

Abstract knowledge of emphatic reduplication in Turkish

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Abstract. This study investigated whether native speakers of Turkish have abstract knowledge regarding the principles guiding the selection of appropriate reduplicative forms in emphatic reduplication in Turkish. 14 native speakers of Turkish completed the study. The participants were asked to reduplicate 48 non-words in 4 experimental conditions where the number of segments and the phonological features of the word forms were manipulated. The 4 experimental conditions had VCV (e.g. /uka/), CVC (e.g. /lot/), CVCV (e.g. /gezi/), and VCCV (e.g. /shfa/) sequences. Each condition included 12 items. In each of the CVC, CVCV, and VCCV conditions, the base forms for 6 items did not include consonants used productively as interpolated consonants {p, m, s}. The next 6 conditions included {p, m, s} either as the first, or the second consonant in the base form of the non-word. The results indicated that the interpolated consonant in Turkish was taken from the set of {p, m, s}. Moreover, the interpolated consonant was sometimes identical to the second consonant of the base, but never to the first consonant. The most frequently produced interpolated consonant was {p}. In the VCV, and VCCV conditions, {m} was preferred over {s}. In the CVC, and CVCV conditions, {s} was preferred over {m}. The results demonstrate that Turkish native speakers were able to extend the reduplication strategies they employed in real words to non-words.

Keywords. Emphatic reduplication; partial reduplication; interpolated consonants; linking consonants; linkers; Turkish.

1. Introduction. In Turkish, it is possible to create emphatic adjectives or adverbs by prefixing a reduplicated (C)VC syllable to the word being made emphatic (Göksel & Kerslake 2005, Kornfilt 1997). When the adjective or adverb starts with a CV sequence, the reduplicated prefix manifests itself in a CVC form, illustrated in (1). On the other hand, when the adjective or adverb starts with a vowel, the reduplicated prefix takes the form of VC, illustrated in (2). The initial CV or V segments in such emphatic constructions are identical to the word initial CV or V. However, as illustrated in (1) and (2), the final C segment is selected from a set of {m, p, r, s} and it can also show variation since more than one consonant can be used for most adjectives.

- (1) Words with an initial CV have a CVC prefix
- | | | | |
|----------|---|----------|-------------------------------------|
| a. jεfıl | → | jεmjεfıl | (green → completely green) |
| b. saru | → | sapsaru | (yellow → completely yellow) |
| c. temiz | → | tεrtemiz | (clean → completely clean/spotless) |
| d. katu | → | kaskatu | (hard → extremely hard) |
- (2) Words with an initial V have a VC prefix
- | | | | |
|-----------|---|----------|------------------------|
| a. εski | → | εpeski | (old → very old) |
| b. akullu | → | apakullu | (clever → very clever) |

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Based on the examples, the emphatic reduplication has been formalized as follows (Kim 2009).

- (3) Consonant-initial words: $C_1V_1C_2\dots \rightarrow C_1V_1+\{m, p, r, s\} + \text{original form}$
(4) Vowel-initial words: $V_1C_1\dots \rightarrow V_1+\{m, p, r, s\} + \text{original form}$

As observed in the data and the rules above, the main issue is to determine the last segment of the prefixed syllable since the first (V) or the first two (CV) segments in reduplication is/are always identical to the first segment/s of the original word. Another issue is to decide whether the final C, also referred to as the linker, or the interpolated consonant in the literature (Yu 1999, Wedel 1999), can show variation.

2. Previous research. There are three approaches towards emphatic or partial reduplication in Turkish. According to lexical approaches, the choice of the linker is lexically determined, and it cannot be predicted depending on the base. To illustrate, Lewis (1967), Underhill (1976), and Dobrovolsky (1987) argue that the interpolated consonant is random and must be learned for each lexical item. Yet, native speakers use interpolated consonants for words they have never heard before with great ease, suggesting that this hypothesis is not plausible. Phonological approaches maintain that the choice of the linker is based on phonological constraints (Demircan 1987, Kelepir 2001). To illustrate, Demircan (1987) states that the interpolated consonant is subject to various dissimilation constraints. He maintains that the underlying form for the interpolated consonant is *-p* and depending on context, it is replaced by $\{m, r, s\}$ in a prioritized order. Demircan (1987) administered 2 experiments where participants selected reduplicated forms of adjectives, and non-words in Turkish. The results indicated that Turkish partial reduplication consists of some avoidance strategies. Demircan's (1987) findings are summarized below.

