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Segmental inventory and the evolution of harmony in Crimean Tatar

Darya Kavitskaya

This paper addresses the issue of the maintenance and loss of vowel harmony in Crimean Tatar, a Northwestern Turkic language. While palatal harmony is present in all three dialects of Crimean Tatar, labial harmony is either fully preserved (the southern dialect), restricted to the initial two syllables of a word (the central dialect), or lost (the northern dialect). The paper presents a description of vocalic inventories in the dialects of Crimean Tatar, the featural analysis of vowels, and the ways palatalization of consonants and syncope of high vowels interact with vowel harmony. A diachronic path of the restructuring of vowel inventories and vowel harmony loss is then proposed. A synchronic analysis of vowel harmony is coached in Stratal Optimality Theory.

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1. Introduction

Quite a few of the world's languages show stable vowel harmony attested for long periods of time. However, in many cases, languages with vowel harmony have close relatives that either made the harmony more restrictive or lost it altogether. For instance, in Turkic, Turkish exhibits pervasive vowel harmony, but there is no harmony in non-literary dialects of Uzbek, a Southeastern Turkic language (Sjoberg 1963). In Uralic, Finnish has vowel harmony, which is lost in Uralic languages such as Saamic, Estonian, and Selkup (Abondolo 2006). Several questions arise when we discuss the loss of vowel harmony. For instance, what are the possible ways by which harmony can be lost? What would serve as a pivotal moment for the reinterpretation of the system with harmony into the system without harmony? Could it be a loss of a certain vowel? Does this loss need to happen through a merger? Can the loss occur through the introduction of a new vowel, and if so, could the introduction of a vowel into the system happen through a split or a borrowing? In other words, what would affect the stability of a system with a pervasive vowel harmony?

In this paper, I examine the development of vowel harmony in Crimean Tatar, a Northwestern Turkic language. Crimean Tatar provides an opportunity to look at the development of two types of vowel harmony: palatal (backness) harmony and labial

(rounding) harmony.[1] Palatal harmony is present in all three dialects of Crimean Tatar, while the instantiation of labial harmony depends on the dialect. The southern dialect fully preserves labial harmony, the central dialect restricts labial harmony to the first disyllabic window of a word, and the northern dialect lost labial harmony altogether, allowing rounded vowels to optionally surface only in the initial syllable. Closely related Karaim did not lose harmony in the same way as the northern dialect of Crimean Tatar did, but its harmony changed significantly, arguably under the influence of the surrounding Slavic and Baltic languages (Musaev 1964, Hamp 1976).

An important issue in vowel harmony accounts, as discussed, for instance, by Walker (2011), is the question of prominence-based licensing of vowels. In the Turkic type of vowel harmony, the prominent position is arguably the initial syllable of a word.[2] In her typology of possible prominent positions, Walker (2011: 18) lists initial syllables among the positions privileged for harmony; there are many cases when vowels in word-initial (or root-initial) syllables control harmony (see van der Hulst & van der Weijer 1995, Kaun 1995, Beckman 1997, Walker 2001, Krämer 2003, Barnes 2006, among others). In Crimean Tatar this conclusion is supported by the fact that, just as in any other Turkic language with vowel harmony, the feature in question spreads left to right. However, this argument runs into a problem, because right-to-left spreading to the epenthetic vowels breaks up initial consonant clusters in borrowings. A more persuasive argument is that in the central dialect, the feature [+round] can only surface in the first two syllables of a word, and in the northern dialect, the initial syllable is the only position that can license [+round].

However, even though the initial syllable is the most prominent for vowel harmony in Crimean Tatar, the language also exhibits the pervasive deletion of high vowels in initial syllables, which are the least prominent prosodically. I suggest that this mismatch in prominence is one of the crucial considerations that steers the system toward the loss of the harmony. The other such consideration is the introduction of an additional high vowel in northern and central dialects of Crimean Tatar, which makes the vowel system asymmetrical. The third important part of the restructuring of the system is the phonemic palatalization of certain consonants and its interaction with harmony.

First, I present an overview of the sociolinguistic situation that affects the dialectal variation in Crimean Tatar and discuss the problems for the data collection that stem from this situation (Section 2). After that, I introduce the vocalic inventories of the three Crimean Tatar dialects, present a featural analysis of these inventories, and

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1   I use the terms *palatal* and *labial* harmony after Johanson & Csató (1998).

2   This statement concerns the synchronic representation of Turkic vowel harmony and represents the views of many, but by no means all researchers (e.g., Clements & Sezer (1982) treat Turkish harmony as active only between stems and affixes and thus dependent on the last vowel of the stem).

then turn to the ways in which the inventories interact with vowel harmony. I will also take into account the interaction of vowel harmony with palatalization of consonants and syncope of high vowels (Section 3). Next, I move to the discussion of the restructuring of vowel inventories in the dialects of Crimean Tatar and then turn to the analysis of vowel harmony (Section 4), followed by the conclusion.

2. The language

2.1. Sociolinguistic facts

Crimean Tatar belongs to the West Kipchak branch of the Northwestern subgroup of the Turkic language family (Johanson 1998). It is spoken mainly in the Crimean peninsula and in Uzbekistan, and also in small communities in Russia, Bulgaria, Romania, and Turkey (Radlov 1896, Samojlovič 1916, Bogoroditskij 1933, Doerfer 1959, Sevortjan 1966, Jankowski 1992, 2010, Memetov 1993, Izidinova 1983, 1997, Useinov, Mireev & Sahaciyev 2005, Kavitskaya 2010). The data used in this paper come primarily from the author's fieldwork conducted in 2002, 2003, and 2009 in Crimea.

The sociolinguistic situation in Crimea is complex because of the tragic history of Crimean Tatars in the 20th century. Before 1944, Crimean Tatar could be clearly divided into three major dialects: northern (or steppe), central, and southern. As illustrated in Figure 1,[3] the southern border of the northern dialect area is drawn roughly through the towns of Kezlev (Evpatoriya), Qarasubazar (Belogorsk), and Kefe (Feodosiya). The southern dialect was spoken along the southern coast of the Crimean peninsula. The central dialect was spoken in the area between the southern and the northern varieties.

In 1944, the entire Crimean Tatar population of Crimea was deported to Central Asia (mainly to Uzbekistan, but also to Kazakhstan and Tajikistan) and to various locations in Russia (Fisher 1978). As a result, speakers of the three originally homogenous Crimean Tatar dialects were separated, mixed, and immersed into radically different language environments. During the exile, it was nearly impossible for Crimean Tatars to stay in groups corresponding to their dialects. The language was also influenced by the surrounding languages, both Turkic (Uzbek and Kazakh) and non-Turkic (Russian and Tajik).

