VOWEL HARMONY IN THE SPEECH OF ENGLISH-HUNGARIAN BILINGUALS OF VANCOUVER

LESLIE GILBERT ZSOLDOS

Bachelor of Arts, Simon Fraser University, 1992

A thesis submitted in partial fulfillment
of the requirements for the degree of

MASTER OF ARTS

In the Department
of
Linguistics

SIMON FRASER UNIVERSITY
Spring 2006

APPROVAL

Name:	**Leslie Gilbert Zsoldos**
Degree:	**Master of Arts**
Title of Thesis:	**Vowel Harmony in the Speech of English-Hungarian Bilinguals of Vancouver**
Examining Committee:	**Dr. Chung-hye Han** Chair Assistant Professor, Department of Linguistics
	Dr. Zita McRobbie Senior Supervisor Associate Professor, Department of Linguistics
	Dr. Alexei Kochetov Supervisor Assistant Professor, Department of Linguistics
	Dr. Joseph F. Kess External Examiner Professor, Department of Linguistics University of Victoria
Date Defended:	Dec. 2/05

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ABSTRACT

The thesis aims at identifying the problematic issues of Hungarian vowel harmony and discussing the results of the sociolinguistic experiment. The objective of this study is to relate findings in the literature on Hungarian vowel harmony to the results of the experiment. Though there exists abundant research on Hungarian vowel harmony, there is relatively little known about the realization of vowel harmony in the speech of bilingual Hungarian speakers. In my experiment I recorded the responses of 30 participants in order to determine their selection of suffix vowels, their use of vowel harmony and their deviation from the standard responses. I examined vowel harmony in three speaker groups with different lengths of stay in Canada and hypothesized that differences in the use of vowel harmony could be attributed to them. Based on the results of the experiment, I propose that there is evidence of language change in progress.

ACKNOWLEDGEMENTS

I would like to thank Dr. Zita McRobbie, Dr. Alexei Kochetov, all the participants in my experiment and my friends and family for their encouragement and support.

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INTRODUCTION

Hungarian is a language that exhibits vowel harmony. According to Gussenhoven and Jacobs (1998), vowel harmony is a phonological process, a subclass of long-distance assimilation, and it excludes certain combinations of vowels in the word. Vágó (1973) describes it as a process in which a particular vowel assimilates to another vowel in some feature specification. Hungarian vowel harmony spreads from left to right and from roots to suffixes, a process of progressive assimilation. For example, in Hungarian 'to Peter' is *Péter-nek* and 'to Martin' is *Márton-nak. Péter-nek* consists entirely of front vowels and *Márton-nak* entirely of back vowels.

Though there is an abundant source of information regarding Hungarian vowel harmony in the literature, there exists relatively little sociolinguistic research involving bilingual Hungarian speakers. The goal of this thesis is to relate the findings in the literature of Hungarian vowel harmony to the results of the sociolinguistic experiment with bilingual Hungarian speakers. The thesis is organized as follows: in Chapter 1 I present background research of Hungarian vowel harmony. In this chapter I discuss the characteristics of vowel harmony systems, present the Hungarian vowels with their feature specifications and analyze vowel harmony. This includes the relationship between backness harmony and rounding harmony, the neutral vowels and problematic issues. Then I discuss previous phonological anaylses of Hungarian vowel harmony, early analyses and more recent analyses. I conclude the chapter with a discussion of previous experimental studies. In Chapter 2 I present my experiment on vowel harmony involving bilingual English-Hungarian speakers in Vancouver, describe the experiment in detail and explain the goals of the experiment. I then present the results of the experiment and provide analysis. I divide the participants into three speaker groups and test the hypothesis that differences can be attributed to the three speaker groups. In Chapter 3, I summarize my analysis of Hungarian vowel harmony and discuss the results and implications of my experiment relating to research on vowel harmony with bilingual English-Hungarian speakers in Vancouver.

CHAPTER 1

BACKGROUND RESEARCH

1.1 Characteristics of Vowel Harmony

An examination of vowel harmony by Ultan (1973) in a number of different languages indicates that the following features are characteristic of all of them:

1) vowel harmony is usually triggered by a root or stem vowel,
2) the domain of vowel harmony is almost always the morphological word,
3) vowel harmony is systematic rather than sporadic,
4) since the essence of vowel harmony is the alternation of vowels or classes of vowels determined by similar vowels or classes of vowels, there must always be at least two classes of vowels in any vowel harmony system that are mutually exclusive of one another within the domain of harmony.[1]

Ultan notes that adjacent vowels are more likely to assimilate to one another and the more removed they are from one another, the less likely they are to assimilate. In Hungarian, the most effective way of defining the vowel which triggers vowel harmony is to identify it as the root-final vowel which conditions successive suffix vowels. For example, *február-ban* 'in February' has a root-final back vowel which conditions a back vowel in the suffix. Compare this to *november-ben* 'in November', a root-final front vowel which conditions a front vowel in the suffix.

[1] This does not apply in the case of doublets (see section 1.5.4).

1.2 The Hungarian Vowels

In order to investigate vowel harmony in Hungarian, it is necessary to establish the Hungarian vowel inventory as shown in (2). Hungarian has fourteen vowels, seven long and seven short. The examples cited will be in Hungarian orthography. Therefore, I will provide the phonetic symbols of the respective Hungarian orthographic vowels in (1).

(1)
Hungarian Orthographic Vowels

a	[ɔ]	i	[i]	u	[u]	ü	[y]
á	[a:]	í	[i:]	ú	[u:]	ű	[y:]
e	[ɛ]	o	[o]	ö	[ø]		
é	[e:]	ó	[o:]	ő	[ø:]		

(2)
Hungarian Vowel Inventory

	SHORT			LONG		
	FRONT		BACK	FRONT		BACK
	[-round]	[+round]	[+round]	[-round]	[+round]	[-round] [+round]
high	i	y	u	i:	y:	u:
mid		ø	o	e:	ø:	o:
low	ɛ		ɔ			a:

Ringen (1988) points out that the long and short vowel systems are not totally symmetrical. The long low back vowel is unrounded whereas the short low back vowel is rounded; there is no short mid front vowel (in standard Hungarian) nor any long low front vowel.

The vowel features which are relevant for the classes of vowels in the sociolinguistic experiment are [+/-back] and [+/-round]. All the Hungarian vowels can be classified with these features. The front unrounded vowels *e*, *é*, *i* and *í* share the features [-back, -round], the front rounded vowels *ö*, *ő*, *ü* and *ű* [-back, +round], the back vowels *a o*, *ó*, *u* and *ú* [+back, +round] and the back vowel *á*, the only unrounded back vowel in Hungarian, shares the features [+back, -round].

Compare this system to the symmetrical vowel inventory system of Turkish which provides us with an example of a perfectly symmetric vowel system of eight vowels: four rounded, four back, four high. The vowel chart below gives the features of these eight vowels. (Levi, 2000)

Table 1

Turkish Vowel Inventory

	i	e	y	ø	ɨ	a	u	o
High	+	-	+	-	+	-	+	-
Back	-	-	-	-	+	+	+	+
Round	-	-	+	+	-	-	+	+

According to Fee (1990), historically the Hungarian language contained both mid and low front vowels, but these have been merged in most dialects. Of the vowel pairs, Keresztes (1999) states that the short vowels and their long counterparts closely correspond to one another in most cases. The greatest difference is in the ɔ-a:, ɛ-e: pairs because they consist of vowels which differ phonetically from one another.

1.3 Vowel Harmony in Hungarian

Hungarian has two types of vowel harmony, backness harmony and rounding harmony. Nádasdy and Siptár (1994, 95) state "A magyar fonológia talán legérdekesebb jelensége, hogy a magánhangzók elölség szempontjából harmonizálnak." [Perhaps the most interesting phenomenon of Hungarian phonology is that the vowels harmonize with respect to backness].

1.3.1 Backness Harmony

To illustrate that the vowels of a Hungarian word must agree in backness, Siptár and Törkenczy (2000) provide the following examples:

(3)

(a)	perd-**ül**-és-**e**tek-tő**l**	'from your (pl.) twirling around
(b)	ford-**u**l-**á**s-**o**tok-tó**l**	'from your (pl.) turning around

We notice that in (a) there are only front vowels and in (b) only back vowels. In backness harmony, all the vowels of the word must agree in backness. Therefore, they must share the feature values [+back] or [-back].

1.3.2 Rounding Harmony

Hajdú (1975) notes that Hungarian also differentiates between rounded and unrounded vowels. The rule of rounding harmony is that front rounded vowels (*ö*, *ü*) may not occur with front unrounded or back vowels. All the vowels of the word must agree in rounding. Therefore, they must share the feature values [+round] or [-round]. Hungarian rounding harmony affects only the first suffix following the stem and is therefore less extensive than backness harmony. For example, 'to land' is *föld-höz* but 'to my land' is *föld-em-hez*. In *föld-höz* there are only front rounded vowels but in *föld-em-hez* the front rounded vowel is restricted to the initial syllable, the root, and the successive vowels are front unrounded.

In Hungarian some suffixes have a third variant to be used when there is a front rounded vowel within the word. We can compare *ház-hoz* 'house-to', *víz-hez* 'water-to' but *gyümölcs-höz* 'fruit-to'. Collinder (1965) states that rounding harmony occurs in Hungarian, Eastern Cheremis and Selkup, all languages which have been subjected to Turkic influence. Hajdú explains that this can be seen in the Hungarian noun suffixes; some such as *-ban/-ben* 'in' have back and unrounded front vowel forms only, while others, such as *-hoz/-hez/-höz* 'to' have two front-vowel forms, one unrounded and the other rounded. Roots taking an unrounded front vowel take the form *-hez*, e.g., *kéz* 'hand' *~kézhez*, but those containing a rounded vowel require the form *-höz*, e.g., *bőr* 'skin' *~bőrhöz*, *tű* 'pin' ~ *tűhöz*. In the case of back vowels, there is only one form *-hoz*, for both rounded and unrounded roots (*úr* 'gentleman' ~ *úrhoz*, *vár* 'castle' *várhoz*). The use of the suffix variants *–ban/ben* and *–hoz/hez/höz* will be tested in the sociolinguistic experiment (see sections 2.2.1, 2.2.2 and 2.2.3).

1.4 Alternating Suffixes

Siptár and Törkenczy (2000) list various types of alternating suffixes in terms of the vowel pairs/triplets that alternate in them:

(4)

ú	ű		láb-ú 'legged' fej-ű 'headed'
u	ü		ház-unk 'our house' kert-ünk 'our garden'
ó	ő		vár-ó 'waiting' (adj.) kér-ő 'asking' (adj.)
o	ö	e	ház-hoz 'to (the) house, föld-höz 'to (the) land kert-hez 'to (the) garden
á	é		vár-ná 'he/she would wait for it', kérné 'he/she would ask for it'
a	e		ház-ban 'in (the) house', kert-ben 'in (the) garden'

Nádasdy and Siptár (1994) note that there can be as many as four alternative suffixes in Hungarian. When there are four alternative suffixes, two are back vowels and two are front (front rounded and front unrounded). In those cases where there are two back vowel suffixes, they are *a* and *o*. To exemplify this, they list the four alternative plural suffixes in Hungarian: *-ak, -ok, -ek, and –ök.*

(5)

(a)	ház	ház-ak	'houses'
(b)	híd	hid-ak	'bridges'
(c)	hold	hold-ak	'moons'
(d)	bab	bab-ok	'beans'
(e)	bot	bot-ok	'sticks'
(f)	húr	húr-ok	'strings'
(g)	fej	fej-ek	'heads'
(h)	hit	hit-ek	'beliefs'
(i)	hölgy	hölgy-ek	'ladies'
(j)	bőr	bőr-ök	'skins'
(k)	bűn	bűn-ök	'sins'
(l)	tök	tök-ök	'squashes'

Although the words in (c) and (e) both contain the vowel *o*, they take different plural suffixes. For this there are historical reasons relating to the presence of a stem vowel in (c) and absence of a stem vowel in (e). Likewise, the words in (i) and (l) both contain the vowel *ö*, but they take different plural suffixes. With respect to vowel harmony, (e) is more harmonic than (c) because in (e) the two vowels are identical and (l) is more harmonic than (i) because in (l) the vowels agree in both backness and rounding while in (i) they only agree in backness.

Ringen and Vágó (1998) explain that with disharmonic roots, those with both back harmonic and front harmonic vowels, the suffix vowel is determined by the last harmonic root vowel. The rule of Hungarian vowel harmony can be written as follows:

$V \rightarrow \begin{bmatrix} \alpha \text{ back} \\ (\beta \text{ round}) \end{bmatrix} / \begin{bmatrix} \alpha \text{ back} \\ (\beta \text{ round}) \end{bmatrix} C_0\_\_$. In other words, a vowel must agree in backness with the preceding vowel and in certain cases, also in rounding.

1.5 Neutral Vowels

Though Hungarian has many examples of alternating suffixes, there are also invariable suffixes, most of which contain neutral vowels. Although all Hungarian vowels can be classified as front or back, the front vowels *e*, *é*, *i* and *í* are special because

they can combine with vowels of either set. As a result, they are called *neutral*. Siptár and Törkenczy (2000) provide the following examples: *-ig* 'up to', *-ni* infinitive marker, *-né* 'Mrs.' These suffixes are invariable because they combine with all vowels:

(6)

öt-ig 'up to five'
hat-ig 'up to six'
kilenc-ig 'up to nine'
beszél-ni 'to speak'
fut-ni 'to run'
süt-ni 'to bake'
Benkő-né 'Mrs. Benkő
Kiss-né 'Mrs. Kiss'
Kovács-né' Mrs. Kovács

Olsson (1992) states that if it were not for the neutral vowels, harmony would really be a very simple process. According to Ohala (1994), languages exhibiting vowel harmony often have one or more vowels which are indifferent to the harmonizing principle. If neutral vowels occur in a stem with non-neutral vowels, they do not seem to trigger vowel harmony. This is the case with *kordé* 'cart' *kordé-nak* 'cart-to' (dat.) and *kordé-tól* 'cart-from' (abl.)

Olsson notes that one way of dividing the Hungarian vowels is according to backness. Harmonic front and back vowels are normally kept apart word-internally. Vowels that belong to the neutral group- though phonetically front- may appear freely with vowels from any of the two harmonic sets.

Esztergar (1971) suggests that *e* in Hungarian is changing from a neutral vowel to a harmonic vowel. That is, *e* is becoming a vowel that only combines with front vowels rather than with both front and back. Anderson (1980) and Farkas (1982), however, suggest that there is a hierarchy of neutrality with *i* as the most neutral vowel and *e* as the least neutral vowel. Siptár and Törkenczy (2000) believe it is reasonable to consider front unrounded vowels neutral because this is better than allowing for huge numbers of exceptions (front unrounded vowels which combine with back vowels). They argue, however, that there is a stronger reason for *i, í, e, é* to be taken as neutral and that is that they let harmony pass through them (i.e. they are transparent). This means that if the

word has another vowel that is harmonic (non-neutral), suffixes will be harmonized to that vowel.

They illustrate this with the following examples: *rövid-en* 'briefly' but *hamis-an* 'falsely', *örmény-től* 'from an Armenian' but *kastély-tól* 'from a manor', *kever-ék-et* 'mixture' (acc.) but *marad-ék-ot* 'remnants' (acc.). They conclude that if the words *hamis*, *kastély* and *maradék* had a front harmonic vowel in the last syllable, we could never explain why they take back vowel suffixes.

We have seen that vowel harmony appears to ignore neutral vowels. Therefore, the last non-neutral vowel in the stem controls vowel harmony. However, when stems contain only neutral vowels, harmonization appears random (Lass, 1984). To illustrate this, consider the following examples:

(7)

Root		from inside	in	at	to
'water'	víz	-ből	-ben	-nél	-nek
'knife'	kés	-ből	-ben	-nél	-nek
'torture'	kín	-ból	-ban	-nál	-nak
'target'	cél	-ból	-ban	-nál	-nak

The words 'water' and 'knife' show phonetically predictable front harmony but the words 'torture' and 'target' show back harmony. This is a further complication of the neutral vowels. However, we notice that the vowel *e* does not appear in the examples. Ringen (1988) argues that there are fifty neutral vowel roots such as these which require back vowel suffixes. Ringen states that one indication that *e* is not a neutral vowel is that of these fifty roots, none contain *e*.

According to Ringen, there is some disagreement about the status of the vowel *e*. Siptár and Törkenczy (2000) classify this vowel as neutral. She argues that this vowel is best viewed as a harmonic front vowel. Vágó (1980) provides an extensive list of neutral vowel roots in Hungarian:

(8)

Neutral Vowel Roots

szid	'scold'	bízik	'trust'
fi-	'son'	izzik	'glow'
szít	'stir up'	nyílik	'open'
híd	'bridge'	cél	'aim'
ín	'tendon'	irt	'exterminate'
pír	'redness'	tilt	'forbid'
ifjú	'young man'	híg	'diluted'
inog	'vacillate'	nyíl	'arrow'
nyirok	'humidity'	izom	'muscle'
szitok	'curse'	piszok	'dirt'
rikít	'glare'	titok	'secret'
sipít	'shrill'	sikít	'shriek'
visít	'scream'	sima	'smooth'
ritka	'rare'	vidul	'cheer up'
tiszta	'clean'	virul	'bloom'
csitul	'become quiet'	hív	'call'
indul	'start'	sír	'cry'
indít	'cause to start'	vív	'fence'
vidít	'cause to cheer up'	csín	'trick'
bír	'be able to'	gyík	'lizard'
ír	'write'	kín	'torture'
rí	'weep'	sír	'grave'
szív	'inhale'	zsír	'fat'
csík	'stripe'	víg	'lively'
díj	'prize'	iszik	'drink'
íj	'bow'	ívik	'spawn'
síp	'whistle'	siklik	'slip'
szíj	'strap'	héj	'crust'
sík	'flat'	ring	'oscillate'

In this list of neutral vowel roots the neutral vowel *é* is present in only two words: *cél* 'goal' and *héj* 'crust'. Vágó notes that the word *cél* is a loanword from German (Ziel) which formerly had a high vowel. The origin of *héj* is not clear but in dialects the variant *haj* can be found. The neutral vowel *e* does not occur in the list; all the other neutral vowel roots contain either the vowel *i* or *í*. Though it is not on Vágó's list, Siptár and Törkenczy (2000) provide the word *hernyó* 'caterpillar' as an example of a root with

a neutral vowel and a back vowel. They note, however, that it is impossible to determine whether a word such as *hernyó* is mixed (neutral vowel followed by back vowel) or disharmonic (harmonic front vowel followed by back vowel). According to Vágó, it is assumed that Proto-Hungarian and Proto-Ugric had the short unrounded high back vowel *i*. It is important to note that the neutral vowel roots form a limited and unproductive set. They are tested in the sociolinguistic experiment (see section 3.4).

Though there are neutral vowel roots which combine with back vowel suffixes, Vágó emphasizes that recently borrowed roots containing only neutral vowels take front vowel suffixes. For example, the plurals of *film* 'movie', *keksz* 'cookie', *grill* 'grill' and *benzin* 'gasoline' are *filmek, kekszek, grillek* and *benzinek.*

Two nouns, *derék* 'waist' and *férfi* 'man', are noteworthy with respect to harmonizing behaviour. The first one exhibits the following pattern:

(9)

derék 'waist'

Possessive	1sg derekam	1pl derekunk
	2sg derekad	2pl derekatok
	3sg dereka	3pl derekuk
Accusative	derekat	
Allative	derékhez/derékhoz	
Adessive	deréknél/deréknál	
Sublative	derékre/derékra	
Plural	derekak	

The root takes back vowel suffixes with possessives, the accusative and the plural, but with the ablative, allative, adessive and sublative forms, harmonic alternations can be observed.

The noun *férfi* 'man' takes back vowel derivational suffixes, but may take either front vowel or back vowel inflectional suffixes, as in *férfias*, *férfies 'manly', *férfiatlan*, *férfietlen 'unmanly', but *férfitek/férfitok* 'your man' (2pl), *férfitól/férfitől* 'from the man' and 'to the man' *férfihez, férfihoz.*

According to Anderson (1980), there is a typological implication with the neutral vowels: if /e/ is transparent, /i/ is also, but not vice-versa.

1.5.1 The Status of the Neutral Vowel *e*

Ringen (1988) argues that *e* is not a neutral vowel, but rather a front harmonic vowel. Siptár and Törkenczy (2000) mention that the neutrality of this vowel is ambiguous and controversial. They give the examples *haver-ok* 'pals' and *kódex-ek* 'codices'. In the word *haver-ok* we notice that the *e* behaves as a neutral or transparent vowel; in *kódex-ek* it behaves as a harmonic front vowel. In addition to Ringen, this vowel has been classified as a front harmonic vowel by Papp (1975) and Szépe (1958), as a neutral vowel by Vágó (1976, 1978) and Jensen (1978), and as a hybrid by Anderson (1980), Farkas (1982) and Esztergar (1971).

Kontra, Ringen and Stemberger (1989) cite empirical evidence for the claim that *e* is a harmonic front vowel. The evidence is based on questionnaire studies in which a group of native speakers were asked to provide suffixed forms of various lexical items containing front unrounded vowels in their final syllable(s) along with back harmonic ones in a preceding syllable. Their data suggests that there is some variation with all front unrounded vowels. However, the number of front vowel responses is statistically higher in the case of words with *e* in their last syllable than in the case of the other front unrounded vowels. As a result, Ringen and Kontra conclude that *e* is best viewed as front harmonic and not neutral. They state that the Hungarian neutral vowels are not equally neutral but rather that the high front unrounded vowels seem most neutral, the mid front unrounded vowel less neutral and the low front unrounded vowel not neutral at all. Törkenczy and Siptár (2000) agree that there is variation in the data, but believe it would be a more faithful summary of the facts if Ringen and Kontra concluded that the low front unrounded vowel is the least neutral of all. In Vágó's list of neutral vowel roots, there are 58 roots. Of these 58 roots, the vowel [ɛ] occurs in 0, the vowel [e:] in 2, the vowel [i] in 31 and the vowel [i:] in 34. The number of vowel occurrences adds up to 67 rather than 58 because the vowels [i] and [i:] occur together in 9 roots. With these results

a neutrality scale for the neutral vowels of Hungarian can be constructed which represents the degree of neutrality of each vowel from most neutral to least neutral:

(10)
Neutrality Scale

← (most neutral) _____ (least neutral) →

[i:]/[i] [e:] [ɛ]

Ringen (1988) presents additional arguments in favour of the view that *e* is not a neutral vowel. She argues that there are no invariable suffixes with *e*, but rather that suffixes with *e* always alternate. In contrast, there are invariable suffixes with i and é. (e.g., -ig *hatig* 'up to six', -ik *mászik* 'it crawls', -ként *kulcsként* 'as a key', -ért *hazáért* 'for one's country'). Her final argument is that the behaviour of suffixes following back vowel roots followed by *e* indicates that *e* is a harmonic vowel. She concludes that if *e* were a neutral vowel, there would be back vowel roots followed by *e* which require only back vowel suffixes. She illustrates this with the neutral vowels *i* and *é*. (*taxi* 'taxi' *taxiban* *taxiben 'taxi-in' *kávé* 'coffee' *kávéban* *kávében 'coffee-in'). Ringen notes that there are few if any such forms with *e*.

However, there are examples of words with back vowel roots followed by *e* where we have back vowel suffixes. These are known as doublets. Examples include: *dzsungel-ban/ben* 'jungle-in', *Ágnes-tól/től* 'Agnes-from', *József-nak/nek* 'Joseph-to' *derék-tól/től* 'waist-from'and *hotel-ban/ben* 'hotel-in'. Jászó (1991) provides the example *Athénban/ben* 'in Athens' which is tested in the sociolinguistic experiment (see section 2.1). One of the aims of the experiment is to determine the neutrality of the vowel *e*. The prediction is that it will be the least neutral of the neutral vowels and often behave as a harmonic front vowel.