- (5) Turkish partial reduplication consists of some avoidance strategies:
(i) avoiding the identity between the linker and any consonant that appear in the base,
(ii) avoiding the similarity between the linker and the first C of a C-initial base,
(iii) avoiding the similarity between the linker and the second C of a C-initial base,
(iv) avoiding homorganic sequences like *-pb-*, *-stf-* at the morpheme boundary.

Another phonological approach is by Taneri (1990), who collected data from 32 native speakers regarding the reduplicated forms of about 300 Turkish adjectives and adverbs. The results indicated that there was a hierarchy in the choice of the linkers or interpolated consonants. Taneri (1990) concluded that the hierarchy was: $[p] > [s] > [m] > [r]$ based on the frequency of occurrence. Similar to Demircan (1987), Taneri (1990) also argued that partial reduplication in Turkish is a dissimilative process of a linker with respect to the consonants in the base (C_1 and C_2). A final phonological approach is by Kelepir (2001), who proposed certain constraints within the Optimality Theory framework. According to Kelepir (2001), the following constraints interact with each other to give rise to the surface forms observed in interpolated consonants in Turkish.

- (6) Kelepir's (2001) Optimality Theoretical analysis:
a. *Repeat [strident]: Don't have the strident linker [s] if there is a strident in the whole base.
b. *-pb-: Don't have the linker [p] with [b]-initial bases.
c. *lab-lab (adjacent): Don't have a [labial][labial] sequence at the reduplication boundary.
d. * α CONT~ α CONT: Don't have a linker that corresponds with the second consonant of the base in terms of continuancy.

- e. *COR ~ COR: Don't have the coronal linker [r] and [s] if the second consonant of the base is coronal.
- f. *LAB ~ LAB: Don't have the labial linker [p] and [m] if the second consonant of the base is labial.
- g. * α SON ~ α SON: Don't have a linker that corresponds with the second consonant of the base in terms of sonority.

Kelepir's (2001) account, however, has received some criticism as her constraints cannot account for certain reduplicated words in Turkish. To illustrate, according to Demir (2018), Kelepir's (2001) constraints cannot capture the attested reduplicated form *kos.kodza* since it violates the highest ranked constraint *Repeat [strident]. This is shown in the table below.

/RED+kodza/	*Repeat [strident]	* α CONT~ α CONT	*COR ~ COR	* α SON ~ α SON
kop.kodza		*!		*
⊕ kos.kodza	*!		*	*
kom.kodza		*!		
⊖ kor.kodza			*!	

Table 1: Derivation of *kodza* (Demir, 2018)

According to Demir (2018), Kelepir's (2001) analysis is inadequate as it cannot account for 24 (27%) words out of 89 consonant initial reduplicated forms in Turkish in her study.

Finally, according to mixed analyses, the linker [r] is lexicalized but the choice of [p, s, m] is determined by phonological constraints (Wedel 1999). Wedel (1999) maintains that Turkish reduplication is a highly productive phenomenon since, when given a new word or even a non-word, native speakers choose one or two of the four consonants with confidence. Wedel (1999) argues that the following constraints interact with each other and give rise to the surface forms in interpolated consonants in Turkish.

- (7) a. The interpolated consonant is taken from the set {p, m, s},
- b. [p] is not selected if C₁ is labial,
- c. The interpolated consonant must be non-identical to both C₁ and C₂ of the base,
- d. Except where contravened by (7b) and (7c), [p] is selected over [m] or [s].