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3   I am grateful to Eric Ciaramella and Antony d'Avirro for their help with the construction of this map.
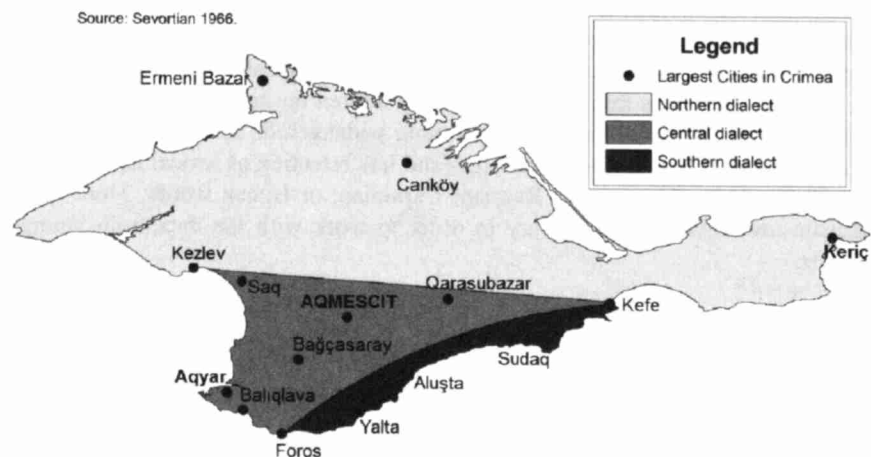
Figure 1. Crimean Tatar dialect boundaries before the deportation in 1944

In the early 1990s, the Crimean Tatars were allowed to return to their homeland. Currently, about 250,000 Crimean Tatars have returned to Crimea, and another 250,000 still live in the diaspora.[4] Former inhabitants of some areas of Crimea attempted to resettle in their native villages, so one can still find, for instance, speakers of the southern dialect who live on the southern coast of Crimea. However, Crimean Tatars encountered great difficulties in trying to move back into their former homes. Many Crimean Tatars were forced to settle far from their birthplaces or the villages of their ancestors, as Russian and Ukrainian families had been resettled into their houses by the Soviet government.[5] Along with years of exile, this situation contributed to a significant dialect mixture. Though it is still possible to locate speakers of distinct dialects, most of them are over 70 years of age, especially speakers of the non-literary northern and southern dialects.

Thus nowadays the dialectological distinctions are most clearly present in the speech of the elders born well before the time of the deportation. The data collected from these older speakers of Crimean Tatar form the basis for the investigation of the dialectal differences. Younger speakers tend to speak the standard variety of Crimean Tatar, which is based on the central dialect with some northern features.

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4 This estimate is per SOTA, the Research Center for Turkestan and Azerbaijan, located in Haarlem, The Netherlands. The exact number of the people deported differs depending on the source.

5 For a discussion of issues connected with the Crimean Tatar exile and resettlement, see Allworth (1998), Bekirova (2004), Fisher (1978), Gabrielian & Petrov (1997), Sheehy (1971), Uehling (2000, 2004), among others.

The standard dialect is used for teaching at schools and universities, in newspapers, on the radio and television, etc.[6] Standardization resulted in a situation where the standard dialect is widely spoken while the number of speakers of clearly southern and northern dialects is rapidly diminishing. Children do not learn them, and these dialects are rapidly becoming more and more endangered. Speakers younger than forty also show a high degree of variation and less retention of lexical items, replacing common lexical items with Russian, Ukrainian, or Uzbek words. More socio-linguistic investigation is necessary in order to work with the data from younger speakers.

2.2. Data collection

Thirty-one native speakers of Crimean Tatar aged 41–89 participated in the data collection. The table in (1) shows the number of participants by dialect and the age range of the participants.

(1)   Crimean Tatar consultants

Dialect	Number of participants	Age at the time of recording
Central	17	41–89 years old
Southern	7	60–85 years old
Northern	7	46–83 years old

For the central dialect, seven consultants were older than 60 at the time of the recording and born in Crimea, and 10 consultants were younger than 60 and born in Uzbekistan during the time of the deportation. The data only from the speakers who spent their deportation years in Uzbekistan were used to control for the influence of the surrounding language. From the speakers of the northern dialect, five were older than 60 and born in Crimea, and the two younger ones (46 and 47 years old at the time of recording) identified themselves as northern speakers but spoke a mixture of northern and central dialects. All our southern consultants were older than 60 and born in Crimea. The data collection took place in Crimea where the consultants moved from Uzbekistan in the early 1990s.

The map in Figure 2 shows birth villages of those consultants who were born before 1944. The speakers of the southern dialects that were recorded come from Simeiz, Gaspra, Nikita, Degirmenköy, Taraq-Taş, and Urkusta. The central Crimean

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6   A reviewer points out that the standard dialect cannot be equated with the central dialect of Crimean Tatar, but is rather a literary language highly affected by Turkish. However, Memetov (1993: 34) states that the Kipchak (northern and central) dialects were used more than the Oguz (southern) dialects in the formation of the literary language. Jankowski (1992: 453) also notes that the modern Crimean Tatar was standardized on the basis of the central dialect.

Tatar speakers come from Qarıl, Otarçık, Büyük Qaralez, Taqıl Cabanaq, Termençi, and Töbenköy. All of our northern speakers were born in the villages of Mavluş and Taşlı Yar.
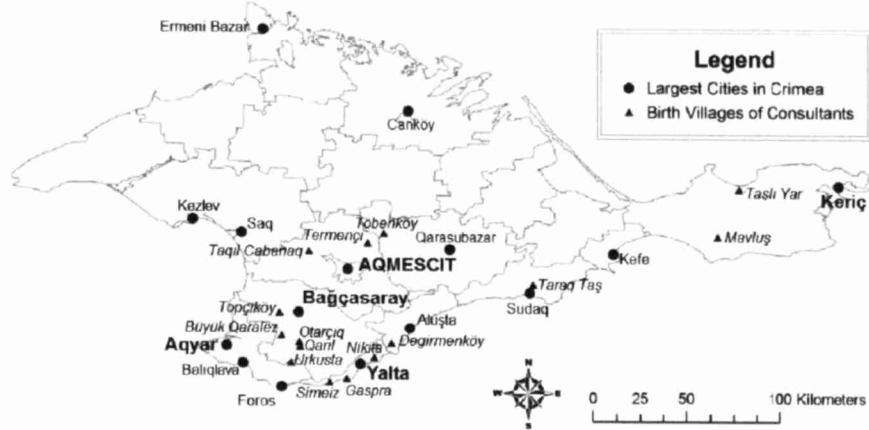

Figure 2. Largest towns in Crimea and birth villages of consultants

To determine a speaker's dialect, the following procedure was used. First, the speakers completed a questionnaire that asked them where they were born, what dialect was spoken in their family, what dialect they spoke with their spouses, and what was an approximate percentage of time they spoke the dialect at home. After that, lexical items, paradigms and narratives were collected from the individuals who identified themselves as speakers of a particular dialect and sounded as such to a linguistically trained native speaker of the central dialect of Crimean Tatar.

3. The data

3.1. Vowel inventory and vowel harmony in the dialects of CT

The vowel system of the southern dialect is reminiscent to that of many other Turkic languages, the most in-depth studied example of which is Turkish (Berta 1998, Johanson 1998). Southern Crimean Tatar has a fully symmetrical vowel system: eight vowel qualities, with oppositions in height, backness, and rounding, as shown in (2).[7]

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7   The International Phonetic Alphabet is used in this article.

(2)   Southern Crimean Tatar vowels

	[-back]		[+back]	
[+high]	i	y	ɯ	u
[-high]	e	ø	ɑ	o
	[-rd]	[+rd]	[-rd]	[+rd]

These oppositions are manifested through vowel harmony. As in many other Turkic languages, including Turkish,[8] all vowels in the southern dialect of Crimean Tatar participate in palatal harmony:[9] in most native roots, the vowels in a word agree in the feature [back], as illustrated in (3) on the example of the infinitive suffix -mek/-maq.[10,11]

(3)   Southern Crimean Tatar palatal harmony

bil-mek 'to know'   juv-maq   'to wash'

ket-mek 'to go'   qorq-maq   'to be afraid'

tyrt-mek 'to poke'   qɯr-maq   'to rub'

tøk-mek 'to drop'   ajlan-maq 'to turn'

The examples in (4) show that all high vowels in a word harmonize with the preceding vowel for the feature [round]. Labial harmony can be triggered by low vowels, as in *dostum*, but it only targets high vowels. As the last example in (4) demonstrates, non-high vowels block rounding harmony.

