classes, while in the *-o-* and *-ö-* classes it occurs only after noncoronal consonants, coronal noncontinuant obstruents, and (most) consonant clusters. We again encounter syncretism where the thematic vowel is absent.

In (9) we list Hungarian nouns containing more than one inflectional suffix. Recall, in Latin past and future imperfective forms the vowel distinctions found in present imperfective forms before the second (person) suffix are neutralised. Likewise, of the four thematic vowels (*a*, *o*, *e*, *ö*) we find only two before the accusative after another suffix (*a*, *e*) and only two or three (*o*, *e*, *ö*) before the superessive suffix (in the latter case the number depends on the previous suffix: first person plural possessive or plural). Note that neutralisation is always conservative in that its result is always membership in an existing paradigm class, namely the *-a-* class or *-e-* class. Note that the superessive fails to follow class membership in (9), just like it failed to follow it in (8).

(9)	-o- class 'grave'	-a- class 'arrow'	-e(e)- class 'news'	-e(ö)- class 'ear'	-ö- class 'circle'	
-PL-ACC	<i>šír-o-k-a-t</i>	<i>ňil-a-k-a-t</i>	<i>hír-e-k-e-t</i>	<i>fül-e-k-e-t</i>	<i>kör-ö-k-e-t</i>	2
-1PL-ACC	<i>šír-u-nk-a-t</i>	<i>ňil-u-nk-a-t</i>	<i>hír-ü-nk-e-t</i>	<i>fül-ü-nk-e-t</i>	<i>kör-ü-nk-e-t</i>	2
-PL-SUP	<i>šír-o-k-o-n</i>	<i>ňil-a-k-o-n</i>	<i>hír-e-k-e-n</i>	<i>fül-e-k-e-n</i>	<i>kör-ö-k-ö-n</i>	3
-1PL-SUP	<i>šír-u-nk-o-n</i>	<i>ňil-u-nk-o-n</i>	<i>hír-ü-nk-ö-n</i>	<i>fül-ü-nk-ö-n</i>	<i>kör-ü-nk-ö-n</i>	2

Verbal root paradigms exhibit less diversity than nominal paradigms, we do not find the *-a-* and the *-e(ö)-* classes here. These thematic vowels (that is, *-a-* after a back vowel and *-e-* after a front rounded vowel) do nevertheless occur after inflectional suffixes, like the subjunctive *-j-* shown in (10), or the past tense *-t(t)-*, which is not included in (10).⁹ Thus, similarly to plural nouns (*šír-o-k-a-t*, *kör-ö-k-e-t*), verbs in the subjunctive mood or past tense contain a low thematic vowel: *ír-j-a-m*, *öl-j-e-m*; *ír-t-a-m* 'write-PST-1SG', *öl-t-e-m* 'kill-'. Convergence is further manifested in the loss of the otherwise unprecedented definite third person singular *-i~ja* alternation after inflectional suffixes: compare *öl-i* vs. *ír-ja* with *öl-j-e*, *öl-t-e* '-PST-DEF.3SG' vs. *ír-j-a*, *ír-t-a* '-PST-DEF.3SG'. This raises the question whether neutralisation is

⁸ The third person singular possessive suffixes (*-a~e*) also have consonant-initial alternants (*-ja~je*), as exemplified in the *-o-*, *-e(e)-*, and *-ö-* classes.

⁹ The low vowels do occur after unsuffixed verb stems that end in a consonant cluster *before* certain person suffixes: *irt-a-s* 'exterminate-NDF.2SG', *irt-a-nak* '-NDF.3PL', etc. and the infinitive suffix: *irt-a-n-o-m* '-INF-1SG'. However, these are not thematic vowels but linking vowels (like *u~ü* in the first person plural suffix *-u-nk~ü-nk*) that do not vary in height and are thus insensitive to paradigm class distinctions apart from backness harmony, see §§5 and 6.3.

conservative in the verbal paradigm too since the missing verbal paradigm classes (-a- and -e(ö)-) occur as novel classes after inflectional suffixes.

(10)	-o- class	-e(e)- class	-ö- class	
	'write'	'reach'	'kill'	
-[INDV]DEF.1SG	<i>ír-o-m</i>	<i>ér-e-m</i>	<i>öl-ö-m</i>	3 (o~e~ö)
-[INDV]DEF.3SG	<i>ír-ja</i>	<i>ér-i</i> = <i>öl-i</i>		2 (ja~i)
-[INDV]NDF.1PL	<i>ír-u-nk</i>	<i>ér-ü-nk</i> = <i>öl-ü-nk</i>		2 (u~ü)
-[INDV]NDF.2SG	<i>ír-s</i> =	<i>ér-s</i> = <i>öl-s</i>		1 (-)
-SBJV-DEF.1SG	<i>ír-j-a-m</i>	<i>ér-j-e-m</i> = <i>öl-j-e-m</i>		2 (a~e)
-SBJV-DEF.3SG	<i>ír-j-a</i>	<i>ér-j-e</i> = <i>öl-j-e</i>		2 (a~e)
-SBJV-NDF.1PL	<i>ír-j-u-nk</i>	<i>ér-j-ü-nk</i> = <i>öl-j-ü-nk</i>		2 (u~ü)
-SBJV-NDF.3SG	<i>ír-j-on</i>	<i>ér-j-en</i>	<i>öl-j-ön</i>	3 (o~e~ö)
-INF-1SG	<i>ír-n-o-m</i>	<i>ér-n-e-m</i>	<i>öl-n-ö-m</i>	3 (o~e~ö)
-INF-1PL	<i>ír-n-u-nk</i>	<i>ér-n-ü-nk</i> = <i>öl-n-ü-nk</i>		2 (u~ü)

3 Paradigm classes and vowel harmony

In Hungarian the quality of vowels within and before suffixes is constrained by front/back and rounding harmony, and thematic vowels are also partly subject to this effect. Thus stems belong simultaneously to both a paradigm class identified by the presuffixal thematic vowel and a harmonic class identified by the suffix vowel.¹⁰