As Wedel (1999) argues, although the interpolated consonant set includes {m, p, r, s}, [r] is highly restricted and not productive since native speakers are reluctant to employ it when confronted with novel or non-words. Wedel (1999) also maintains that the interpolated consonant cannot be a [p] if the first consonant in the original word is labial. This is illustrated below.

- (8) bejaz → bembejaz but not → *bepbejaz

Another constraint is that the interpolated consonant cannot be identical to the first or the second consonant of the base, exemplified in (9) and (10) respectively.

- (9) saru → sapsaru but not → *sassaru
- (10) peme → pespeme but not → *pempeme

Finally, Wedel (1999) argues that except where violated by (7b) and (7c) above, [p] is selected as the interpolated consonant over [m] or [s]. This generalization finds support given many

adjectives that start with a vowel that have a [p] as the interpolated consonant (Yu 1999). This is exemplified below.

(11) eski → epeški but not → *emeski / *esški

The last generalization also finds support in Demircan (1987), Taneri (1990), and Kelepir (2001), who reported that the preference order of interpolated consonants is [p] > [s] > [m] > [r]. Similarly, Hatiboğlu (1973) reported 121 instances of reduplicated adjectives in the Turkish Electronic Living Lexicon corpus (TELL). The breakdown of the interpolated consonants is given below.

Interpolated consonant	m	p	r	s
Number of samples	22	55	9	35

Table 2: The breakdown of interpolated consonants in the TELL corpus

It is also necessary to note that in a number of adjectives and adverbs, the interpolated consonants can show variation as it is possible to reduplicate those words with more than one interpolated consonant. The examples below illustrate the different interpolated consonants for three adjectives.¹

Turkish orthography	IPA	Gloss	Interpolated consonant/s	Reduplicated surface form/s
siyah	sijah	black	m/p	[simsijah] / [sipsijah]
katı	kату	solid	p/s	[kapkatu] / [kaskatu]
yuvarlak	juvarlak	round	m/p/s	[jumjuvarlak] / [jupjuvarlak] / [jusjuvarlak]

Table 3: Variation in interpolated consonants in Turkish emphatic reduplication

Two recent studies on Turkish reduplication are by Tang & Akkuş (2018), and Demir (2018). In their research, Tang & Akkuş (2018) start by pointing out a major drawback in earlier studies in Turkish reduplication. By reviewing 10 studies previously carried out on Turkish reduplication, they demonstrate that the judgements of native speakers in those studies were often based on the researchers' intuitions only as the researchers employed forced-choice tasks where the participants had to select a pre-determined linker. To remedy this problem, Tang & Akkuş (2018) carried out a comprehensive analysis of Turkish partial reduplication with 162 real words where the participants were asked to rate the naturalness of each of the 4 reduplicated forms per item on a scale from 1 to 7, as well as to pick one option out of the 4 reduplicated forms. The results indicated that it is not just the first or the second consonant, but the subsequent consonants in the base that influence the choice of the linker. In other words, Tang & Akkuş (2018) maintain that the Obligatory Contour Principle (OCP) effect extends all the way from C₁ to C₄. Moreover, the authors demonstrated that the OCP constraints are more graded than they have been previously proposed as those effects are not weighted linearly from high to low. Another recent study on Turkish emphatic reduplication is by Demir (2018). She carried out two experiments to investigate the same phenomenon. The first experiment asked 125 participants to reduplicate 10 actual, and 34 non-words. The non-words were categorized into vowel and consonant initial non-words. The consonant initial non-words were further subdivided into

¹ See Table A1 in the Appendix for a list of 30 words and their reduplicated forms.

labial-initial, strident-initial and other consonant-initial non-words. Similar to Tang & Akkuş (2018), participants were asked to reduplicate the items in a free-choice task. That is, participants were not provided with any reduplicated forms as it was done in the forced-choice or multiple-choice tasks employed in the previous studies.