1.6 Problematic Issues

1.6.1 Loanwords

How does Hungarian deal with loanwords? According to Slobin (1997), although backness harmony historically regulated the quality of vowels within the word, in the present day language this assimilatory phenomenon has eroded, as contamination from loanwords has produced many exceptions to the general word-internal pattern. Keresztes (1999) states that from the point of view of vowel harmony, they have not yet been fully assimilated into Hungarian. Törkenczy and Siptár (2000) offer the following examples: *sofőr* 'driver', *kosztüm* 'outfit', *nüansz* 'nuance', *amőba* 'amoeba' and *pözsó* 'Peugeot'. These roots can be described as disharmonic. The word '*nüansz*', for example, consists of a front rounded vowel and a back rounded vowel, a combination which violates backness harmony. The word '*amőba*' contains two back vowels and a front rounded vowel. However, suffix harmony is predictable as we can see from these examples:

(11)

dative	sofőrnek	kosztümnek	nüansznak	amőbának	pözsónak
ablative	sofőrtől	kosztümtől	nüansztól	amőbától	pözsótól

The examples show that Hungarian vowel harmony is root-controlled which means that it is always the harmonic value of roots that controls that of affixes, never the other way round. Harmony is progressive (left-to-right), i.e. only suffixes are affected Törkenczy and Siptár (2000). The roots are invariable. If we look at the examples, we notice that it is the last vowel of these roots which determines the vowel quality of the suffix vowel. In *sofőr* 'chauffeur' the final vowel of the root is a front vowel; therefore, the suffix is *-nek*. In the case of *nüansz* 'nuance' the final vowel is a back vowel. As a result, the suffix must be *-nak*.

1.6.2 Doublets

Siptár and Törkenczy (2000) refer to the doublets of Hungarians as mixed vacillating stems- they vacillate between selecting front and back vowel suffixes. They are tested in the sociolinguistic experiment (see section 2.6). We can only account for the front-harmonic variants if we assume that the vowel of the final syllable is not neutral but harmonic. That is, it functions as an opaque segment that takes over the role of harmonic governor for the rest of the word. For instance, in *dzsungel* 'jungle' the *e* may be transparent, letting the back vowel *u* govern harmony, i.e. *dzsungelban* 'in the jungle' or else it may be opaque, *dzsungelben.* In a word such as *dzsungel* in which the stressed vowel is a back vowel, Kontra and Ringen's study (1986) would suggest that a back vowel suffix would be more common than a front vowel suffix since they concluded that stress appeared to play a role with respect to vowel harmony in loanwords and *dzsungel* is clearly a loanword. We notice that most of the doublets have an *e* in the final syllable and a few have *é*. Siptár and Törkenczy provide the following list:

(12)

dzsungel-ban/ben 'in the jungle'
Ágnes-nak/nek 'for Ágnes'
szalamander-tól/től 'from a salamander'
bankett-en/on 'at a banquet'
zsáner-ról/ről 'about a genre'
hotel-ek/ok 'hotels'
konkrét-an/en 'concretely'
Tihamér-ról/ről 'about Tihamér'
affér-ban/ben 'in a quarrel'
analízis-sal/sel 'with analysis'
aszpirin-tól/től 'from aspirin'
aggresszív-an/en 'aggressively'
klarinét-tal/tel 'with a clarinet'
matiné-ra/re 'to a morning performance'
szanitéc-nak/nek 'to a medical orderly'

Siptár and Törkenczy note that these doublets appear to exhibit some sensitivity to a larger context. For example, with the doublet *pulóver* 'pullover' it is more common to hear *ezzel a pulóverrel* 'with this pullover' than *ezzel a pulóverral* and likewise, it is more common to hear *azzal a pulóverral* than *azzal a pulóverrel* 'with that pullover'. This is known as the 'echo effect' which Kontra and Ringen (1986) claim is influenced by context. Siptár and Törkenczy state that if this phenomenon is true beyond the experimental setting referred to in Kontra, Ringen and Stemberger's paper (1989), this is a case of harmony at a distance. Though this phenomenon was not tested in the sociolinguistic experiment, it remains a goal of future research.

1.7 Previous Phonological Analyses

1.7.1 Absolute Neutralization

Early analyses of vowel harmony relied on the use of underlying vowels and abstract segments. Lass (1984) explains that there were two basic approaches: one approach was to mark the aberrant items with a rule feature such as [+back VH] in order to override the normal assimilatory vowel harmony rule. The other was to argue that the non-harmonic *e*, *é*, *i* and *í* were underlyingly different from the harmonic ones because they were not truly front vowels. Therefore, they were represented as back vowels which did not appear on the surface, i.e. / /ɯ/ and /ɣ/ since Hungarian does not have a high back or mid back unrounded vowel. The result was an underlying contrast that never surfaced. This approach which uses an underlying contrast to trigger differential behaviour and then gets rid of it before deriving the surface form is called absolute neutralization.

This theory was not phonetically grounded because it posited underlying forms which never occurred in the Hungarian phoneme inventory. Therefore, it disregarded phonetic plausibility. According to Schlindwein Schmidt (1995), few investigations of Hungarian vowel harmony any longer even entertain the abstract analysis proposed by Vágó (1973), in which the *i* and *e* occurring in back harmonic domains are, until the final stages of the phonological derivation, really */ɯ/ and /ɣ/*. This sort of abstract analysis subjected */ɯ/* and */ɣ/* to a feature-reversing rule of absolute neutralization that resulted in

their surfacing as *i*, *í*, *e* and *é*. She claims that this analysis of Hungarian vowel harmony is now largely ignored.

1.7.2 Feature Geometry

A relatively recent analysis of vowel harmony in Hungarian is found in the framework of Feature Geometry. According to Levi (2000), it exploits the hierarchical structure of the internal features of phonemes. This model relies on an organization where vowel features are located on a lower tier than consonants. Since consonants lack this tier, they are transparent to spreading rules. Vowel harmony can therefore be explained as a local process involving adjacent vowel place features.

1.7.3 Optimality Theory

In addition to Feature Geometry, another recent analysis of Hungarian vowel harmony is in Optimality Theory. Ringen and Vágó (1998) analyze Hungarian vowel harmony in the framework of Optimality Theory. Many Optimality Theoretic analyses of Hungarian vowel harmony consider the underlying form of Hungarian suffixes.

Recall that Hungarian suffixes often have two or more alternants. In the case of two alternants, one vowel is front and the other is back. If there are three alternants, we can predict a front unrounded vowel, front rounded vowel and back vowel. In the case of four alternants, there will be two front vowels (rounded, unrounded) and two back vowels, a mid back rounded vowel and a low back rounded one. According to Ringen and Vágó (1998), most alternating suffixes have two alternants, but those with short mid vowels (short mid front rounded, short mid back rounded, short low unrounded) have three. The Hungarian dative suffix has two alternants, *-nak* and *-nek*. Vágó (1973) notes that it occurs independently with personal suffixes, and when this is the case, the root has front vowels and the suffix vowels are also front. For example, *nekem* is translated as 'to me'. The independent forms of such suffixes provide evidence of which is the underlying form. The inessive suffix also has two alternants, *-ban* and *-ben*. This suffix

also occurs independently with personal suffixes. The word *bennem* is translated as 'in me'. Therefore, we can choose the alternant *-ben* as the underlying form.

Since Hungarian vowel harmony is a process of progressive assimilation which spreads from left to right, and from roots to suffixes, the root is more prominent than the suffix. Beckman (1999) argues that there is a tendency to preserve segments which occur in salient positions such as roots. Kager (1999) describes this as positional faithfulness. McCarthy (1999) describes vowel harmony as root-controlled. In Hungarian vowel harmony, vowel features are always spread from the root to the suffix, never from the suffix to the root. To capture the prominence of the root in Hungarian vowel harmony, it is necessary to have a constraint which preserves faithfulness to the root such as the constraint ID-IO(rt) which stipulates that input segments of the root must have output correspondents.

An analysis of Hungarian vowel harmony must also account for the two types of vowel harmony present in the language, backness harmony and rounding harmony. The observation that Hungarian suffixes with only two alternants always differ in backness and not in rounding, and the more restricted use of rounding harmony (triggers of rounding harmony are usually front rounded vowels, but backness harmony can be triggered by any front/back vowel) indicates that backness harmony is much more productive than rounding harmony. This provides evidence for ranking the constraint Agr(bk) higher than Agr(rd). The constraint Agr(bk) specifies that vowels must agree in backness and Agr(rd) that vowels must agree in rounding.

The neutral vowels of vowel harmony can be transparent (they get skipped by vowel harmony) or they can be opaque (they block back vowels from spreading vowel harmony and trigger harmony in the suffix vowel, thereby acting as a harmonic front vowel). For transparent neutral vowels, i.e. *kávé-ban* 'coffee-in', one approach is to mark the root with the feature [+back]. This feature is only present in roots which combine with back suffix vowels. In roots which do not combine back suffix vowels, the feature [+back] is not present. Ringen and Vágó (1998) refer to it as a floating feature.

An Optimality Theoretic account of Hungarian vowel harmony must also consider the neutral vowel roots, roots consisting of neutral vowels which combine with back vowel suffixes. One possible approach is to use the floating feature [+back] and another is to use underspecification to indicate the neutrality of the vowel. One can claim that learners have internal knowledge of the backness specification of roots and choose the optimal form, a strategy Prince and Smolensky (1993) refer to as Lexicon Optimization. This was suggested by Stampe (1972) who claimed that underlying forms should always match surface forms in the absence of evidence to the contrary.

The lowering roots are exceptional because they combine with low suffix vowels rather than mid. For example, *tüz-ek* 'fires' is a lowering root because there is a mid vowel in the root and a low vowel in the suffix rather than the expected mid vowel. Two possible approaches are to attach a floating feature [+low] or to use underspecification in the suffix vowel.

The doublets of Hungarian can select either front or back vowel suffixes. With each doublet there are two possible lexical forms. In those cases in which doublets select back vowel suffixes, the neutral vowel is transparent because it does not trigger vowel harmony in the suffix. In those cases in which doublets select front vowel suffixes, the neutral vowel is opaque because it blocks the back vowel of the root from spreading vowel harmony and triggers vowel harmony in the suffix. In such cases, the neutral vowel acts as a harmonic front vowel. A possible approach to the problem of the doublets is to attach the floating feature [+back] to those which select back suffix vowels and exclude it from those which combine with front suffix vowels.

An Optimality Theoretic analysis of Hungarian vowel harmony must address the problematic issues of the neutral vowels, neutral vowel roots, lowering roots and doublets. Two possible solutions are the use of floating features such as [+back] and the use of underspecification. Ringen and Vágó (1998) use both successfully in their Optimality Theoretic analysis of Hungarian vowel harmony. The neutral vowels, neutral vowel roots, lowering roots and doublets are all tested in the sociolinguistic experiment. Optimality Theory provides a framework for the analysis of these problematic issues.

1.8 Previous Experimental Studies

1.8.1 Affixes With Loanwords

Kontra and Ringen (1986) explain that the behaviour of affixes with loanwords is apparently systematic and is generally believed to be governed by the same rules that determine affix vowel quality with native roots and second, that the harmonic behaviour of suffixes following loanwords is taken to be an indication of what vowel harmony rule or rules are currently productive in that language. Vágó (1976), Szépe (1958) and Papp (1975) claim that some recent loanwords allow either front or back vowel suffixes. Most of these vacillating forms end in an *e* preceded by a back vowel. Here are examples:

(13)

Ágnes	'Agnes'	Ágnesnak/Ágnesnek	dative
hotel	'hotel'	hotelnak/hotelnek	dative
fotel	'armchair'	fotelnak/fotelnek	dative
balett	'ballet'	balettnak/balettnek	dative
analízis	'analysis'	analízisnak/analízisnek	dative

Kontra and Ringen (1986) observe that there are no roots with a back vowel followed by *e* which govern back harmony exclusively, whereas there are such roots for the vowels which Kontra and Ringen refer to as the true neutral vowels. Compare the following forms:

(14)

taxinak/*nek	'taxi'	dative
hotelnak/nek	'hotel'	dative
*Józsefnak/nek	'Joseph'	dative

The first form, which contains *i,* can only be followed by a back suffix vowel. The front vowel *i* is transparent in this case because it allows vowel harmony to pass through. The second form, which contains *e,* can be followed by a choice of either a front vowel or back suffix vowel, and the third form, which also contains *e*, can only be

followed by a front vowel.[2] When the second form is followed by a back vowel, the front vowel *e* is transparent but when it is followed by a front vowel, it is opaque because it blocks the back vowel from spreading a back vowel to the suffix and imposes a front vowel on the suffix.

In addition, Kontra and Ringen (1986) remark that there are no invariant suffixes with *e* but there are invariant suffixes with *i*, *í* and *é*. They state that the ambiguous nature of *e* arose because of the merger of the earlier short mid harmonic *e* [e] with the short low neutral e [ɛ] in standard Hungarian.

Participants were required to add suffixes to a series of words, all of which contain neutral vowels. They were given carrier sentences and asked to use the same suffixes with the words which were tested. In all of the words which they tested, the majority of participants selected a front vowel suffix for roots containing a back vowel followed by *e*. These are given in (15a). Words containing only front vowels are given in (15b). Words containing a back vowel followed by *é*, *i*, and *í* are given in (15c). The numbers indicate the percentage of participants who chose each suffix type.

(15)

a. Words Containing A Back Vowel Followed by *e*

	Front	**Back**	**Both**	**Gloss**
mágnes	95.2	2.9	1.9	'magnet'
karakter[3]	96.2	1.0	2.9	'character'
karakter	90.6	5.7	3.8	
karakter	89.6	8.5	1.9	
indiáner	97.2	1.9	0.9	'a kind of cake'
ciklámen	98.1	1.9	0.0	'cyclamen'
fiáker	94.3	2.8	2.8	'horse and buggy'
amulett	95.3	3.8	0.9	'amulet'
bitumen	98.1	0.0	1.9	'bitumen'
partner	88.6	3.8	7.6	'partner'
kártyapartner	95.3	1.9	2.8	'card partner'
púder	73.8	15.0	11.2	'powder'

[2] My experiment recorded cases in which *József* was followed by a back vowel (see section 3.6).
[3] The word k*arakter* occurred in more than one sentence.

(15)

b. Words Containing Only Front Vowels

	Front	Back	Both	
filé	98.1	1.0	1.0	'fillet'
relé	100.0	0.0	0.0	'relay'
zselé	100.0	0.0	0.0	'jelly'
esszé	100.0	0.0	0.0	'essay'
pedigré	100.0	0.0	0.0	'pedigree'
klisé	100.0	0.0	0.0	'cliche'
neglizsé	98.1	1.0	1.0	'negligee'
Kissné	97.2	0.9	1.9	'wife of Kiss'
Viziné	93.4	3.8	2.8	'wife of Vizi'
Vizerné	96.2	1.9	1.9	'wife of Vizer'
Kelemenné	99.1	0.9	0.0	'wife of Kelemen'
Ürömine	94.3	2.8	2.8	'wife of Ürömi'

(15)

c. Words Containing A Back Vowel Followed by i, í, é

	Front	Back	Both	
profit	0.0	100.0	0.0	'profit'
aktív	0.0	100.0	0.0	'active'
ankét	3.8	90.5	5.7	'meeting'
konstruktív	10.3	88.8	0.9	'constructive'
pantomim	6.7	88.5	4.8	'pantomime'
produktív	4.2	86.5	9.4	'productive'
abszint	34.4	57.8	7.8	'a kind of drink'
szamojéd	33.3	49.5	17.1	'Samoyed'

Kontra and Ringen (1986) observed that there was a striking difference between *e* and the other vowels. When *e* followed a back vowel as in the forms of (15a), the majority of participants chose a front suffix vowel, but when the other vowels followed a back vowel as in (15c), the majority of the participants chose a back suffix vowel. Therefore, they suggest that the behaviour of the participants with words containing *e* preceded by a back vowel is very similar to the behaviour of participants with words containing only front vowels. They argue that the results of their experiment also support the conclusion that *e* is treated as a front harmonic vowel. In their experiment, the same uninflected form was supplied in five different contexts, each requiring one of five different case endings. The figures reported represent the averages of the five cases.

(16)

	Front	
szalamander	95.1	'salamander'
pasztell	94.1	'pastel'
karakter	99.2	'character'
sláger	95.5	'hit tune'
abesszin	75.2	'Abysinnian'

Kontra and Ringen (1986) note that 'abesszin' has a much higher number of participants who used a back vowel suffix than for the other words. They speculate that this could be because this root, unlike the others, has neutral *i* after the *e*, and that when *e* is separated from the suffix by a neutral vowel, it may be easier for speakers to use back vowels if the stressed vowel is back.

1.8.2 Compounds

Papp (1975) claims that vacillating loanwords take front vowels when they are the second part of a compound. Kontra and Ringen (1986) included three words from his list on their questionnaire: *hidrogén* 'hydrogen', *partner* 'partner', and *paralízis* 'paralysis', both alone and as the second element of a compound (*szénhidrogén* 'hydrocarbon, *kártyapartner* 'card partner', *gyermekparalízis* 'infantile paralysis'). The participants' responses are given here in (17):

(17)

	Front	**Back**	**Both**
hidrogén	97.2	1.9	0.9
szénhidrogén	92.3	6.7	1.0
partner	88.6	3.8	7.6
kártyapartner	95.3	1.9	2.8
paralízis	94.3	4.7	0.9
gyermekparalízis	93.5	4.7	1.9

The results do not support Papp's claims. In two of the cases there are fewer front vowel responses for the compound (*szénhidrogén* vs. *hidrogén* and *paralízis* vs. *gyermekparalízis*). In the case of *partner* and *kártyapartner*, more participants chose

front vowel suffixes for the compound, but the difference is only 6.7% and therefore not significant. The only word in the sociolinguistic experiment which could be considered a compound word is *Budapest*, a city which formerly consisted of two separate cities, *Buda* and *Pest*. Nevertheless, the analysis of compound words remains a goal of future research.

1.8.3 The Relevance of Stress

Kontra and Ringen (1986) claim that stress is a relevant factor with respect to Hungarian vowel harmony. In Hungarian, primary stress is predictable: it is always on the first syllable of a word. One of the most noteworthy results of Kontra and Ringen's study (1986) was that the quality of the stressed vowel (first vowel in the word) appeared to affect the quality of suffix vowels in loanwords. They note that the observation that stress may play some role in vowel harmony has not gone unnoticed in earlier discussions. Skousen (1975) notes that vowel harmony applies right to left rather than left to right in Finnish where a stressed vowel follows an unstressed vowel. For example, in colloquial Helsinki Finnish, the first person singular pronoun *minä* is reduced to *mä*. In rapid speech, the *ä* which is not stressed, becomes *ɑ* when followed by a stressed back vowel. For example, *mä tulen* 'I am coming' becomes *matúlen*. Ultan (1973) notes that unstressed vowels are more likely to harmonize than are stressed vowels and that stressed vowels often determine the quality of unstressed vowels.

Kontra and Ringen (1986) believe that based on the results of their study, stress plays a significant role in Hungarian vowel harmony, at least for loanwords. They state that when a back vowel was followed by a neutral vowel, participants chose front suffix vowels when primary stress was on a preceding neutral vowel. However, participants chose back suffix vowels when the back vowel (or some other preceding back vowel) was stressed. Here are the results of their study in (18):

(18)

a. Primary Stress On Neutral Vowel

	Front	Back	Both	Gloss
hidrogén[4]	98.1	0.0	1.9	'hydrogen'
hidrogén	97.2	1.9	0.9	
szingaléz	75.0	22.0	3.0	'Singhalese'
hieroglif	61.5	32.3	6.2	'hieroglyph'
bibliofil	74.7	19.5	5.8	'bibliophile'

b. Primary Stress On Back Vowel

aktív	0.0	100.0	0.0	'active'
profit	0.0	100.0	0.0	'profit'
ankét	3.8	90.5	5.7	'meeting'
pantomim	6.7	88.5	4.8	'pantomime'
produktív	4.2	86.5	9.4	'productive'
konstruktív	10.3	88.8	0.9	'constructive'
szamojéd	33.3	49.5	17.1	'Samoyed'
abszint	34.4	57.8	7.8	'a kind of drink'

c. Primary Stress On Back Vowel With Two Neutral Vowels

paralízis	94.4	4.7	0.9	'paralysis'
alibi	95.3	2.8	1.9	'alibi'
bronchitisz	93.0	3.0	4.0	'bronchitis'
poézis	89.9	6.7	3.4	'poetry'
harakiri	100.0	0.0	0.0	'hari-kari'

We can observe that in (18a) where the words had primary stress on a neutral vowel, the majority of participants chose front vowel suffixes. In (18b), however, where the primary stress was on a back vowel, the majority chose back vowel suffixes. Kontra and Ringen observe that in (18c) where two neutral vowels followed a stressed back vowel, the results were strikingly different. In this case, even though the stressed vowel was a back vowel, the majority of participants chose front vowel suffixes. It appears that the occurrence of two neutral vowels in the final syllables of these words

[4] The word *hidrogén* occurred in two different sentences.

was more prominent than the occurrence of a stressed back vowel in the initial syllable. This prominence of the neutral vowels in determining the suffix vowel is a phenomenon which Hayes (2004) refers to as the *count effect*.

Kontra and Ringen argue that their data cannot be explained by the rules of harmony which have been proposed to account for suffix harmony with native roots. The rule for native roots states that the last harmonic root vowel serves as the trigger for harmony. If this were the case, the majority of participants would have chosen back suffix vowels in (a) and (c). Though the majority did choose back suffix vowels in (b) where the back vowel was stressed, there was variation except in the cases of *aktív* 'active' and *profit* 'profit'. Kontra and Ringen conclude that it appears that the rules for native roots, which use the last harmonic root as the trigger for harmony, are wrong or that suffix harmony with loanwords does not, contrary to what had been previously claimed, obey the same conditions as with native words. Despite these claims of the relevance of stress, I will not consider this factor in my own analysis of Hungarian vowel harmony.

1.8.4 Study of English-Hungarian Bilinguals

Utasi-McRobbie (1984) evaluates an influential approach (Vágó 1975) to Hungarian vowel harmony on the basis of her observations of a phonological change in the speech of English-Hungarian bilinguals. It is her contention that Hungarian rounding harmony functions as a sub-part of a complex vowel harmony rule. She argues that if we consider the rounding harmony rule as a sub-part of a complex vowel harmony rule, we may look upon the process of the disappearance of the rounding harmony rule in cases of imperfect language performance as rule simplification. Dasinger (1997) notes that there is some experimental evidence suggesting the full mastery of the subpattern of rounding harmony sometime after the more general rule of backness harmony by Hungarian children.

To view rounding harmony as an independent rule, as Vágó does, would have to be regarded as rule loss. Utasi-McRobbie explains that to account for this rule loss would mean considering two possibilities, both of which are implausible: i) accepting Vágó's

solution would leave the change from one grammar to another unmotivated; ii) assuming the correctness of two separate rules, backness and rounding harmony, would not truly reflect the essence of the relationship between them.

After his vowel harmony rule has applied, Vágó posits two additional rules: a rounding harmony rule and an *e*-adjustment rule. The *e*-adjustment rule is needed to lower the output of rounding harmony, a front mid rounded vowel, to a front low unrounded vowel. In verbs where the underlying suffix is /tok/ (Ind. Prs. Pl, 2), he proposes the following derivations for the verbs *mostok* 'you wash', *vertek* 'you beat' and *törtök* 'you break'.

(19)

	/mos + tok/	/ver + tok/	/tör + tok/
VH	mostok	vertök	törtök
RH	---	vertek	---
e-adj	---	vertek	---
	[mostok]	[vertek]	[törtök]

Utasi-McRobbie notes that if this type of derivation is correct it follows that in the course of imperfect language performance there is a greater chance that the *mostok* and *törtök* types of strings will be achieved naturally. However, once an assimilation rule does not seem to be functioning in exact accordance with the exact requirements of the rule, one may suspect that the rule is marked. She states that in the above derivation the unrounding process has to be marked. Thus one would expect the *vertök, törtök* forms to surface in the case of imperfect language learning. However, she did not observe this to be the case among her sample of bilinguals. They never produced forms like *vertök. On the contrary, the overwhelming majority used strings such as *törtek. The following are typical examples taken from her material:

(20)

főzek 'cook' (1Sg.), töltek 'fill' (1Sg.), jövek 'come' (1Sg.)

főztek (2Pl.), fésültek 'comb' (2Pl.), jöttek (2Pl.)