These two classifications are correlated, but partly independent of each other. We list almost¹¹ all possible combinations of paradigmatic and harmonic stem classes in (11). In the label of stem types the first, lowercase vowel letter(s) represent the thematic vowel, that is, the paradigm class, the last, uppercase letter(s) represent the harmonic class (defined as the sets B, F, and N, to be specified in (12)). The last column in (11) contains the principal parts of and examples for stems that belong to the relevant paradigmatic and harmonic class combinations: these are the plural *-ok~ak~ek~ök* and allative *-hoz~hez~höz* for nominals. Where available we also include verb forms to show the parallelisms between nominal and verbal paradigms. The verb forms are the nondefinite first person singular (N1S) *-ok~ak~ek~ök* and nondefinite second person plural (N2P) *-tok~tek~tök*. There are four groups of stems: (11a) those that do not show any vacillation in thematic and suffix vowels (**oB**, **aB**, **eN**, **eF**, **öF**), these are the classes we have identified in (8), (11b) those in which the thematic vowel vacillates in height but suffix vowels do not (**oaB**, **öeF**), (11c) those in which both the thematic and suffix vowels vacillate in backness harmony and/or in height (**oeBN**, **aeBN**, **oaeBN**), and (11d) those in which the thematic vowel

¹⁰ Harmonic class membership is sometimes only probabilistic or even unpredictable from the vocalism of the stem (and is also reflected in paradigm class membership, cf. the “zone of variation”, Hayes et al. 2009). Freely variable allomorphs of a stem may belong to different harmonic classes, partly determined by their vocalism: e.g., *spejz* ‘pantry’ is a member of the **BN** class, its variant *spájz* is a member of the **B** class; *tejfél* ‘sour cream’ of the **N**, *tejföl* of the **F** class.

¹¹ Marginally we also find novel loans pronounced with schwa or syllabic *l* or *n*, none of which exist in the native sound inventory. This vacillating BF harmonic class includes, e.g., *Google-hoz/höz*, *Google-nak/nek*, *Google-?o/ö-n*; *Haydn-hoz/höz*, etc. (Blaskovics & Ittész 2022).

is constant but suffix vowels vacillate (**oBN**, **aBN**, **eBN**); this last group was already partly introduced in (4). All of the stem types listed in (11) are open classes: new noun stems and certain new adjective stems may be introduced in the **oB**, **eN**, **öF** classes, as well as the harmonically and/or paradigmatically vacillating **oeBN**, **oBN**, and **eBN** classes, while other new adjective stems may be introduced in the **aB**, **eN**, **eF**, as well as the harmonically vacillating **aBN**, **eBN** the paradigmatically vacillating **oaB**, **öeF**, and the both harmonically and paradigmatically vacillating **oaBN**, **aeBN**, and **oaeBN** classes (on the extensive vacillating behaviour of adjectives, see Rebrus & Szigetvári 2022; on register-based lexical differences in harmonic vacillation (cultural, familiar, and plain stems), see Forró 2013, Rebrus et al. 2020, 2023a).

(11) Stem types defined by paradigmatic and harmonic class membership¹²

stem types		paradigmatic class thematic vowel	harmonic class suffix vowel	principal parts nominals: PL; ALL (verbs: N1S; N2P, N3S)
a. constant stem types				
I	oB	-o- (mid)	B (back)	<i>tag-o-k, tag-hoz</i> (<i>fog-o-k, fog-tok</i>)
II	aB	-a- (low)	B (back)	<i>ág-a-k, ág-hoz</i> (<i>fog-j-a-k, fog-j-on</i>)
III	eN	-e- (low)	N (front excluding ö)	<i>vég-e-k, vég-hez</i> (<i>ég(-j)-e-k, ég-tek, ég-j-en</i>)
IV	eF	-e- (low)	F (front including ö)	<i>sög-e-k, sög-höz</i> (<i>bőg-j-ek, bőg-j-ön</i>)
V	öF	-ö- (mid)	F (front including ö)	<i>rög-ö-k, rög-höz</i> (<i>bőg-ö-k, bőg-tök</i>)
b. vacillating stem types: only thematic vowel vacillates				
I+II	oaB	-o/a- (mid/low)	B (back)	<i>boldog-o/a-k, boldog-hoz</i> —
IV+V	öeF	-ö/e- (mid/low)	F (front including ö)	<i>öröm-ö/e-k, öröm-höz</i> —
c. vacillating stem types: both thematic vowel and harmonic class vacillate				
I+III	oeBN	-o/e- (mid/low)	BN (back/front excl. ö)	<i>fotel-o/e-k, fotel-ho/ez</i> (<i>kamel-o/e-k, kamel-to/ek</i>)
II+III	aeBN	-a/e- (low)	BN (back/front excl. ö)	<i>pozitív-a/e-k, pozitív-ho/ez</i> (<i>alibiz-z-a/e-k, alibiz-z-o/en</i>)
I+II+III	oaeBN	-o/a/e- (mid/low/low)	BN (back/front excl. ö)	<i>agiliš-o/a/e-k, agiliš-ho/ez</i> —
d. vacillating stem types: only harmonic class vacillates				
I(+III)	oBN	-o- (mid)	BN (back/front excl. ö)	<i>haver-o-k, haver-ho/ez</i> —
II(+III)	aBN	-a- (low)	BN (back/front excl. ö)	<i>konkrét-a-k, konkrét-ho/ez</i> —
III(+I)	eBN	-e- (low)	BN (back/front excl. ö)	<i>partner-e-k, partner-ho/ez</i> —

The thematic vowel or vowels of each paradigmatic class is a subset of the harmonic set of vowels defining the harmonic class that the given stem belongs to. That is, any thematic vowel also occurs in at least one of the harmonising suffixes found after the given stem. The harmonic set is always necessarily larger since it contains both

¹² Glosses; *tag* 'member', *fog* 'hold', *ág* 'branch', *vég* 'end', *ég* 'burn', *sög* 'nail', *bőg* 'bellow', *rög* 'clod', *boldog* 'happy', *öröm* 'joy', *fotel* 'armchair', *kamel* 'love', *pozitív* 'positive', *alibiz-* 'to fake activity', *agiliš* 'agile'.

short and long vowels and/or also high vowels, while thematic vowels are all short and nonhigh. We expand these harmonic sets in (12). The vowels that also occur as the thematic vowel(s) of a paradigmatic class combinable with the given harmonic class are emboldened in each set.