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8   On the analysis of Turkish vowel harmony see Clements & Sezer (1982), Kaun (1995), Kirchner (1993), Krämer (2003), among many others.

9   Diachronically, palatal harmony has been reconstructed to Proto-Turkic at least by some scholars. The initial syllables were the only ones that had two distinctive length oppositions, as opposed to non-initial syllables that had short and reduced vowels (Róna-Tas 1998). This makes it plausible to reconstruct initial stress for Proto-Turkic (Barnes 2006).

10   There are disharmonic roots, most of which are borrowings, e.g. *kitap* 'book', *taleke* 'cart', *xane* 'room', etc. Also, a number of suffixes in Crimean Tatar, such as adjectival -*ki*, have non-alternating vowels and thus do not participate in palatal harmony.

11   In the southern and central dialects, the quality of the velar/uvular consonant depends on the harmonic affiliation of the word: [k] surfaces in words with front vowels, and [q] in words with back vowels. This is the case both for stems, such as *ket* 'go' vs. *qorq* 'be afraid', and suffixes, such as the infinitive -*mek/-maq*. Johanson (1998: 33) analyzes the participation of the velars in the alternations as a case of intrasyllabic sound harmony, that is, palatal harmony affecting the whole syllable, including consonants.

(4)   Southern Crimean Tatar labial harmony

    dost-um'   'friend-1SG.POSS'

    kyz-lyk   'autumn-ADJ.SUF'

    tuzluɣ-um   'salt shaker-1SG.POSS'

    syrgyn-lyk 'deportation-ADJ.SUF'

    tykyr-yn-mek 'spit-PASS-INF'

    dost-lar-ɯm 'friend-PL-1SG.POSS'

Contrastive features of the southern Crimean Tatar necessary for an account of palatal and labial harmonies are shown in (5).[12]

(5)   Contrastive features of southern Crimean Tatar vowels

	i	y	ɯ	u	e	ø	ɑ	o
high	+	+	+	+	-	-	-	-
back	-	-	+	+	-	-	+	+
round	-	+	-	+	-	+	-	+

In addition to the vowels in (5), one more phonemic high vowel is present in the northern dialect (Berta 1998) and in the central dialect (Useinov, Mireev & Sahaciyev 2005; Kavitskaya 2010). These dialects have phonemicized the difference between [i] and a more central shorter [ɨ], as supported by the (near-)minimal pairs in (6).

(6)   *kir*   'mud'   *kɨr* 'come in'
    bit   'louse'   *bɨz* 'we'

There are only a handful of native monosyllabic words with /i/ in the northern and central varieties, along with suffixed words, such as in (7)a, and borrowings from Russian, such as in (7)b. Words with the initial /i/ also have the quality of the higher and fronter vowel, as in (7)c.

(7)   a. *bit-ler* 'lice'
      kir-lɨ   'dirty'[13]

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12 Here I make use of the most general version of the feature theory (see Clements & Hume 1995 and references therein), while I believe that other existing approaches (such as Articulatory Phonology (Browman & Goldstein 1989) that uses gestures as both phonetic and phonological units) may account for the data as well.

13 *Kirlɨ* 'dirty' is derived from *kir* 'mud' with the adjectival suffix *-lɨ*. It is pronounced with a fronter [i] by only two speakers of the central dialect, while [ɨ] surfaces in the first sylla-

    b. *kilametr* 'kilometer'
       kino   'film'
    c. *itʃ*   'intestines'
      it   'dog'
      itemek 'push'
      iʃlemek 'work'

In these tokens, the high front unrounded vowel is phonetically an [i] (with the quality approximately that of the southern dialect's [i]), while most of the high front vowels are now pronounced with a backer variant of the vowel.

While the front [i] is phonetically distinct from the central [ɨ], both of these vowels are phonologically [-back], as their participation in vowel harmony shows (cf. *bitler* 'lice', *tiʃler* 'teeth', where the suffix vowel agrees in the [-back] value with the preceding vowel). The phonetic difference between the vowels /i/ and /ɨ/ is evidenced by the spectrograms and supported by the measurements. The measurements provided here are for the speakers of the central dialect. I only consider measurements of vowels in monosyllabic words of the form CVC. There are several reasons for this restriction. First, in Crimean Tatar vowels in non-final syllables undergo reduction and are often centralized. Second, high vowels in final CV syllables undergo lowering. Third, for some speakers, low vowels in initial syllables are much longer than high vowels in final syllables. For example, in *baluq* 'fish', as pronounced by an older speaker of a central dialect, the [ɑ] in the first syllable was over 200 ms, while the [ɯ] in the last syllable was shorter than 40 ms. Finally, it has been demonstrated that in Turkish, vowels are longer in CVC syllables than in CV syllables (Kopkallı-Yavuz 2000, Barnes 2001). This appears to be the case in Crimean Tatar as well even though more rigorous phonetic work is required to conclude this with certainty.

The spectrograms in Figures 3 and 4 show words with the two front unrounded vowels pronounced by a speaker of the central dialect.

ble of this word as pronounced by the rest of the recorded speakers of northern and central Crimean Tatar.
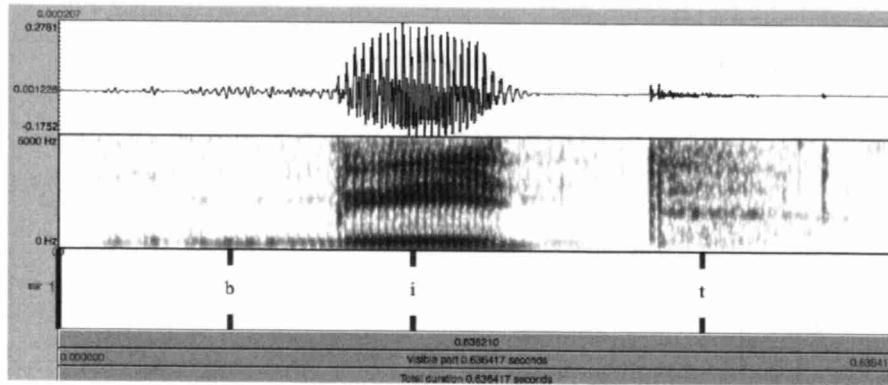
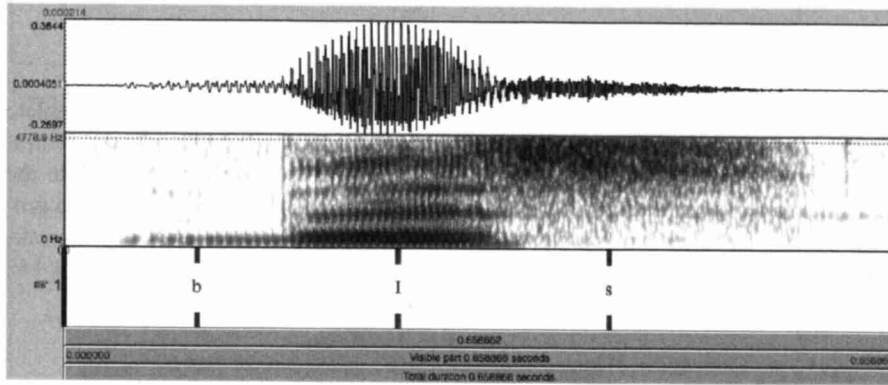Figure 3. A spectrogram of *bit* [bit] 'louse' (central dialect)