Utasi-McRobbie's research shows that backness harmony appears to be the more stable assimilation rule, the one applied by her bilingual participants with almost no exceptions. She concludes that the fact that vowel harmony occurs where rounding harmony does not occur at all, or may occur optionally in only the most frequently used strings, suggests that the relationship between the two rules is more than just structural. It seems very likely that rounding harmony is a sub-rule of the backness harmony rule and that the result is a case of rule simplification. She also argues that diachronic evidence supports the probable relationship between backness harmony and rounding harmony. Szépe (1958) and Rédei (1986) both state that rounding harmony appeared at a much later period than backness harmony.

1.9 Summary

Previous experimental studies have tested the problematic issues of loanwords, doublets, the neutral vowel roots and neutral vowels, and the interaction of backness and rounding harmony. It is known that many loanwords can take either front or back vowel suffixes. In the sociolinguistic experiment, these loanwords are tested in the category of doublets. The reason is to determine if participants select the suffix vowel randomly or if they exhibit a clear preference for one vowel or another. It is also known that the neutral vowels appear to have different degrees of neutrality and that backness harmony appears to be more stable than rounding harmony. Therefore, the sociolinguistic experiment aims to test the retention and loss of rounding harmony in verb suffixes, the interaction between backness harmony and rounding harmony, and the neutrality of the neutral vowels. The originality of the study is that it tests Hungarian and international toponyms to determine if there are differences in vowel harmony, tests the neutral vowel roots with the prediction that some participants will apply front suffix vowels and compares nonsense words to real words with the prediction that there will be more variation in participants' responses with the unfamiliar nonsense words. In addition, participants are divided into three speaker groups based on their length of stay in Canada with the hypothesis that it will be possible to attribute differences to them.

CHAPTER 2

EXPERIMENT

2.1 Method

The goal of my experiment was to determine how Hungarian speakers living in Vancouver apply the rules of Hungarian vowel harmony. 30 participants were recorded and each word was tested three times for a total of 90 responses per word. I showed my participants 117 words written on index cards and recorded their responses. I divided the 30 participants into three different groups.

Group 1

This group consisted of 3 participants who were born in Canada. The prediction was that the responses from this group would deviate the most from the standard because these participants were native English speakers.

Group II

This group consisted of 2 participants who had been in Canada for less than five years. The prediction was that the responses from this group would be the closest to the standard because these participants had been in Canada for a relatively short period of time in comparison to the participants from the other groups.

Group III

This group consisted of 25 participants who had been in Canada for over 20 years. The prediction was that the responses from this group would be closer to the standard than those of group 1 but not as close to the standard as those of group II because the participants had been in Canada for a longer period of time.

I provided my participants with 15 sentences (see Appendix D) and then asked them to provide a suffix for each word that I showed them. The 30 participants who I recorded (16 females and 14 males) live in Greater Vancouver. They consisted of 27 native speakers born in Hungary, Romania, Serbia, Slovenia and Slovakia and 3 non-native speakers born in Canada[5]. I asked the participants to fill out an information form (see Appendix A). The information form asked their age group, how frequently they spoke Hungarian, how long they had been in Canada and their place of birth (see Appendices B and C). More than half of the participants were over the age of 60, spoke Hungarian daily, and had been in Canada for more than 40 years.

2.2 Test Materials

I selected test words which I divided into six categories: (1) toponyms, (2) nonsense words with three suffix alternants, (3) real words with the same suffix alternants, (4) neutral vowel roots, (5) verbs with three suffix alternants, and (6) doublets. These categories were used in previous research: Fenyvesi (1996) tested participants' responses with toponyms, Kontra and Ringen (1986) tested participants' responses with suffix alternants and with neutral vowels, Utasi-McRobbie (1984) tested verbs with three suffix alternants and Siptár and Törkenczy (2000) discussed the vowel alternations of doublets. In the first category, toponyms, 32 of the 52 words tested consisted of a combination of front and back vowels (see section 2.2.1). The reason was to test the frequency of front and back vowels in the suffix. The other words consisted of only front vowels (front rounded, front unrounded and a combination of front rounded and front unrounded). Though it was expected that these words would show less variation in the choice of suffix vowel, they were chosen to determine the interaction between backness harmony and rounding harmony. In the second and third categories, the same suffix alternants were used. The second category consisted of 16 nonsense words (see section 2.2.2). The nonsense words were added to provide a comparison with the real words.

[5] Dialect differences did not appear to be significant in the sociolinguistic experiment.

The neutral vowel roots were included to determine the frequency of back vowel responses. Though the neutral vowels consist of front vowels, they combine with back suffix vowels. Nevertheless, the prediction was that a number of responses would contain front suffix vowels (see section 2.2.4).

The verbs selected only combined with two of three suffix alternants, the front rounded and the back suffix vowel alternants. Though none of these verbs combined with the front unrounded suffix alternant, the prediction was that rounding harmony would fail to apply in a number of cases, and as a result, the front unrounded vowel would be recorded in the suffix (see 2.2.5).

The doublets were tested to determine the frequency of front and back vowels in the suffix. The prediction was that the selection of suffix vowel would not be purely random but rather exhibit a preference for one vowel over another (see section 2.2.6).

2.2.1 Toponyms

The first category of words consisted of toponyms: cities, towns and villages in Hungary, and cities, states and provinces outside of Hungary. The sentences used for this category were the following:

Péter Sopronban lakik.	Peter lives in Sopron.
Péter Egerben lakik.	Peter lives in Eger.
Péter Szegeden lakik.	Peter lives in Szeged.
Péter Sárospatakon lakik.	Peter lives in Sárospatak.
Péter Fertődön lakik.	Peter lives in Fertőd.

In these sentences we have the inessive suffix variants *-ban/-ben* and the adessive suffix variants -*on/-en/-ön*. Participants were given the carrier sentence *Péter* _____ *lakik* and then the toponyms and asked to put them in either adessive or inessive case.

With Hungarian toponyms there are five possible suffix alternants: they are the inessive suffix alternants *–ban/–ben* and the adessive suffix alternants *–on/-en/-ön* (Kontra 2000). For international toponyms (toponyms outside of Hungary), we expect the inessive case to be used. The rule for Hungarian toponyms is that the inessive case is often used with roots that end with the bilabial nasal, alveolar nasal, palatal nasal,

alveolar trill and palatal fricative.[5] For roots which end in other consonants and in vowels, the adessive case is normally used. However, the patterns of variation in the use of suffixes are rather complex, making generalizations difficult. According to Fenyvesi (1995), the use of case with Hungarian place names is not predictable. Another complication is that in some cases the choice of suffix creates a semantic distinction. For example, *Békés-ben* means 'in Békés county' and *Békés-en* means 'in Békes town'.

The following toponyms were used in this category:

Hungary:

Börcs
Budapest
Bükk
Celldömölk
Esztergom
Füred
Gyöngyös
Győr
Kömpöc
Meződ
Miskolc
Nyőgér
Pély
Rédics
Sümeg
Szűr
Tengőd
Üllés
Viss
Zirc

International:

Alberni
Athén
Bukarest
Burnaby
Calgary
Coquitlam
Delta
Göteborg
Jeruzsálem
Kobe
Langley
Lima
Los Angeles
Madrid
Maple Ridge
Massachusetts
Montreál
New Brunswick
New Hampshire
Párizs
Saskatchewan
Seattle
Squamish
Surrey
Szöul
Tallinn
Taskent
Tel Aviv

[5] The palatal fricative can be represented orthographically as *j* and *ly*. (Kassai, 1998)

Texas
Vancouver
Vermont
Windsor

The 20 Hungarian toponyms have the following vowel combinations:

front rounded	(6)
front unrounded	(4)
front rounded and unrounded	(7)
front unrounded and back	(3)

The roots with front rounded vowels were chosen to test the stability of rounding harmony in suffixes. Those with front unrounded vowels were chosen to test backness harmony. Since neutral vowel roots are roots with front unrounded vowels that combine with back suffix vowels, the hypothesis that participants may combine front unrounded vowel roots with back suffix vowels could be tested. The roots which consist of front rounded and unrounded vowels, and front unrounded and back vowels can determine whether the front unrounded (neutral) vowels function as transparent vowels or as harmonic front vowels.

The 32 international toponyms have the following vowel combinations:

front rounded and unrounded	(3)
front rounded and back	(2)
front rounded, unrounded and back	(2)
front unrounded and back	(25)

The roots with front unrounded vowels were chosen to determine whether they function as transparent vowels or as harmonic front vowels. The disharmonic roots consisting of front rounded and back vowels were chosen to determine whether the front rounded vowel or the back vowel determines the choice of suffix vowel.

2.2.2 Nonsense Words

The second category consisted of nonsense words with three allative suffix alternants: *-hoz/-hez/–höz*. The suffix alternant *–hoz* occurs with independent forms, i.e. *hozzám* 'to me', and can thus be regarded as the underlying form. The carrier sentences used for this category were the following:

Vidd a szekrényhez.	Take it to the wardrobe.
Vidd az asztalhoz.	Take it to the table.
Vidd a tetőhöz.	Take it to the roof.

Here is the list of nonsense words used:

albánk
bahul
biléz
fompét
krenisz
kümpig
metes
obböld
öntbön
örné
pércse
riltak
sonyor
tészkocs
udmisz
ügmüt

The 16 disyllabic nonsense words have the following vowel combinations:

front rounded	(2)
front unrounded	(4)
front rounded and unrounded	(2)
front rounded and back	(1)
front unrounded and back	(4)
back	(3)

The roots with front rounded vowels were chosen to test the stability of rounding harmony. Those with front unrounded vowels were chosen to determine whether they function as transparent vowels or harmonic front. The disharmonic roots (front rounded and back) were chosen to determine which vowel governs the choice of suffix vowel and the back vowels were chosen to determine the stability of backness harmony.

2.2.3 Real Words

In this category real nouns were used instead of nonsense words. Participants were asked to use the same allative suffix alternants: *-hoz, -hez and –höz*. The same sentences were used as in the previous category:

Vidd a szekrényhez.	Take it to the wardrobe.
Vidd az asztalhoz.	Take it to the table.
Vidd a tetőhöz.	Take it to the roof.

The reason real words were used in this category was to determine how similarly the responses used with real words (nouns) would mirror those used with nonsense words. Here is the list of nouns used:

állomás	'station'
asztal	'table'
bolt	'store'
bölcső	'cradle'
épület	'building'
étterem	'restaurant'
föld	'land'
fű	'grass'
fül	'ear'
hegy	'mountain'
hűtő	'cooler'
kő	'rock'
követ	'minister'
őr	'guard'
szék	'chair'
szög	'triangle'
tükör	'mirror'
üzem	'factory'

The twenty nouns have the following vowel combinations:

front rounded	(9)
front unrounded	(3)
front rounded and unrounded	(3)
back	(3)

The front rounded roots were chosen to test the stability of rounding harmony. Those with front unrounded vowels were chosen to determine whether they would function as transparent vowels or as harmonic front vowels. The back vowel roots were chosen to determine the regularity with which backness harmony would apply.

2.2.4 Neutral Vowel Roots

This category consisted of neutral vowel roots, roots with front unrounded vowels which require back suffix vowels. Although all Hungarian vowels can be classified as either front or back, the front vowels *e*, *é*, *i* and *í* are special because they can combine with vowels of either set. As a result, they are called neutral vowels. Participants were asked to use the neutral vowel roots in accusative case. The sentences used were the following:

ablak	'window'	Nem látom az ablakot.	I don't see the window.
kert	'garden'	Nem látom a kertet.	I don't see the garden.

Here is the list of neutral vowel roots:

díj	'prize'
gyík	'lizard'
héj	'bark'
izom	'muscle'
nyíl	'arrow'
titok	'secret'

The neutral vowel roots were chosen to determine whether participants would use front or back vowels in the suffix. The neutral vowel roots 'izom' and 'titok' consist of a neutral vowel and a back vowel, but when the accusative suffix is added, the back vowel of the root is deleted.

2.2.5 Verbs

This category consisted of verbs with three suffix alternants: *-tok/-tek/–tök.* However, the verbs used all consisted of front vowel roots with two possible suffix alternants, *-tok* for the neutral vowel roots and *-tök* for the front rounded vowel roots. The sentences used (see Appendix D) were the following:

beszél	'speak'	Beszéltek.	You (2pl) are speaking.
ír	'write'	Írtok.	You (2pl.) are writing.
repül	'fly'	Repültök.	You (2pl.) are flying.

Here is the list of verbs:

bír	'manage'
főz	'cook'
fütyül	'whistle'
indul	'arrive'
iszik	'drink'
köhög	'cough'
nyög	'moan'
söpör	'sweep'
vidul	'cheer up'
visít	'shriek'

The ten verbs have the following vowel combinations:

front unrounded	(3)
front rounded	(5)
front unrounded and back	(2)

The front unrounded roots were chosen to test the stability of backness harmony and the front rounded roots were chosen to test the stability of rounding harmony. The roots with a combination of a front unrounded vowel and a back vowel were chosen to test the regularity of back suffix vowel responses.

2.2.6 Doublets

The final category consisted of doublets, words with two lexical forms because they can select either front or back suffix vowels. In cases where the doublet selects a frnt suffix vowel, the final vowel of the root is front-harmonic. In those cases where the doublet selects a back suffix vowel, the final vowel of the root is transparent. For instance, in *dzsungel* 'jungle' the *e* may be transparent, letting the back vowel *u* govern harmony, i.e. *dzsungelban* 'in the jungle' or else it may be opaque, *dzsungelben*. In the latter case, the *e* blocks the back vowel from spreading vowel harmony and becomes a harmonic front vowel because it spreads harmony to the suffix vowel.

With the first group of words used in this category participants were asked to use the dative suffix which has two alternants: *-nak/-nek*. The alternant *-nek* occurs in independent forms, i.e. *nekem* 'to me', and can therefore be regarded as the underlying form. Here are the sentences used:

Kinek adta?	Andrásnak	Who did he/she give it to?	To Andrew.
Kinek adta?	Péternek.	Who did he/she give it to?	To Peter.

Here is the list of doublets used with the dative suffix:

Ágnes	'Agnes'
hotel	'hotel'
József	'Joseph'
szalamander	'salamander'

The first three doublets are disyllabic and consist of a back vowel followed by a front urnounded vowel. The doublet 'szalamander' consists of three back vowels followed by a front unrounded vowel. If the count effect (Hayes 2004) is relevant, we can expect a greater number of back suffix vowels with this doublet. The neutral vowel *e* is classified as the least neutral of the neutral vowels; therefore, my prediction was that the majority of responses would contain front suffix vowels.

With the next group of doublets participants were asked to used the ablative suffix which has two alternants: *-ról/-ről*. The alternant *–ról* occurs in independent forms, i.e. *rólam* 'about me' and can thus be regarded as underlying. The sentences used were the following:

Miről beszél?	A házról	What is he/she talking about?	About the house.
Miről beszél?	A névről.	What is he/she talking about?	About the name.

Here is the list of words:

affér	'quarrel'
aszpirin	'aspirin'
dzsungel	'jungle'
klarinét	'clarinet'
zsáner	'genre'

My prediction was that the doublets with the vowel *e* would result in the highest rate of occurrences of front suffixes, followed by the vowels *é* and *i*. The reason is that *e* is considered the least neutral vowel and should therefore result in the highest number of front suffixes and *i* is conidered the most neutral and should therefore result in the highest number of back suffixes.

With the next group of doublets participants were asked to use the instructive suffix which has two variants: *-val/-vel*. With roots ending in consonants, these are *-al* and *-el*. Here are the sentences used:

ásványvíz	'mineral water'
Az ásványvízzel kérem.	I'd like it with the mineral water.
ágy	'bed'
Azággyal kérem.	I'd like it with the bed.

This is the list of doublets used with the instructive case:

bankett	'banquet'
fotel	'armchair'
analízis	'analysis'
balett	'ballet'

Three of the doublets are disyllabic and consist of a back vowel followed by the neutral vowel *e*. The doublet 'analízis' consists of four syllables, two back vowels followed by two neutral vowels.

With the final group of doublets participants were asked to used the adverbial suffix alternants *-an* and *-en*. Here are the sentences:

Hogyan csinálta?	Szépen	How did he/she do it? Beautifully.
Hogyan csinálta?	Gyorsan.	How did he/she do it? Quickly.

The words used are:

aggresszív	'aggressive'
konkrét	'concrete'

The root 'aggresszív' consists of a back vowel followed by two neutral vowels and the root 'konkrét' consists of a back vowel followed by a neutral vowel. My prediction was that 'agresszív' would result in more front suffixes than 'konkrét' because of the two neutral vowels in its root and its vowel *e* which is regarded as the least neutral of the neutral vowels.

2.3 Task

Participants were instructed to provide suffixes for the words shown to them on index cards. Prior to showing them the index cards for each category, I provided them with a carrier sentence and sample sentences to model the activity. I explained to them that when I showed them the index card they would need to give the same suffix as in the carrier sentence and the sample sentences. I then asked if they had questions and if they did not, I showed them the index cards and recorded their answers with a cassette recorder. Each word in each category was recorded three times. This was done by mixing up the order of the cards in each category. When recording participants' responses the first time, I used the same order with each participant. I started with toponyms and then continued with nonsense words, real words, neutral vowel roots, verbs and doublets. The second and third times, however, I also mixed up the order of these categories.

2.4 Results

In all three groups, deviations from the standard could be considered examples of attrition. According to Seliger and Vágó 1984, Hulsen 2000, Riionheimo 1998, Kaufman 1995, attrition is the disintegration of the structure of a first language in contact with a second language. They also define this process as language shift because the second language becomes the primary language of the new environment.

The first group was born in Canada and was thus exposed to the primary language of the new environment from the beginning. The second group, however, was exposed to this new environment for less than 5 years. As a result, it could be expected that the first group would deviate most from the standard and the second group the least. The third group, having been in Canada for more than 20 years, could be expected to show more deviation than the second group but less than the first.

2.4.1 Toponyms

Table 2 presents speaker responses to Hungarian toponyms. They are averaged across groups and presented separately for each word. In this table, the rightmost value and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected (standard) responses are shown in bold. Note that the set of grammatically possible suffixes does not include the feature combination [+back, -round].

Table 2

Hungarian Toponyms

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk,-rd	+bk, +rd
Börcs		-bk, +rd	-ben 55.6%	**-ön 42.2%**	-ban 2.2%
Budapest	+bk, +rd		**-en/-ben 100%**		
Bükk		-bk, +rd	-en/-ben 74.4%	**-ön 25.6%**	
Celldömölk	-bk, +rd	-bk, +rd	-ben 23.3%	**-ön 76.7%**	
Esztergom	-bk, -rd	+bk, +rd			**-on/ban 100%**
Füred	-bk, +rd	-bk, -rd	**-en/ben 100%**		
Gyöngyös	-bk, +rd	-bk, +rd	-ben 15.6%	**-ön 84.4%**	
Győr		-bk, +rd	-et/-ben 72.2%	**-ön/-ött 27.7%**	
Kömpöc	-bk, +rd	-bk, +rd	-en/-ben 34.4%	**-ön 64.4%**	-ban 1.1%
Meződ	-bk, -rd	-bk, +rd	-ben 26.7%	**-ön 73.3%**	
Miskolc	-bk, -rd	+bk, +rd			**-on/-ban 100%**
Nyőgér	-bk, +rd	-bk, -rd	**-en/-ben 100%**		
Pély		-bk, -rd	**-en/-ben 94.4%**		
Rédics	-bk, -rd	-bk, -rd	**-en/-ben 95.6%**		-on 4.4%
Sümeg	-bk, +rd	-bk, -rd	**-en/-ben 100%**		
Szűr		-bk, +rd	-en/-ben 65.5%	**-ön 31.1%**	-ban 3.3%
Tengőd	-bk, -rd	-bk, -rd	-ben 28.9%	**-ön 70%**	-ban 1.1%
Üllés	-bk, +rd	-bk, -rd	**-en/-ben 100%**		
Viss		-bk, -rd	**-en/-ben 82.2%**		-on/-ban 17.8%
Zirc		-bk, -rd	**-en/-ben 95.6%**		-on/-ban 4.4%

- Participants suffixed the forms *-ben/-ban/-ön* with 'Börcs', and the most frequent selection *-ben* accounted for 55.6% of responses, but the back suffix vowel of *-ban* was only used in 2.2% of responses.

- 'Budapest' had the suffix variant with the highest percentage of responses: 92.2%.

- Following 'Budapest', the highest numbers of responses were recorded for 'Esztergom' (88.9%), 'Gyöngyös' (84.4%), 'Miskolc' (81.1%) and 'Füred' (80%).

- Though 'Esztergom' and 'Miskolc' consist of front unrounded vowels and back vowels, participants unanimously selected back suffix vowels. In these words the final vowel of the root is a back vowel, an indication that the final vowel of the root appears to be the trigger of harmony in disharmonic roots.

- With 'Viss', the back suffixes *–on* and *–ban* were selected in 17.8% of cases. In those cases 'Viss' behaved as a neutral vowel root. With 'Zirc', however, the back suffixes *-on* and *–ban* were only chosen in 4.4% of cases.

- Front unrounded roots showed considerable variation. The front unrounded suffix alternant *-en* was suffixed to 'Bükk' in 4.4% of cases, and to 'Szűr' in 3.3% of cases. However, with the front unrounded roots such as 'Pély' and 'Rédics', no front rounded suffix alternants were used.

Table 3 presents speaker responses to international toponyms. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected (standard) responses are shown in bold. Note that the set of grammatically possible suffixes does not include the feature combination [+back, +round] or [+back, -round].

Table 3

International Toponyms

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
Athén	+bk, +rd	-bk, -rd	-ben 48.9%			**-ban 51.1%**
Bukarest	+bk, -rd	-bk, -rd	**-en/ben 100%**			
Göteborg	-bk, -rd	+bk, +rd	-en/-ben 34.4%			**-on/-ban 65.5%**
Jeruzsálem	+bk, -rd	-bk, -rd	**-ben 81.1%**			-ban 18.9%
Kobe	+bk, +rd	-bk, -rd	**-ben 32.2%**			-ban 45.6%
Lima	-bk, +rd	+bk, +rd				**-ban 97.8%**
Madrid	+bk, +rd	-bk, -rd	-ben 1.1%			**-ban 98.9%**
Párizs	+bk, -rd	-bk, -rd	-ben 2.2%			**-ban 97.8%**
Szöul	-bk, +rd	+bk, +rd	-ben 14.4%			**-on/-ban 85.5%**
Tallinn	+bk, +rd	-bk, -rd	-en/-ben 7.8%			**-on/-ban 92.2%**
Taskent	+bk, +rd	-bk, -rd	**-en/-ben 68.9%**			-on/-ban 31.1%
Tel Aviv	+bk, +rd	-bk, -rd	-en/-ben 25.5%			**-on/-ban 74.4%**

Table 4 presents speaker responses to North American toponyms averaged across groups and presented separately for each word. The rightmost vowel and second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected responses are shown in bold. The set of gramatically possible suffixes does not include the feature combination [+back, -round] or [-back, +round].

Table 4

North American Toponyms

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
Alberni	-bk, -rd	-bk, -rd	**-ben 81.1%**		-ban 18.9%
Burnaby	+bk, +rd	-bk, -rd	-ben 63.3%		**-ban 36.7%**
Calgary	+bk, +rd	-bk, -rd	-ben 4.4%		**-ban 95.6%**
Coquitlam	-bk, -rd	+bk, +rd	-ben 5.6%		**-ban 94.4%**
Delta	-bk, -rd	+bk, +rd			**-ban 100%**
Langley	+bk, +rd	-bk, -rd	**-ben 96.7%**		-ban 3.3%
Los Angeles	-bk, -rd	-bk, -rd	**-ben 87.8%**		-ban 12.2%
Maple Ridge	-bk, +rd	-bk, -rd	**-en/-ben 97.7%**		-on 2.2%
Massachusetts	+bk, +rd	-bk, -rd	**-en/-ben 72.2%**		-ban 27.8%
Montreál	-bk, -rd	+bk, -rd			**-ban 100%**
New Brunswick	+bk, -rd	-bk, -rd	-ben 18.9%		**-on/-ban 81.1%**
New Hampshire	+bk, -rd	-bk, +rd	-en/-ben 81.1%		**-on/-ban 18.9%**
Saskatchewan	-bk, -rd	+bk, +rd			**-ban 100%**
Seattle	+bk, +rd	-bk, -rd	**-ben 31.1%**		-ban 68.9%
Squamish	+bk, +rd	-bk, -rd	-en/-ben 7.8%		**-on/-ban 92.2%**
Surrey	-bk, +rd	-bk, -rd	**-ben 100%**		
Texas	-bk, -rd	+bk, +rd			**-on/-ban 100%**
Vancouver	+bk, +rd	-bk, -rd	**-ben 70%**		-ban 30%
Vermont	-bk, -rd	+bk, +rd	-ben 1.1%		**-on/-ban 98.9%**
Windsor	-bk, -rd	+bk, +rd	-ben 3.3%		**-on/-ban 96.6%**

Now I will focus on participants' responses with international and North American toponyms:

- Pronunciation of North American toponyms varied between a traditional pronunciation and a North American pronunciation and this was often a factor in the choice of suffix variant.