(12) Harmonic classes

- B = {**a**, **o**, *u*, *á*, *ó*, *ú*}, i.e., all the back vowels (that occur as a back alternant in harmonising suffixes)
- N = {**e**, *ü*, *é*, *ö*, *ü*}, i.e., all the front vowels that occur as a front alternant in harmonising suffixes after those stems whose last vowel is front unrounded (*e*, *é*, *i*, *í*)
- F = {**e**, **ö**, *ü*, *é*, *ö*, *ü*}, i.e., all the front vowels that occur as front alternant in harmonising suffixes after those stems whose last vowel is front rounded (*ü*, *ü*, *ö*, *ö*)
- BN = B ∪ N

The thematic vowel of a B (back) harmonic stem is either -a- or -o- (cf. **oB**, **aB**, and **oaB** in (11)). All stems of the N harmonic class belong to the paradigmatic class -e- (**eN**), while those of the F (front) class may belong either to class -e- or -ö- (**eF**, **öF**, and **öeF**). Where the harmonic class vacillates, the thematic vowels may show even more variation (we have not only **oeBN**, **aeBN**, but also **oeBN**). It is important to emphasise that although we borrow the labels of these harmonic classes from the labels of traditional vowel sets (back, neutral and front), only B is coextensive with that set: B contains all and only back vowels. N and F, however, contain the vowels that occur in the front alternant of suffixes *after* stems whose last vowel is a neutral vowel (i.e., *i*, *í*, *e*, *é*) or a front rounded vowel (i.e., *ö*, *ö*, *ü*, *ü*), respectively. Since *i*, *í* generally¹³ do not occur in suffixes that exhibit front/back alternation, these two front vowels are missing from both harmonic classes N and F. But these two sets are different since *ö* does not occur in a suffix after a stem that ends in a neutral (front unrounded) vowel. This is why **öF** and **öeF** are possible stem types, but ***öN** and ***öeN** are not (also cf. (18)). The BF set contains *all* potential suffix vowels and this harmonic class contains extremely few items, see footnote 11. The N and F sets cannot be meaningfully combined in union because N is a subset of F.

The only constraint on the thematic vowel of a stem is that it should belong to the set of vowels that the harmonic class of that stem contains (e.g. ***oF** is not a possible stem type), but within these limits practically all combinations of thematic vowels and harmonic classes are attested.¹⁴ That is, the thematic vowel (= paradigmatic class) and the harmonic class of a stem must be independently specified in order to predict the behaviour of a stem. This is a significant piece of evidence that in addition to being assigned to harmonic classes, nominal (and verbal) stems are also assigned

¹³ The only example is the front allomorph of the definite 3rd person singular present indicative verbal suffix -i, whose back alternant is -ja, cf. (10).

¹⁴ We are unaware of stems belonging to the **oaBN** class, but the possible absence of this class may be ascribed to the scarcity of harmonically vacillating adjectives in the first place.

to paradigmatic classes, which as we have shown can be characterised by their thematic vowel.

4 Two morphological systems

We submit that the nominal¹⁵ morphology of Hungarian is under the control of two systems. The paradigmatic system is responsible for the vowels of vowel-initial suffix allomorphs (mainly linking vowels): these are defined by thematic vowels of stems (-o-, -a-, -e-, -ö-, or some combination of two or three of them), that is, their paradigmatic class. The harmonic system is responsible for the other harmonic vowels of (mainly consonant-initial) suffixes: these are defined by the harmonic class of stems (B, N, F, or some combination of two of them). As described above, the two systems are not independent, but correlated: for linking vowels they redundantly assign the same behaviour, but in some cases the behaviour prescribed by the harmonic system is restricted (but never contradicted) by the paradigmatic system.¹⁶

The height of a linking vowel may be variable, -o~a~e~ö-, stably high, -u~ü-, stably low -a~e-, or mid/low -o~e~ö-, depending on the particular suffix they precede. The first type of linking vowel is by far the most frequent one,¹⁷ pervasive in inflectional paradigms while the others are much less frequent. If the linking vowel is one of variable height (i.e., not fixed suffix-specifically as high or low), it will be identical to the thematic vowel identifying the paradigmatic class (see the plural forms in (11)). If the linking vowel is stably high or stably low, then only its front/back quality is identical to that of the thematic vowel. In the -o-, -a-, and -oa- paradigm classes we find -u- and -a- (e.g., *tag-u-nk* ‘-1PL’, *ág-u-nk*, *boldog-u-nk*; *vak-a-bb* ‘blind-CMPR’, *új-a-bb* ‘new-’, *boldog-a-bb*). In the -ö-, -e-, and -öe- classes we find -ü- and -e- (e.g., *rög-ü-nk*, *sög-ü-nk*, *vég-ü-nk*, *öröm-ü-nk*; *hős-e-bb* ‘heroic-’, *prűd-e-bb* ‘prudish-’). When the thematic vowel shows vacillation in front/backness (in classes -oe-, -ae-, -oae-) stably high and stably low linking vowels also vacillate (e.g., *agilis-u/ü-nk*; *pozitív-a/e-bb*).

The overwhelming majority of suffix vowels, which are not linking vowels, are controlled by the harmonic system. Accordingly, stems belonging to harmonic class B take the back alternants of suffix vowels (e.g., the forms in the paradigm containing a principal part like *tag-hoz* or *ág-hoz* are *tag-o-tok*, *ág-a-tok* ‘-2PL’;

¹⁵ Verbal stem types are fewer in number: there are only four types of uninflected verb stems (**oB**, **eN**, **öF**, and **oeBN**; the last type typically comprises stems consisting of a harmonically vacillating noun and verb-forming derivational suffix), while there list 13 nominal stem types in (11). Henceforward we focus on the more complex nominal system.