Figure 4. A spectrogram of *biz* [bɨs] 'we' (central dialect)

The comparison in (8) shows the average F1 and F2 for the three high unrounded vowels based on 358 tokens from 10 speakers of the central dialect, and shows the phonetic space for these vowels for all 10 speakers. These vowels are clearly different, even though there is some overlap in the acoustic space between [i] and [ɨ], as well as between [ɨ] and [ɯ], as shown by the scatter chart in Figure 5.[14]

(8)   Comparison of high unrounded vowels in the central dialect of Crimean Tatar

Vowels	average F1	average F2
/i/	345 Hz	2520 Hz
/ɨ/	521 Hz	1740 Hz
/ɯ/	569 Hz	1476 Hz

14 On the charts, [ɨ] is marked as *I*, and [ɯ] is marked as *y*.
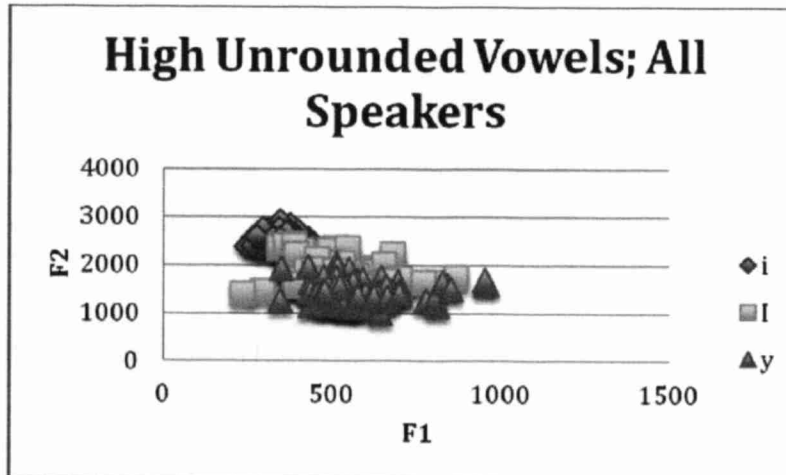
High Unrounded Vowels; All Speakers

Figure 5. Comparison of /i/ and /ɨ/ in the central dialect of Crimean Tatar

However, a pilot study suggested that /ɨ/ and /ɯ/ have undergone a nearly complete phonetic merger (Kavitskaya 2010). Further investigation shows that in the central dialect, the merger is only complete in the speech of younger speakers, while the older speakers maintain the difference between the two. The comparison in (9)a presents F1 and F2 for the high unrounded vowels, based on 212 tokens from 7 speakers of the central dialect aged 60-89, and the comparison in (9)b is based on 146 tokens from 3 speakers of the central dialect aged 45–59.

(9)   a. Comparison of high unrounded vowels; speakers older than 60

Vowels	F1	F2
/i/	345 Hz	2537 Hz
/ɨ/	528 Hz	1815 Hz
/ɯ/	587 Hz	1458 Hz

b. Comparison of high unrounded vowels; speakers younger than 60

Vowels	F1	F2
/i/	346 Hz	2495 Hz
/ɨ/	511 Hz	1641 Hz
/ɯ/	540 Hz	1508 Hz

The graph in Figure 6 illustrates the distribution in the phonetic space of the three high non-rounded vowels for the older speakers, and the graph in Figure 7 shows the distribution for the younger speakers.
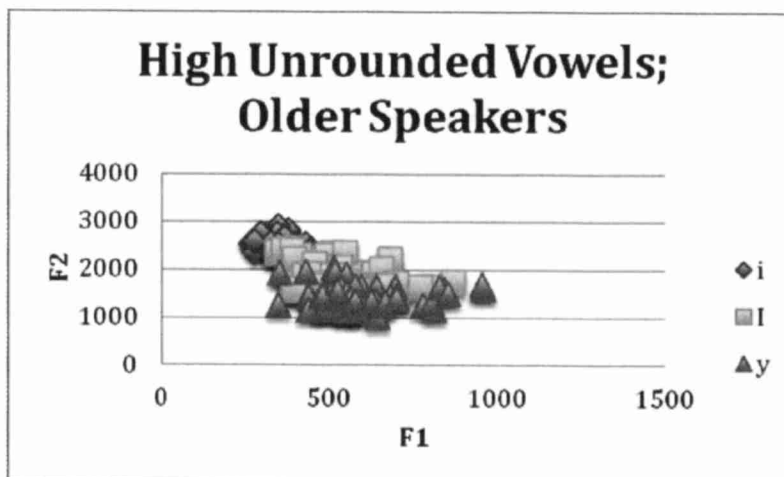
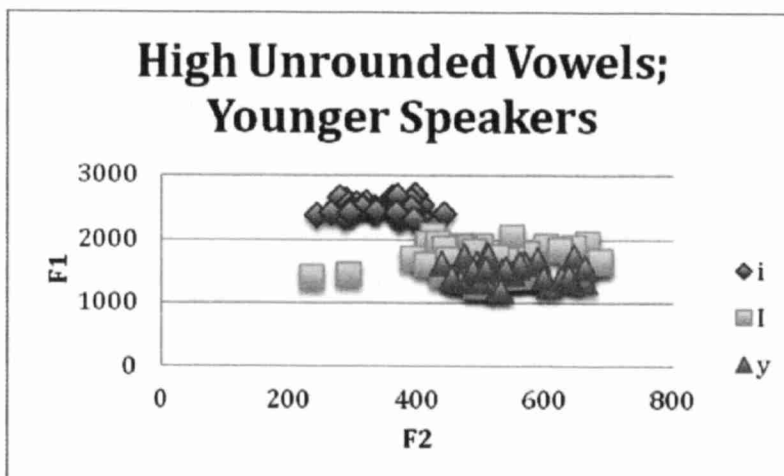Figure 6. F1–F2 for high unrounded vowels; older speakers

Figure 7. F1–F2 for high unrounded vowels; younger speakers

The older speakers have three distinct phonetic qualities corresponding to the three phonemes /i/, /ɨ/, and /ɯ/, although as we saw earlier, there is a significant overlap between /ɨ/ and /ɯ/, suggesting that these two vowels could be on their way to a

merger.[15] For the younger speakers, the phonetic merger between /i/ and /ɯ/ is (nearly) complete, while /i/ remains clearly distinct from the other two high non-rounded vowels.

However, while having undergone a phonetic merger in the speech of the younger generation, /i/ and /ɯ/ remain phonologically distinct: /i/ is [-back] and /ɯ/ is [+back], as evidenced by their participation in vowel harmony, illustrated in (10).

(10) *biz-ler*   'we-PL'
       jɯl-lar   'year-PL'

The table in (11) shows the vowel inventory for central and northern dialects of Crimean Tatar. These dialects now have two phonemic high non-back unrounded vowels, /i/ and /i/, the latter of which has phonetically merged with the back unrounded vowel /ɯ/, creating an asymmetrical vowel system and a potentially unstable situation for the labial harmony.

