

## AN EXPERIMENTAL STUDY OF TURKISH VOWEL HARMONY

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### ABSTRACT

Prosodic words in Turkish are generated according to the palatal and labial Vowel Harmony (VH) rules: being left-to-right iterative, (1) any suffix vowel agrees with the preceding vowel with the [back] feature and (2) a high vowel agrees with the preceding vowel with the [round] feature. However, bare forms, compounds, affixes of foreign origin, some derivational morphemes, semi-copulas, imperfective, and complementizers violate the rules forming exceptional cases. Considering these exceptions, do Turkish speakers apply VH rules to affixes including 28 disharmonic affixes attached to newly formed or borrowed words? Aiming to answer this question, this paper reports on two experimental linguistic studies which are the first experimental studies on this topic: acceptability judgments with a Likert scale, consisting of a repeated measures within-subjects design, and a forced choice questionnaire. Participants judged words with suffixes, i.e., eight suffixes (harmonic: -DI, -mAll, -lAr, -llk and disharmonic: -lejin, -Ijor, -gil, -Ebil) attached to nonsense words (also nonwords) with a common Turkish CVC syllable structure. Results showed that when it comes to nonsense words, regardless of exceptions, Turkish speakers preferred suffixes that undergo VH harmony more than those which do not, and prefer harmonization more than disharmony.

KEYWORDS: Turkish Vowel Harmony; experimental linguistics.

### 1. Introduction

Turkish is a highly agglutinative language. With the exception of a few prefixes such as a negative marker *bi* in *biçare* ‘no-remedy or helpless’ (Sahin 2006), almost all of the affixes are suffixes attached to roots. Prosodic words, including all suffixes, are generated according to vowel harmony (VH) rules. The Turkish VH *rules* are stated as being left-to-right iterative, i.e. (1) any

suffix vowel agrees with the preceding vowel with the [back] feature; and (2) a high vowel agrees with the preceding vowel with the [round] feature. However, there are some shortcomings to these rules. First, the rules cannot predict bare forms that do not obey the VH rules. Second, compounds, affixes of foreign origin, some derivational morphemes, semi-copulas, imperfective, and complementizer violate the rules. Crucially, these forms do not constitute any uniform semantic/syntactic/phonological category, and thus, are unpredictable. Third, the rules also fail to show a gradual decline, from 90% (old Turkish) to 75% (modern Turkish), in backness VH (Harrison et al. 2002). Therefore, it can be assumed that Turkish has two types of prosodic words: the first set consists of those which undergo harmonization and the other consists of exceptions to harmonization. The question, then, is how native speakers of Turkish know when to apply the VH rules. In this vein, the present study asks whether Turkish speakers apply VH rules to affixes including 28 disharmonic affixes attached to newly formed or borrowed words? The current study takes an experimental perspective focusing on the disharmonic suffixes. The results show that Turkish speakers give significantly higher ratings to suffixes that undergo VH harmony more than disharmonic suffixes. The results also show that regardless of the type of suffixes, Turkish speakers prefer harmonized words more than disharmonic prosodic words.

## 2. VH in Turkish

Turkish VH, which has been investigated extensively from almost all of theories of phonology, is a clear example of “vowel harmony rules” in many, if not all, phonology textbooks (e.g. Jensen 2004; Kenstowicz 1994). According to Comrie (1997: 886),

[v]owel harmony in Turkish is a process whereby qualitative vowel oppositions are substantially neutralized in non-initial syllables, the quality of such a non-initial vowel being assimilated to that of the preceding vowel [...] proceeds from left to right through the word, although the evidence for this particular formulation, though compelling, comes more from exceptional than regular cases.

Due to the Turkish phonotactics. The underlying form of the vowels is the closer one. In nucleus positions of open syllables, vowels are almost always opened whereas those of closed syllables are the same with the underlying

form. For example, *bebek* ‘baby’ is realized as [bɛ.bek] but not \*[bɛ.bək] or \*[be.bek]. *Burun* ‘nose’ is realized as [bʊrun] but not \*[bʊrʊn] or \*[bu.run].

Table 1. Phonemic inventory of the vowels in Turkish.