¹⁶ This distinction between the paradigmatic and the harmonic systems approximately corresponds to the distinction between level 1 (or synthetic) and level 2 (or analytic) suffixation in that, in addition to the patterns discussed here, the former but not the latter can trigger various lexically constrained stem alternations and the latter but not the former can create phonotactics that is monomorphemically excluded, Rebrus et al. 1996, Siptár & Törkenczy 2000.

¹⁷ Nominal suffixes with a variable linking vowel include PL -*k*, 1SG -*m*, 2SG -*d*, 2PL -*tok~tek~tök*, ACC -*t*, ADJZ -*s*, ADVZ -*n*, VRBZ -*l*, -*z*, distributive -*nként*, -*nta~nte*, sociative -*stul~stül*, diminutive -*čka~čke*.

tag-nak, *ág-nak* ‘-DAT’; *tag-nál*, *ág-nál* ‘-ADE’; *tag-tól*, *ág-tól* ‘-ABL’; *tag-ul*, *ág-ul* ‘-MESS’; *tag-ú*, *ág-ú* ‘-ADJZ’, etc.), and similarly, stems belonging to the N and F harmonic classes take the front alternants of suffix vowels (e.g., *vég-hez*: *vég-e-tek*, *vég-nek*, *vég-nél*, *vég-től*, *vég-ül*, *vég-ű*; *rög-höz*: *rög-ö-tök*, *rög-nek*, *rög-nél*, *rög-től*, *rög-ül*, *rög-ű*, etc.). Stems of the **eF** class, however, do not fit this pattern in every case. The principal part *több-höz* entails *több-sör* ‘-MULT’, but the 2pl possessive is *több-e-tek*, not the expected **több-e-tök*. We return to this apparent anomaly in §6.2.

Generally the quality of linking vowels is influenced by the paradigmatic system and the quality of suffix vowels by the harmonic systems. In (13) we show that the front or back quality of the stably high and stably low linking vowels of the 1pl possessive and the comparative suffixes is controlled by the paradigmatic class of the stem (indicated by a double arrow) and not by the harmonic system:¹⁸ these linking vowels are back in all the **o-**, **a-**, and **oa-** classes, front in all the **e-**, **ö-**, and **öe-** classes, and vacillate in the **oe-**, **ae-**, and **oe-** classes. Shading highlights the crucial facts that the linking vowel is only back in the **oBN** and **aBN** classes and only front in the **eBN** class even though the suffix vowels after these stems vacillate. The linking vowel of these suffixes only vacillates in the **oeBN**, **aeBN**, and **oeBN** classes in which the paradigm class itself is vacillating, as we have already pointed out in (4).

- (13) Allomorphs with a stably high or low linking vowel are defined by the paradigmatic system

stem type	PARADIGMATIC SYSTEM			
	paradigm class restrictions	morph restrictions:		examples
		1PL -[high] <i>nk</i>	CMPR -[low] <i>bb</i>	
oB, aB oaB	[back] ⇒	-unk	-abb	tag-u-nk tág-a-bb
eN, eF öF, eöF	[front] ⇒	-ünk	-ebb	vég-ü-nk sűk-e-bb
oBN, aBN	[back] ⇒	-unk	-abb	haver-u-nk konkrét-a-bb
eBN	[front] ⇒	-ünk	-ebb	partner-ü-nk korrekt-e-bb
oeBN, aeBN oaeBN	[back/front] ⇒	-unk/-ünk	-abb/-ebb	šóder-u/ü-nk pozitív-a/e-bb

As opposed to linking vowels, which are controlled by the paradigmatic system, suffix vowels are controlled by the harmonic system. This is illustrated in (14). In this case vacillation occurs in all stem types containing the **BN** harmonic class. There is no spectacular discrepancy as in (13), since front/back vacillation of the thematic vowel only occurs if the harmonic class also vacillates along the same dimension.

¹⁸ The front or back values implied by the harmonic system may be redundantly identical with those by the paradigmatic system, but it is always the latter that prevails when there is a difference.

Importantly, recall that vacillation in the harmonic system does not entail vacillation in the linking vowel, as we have already seen in (13).

(14) Allomorphs with suffix vowels are defined by the harmonic system

stem type	HARMONIC SYSTEM						
	examples			morph restrictions:			harmonic class restrictions
				ADJZ [high]	ABL [mid]	SBL [low]	
oB, aB oaB	tag-ú	tag-tól	tag-ra	-ú	-től	-ra	⇐ [back]
eN, eF öF, eöF	vég-ű	vég-től	vég-re	-ű	-től	-re	⇐ [front]
oBN, aBN	koles-ú/ű	koles-tó/ől	koles-ra/e	-ú/ű	-tó/ől	-ra/e	⇐[back/front]
eBN	kódeks-ú/ű	kódeks-tó/ől	kódeks-ra/e	-ú/ű	-tó/ől	-ra/e	
oeBN, aeBN oaeBN	hotel-ú/ű	hotel-tó/ől	hotel-ra/re	-ú/ű	-tó/ől	-ra/e	

5 The interaction of the paradigmatic and harmonic systems

Morphemes that have both vowel- and consonant-initial allomorphs, like the 3rd person plural possessive suffix *-uk~ük~juk~jök*, provide a particularly revealing demonstration of the interaction of the two morphological systems. In the first three rows of (15) the paradigmatic and the harmonic systems make the same requirements, accordingly the vowel of both the vowel-initial (yodless) and the consonant-initial (yodful) allomorphs is the same: front, back, or vacillating. Thus, for *šóder* ‘gravel’ there exist four grammatical forms in this paradigm cell, since there is vacillation both in the paradigmatic and in the harmonic system.¹⁹ However, in the shaded rows the thematic vowel does not vacillate, so we only get one (linking) vowel-initial allomorph (either only *-ük*, or only *-uk*), but the harmonic system does vacillate, resulting the availability of both front and back yodful (consonant-initial) allomorphs, that is, the vacillation of the suffix vowel (*-juk/jök*).