(11) Central and northern Crimean Tatar vowels

       i   y   i   ɯ   u
       e   ø   a   o

The first three columns in (12) provide examples of high vowel correspondences in the three dialects of Crimean Tatar. The fourth column compares the modern situation with the data from a Crimean Tatar glossary compiled in the 17th century by Dutch scholar Nicolaes Witsen (Baski 1986).

(12)
Southern	Central	Northern	Witsen's glossary (17th century)	
bit	*bit*	*bit*	-	'louse'
kir	*kir/kir*	*kir/kir*	-	'mud'
tiʃ	*tiʃ*	*tiʃ*	*diʃ*	'tooth'
kemik	*kemik*	*kemik*	*k'emik*[16]	'bone'

15 Based on the preliminary measurements, the same situation holds for the speakers of the northern Crimean Tatar dialect. It is impossible to say whether this finding reflects the dialect or the age of the speakers though, since there are no young speakers of the northern dialect. However, one 47-year-old speaker, whose data are not included in these measurements because the speaker's dialect had mixed features from central and northern varieties, follows the pattern in Figure 7, suggesting that it may be based on the dialect, and not on age.

16 /k/ and /g/ followed by front vowels are marked as palatalized ['] by Witsen. This palatalization is not contrastive. The palatalization is also present in the southern dialect before /i/

bir	*bir*	*bir*	*bir*	'one'
kim	*kim*	*kim*	*k'im*	'who'
qul	*qul*	*qul*	*qul*	'hair'
qamuʃ	*qamuʃ*	*qamuʃ*	*qamuʃ*	'reed'
tyʃ	*tyʃ*	*tyʃ/tuʃ*	-	'dream'
syt	*syt*	*syt*	-	'milk'
gylʲ	*gulʲ*	*gulʲ*	*g'yl*[17]	'rose'
quʃ	*quʃ*	*quʃ*	*quʃ*	'bird'
bu	*bu*	*bu*	*bu*	'this'

While the four high vowels are contrastive in all three dialects, the i/ɨ contrast is not present in the southern dialect. The distinction in not present in Witsen's glossary either, which allows us to speculate that the southern dialect preserves the earlier vowel inventory. However, as mentioned in Baski (1986: 110), the reliability of Witsen's dictionary is low and thus this speculation is highly tentative.

3.2. Front vowels and the palatalization of consonants

While asymmetrical vocalic systems are not typologically uncommon, the Crimean Tatar vowel system still requires a synchronic representation. The features [back], [high], and [round], used to account for the vocalic contrasts in the southern dialect of Crimean Tatar presented above, are insufficient to express the contrast between /i/ and /ɨ/ in the central and northern dialects. Following the analysis of the Manchu vowel system by Dresher & Zhang (2005), I propose that the feature [Coronal] distinguishes /i/ and /ɨ/ in these dialects of Crimean Tatar. According to the featural cross-classification of Crimean Tatar vowels shown in (13), [Coronal] is posited for both /i/ and /y/.

(13)   Contrastive features of central and northern Crimean Tatar vowels

	i	y	ɨ	ɯ	u	e	ø	ɑ	o
high	+	+	+	+	+	-	-	-	-
back	-	-	-	+	+	-	-	+	+
round	-	+	-	-	+	-	+	-	+
Coronal	✓	✓							

and in the northern and central dialects before /i/, but not /ɨ/, which is further discussed in section 3.2.

17 While /y/ is present in Witsen's data, it is difficult to find correspondences in the central and northern dialects of Crimean Tatar, where /y/s backed to /u/s before *l*, *r*, and *z* with the palatalization of the following consonants. Such stems participate in palatal harmony as front vowel stems, cf. *guljler* 'roses', as discussed in section 3.2. In the southern dialect, the quality of the vowel is front, with the phonetic palatalization of the following consonant.

The support for this classification comes from the fact that both and only /i/ and /y/ palatalize preceding consonants, as shown in (14). The regressive palatalization is phonetic and not contrastive.

(14)   Phonetic palatalization in northern and central Crimean Tatar: /i/ and /y/
        bʲit   'louse'
        tʲyf   'dream'

The vowel /ɨ/ is [-back], patterning with the front vowels /i/ and /y/ with respect to palatal harmony, but it does not palatalize the preceding consonant, unlike /i/ and /y/, patterning with non-front /ɯ/ and /u/ and supporting the analysis of /ɨ/ as a non-coronal segment.

(15)   No phonetic palatalization in northern and central Crimean Tatar: /ɨ/
        tiz   'knee'
        tif   'tooth'
        bɨr   'one'

The introduction of the feature [Coronal] into the vocalic system accounts for the facts, but the question remains of how such a situation could arise. All high vowels are substantially reduced (shortened and centralized) in polysyllabic words in Crimean Tatar, but /i/ is the shortest and thus the most reduced vowel. This reduced quality could be generalized to all instances of /i/. I speculate that the existing few words with the /i/ in the central and northern dialects can be explained by lexical diffusion (Wolfram & Schilling-Estes 2003), a gradual borrowing of words from the southern dialect.[18]

Since the feature [Coronal] is necessary for the expression of contrast, there is the possibility that it would phonologize, creating a system with contrastive palatalization of consonants, similar to the related Karaim, a West Kipchak language spoken in Lithuania. In Karaim, all consonants (except glides) participate in palatal harmony, while [back] is not contrastive in all non-initial vowels (Nevins 2010: 84).[19] In Crimean Tatar, regressive palatalization of consonants is not contrastive. However, Crimean Tatar exhibits several minimal and near-minimal pairs that argue for the presence of contrastive palatalization for *l, r,* and *z,* as evidenced by the examples in (16).

18 I thank Andrew Garrett for the discussion of this issue.
19 See Denwood (2005) on an analysis of Karaim vowel harmony within the framework of Government Phonology.

(16)   Contrastive palatalization of consonants in the central dialect
        toz   'dust'   *koz^j*   'eye'
        bol   'free'   *bol^j*   'divide-imp'
        or   'harvest-imp'   *or^j*   'braid-imp'

While the vowels are back in all of the examples in (16), the backness value of the following vowel is determined by the consonant. If it is not palatalized, the suffix vowel is [+back], as in *toz-lar* 'dust-pl' or *or-maq* 'to harvest', and if it is palatalized, the suffix vowel is [-back], agreeing with the consonant, as in *koz^j-ler* 'eye-pl' or *or^j-mek* 'to braid'.

Historically, constrastive palatalization arises with the backing of front rounded vowels, as in (17). This makes it different from the palatalization that is the result of the coarticulation of the consonant with the following front vowels, as in Karaim, which we analyzed as the spreading of the feature [Coronal].

(17)   **gyl > gul^j*   (cf. Turkish *gyl* 'flower')
        *køz > koz^j   (cf. Turkish *gøz* 'eye')

We can thus hypothesize that the consonants in (17) preserve the [-back] value with the backing of the vowel and can participate in palatal harmony, while the harmony that involves the feature [Coronal], as in Karaim, requires a different mechanism. It remains to be seen whether the phonologization of the regressive phonetic palatalization would lead to the same result in Crimean Tatar.

