

## 0 Introduction

This paper aims to contribute to the understanding of the complexities of Hungarian vowel harmony. Stems which contain a back vowel followed by at least one neutral vowel show lexical variation (i.e., some stems take back suffixes, while others take front suffixes) and yet other stems are subject to vacillation. In the case of vacillating stems, the choice of the front or back suffix allomorph may be influenced by the broader context, as noted in Kontra et al. (1989).

An experiment was designed to find out whether vacillating stems are influenced by a preceding determiner. The experiment was extended to *Be* stems which are traditionally not thought to be vacillating. The results confirm the existence of a determiner effect, which was found to be influential also in the case of *Be* stems with strong front or back preference.

## 1 The vowel inventory of Hungarian

In Hungarian 14 vowel phonemes are distinguished, which constitute 7 short-long pairs. The traditional phonological classification divides Hungarian vowels into front /i, i:, y, y:, ε, e:, ø, ø:/ and back /u, u:, o, o:, ɔ, a:/ vowels and distinguishes three degrees of height: vowel phonemes can be classified into high vowels /i, i:, u, u:, y, y:/, mid vowels /o, o:, ø, ø:, e:/, and low vowels /ɔ, a:, ε/. Rounding is a distinctive feature in Hungarian; rounded vowels include /o, o:, ø, ø:, y, y:, u, u:, ɔ/ while unrounded ones comprise /i, i:, ε, e:, a:/. Table (1) shows the traditional phonological classification of Hungarian vowels (e.g., Siptár and Törkenczy 2000).

Some of the vowels, however, have different phonetic realisations. Short and long vowels do not have the same quality, as long vowels tend to have a less open articulation. Vowels phonologically classified as mid can be divided into an upper-mid [e:, ø:, o:] and a lower-mid category [ø, o]. Phonetically, [a:] is central and is produced with a lower tongue position than [ɔ]. Although vowel length is also a distinctive feature in Hungarian, the phonetic length of vowels is variable.

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(1)

	front		back	
	unrounded	rounded	unrounded	rounded
high	i, i:	y, y:		u, u:
mid	e:	ø, ø:		o, o:
low	ɛ		a:	ɔ

## 2 Vowel harmony in Hungarian

In Hungarian, both backness and rounding harmony apply. All vowels participate in backness harmony, while rounding harmony is a more restricted phenomenon. Hungarian vowel harmony is of the directional type, and it proceeds from left to right. The domain of application is usually defined as the phonological word. Vowel harmony applies within morphemes, across synthetic and analytic suffix boundaries, but compounds and prefixed words do not show vowel harmony as the elements constitute their own harmonic domain (Siptár and Törkenczy 2000).

Backness harmony in roots and suffixed stems shows significant differences. Roots may be harmonic, or front and back vowels may mix in the same root. There are two types of harmonic roots. The first class of roots contains only back vowels, as in *asztal* ‘table’, *falu* ‘village’. The second class of roots is composed of front rounded vowels only, as in *ökör* ‘ox’, *tükör* ‘mirror’. Hungarian also allows for mixed roots, which are a combination of front and back vowels. A large number of roots contain back vowels plus front unrounded vowels (/i/, /i:/, /ɛ/, or /e:/), for example, *papír* ‘paper’, *ital* ‘drink’. Roots that contain back and front rounded vowels are called disharmonic roots (such as *sofőr* ‘chauffeur’, *nüansz* ‘nuance’). Such words are scarce in number and are often considered exceptional.

In the case of suffixed stems, suffix vowels are expected to show harmony with the rightmost root vowel. If this vowel is non-neutral, then the suffix allomorph is unequivocally determined. If the last vowel is back, a back allomorph is chosen, if it is front rounded, then a front allomorph will appear. Some examples are provided in (2).

(2)

<i>asztal+hOz</i> <sup>1</sup>	‘table’ allative	<i>asztalhoz</i>
<i>tükör+hOz</i>	‘mirror’ allative	<i>tükörhöz</i>

If a stem contains at least one front unrounded vowel following a back vowel, the front unrounded vowel behaves transparently and the suffix appears in its back allomorph. More details on transparency and neutral vowels are given in Section 3.

<sup>1</sup> Capital letters refer to front as well as back alternants of suffixes.