	–back	–back	+back	+back
	–round	+round	–round	+round
+high	i	Y	u	u
–high	e	Ø	a	o

Yavas (1980) and Kardestuncer (1982) provided a classical harmony rule which can be summarized by the following (Jensen 2004: 83):

- (1) Any suffix vowel agrees with the preceding vowel with the [back] feature.
- (2) A high vowel agrees with the preceding vowel with the [round] feature.

Kenstowicz (1994: 26) provided the two harmony rules.

- (3) 
$$V \rightarrow [\alpha_{\text{back}}] / V C_0 \_\_\_$$

$$\begin{array}{c} | \\ [\alpha_{\text{back}}] \end{array}$$
- (4) 
$$V \rightarrow [\alpha_{\text{round}}] / V C_0 \_\_\_$$

$$\begin{array}{cc} | & | \\ [+hi] & [\alpha_{\text{round}}] \end{array}$$

However, these rules are not satisfactory. For example, these rules do not specify left-to-right iteration. Jensen (2004: 269) provided a rule that covers this given in (5) with an example in (6).

- (5) 
$$[+syll, <+hi>] \rightarrow [\alpha_{\text{back}}, <\beta_{\text{round}}>] / [+syll, \alpha_{\text{back}}, \beta_{\text{round}}] C_0 \_\_\_$$

(6)	/dal+IVr/ ‘branches’	/gØl+IVr/ ‘lakes’	UR
	dallar	gØller	Vowel harmony
	dallar	gØller	SR

Kardestuncer (1982) noted that these rules can only apply in the presence of morphological boundaries.

Turkish VH is also analyzed from an autosegmental approach. Clements and Sezer (1982) argued that there are two independent tiers (back and round tiers; both binary) associated with the vowels in roots and suffixes. They further argued that /i, e, a, o, u/ are unmarked and thus freely combine in roots while /Y, Ø, u/ are marked and absent in “disharmonic” roots. However, they also noted that /Y, Ø, u/ can be found, again, in exceptional cases such as *Ymit* ‘hope’, *kuafØr* ‘hairstylist’, *nilYfer* ‘water lily’, etc. (see also Kabak and Vogel, 2011; Kabak, 2007). Thus, because of the apparent violations of the rules, according to Clements and Sezer (1982), VH is no longer active in the roots. Their approach to “exceptions” was that vowels of the suffixes that violate the rules must be “opaque” in their underlying representations. Hulst and van de Weijer (1991) also provided an autosegmental analysis of Turkish VH. In their analysis, they used unary features such as front, round, and low. These features can be either associated with V-positions in the roots or not. They observed that /o/ and /Ø/ do not occur in non-initial syllables (but see footnote no. 5 in Kirchner 1993; Kabak and Vogel 2011). Their approach to “exceptions” was that vowels of the suffixes that do not harmonize must be associated with the appropriate feature, i.e. prespecified, in some cases. In others, following Kardestuncer (1982), such suffixes have a compound-like character, which have “special status”.

Kirchner (1993) and Krämer (1998), among others, analyzed Turkish VH from an Optimality Theory perspective. Following the claims in Hulst and van de Weijer (1991), Kirchner (1993) started his analysis by assuming that /o/ and /Ø/ do not occur in non-initial syllables and proposed several constraints on the bases of the previous analyses. However, he still considered that there are opaque vowels in “disharmonic” suffixes. Krämer (1998) assumed that harmony only operates on underspecified vowels since various words and suffixes, which are less frequent than regular ones, do not participate in palatal and labial harmony. Thus, full specification of a given form blocks harmony. Nevertheless, the /o/ and /Ø/ constraint is present in his analysis. Polgárdi (1999) argued that VH is no longer active in the roots. She also claimed that some suffixes that do not harmonize with the root form a

single phonological unit with the root whereas some others have a compound-like structure.

Levi (2001: 1) compared a syllable-head approach and a feature geometric approach to Turkish VH, and concluded that the latter “can adequately and accurately account for the Turkish data while the syllable-head approach cannot”. In her analysis, she put vowel features on a lower tier (subsegmental). However, she did not provide any analysis for the “exceptions”.