¹⁹ The patterns given in (15) and (16) are the most frequent productive patterns. Other patterns including the occurrence of yodful and yodless suffix variants are subject to further phonological, morphological, and stem-specific lexical constraints, see Kiefer 1985, Rácz & Rebrus 2012, Rebrus et al. 2017.

(15) Allomorphs distributed by the two systems: POSS.3PL

stem type	PARADIGMATIC SYSTEM		HARMONIC SYSTEM			
	paradigm class restriction	morph restriction: -[high]k	examples		morph restriction -/[high]k	harmonic class restriction
			yodless	yodful		
eN	[front] ⇒	- <i>ük</i>	<i>féser-ük</i>	<i>féser-jük</i>	- <i>jük</i>	⇐ [front]
oB	[back] ⇒	- <i>uk</i>	<i>motor-uk</i>	<i>motor-juk</i>	- <i>juk</i>	⇐ [back]
oeBN	[back/front] ⇒	- <i>uk</i> - <i>ük</i>	<i>šóder-uk</i> <i>šóder-ük</i>	<i>šóder-juk</i> <i>šóder-jük</i>	- <i>juk</i> - <i>jük</i>	⇐ [back/front]
eBN	[front] ⇒	- <i>ük</i>	<i>partner-ük</i>	<i>partner-jük</i>	- <i>juk</i> - <i>jük</i>	⇐ [back/front]
oBN	[back] ⇒	- <i>uk</i>	<i>haver-uk</i>	<i>partner-juk</i> <i>partner-jük</i>	- <i>juk</i> - <i>jük</i>	⇐ [back/front]

The situation is slightly more complex in the case of the 3rd person singular possessive suffix. This also has yodless and yodful alternants, hence we expect the same distribution as we saw for the plural counterpart in (15). The data in (16) confound our expectations. The distribution is more restricted: it is like that in (15) except that the yodless back allomorphs are systematically ungrammatical.

(16) Allomorphs distributed by the two systems: POSS.3SG

stem type	PARADIGMATIC SYSTEM		HARMONIC SYSTEM			
	paradigm class restriction	morph restriction: -[low]	examples		morph restriction -/[low]	harmonic class restriction
			yodless	yodful		
eN	[front] ⇒	- <i>e</i>	<i>féser-e</i>	<i>féser-je</i>	- <i>je</i>	⇐ [front]
oB	[back] ⇒	- <i>a</i>	<i>*motor-a</i>	<i>motor-ja</i>	- <i>ja</i>	⇐ [back]
oeBN	[back/front] ⇒	- <i>a</i> - <i>e</i>	<i>*šóder-a</i> <i>šóder-e</i>	<i>šóder-ja</i> <i>šóder-je</i>	- <i>ja</i> - <i>je</i>	⇐ [back/front]
eBN	[front] ⇒	- <i>e</i>	<i>partner-e</i>	<i>partner-je</i>	- <i>ja</i> - <i>je</i>	⇐ [back/front]
oBN	[back] ⇒	- <i>a</i>	<i>*haver-a</i>	<i>haver-ja</i> <i>haver-je</i>	- <i>ja</i> - <i>je</i>	⇐ [back/front]

It is shown elsewhere that the ungrammatical 3sg possessive forms **motor-a*, **šóder-a*, **haver-a* are filtered out by an independent constraint specific to the productive yodless forms within the possessive subparadigm of nouns (Possessive Analogical Support, Rebrus et al. 2017) requiring that the initial suffix vowel of these allomorphs should be supported by also occurring elsewhere as a linking vowel in the relevant (sub)paradigms. In paradigm classes -e- and -oe- the yodless front

variant -e is always supported, because first and second person forms contain this thematic vowel (*féser-e-m*, *féser-e-d*; *šóder-e-m*, *šóder-e-d*; *partner-e-m*, *partner-e-d*).²⁰ In the -o- class (as well as the -oe- class) however, the yodless back variant -a is not supported, since other possessive forms contain -o (*motor-o-m*, *motor-o-d*; *šóder-o-m*, *šóder-o-d*; *haver-o-m*, *haver-o-d*) or -u (*motor-u-nk*, *motor-u-k*; *šóder-u-nk*, *šóder-u-k*; *haver-u-nk*, *haver-u-k*), but never -a. Hence -a is left without analogical support and is therefore not available. That is, the only difference in the distributions of the 3pl and the 3sg possessive allomorphs is the absence of the 3sg -a: **oBN** and **oeBN** stems cannot select the unsupported yodless -a (**šóder-a*, **haver-a*), therefore **oBN** stems cannot be followed by a yodless 3sg allomorph at all (the other yodless allomorph, **haver-e*, is ruled out by the paradigmatic system), while **eBN** stems can select -e (*partner-e*), therefore they do occur with a yodless allomorph.

6 The rounding of front vowels

As it stands, the analysis just put forward fails to account for the roundedness of alternating vowels in at least three environments. We discuss these cases, which are partly connected, presently.

6.1 Suffixation results in potential stem type recategorisation

Firstly, as (17a) shows, when a suffix that is preceded by a front rounded linking vowel or contains a front rounded suffix vowel is added to an **eN** stem (e.g., *vég-ü-nk*, *vég-šõ* ‘end-ADJZ’), the resulting stem selects the front rounded vowel allomorph of a further suffix (provided that this suffix has such an allomorph, of course, e.g., *vég-ü-nk-höz*, *vég-šõ-tök* ‘end-ADJZ-2PL’). Recall that -*höz* and -*tök* may be selected only by stems belonging to one of the **F** stem types (e.g., **eF** *sög-höz*, **öF** *öt-höz* ‘five-ALL’, or **öeF** *öröm-höz*), since the suffix vowel *õ* only occurs in the **F**, but not in the **N** harmonic set, see (12). Likewise, **eF** and **öF** stems, when extended by a suffix that “contains” a front unrounded vowel, take the front unrounded allomorph of further suffixes, irrespective of whether this preceding front unrounded vowel is a linking vowel, as the -*e*- in (17b), or a suffix vowel, as the -*i*- in (17c).