Stems which contain neutral vowels only show lexically determined variation. Certain stems always take front suffixes (as in *víz+nek* ‘water’ dative), which is the regular productive pattern. Other stems take back suffixes exclusively (such as *hid+nak* ‘bridge’ dative); these stems are traditionally called antiharmonic stems and are usually considered exceptional. Stems with neutral vowels only do not show vacillation<sup>2</sup> (Törkenczy 2011).

Suffixes may be classified into two groups, alternating and non-alternating, depending on whether they show vowel harmony or not. Alternating suffixes may further be distinguished on the basis of how many vowels participate in the alternation: there are binary suffixes (such as y/u, ø/o, ε/ɔ), ternary suffixes (ø/o/ε), and quaternary suffixes (ø/o/ε/ɔ). Non-alternating or invariant suffixes do not show vowel harmony; most of the productive suffixes contain neutral vowels with the exception of the suffix *-kor* (Törkenczy 2011).

Rounding harmony in Hungarian only involves front vowels. It is only active in suffixed stems and it does not show morpheme-internal harmony. The roundedness of the final front vowel of the root determines the roundedness of the suffix, as shown in (3). Nevertheless, not all suffixes show rounding, only ternary and quaternary alternating suffixes have both front rounded and front unrounded allomorphs (Törkenczy 2011). Since rounding harmony does not involve vacillation, we will not discuss it in more detail in this account.

- (3)
- |                  |                    |                 |
|------------------|--------------------|-----------------|
| <i>körte+hOz</i> | ‘pear’ allative    | <i>körtéhez</i> |
| <i>likőr+hOz</i> | ‘liqueur’ allative | <i>likőrhöz</i> |

### 3 Neutral vowels

On the basis of their phonological behaviour, front unrounded vowels may be considered neutral since they behave transparently with respect to backness harmony, combine with back vowels in a large number to form mixed roots and almost all non-alternating productive suffixes contain front unrounded vowels.

Front unrounded vowels, however, are not transparent to the same extent. High vowels are more transparent than mid vowels, which are in turn more transparent than low ones. Accordingly, neutral vowels may be arranged into a transparency hierarchy: [i(:)]>[e:]>[ε]. Certain accounts even question the transparency of [ε] (e.g., Ringen and Kontra 1989).

The transparency hierarchy is based on the observation that back plus neutral roots are more likely to take back suffixes if the neutral vowel is high, as shown in (4). This phenomenon was termed the *height effect* by Hayes and Londe (2006).

<sup>2</sup> Very few stems, such as *férfi* and *izé*, may take front as well as back suffixes.

- (4)
- |                         |                 |
|-------------------------|-----------------|
| <i>papír+nak</i>        | ‘paper’ dative  |
| <i>dzsungel+nak/nek</i> | ‘jungle’ dative |

Stems may contain more than one neutral vowel. It has been observed that the longer the sequence of neutral vowels in a back plus neutral stem, the more likely it is that the suffix will appear in its front allomorph, as in (5). Therefore, the transparency of neutral vowels is influenced by the number of neutral vowels in a stem. This observation is called the *count effect* (Hayes and Londe 2006).

- (5)
- |                         |                   |
|-------------------------|-------------------|
| <i>Alíz+nak</i>         | ‘Alice’ dative    |
| <i>analízis+nak/nek</i> | ‘analysis’ dative |

#### 4 Vacillating stems

While certain stems which contain a back vowel and at least one neutral vowel take only front or only back suffixes, a large number of stems with *BN* structure are grammatical with front and back suffixes as well. Such words are called vacillating stems. Since words of the same harmonic structure may behave differently, vacillation is said to be lexically determined (some examples are provided in (6)).

- (6)
- |                      |                |
|----------------------|----------------|
| <i>matek+nak</i>     | ‘maths’ dative |
| <i>hotel+nak/nek</i> | ‘hotel’ dative |
| <i>kódex+nek</i>     | ‘codex’ dative |

A corpus examination of *Be* stems in the *Szószablya* database (Halácsy et al. 2003) suggests that vacillating stems do not form a clear-cut class of words (Rebrus and Törkenczy 2013). Some of the words which have a *Be* structure may take front suffixes (almost) exclusively while other words of the same harmonic structure may take back suffixes most of the time. Most words are in between these two extremes and take both front or back suffixes to a varying degree.