Focusing mostly on roots, Pöschtrager (2010) analyzed Turkish VH from a government phonology approach, which states that phonology is without exception. He argued that non-initial syllables can contain any phonological expression, i.e. vowels; if there is no phonological expression associated with a syllable then palatal VH occurs; and, labial VH only occurs when there is an empty phonological expression.

Kabak and Vogel (2011) proposed that lexical pre-specifications of vowel features should be used to represent phonological exceptions, i.e. only in disharmonic roots. In doing so, they claimed that disharmonic root vowels are represented with the minimal number of features, and the only lexical marking for the root is whether or not it obeys the general principles of VH.

Further research has indicated that there are some other constraints on VH. It was claimed that disharmonic vowels of roots and suffixes are restricted in such a way that /i, e, a, o, u/ are unmarked while /Y, Ø, u/ are marked (Clements and Sezer 1982; Kirchner 1993; Polgárdi 1999). Thus, /Y, Ø, u/ must be consistent with palatal harmony. However, according to Kabak (2007), this does not hold for Turkish VH. For example, disharmonic sequences involving /Y, Ø/ are not any less common than those involving some of the harmonic sequences. Furthermore, the sequence /Y, a/ outnumbers many harmonic sequences. Therefore, it might be misleading to assume that /Y, Ø, u/ are marked while the others are not. It was also claimed that VH may not be applicable (nor apparent) in roots (Clements and Sezer, 1982) because of at least three reasons. Some borrowed words violate the VH rules. For instance, *kitap* ‘book,’ borrowed from Arabic, violates the rule because /a/ is [–high, +back, –round] whereas /i/ is [+high, –back, –round]. Thus, /a/ does not agree with /i/ in either backness or highness. According to the VH rule, the correct form should be \**kitep*, instead it is *kitap* in Turkish. Native roots can also violate VH rules. For example, *anne* ‘mother’, *kardeş* ‘sibling’, do not harmonize. Many compounds such as *kefi-boynuz-u* ‘carob (lit. goat+horn)’, *baf-kent* ‘capital city (lit. head+city)’, *Ata-tYrk*, and *bu-gYn* ‘today (lit. this+day)’ do not harmonize. Many derivational and inflectional

morphemes such as affixes of foreign origin, i.e. *anti-*, *-izm*, *bi-*, *-en*; some derivational morphemes, i.e. *-gen*, *-gil*, *-imtrak*, *-leyin*, *-vari*, *-istan*; semi-copulas, i.e. *-iver*, *-egel*, *-edur*, *-ekal*, *-ejaz*, *-ol*; modal *-ebil*; imperfective *-ijor*; and complementizers *-ki*, *-ken*, among others, violate VH rules (i.e. Göksel and Kerslake 2005; Kornfilt 1997; van Schaaik 1996). Appendix A lists a total of twenty-eight disharmonic suffixes. Kardestuncer (1982) argued that these suffixes must have a strong suffix boundary and therefore operate as words, whereas suffixes that allow harmony must have a weak suffix boundary. Research has also shown that there is a gradual decline, from 90% (old Turkish) to 75% (modern Turkish), in backness VH (Harrison et al., 2002). Crucially, in Harrison et al. (2002), it is computationally shown that the factors for the increase in exceptional cases and/or harmony decay are neither changes in the vowel inventory, nor borrowings, nor the emergence of disharmonic morphemes alone, but a combination of them all.

Regardless of theoretical orientations, most previous research has relied on the intuitions or judgments of a few speakers. Moreover, some previous research has tackled only exceptionless cases. Although previous research has proposed alternative analyses from various perspectives, little is known about how Turkish speakers know when to apply VH rules to affixes, including the 28 listed disharmonic affixes. In contrast, the present study takes an experimental approach to collect and analyze data from more than a few native speakers, focuses on both harmonic and disharmonic affixes, and relies mostly on statistical results. The present study reports two experiments to investigate the following issues: Given that (1) the VH rules may no longer be applicable to the roots and (2) some suffixes are disharmonic and some are not, do Turkish speakers apply VH rules to affixes including 28 disharmonic affixes attached to newly formed or borrowed words?