- Four words received unanimous responses: 'Delta', 'Montreál', 'Saskatchewan' and 'Surrey'. Though 'Delta', 'Montreál' and 'Saskatchewan' have a combination of front unrounded and back vowels, participants were unanimous in their decision to treat these front vowels as transparent vowels.

- Participants did not give unanimous responses for disyllabic words consisting of a back vowel and a front unrounded vowel in which the front unrounded vowel was the final vowel of the root.

- For example, 'Taskent' has the same combination of vowels as 'Delta' but in reverse order. Although participants were unanimous in their selection of the back suffix alternant *-ban* with 'Delta', they were not unanimous in their selection of the front suffix alternant *-ben* with 'Taskent'. Rather, participants suffixed the front suffix alternant *-ben* to Taskent in 43.3% of cases and the back suffix alternant *-ban* in 27.8% of cases.

- It appears that suffix choice is more consistent in cases where the final vowel of a root is a back vowel as opposed to a front unrounded vowel.

- Following the four words which received unanimous responses, the highest percentages for a suffix variant were recorded for 'Madrid' (98.9%), 'Lima', 'Párizs' and 'Texas' (97.8%), 'Langley' (96.7%), 'Calgary' (95.6%) and Coquitlam (94.4%). These words all contain a combination of back vowels and front unrounded vowels.

- Langley' is different from the other words because participants were nearly unanimous in their selection of the front suffix variant *-ben* with Langley, and not the back suffix variant *-ban* which was used with the other words. Perhaps the reason that nearly all participants used the front suffix variant with Langley is that they tended to pronounce this word as it would be pronounced in English. In other words, the tendency was to pronounce the first vowel as the low front unrounded [æ] rather than the low mid back rounded [ɔ]. In those cases in which the first vowel was pronounced [æ], the result was a front harmonic root and the suffix variant *-ben* was then the expected response.

- 'New Hampshire' also resulted in a high number of front suffix variants, but there are two plausible explanations. One is that participants treated this word as a compound and therefore did not spread the back vowel of 'New' to the suffix. The other explanation is one which was already used to explain the results which occurred with 'Langley'. Many participants pronounced 'Hampshire' with an English pronunciation which resulted in the first vowel being pronounced [æ]. In this case, 'Hampshire' consisted of two front vowels and a front suffix variant was therefore an expected result.

- 'Seattle' is an example of a disharmonic root. Participants chose the back suffix in 68.9% of cases. A few participants used the pronunciation [seɔtlɛ], a pronunciation which resulted in a higher percentage of front suffixes.

- In the cases of roots consisting of a back vowel followed by a neutral vowel, the tendency was to use the highest percentage of back suffix vowels with the neutral vowel *i* followed by fewer back suffix vowels with the vowel *é* and the lowest percentage of back suffix vowels with *e*. It appears that *i* is the most transparent vowel with respect to vowel harmony and *e* is the most harmonic front. In terms of neutrality, we can say that *i* appears to be the most neutral vowel and *e* the least neutral.

- To determine this, we can compare the disyllabic roots 'Madrid', 'Párizs, 'Tallinn', 'Athén' and 'Taskent'. 'Madrid', 'Párizs' and 'Tallinn' all have the high front unrounded *i* as the final vowel of their root. Participants suffixed the back suffix variant *-ban* to 'Madrid' with a frequency of 98.9%, to 'Párizs' 97.8% and to 'Tallinn' 82.2%. The frequency with which *-ban* was used in the case of 'Tallinn' appears a little low, but the reason is that in 10% of cases, participants used the adessive variant *-on*. Nevertheless, participants suffixed a back vowel to 'Tallinn' in 92.2% of cases. In all of these cases, the high front unrounded vowel *i* had an overwhelming tendency to behave as a transparent vowel.

- The root 'Athén' consists of a back vowel and a long high mid front unrounded vowel. With this root, participants selected the back suffix variant *-ban* with a frequency of 51.1% and the front suffix variant 48.9%. The distribution of the two suffix variants was very even, but nevertheless it is clear that in this root the vowel *é* was less transparent than the vowel *i* was in the other disyllabic roots.

- 'Taskent' contains a back vowel followed by the low front unrounded *e*. With this root, participants selected the front suffix variant *-ben* with a frequency of 43.3%. This percentage may seem low for the claim that *e* tends to behave as a harmonic front vowel, but the adessive variant *-en* was selected in another 25.6% of cases. As a result, a front suffix vowel was selected in 68.9% of cases. This appears to indicate that of the neutral vowels, *e* is the one which is least neutral. As the final vowel of a root with back vowels, the vowel *é* tends to select fewer front suffix vowels than *e,* and *i* selects the fewest because it is the neutral vowel which tends to behave most as a transparent vowel.

- 'Vancouver' provides strong evidence for the claim that *e* often tends to function as a harmonic front vowel. This root has two back vowels and only one neutral vowel, but nevertheless the front suffix variant *-ben* was chosen by participants with a frequency of 70%.

- In 'Los Angeles', the root also has two back vowels but the final two vowels of the root are the neutral vowels *e*. In this case, participants chose the front suffix variant with an even higher frequency than with 'Vancouver', a frequency of 87.8%. That the neutral vowel is the final vowel of the root appears to be very significant because in the case of 'Delta', a root with a neutral vowel in the initial syllable and a back vowel in the final syllable, participants were unanimous in their selection of the back suffix variant *-ban.*

- The root 'Szöul' is exceptional because it is a disyllabic root consisting of a front rounded vowel followed by a back vowel. However, many participants pronounced this word [sol] in which case they understandably only applied the back suffix variant *-ban.* Among those who pronounced the word [søul], there were a few who used the front suffix variant *-ben.* Nevertheless, the frequency of *-ban* was high, 84.4%.

- 'Göteborg' has a front rounded vowel followed by a front unrounded vowel and a back vowel. The root has two front vowels to one back vowel, an example of the count effect which predicts a higher frequency of front suffix vowels with a higher ratio of front unrounded (neutral) vowels to back vowels in the root. The back vowel is the final vowel of the root, though, which tends to result in a high frequency of back suffix vowels. Participants chose the back suffix variant in 64.4% of cases, not such a high frequency in comparison to other roots such as 'Szöul'. This could be partly as a result of the count effect.

- In the case of 'Massachusetts', however, there is little evidence of the count effect. Although the neutral vowel is the final vowel of the root, it is preceded by three back vowels. As a result, one might expect a relatively low number of front suffix variants, but participants selected the front suffix variant *-ben* with a frequency of 64.4%. Nevertheless, this is a lower frequency of the front suffix variant than with 'Jeruzsálem', a root with two back vowels and two neutral vowels. In this case, participants selected the front suffix variant *-ben* with a frequency of 81.1%.

Table 5 presents the percentage of front vowels and back vowels in the suffixes of Hungarian, North American and international toponyms.

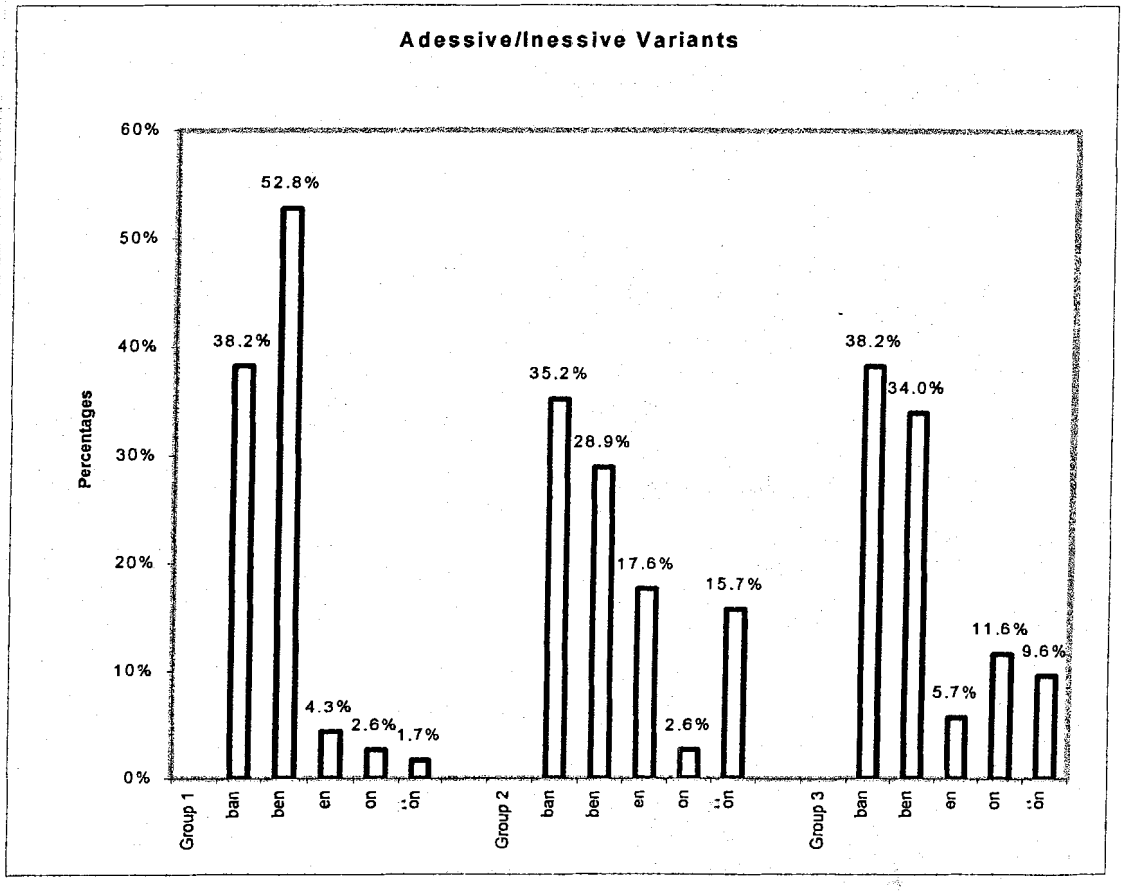
Table 5

Vowel Quality of Toponym Suffix

Front Vowel	39%
Back Vowel	61%

The following chart shows the distribution of suffix variants in toponyms in each of the three groups:

Figure 1



From the charts we can clearly see that the results of the second and third groups are similar. The results of the first group vary the most from the other groups.

2.4.2 Nonsense Words

Table 6 presents speaker responses to nonsense words. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. The set of grammatically possible suffixes does not include the feature combination [+back, -round].

Table 6

Nonsense Words

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
albánk	+bk, +rd	+bk, -rd	-hez 2.2%	-höz 1.1%	-hoz 96.7%
bahul	+bk, +rd	+bk, +rd	-hez 2.2%		-hoz 97.8%
biléz	-bk, -rd	-bk, -rd	-hez 94.4%	-höz 3.3%	-hoz 2.2%
fompét	+bk, +rd	-bk, -rd	-hez 71.1%	-höz 2.2%	-hoz 26.7%
krenisz	-bk, -rd	-bk, -rd	-hez 93.3%	-höz 1.1%	-hoz 5.6%
kümpig	-bk, +rd	-bk, -rd	-hez 81.1%	-höz 6.7%	-hoz 12.2%
metes	-bk, -rd	-bk, -rd	-hez 92.2%	-höz 5.6%	-hoz 2.2%
obböld	+bk, +rd	-bk, +rd	-hez 7.8%	-höz 72.2%	-hoz 20%
öntbön	-bk, +rd	-bk, +rd	-hez 14.4%	-höz 81.1%	-hoz 4.4%
örné	-bk, +rd	-bk, -rd	-hez 84.4%	-höz 5.6%	-hoz 10%
pércse	-bk, -rd	-bk, -rd	-hez 95.6%	-höz 2.2%	-hoz 2.2%
riltak	-bk, -rd	+bk, +rd	-hez 1.1%	-höz 1.1%	-hoz 97.8%
sonyor	+bk, +rd	+bk, +rd	-hez 3.3%	-höz 1.1%	-hoz 95.6%
tészkocs	-bk, -rd	+bk, +rd	-hez 1.1%	-höz 4.4%	-hoz 94.4%
udmisz	+bk, +rd	-bk, -rd	-hez 52.2%	-höz 1.1%	-hoz 46.7%
ügmüt	-bk, +rd	-bk, +rd	-hez 21.1%	-höz 66.7%	-hoz 12.2%

Recall that in this category, I created nonsense words which resembled Hungarian words. Participants were asked to use the allative suffix. The following could be observed:

- No unanimous responses were recorded, but a number of nonsense words received a high percentage of responses with one suffix variant. The highest number of responses was recorded for 'bahul' and 'riltak': 97.8%, followed by 'albánk', 96.7%, 'pércse' and 'sonyor', 95.6%, 'biléz' and 'tészkocs', 94.4%, 'krenisz', 93.3%, and 'metes', 92.2%.

- None of the nonsense words which recorded the highest percentage of responses contained front rounded vowels. They consisted of nonsense words with back vowels, front vowels, and a combination of front unrounded and back vowels.

- Two important observations can be made regarding the nonsense words consisting of front unrounded and back vowels with a high frequency of responses with one suffix variant: the front unrounded vowel was always the first vowel of the root, and the front unrounded vowel was always transparent. As a result, the suffix vowel selected in these cases was always a back vowel.

- Back vowel roots received a slightly higher number of responses with one suffix variant than did front unrounded vowel roots. The percentages of unanimous responses recorded for 'bahul', 'albánk' and 'sonyor' were 97.8%, 96.7% and 95.6%. In comparison, the front unrounded roots of 'pércse', 'krenisz' and 'biléz' received percentages of 95.6%, 94.4% and 93.3%. The higher percentages of the back vowel roots may reflect the fact that there was only one back vowel variant *-hoz* as opposed to two front vowel variants, *-hez* and *-höz*.

- The front rounded vowel roots, 'öntbön' and 'ügmüt', received a considerably lower number of responses with one suffix variant than did the back vowel and front unrounded vowel roots. The number of responses recorded for 'öntbön' and 'ügmüt' was 81.1% and 66.7%. Many participants used the front unrounded variant *-hez* instead of the front rounded *-höz*. With 'öntbön' *-hez* was used in 14.4% of cases and with 'ügmüt' in 21.1% of cases.

- This appears to indicate that rounding harmony is not so stable. Though the front unrounded *-hez* was often suffixed to front rounded roots, the opposite was not common. There were few cases where the front rounded *-höz* was suffixed to front unrounded roots. For example, *-höz* was suffixed to 'pércse', 'krenisz' and 'biléz' in only 2.2%, 1.1% and 3.3% of cases. Therefore, participants were much more likely to overapply a front unrounded suffix variant to a front rounded root than to overapply a front rounded suffix variant to a front unrounded root.

- Two of the nonsense words consisted of a back vowel followed by a neutral vowel, 'fompét' and 'udmisz'. In the previous category, toponyms, it was discovered that such roots tended to result in a high number of back suffix variants due to the transparent behaviour of the neutral vowel. With these nonsense words, however, participants used a high percentage of front suffix variants. In the cases of 'fompét' and 'udmisz', *-hez* was used in 71.1% and 52.2% of cases.

- As expected, the *i* of 'udmisz' was more neutral than the *é* of 'fompét', but nevertheless, both vowels often behaved as front harmonic vowels. It appears that the neutral vowels in these nonsense words behaved as front harmonic vowels more often than they would have in real words. Perhaps the neutral vowels tend to behave more as front harmonic vowels when they occur in unfamiliar words.

- In the root 'tészkocs', the reverse situation of 'fompét' and 'udmisz' because the neutral vowel preceded the back vowel, the results were very different. The back suffix variant *-hoz* was recorded in 94.4% of cases, indicating that the final vowel of

the root determined the choice of suffix vowel. In this root the vowel *é* nearly always behaved as a transparent vowel.

- Two of the nonsense words, 'örné' and 'kümpig', consisted of a front rounded vowel followed by a front unrounded vowel. In both cases, participants consistently chose the front unrounded suffix variant over the front rounded one. The front unrounded suffix variant *–hez* was suffixed to 'örné' and 'kümpig' in 84.4% and 81% of cases. The front rounded *–höz* was only applied in 5.6% and 6.7% of cases, lower percentages than for the back suffix variant *–hoz*. In these cases, the front rounded vowel of the first syllable seldom spread rounding to the suffix.

- The word 'obböld' contains no neutral vowels and can therefore be regarded as disharmonic. In many cases participants failed to pronounce the word 'obböld' [ob:øld] but rather [ob:old] or [øb:øld]. Since the front rounded vowel was in the final syllable of the root, the prediction was that participants would select the front rounded variant *–höz* over *–hoz*. This was the case: *-höz* was selected in 72.2% of cases and *–hoz* in 20%. In a number of cases rounding harmony did not apply because *–hez* was selected in 7.8% of cases.

Table 7 presents the percentages of front and back vowels in the suffixes of nonsense words.

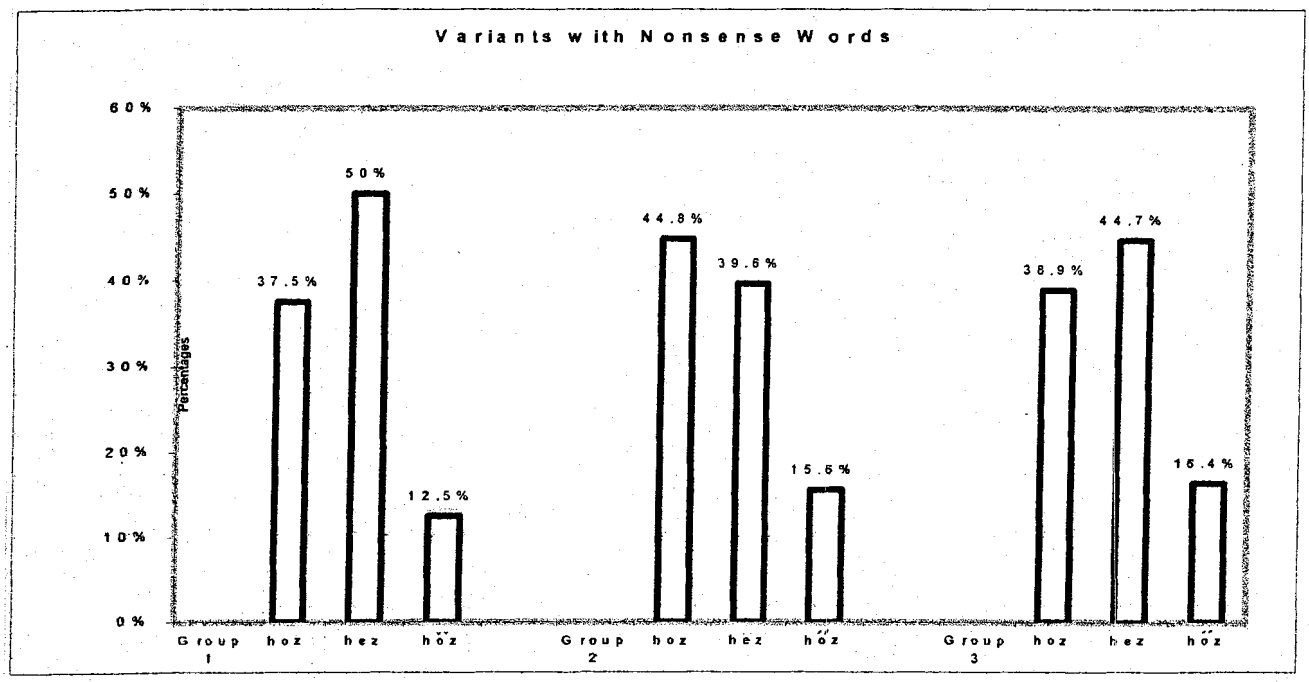
Table 7

Backness of Allative Suffix Vowel in Nonsense Words

front vowel roots	front vowel 95.1 %
back vowel roots	back vowel 96.7%
front and back vowel roots	back vowel 97.8%
back and front vowel roots	front vowel 68.9%

There was not much variation in the responses of the three groups, but participants in the first group used the front unrounded variant with greater frequency than in the other two groups. Here are the results:

Figure 2



From the chart we can see that the responses of all groups were quite similar.

2.4.2 Real Words

Table 8 presents speaker responses to real words averaged across groups and presented separately for each word. In this table, the rightmost vowel and second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected (standard) responses are shown in bold. The set of grammatically possible suffixes does not include the feature combination [+back, -round].

Table 8

Real Words

2nd V from right		Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
állomás	+bk, +rd	+bk, -rd		-höz 1.1%		**-hoz 98.9%**
asztal	+bk, +rd	+bk, +rd				**-hoz 100%**
bolt		+bk, +rd	-hez 1.1%	-höz 2.2%		**-hoz 96.7%**
bölcső	-bk, +rd	-bk, +rd	-hez 1.1%	**-höz 97.8%**		-hoz 1.1%
épület	-bk, +rd	-bk, -rd	**-hez 91.1%**	-höz 7.8%		-hoz 1.1%
étterem	-bk, -rd	-bk, -rd	**-hez 96.7%**	-höz 3.3%		
föld		-bk, +rd	-hez 3.3%	**-höz 96.7%**		
fű		-bk, +rd	-hez 4.4%	**-höz 92.2%**		-hoz 3.3%
fül		-bk, +rd	-hez 16.7%	**-höz 81.1%**		-hoz 2.2%
hegy		-bk, -rd	**-hez 93.3%**	-höz 6.7%		
hűtő	-bk, +rd	-bk, +rd	-hez 1.1%	**-höz 95.6%**		-hoz 3.3%
kő		-bk, +rd	-hez 2.2%	**-höz 95.6%**		-hoz 2.2%
követ	-bk, +rd	-bk, -rd	**-hez 87.8%**	-höz 11.1%		-hoz 1.1%
őr		-bk, +rd	-hez 1.1%	**-höz 93.3%**		-hoz 5.6%
szék		-bk, -rd	**-hez 98.9%**	-höz 1.1%		
szög		-bk, +rd	-hez 11.1%	**-höz 86.7%**		-hoz 2.2%
tükör	-bk, +rd	-bk, +rd	-hez 2.2%	**-höz 96.7%**		-hoz 1.1%
üzem	-bk, +rd	-bk, -rd	**-hez 96.7%**	-höz 3.3%		

Recall that in this category the nonsense words of the previous category were replaced with real words. The purpose was to compare participants' responses with nonsense words and real words. The following could be observed :

- The only word which received a unanimous response was 'asztal', a back vowel root to which participants suffixed *-hoz*. Following 'asztal', the roots with the highest number of responses with one suffix variant were 'állomás' and 'szék' (98.9%), 'bölcső' (97.8%), 'bolt', 'étterem', 'föld', 'tükör' and 'üzem' (96.7%), 'hűtő' and 'kő' (95.6%), 'hegy' and 'őr', (93.3%), 'fű' (92.2%) and 'épület' (91.1%).

- The only roots which did not record responses of over 90% were roots with front rounded vowels.

- In comparison to the nonsense words of the previous category, real words recorded a higher number of responses with one suffix variant. Of the nonsense words, only 9 out of 16 recorded responses with a frequency of over 90%, but of the real words, 15 out of 18 recorded responses with a frequency of over 90%.

- It appears that familiarity played an important role in the selection of suffix variants. Familiar words (real words) recorded a considerably higher number of responses with one suffix variant than unfamiliar (nonsense) words.