#### 5 The determiner effect

Although the domain of application of vowel harmony is the phonological word, it has been noted that the choice of the suffix allomorph after vacillating stems may be influenced by the broader context. Preceding words may influence the frontness or backness of the suffix of the vacillating stem. However, it seems to be the case that some kind of syntactic relationship between the vacillating stem and the preceding word is needed for this effect to apply. If a determiner precedes the vacillating stem in a construction such as

*abban a farmerban* ‘in those jeans’, the appearance of the same suffix on the preceding determiner may have a kind of priming effect and the frontness or backness of the determiner may influence the choice of the suffix allomorph of the stem. This phenomenon has been called the *priming effect* (Kontra et al. 1989), the *determiner effect* or *determiner governance* (Londe 2005), and *long distance harmony* (Nádasdy and Siptár 1994).

### 5.1 Previous experiments

Several researchers have touched on the issue of the determiner effect. Kontra et al. (1989) were among the first to point out that suffix vowels of vacillating stems behave in a peculiar way in certain contexts. They examined a small number of vacillating stems (*sláger*, *karakter* and *férfi*) in front, back and neutral contexts. In front contexts focus words were preceded by determiners with a front suffix alternant while back contexts included focus words preceded by determiners with a back suffix alternant. For neutral contexts Kontra et al. chose back harmonic words to precede focus words. In these contexts the previous word did not contain the suffix morpheme to be elicited on the focus word. An example for a neutral context is shown in (7). 3 different suffixes (*-vAl*, *-bAn*, *-nAk*) were used in the questionnaire, which was filled out by 59 respondents aged between 16-18.

(7)

Valaha karakter\_ lenni dicsőség volt, ma inkább szégyen. (Kontra et al. 1989: 132)

The results confirmed the existence of the determiner effect. In front contexts significantly more front allomorphs were chosen than in neutral contexts and in neutral contexts significantly more front allomorphs were chosen than in back contexts. In this experiment there was no significant difference between the three suffixes. Kontra et al. also found that one of the three focus words (*férfi*) displayed different behaviour, which may reflect the different harmonic structure focus words have (*sláger* and *karakter* are *BN* stems while *férfi* is a *NN* stem).

A similar experiment was conducted by Londe (2005), whose research involved a larger set of data and more participants. She selected 20 vacillating stems and three suffixes (*-vAl*, *-bAn*, *-nAk*), and her questionnaire was filled out by 250 native speakers of Hungarian. She found that speakers are 11% more likely to use the harmonically agreeing suffix allomorph in such cases.

She also conducted a direct elicitation experiment in which vacillating stems were not included in sentences. 14 respondents were given a list of 36 vacillating stems with determiners and they had to fill in the appropriate suffix allomorph of the focus word. In this experiment the results indicated a somewhat stronger effect.

## 5.2 Research questions

Several questions arise in connection with this phenomenon. One obvious question to ask is whether the choice of the determiner influences the choice of the suffix allomorph of the stem. If the determiner indeed influences the backness or frontness of the suffix, a further area worth investigating is how strong the determiner effect is and to what extent the preceding determiner influences the choice of the suffix.

This phenomenon may also shed some light on how we perceive vacillating stems. If the class of words with a *Be* structure may be conceived of as a continuum on the basis of how strong preference they have for front and back suffixes in contexts which do not influence the choice of the suffix allomorph, the preceding determiner might influence the choice of the suffix allomorph even in stems which have a strong preference for front or back suffixes and are traditionally not thought to be vacillating.

It is also interesting to see whether the lexical preference each vacillating stem has proves to be a stable property or not. It might be the case that the presence of a potentially influential determiner overrides the lexical preference of a stem.

## 5.3 Experimental design

An experiment was designed to investigate how the determiner effect works. In the present experiment only words which contain a back vowel and /ɛ/ were included, since this is the harmonic structure that shows the most vacillation. The test words included four vacillating words (*fotel*, *notesz*, *panel*, *farmer*), four non-vacillating words with the same *Be* structure which take front suffixes almost exclusively (*konzerv*, *kódex*, *sláger*, *pamflet*) and four words with different harmonic structure (*épület*, *kocsi*, *ajándék*, *család*). The test words appeared with either of the two suffixes *-bAn* and *-nAk*. Each word was included in six sentences with a front or back suffix on the focus word, combined with a front or back determiner. Two of the sentences did not contain a determiner. Examples for the focus word *panel* are shown in (8).