### 3. Experiment 1

In Experiment 1, the hypothesis was that Turkish speakers would distinguish harmonized prosodic words from disharmonized prosodic words and prefer harmonic suffixes over disharmonic ones. Therefore, it was expected that when asked, Turkish speakers would accept harmonized words more than disharmonized words. It was also expected that they would accept harmonic suffixes more than disharmonic suffixes, even though both are part of the natural grammar.

### 3.1. Participants

Forty-eight native Turkish speaking first year undergraduate students (age range: 18–22) enrolled in an Introduction to Psychology course at Işık University, Istanbul, Turkey, participated in this study. They signed consent forms and received extra credit for their participation. None of the students had taken linguistics courses or formal training in linguistics other than common core Turkish Language courses.

### 3.2. Procedure and design

A  $2 \times 2$  within-subjects design was used. The first factor was Suffix with two levels: VHsuffix, suffixes undergo harmonization; and NoVHsuffix, suffixes do not undergo harmonization under normal circumstances. The second factor was VHapplication with two factors: Harmonized, suffixes harmonize with the root; NoHarmony, suffixes do not harmonize with the root. For experimental reasons, eight disharmonic suffixes were randomly selected from 28 disharmonic suffixes then reduced to four common disharmonic suffixes by hand to match harmonic suffixes. Therefore, there were a total of eight suffixes: harmonic, -DI (past tense marker), -mAİ (modal ‘must’), -İAr (plural marker), -İlk (a nominalizer); and disharmonic, -lejin (an adverbial marker), -İjor (imperfect aspect marker), -gil (a nominalizer to create a group name), -Ebil (modal ‘ability’).

The canonical structure of Turkish syllables is (C)V(C) (Hulst and van der Weijer 1991). As for roots, therefore, sixty-four nonsense words consisting of CVC sequences, a common syllable structure in Turkish, were randomly created. In this way, because the root consisted of only a single syllable, the question of whether the root obeys VH rules or not was automatically eliminated. If a cluster existed in the Turkish lexicon, it was deleted from the list of nonsense words. For example, if *kaz* ‘to dig’ is generated, then it was excluded because it is not a nonsense word. This process continued until sixty-four nonsense words were created. All of the above suffixes were then attached to nonsense words to generate all of the five-hundred and twelve words, 8 suffixes  $\times$  64 nonsense words. After that, two scripts were created. Each had 2 warm-up items and 16 testing items. These items were matched to make sure that all of the possible 4 cases ( $2 \times 2$ ) were equally, i.e. 4 times, represented. There were no fillers since all of the items were essentially non-

sensical. Then, each script was assigned to a questionnaire. The directions contained one example from everyday Turkish, an example from a nonsensical word, and a suffix from Turkish grammar to explain roots and suffixes. Then, the directions asked participants to evaluate the harmony of a suffix from Turkish grammar and a nonsensical word according to appropriateness to everyday Turkish. For their evaluations, they were asked to use a 7-point Likert scale (0=*tuhaf* 'unusual, bizarre', 6=*normal* 'normal'). Each suffix was given in bold to help participants distinguish meaningful suffixes from nonsensical roots. All items were written in Turkish orthography. For example, *jedleyin*, *casgil*, *nagdi*, *veplik*. Directions and items were given in a single page (see Appendix B for an example in Turkish). The data were collected in a big classroom.

### 3.3. Results

There were no missing data. There was no difference between the scripts; therefore, there was no item ordering effect. There were no missing items either, so all of the items were rated by the participants. Repeated-measures ANOVA, a test commonly used for factorial data where participants take the same task which is repeatedly measured, was conducted to analyze main effects and interactions of the factors. The results indicated there were significant main effects of Suffix ( $F(1, 47) = 7.64, p < .05$ ) and VH application ( $F(1, 47) = 5.81, p < .05$ ). There was also an interaction between the two main factors ( $F(1, 47) = 13.09, p = .001$ ). These results showed that the participants gave VHsuffixes ( $M = 2.21, SD = .17$ ) significantly higher ratings than NoVHsuffixes ( $M = 1.76, SD = .19$ ). Moreover, the participants rated VH applied suffixes (i.e. harmonized suffixes) ( $M = 2.10, SD = .18$ ) significantly higher than suffixes with no VH application ( $M = 1.86, SD = .16$ ). The interaction indicated that when VH suffixes such as -DI were harmonized, they received higher ratings than when they were not harmonized; whereas, when No VH suffixes such as -Ijor were harmonized, they received lower ratings than when they were not harmonized, as given in Table 2.