The results demonstrated that participants produced predicted linkers in actual words. Nevertheless, there was more variation in non-words. Moreover, participants utilized some novel linkers, other than [p], [m], [s], or [r], not attested in Turkish. The linkers that participants provided were sometimes a consonant found in the word, including the final consonant in the base. What is more, participants sometimes even omitted linkers altogether. Demir (2018) demonstrated that the preferences for both vowel and consonant initial non-words were $p > s > m > r$, which substantiates previous research (Hatiboğlu 1973, Demircan 1987, Taneri 1990, and Keleşir 2001). Demir (2018) concluded that emphatic reduplication in Turkish is a productive process. Crucially, she argues that emphatic reduplication is lexicalized for actual words as her second experiment demonstrated that the same linkers predicted for actual words were not extended to similar non-words. Demir (2018) also argues that the distribution of those linkers is influenced by phonology.

3. The current study. This study investigated whether native speakers of Turkish have abstract knowledge regarding the principles guiding the selection of appropriate reduplicative forms in emphatic reduplication in Turkish. Another goal was to test Wedel's (1999) hypotheses experimentally. The research questions addressed in this study are:

- (12) a. Do native speakers of Turkish have abstract knowledge regarding the principles guiding the selection of appropriate reduplicative forms in emphatic reduplication in Turkish? That is, can native speakers of Turkish extend their knowledge of emphatic reduplication to non-words?
- b. To what extent do native speakers of Turkish follow the constraints outlined in Wedel (1999) in forming reduplicative forms with non-words?

3.1. METHOD. 14 native speakers of Turkish completed the study on Qualtrics, an online platform to conduct surveys. Participation in the study was voluntary and all the participants gave consent to participate in the study. The participants were all living in the US at the time of the study. Two participants were undergraduate students while 12 were graduate students at various universities in the US. The average age of the participants was 29.2.

3.2. PROCEDURE. The participants were simply asked to reduplicate 48 non-words in 4 different experimental conditions in which the number of segments and the phonological features of the word forms were manipulated. Written instructions were provided.² As the instructions included 4 examples of reduplicated adjectives in Turkish, the participants were not given practice items prior to the experimental component. The 4 experimental conditions had VCV (e.g. /uka/), CVC (e.g. /lot/), CVCV (e.g. /gɛzi/), and VCCV (e.g. /ɔhfa/) sequences. Each condition included 12 items. In each of the CVC, CVCV, and VCCV conditions, the base forms for 6 items did not include any consonants used productively as interpolated consonants {p, m, s}. The next 6 conditions included {p, m, s} either as the first, or the second consonant in the base form of the non-word.³

² See Table A2 for instructions in Turkish and English.

³ See Table A3 for the experimental items used to elicit reduplicated forms in Turkish.

3.3. RESULTS. The results indicated that, in line with the predictions of Wedel (1999), native speakers of Turkish produced {p} more than {m}, and {s} in the VCV condition (68, 20, and 12 percent respectively). This is illustrated below.