(8)

*Ebben a panelben* még a lift sem működik.

*Ebben a panelban* több szörnyű tüzeset is volt tavaly.

*Abban a panelben* két eladó lakás is van.

*Abban a panelban* húsz évig laktunk.

*Panelben* nem kellene kutyát tartani.

*Panelban* lakott, amíg vidékre nem költöztek.

The experiment was designed to shed some light on several potential factors that may influence the choice of the suffix allomorph. The lexical behaviour of individual words was expected to have the strongest influence on which suffix allomorph a focus word appears with. Significant differences are expected

depending on whether the focus word belongs to the group of words traditionally thought to be vacillating, takes only front suffixes or has a completely different harmonic structure. The presence or absence of the determiner as well as the frontness or backness of the determiner are potential factors that show whether there is a determiner effect. Although the two suffixes *-bAn* and *-nAk* are both binary suffixes and are expected to behave in the same way, the choice of the suffix may also influence the results.

An internet-based questionnaire was compiled out of the 72 test sentences. Native speakers of Hungarian were presented with the sentences in a random order and were expected to give acceptability judgements and rate sentences on a scale from 1 to 7. 133 respondents filled out the questionnaire.

#### 5.4 Results

The test sentences without determiners show the lexical preference of each focus word. Three of the vacillating focus words (*fotel*, *notesz*, *farmer*) were rated higher with a front suffix while *panel* was rated higher with a back suffix. To establish whether the determiner indeed influences the choice of the suffix allomorph, we compared the ratings given in the different contexts in the case of the four vacillating focus words (*fotel*, *notesz*, *farmer*, *panel*). Table (9) shows the results for each focus word with a front determiner combined with a front and a back suffix and with a back determiner combined with a front and a back suffix.

(9)

Determiner	Focus word	Suffix	Average
F	fotel	F	6.23
B	fotel	F	5.93
F	fotel	B	4.81
B	fotel	B	5.16
F	notesz	F	6.08
B	notesz	F	5.53
F	notesz	B	4.99
B	notesz	B	5.39
F	farmer	F	6.10
B	farmer	F	5.29
F	farmer	B	5.53
B	farmer	B	5.66
F	panel	F	5.94
B	panel	F	5.47
F	panel	B	5.30
B	panel	B	6.02

For the first three focus words the test sentences with a front determiner and front suffix got higher averages than with a back determiner and back suffix, in the case of *panel* the back determiner and back suffix combination was preferred. The results show that those constructions which involved a harmonically agreeing determiner and suffix were indeed rated higher. In the case of *fotel* and *notesz*, a back suffix with a harmonically agreeing back determiner could not override the lexical preference for frontness, thus, *fotel* and *notesz* have stronger front suffix preference. In the case of *farmer* and *panel*, back determiner and back suffix sentences were rated higher than back determiner and front suffix sentences and also front determiner and front suffix sentences got higher averages than front determiner and back suffix constructions which suggests that these two focus words have less stable lexical preferences and the determiner effect seems to be stronger in these cases.

The results confirm that the determiner effect also influences *Be* stems which are not vacillating. While sentences with front suffixes got the highest averages regardless of the determiner, sentences with harmonically agreeing determiners got higher averages for each focus word (*kódex*, *konzerv*, *sláger*, *pamflet*). In the case of focus words which take front suffixes, then, the determiner effect cannot override the lexical preference of words.

Table (10) sums up the results for vacillating words and words taking front suffixes in different contexts. Disregarding the slight differences in the behaviour of individual words, we can see that *Be* stems with front suffixes are also influenced by the preceding determiner although their front preference is a much more stable property.