- The three roots with the lowest number of responses with one suffix variant contained front rounded vowels: 'fül', 'követ' and 'szög'. The suffix variant *–hez* was suffixed to 'fül' and 'szög' with frequencies of 16.7% and 11.1%. In the case of 'követ', the expected suffix variant was *-hez*, but *-höz* occurred with a frequency of 11.1%. In these cases, the front unrounded *e* behaved as a transparent vowel.

- All the roots consisting solely of front rounded vowels recorded responses with the front unrounded *-hez*, but roots consisting of two front rounded vowels rather than one recorded a lower number of responses with *-hez*.

- With the front rounded roots 'bölcső', 'hűtő' and 'tükör', *–hez* was recorded in only 1.1%, 1.1% and 2.2% of cases. However, with the monosyllabic roots 'föld', 'fű', 'fül', 'kő', 'őr' and 'szög', *–hez* was recorded in 3.3%, 4.4%, 16.7%, 2.2%, 1.1% and 11.1% of cases.

- The results appear to indicate that the count effect is significant: roots consisting of two front rounded vowels resulted in a higher frequency of responses with the front rounded variant *–höz* than did roots with one front rounded vowel.

- All of the roots consisting solely of front rounded vowels recorded responses with the front unrounded *-hez*. In these cases, participants overapplied the front unrounded suffix variant. The reverse also occurred. With the roots 'étterem', 'hegy' and 'szék', the front rounded *-höz* was recorded with frequencies of 3.3%, 6.7% and 1.1%. With the exception of 'étterem', though, the front rounded *-höz* was suffixed to the front unrounded roots in only a few cases.

- Participants exhibited a greater tendency to overapply the front unrounded *-hez* to front rounded roots rather than the front unrounded *-höz* to front rounded roots.

- Of the roots consisting of a combination of front rounded and front unrounded vowels, there was more variation in the responses than with the other roots. The root 'üzem' recorded a high percentage of responses with one suffix variant, 96.7%, but the other two roots, 'épület' and 'követ', recorded percentages of 91.1% and 87.8%. With these roots, it was usually the final vowel of the root which spread harmony to the suffix, making these vowels behave as harmonic front vowels. However, a number of responses were recorded in which they behaved as transparent vowels. The suffix variant *–höz* was suffixed to 'épület', 'követ' and 'üzem' with frequencies of 7.8%, 11.1% and 3.3%.

- With the roots 'őr' and 'hűtő' the suffix variant *–hoz* was recorded more often than the suffix variant *–hez*.

- With the other front rounded roots, *-hez* occurred with greater frequency than *-hoz*. A possible explanation for the relatively high occurrences of *-hoz* may be that this occurs in independent forms, i.e. *hozzám*, 'towards me', and therefore can be considered the underlying form. However, in those cases where *–hoz* was selected more often than *-hez*, it was a relatively low number.

In a comparison of nonsense words with real words, the following was evident: real words recorded a higher number of responses with one suffix variant and less variation in the responses, and rounding harmony was more stable with real words. With both nonsense words and real words, the highest number of responses was recorded with back vowel roots and front unrounded roots.

In the responses of the three groups, the responses of the first group deviated the most from the standard. This can be seen in the following charts:

Figure 3

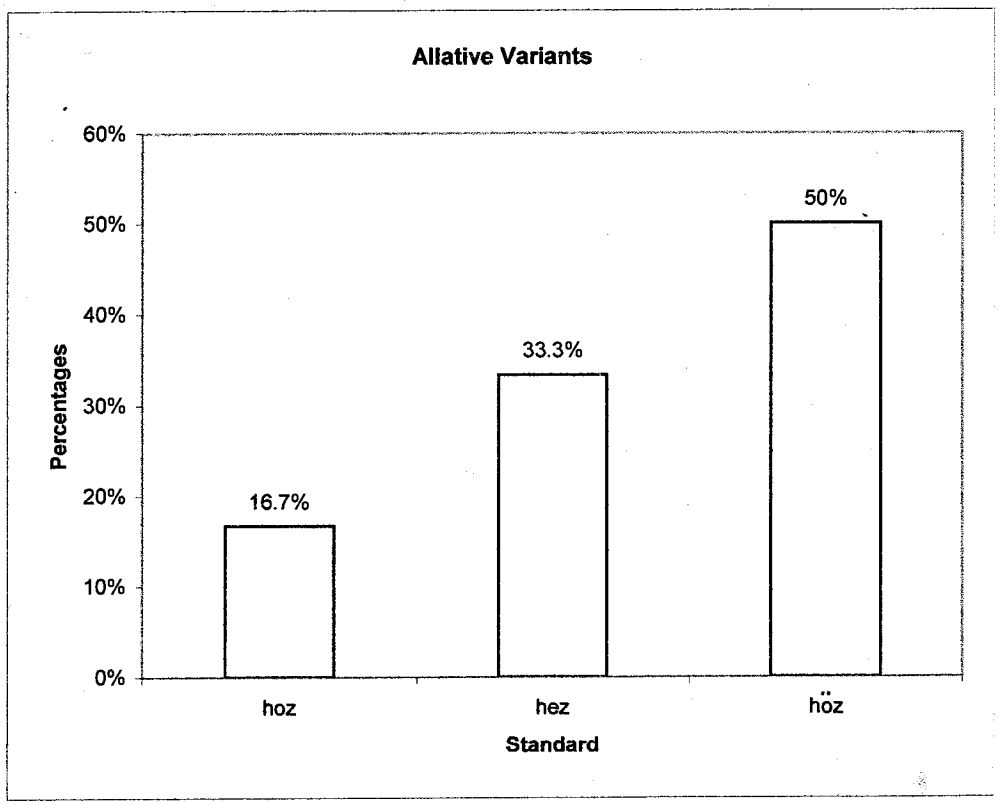
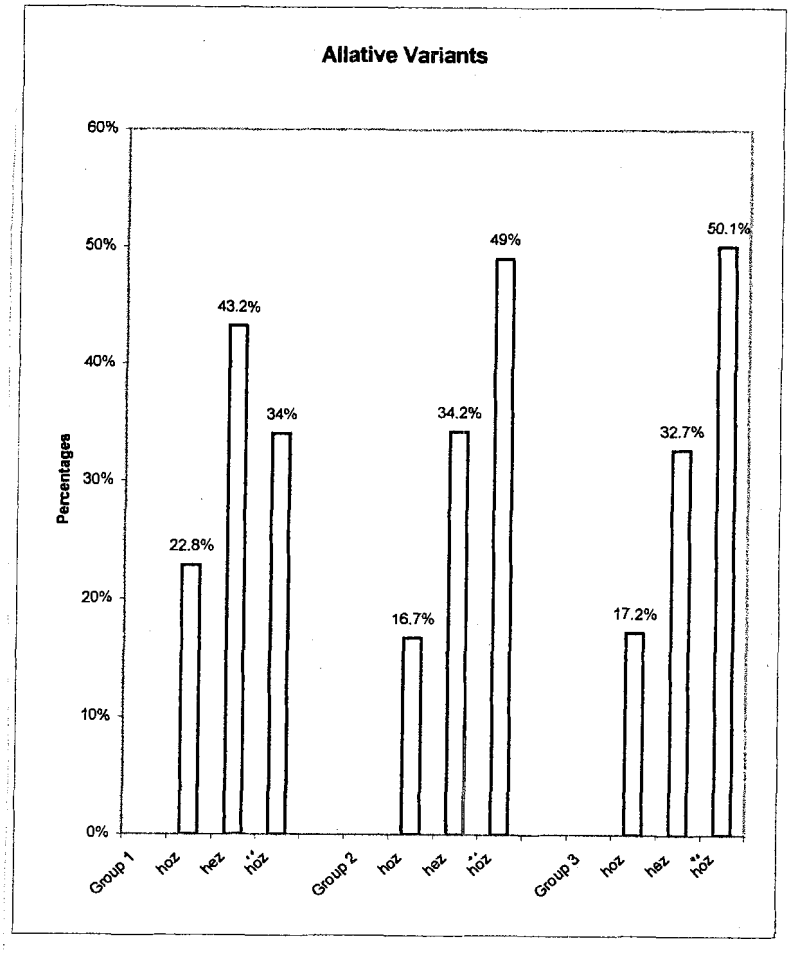


Figure 4



The following table presents the percentage of front and back vowels in the allative suffix of real words.

Table 9

Backness of Allative Suffix Vowel in Real Words

front vowel roots	front vowel 98.4%
back vowel roots	back vowel 98.5%

2.4.3 Neutral Vowel Roots

Table 10 presents speaker responses to neutral vowel roots. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected (standard) responses are given in bold. Note that for the neutral vowel roots the set of grammatical possible suffixes does not include the feature combination [-back, +round].

Table 10

Neutral Vowel Roots

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
díj		-bk, -rd			**-at**/-ot 93.3%
gyík		-bk, -rd	-et 3.3%		**-ot** 96.7%
héj		-bk, -rd	-et 20%	-át 10%	**-at**/-ot 61.1%
izom	-bk, -rd	+bk, +rd			-at/**-ot** 100%
nyíl		-bk, -rd	-et 1.1%		**-at**/-ot 86.6%

Recall that participants were asked to use the accusative suffix. The following could be observed:

- The neutral vowel root with the highest number of responses with one suffix variant was 'izom' with 98.9%. This was followed by 'gyík' (96.7%), 'titok' (94.4%), 'díj' (90%), 'nyíl' (84.4%) and 'héj' (60%). The root 'héj' recorded a far lower number of responses than the other roots. This may indicate that this root was less familiar to the participants than the other ones.

- The neutral vowel root 'díj' can also be classified as a lowering root because the suffix vowel is not only back but also low. Lowering roots require a low vowel in the suffix, either the low front unrounded *e* or the low back unrounded *a*. The other neutral vowel roots which are also lowering roots are 'héj' and 'nyíl'. I will now refer to these neutral vowel roots as neutral vowel lowering roots. With these neutral vowel lowering roots, the suffix vowel is not the vowel *o* but rather *a*. The prediction was that these neutral vowel lowering roots would show more variation than the other neutral vowel roots and record a lower number of responses with one suffix variant. The results show that this was indeed the case. The neutral vowel lowering roots recorded the lowest numbers of unanimous responses.

- Other observations were the following: in the case of 'díj', a neutral vowel lowering root, *-at* was recorded with a frequency of 90%. However, the second most popular response was not *-ot*, the suffix variant which would normally combine with a neutral vowel root, but rather *-t*. This suffix variant occurs after roots which end in vowels and after certain coronal consonants such as *kín* 'torture' and *sír* 'grave'. It was not the expected response with 'díj' but nevertheless occurred in 6.7% of cases.

- Rather than selecting a suffix vowel, participants who used the suffix variant *-t* deleted the vowel. This may exemplify language change in progress.

- Since vowel deletion occurred with 'dij', it would seem very likely that this would also be the case with 'héj' and 'nyíl'. Vowel deletion would not be expected with 'gyík' because Hungarian syllable structure does not allow a velar stop followed by a dental stop in the syllable coda. It would not be expected with 'izom' or 'titok', either, because the *o* of the root deletes when they combine with the accusative suffix. The results indicate that vowel deletion occurred not only with 'díj' but also with 'héj' and 'nyíl': with 'díj' it did not occur so frequently, only in 6.7% of cases, but with 'héj' and 'nyíl' the frequencies were a little higher: 8.9% and 12.2%. Nevertheless, the frequency of vowel deletion was relatively stable and systematic.

- Participants who applied vowel deletion to one root tended to do the same with the other roots.

- The neutral vowel lowering roots require low vowels in the suffix, but in a number of cases, participants used a mid back vowel instead. With 'díj', the suffix variant *-ot* was recorded in 3.3% of cases, with 'héj' in 1.1% of cases and with 'nyíl in 2.2%. The root 'héj' recorded the response *-át* in 10% of cases. It was never recorded with any of the other neutral vowel roots. Root-final vowels often lengthen when they combine with a suffix, i.e. *rózsa* 'rose', *rozsá-t* 'rose acc.' This may explain vowel lengthening in this case.

- Mid back suffix vowels seldom occurred with the neutral vowel lowering roots, but in a few cases the reverse occurred: participants used a low suffix vowel with a neutral vowel root. For example, the back suffix variant *–at* occurred with 'izom' and 'titok' in 1.1% and 5.6% of cases. It did not occur with the other neutral vowel roots. When we compare the frequency with which *–at* was applied to roots where *–ot* was the expected response, and *–ot* was applied to roots where *–at* was the expected response, the frequencies are low and virtually identical.

- The neutral vowel roots are exceptional because they consist of roots with front unrounded vowels which require back suffix vowels. Unlike the majority of Hungarian words consisting solely of front unrounded vowels in the root, the neutral vowel roots do not combine with front suffix vowels. It is significant to determine the frequency of responses with front suffix vowels. With 'díj' the front suffix variant *-et* was never recorded. In the neutral vowel roots with the back vowel *o* in the root, no responses with *-et* were recorded, either. The only neutral vowel roots which recorded the response *-et* were 'gyík' and 'héj' and there was considerable variation in the frequencies. With 'gyík', *-et* was recorded in only 3.3% of cases but with 'héj' it was recorded in 20%.

- This is a significant difference but is consistent with the analysis of *í* as a more neutral vowel than *é*. Since *í* is more neutral than *é*, we can expect *é* to behave as a front harmonic vowel in a greater number of cases, thereby resulting in a higher number of front suffixes. In Vágó's list of 58 neutral vowel roots provided in section 1.4, *i* occurred in 34 roots but *é* in only two. As a result, it is not surprising that *í* combined more consistently with back suffixes than did *é*.

Table 11 presents the percentage of front and back vowels in the accusative suffix:

Table 11

Backness of the Accusative Suffix Vowel in Neutral Vowel Roots

Front Vowel	4.3%
Back Vowel	95.7%

The participants in the second and third groups gave responses close to the standard but those in the first group deviated significantly from the standard responses. This can be seen in the following charts:

Figure 5

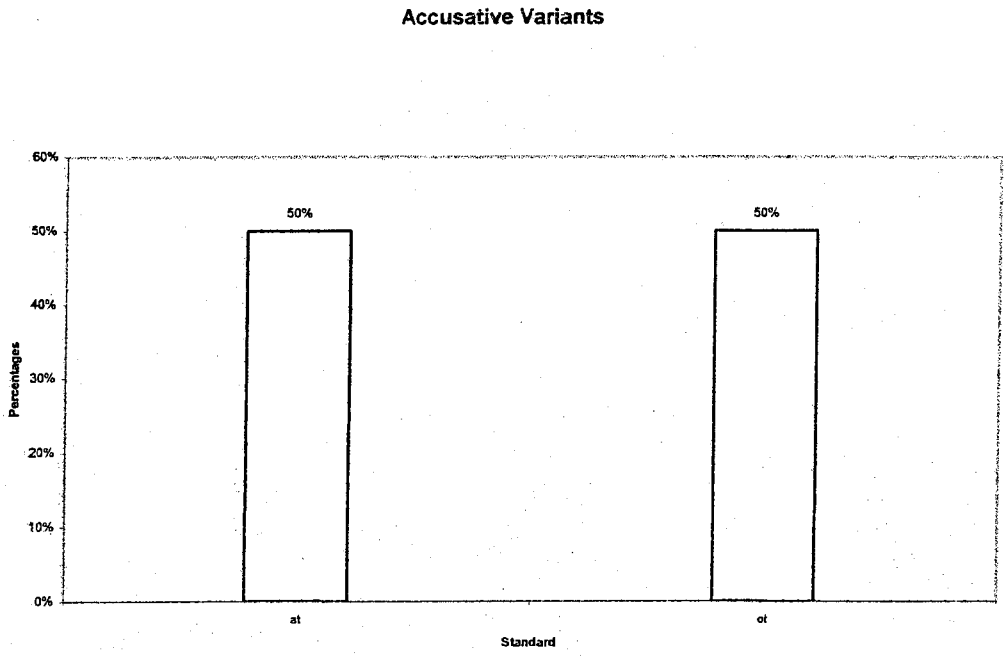
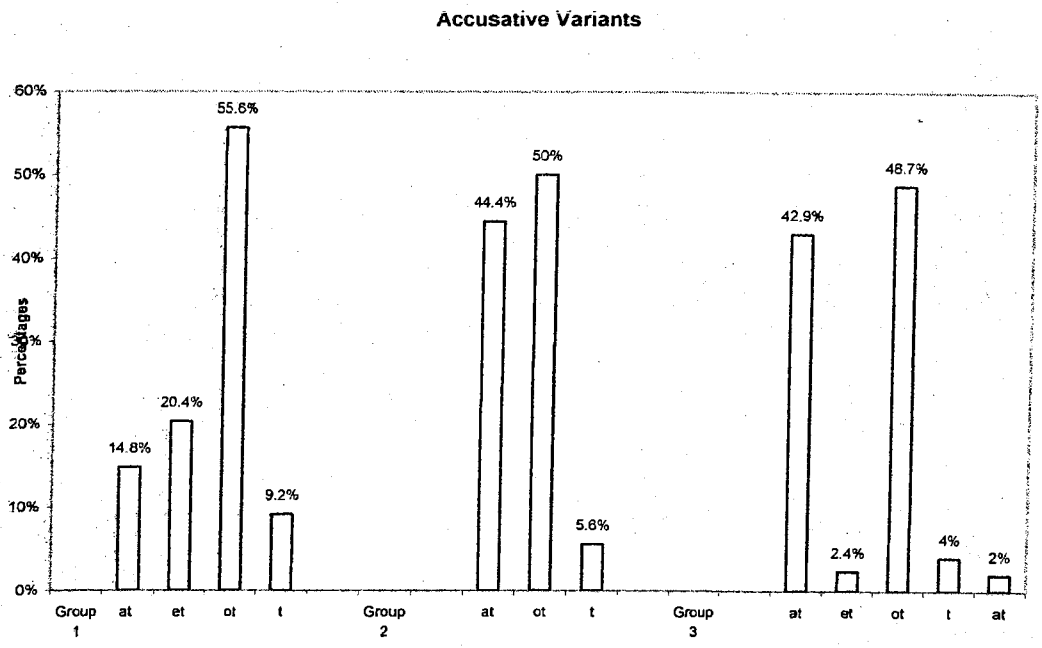


Figure 6



2.4.4 Verbs

Table 12 presents speaker responses to verbs. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel of the word and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Expected (standard) responses are shown in bold. Note that the set of grammatical possible suffixes for these verbs does not include the feature combination [+back, -round].

Table 12

Verbs

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
bír		-bk, -rd			**-tok 100%**
főz		-bk, +rd	-tek 10%	**-tök 90%**	
fütyül	-bk, +rd	-bk, +rd	-tek 5.6%	**-tök 94.4%**	
indul	-bk, -rd	+bk, +rd			**-tok 100%**
iszik	-bk, -rd	-bk, -rd			**-tok 100%**
köhög	-bk, +rd	-bk, +rd	-tek 8.9%	**-tök 91.1%**	
nyög		-bk, +rd	-tek 3.3%	**-tök 95.6%**	-tok 1.1%
vidul	-bk, -rd	-bk, +rd		-tök 4.4%	**-tok 95.6%**
visít	-bk, -rd	-bk, -rd	-tek 26.7%	-tök 1.1%	**-(a)tok 72.2%**

Recall that in this category participants were asked to use the 2pl present tense suffix with verbs consisting of neutral vowel roots and front rounded roots. The 2pl present tense suffix has three alternants: *-tok*, *-tek*, and *–tök*. However, with the verbs used in this category there were only two possible suffix alternants, *-tok* for the neutral vowel roots and *–tök* for the front rounded vowel roots. The following could be observed:

- Three verbs recorded unanimous responses: 'bír', 'indul' and 'iszik'. These are all neutral vowel roots which combine with the variant *–tok*. It should be noted that with the verb 'iszik', it changes to 'isztok' when it combines with the suffix.

- Following 'bír', 'indul' and 'iszik', the verbs with the highest numbers of responses with one suffix variant were 'nyög' and 'vidul' (95.6%), 'fütyül' (94.4%), 'köhög' (91.1%), 'főz' and 'söpör' (90%) and 'visít' (72.2%).

- The verb 'visít' had a significantly lower number of unanimous responses than the other verbs. This may indicate that participants were less familiar with this verb than with the other ones.

- The neutral vowel roots 'bír', 'indul' and 'iszik' recorded unanimous responses, but 'vidul' and 'visít' did not. With 'vidul' the variant *–tök* occurred in 4.4% of cases. With 'visít' the front unrounded variant *–tek* was selected in 26.7% of cases and *–tök* in only 1.1%. That *–tek* was selected so frequently indicates that many participants did not recognize 'visít' as a neutral vowel root. It appears likely that a lack of familiarity with a neutral vowel root results in a greater number of front suffixes because participants then tend to treat the root as if it were a harmonic front root.

- With the front rounded roots 'főz', 'fütyül', 'köhög', 'nyög' and 'söpör', no unanimous responses were recorded. The front unrounded variat *–tek* occurred in all instances.

- These results provide evidence that rounding harmony is less extensive and less stable than backness harmony. As noted by Utasi-McRobbie 1984 (see 1.6), this process of the disappearance of the rounding harmony rule occurs in cases of imperfect language performance.

- With the front rounded verbs 'főz', 'fütyül', 'köhög', 'nyög' and 'söpör', the suffix variant *-tek* was recorded with frequencies of 10%, 5.6%, 8.9%, 3.3% and 10%. The back variant *-tok* was also recorded with 'nyög' but the frequency was a very low 1.1%.

- Since the front unrounded variant *–tek* occurred with the front rounded roots, I also determined the frequency with which participants used the front rounded variant *–tök* with the neutral vowel roots. The only two neutral vowel roots which recorded the front rounded variant were 'vidul' and 'visít' with frequencies of 4.4% and 1.1%. In the case of 'vidul', the selection of the front rounded variant may have been influenced by the uncertainty of whether to use a front unrounded or back vowel in the suffix. In the case of 'visít' the frequency is so low we can consider it negligible.

- The results indicate that overapplication of the front unrounded *-tek* was more common than overapplication of the front rounded *-tök*. In several instances rounding harmony was violated, but backness harmony was only violated once. It is clear from the results that backness harmony was applied far more consistently than rounding harmony. It appears that in cases of imperfect language performance, rounding harmony is less stable than backness harmony.

Table 13 presents the percentage of front vowels and back vowels in the suffixes of the verbs.