(17)	stem type change	example
a.	eN → eF	<i>vég-hez</i> , <i>vég-ü-nk-höz</i>
b.	eF → eN	<i>sög-höz</i> , <i>sög-e-m-hez</i>
c.	öF → eN	<i>öt-höz</i> , <i>öt-ödik-hez</i> ‘-FRAC-ALL’

This shows, as we have already noted, that suffixation may alter the stem type. Recall from (7) that in the past imperfective forms of Latin verbs, the vowel before the person suffixes is uniformly -a- in all conjugations, although in the present forms

²⁰ This requirement also holds for third person plural forms (*motor-uk*), but those are always supported by first person plural forms (*motor-unk*).

-a- is the thematic vowel of conjugation I only. By the same token, we have seen in (9) that the plural forms of both **oB** and **aB** class nouns belong to the **aB** class (*šír-o-k* vs. *ňil-a-k*, but *šír-o-k-a-t* and *ňil-a-k-a-t*) and those of the **öF** class belong to the **eF** class (*kör-ö-k*, *kör-höz*, but *kör-ö-k-e-t*, *kör-ö-k-höz*). We conclude that adding the front alternants of first and third person plural possessive suffixes (-*ü-nk*, -*ü-k*) to nominals recategorises their stem type: thereby stems of the **eN**, **öF**, and **öeF** classes are all recategorised as belonging to the **eF** type (*vég-ü-nk-e-t*, *vég-ü-nk-höz*; *öt-ü-nk-e-t*, *öt-ü-nk-höz*; *öröm-ü-nk-e-t*, *öröm-ü-nk-höz*, join the same type as *fül-ü-nk-e-t*, *fül-ü-nk-höz*, where the root itself is in the **eF** type: *fül-e-t*, *fül-höz*). In the recategorisation of **öeF** type nominals to the **eF** type, vacillation of the thematic vowel is eliminated. Likewise, vacillation of the harmonic class is often eliminated by stem type recategorisation: while *haver* is in the **oBN** type (cf. *haver-o-m*, *haver-ho/ez*), *haver-u-nk* is in the **aB** type (cf. *haver-u-nk-a-t*, *haver-u-nk-hoz*), the vacillation in the harmonic class disappears. Such stem type recategorisations result in syncretisms seen in (8) and (9).²¹

6.2 Rounding harmony

The second type of suffix vowel unaccounted for so far is that found in the 2pl possessive form *sög-e-tek*, as compared to *rög-ö-tök* (or *öt-ö-tök*). The two stems *sög* and *rög* belong to different stem types, **eF** and **öF**, respectively, but this in itself does not explain the difference in the suffix vowel of our examples, their harmonic class is the same, F, as the allative forms show: *sög-höz*, *rög-höz*. Since in these examples there is a single suffix (with a suffix vowel preceded by a linking vowel) and these vowels are not associated with a sequence of suffixes, we cannot have recourse to stem type recategorisation as in the examples of the previous section. Furthermore, the behaviour of the **öeF** stem *öröm* suggests that the difference in the 2pl possessive forms is due to the linking vowel: both *öröm-ö-tök* and *öröm-e-tek* are grammatical (echoing *rög-ö-tök* and *sög-e-tek*, respectively), but neither **öröm-ö-tek*, nor **öröm-e-tök* is. Clearly, a purely phonological phenomenon is at work here: rounding harmony (e.g. Vago 1980, Siptár & Törkenczy 2000, Törkenczy 2011), see (18) below. The difference in the operation of front/back and rounding harmony has long been noted in Hungarian (e.g. Polgárdi & Rebrus 1998). Rounding harmony is strictly local: there are no vowels that are transparent to rounding harmony. Also, there is no rounding antiharmony²² in Hungarian. Rounding harmony applies in the harmonic class F, where the rounding of the suffix vowel is underdetermined (since both *e* and *ö* are members of this set), and consists of the two constraints on surface forms presented in (18).

²¹ We can even find recategorisation from the N (or F) to the B class by virtue of the nonalternating suffix -*kor* 'at (some time)', which contains a back vowel: *er-re* 'this-SUBL', *öt-re*, but *ek-kor-ra* '-TEMP-ADJZ-SUBL', *öt-kor-ra* (Rebrus et al. 2023a).

²² In front/back antiharmony a stem containing a front unrounded vowel nevertheless selects the back-vowelled allomorph of a harmonically alternating suffix: e.g., *šír-hoz* 'grave-ALL', see (8), cf. Törkenczy 2011, Rebrus & Törkenczy 2019.

(18) **Rounding harmony**

if the harmonic class underdetermines the suffix vowel (as in **F**)

- a. select *ö* after a front rounded vowel and
- b. select *e* after a front unrounded vowel.

As a result of rounding harmony, a suffix vowel exhibiting the three-way *o~ö~e* alternation may only be front rounded *ö* if the *immediately* preceding vowel is also front rounded. This explains why despite their being a member of the **F** harmonic class, the front rounded alternant of a suffix is not available for **eF** stems if it is preceded by a linking vowel (which in this stem type is unrounded *-e-*). The phenomenon pervades throughout all paradigms, including, as we have seen, verbal paradigms: e.g., *öl-tök* ‘kill-NDF.2PL’, *öl-n-ö-tök* ‘-INF-2PL’ vs. *öl-t-e-tek* ‘-PST-NDF.2PL’, *öl-j-e-tek* ‘-SBJV-NDF.2PL’. We can see that the front rounded allomorph is only selected if the preceding vowel is front rounded too, in any other case the front unrounded allomorph is selected. (18a) is why the last vowel of all stems whose thematic vowel is *-ö-* is necessarily front rounded. Nonetheless, a front unrounded vowel may follow a front rounded vowel either if it is a (low) thematic vowel (as in **eF** stems, e.g., *sög-e-k*, *sög-e-tek*), or if it is a stably low suffix vowel (e.g., *sög-nek*, *öl-nek* ‘-NDF.3PL’).²³