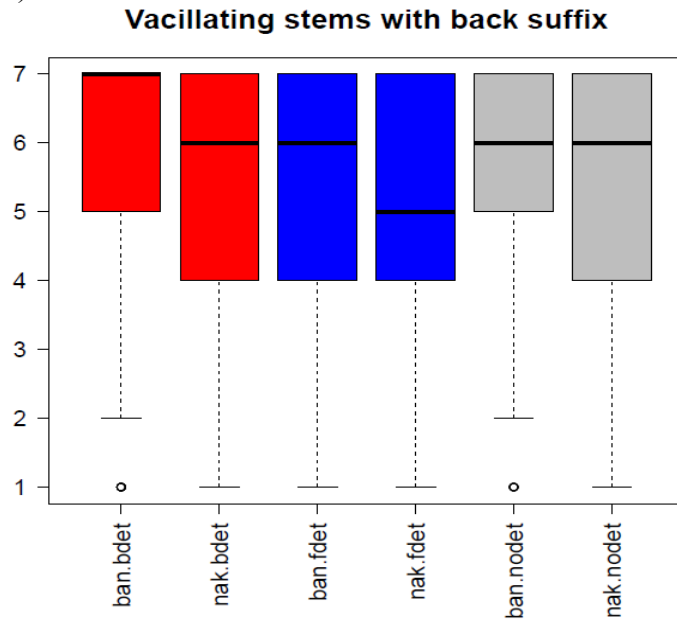
(10)

Determiner	Type of word	Suffix	Average
F	vacillating	F	6.09
B	vacillating	F	5.56
F	vacillating	B	5.16
B	vacillating	B	5.56
F	front	F	6.30
B	front	F	5.76
F	front	B	3.13
B	front	B	3.68

The two suffixes *-nAk* and *-bAn* were not expected to show differences, nevertheless, they also seem to influence the results. Stems suffixed with *-bAn* were rated higher in most of the cases, which was especially noticeable in the case of back suffixes (shown in (11) and (12)).

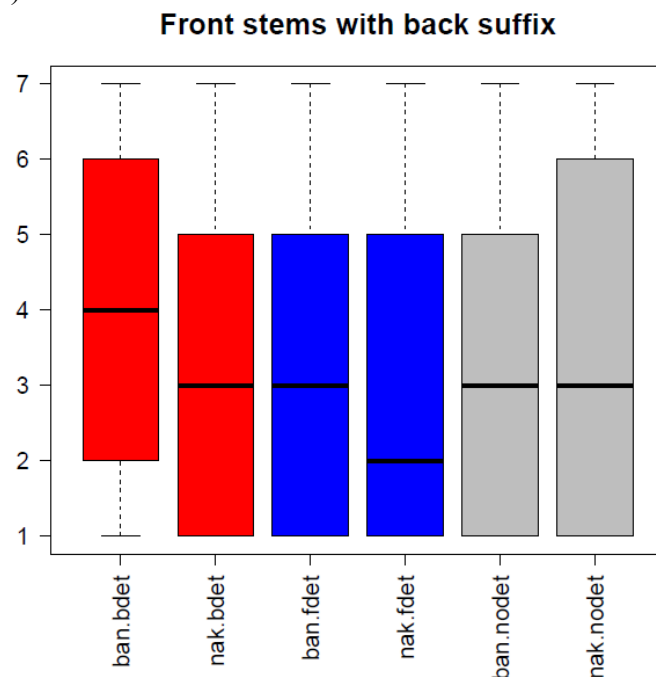


(11)



The back allomorph of *-ban* was rated higher than the back allomorph of *-nak* both in the case of vacillating stems and stems taking front suffixes with front as well as back determiners. While vacillation is usually assumed to be a property of stems, the preference for front or back allomorphs may also be lexically determined by the individual suffixes. The same stem may show vacillation with one suffix and may have strong front or back preference with another, as in *mágnes+vel/val* but *\*mágnesos* (Forró 2013).

(12)



## 6 Conclusion

The present experiment confirms the existence of the determiner effect. Results show that harmonically agreeing determiners and suffixes achieve higher marks than non-agreeing determiners and suffixes. This is

true in the case of vacillating words and also in the case of *Be* stems which have stable front preference. The determiner effect may override lexical preferences in the case of vacillating words depending on individual behaviour. However, the determiner effect is not so strong as to override the lexical preference of words with front suffix preference. The type of suffix attached to the stem also influences the results as the suffix *-bAn* seems to improve results more than the suffix *-nAk*, especially when it appears in its back allomorph.

The results suggest that vacillating stems are not an exceptional class, but form a continuum with *Be* stems which have strong back or front preference. The results also raise further questions, such as whether there are other constructions which influence the choice of the suffix allomorph or other cases in which the domain of vowel harmony may extend to a broader context.

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