3.3. The development of labial harmony

With a handful of lexical exceptions, palatal harmony is active and regular in all dialects of Crimean Tatar. This cannot be claimed about labial harmony. In the southern dialect of Crimean Tatar, labial harmony affects all high vowels in a word. Low vowels are triggers in initial syllalbles and blockers in non-initial syllables, but they are never undergoers of harmony. In the central dialect, labial harmony is restricted to the first two syllables of a word (see Walker 2001 for similar cases).[20] When a suffix with a high vowel is added to a monosyllabic stem, as in (18)a, its vowel agrees with the vowel of the stem in both backness and rounding. When such a suffix is added to a polysyllabic stem, labial harmony does not target the vowel in

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20 This generalization is supported by recordings from 17 speakers of the central dialect collected by the author and conversations with many more speakers of different ages (note that it is hard to ascertain dialectal affiliation of younger speakers). Indeed, as a reviewer mentions, it seems to be a newer development since the data in Radlov (1896) show labial harmony beyond the second syllable in the central dialect.

the suffix, as in (18)b, which shows that the domain of harmony is indeed the first two syllables of a word, regardless of the morphological composition of the word.

(18) a. *dost-um*   'friend-1SG.POSS'
         kyz-lyk   'autumn-ADJ.SUF'
         bul-un-maq   'find-PASS-INF'
      b. *tuzluy-um*   'salt shaker-1SG.POSS'
         syrgyn-lik   'deportation-ADJ.SUF'
         tykyr-in-mek   'spit-PASS-INF'

Labial harmony is lost in the northern dialect, where round vowels remain only in initial syllables (cf. morphological data in Medzhitova 1998), as in (19), and high vowels undergo optional unrounding even there. The restriction of rounded vowels to the word-initial position is a pattern that is attested in a number of other languages, such as Khanty (or Ostyak), Mansi (or Vogul), and Bashkir (Steriade 1995).

(19) Central   Northern
      bojun   *bojun*   'neck'
      dost-um   *dost-ɯm*   'friend-1sg.poss'
      burun   *burun ~ bɯrɯn*   'nose'
      tʃykyndir   *tʃingildir*   'beets'
      bulamuq   *bulamuq ~ bulamɯq* 'a type of cereal'

It is possible that labial harmony was not as consistent as palatal even in the 17th century: Baski states that "Witsen's material is disharmonic as regards labial harmony" (Baski 1986: 118). However, harmonic stems are attested in Witsen's data, so it would be premature to claim that 17th century Crimean Tatar lacked labial harmony altogether and developed it later. If Witsen's data are to be trusted, they show that the restriction on labial harmony in Crimean Tatar is not due to the influence of Uzbek, many dialects of which lost harmony altogether, as Crimean Tatar came into contact with Uzbek only in the 1940s.

3.4. Syncope of high vowels and stress

Crimean Tatar also exhibits reduction and syncope of high vowels. The process targets high vowels in word-initial syllables, as illustrated in (20).[21] The vowel may delete even when it is the absolute initial in a word, as in *iʃlemek* 'to work'.[22]

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21 This process is different from vowel/zero alternations in word-medial positions exhibited by Crimean Tatar and by other Turkic languages, such as in [burun] 'nose' vs. [burnum] /burun-um/ 'nose-1SG.POSS.' This word is usually analyzed as /burn/ in the input with the epenthesis of a high vowel driven by the considerations of syllable structure. The medial

(20) *kitap*   [ktɑp]   'book'
    tiſlemek   [tʃlemek]   'to bite'
    bilem   [blem]   'I know'
    suıkmaq   [skmɑq]   'to push, press'
    quısqa   [qsqɑ]   'short'
    tyſyrdik   [tʃyrdik]   'they dropped, went down'
    tykyrmek   [tkyrmek]   'to spit'
    piſirmek   [pʃirmek]   'to cook'
    iſlemek   [ʃlemek]   'to work'

Syncope of high vowels in Crimean Tatar should be analyzed as postlexical for several reasons. First, it is gradual: some tokens show no phonetic presence of the vowel, while some others show very short high vowels in initial syllables. Second, it depends on the rate of speech and is more likely to occur in fast and informal speech. Third, syncope can result in word-initial complex onsets, creating tri-consonantal clusters, such as [tkm], [qsq], etc., that are otherwise not present in the native vocabulary, where complex onsets are not allowed and codas are maximally bi-consonantal and obey the sonority sequencing principle (only codas of falling sonority are permitted).

The spectrogram in Figure 8 shows the syncope of the high vowel in the initial syllable of the word /tykyrmek/.
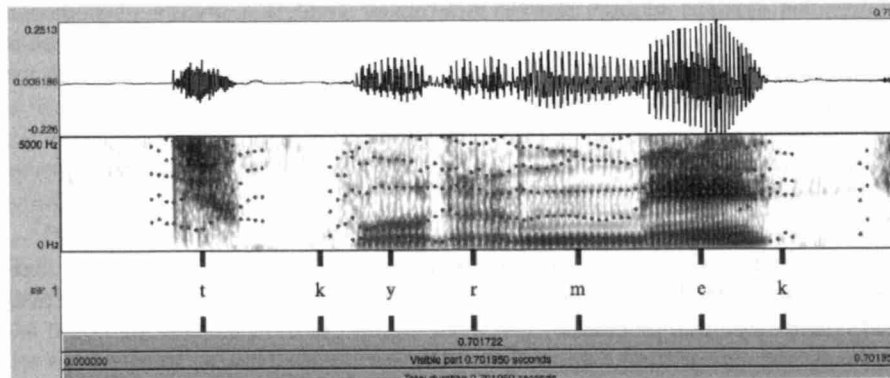

Figure 8. A spectrogram of /tykyrmek/ 'to spit'

There is no trace of the vowel present in the spectrogram, while the preceding [t] is fricated and audibly palatalized. Thus, the front character of the deleted vowel /y/ is

vowel/zero alternations of the *burun* ~ *burnum* type are not gradual and are exceptionless and thus can be analyzed as lexical.

22 To address a reviewer's question, the vowel deletion is extremely widespread in casual speech.

evidenced by the presence of palatalization, while the rounding is only discernable from the fact that the vowel in the second syllable is round. In case of the deletion of /ɨ/, as in, for instance, [pʃɪrmek] 'to cook', the preceding consonant is not palatalized, rendering the palatal harmony opaque.

Crimean Tatar words exhibit default word-final stress, as shown in (21).[23] It has been argued for Turkish (Levi 2005) that its default final stress is postlexical (it is predictable, not "strong", and native speakers are not aware of it). This seems to be the case for Crimean Tatar as well.

(21) *ara'ba*   'cart'
      araba-'lar   'cart-PL'
      araba-lar-ɯ'mɯz   'cart-PL-1PL.POSS'
      araba-lar-ɯmɯz-'dan   'cart-PL-1PL.POSS-ABL'

High vowels never delete in word-final (stressed syllables), but high vowel deletion is also attested in non-initial syllables. The initial syllable takes precedence for syncope: if two consecutive high vowels are present in a word, and the first one is in the initial syllable, it will delete and the next one will stay, as several examples in (20) illustrate (Kavitskaya 2004, forthcoming). We will not be concerned with the precise conditions for the deletion of vowels in non-initial syllables here, but example (22) shows that syncope of high vowels in Crimean Tatar is a phrasal phenomenon (Kavitskaya 2010: 30). The vowel [ɯ] that is deleted in (22) is word-final, so it would never undergo deletion pre-pausally. However, the deletion happens in the prosodic phrase where this vowel is not final and not stressed.

(22) *tʃaluʃ-ɯp*   *ol-ɣan*   [tʃɑ.lɯʃ.pol.ɣɑn]   'able to work'
      work-conv   be-past

While the initial syllable is the most prominent for vowel harmony, which is a lexical process, it is the least prominent for stress and syncope, stress being a postlexical and syncope a phrasal process.