Supporting the hypotheses, these findings suggest that Turkish speakers can detect harmonic and disharmonic words even when these words are nonsensical. Their choices are affected by the type of suffixes, whether they undergo VH or not, and the VH application since some suffixes are opaque to VH rules.



Table 2. Means and standard deviations of constructions.

	Mean	SD
VHsuffixVHapplied	2.6302	1.57101
VHsuffixNotVHapplied	1.7985	1.30087
NOVHsuffixVHapplied	1.5850	1.36022
NOVHsuffixNotVHapplied	1.9342	1.57728

#### 4. Experiment 2

One could argue that there might be different results when participants were asked to make a forced choice, similar to grammaticality judgments. In order to provide further evidence, Experiment 2 was conducted, in which participants were asked to make a choice between two given options. Hypotheses were the same as those in Experiment 1 in that native speakers of Turkish would distinguish harmonized prosodic words from disharmonized prosodic words and have a preference for harmonic suffixes over disharmonic ones.

##### 4.1. Participants

Forty-three native Turkish speaking undergraduate students (age-range: 18–22) in the department of psychology at the same university participated in this study. These participants did not participate in Experiment 1. They also signed the consent form and received extra credit in return. None of the students had taken linguistics course or formal training in linguistics other than common core Turkish Language courses.

##### 4.2. Procedure and design

Experiment 2 used the same design as Experiment 1. Two scripts containing 16 testing items were generated. Then, a questionnaire containing one warm-up item and one of the scripts were prepared in two columns. The participants were asked to select one item over the other in a row in the questionnaire, which was given in a single page (see Appendix C for an example in Turkish). The data were collected in a big classroom.

### 4.3. Results

There were no missing data. There was no difference between the scripts; therefore, there was no item ordering effect. There was no missing item either, so all of the items were rated by all the participants. A Cochran Q's test, a nonparametric test for binary data, indicated a significant difference ( $\chi^2(15) = 175.14, p < .001$ ), suggesting that participants selected harmonized words (overall 67.15%) significantly more than disharmonized words (overall 32.84%). A separate test for VH and NoVH suffixes indicated again significant differences ( $\chi^2(7) = 96.97, p < .001$ ) and ( $\chi^2(7) = 16.70, p < .05$ ), respectively. As for VH suffixes, these findings indicated that participants selected harmonized words (overall 79.06%) significantly more than disharmonized words (overall 20.93%). Similarly, as for NoVH suffixes, suffixes that do not normally undergo harmony, participants selected harmonized words (overall 55.23%) significantly more than disharmonized words (overall 44.76%).

### 5. Discussion and conclusion

Turkish palatal and labial VH is one of the most studied topics in contemporary phonology. Previous research has shown that there are exceptions in that bare forms, compounds, affixes of foreign origin, some derivational morphemes, semi-copulas, imperfective, and complementizer suffixes do not undergo VH. I conducted two experimental studies in which I asked native speakers of Turkish (1) to rate words consisted of a nonsense syllable (non-words) and (dis)harmonic suffixes; and (2) to choose one of these words.

Results of Experiment 1 supported the hypothesis: Turkish speakers implicitly knew which suffixes were harmonic and which suffixes were not even when they were not readily recognizable because of experimental manipulations. Turkish speakers also made the following acceptability judgment: Whenever those suffixes were attached to nonsense words, they obeyed the VH rules. The findings indicate that participants gave significantly higher ratings to suffixes that normally undergo harmonization than those which do not. Participants also rated suffixes harmonized with the roots significantly higher than those did not. The significant interaction showed that participants gave the highest ratings to the harmonic suffixes that harmonized with the roots and the lowest ratings to the disharmonic suffixes that harmonized with the roots. Results of Experiment 2 supported the hypothesis as well: Turkish speakers distinguished harmonized words from disharmonized

words by selecting harmonized words significantly more than disharmonized words. They also preferred harmonic suffixes over disharmonic ones. It must be noted that in Experiment 1, participants gave lower ratings to disharmonic suffixes when they were assimilated to the roots compared to other cases, but in Experiment 2, when forced to choose one item over another, participants picked both assimilated harmonic and disharmonic suffixes significantly more than the others. These two contradictory findings need further investigation.