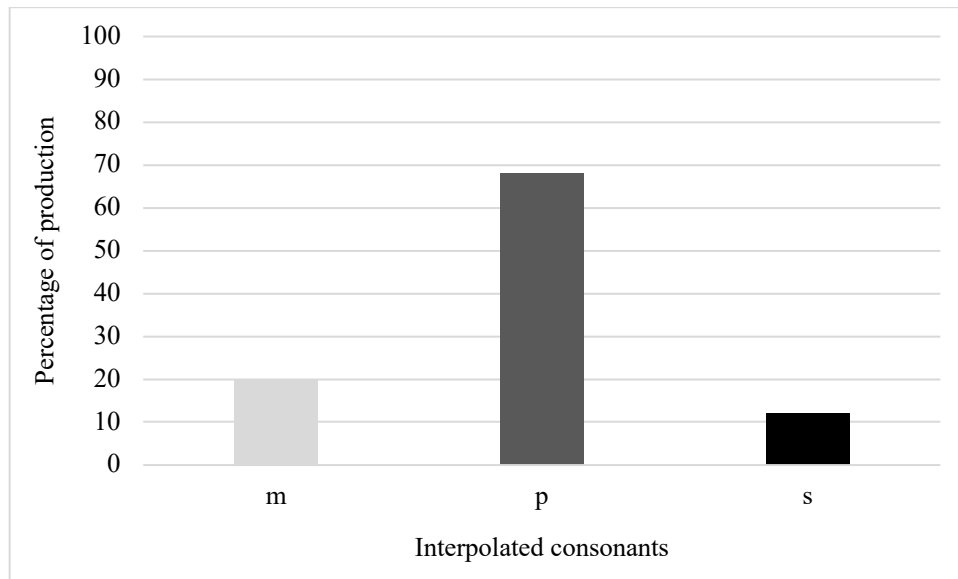


Figure 1. The percentage of interpolated consonants produced in VCV sequences in Turkish

The results from the other three conditions are shown in the figures below. Note that in each of the figures below, whenever one of the {p, m, s} segments is in the base, that is indicated. In terms of the combined average production in the CVC condition, {p} was selected most frequently (40.14%), followed by {s} and {m} (34%, and 25.85% respectively). As hypothesized by Wedel (1999), the interpolated consonant was never identical to C₁ or C₂ of the base.

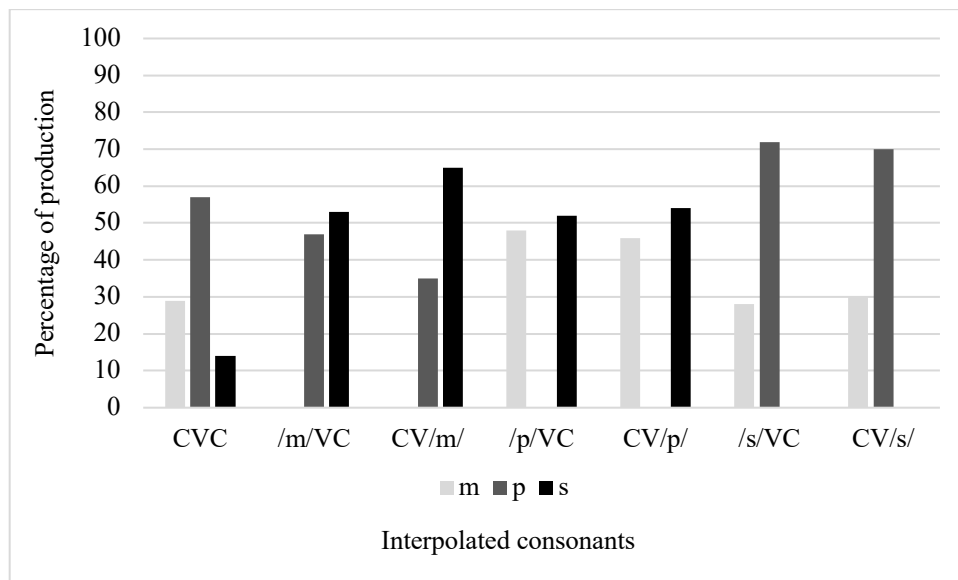


Figure 2. The percentage of interpolated consonants produced in CVC sequences in Turkish

With respect to the combined average production, the CVCV condition demonstrated that {p} was selected most frequently (47.42%), followed by {s} and {m} (29.57%, and 23%

respectively). The interpolated consonant was sometimes identical to C_2 of the base. This provides counterargument against Wedel (1999), who maintains that the interpolated consonant can never be identical to C_1 or C_2 of the base.

