Comparative Analysis of Vowel Harmony in Turkish Loanwords and Native Words Using Optimality Theory
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Introduction:

This study utilizes Optimality Theory to analyze and compare patterns of vowel harmony in Turkish loanwords and native words. Optimality Theory is useful for understanding how vowel harmony operates in Turkish loanwords and native words and sheds light on the ways in which linguistic systems adapt to linguistic contact. By comparing the rankings and constraint violations for vowel harmony in loanwords and native words, new insight into how Turkish speakers adapt loanwords to their native grammar can be explored.

In Optimality Theory, certain constraints are more crucial to the grammar of a language. Constraints that are more central to the language are ranked higher and are less likely to be violated, while those that are more peripheral are ranked lower and are therefore more flexible and easily accommodated in loanword phonology. Loanwords, which typically violate more constraints than native words, may require adjustments to the sounds of the word to satisfy the vowel harmony system while still adhering to the constraints of the language. (Smith, 2018).

The objective is to apply Optimality Theory to investigate the variations in vowel harmony between loanwords and native words in Turkish phonology.

Turkish Grammar:

Turkish is a suffixing language known for its vowel harmony. Suffix vowels harmonize with the root for backness. (Clements, 1982).

In Turkish, most words consist of one syllable and words are created only through adding suffixes (up to 12). Native words follow the vowel harmony rules, with the exception of a few that come from verb roots (Charette and Göksel, 1996).

Turkish has eight vowels (1). The front vowels in Turkish (IPA) are [i, y, e, ø] and back vowels are [ɯ, u, a, o] (Clements, 1982). For this analysis, Turkish orthography will be used in examples.

(1) (IPA symbols in brackets)

	[-back]		[+back]	
	[-round]	[+round]	[-round]	[+round]
[+high]	i	ü [y]	ı [ɯ]	u
[-high]	e	ö [ø]	a	o

Data:

Harmony in Native vs. Loanwords

-Backness harmony requires all vowels to be [+back] or all vowels to be [-back].

Turkish has two different patterns for backness vowel harmony:

- Native words use the first vowel of the root as the trigger **(**to initiate harmony**)**, causing all vowels following it to match its value for backness (Kabak, 2011).

- Loanwords can be disharmonic for backness within the root, and suffixes use the root-final vowel as the trigger (Clements, 1982).

Native words:

Tables 2-4 display examples of native words/stems that undergo vowel harmony (Walker 2012):

(2)

Nom.Sg.:	ip	kɪz	son
Gen.pl.:	ip-lʲer-in	kɪz-lar-ɪn	son-lar-ɪn
Gloss	'rope'	'girl'	'end'

i.e. [son-lar-ın] from table (2), the harmony is triggered by the first vowel in the word [+back],

and therefore the suffixes also receive [+back].

Native words with back harmony (Kornfilt, 1997):

(3)

Native words (no affix)	Gloss
g**ü**zel	'beautiful'
ç**i**çek	'flower'
ada	island
iste	'didn't want'
ki**ş**i	'person'
ge**ç**en	'last'

(4)

Native words	Suffix	Translation
iste	-m**e**-d**i**	'want-NEG-past'
ada	-d**a**	'island-LOC'
öğrenc**i**	-ler	'student (pl.)'
h**a**v**u**z	-d**a**	'pool (dative)'
ç**o**c**u**k	-**u**	'children (acc.)'

(vowels bolded are harmonizing)

Loanwords:

- Unlike native vowels, loanwords use the final root vowel as the trigger.

- i.e. [otobüs-ü] (borrowed from French) from table (7) is disharmonic in the stem. [o] is [+back] while [ü] is [- back]. The suffix harmonizes with the closest vowel (right to left), the final vowel of the root (Kornfilt, 1997).

Loanwords examples (from Arabic) with [back] harmony:

(5)

Arabic	Turkish	Gloss
mudi:r	müdür	'manager'
mumkin	mümkün	'possible'

Loanwords examples (from Arabic) without [back] harmony:

(6)

Arabic	Turkish	Gloss
ħisa:b	hesap*	'account/bill'
miθa:l	misal*	'example'

vowel disharmony*

(7)

Loanwords	Suffix	Gloss
biftek		'steak'
ıstibdat*		'despotism'
kitap*		'book'
kebap*	-çı	'kebab shop'
otobüs*	-ü	'bus (dative)'

vowel disharmony*

Tables 5-7 show how loanwords sometimes produce disharmonic vowels within the words (Alshammari, 2020).

OT Analysis:

Loan words are unable to be accounted for in the same ranking of constraints as native words due to their differences in vowel harmony. Beckman (1998) proposes that constraints based on positional faithfulness can be used to achieve trigger control when the trigger is in a prominent

position. These positions can be identified with root-initial syllables, stressed syllables, morphological roots, and final syllables (McCarthy 1995; Walker 2012).