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23 Final stress is overridden by lexical stress in both roots and pre-stressing suffixes, as for instance, in *'nasɯl* 'which, how', or verbs with the 1st singular present suffix *-Im*, as in *a'ʃar-ɯm* 'I eat', or verbal negation suffix *-mA*, as in *'bar-ma-dɯ* 'he didn't go', etc.

4. The restructuring of vowel inventories in the dialects of Crimean Tatar

4.1. The inventory

The vowel inventory of the central and nothern dialects of Crimean Tatar is shown in (23), where the parts of the inventory that currently undergo restructuring in various ways are circled.

(23)   The vowel system of central and northern Crimean Tatar
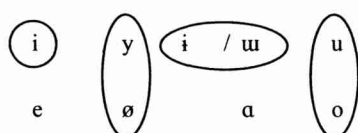
First, the front high unrounded vowel /i/ is truly marginal, occurring only in a handful of words with one attested minimal pair (*kir* 'mud' vs. *kir* 'come in'). Second, the high central vowel /ɨ/ was introduced by the *i > ɨ change (/i/ arguably reintroduced through borrowing). There is a phonetic merger of the non-back /ɨ/ and back /ɯ/. Third, rounded vowels are restricted, more so in the northern dialect where they are licensed only in the initial syllable than in the central dialect where labial harmony is present in the first two syllables of a word. Finally, front rounded vowels undergo backing in monosyllabic words, with the palatalization of the following *l, r*, and *z*, as was discussed in section 3.2.

The restriction on rounded vowels makes the labial harmony severely limited. It is lost in the northern dialect, but even in the central dialect, where it is restricted to the initial disyllabic window of the word, this requirement is rendered opaque by the syncope of high vowels in initial syllables, leaving only one rounded vowel in a word, as in [tkyrmek] 'to spit'.

Palatal harmony is more stable. There are lexical items that are counterexamples to it, but it is kept in all three dialects. However, the *i/ɯ* merger may turn out to be problematic for palatal harmony, especially given the fact that [ɨ] does not palatalize the preceding consonant. That said, northern and central Crimean Tatar may be on the way to losing palatal harmony altogether or keeping it for non-high vowels only.

Given the development of vowel inventories in central and northern Crimean Tatar, there is a possibility that the language is on the way to a system where the feature [round] is not contrastive any more. The most extreme is the northern dialect, which has no rounding harmony and contrastive [round] only in the initial syllables, and even there high round vowels undergo optional unrounding. The phonologization of this unrounding can result in a hypothetical vowel system in (24).

(24)   A possible development of the Crimean Tatar vowel system
    (i)   i/ɯ
        e   a

In this inventory, the high front /i/ is marginal; thus only one high vowel remains after the merger of /ɨ/ and /ɯ/, and no rounded vowels are left. Of course, such a drastic restructuring is not attested yet, but it is a possibility given the developments discussed above.

4.2. An analysis

The Crimean Tatar data provide support for Kiparsky's (2013) suggestion to keep the notions of contrastiveness and distinctiveness separate under the Stratal OT perspective on sound change. Kiparsky's proposal is presented in (25), separating the traditionally conflated structural notion of contrastiveness, that is, unpredictable distribution, and the perceptual notion of distinctiveness.

(25)   A possible development of the Crimean Tatar vowel system

	contrastive	non-contrastive
distinctive	phonemes	quasi-phonemes
non-distinctive	near-merged	allophones

The table in (26) illustrates the four proposed categories in the central dialect of Crimean Tatar. Among the high vowels of Crimean Tatar, /i/ and /ɨ/ are contrastive and distinctive and are thus phonemes. Both /i/ and /ɨ/ have non-contrastive and non-distinctive reduced variants, which are allophones. In addition to these traditional terms, two more are required to address the inventory. *i* and *ɯ* in the central dialect are merged or near-merged and thus are contrastive but non-distinctive. Finally, the distinction between *k* and *q* and between non-palatalized and plain consonants is quasi-phonemic, except in the cases where the originally fronted rounded vowels underwent backing. While palatalized and plain consonants are distinctive, they are not contrastive, but are on the way to becoming phonemic should the described changes in the inventory take place.

(26)   Contrastiveness and distinctiveness in central Crimean Tatar

	contrastive	non-contrastive
distinctive	phonemes	quasi-phonemes
	/i/ vs. /ɨ/	k vs. q, C vs. Cʲ
non-distinctive	near-merged	allophones
	/ɨ/ vs. /ɯ/	/i/ [i] not reduced
	[ɪ], [ɨ] reduced	

The proposal in (26) correlates well with the analysis of Crimean Tatar in terms of Lexical Phonology (Kiparsky 1982, 1985; Mohanan 1982, 1986; and subsequent work). Here I will only present an analysis for the central dialect, the most complex of the three. The levels and the relevant processes for central Crimean Tatar are outlined in (27).

(27) Levels in Crimean Tatar
Level 1: Lexical
Vowel Harmony
Level 2: Postlexical
Palatalization
Stress
Level 3: Phrasal
Syncope

I briefly illustrate the proposed system with a Stratal OT analysis (Bermudez-Otero 1999, Kiparsky 2000, 2003). Stratal OT is a hierarchically organized system of serially related modules that correspond to traditional Lexical Phonology levels. Each of the levels is a parallel constraint system of the classical OT type (Prince & Smolensky 1993). The difference between modules is achieved by promoting constraints that are lower ranked at the earlier levels. This model was successfully used to model sound change as well (Bermudez-Otero 1999, Kiparsky 2013 and other work).

Vowel harmony is a lexical process in Crimean Tatar. The domain of vowel harmony is the word. There are lexical exceptions to the harmony, and it is categorical. The phonemic distinctions are all that matters lexically, and for the purposes of vowel harmony all high vowels are both targets and triggers. The vowels are either [+back] (ɯ and u) or [-back] (i, y, and ɨ).

The merger of /ɨ/ nor /ɯ/ only matters in postlexical phonology, and neither /ɨ/ nor /ɯ/ causes palatalization of the preceding consonant. Thus, postlexically high vowels are split along a different dimension, where /i/ and /y/ are palatalizing segments, and /ɨ/, /ɯ/, and /u/ are not, by virtue of being non-coronal. Should the constraints that are responsible for the palatalization on this level be promoted and become higher ranked on the lexical level, it will result in the sound change, with quasi-phonemic palatalization becoming phonemic in Crimean Tatar.

Syncope is a phrasal phenomenon, gradual and phonetic in character and applying to structures larger than words. Syncope has to follow both harmony and palatalization, and does not distinguish between high vowels: all high vowels delete in the initial syllable of a prosodic word.

To provide an illustration for this analysis, I will use a set of general constraints proposed to account for vowel harmony. Since palatal and labial harmonies in southern Crimean Tatar are identical to that of Turkish, any account of Turkish vowel harmony addresses the southern Crimean Tatar facts as well (for a summary of the accounts of vowel harmony in Turkish, see Walker 2012).

According to the Walker's (2011) typology of vowel patterns in the world's languages, vowel harmony in Crimean Tatar belongs to a category of vowel patterns that involve indirect licensing. In such cases, the vowel in the licensing position does not alternate and controls assimilation in other positions. In Crimean Tatar, it is the vowel in the initial syllable, having a perceptually strong position, that controls

harmony. I will use the family of LICENSE constraints after Walker (2005, 2011)[24] to express this prominence-based configuration. The LICENSE([bk], $\sigma_{initial}$) in (28) conveys the fact that the feature [back] is necessarily affiliated with the initial syllable. This constraint will penalize each token of the feature [back] belonging to a chain where no members of that chain coincides with the initial syllable.