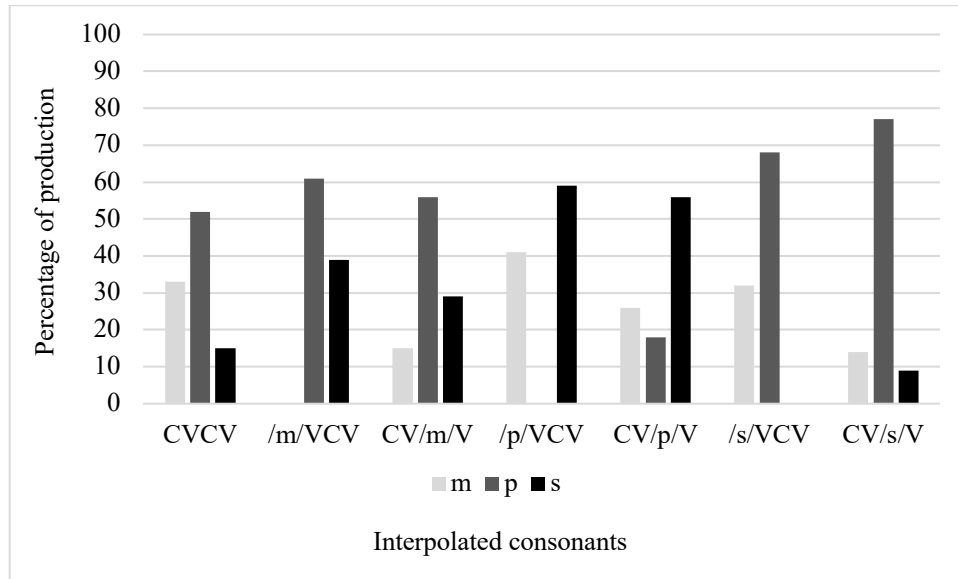


Figure 3. The percentage of interpolated consonants produced in CVCV sequences in Turkish

In regard to the combined average production, the VCCV condition indicated that {p} was selected most frequently (49.14%), followed by {m} and {s} (26.71%, and 24.14%). The interpolated consonant was sometimes identical to C_2 of the base, but never to C_1 .

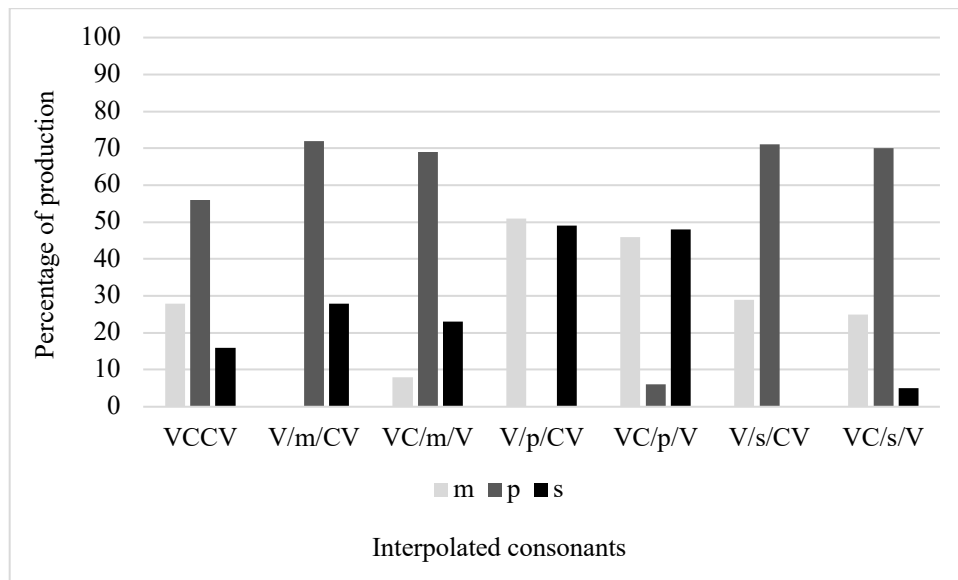


Figure 4. The percentage of interpolated consonants produced in VCCV sequences in Turkish

4. Conclusion. The results demonstrate that Turkish emphatic reduplication is a productive process and native speakers do have abstract knowledge of emphatic reduplication. The interpolated consonant in Turkish is indeed taken from the set of {p, m, s}. Contrary to Wedel (1999) and Kelepir (2001), {p} was sometimes selected even when C_1 was labial (e.g. *mok* →

mopmok). Moreover, the interpolated consonant was sometimes identical to C₂ of the base, but never to C₁. The most frequently produced interpolated consonant was {p}. In the VCV, and VCCV conditions, /m/ was preferred over {s}. In the CVC, and CVCV conditions, {s} was preferred over {m}.