Table 13

Vowel Quality in Suffix Vowel of Verbs

Front Vowel	53.1%
Back Vowel	46.9%

Of the three groups, the first deviated most from the standard and the second group did not deviate at all. Here are the results:

Figure 7

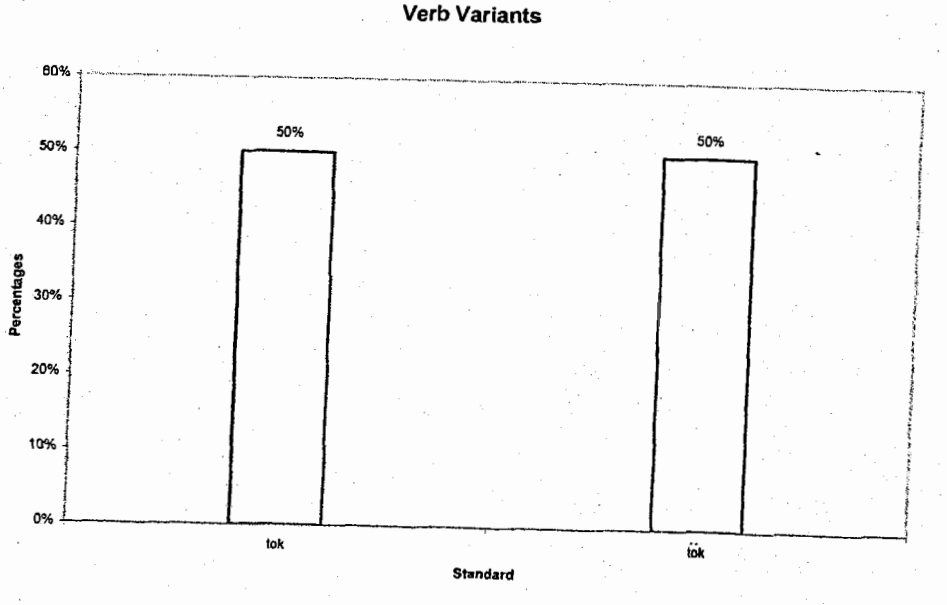
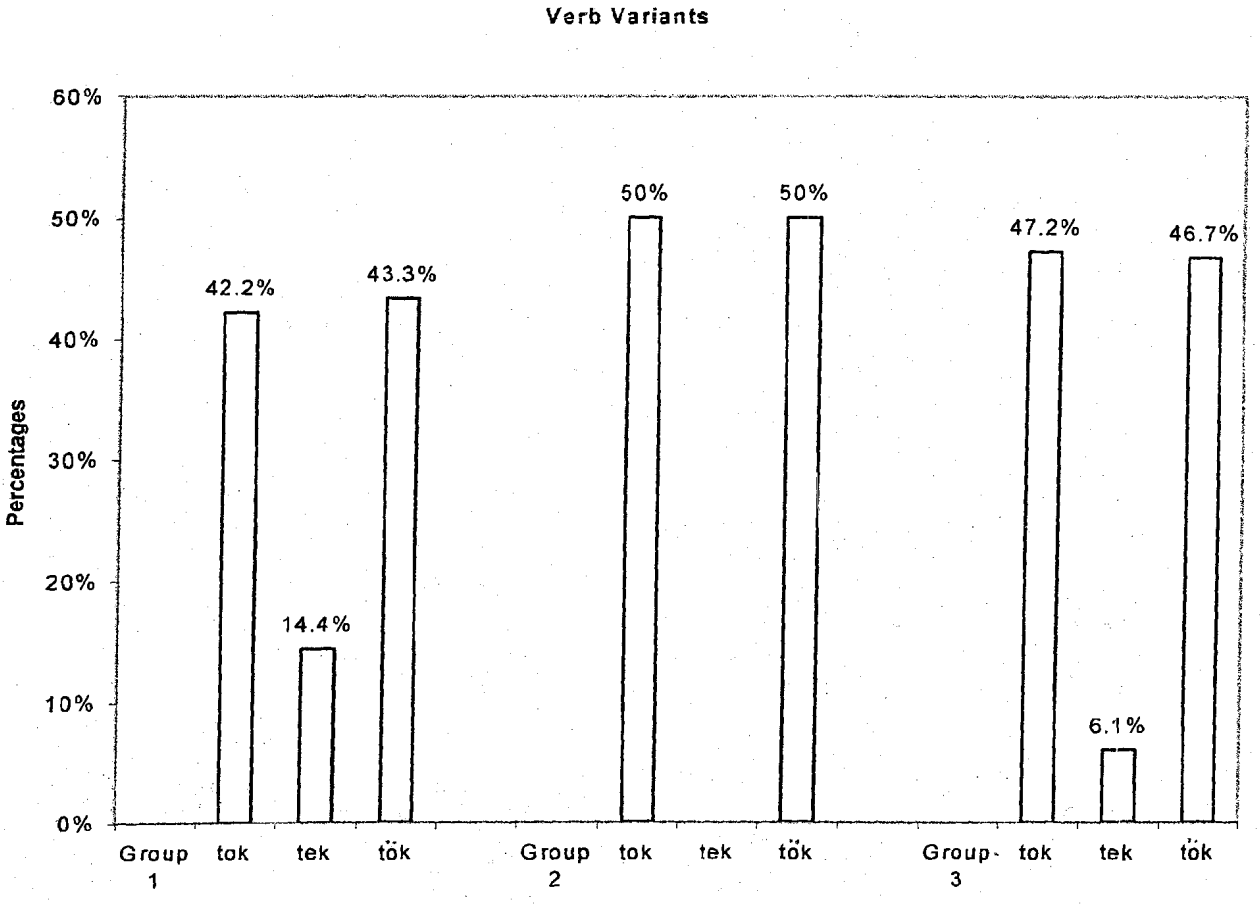


Figure 8


Verb Variants
Percentages
60%
50%
40%
30%
20%
10%
0%
42.2%
14.4%
43.3%
50%
50%
47.2%
6.1%
46.7%
Group 1
tok
tek
tök
Group 2
tok
tek
tök
Group 3
tok
tek
tök

2.4.5 Doublets

Table 14 presents speaker responses to doublets. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Note that the set of grammatically possible suffixes does not include the feature combination [-back, +round] or [+back, -round].

Table 14

Doublets With Dative

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
Ágnes	+bk, -rd	-bk, -rd	-nek 73.3%		-nak 26.7%
hotel	+bk, +rd	-bk, -rd	-nek 80%		-nak 20%
József	+bk, +rd	-bk, -rd	-nek 88.9%		-nak 11.1%
szalamander	+bk, +rd	-bk, -rd	-nek 87.8%		-nak 12.2%

In the category of doublets, participants were asked to use four different suffixes. Therefore, the doublets were divided into four groups. With the first group of doublets, participants were asked to use the dative suffix *-nak/-nek*. Since *-nek* occurs in independent forms, i.e. *nekem* 'to me', it can be regarded as the underlying form. The following could be observed:

- It is clear that *e* behaved more as a harmonic front vowel than as a transparent vowel. The front variant *-nek* was recorded with 'József' in 88.9% of cases, followed by 'szalamander' (87.8%), 'hotel' (80%), and 'Ágnes' (73.3%).

- Participants preferred *-nek* over *-nak* but there was variation. With 'József', the back variant *-nak* was only selected in 11.1% of cases, but with 'Ágnes' the same back variant was selected in 26.7% .

- The *e* in the root 'József' behaved as a harmonic front vowel for the majority of participants.

- In Ágnes, however, the *e* behaved as a transparent vowel in a considerable number of cases. This was also the case with 'hotel' because the back variant *–nak* was chosen in 20% of cases.

- Despite the variation in the selection of *–nak* or *–nek*, the results appear to indicate that the choice of suffix variant was not random, but rather, that participants tended to exhibit a preference for one variant over another.

- The root 'szalamander' is different from the other roots because it consists of four syllables and has three back vowels followed by the front unrounded *e*. The combination of three back vowels and one front unrounded vowel did not result in a high number of back variants. In 87.8% of responses, the front variant *-nek* was selected.

- The only root with a higher number of front variants than 'szalamander' was 'József' with 88.9%. The results of 'szalamander' may indicate that in doublets in which *e* is the final vowel of the root, it has a great tendency to behave as a harmonic front vowel regardless of the number of back vowels which precede it.

Table 15 presents the percentage of back and front vowels in the dative suffix.

Table 15

Quality of Dative Suffix Vowel

Front Vowel	82.5%
Back Vowel	17.5%

The responses of the first two groups were identical. The third group recorded the highest percentage of back vowel variants and the lowest percentage of front vowel variants. Here are the results:

Figure 9

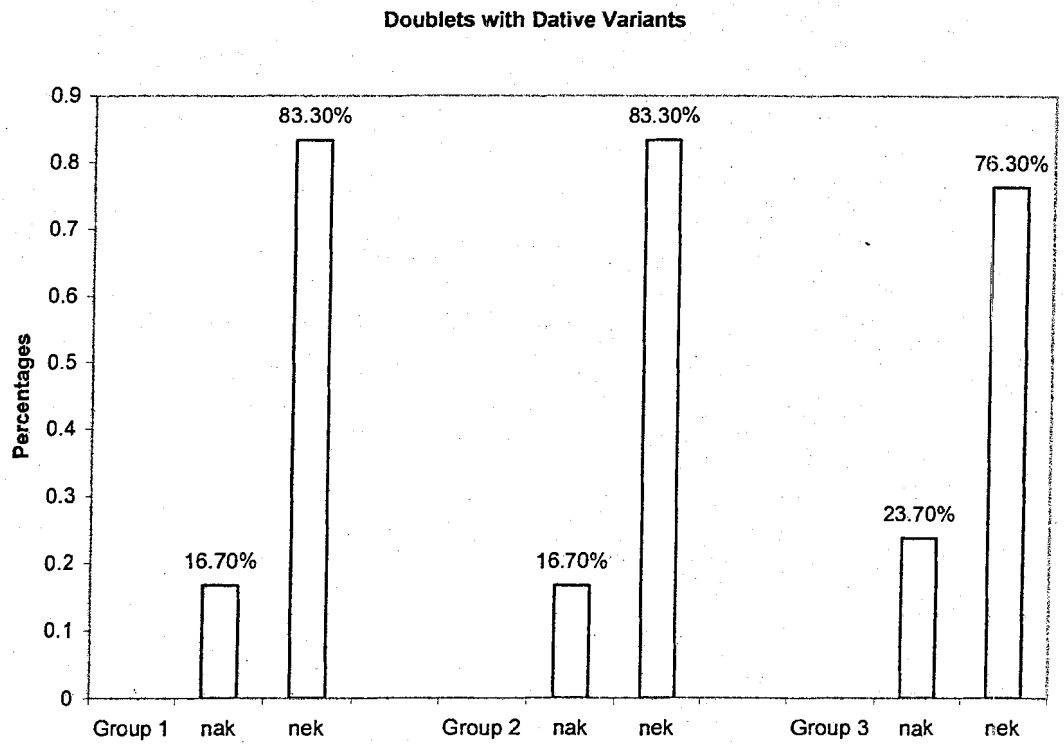


Table 16 presents speaker responses to doublets with the ablative suffix. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the stem are specified for [+-back] and for [+-round] feature values; so are the responses. Note that with these doublets the set of gramatically possible suffixes does not include either the feature value combination [+back, -round] or [-back, -round].

Table 16

Doublets With Ablative

	2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
affér	+bk, +rd	-bk, -rd		-ről 48.9%		-ról 51.1%
aszpirin	-bk, -rd	-bk, -rd		-ről 36.7%		-ról 63.3%
dzsungel	+bk, +rd	-bk, -rd		-ről 62.2%		-ról 37.8%
klarinét	-bk, -rd	-bk, -rd		-ről 44.4%		-ról 55.6%
zsáner	+bk, -rd	-bk, -rd		-ről 57.8%		-ról 42.2%

With the second group of doublets, participants were asked to use the ablative suffix *-ról/-ről*. Since *-ról* occurs in independent forms, i.e. *rólam* 'about me', it can be regarded as the underlying form. The following could be observed:

- With this group of doublets participants did not show such a clear preference for one form over another. There was considerable variation in participants' responses and participants were often inconsistent in their selection of suffix variant. Nevertheless, there were participants who were consistent in their selection.

- The root 'aszpirin' recorded the highest number of responses with one suffix variant, 63.3%. This was followed by 'dzsungel', 62.2%, 'zsáner, 57.8%, 'klarinét', 55.6%, and 'affér', 51.1%. In the case of 'affér', participants were almost evenly split on their selection of suffix variant.

- The two roots with the low front unrounded *e* were the ones which recorded the highest frequencies of -ről. The front variant *-ről* occurred with 'dzsungel' in 62.2% of cases and with 'zsáner' in 57.8%.

- Thus we can say that *e* behaved as a front harmonic vowel more often than the other neutral vowels.

- With the neutral vowel é the front suffix variant *-ről* occurred with less frequency: with 'affér' in 48.9% of cases and with 'klarinét' in 44.4%.

- The lowest frequency of front suffix vowels occurred with 'aszpirin', a root with the most neutral vowels in its final two syllables. With 'aszpirin' *-ről* was only recorded in 36.7% of cases.

- The results show that the vowel *i* was the most transparent vowel. It was the vowel which was most likely to combine with a back suffix variant. The vowel *é* was less neutral than *i* and the vowel *e* was the least neutral. In other words, the vowel *e* was the one which most often behaved as a front harmonic vowel and the vowel *i* the one which least often did so. Here are the participants' responses:

Table 17 presents the percentage of front and back vowels in the ablative suffix of doublets.

Table 17

Quality of Ablative Suffix Vowel

Front Vowel	50%
Back Vowel	50%

The responses of the three groups varied little, but the third group selected the back variant over the front variant. Here are the results:

Figure 10

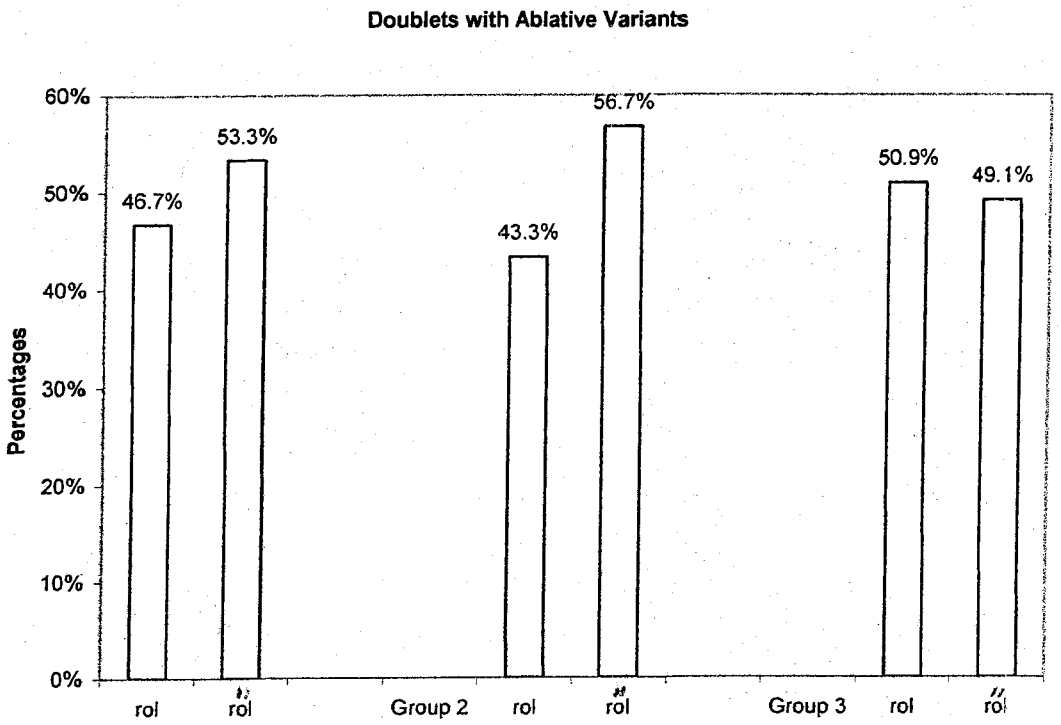


Table 18 presents speaker responses to doublets with the instrumental suffix variant. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the stem are specified for [+-back] and for [+-round] feature values; so are responses. The set of grammatically possible suffixes does not include the feature value combination [+back, -round] or [-back, +round].

Table 18

Doublets With Instrumental

2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
analízis	-bk, -rd	-bk, -rd	-el 64.4%		-al 35.6%
balett	+bk, +rd	-bk, -rd	-el 61.1%		-al 38.9%
bankett	+bk, +rd	-bk, -rd	-el 74.4%		-al 25.6%
fotel	+bk, +rd	-bk, -rd	-el 74.4%		-al 25.6%

Table 19

Backness of Instrumental Suffix Vowel

Front Vowel	68.6%
Back Vowel	31.4%

- The front variant *-el* was preferred in all cases. It occurred most frequently with 'bankett' and 'fotel', in 74.4% of cases. This was followed by 'analízis', 64.4%, and 'balett', 61.1%.

- The front variant occurred most often after doublets with the low front unrounded *e* in the final syllable. However, it also occurred least often after a doublet with *e* in the final syllable.

- In the case of 'balett', the front variant occured in fewer cases than it did with 'analízis'.

- The doublets 'balett' and 'bankett' are similar. They both contain the same back vowel in their first syllable and the same neutral vowel in their final syllable, but 'balett' triggered considerably fewer front suffix vowels than did 'bankett'. With 'balett' there was more variation in the selection of the suffix variant.

- In the case of 'analízis', the prediction was that the back suffix variant would be preferred, but it is possible that the two neutral vowels in the final two syllables of the doublet resulted in a higher number of front suffix variants.

- With the exception of 'balett', the doublets with *e* in their final syllable triggered a higher number of front suffix variants than the doublet with *i* in its final syllable. The results show that the selection of suffix variant was not random, particularly in the cases of 'bankett' and 'fotel'. It appears that participants tended to have a clear preference for one form over another.

  In the following figure, we can see that all groups preferred the front suffix variant over the back. This was especially true in the case of group II which selected the front suffix variant in 87.5% of cases.

Figure 11

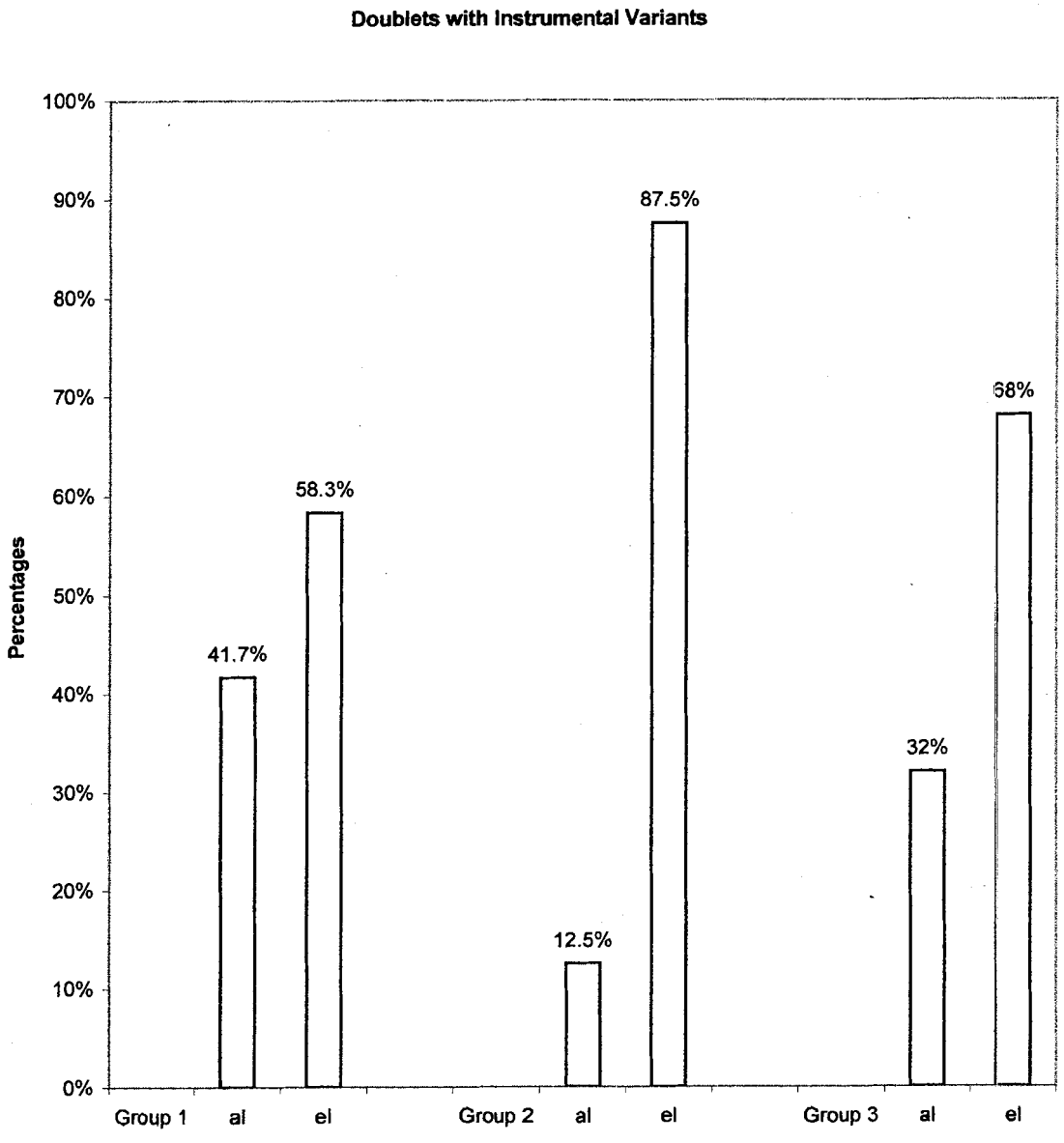

Doublets with Instrumental Variants
Percentages
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
41.7%
58.3%
12.5%
87.5%
32%
68%
Group 1
al
el
Group 2
al
el
Group 3
al
el

Table 20 presents speaker responses to nonsense words. They are averaged across groups and presented separately for each word. In this table, the rightmost vowel and the second vowel from the right in the stem are specified for [+-back] and [+-round] feature values; so are the responses. Note that the set of grammatically possible suffixes does not include the feature combination [-back, +round] or [+back, -round].

Table 20

Doublets With Adverbial

	2nd V from right	Rightmost V	-bk, -rd	-bk, +rd	+bk, -rd	+bk, +rd
aggresszív	-bk, -rd	-bk, -rd	-en 71.1%			-an 28.9%
konkrét	+bk, +rd	-bk, -rd	-en 38.9%			-an 61.1%

With the fourth group of doublets, participants were asked to use the adverbial suffix *-an/-en*. The following could be observed:

- With 'aggresszív' *-en* occurred in 71.1% of cases but with 'konkret' in only 38.9% of cases.

- The root 'aggresszív' has one back vowel followed by two front unrounded vowels, *e* and *í*. It is likely that the low front unrounded *e* triggered a high number of front suffix vowels despite not being the final vowel of the root.

- The doublet 'konkrét' has the mid front unrounded *é* in the final syllable, a vowel which tends to trigger fewer front suffix vowels than *e*.

- It is also possible that 'aggresszív' triggered more front suffix vowels than 'konkrét' because it has two neutral vowels to one back vowel whereas 'konkret' has only one neutral vowel to one back vowel. Therefore, the higher number of front suffix vowels with 'aggresszív' may have partly been the result of the count effect.

- Participants preferred the front vowel suffix variant *-en* with 'aggresszív' and the back vowel suffix variant *-an* with 'konkrét'.

Table 21 shows the percentage of front and back vowels in the adverbial suffix:

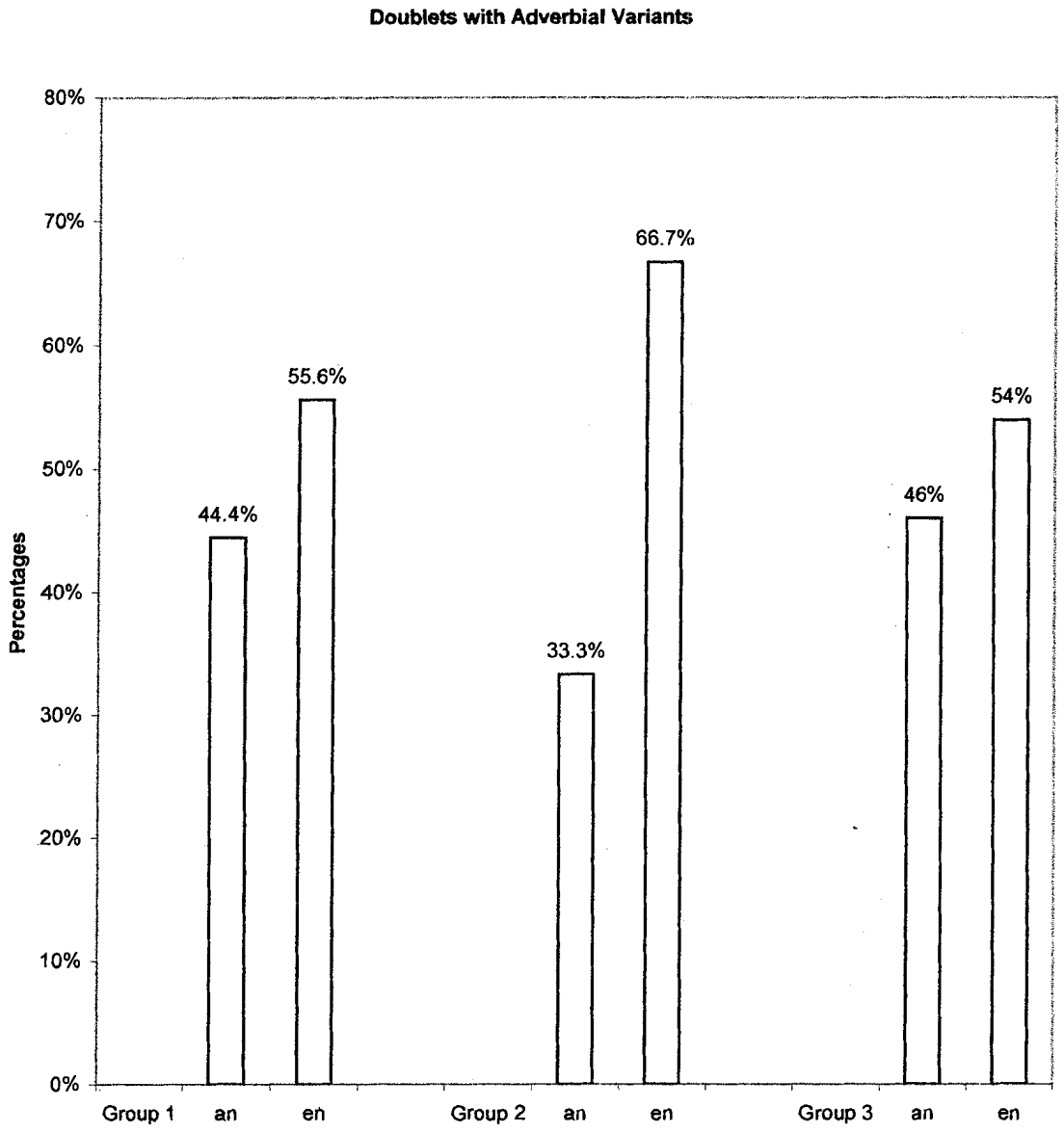
Table 21

Quality of Adverbial Suffix Vowel

Front Vowel	55%
Back Vowel	45%

The responses of the three groups, particularly the first and third groups, were similar. All preferred the front suffix variant as can be seen in the following chart:

Figure 12


Doublets with Adverbial Variants
Percentages
80%
70%
60%
50%
40%
30%
20%
10%
0%
44.4%
55.6%
33.3%
66.7%
46%
54%
Group 1
an
en
Group 2
an
en
Group 3
an
en

A statistical analysis revealed that there was a significant correlation between the expected and observed responses with respect to backness in North American toponyms. Statistical analysis was based on the traditional Hungarian pronunciation of English toponyms. The analysis revealed the Pearson correlation coefficient $r = .588$, $p < .000$ for backness.