We have seen that after an **öF** stem both the linking vowel and the suffix vowel is front rounded (*rög-ö-k*, *rög-höz*), while after an **eF** stem the linking vowel is front unrounded (*sög-e-k*), while the rounding of the suffix vowel depends on whether it is preceded by a linking vowel, which is unrounded (*sög-e-tek*) or not (*sög-höz*). This latter variability is due to rounding harmony and is possible because, recall, the harmonic set **F** contains both *e* and *ö*. But this itself could cause a problem: if there are two eligible vowels in the harmonic set, we need a constraint to select between them. In case of linking vowels we do encounter vacillation in rounding (in the **öeF** stem type), but this rarely happens in the case of suffix vowels.²⁴ It is again (18a) that enforces that the front rounded vowel is selected in a suffix if the preceding vowel is front rounded. That is, in *sög-höz* we find a front rounded vowel by virtue of (18a): the preceding vowel is rounded; but in *sög-e-tek* the vowel is unrounded by virtue of (18b): the preceding vowel is unrounded (as required by the paradigm class of *sög*).

²³ The same asymmetry is observed in monomorphemic words too: roots in which a front rounded vowel is followed by a front unrounded vowel (*üveg* ‘glass’, *öreg* ‘old’) occur freely and are supported by etymologically morphologically complex items (*üzem* ‘workshop’, *ölel* ‘hug’), while examples for short *ö* following a front unrounded (or back) vowel are very few. There is a single derivational agentive nominalizer suffix of little productivity which produces the dispreferred sequence, *-nök~nok*: *ül-nök* ‘assessor, lit. sit-AGNZ’, *mér-nök* ‘engineer, lit. measure-AGNZ’, *lát-nök* ‘prophet, lit. see-AGNZ’.

²⁴ The recent loanword *Apple* [ɛpəl]/[ɛpl] exhibits front rounded/unrounded vacillation in suffix vowels: *Apple-hez/höz* (Blaskovics & Ittész 2022). Note that the case of this word is not properly managed: *Apple* belongs to the **öeF** stem type, but the last vowel of the stem is not necessarily front rounded or front unrounded. Hence neither (18a), nor (18b) can make the decision on the roundedness of the suffix vowel.

Many of the rounded~unrounded alternations discussed in §6.1 can also be explained by rounding harmony. Although *vég* belongs to the **eN** stem type and hence its allative is *vég-hez*, some of its suffixed forms take the allative allomorph with a front rounded vowel: e.g., *vég-ü-nk-höz* ‘-1PL-ALL’, *vég-ű-höz* ‘-ADJZ-ALL’. We have ascribed these facts to stem type recategorisation, but ultimately in this case it is rounding harmony that forces the harmonic class to be overridden, hence the stem type to be recategorised.

6.3 The superessive

Of the vowels that participate in the harmonic front/back alternation, neither the high pair, nor the low pair is sensitive to rounding harmony. The high pair (*u~ü*) is always rounded (recall, the unrounded high *i* is hardly ever involved in vowel harmony), the low pair (*a~e*) is always unrounded, since there is no low rounded vowel in the inventory. The mid pair (*o~ö*) is also rounded, but low *e* joins them in three-way alternations that involve rounding harmony beside the more general front/back harmony.

The superessive suffix behaves in a unique way among nominal suffixes in being preceded by a linking vowel (*vég-e-n*, *rög-ö-n* vs. *karó-n* ‘pole-’, *nő-n* ‘woman-’) which is not always identical to the thematic vowel of the stem’s paradigm class, as the **eF** stem *sög-e-k* vs. *sög-ö-n*, the **aB** stem *ág-a-k* vs. *ág-o-n*, the **öeF** stem *öröm-e/ö-k* vs. *öröm-*e/ö-n*, or the **oaB** stem *boldog-a/o-k* vs. *boldog-*a/o-n* show. Instead, in these cases the linking vowel before the superessive suffix is the same as the suffix vowel in the allative suffix (*sög-ö-n*, *sög-höz*; *ág-o-n*, *ág-hoz*; *öröm-ö-n*, *öröm-höz*). But the similarity ends where the suffix vowel vacillates: the vowel before the superessive only vacillates if the thematic vowel does so too. So we find its vacillation in the **oeBN**, **aeBN**, and **oaeBN** classes (*šóder-o/e-n*, etc.), but not in the **eBN** (*partner-*o/e-n*) and the **oBN** classes (*haver-o/*e-n*).²⁵

We have to stipulate that the linking vowel of the superessive suffix is controlled by both systems. The simultaneous control of the two systems may get into conflict: these cases are shaded in (19).

²⁵ The asterisk here means ‘significantly less common than the unasterisked form.’

- (19) Morpheme vowel quality simultaneously determined by the two systems:
the superessive

stem type	PARADIGMATIC SYSTEM	HARMONIC SYSTEM	
	paradigm class restriction	example	harmonic class restriction
eN	[front] ⇒	<i>vég-e-n</i>	⇐ [front, -round]
öF	[front] ⇒	<i>rög-ö-n</i> (* <i>rög-e-n</i>)	⇐ [front, ±round]
eF	[front] ⇒	<i>sög-ö-n</i> (* <i>sög-e-n</i>)	⇐ [front, ±round]
oeBN (o)aeBN	[back] / [front] ⇒	<i>šóder-o/e-n</i>	⇐ [back] / [front, -round]
eBN	[front] ⇒	<i>partner-e-n</i>	⇐ [back] / [front, -round]
oBN aBN	[back] ⇒	<i>haver-o-n</i>	⇐ [back] / [front, -round]

We can see that where the conflict is in the front–back dimension it is the paradigmatic system that prevails upon the harmonic system: the latter allows vacillation, while the former does not, and there is no vacillation in the linking vowel of the superessive, following the pattern of linking vowels. When the conflict is in rounding, that is, where the F harmonic class also allows a rounded front vowel, then this opportunity is realised, the linking vowel is front rounded. This is an effect of (18a). The rounding of the linking vowel of the superessive is thus (unexpectedly) controlled by the harmonic class. We submit that this is possible because superessive is a case suffix and the majority pattern of such suffixes (with the exception of the most frequent one, the accusative) is that they contain a suffix vowel, which by rule is under the purview of the harmonic system.