Nevertheless, taken together, because participants rated harmonized suffixes higher than disharmonic suffixes in Experiment 1 and selected harmonized suffixes with the roots over others in Experiment 2, the findings clearly support that the Turkish palatal and labial VH rules (e.g. Yavas 1980; Crothers and Shibatani 1980; Kardestuncer 1982; Hulst and Weijer 1995; Comrie 1997) are evident even when it comes to the words that do not exist in the Turkish lexicon. Nevertheless, because there was a significant interaction between the type of suffixes and the roots in Experiment 1, “exceptional” disharmonic suffixes are also readily available in the Turkish lexicon. These findings may imply that new words in Turkish, such as words of a foreign origin and borrowings, also become a part of the Turkish lexicon due to the fact that suffixes underwent harmonization when they were attached to non-sense words in the present study.

There are some pitfalls of the methods applied in the present study which do not diminish the value of the current findings. First, in the present study, I assumed that the directions were clear and participants followed the guidelines and made judgments accordingly. But, as for any experimental study, I cannot be 100% sure whether participants made their choices on the basis of VH manipulations alone. Therefore, further replication studies are needed. Secondly, only four harmonic suffixes and four disharmonic suffixes were manipulated in the experiments. One could generate stimuli by using all of the 28 disharmonic suffixes and as many harmonic suffixes in a replication of this study. Although such a study might tackle a larger amount of data and have to deal with more statistical issues than the present study, future research will target more than a total of eight suffixes. Thirdly, I presented the words as stimuli on paper and asked participants to make acceptability judgments with a pen/pencil. Results might be different when stimuli are presented by other means. For example, participants could have been given auditory stimuli for them to rate the words orally. Such an experiment will be conducted in future research.

## REFERENCES

- Clements, G.N. and E. Sezer. 1982. "Vowel and consonant disharmony in Turkish". In: Hulst, H. v. d. and N. Smith (eds.), *The structure of phonological representations* (Part 2). Dordrecht: Foris. 213–255.
- Comrie, B. 1997. "Turkish phonology". In: Kaye, A.S. (ed.), *Phonologies of Asia and Africa: Including the Caucasus*. Winona Lake, IN: Eisenbrauns. 883–898.
- Crothers, J. and M. Shibatani. 1980. "Issues in the description of Turkish vowel harmony". In: Vago, R.M. (ed.), *Studies in Language Companion Series*, 6. Amsterdam: John Benjamins. 53–88.
- Göksel, A. and C. Kerslake. 2005. *Turkish: A comprehensive grammar*. New York: Routledge.
- Harrison, K.D., M. Dras and B. Kapicioglu. 2002. "Agent-based modeling of the evolution of vowel harmony". *Proceedings of the Northeast Linguistic Society (NELS)* 32.
- Hulst, H. van der and J. van de Weijer. 1991. "Topics in Turkish phonology". In: Boeaschoten, H.E. and L.T. Verhoeven (eds.), *Turkish linguistics today*. Leiden: Brill. 11–59.
- Hulst, H. van der and J. van de Weijer. 1995. "Vowel harmony". In: Goldsmith, J.A. (ed.), *The handbook of phonological theory*. Cambridge, MA: Blackwell. 495–534.
- Jensen, J.T. 2004. *Principles of generative phonology: An introduction*. Philadelphia: John Benjamins.
- Kabak, B. 2007. "Co-occurrence patterns in Turkish vowel harmony". Paper presented at Old World Conference in Phonology 4, 18–21 January 2007, University of Aegean, Mytilene, Greece.
- Kabak, B. and I. Vogel. 2011. "Exceptions to stress and harmony in Turkish: Cophonologies or prespecification?" In: Simon, H. and H. Wiese (eds.), *Expecting the unexpected: Exceptions in grammar*. Berlin: Mouton de Gruyter. 59–94.
- Kardestuncer, A. 1982. "A three-boundary system for Turkish". *Linguistic Analysis* 10(2). 95–117.
- Kenstowicz, M. 1994. *Phonology in generative grammar*. Cambridge, MA: Blackwell.
- Kirchner, R. 1993. "Turkish vowel harmony and disharmony: An Optimality Theoretic account". Paper presented at Rutgers Optimality Workshop 1.
- Kornfilt, J. 1997. *Turkish grammar*. New York: Routledge.
- Krämer, M. 1998. "A correspondence approach to vowel harmony and disharmony". ROA-293-0199.
- Levi, S.V. 2001. "Glides, laterals, and Turkish Vowel Harmony". *CLS 37: The Main Session*. 379–393.
- Oflazer, K. 1994. "Two-level description of Turkish morphology". *Literary and Linguistic Computing* 9(2). 137–148.
- Polgárdi, K. 1999. "Vowel harmony and disharmony in Turkish". *The Linguistic Review* 16(2). 187–204.