(28)   LICENSE([bk], $\sigma_{initial}$): Feature [back] must be associated to the initial syllable.

The constraint LICENSE([bk], $\sigma_{initial}$) with the constraint *DUPLICATE([bk]) that penalizes duplication of the feature [back] achieves palatal harmony in Crimean Tatar.

For labial harmony, a constraint similar to that in (28) is provided in (29). This LICENSE constraint conveys that the feature [+round] must be affiliated with the initial syllable and will penalize each token where the feature [+round] belonging to a chain where no members of that chain coincide with the initial syllable.

(29)   LICENSE([+rd], $\sigma_{initial}$): Feature [+round] must be associated to the initial syllable.

Due to the fact that [+back] only spreads onto high vowels, labial harmony requires a constraint that will single out high vowels as the only targets. As Walker (2012) discusses, there are many possible ways to achieve this result, so for our purposes we will use the constraint *ROLO in (30) that blocks harmony if the output contains a non-high rounded vowel that is not present in the input (Kaun 2004: 105).

(30)   *ROLO: Nonhigh rounded vowels are avoided.

LICENSE([+rd], $\sigma\sigma$) in (31) addresses the fact that in the central dialect the feature [round] requires two syllables in order to surface (Walker 2001, 2005). Even though the initial position is prominent, it is not sufficiently strong to license [+round] in central Crimean Tatar (note that in northern Crimean Tatar it is the only position that licenses [+round]). Otherwise, rounded vowels are avoided by virtue of the constraint *ROUND.

(31)   LICENSE([+rd], $\sigma\sigma$): Feature [+round] must be associated to positions
        in two syllables.

The DEP constraint in (32) penalizes every insertion of a feature that is not present in the input.

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24 See Walker (2011: 44–48) on the formal definitions of LICENSE constraints.

(32) DEP(F): Assign a violation mark for every instance of the feature in the output that has no correspondent in the input.

The tableau in (33) illustrates the labial harmony in the central dialect of Crimean Tatar on the example of the word *tykyrem* 'I spit'.

(33) Level 1: Labial harmony in central Crimean Tatar

tykIrEm	LICENSE ([+rd], σσ)	LICENSE ([+rd], σ_init)	DEP[+rd]	*RD	*RoLo
a. tykyrem				**	
b. tykirem	*!			*	
c. tikirem			*!		
d. tikyrem	*!	*	*	*	
e. tikyrom		*!	*	**	*

The output of Level 1 has its vowel harmony in place and becomes the input to Level 2, where stress is assigned and the eligible consonants undergo palatalization before the high front vowels [i] and [y]. Syncope becomes active at Level 3. The *NUC/X constraints drive the syncope that only targets high vowels (on differential syncope, see Gouskova 2003, and also Prince & Smolensky 1993, de Lacy 2004, 2006). The ranking in (34) states that having high vowels in the nucleus of a syllable is worse than having non-high vowels in this position. At Level 3, the syncope constraints are promoted above MAXV in (35), which is a constraint against vowel deletion.

(34) *NUC/i,y,ɨ,ɯ,u >> *NUC/e,ø,ɑ,o (informally, *NUC/high >> *NUC/low)

(35) MAXV: Assign a violation mark for every input vowel that has no output correspondent.

As pointed out in Kavitskaya (forthcoming), syncope in Crimean Tatar is problematic for the surface-oriented classical OT approach. Given our current constraints on syncope, we still cannot explain why the winner is *tkyrem* and not the unattested *tykrem*, even though the second candidate fairs better from the point of view of every constraint we proposed so far. In the first case, the onset created by syncope is not allowed by the lexical phonotactics of the language, while the second candidate is perfectly acceptable. In both cases, on the surface there is a high vowel in the first syllable, so the candidate *tykrem* cannot be ruled out by the prohibition on high vowels in initial syllables. Finally, both candidates render opaque the requirement that the feature [+round] be licensed by the two syllables.

The tableau in (36) illustrates the nature of the problem. There is no possible ranking under which the opaque candidate (36)c would emerge as the winner; it is harmonically bound. LICENSE([+rd], σσ) does not choose between transparent candidates (36)b and (36)d, and a high ranked *NUC/hi would rule out (36)b (a candidate with no syncope), but the transparent (36)d would still win.

(36)   Crimean Tatar syncope in classic OT

/tyk-Ir-Em/	LICENSE ([+rd], σσ)	*NUC/hi	DEP[rd]	MAXV
a. tykirem	1	2		
b. tykyrem		2	1	
☞ c. tkyrem	1	1	1	1
d. tkirem		1		1
e. tykrem	1	1		1

However, this kind of opacity is not a problem for derivationally oriented models of OT, such as Stratal OT. The input for Level 3 is the output of the postlexical Level 2, where stress and other prosody get assigned. Level 2, in turn, gets its output from Level 1, where syllabification applies since the LICENSE(Feature, σ$_{initial}$) constraint crucially refers to the vowel in the initial syllable. This information is necessarily present in the input, so the constraints at Level 3 are free to use it. We can thus amend the *NUC/high/σ$_{init}$ constraint to refer to the correspondence between the first vowel in the input and in the output.

The tableau in (37) shows the final output after the syncope on the phrasal level.

(37)   Level 3: Syncope in central Crimean Tatar

ty$_1$.ky.rem	MAXC	*NUC/high/σ$_{init}$	MAXV	*NUC/high	*NUC/low
a. ty$_1$.ky.rem		*!			
a. tkyrem			*	*	*
b. ty$_1$krem		*!	*	*	*
c. tkrem			**!	*	*
d. ty$_1$kem	*!	*	*	*	*

None of the constraints that are shown in the tableau for Level 1 figures here, since they are demoted and thus irrelevant in the selection of the winner at Level 3. The

high ranking of MAXC ensures that there is no cluster simplification through conso-
nant deletion.[25]

Conclusions

This paper had a descriptive and an analytical goal. In the first part of the paper, I
introduced a description of vocalic inventories of the three dialects of Crimean
Tatar, supported by phonetic measurements. I also provided a description and analy-
sis of palatal and labial harmony in the language, along with some conjectures on
possible diachronic developments of harmony that are connected to the changes in
the inventory. I showed that the introduction of a new high unrounded vowel into
the vowel system affected the palatal harmony, making it partially opaque, and that
the marginal status of rounded vowels, together with the syncope of high vowels and
the unrounding of front rounded vowels, had a detrimental effect on the labial har-
mony.

In the second part of the paper, I argued that the Crimean Tatar data provide sup-
port to the proposal of Kiparsky (2013) that distinctiveness and contrastiveness
should be viewed as independent notions and that Crimean Tatar alternations pro-
vide evidence for levels in the system since the contrast is manifested differently
lexically (vowel harmony), postlexically (palatalization), and phrasally (syncope).
Finally, I provided an analysis of vowel harmony in central Crimean Tatar based on
Walker's (2011) theory, and proposed a possible account for phrasal syncope in Cri-
mean Tatar.

Acknowledgements

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25 While it is outside of the scope of this paper, it is worth noting that cluster simplification
through consonant deletion is attested in the postlexical phonology of Crimean Tatar in
the codas of non-falling sonority (as in /dost/ [dos] 'friend') (Kavitskaya 2010: 20). Fur-
ther splitting of MAXC will insure that this generalization is accounted for.

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