7 Summary

We have argued that in Hungarian the behaviour of linking vowels and suffix vowels that show alternations (in height, backness and/or roundness) is due to (the interaction of) two partially overlapping systems, the paradigmatic system and the harmonic system. As a basic regularity, linking vowels obey the former and suffix vowels the latter system by analogy. There is a considerable degree of redundancy in this interaction since sometimes the two systems assign the same value (or feature) but, generally, alternating vowels display the requirements of their “own” system. The paradigmatic system assigns a specific thematic vowel (o, a, e, ö), or their combinations in case of vacillation, lexically determined stem specifically. The harmonic system affords a stem a choice of suffix vowel selection from four sets B, N, F and a combination BN in the case of vacillation. N and F overlap considerably (F has an extra ö). The harmonic class of a stem may be fully lexical but (sometimes) may be categorically or probabilistically derivable from the vocalism (and occasionally other phonological properties) of the stem. The predictable and strictly local nature of rounding harmony in Hungarian necessitates setting up a constraint which is independent of both systems to decide in the cases where

rounding is underdetermined by the two systems (the constraint also redundantly holds true when rounding is not underdetermined). Each stem lexically belongs to a stem type, a combination of its paradigmatic class and harmonic class, which (sometimes combined with rounding harmony) accounts for the behaviour of its alternating (linking or suffix) vowel.²⁶ Note that this view implies that Hungarian vowel harmony is morphologised to a considerable extent (as argued in Rebrus et al. 2023ab).

To conclude, in (20) we summarise the influence of the paradigmatic class and the harmonic class on linking vowels for nominals in the various types of cases discussed in detail in the paper. The first row of (20) displays the factors that determine the identity of the vowel alternants associated with the sets and types of suffixes identified in the last row. The second row shows the types of vowels and vowel alternations we have discussed. In the first three cells we tabulate the linking vowels and their “cohorts”, i.e., suffix-initial vowels that fail on some linking vowel trait (e.g., do not alternate with zero) but behave like linking vowels. The cells are distinguished as follows. (20i): the linking vowels of suffixes in the first one have variable height — the identity of these is fully determined by the paradigm class of the stem (they are thematic vowels) as indicated in the first cell of the first row; (20ii): the linking vowels or cohorts of suffixes in the second one are stably low or high — since their height is fixed lexically, they can get only their backness value from the paradigmatic system as indicated in the second cell of the first row ([+back] when the stem is lexically (exclusively or in combination) of the *o* or *a* class, [–back] when the stem is lexically (exclusively or in combination) of the *e* or *ö* class). The last two cells of the second row contain (suffixes with) suffix vowels. (20iv): the first one has (suffixes with) suffix vowels that are stably high, mid or low — as indicated in the fourth cell of the first row, they get their backness²⁷ on the basis of the harmonic class of the stem ([+back] when the stem is lexically (exclusively or in combination) of the B class, [–back] when the stem is lexically (exclusively or in combination) of the N or F class); (20v): the second one contains (suffixes with) suffix vowels that show the ternary alternation *o~ö~e* — as indicated in the last cell of the first row it is their harmonic class that determines their backness values ([+back] when the stem is lexically of the B class, [–back] when the stem is lexically of the N or F class). When the stem is in the N class, it unambiguously determines the rounding of the front alternant of the suffix vowel (as [–round]), however, the harmonic class underdetermines the rounding of the front alternant of the suffix vowels when the stem is of the F class since it contains both *e* and *ö* and they are both available as suffix vowel alternants. In this case rounding harmony decides (not included in (20) to avoid clutter). We conclude with the most complex case: for nominals the third cell in the second row, (20iii), contains the lone superessive suffix, whose linking vowel partially copies the behaviour of the suffix vowels in cell (20v). The height of the

²⁶ Including the asymmetries between the way vowel-initial and consonant-initial suffixes harmonise.

²⁷ Roundness is not based on the harmonic class in this case since the alternant *ö* is unavailable as a suffix vowel in these suffixes (even when the stem is in the F class).

linking vowel for this suffix is fixed as mid/low so it can only take the back value from the paradigmatic class of the stem ([+back] when the stem is lexically (exclusively or in combination) of the o or a class, [-back] when the stem is lexically (exclusively or in combination) of the e or ö class), but it has to be lexically stipulated for this suffix that exceptionally it receives the roundedness value of its front alternants (even when in conflict with the thematic vowel of the stem) from the harmonic class of the stem ([-round] if the stem is harmonically N class, [+round] when it is F, as selected by rounding harmony). This anomalous behaviour of the superessive may be functionally motivated by the fact that it is an untypical linking vowel suffix in that it is a case suffix, which typically have suffix vowels (this is indicated in the last row of (20).

(20) Determining factors of vowel variants in different nominal suffixes

PARADIGM CLASS (o a e ö & combinations)	⇒ [back] (identical in backness with paradigm class)	⇒ ⇐ [back] [round] (identical in back/roundness with par./harm. cl.)	⇐ [back] (identical in backness with harmonic class)	HARMONIC CLASS (B N F & combinations)
linking (& cohort) vowels			suffix vowels	
variable height	lexically non-variable height		(iv)	(v)
(i) thematic V (o~a~e~ö)	(ii) high (u~ü) or low (a~e)	(iii) mid/low (o~ö~e)	high (u~ü, ú~ű), long mid (ó~ő) or low (a~e, á~é)	mid/low (o~ö~e)
PL & many others	1PL (3PL); CMPR (3SG)	SUP	many	ALL (2PL, MULT)
typical inflection: POSSESSOR person/number		typical inflection: NOMINAL CASE		

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