This study confirms the significance of experimental data, particularly productive measures such as writing (Demir 2018) or orally producing an emphatic form to investigate emphatic reduplication in Turkish.

5. Implications and future directions. The Turkish facts regarding emphatic reduplication could be accounted for by Yip's (1998) identity avoidance principle, according to which sequences of homophonous phonemes or morphemes are avoided across world's languages. Such avoidance has been attested for many languages in the literature (e.g. in Korean reduplication by An 2012). A similar account is Fromkin's (2000) The Not-Too-Similar Principle, which asserts that similar obstruent sequences are not permitted in English.

As Tang & Akkuş (2018) illustrated, the significance of all the consonants in the base should be investigated in studies regarding emphatic reduplication in Turkish. Another similar direction would be to research the contribution of vowels. As Demir (2018), illustrated, her participants reduplicated *beyaz* (white) using a well-attested form in Turkish: /bejaz/ → /bembejaz/. Nevertheless, the participants did not extend the same interpolated consonant to a non-word /bojuz/ as they produced various forms such as {bombojuz, bopbojuz, bosbojuz, borbojuz, bozbojuz}. Thus, an interesting question is whether the vowels also have an influence on the choice of the interpolated consonant in emphatic reduplication in Turkish. One way to test such a hypothesis would be to investigate whether front or back vowels lead to any difference in the interpolated consonants when the consonants in the base are the same. Some non-words through which such a hypothesis could be tested are listed in (13).

- (13) Sample non-words to test the effect of vowels on the choice of interpolated consonants
- | | | | | |
|----|---------|-----|---------|-----|
| a. | /telge/ | → ? | /taɫga/ | → ? |
| b. | /tilgi/ | → ? | /tuɫgu/ | → ? |
| c. | /tølgø/ | → ? | /toɫgo/ | → ? |
| d. | /tylgy/ | → ? | /tuɫgu/ | → ? |

Although I do not know of any studies that have investigated the effect of vowels on the choice of interpolated consonants, I have different judgments as to what those consonants should be in the two sets above with different vowels. Such native speaker intuitions should be experimentally tested with native speakers of Turkish in future research.