For example, the backness harmony in root-initial syllables in Turkish is represented using the constraint proposed by Charette and Göksel (1996) in their work on phonological constraints in Turkish:

"Ident-σ1-IO(back): A segment in the root-initial syllable in the output and its corresponding segment in the input have identical values for [back]."

The constraint accounts for the triggering of vowel harmony in native words and ensures that harmony is maintained in prominent positions, while also encouraging other positions to conform to the pattern. The constraint is utilized to regulate the direction of the harmony. Various other constraints have also been suggested to explain the vowel harmony of native words in Turkish such as (Walker 2012; Charette and Göksel 1996; Krämer, 2003):

- ALIGN-Right([back], Word): For any feature [back] associated to a segment in a word, that feature has an association to the rightmost syllable of a word.
- NoCross: Association lines cannot cross.
- IDENT-IO(back): Corresponding segments in the input and output have identical values for the feature [back].

We can better understand how Turkish speakers adjust loanwords to fit their native language by examining how the constraints related to vowel harmony are violated.

Tableau (1): Native words

UR: /öğrenci-lar/ [-bk] [+bk]	Ident-σ1 -IO(back):	NoCross	ALIGN-Right([back], Word):	Ident-IO[back]
öğrenci-ler [-bk]	✓	✓	✓	*
öğrenci-lar [-bk] [+bk]	✓	✓	***	✓ L
öğrencı-lar [-bk] [+bk]	✓	✓	**	*
öğroncı-lar [-bk] [+bk]	✓	✓	*	**
oğroncı-lar [+bk]	*	✓	✓	***

Tableau (1) shows that this ordering of constraints selects the correct SR in Turkish native words. The constraint ranking chooses the candidate that satisfies the phonological rules regarding vowel harmony for native words.

Tableau (2): Loanwords

UR: kebap-çı [-bk] [+bk]	Ident-σ1 -IO(back):	NoCross	ALIGN-Right([back], Word):	Ident-IO[back]
kebap-çı [-bk] [+bk]	✓	✓	*	✓
kebap-çü [-bk] [+bk]	✓	*	*	*
kobap-ço [+bk]	*	✓	✓	*
küböp-çö [-bk]	✓	✓	✓	**

Tableau (2) shows that utilizing the same constraints for loanwords as native words results in the incorrect candidate chosen as the winner. The starred candidate should be chosen as the winner but is not. Therefore, a new constraint must be implemented for the constraints in the tableau to choose the correct winner for loanwords.

Tableau 3: By including the following constraint, the correct winner is chosen for loanwords:

Ident-LastRV-IO(Back): The last vowel in the root of the input and its corresponding segment in the output must have identical values for [back].

UR: kebap-çı | \ \ [-bk]　[+bk]	IDENT-LastRV-IO(Back):	Ident-σ1 -IO(back):	NoCross	ALIGN-Right([back], Word):	Ident-IO[back]
kebap-çı | \ \ [-bk]　[+bk]	✓	✓	✓	*	✓
kebap-çü | X [-bk]　[+bk]	✓	✓	*	*	*
kobap-ço | / [+bk]	✓	*	✓	✓	*
küböp-çö | / [-bk]	*	✓	✓	✓	**

The pattern of disharmonic stems in loanwords can be accounted for by root faithfulness, which maintains the feature [back] in the root across the input and output of Turkish words. (Anderson, 2023).

Therefore, the correct ordering of constraints for Turkish loanwords is:

Ident-LastRV-IO(Back) > Ident-σ1 -IO(back) > NoCross > ALIGN-Right([back], Word) > Ident-IO[back]

Conclusion:

Vowel harmony in Turkish is dependent on the backness of vowels and their position within the word. When loanwords are borrowed from other languages, they may not follow this rule, which can result in constraint violations and the incorrect candidate chosen as the winner.

Overall, using OT to analyze the patterns of vowel harmony in Turkish loanwords and native words helps shed light on the challenges of adapting foreign phonological patterns to language systems, as well as the underlying differences between loanwords and native words in terms of phonology and morphology.

Loanwords violate the harmony constraint more frequently than native words, indicating that loanwords face greater challenges in adapting to Turkish vowel harmony. OT allows us to explore the phonological and morphological factors that affect loanword adaptation. For example, loanwords that contain suffixes may be more easily adapted to Turkish than those that do not, because the addition of the morphemes can help harmonize the vowels in the word.

The challenge for loanword adaptation is to find a way to satisfy as many of the constraints as possible while still preserving the phonetic form of the original word. By implementing the IDENT-LastRV-IO(Back) faithfulness constraint, Turkish loanwords can be accounted for and the winning candidate can be correctly chosen. The constraint on root identity allows for the correct output candidate to be selected for both loanwords and native words. These findings support the notion that Turkish roots are static, with alternations taking place only within the suffixes of the language (Clements 1982).

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