- Pöchtrager, M.A. 2010. "Does Turkish diss harmony?" *Acta Linguistica Hungarica* 57(4). 458–473.
- Sahin, H. 2006. "Türkçe'de önek" [Prefix in Turkish]. *The Social Sciences Review of the Faculty of Sciences and Letters of the University of Uludağ* 7(10). 65–77.
- Schaaik, G. van. 1996. *Studies in Turkish grammar*. Wiesbaden: Harrasowitz Verlag.
- Yavas, M. 1980. "Vowels and consonant harmony in Turkish". *Glossa* 14. 189–211.

## APPENDIX A. DISHARMONIC AFFIXES IN TURKISH

Derivational morphemes		
	<i>anti</i>	<i>anti-demokratik</i> 'antidemocratic'
	<i>izm</i>	<i>faman-izm</i> 'shamanism'
	<i>bi</i>	<i>bi-haber</i> 'unaware'
	<i>en</i>	<i>tamam-en</i> 'completely'
	<i>gen</i>	<i>altu-gen</i> 'hexagon'
	<i>gil</i>	<i>onur-gil</i> 'Onur's family'
	<i>imtrak</i>	<i>jeñil-imtrak</i> 'green-lik'
	<i>leyin</i>	<i>akñam-leyin</i> 'during evening'
	<i>vari</i>	<i>ingiliz-vari</i> 'English-like'
	<i>istan</i>	<i>bulgar-istan</i> 'Bulgaria'
	<i>et</i>	<i>kabul-etmek</i> 'accept'
	<i>ane</i>	<i>dost-ane</i> 'friendly'
	<i>baz</i>	<i>dYzen-baz</i> 'cheater'
	<i>dar</i>	<i>din-dar</i> 'religious'
	<i>engiz</i>	<i>esrar-engiz</i> 'mysterious'
	<i>iye</i>	<i>mal-iye</i> 'public finance'
	<i>iyet</i>	<i>fa:l-iyet</i> 'activity'
	<i>kar</i>	<i>sahte-kar</i> 'dishonest'
Semi-copulas		
	<i>iver</i>	<i>japuvermek</i> 'to do it suddenly'
	<i>egel</i>	<i>japagelmek</i> 'to have done'
	<i>edur</i>	<i>geledurmak</i> 'to go on coming'
	<i>ekal</i>	<i>bakakalmak</i> 'to stare continuously'
	<i>ejaz</i>	<i>dYfejazmak</i> 'almost fall'
	<i>ol</i>	<i>mestolmak</i> 'to like it very much'
Modal		
	<i>ebil</i>	<i>satabilmek</i> 'to be able to sell'

Imperfective Aspect		
	<i>ijor</i>	<i>gelijordum</i> ‘I was coming’
Complementizers		
	<i>ken</i>	<i>tutarken</i> ‘while catching it’
	<i>ki</i>	<i>masadaki</i> ‘the one that is on the table’

APPENDIX B. ONE OF THE SCALES  
USED IN EXPERIMENT 1  
(ORIGINAL SCALE IS GIVEN ON A SINGLE PAGE).