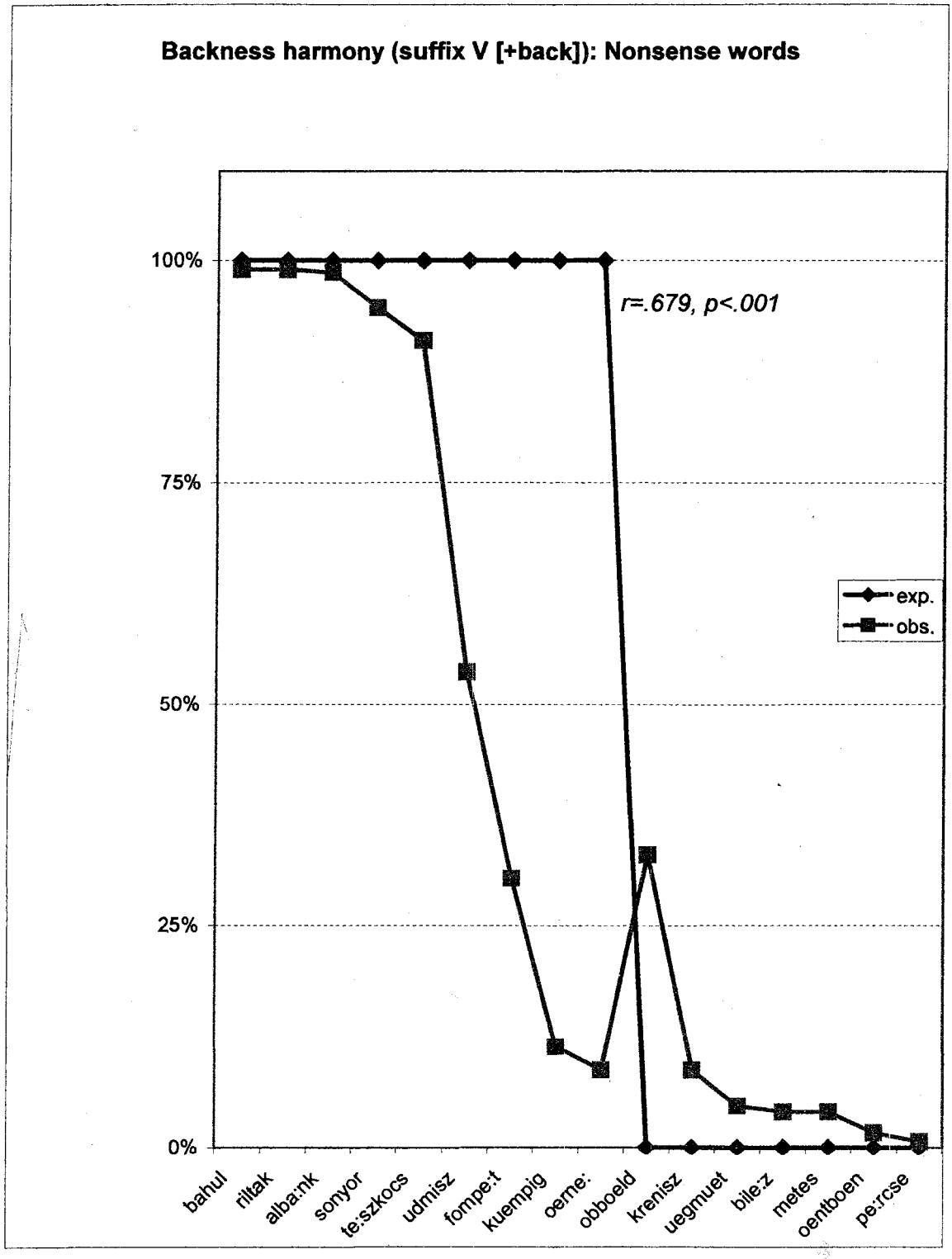
With Hungarian toponyms, the analysis revealed the Pearson correlation coefficient $r = .983$, $p < .001$ for backness and the Pearson correlation coefficient $r = .472$, $p < .001$ for roundness which is significant in both cases.

With international toponyms, the analysis revealed the Pearson correlation coefficient $r = .716$, $p < .001$ for backness and the Pearson correlation $r = -.086$, $p = .620$ for roundness. In this case, backness harmony was signficant but roundness harmony was not.

A statistical analysis was not performed on neutral vowel roots, verbs or doublets due to the small number of test items.

A statistical analysis revealed that there was a significant correlation between the expected and observed responses with respect to both backness (Pearson correlation coefficient $r = .679$, $p < .001$) and roundness ($r = .653$, $p < .001$) in nonsense words. There was near-perfect application of vowel harmony in words with harmonic rightmost vowels and less than perfect application in words with neutral rightmost vowels. The following chart shows the application of vowel harmony with nonsense words in all three groups:

Figure 13


Backness harmony (suffix V [+back]): Nonsense words
100%
75%
50%
25%
0%
r=.679, p<.001
exp.
obs.
bahul
rilłak
alba:nk
sonyor
te:szkocs
udmisz
fompe:t
kuempig
oerne:
obboeld
krenisz
uegmuet
bile:z
metes
oentboen
pe:rcse

2.5 Discussion

The results showed that it was possible to attribute differences to the three speaker groups. As predicted, the group born in Canada deviated most from the standard and the group in Canada for less than five years deviated least. As in previous studies, rounding harmony appeared to be less stable than backness harmony. The overapplication of the front unrounded vowel instead of the front rounded occurred more than the overapplication of the front rounded vowel. With the doublets, participants tended to prefer one form over another. With the exception of the doublets with the ablative suffix, the front suffix was clearly preferred. In the case of the doublets with the ablative, this was the only case in which the front vowel was rounded rather than rounded. It may be that front rounded vowels in doublets are selected less frequently than front unrounded, but more research is needed to draw conclusions. The deletion of the suffix vowel in neutral vowel roots was not predicted and was therefore an unexpected result. As in previous studies, the neutral vowels appeared to have different degrees of neutrality. This was particulary evident in the doublets. As in previous studies, it appeared that the neutral vowels tended to be transparent when they were not in the final syllable of the root. The nonsense words patterned differently from real words. In the nonsense words, the neutral vowels patterned more as harmonic front vowels than they did in real words. This may indicate that in unfamiliar words participants tend to treat neutral vowels as harmonic front.

CHAPTER 3

CONCLUSION

Vowel harmony in Hungarian is systematic and its domain is the morphological word. The first vowel of the root usually spreads harmony but in loanwords it is the final vowel of the root and in doublets there are two lexical forms, one with a back suffix vowel and the other a front suffix vowel. The neutral vowels are front unrounded vowels which can combine with both front and back vowels. However, they are not equally neutral: Ringen and Kontra's 1986 study showed that in mixed harmony roots, roots consisting of back vowels followed by a front unrounded vowel, the roots with *e* in the final syllable resulted in the highest number of front suffix vowels followed by *é* and then *i* and *í*. Therefore, we can construct a neutrality scale and clasify *i* and *í* as the most neutral vowels followed by *é* and *e*.

The Hungarian language has two types of vowel harmony, backness and rounding. Utasi-McRobbie's study showed that in cases of imperfect language performance, backness harmony occurred where rounding harmony did not. Though there were cases where participants applied a front rounded vowel instead of a front unrounded one, such cases were rare. The opposite, the overapplication of a front unrounded vowel instead of a rounded one, was much more common. Thus we can conclude that backness harmony is more extensive and stable than rounding harmony, and that rounding harmony appears to be a sub-rule of backness harmony and that in those cases in which rounding harmony does not occur we have a process of language change.

In my experiment on vowel harmony, I recorded Hungarian speakers living in Vancouver for the purpose of comparing the results of the sociolinguistic experiment with the literature. It was discovered that participants divided into three speaker groups applied vowel harmony differently. The first group consisted of Hungarian speakers born in Canada, the second of Hungarian speakers who had been in Canada for under 5 years, and the third of Hungarian speakers who had been in Canada for over 20 years. The responses of the first group deviated the most from the standard and the responses of the

second were usually closest to the standard. The responses of the second and third groups were similar; the responses of the first group varied the most from the other groups. For example, with toponyms which combined with the inessive suffix *-ban/-ben*, the first group favoured the front suffix variant *-ben* in the majority of instances but the second and third groups favoured the back suffix variant *-ban*.

I performed a chi-square test to determine statistical significance in the selection of suffix variants in the three groups. The limitations of the test were that there were only three speakers in the first group and two speakers in the second. Nevertheless, the test determined that there was statistical significance in the toponyms, real words, neutral vowel roots and doublets at the .05 level but no statistical significance in the nonsense words or the doublets.

In a few cases, Hungarian toponyms consisting solely of front unrounded vowels, i.e. 'Viss', 'Rédics', combined with back suffix vowels. This was probably due to the status of the front unrounded vowels as neutral vowels which can combine with both front and back vowels. In those cases where the front unrounded roots combined with back suffix vowels, they behaved as neutral vowel roots.

In the comparison of nonsense words with real words, more unanimous responses were recorded with the real words. Backness harmony was shown to be more stable than rounding harmony because in many cases, a front unrounded suffix vowel was recorded instead of a front rounded one. The opposite, a front rounded suffix vowel recorded instead of a front unrounded one, occurred in relatively few cases.

With the neutral vowel roots to which participants attached the accusative suffix, the majority used back suffix vowels consistently, but in a few instances, front suffix vowels were recorded. More common, however, was the deletion of the suffix vowel, a process which I had not expected. This can be considered a case of language change.

Participants consisently chose the back suffix variant *-tok* with the neutral vowel root verbs. The one verb which was an exception was 'visít', a verb which was probably unfamiliar to many. In this case, the front variant *-tek* was recorded in many instances. It was with the front rounded verbs that there was more variation. In a significant number of cases involving front rounded verbs, the front unrounded *-tek* was recorded,

indicating that rounding harmony is less stable and less extensive than backness harmony.

With the doublets, it was clear that those with *e* in the final syllable triggered the most front suffix vowels, followed by *é* and then *i* and *í*. This confirmed the results of Ringen and Kontra's 1986 study. In most cases, the choice of suffix vowel did not appear random. Most participants clearly exhibited a preference for one form over another. In a few cases, the front and back suffix variants were very evenly distributed, but with doublets that had *e* in the final root, the front variant was always selected by the majority. It was unclear whether participants' responses were influenced by the underlying form of a suffix. In the case of the ablative suffix *-ról/-ről* used with the second group of doublets, the underlying *-ról* was recorded in 261 out of 450 cases, a percentage of 58%. Perhaps the underlying form of a suffix influences the choice of suffix vowel, but more research is needed to determine this.

My experiment provided evidence for the neutrality scale which classifies the neutral vowels from least neutral to most neutral. It was shown that in mixed roots the vowel *e* consistently triggers the highest number of front suffix vowels. Therefore, we can classify this vowel as the most harmonic front and the least neutral. The vowels *i* and *í* trigger the fewest front suffix vowels; thus, they are the least harmonic front and the most neutral.

The results of my experiment showed evidence for the neutrality scale of the neutral vowels, the different applications of vowel harmony by the three speaker groups and cases of language change. This was evident by:

1) the selection of front/back variants in doublets which corresponded to the neutrality of the neutral vowels,
2) the selection of the inessive suffix variants *-ban/-ben* by the three speaker groups,
3) the loss of rounding harmony in the suffix,
4) the use of front suffix vowels with the neutral vowel roots,
5) the use of mid suffix vowels with the lowering roots,
6) the deletion of suffix vowels.

To determine the neutrality of the neutral vowels, we can compare the frequency of the ablative front variant *-ről* in the doublets following *i* in *aszpirin* 'aspirin', following *é* in *klarinét* 'clarinet' and *affér* 'quarrel', and following *e* in *dzsungel* 'jungle' and *zsáner* 'genre'.

Table 22

Neutrality of Neutral Vowels

Doublets	% of front variant
aszpirin	36.7%
klarinét	44.4%
affér	48.9%
zsáner	57.8%
dzsungel	62.2%

These results provide strong evidence for the neutrality scale which classifies *i* as the most neutral vowel and *e* as the least neutral.

The selection of the inessive suffix variants *-ban/-ben* with toponyms varied in the three speaker groups.

Table 23

Selection of Inessive Suffix Variants

Suffix Variants	Group 1	Group 2	Group 3
-ban	42%	54.9%	52.9%
-ben	58%	45.1%	47.1%

From the results it is clear that the second and third groups preferred the back suffix variant and the first group preferred the front suffix variant. The responses of the second and third groups in all categories tended to be similar and the responses of the first group tended to vary significantly. Since the second and third groups consisted of native Hungarian speakers born in Europe, and the first group consisted of Hungarian speakers born in Canada, this pattern was expected.

To test the loss of rounding harmony we can compare the results of roots in category two with the ablative suffix variant *-hoz/-hez/-höz.*

Table 24

Loss of Rounding Harmony

Variants	Standard	Group 1	Group 2	Group 3
-hoz	16.7%	22.8% (+6.1%)	16.7% (0%)	17.2% (+.5%)
-hez	33.3%	43.2% (+9.9%)	34.2% (+.9%)	32.7% (-.6%)
-höz	50%	34% (-16%)	49% (-1%)	50.1% (+.1%)

The responses of the second and third groups were very close to the standard. The first group, however, by overapplying the front unrounded variant *-hez* and underapplying the front rounded variant *-höz*, clearly exhibited a loss of rounding harmony.

In the neutral vowel roots we can test language change by determining the frequency of front variants. Since the neutral vowel roots combine with back variants, all responses with front variants were non-standard.

Table 25

Front Suffix Vowels with Neutral Vowel Roots

Group 1	20.4%
Group 2	0%
Group 3	2.4%

The first group recorded a significantly higher number of front suffix variants than the other two groups, deviating most from the standard and providing clear evidence of language change.

Of the neutral vowel roots, 50% were also lowering roots and therefore required low back suffix vowels. As a result, all responses which combined the lowering roots with mid suffix vowels were non-standard.

Table 26

Mid Suffix Vowels with Lowering Roots

Variants	Standard	Group 1	Group 2	Group 3
-at	50%	14.8% (-35.2%)	44.4% (-5.2%)	42.9% (-7.1%)
-ot	50%	55.6% (+5.6%)	50%	48.7% (-1.3%)

The results indicate that the first group underapplied the low vowel and overapplied the mid vowel, a clear case of language change. The responses of the second and third groups were both close to the standard, but the third group underapplied the low vowel more than the second group, and also underapplied the mid vowel.

Another case of language change is the deletion of suffix vowels which occurred with the neutral vowel roots. All responses which deleted suffix vowels in neutral roots were non-standard. This is illustrated by the following table:

Table 27

Suffix Vowel Deletion in Neutral Vowel Roots

Group 1	9.2%
Group 2	5.6%
Group 3	4%

As in previous cases, the first group best exhibited language change in progress and therefore the greatest deviation from the standard. This deviation in the first group, a group consisting of participants born in Canada, can be attributed to language attrition. In the second and third groups, the responses did not deviate significantly from the standard. Though the participants of the third group had been in Canada longer than those of the second group, their responses were similar and in certain cases were closest to the standard. The selection of inessive suffix variants by the three speaker groups reflected the overall pattern of the three groups: the responses of the first group deviated the most of the three groups and the responses of the second and third groups were similar.

In the experiment it was shown that of the two types of vowel harmony, backness harmony and rounding harmony, backness harmony is the more extensive and stable of the two. There were many instances in which a front unrounded vowel was applied instead of a front rounded one, but relatively few in which a front rounded vowel was applied instead of a front unrounded one.

In the case of the neutral vowel roots, a limited set of roots consisting of front vowels which combine with back suffix vowels, a number of participants applied front vowels in the suffix. The reverse, the application of a back suffix vowel to a root with harmonic front vowels, was not as common but also occurred. For example, the back adessive variant *-on* was suffixed to the Hungarian toponyms 'Rédics' and 'Viss' in 3.3% and 10% of cases. We can compare this to the neutral vowel root *héj* 'bark' in

which the front accusative variant *-et* was suffixed in 20% of cases rather than the expected back variant *-at*. A number of participants deleted the suffix vowel of the neutral vowel roots and applied the accusative suffix *-t*. In these cases, the process of suffix deletion was applied. In the neutral vowel root *nyíl* 'arrow' *-t* was the response in 12.2% of cases. With the lowering roots *díj* 'prize' and *nyíl* 'arrow', participants applied a mid suffix vowel rather than the expected low vowel in 3.3% of cases.

The experiment on Hungarian vowel harmony exhibited differences in the responses of the three speaker groups: the first group clearly deviated the most from the standard. It was also this group which recorded the greatest loss of rounding harmony. The participants' responses were affected by the following processes: the loss of rounding harmony, the application of front suffix vowels with the neutral vowel roots, the application of mid suffix vowels with the lowering roots, and the deletion of suffix vowels in the neutral vowel roots. Based on these results, I propose that this is evidence of language change in progress.

3.1 Summary

The sociolinguistic experiment on Hungarian vowel harmony leaves many questions for further research. These can be listed as follows:

1) Why do the neutral vowels have different degrees of neutrality?
2) What is the significance of the count effect on the selection of suffix vowel?
3) Is the selection of suffix vowel in doublets random?
4) What is the role of stress in Hungarian vowel harmony?
5) Why is backness harmony more stable than rounding harmony?
6) Do neutral vowels pattern more as harmonic front vowels in unfamiliar words than in familiar words?

It was determined that there is a neutrality scale for the neutral vowels which classifies the high front unrounded *i* as the most neutral vowel followed by the mid front unrounded *é* and the low front unrounded *e*. This was observed in Kontra and Ringen's experiment (1986) as well as in mine. I clearly noticed this pattern in participants'

responses with doublets. Nevertheless, it is not clear why the neutral vowels have different degrees of neutrality. This remains a goal of future research.

Count effect appeared to have a significance on the selection of suffix vowel in certain cases but not in others. For example, participants suffixed the inessive back variant *–ban* to 'Saskatchewan' in 100% of cases. 'Saskatchewan', a root with three back vowels and one front vowel appears to be a good example of a root in which the higher ratio of back vowels to front vowels influenced the selection of suffix vowel. However, in the root 'Massachusetts', though there are three back vowels to one front vowel, the front suffix variant *–ben* was chosen in 64.4% of cases. The preference for the front suffix variant may also be due to its position in the final syllable of the root. Determining the significance of the count effect and the significance of the neutral vowel in the final syllable of the root also remain goals of future research.

With the doublets it appeared that the choice of suffix vowel was not random. Participants seemed to exhibit a clear preference for one vowel over another. However, with the ablative variants participants selected both the front and back vowel variants in 50% of cases. Since the ablative front vowel variant contains a front rounded vowel, it could be that when the front vowel variant is a rounded vowel, there is a tendency to apply it less frequently than when it is a front unrounded vowel. More research is needed to clarify this. Nevertheless, an experiment with a larger number of participants and more doublets would clarify the randomness of suffix choice with the doublets.

With the doublet *Ágnes* participants selected the front dative variant *–nek* in 73.3% of cases but with the doublet *József* they selected the same variant in 88.9% of cases. Though both doublets consist of a back vowel followed by the low front unrounded *e,* there was a significant difference in the selection of suffix vowel. This may indicate that certain back vowels in the root trigger a back vowel in the suffix more frequently than other back vowels. This also remains a goal of further research.

Further research could also help to clarify the reason one suffix vowel is favoured over another. For example, it may be the case that with a doublet such as 'József', participants who choose the front dative suffix variant *–nek* have a strong tendency to treat the neutral vowel *e* as a harmonic front vowel and may also have a tendency to spread vowel harmony from the final vowel of the root to the suffix. Likewise, it may be

the case that for participants who choose the back dative suffix variant *-nak* they have a strong tendency to treat the neutral vowel *e* as a transparent vowel and may also have a tendency to favour back vowels over front vowels in vowel harmony. Participants favoured back vowels over front vowels in their selection of suffix vowels with international toponyms; therefore, there may be a preference for the back vowel over the front vowel.

Stress may play a role in vowel harmony but I did not analyze this in my experiment. Nevertheless, an experiment which compared suffix vowels of roots with stressed front vowels and stressed back vowels could provide data to support or counter the view that stress is important in vowel harmony.

Rounding harmony appears to be far less stable and less extensive than backness harmony because participants were much likelier to apply backness harmony than rounding. This could be due to the markedness of the front rounded vowels but further research would further clarify the reason backness harmony is more stable.

The responses recorded with nonsense words exhibited a tendency to treat the neutral vowels as harmonic front vowels more often than was the case with real words. Thus, it may be the case that the neutral vowels pattern more as harmonic front vowels in unfamiliar words than they do in familiar words. Further research is necessary to clarify the issues listed here. Goals of future research include clarifying the reason the neutral vowels have different degrees of neutrality, examining the significance of the count effect, determining if the neutral vowels pattern more as front harmonic vowels in unfamiliar words than familiar words and exploring whether for the purposes of vowel harmony the back vowels are less marked than the front vowels.

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APPENDIX A

ETHICS APPROVAL

SIMON FRASER UNIVERSITY

OFFICE OF RESEARCH ETHICS

BURNABY, BRITISH COLUMBIA
CANADA V5A 1S6
Telephone: 604- 291-4370
FAX: 604-291-4860

October 7, 2004

Dr. Les Zsoldos
Department of Linguistics
Simon Fraser University

Dear Dr. Zsoldos:

Re: Vowel harmony in the Hungarian community

I am pleased to inform you that the above referenced Request for Ethical Approval of Research has been approved on behalf of the Research Ethics Board. This approval is in effect until the end date October 7, 2008, or for the term of your faculty appointment at SFU, whichever comes first. Any changes in the procedures affecting interaction with human subjects should be reported to the Research Ethics Board. Significant changes will require the submission of a revised Request for Ethical Approval of Research.

Your application has been categorized as 'minimal risk" and approved by the Director, Office of Research Ethics, on behalf of the Research Ethics Board in accordance with University policy R20.0, http://www.sfu.ca/policies/research/r20-01.htm. The Board reviews and may amend decisions or subsequent amendments made independently by the Director, Chair or Deputy Chair at its regular monthly meetings.