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Appendix

	Turkish orthography	IPA	C ₁	C ₂	Gloss	Interpolated consonant/s	Reduplicated surface form/s
1	beyaz	/bejaz/	b	j	white	m	[bembeyaz]
2	hızlı	/huuzlu/	h	z	fast	p	[huphuuzlu]
3	sessiz	/sessiz/	s	s	silent	p	[sepsessiz]
4	sarı	/sarı/	s	r	yellow	p	[sapsarı]
5	gürültülü	/gyryltyly/	g	r	loud	p	[gypyryltyly]
6	kahverengi	/kahverengi/	k	h	brown	p	[kapkahverengi]
7	gri	/gri/	g	r	gray	p	[gupgri]
8	turuncu	/turundzu/	t	r	orange	p	[tupturundzu]
9	kızıl	/kuzul/	k	z	red	p	[kupkuzul]
10	heyecanlı	/hejedzanlu/	h	j	excited	p	[hephejedzanlu]
11	talihsiz	/talihsiz/	t	l	unfortunate	p	[taptalihsiz]
12	aydınlık	/ajduunluk/	j	d	bright	p	[apajduunluk]
13	eski	/eski/	s	k	old	p	[epeski]
14	durgun	/dupdurgun/	d	r	still	p	[dupdurgun]
15	ciddi	đziddi/	đz	d	serious	p	[đzıpdđziddi]
16	kirli	/kirli/	k	r	dirty	p	[kipkirli]
17	temiz	/temiz/	t	m	clean	r	[tertemiz]
18	berbat	berbat/	b	r	terrible	s	[besberbat]
19	mavi	/mavi/	m	v	blue	s	[masmavi]
20	mor	/mör/	m	r	purple	s	[mösmör]
21	pembe	/pembe/	p	m	pink	s	[pespembe]
22	siyah	/sijah/	s	j	black	m/p	[simsijah] [sipsijah]
23	sert	/sert/	s	r	hard	m/p	[semsert] [sepsert]
24	katı	katı/	k	t	solid	p/s	[kapkatı] [kaskatı]
25	lacivert	/ladzivert/	l	đz	dark blue	p/s	[lapladzivert] [lasladzivert]
26	kırmızı	/kurmuzı/	k	r	red	p/s	[kupkurmuzı] [kuskurmuzı]
27	yumuşak	/jumufak/	j	m	soft	p/s	[jupjumufak] [jusjumufak]
28	tatlı	/tatlı/	t	t	sweet	p/s	[taptatlı] [tastatlı]
29	yuvarlak	/juvarlak/	j	v	round	m/p/s	[jumjuvarlak] [jupjuvarlak] [jusjuvarlak]
30	yeşil	/jeşil/	j	ş	green	m/p/s	[jemjeşil] [jepjeşil] [jesjeşil]

Table A1: Some example words in Turkish emphatic reduplication

Talimatlar	Instructions
<p>Türkçede bazı kelimeleri aşağıdaki gibi pekiştirebiliriz.</p> <p>akıllı → apakıllı yeşil → yemyeşil katı → kaskatı temiz → tertemiz</p> <p>Bu çalışmada anlam ifade etmeyen 48 kelime göreceksiniz. Lütfen bu kelimelerin Türkçe olduğunu düşünün ve yukarıdaki stratejiyi kullanarak bu 48 kelimeyi pekiştirin. Lütfen sadece 1 kelime yazın.</p>	<p>In Turkish, we can modify some words as illustrated below.</p> <p>akıllı → apakıllı yeşil → yemyeşil katı → kaskatı temiz → tertemiz</p> <p>In this study, you will see 48 non-words. Please suppose that these are Turkish words and modify those 48 words using the strategy above. Please only write one word.</p>

Table A2: Instructions in Turkish and English

Condition	Word form	The non-word in Turkish orthography	The non-word in IPA	Condition	Word form	The non-word in Turkish orthography	The non-word in IPA
Condition 1	VCV	ajo	[aʒo]	Condition 3	CVCV	geji	[gɛʒi]
		erü	[ɛry]			jige	[ʒige]
		ıla	[uɫa]			huva	[huva]
		izo	[izo]			vahu	[vahu]
		ofu	[ofu]			taro	[taro]
		öti	[œti]			rato	[rato]
		uke	[ukɛ]			mızı	[muzuu]
		üci	[ydʒi]			zımı	[zumuu]
		ane	[ane]			zıpı	[zupuu]
		eka	[eka]			pızı	[puzuu]
		ıgo	[uɡo]			soki	[soki]
ija	[iʒa]	kosi	[kosi]				
Condition 2	CVC	hüf	[hyf]	Condition 4	VCCV	ütlü	[ytly]
		füh	[fyh]			ültü	[ylty]
		nul	[nuɫ]			akri	[akri]
		lun	[ɫun]			arki	[arki]
		gur	[gur]			ohfa	[ohfa]
		rug	[rug]			ofha	[ofha]
		mok	[mok]			imti	[imti]
		kom	[kom]			itmi	[itmi]
		peç	[pɛʃ]			apta	[apta]
		çep	[tʃɛp]			atpa	[atpa]
		sag	[sag]			üsvü	[ysvy]
gas	[gas]	üvsü	[yvsy]				

Table A3: Experimental items to elicit reduplicated forms in Turkish