Lütfen aşağıdaki sözcükleri dikkatlice okuyunuz. Bu sözcükler anlamsız kök sözcüklerden oluşmuştur ve her sözcüğe Türkçe’de kullanılan bir ek eklenmiştir. Örneğin, “baş” anlamlı sözcüğü -da **eki getirilerek** “başda” yapılmış, “büş” anlamsız sözcüğü -de **eki getirilerek** “büşde” haline getirilmiştir. Sizin her bir **anlamlı ekin anlamsız kökle** uygunluğuna bakarak Türkçe’ye ne kadar uygun olduğunu değerlendirmenizi istiyoruz.

Eğer sözcüğün eki size göre tamamen normal gözüküyorsa 6’yı; tuhaf gözüküyorsa 0’ı işaretleyiniz. Eğer tepkiniz bu iki nokta arasındaysa 0 ile 6 arasındaki rakamları da seçebilirsiniz. “DOĞRU” YA DA “YANLIŞ” CEVAP YOK. Lütfen cevaplarınızı okulda öğrendiğiniz “güzel Türkçe”ye göre değil kendinize göre ve ‘sokakta konuşulan Türkçe’ye göre veriniz. Katıldığınız için teşekkür ederiz.

Aşağıdaki sözcüklerin ekleri Türkçe’ye ne kadar uygun?

	tuhaf						normal
<b>vüğde</b>	0	1	2	3	4	5	6
<b>vüğda</b>	0	1	2	3	4	5	6
<b>jedleyin</b>	0	1	2	3	4	5	6
<b>zasıyur</b>	0	1	2	3	4	5	6
<b>casgıl</b>	0	1	2	3	4	5	6
<b>nagdı</b>	0	1	2	3	4	5	6
<b>zeğmalı</b>	0	1	2	3	4	5	6

raçgıl	0	1	2	3	4	5	6
lejebil	0	1	2	3	4	5	6
pamlar	0	1	2	3	4	5	6
veplık	0	1	2	3	4	5	6
getleyin	0	1	2	3	4	5	6
çahıyur	0	1	2	3	4	5	6
feymalı	0	1	2	3	4	5	6
yechık	0	1	2	3	4	5	6
dablar	0	1	2	3	4	5	6
mavdı	0	1	2	3	4	5	6
letebil	0	1	2	3	4	5	6

APPENDIX C. ONE OF THE QUESTIONNAIRES  
USED IN EXPERIMENT 2  
(ORIGINAL SCALE IS GIVEN ON A SINGLE PAGE).

Lütfen aşağıdaki sözcükleri dikkatlice okuyunuz. Bu sözcükler anlamsız kök sözcüklerden oluşmuştur ve her sözcüğe Türkçe’de kullanılan bir ek eklenmiştir. Örneğin, “baş” anlamlı sözcüğü -da **eki getirilerek** “başda” yapılmış, “büş” anlamsız sözcüğü -de **eki getirilerek** “büşde” haline getirilmiştir. Her bir **anlamlı ekin anlamsız kökle** uygunluğuna bakınız ve her satırda bulunan iki sözcükten birini seçiniz. Sözcüğün Türkçe’ye ne kadar uygun olduğunu değerlendirmenizi istiyoruz.

“DOĞRU” YA DA “YANLIŞ” CEVAP YOK. Lütfen cevaplarınızı okulda öğrendiğiniz “güzel Türkçe”ye göre değil kendinize göre ve ‘sokakta konuşulan Türkçe’ye göre veriniz. Katıldığınız için teşekkür ederiz. Anketi istediğiniz gibi doldurduktan sonra aşağıdaki e-mail adresine gönderiniz.

vüğde	vüğda
jedleyin	jedlayın
zasıyur	zasıyor
casgıl	casgil

nagdı	nagdı
zeğmalı	zeğmeli
raçgil	raçgil
lejebil	lejabıl
palmar	pamler
veplık	veplik
getleyin	getlayın
çahıyur	çahıyor
feymalı	feymeli
yeclık	yeclik
dablar	dabler
mavdı	mavdı
letebil	letabil

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