"Minimal risk" occurs when potential subjects can reasonably be expected to regard the probability and magnitude of possible harms incurred by participating in the research to be no greater than those encountered by the subject in those aspects of his or her everyday life that relate to the research.

.../2

Please note that it is the responsibility of the researcher, or the responsibility of the Student Supervisor if the researcher is a graduate student or undergraduate student, to maintain written or other forms of documented consent for a period of 1 year after the research has been completed.

Best wishes for success in this research.

Sincerely,

Dr. Hal Weinberg, Director
Office of Research Ethics

c: Dr. Zita McRobbie, Supervisor

/jmy

APPENDIX B

INFORMATION FORM

1. What is your name?

2. Where were you born?

3. How long have you been in Canada?

4. How often do you speak Hungarian?

5. What is your age group?

19-29

30-39

40-49

50-59

60-69

70-79

80-89

APPENDIX C

What is your age group?

19-29 (2)
30-39 (1)
40-49 (1)
50-59 (4)
60-69 (14)
70-79 (7)
80-89 (1)

How often do you speak Hungarian?

daily	(22)
occasionally	(2)
seldom	(6)

How long have you been in Canada?

approximately 6 months	(1)
approximately 4 years	(1)
approximately 25 years	(2)
approximately 30 years	(2)
approximately 35 years	(1)
approximately 40 years	(5)
approximately 45 years	(2)
approximately 50 years	(12)
approximately 55 years	(1)

APPENDIX D

Where were you born?

Hungary	(20)
Romania	(3)
Serbia	(2)
Slovenia	(1)
Slovakia	(1)
Canada	(3)

Where in Hungary were you born?

Budapest	(7)
Western Hungary	(6)
Eastern Hungary	(7)

APPENDIX E

Carrier Sentences of Sociolinguistic Experiment

Category 1 Toponyms

Péter Sopronban lakik.	Peter lives in Sopron.
Péter Egerben lakik.	Peter lives in Eger.
Péter Szegeden lakik.	Peter lives in Szeged.
Péter Sárospatakon lakik.	Peter lives in Sárospatak.
Péter Fertődön lakik.	Peter lives in Fertőd.

Categories 2 and 3 Nonsense Words and Real Words

Vidd a szekrényhez.	Take it to the wardrobe.
Vidd az asztalhoz.	Take it to the table.
Vidd a tetőhöz.	Take it to the roof.

Category 4 Neutral Vowel Roots

ablak	'window'	Nem látom az ablakot.	I don't see the window.
kert	'garden'	Nem látom a kertet.	I don't see the garden.

Category 5 Verbs

beszél	'speak'	Beszéltek.	You (2pl) are speaking.
ír	'write'	Írtok.	You (2pl.) are writing.
repül	'fly'	Repültök.	You (2pl.) are flying.

Category 6 Doublets

First Group Dative Suffix

Kinek adta? Andrásnak		Who did he/she give it to?	To Andrew.
Kinek adta? Péternek.		Who did he/she give it to?	To Peter.

Second Group **Ablative Suffix**

Miről beszél?	A házról	What is he/she talking about?	About the house.
Miről beszél?	A névről.	What is he/she talking about?	About the name.

Third Group **Instrumental Suffix**

ásványvíz	'mineral water'
Az ásványvízzel kérem.	I'd like it with the mineral water.
ágy	'bed'
Az ággyal kérem.	I'd like it with the bed.

Fourth Group **Adverbial Suffix**

Hogyan csinálta?	Szépen	How did he/she do it?	Beautifully.
Hogyan csinálta?	Gyorsan.	How did he/she do it?	Quickly.

APPENDIX F

Results by Group

Hungarian Toponyms

Börcs	Group 1	-ben 77.8%		-ban 22.2%
Börcs	Group 2		-ön 100%	
Börcs	Group 3	-ben 57.3%	-ön 42.7%	
Budapest	Group 1	-en/-ben 100%		
Budapest	Group 2	-en 100%		
Budapest	Group 3	-en/ben 100%		
Bükk	Group 1	-ben 100%		
Bükk	Group 2	-ben 16.7%	-ön 83.3%	
Bükk	Group 3	-ben 76%	-ön 24%	
Celldömölk	Group 1	-ben 55.5%	-ön 44.4%	
Celldömölk	Group 2		-ön 100%	
Celldömölk	Group 3	-ben 21.3%	-ön 78.7%	
Esztergom	Group 1			-on/-ban 100%
Esztergom	Group 2			-ban 100%
Esztergom	Group 3			-on/-ban 100%
Füred	Group 1	-en/ben 100%		
Füred	Group 2	-en 100%		
Füred	Group 3	-en/-ben 100%		
Gyöngyös	Group 1	-en/-ben 55.5%	-ön 44.4%	
Gyöngyös	Group 2		-ön 100%	
Gyöngyös	Group 3	-ben 12%	-ön 88%	
Győr	Group 1	-ben 100%		
Győr	Group 2	-ben 50%	-ön 50%	
Győr	Group 3	-ben/-et 70.7%	-ön/-ött 29.3%	
Kömpöc	Group 1	-ben 100%		
Kömpöc	Group 2		-ön 100%	
Kömpöc	Group 3	-en/-ben 32%	-ön 68%	
Meződ	Group 1	-ben 100%		
Meződ	Group 2		-ön 100%	
Meződ	Group 3	-ben 20%	-ön 80%	
Miskolc	Group 1			-on/-ban 100%
Miskolc	Group 2			-on 100%
Miskolc	Group 3			-on/-ban 100%
Nyőgér	Group 1	-en/-ben 100%		
Nyőgér	Group 2	-en/-ben 100%		
Nyőgér	Group 3	-en/-ben 100%		
Pély	Group 1	-en/-ben 100%		
Pély	Group 2	-en/-ben 100%		
Pély	Group 3	-en/-ben 93%		

Rédics	Group 1	-en/-ben 100%		
Rédics	Group 2	-en 100%		
Rédics	Group 3	-en/-ben 94.7%		-on 5.3%
Sümeg	Group 1	-en/-ben 100%		
Sümeg	Group 2	-en 100%		
Sümeg	Group 3	-en/-ben 100%		
Szűr	Group 1	-ben 77.7%		-ban 22.2%
Szűr	Group 2	-ben 16.7%	-ön 83.3%	
Szűr	Group 3	-en/ben 68%	-ön 30.7%	-ban 1.3%
Tengőd	Group 1	-ben 100%		
Tengőd	Group 2		-ön 100%	
Tengőd	Group 3	-ben 22.7%	-ön 76%	-ban 1.3%
Üllés	Group 1	-en/-ben 100%		
Üllés	Group 2	-en 100%		
Üllés	Group 3	-en/-ben 100%		
Viss	Group 1	-ben 88.8%		-ban 11.1%
Viss	Group 2	-en 100%		
Viss	Group 3	-en/-ben 80%		-on/-ban 20%
Zirc	Group 1	-ben 88.8%		-ban 11.1%
Zirc	Group 2	-en/-ben 100%		
Zirc	Group 3	-en/-ben 94.7%		-on 5.3%

International Toponyms

Athén	Group 1	-ben 11.1%	-ban 88.8%
Athén	Group 2	-ben 33.3%	-ban 66.7%
Athén	Group 3	-ben 54.7%	-ban 45.3%
Bukarest	Group 1	-en/-ben 100%	
Bukarest	Group 2	-en/-ben 100%	
Bukarest	Group 3	-en/ben 100%	
Göteborg	Group 1	-ben 100%	
Göteborg	Group 2		-ban 100%
Göteborg	Group 3	-ben 29.3%	-on/-ban 70.7%
Jeruzsálem	Group 1	-ben 77.7%	-ban 22.2%
Jeruzsálem	Group 2	-ben 100%	
Jeruzsálem	Group 3	-ben 80%	-ban 20%

Kobe	Group 1	-ben 66.6%	-ban 11.1%
Kobe	Group 2	-ben 100%	
Kobe	Group 3	-ben 30%	-ban 45.3%
Lima	Group 1		-ban 100%
Lima	Group 2		-ban 100%
Lima	Group 3		-ban 97.3%
Madrid	Group 1	-ben 11.1%	-ban 88.8%
Madrid	Group 2		-ban 100%
Madrid	Group 3		-ban 100%
Párizs	Group 1		-ban 100%
Párizs	Group 2		-ban 100%
Párizs	Group 3		-ban 100%
Szöul	Group 1	-ben 11.1%	-ban 88.8%
Szöul	Group 2		-ban 100%
Szöul	Group 3	-ben 16%	-on/-ban 84%
Tallinn	Group 1	-ben 22.2%	-ban 77.7%
Tallinn	Group 2		-ban 100%
Tallinn	Group 3	-ben 6.7%	-on/-ban 93.3%
Taskent	Group 1	-ben 66.6%	-ban 33.3%
Taskent	Group 2	-ben 16.7%	-ban 83.3%
Taskent	Group 3	-ben 73.3%	-on/-ban 26.7%
Tel Aviv	Group 1	-ben 55.5%	-ban 44.4%
Tel Aviv	Group 2		-ban 100%
Tel Aviv	Group 3	-ben 24%	-on/-ban 76%

North American Toponyms

Alberni	Group 1	-ben 88.8%	-ban 11.1%
Alberni	Group 2	-ben 100%	
Alberni	Group 3	-ben 78.7%	-ban 21.3%
Burnaby	Group 1	-ben 66.6%	-ban 33.3%
Burnaby	Group 2	-ben 83.3%	-ban 16.7%
Burnaby	Group 3	-ben 61.3%	-ban 38.7%
Calgary	Group 1		-ban 100%
Calgary	Group 2	-ben 66.6%	-ban 33.3%
Calgary	Group 3		-ban 100%
Coquitlam	Group 1		-ban 100%
Coquitlam	Group 2	-ben 50%	-ban 50%
Coquitlam	Group 3	-ben 2.7%	-ban 97.3%
Delta	Group 1		-ban 100%
Delta	Group 2		-ban 100%
Delta	Group 3		-ban 100%
Langley	Group 1	-ben 100%	
Langley	Group 2	-ben 100%	
Langley	Group 3	-ben 96%	-ban 4%
Los Angeles	Group 1	-ben 88.8%	-ban 11.1%
Los Angeles	Group 2	-ben 100%	
Los Angeles	Group 3	-ben 86.7%	-ban 13.3%
Maple Ridge	Group 1	-en/-ben 100%	
Maple Ridge	Group 2	-en/-ben 100%	
Maple Ridge	Group 3	-en/-ben 97.3%	-on 2.7%
Massachusetts	Group 1	-ben 88.8%	-ban 11.1%
Massachusetts	Group 2	-ben 66.6%	-ban 33.3%
Massachusetts	Group 3	-ben 70.7%	-ban 29.3%
Montreál	Group 1		-ban 100%
Montreál	Group 2		-ban 100%
Montreál	Group 3		-ban 100%

New Brunswick	Group 1	-ben 88.8%	-ban 11.1%
New Brunswick	Group 2	-ben 66.6%	-ban 33.3%
New Brunswick	Group 3	-ben 17.3%	-on/-ban 82.7%
New Hampshire	Group 1	-ben 55.5%	-ban 44.4%
New Hampshire	Group 2	-ben 100%	
New Hampshire	Group 3	-ben 17.3%	-on/-ban 82.7%
Saskatchewan	Group 1		-ban 100%
Saskatchewan	Group 2		-ban 100%
Saskatchewan	Group 3		-ban 100%
Seattle	Group 1	-ben 33.3%	-ban 66.6%
Seattle	Group 2	-ben 100%	
Seattle	Group 3	-ben 25.3%	-ban 74.7%
Squamish	Group 1	-ben 11.1%	-ban 88.8%
Squamish	Group 2	-ben 50%	-ban 50%
Squamish	Group 3	-ben 4%	-on/-ban 96%
Surrey	Group 1	-ben 100%	
Surrey	Group 2	-ben 100%	
Surrey	Group 3	-ben 100%	
Texas	Group 1		-ban 100%
Texas	Group 2		-ban 100%
Texas	Group 3		-on/-ban 100%
Vancouver	Group 1	-ben 44.4%	-ban 55.5%
Vancouver	Group 2	-ben 100%	
Vancouver	Group 3	-ben 70.7%	-ban 29.3%
Vermont	Group 1		-on/-ban 100%
Vermont	Group 2		-ban 100%
Vermont	Group 3	-ben 1.3%	-on/-ban 98.7%
Windsor	Group 1	-ben 11.1%	-ban 88.8%
Windsor	Group 2		-on/-ban 100%
Windsor	Group 3	-ben 2.7%	-on/-ban 97.3%

Nonsense Words

albánk	Group 1			-hoz 100%
albánk	Group 2			-hoz 100%
albánk	Group 3	-hez 2.7%	-höz 1.3%	-hoz 96%
bahul	Group 1			-hoz 100%
bahul	Group 2			-hoz 100%
bahul	Group 3	-hez 2.7%		-hoz 97.3%
biléz	Group 1	-hez 66.6%	-höz 22.2%	-hoz 11.1%
biléz	Group 2	-hez 100%		
biléz	Group 3	-hez 97.4%	-höz 1.3%	-hoz 1.3%
fompét	Group 1	-hez 100%		
fompét	Group 2	-hez 33.3%		-hoz 66.6%
fompét	Group 3	-hez 72%	-höz 2.7%	-hoz 25.3%
krenisz	Group 1	-hez 66.6%	-höz 11.1%	-hoz 22.2%
krenisz	Group 2	-hez 100%		
krenisz	Group 3	-hez 96%		-hoz 4%
kümpig	Group 1	-hez 77.7%		-hoz 22.2%
kümpig	Group 2	-hez 100%		
kümpig	Group 3	-hez 80%	-höz 8%	-hoz 12%
metes	Group 1	-hez 88.8%		-hoz 11.1%
metes	Group 2	-hez 100%		
metes	Group 3	-hez 92%	-höz 6.7%	-hoz 1.3%
obböld	Group 1	-hez 22.2%	-höz 44.4%	-hoz 33.3%
obböld	Group 2		-höz 50%	-hoz 50%
obböld	Group 3	-hez 6.7%	-höz 77.3%	-hoz 16.7%
öntbön	Group 1	-hez 44.4%	-höz 55.5%	
öntbön	Group 2		-höz 100%	
öntbön	Group 3	-hez 12%	-höz 82.7%	-hoz 5.3%
örné	Group 1	-hez 100%		
örné	Group 2	-hez 83.3%		-hoz 16.7%
örné	Group 3	-hez 82.7%	-höz 6.7%	-hoz 10.7%

pércse	Group 1	-hez 100%	-höz 2.2%	-hoz 2.2%
pércse	Group 2	-hez 100%		
pércse	Group 3	-hez 94.6%	-höz 2.7%	-hoz 2.7%
riltak	Group 1			-hoz 100%
riltak	Group 2			-hoz 100%
riltak	Group 3	-hez 1.3%	-höz 1.3%	-hoz 97.4%
sonyor	Group 1	-hez 11.1%		-hoz 88.8%
sonyor	Group 2			-hoz 100%
sonyor	Group 3	-hez 2.7%	-höz 1.3%	-hoz 96%
tészkocs	Group 1		-höz 22.2%	-hoz 77.7%
tészkocs	Group 2			-hoz 100%
tészkocs	Group 3	-hez 1.3%	-höz 2.7%	-hoz 96%
udmisz	Group 1	-hez 66.7%		-hoz 33.3%
udmisz	Group 2	-hez 16.7%		-hoz 83.3%
udmisz	Group 3	-hez 53.4%	-höz 1.3%	-hoz 45.3%
ügmüt	Group 1	-hez 55.5%	-höz 44.4%	
ügmüt	Group 2		-höz 100%	
ügmüt	Group 3	-hez 18.7%	-höz 66.7%	-hoz 14.7%

Real Words

állomás	Group 1			-hoz 100%
állomás	Group 2			-hoz 100%
állomás	Group 3		-höz 2.7%	-hoz 97.3%
asztal	Group 1			-hoz 100%
asztal	Group 2			-hoz 100%
asztal	Group 3			-hoz 100%
bolt	Group 1	-hez 11.1%	-höz 11.1%	-hoz 77.7%
bolt	Group 2			-hoz 100%
bolt	Group 3		-höz 1.3%	-hoz 98.7%
bölcső	Group 1		-höz 100%	
bölcső	Group 2		-höz 100%	
bölcső	Group 3	-hez 1.3%	-höz 97.3%	-hoz 1.3%
épület	Group 1	-hez 100%		
épület	Group 2	-hez 100%		
épület	Group 3	-hez 89.3%	-höz 9.3%	-hoz 1.3%
étterem	Group 1	-hez 100%		
étterem	Group 2	-hez 100%		
étterem	Group 3	-hez 96%		-höz 4%
föld	Group 1	-hez 33.3%	-höz 66.7%	
föld	Group 2		-höz 100%	
föld	Group 3		-höz 100%	
fű	Group 1	-hez 33.3%	-höz 44.4%	-hoz 22.2%
fű	Group 2		-höz 100%	
fű	Group 3	-hez 1.3%	-höz 97.3%	-hoz 1.3%
fül	Group 1	-hez 66.6%	-höz 33.3%	
fül	Group 2	-hez 16.6%	-höz 83.3%	
fül	Group 3	-hez 10.7%	-höz 86.7%	-hoz 2.7%
hegy	Group 1	-hez 100%		
hegy	Group 2	-hez 100%		
hegy	Group 3	-hez 92%	-höz 8%	
hűtő	Group 1		-höz 88.8%	-hoz 11.1%
hűtő	Group 2		-höz 100%	
hűtő	Group 3	-hez 1.3%	-höz 96%	-hoz 2.7%
kő	Group 1	-hez 22.2%	-höz 66.6%	-hoz 11.1%
kő	Group 2		-höz 100%	
kő	Group 3		-höz 98.7%	-hoz 1.3%
követ	Group 1	-hez 66.7%	-höz 22.2%	-hoz 11.1%
követ	Group 2	-hez 100%		
követ	Group 3	-hez 89.3%	-höz 10.7%	
őr	Group 1		-höz 44.4%	-hoz 55.5%
őr	Group 2		-höz 100%	
őr	Group 3	-hez 1.3%	-höz 98.7%	
szék	Group 1	-hez 100%		
szék	Group 2	-hez 100%		
szék	Group 3	-hez 98.7%	-höz 1.3%	

szög	Group 1	-hez 33.3%	-höz 44.4%	-hoz 22.2%
szög	Group 2		-höz 100%	
szög	Group 3	-hez 9.3%	-höz 90.7%	
tükör	Group 1	-hez 11.1%	-höz 88.8%	
tükör	Group 2		-höz 100%	
tükör	Group 3	-hez 1.3%	-höz 97.4%	-hoz 1.3%
üzem	Group 1	-hez 100%		
üzem	Group 2	-hez 100%		
üzem	Group 3	-hez 96%	-höz 4%	

Neutral Vowel Roots

díj	Group 1	-t 11.1%			-at 55.5%	-ot 33.3%
díj	Group 2				-at 100%	
díj	Group 3	-t 6.7%			-at 93.3%	
gyík	Group 1		-et 22.2%			-ot 77.7%
gyík	Group 2					-ot 100%
gyík	Group 3		-et 1.3%			-ot 98.7%
héj	Group 1	-t 11.1%	-et 88.8%			
héj	Group 2	-t 16.7%			-at 83.3%	
héj	Group 3	-t 8%	-et 13.3%	-át 12%	-at 65.3%	-ot 1.3%
izom	Group 1					-ot 100%
izom	Group 2					-ot 100%
izom	Group 3				-at 1.3%	-ot 98.7%
nyíl	Group 1	-t 33.3%	-et 11.1%		-at 33.3%	-ot 22.2%
nyíl	Group 2	-t 16.7%			-at 83.3%	
nyíl	Group 3	-t 9.3%			-at 90.7%	
titok	Group 1					-ot 100%
titok	Group 2					-ot 100%
titok	Group 3				-at 6.7%	-ot 93.3%

Verbs

bír	Group 1			-tok 100%
bír	Group 2			-tok 100%
bír	Group 3			-tok 100%
főz	Group 1	-tek 33.3%	-tök 66.6%	
főz	Group 2		-tök 100%	
főz	Group 3	-tek 8%	-tök 92%	
fütyül	Group 1		**-tök 100%**	
fütyül	Group 2		-tök 100%	
fütyül	Group 3	-tek 6.7%	-tök 93.3%	
indul	Group 1			-tok 100%
indul	Group 2			-tok 100%
indul	Group 3			-tok 100%
iszik	Group 1			-tok 100%
iszik	Group 2			-tok 100%
iszik	Group 3			-tok 100%
köhög	Group 1	-tek 22.2%	-tök 77.7%	
köhög	Group 2		-tök 100%	
köhög	Group 3	-tek 8%	-tök 92%	
nyög	Group 1		-tök 88.8%	-tok 11.1%
nyög	Group 2		-tök 100%	
nyög	Group 3	-tek 4%	-tök 96%	
söpör	Group 1	-tek 11.1%	-tök 88.8%	
söpör	Group 2		-tök 100%	
söpör	Group 3	-tek 10.7%	-tök 89.3%	
vidul	Group 1		-tök 22.2%	-tok 77.7%
vidul	Group 2			-tok 100%
vidul	Group 3		-tök 2.7%	-tok 97.3%
visít	Group 1	-tek 77.7%		-tok 22.2%
visít	Group 2			-tok 100%
visít	Group 3	-tek 22.7%	-tök 1.3%	-tok 76%

Doublets

Ágnes	Group 1	-nek 66.6%	-nak 33.3%
Ágnes	Group 2	-nek 83.3%	-nak 16.7%
Ágnes	Group 3	-nek 73.3%	-nak 26.7%
hotel	Group 1	-nek 100%	
hotel	Group 2	-nek 100%	
hotel	Group 3	-nek 76%	-nak 24%
József	Group 1	-nek 88.8%	-nak 11.1%
József	Group 2	-nek 100%	
József	Group 3	-nek 88%	-nak 12%
szalamander	Group 1	-nek 88.8%	-nak 11.1%
szalamander	Group 2	-nek 50%	-nak 50%
szalamander	Group 3	-nek 90.7%	-nak 9.3%

affér	Group 1	-ről 55.5%	-ról 44.4%
affér	Group 2		-ról 100%
affér	Group 3	-ről 52%	-ról 48%
aszpirin	Group 1	-ről 33.3%	-ról 66.6%
aszpirin	Group 2	-ről 83.3%	-ról 16.7%
aszpirin	Group 3	-ről 33.3%	-ról 66.7%
dzsungel	Group 1	-ről 77.7%	-ról 22.2%
dzsungel	Group 2	-ről 100%	
dzsungel	Group 3	-ről 57.3%	-ról 42.7%
klarinét	Group 1	-ről 77.7%	-ról 22.2%
klarinét	Group 2		-ról 100%
klarinét	Group 3	-ről 44%	-ról 56%
zsáner	Group 1	-ről 22.2%	-ról 77.7%
zsáner	Group 2	-ről 100%	
zsáner	Group 3	-ről 58.7%	-ról 41.3%

analízis	Group 1	-el 44.4%	-al 55.5%
analízis	Group 2	-el 100%	
analízis	Group 3	-el 64%	-al 36%
balett	Group 1	-el 22.2%	-al 77.7%
balett	Group 2	-el 66.6%	-al 33.3%
balett	Group 3	-el 65.3%	-al 34.7%
bankett	Group 1	-el 66.6%	-al 33.3%
bankett	Group 2	-el 100%	
bankett	Group 3	-el 73.3%	-al 26.7%
fotel	Group 1	-el 100%	
fotel	Group 2	-el 83.3%	-al 16.7%
fotel	Group 3	-el 70.7%	-al 29.3%

aggresszív	Group 1	-en 66.6%	-an 33.3%
aggresszív	Group 2	-en 100%	
aggresszív	Group 3	-en 69.3%	-an 30.7%
konkrét	Group 1	-en 44.4%	-an 55.5%
konkrét	Group 2	-en 33.3%	-an 66.6%
konkrét	Group 3	-en 38.7%	-an 61.3%