Epiphenomenal and true non-iterative harmony

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12.1 Introduction

In many cases, a vowel harmony process may generate outputs that, in turn, feed further application of the harmony process. In other words, vowel harmony often applies iteratively within some domain, often the word, harmony (van der Hulst & van der Weijer 1995; Casali 2008; Rose & Walker 2011; Walker 2012). However, iterative, word-delimited harmonies are not the only types attested among the world's language. This chapter focuses on patterns that do not apply throughout an entire word (see Ch. 20 for phrasal patterns). Before wading too deeply in these waters, a few definitions are necessary. Within a given domain, I define iterative, non-iterative, and bounded iterative harmony in (1-3).

(1) Iterative harmony: a harmony pattern in which *every* potential featurally-defined target may assimilate to [F].
(2) Non-iterative harmony: a harmony pattern in which *only one* featurally-defined target may assimilate to [F].
(3) Bounded iterative harmony: a harmony pattern in which n, where $n > 1$, featurally-defined targets may assimilate to [F].

When we think of harmony, (1) is typically what we consider (van der Hulst and van der Weijer 1995: 501-503). This is evident from the relative scarcity of discussion concerning types (2) and (3) in the various handbook chapters and overviews of vowel harmony (e.g. van der Hulst and van der Weijer 1995; Rose and Walker 2011; cf. Archangeli and Pulleyblank 2007: 367-368).

However, there is a relatively large body of work on iterativity within serial rule-based theories of phonology (Chomsky and Halle 1968 and subsequent work) as well as Optimality Theory (henceforth, OT; Prince and Smolensky 2004). Early work in rule-based approaches explored how to derive non-iterative assimilation, proposing a variety of mechanisms to differentiate iterative from non-iterative patterns (Johnson 1972; Howard 1973; Jensen and Stong-Jensen 1973; Anderson 1974; Kenstowicz and Kisseberth 1977). While the architecture of many rule-based formalisms allows for the direct representation of iterativity and non-iterativity parametrically, encoding non-iterativity is more challenging for OT, as noted by Kisseberth (2007). Since markedness constraints have access only to surface structures (cf. McCarthy 1996), there is no straightforward way to distinguish whether a particular [+F][-F] sequence derives from /[+F][-F]/ or from /…[-F][-F]/. In the first case, [+F][-F] surfaces as the faithful output to the input string without any harmony. In the second, surface [+F][-F] is due to the assimilation of one but not both underlying [-F] elements. Some faithfulness constraint, FAITH, must outrank the harmony-driving constraint, HARMONY, to generate /[+F][-F]/ → [+F][-F]. However, no ranking of these two constraints alone can generate the second; there must be some independent constraint interaction at work in the language that either bans [+F] in that position, or is satisfied by spreading throughout a particular sub-word domain.

Kaplan (2008b) responds to the challenge of modelling non-iterativity in OT with two claims. First, he argues that OT cannot model true non-iterativity, and second, he contends OT should not model non-iterativity because all reported non-iterativity is derivable from some well-motivated, independent constraint interaction in the language. Thus, according to Kaplan (2008b) all non-iterativity is epiphenomenal, and the fact that OT cannot generate it is a desirable result.

I evaluate these two claims below, focusing almost entirely on the second. In discussing the existence of true non-iterativity, I lay out four types of patterns that are analyzable without reference to non-iterativity, as well as a fifth type of pattern, true non-iterativity. I ultimately reject both of Kaplan's (2008b) claims, arguing that true non-iterativity is attested, and that it can be generated in OT.

12.2 Types of non-iterative harmony

When the typology of patterns is examined, five basic types of non-iterativity emerge: domain-bounded, prominence-targeting, featural non-intersection, exceptional harmony, and true non-iterativity. These are discussed in turn.

12.2.1 Domain-bounded harmony

Phonological patterns exhibit sensitivity to a range of word-internal domains, including both morphological and prosodic domains. Among these, the foot provides a (typically binary) sub-word domain to delimit the operation of a number of harmonies. Consider the data from Veps (Uralic) in (4). In Southern Veps, the frontness of the initial syllable controls the frontness of second-syllable vowel, whereas no such effect is evident in the Central and Northern dialects. The fact that stress falls on the initial syllable in Veps renders the pattern consistent with harmony operating within a trochaic foot, e.g. (ký.zy).ma.ha in (4a). Thus, it is possible to analyze the Veps data as either non-iterative spreading of [+front] or as spreading within a foot. In many similar cases, domain-bounded analyses are extensionally equivalent to a non-iterative analysis. As a result, the sub-word pattern found in Veps does not provide clear evidence for true non-iterativity.

(4) Foot-bounded palatal harmony in Veps (Zaiceva 1981)

	Southern	Central/Northern	Gloss
a.	kýzy-ma-ha	kýzu-ma-ha	ask-INF.3-ILL
b.	nǽlktyda	nǽlktuda	be.hungry
c.	lǽmptæʃkandob	lǽmptaʃkandob	fills.up

Another case of foot-bounded harmony is found in Kera (Pearce 2006; 2007; Ch. 48), where the head an iambic foot controls the realization of frontness of the non-head. More generally, among the word-internal forces that interact with harmony, foot and metrical structure have played a significant role in a number of theoretical approaches (Halle and Vergnaud 1981; van der Hulst and Smith 1982; Abu-Salim 1987; Hualde 1989).

12.2.2 Prominence-targeting harmony

Distinct from the pattern above, the trigger for harmony may also occur in a weak position, triggering assimilation of a stronger position. This is precisely the analysis of metaphony patterns developed in Walker (2005; 2011; see also Chs. 8. 68, and 69). Consider the pattern from Grado (Romance) in (5). In the left-hand column, stressed mid vowels are followed by non-high vowels. However, in the right-hand column, when these same mid vowels are followed by a high vowel, they raise to high. Observe that in (5a,b), [+high] affects the initial/penultimate vowel in disyllabic words. Thus, it is not possible from these data to determine whether [+high] spreads throughout the entire word, up to the stressed mid vowel, or just one syllable leftward. In (5c) though, it is clear that raising does not extend throughout the entire word. At this point, it is unclear whether raising is truly non-iterative or terminates at the stressed syllable. Crucially through, (5d), demonstrates that the extent of [+high] spreading is defined by stress, not by the number of syllables affected. The pattern in (5a-c) only appears to be non-iterative because the trigger and target are in adjacent syllables. Walker argues that the [+high] feature of the post-tonic vowel is licensed only by affiliation with a prominent position, i.e., the stressed syllable, in Grado. As such, her analysis is able to generate the pattern without reference to iterativity. It is worth noting that while foot-based and non-iterative analyses of Veps above generate the same outputs, a non-iterative analysis of Grado fails to predict forms like (5d).

(5) Stress-targeting metaphony in Grado (Walker 2005: 924-926)

	Post-tonic vowel is [-high]		Post-tonic vowel is [+high]	
a.	mét-o	put-1.SG	mít-i	put-2.SG
b.	rénd-e	return-3.SG	rínd-i	return-2.SG
c.	odorós-o	odorous-M.SG	odorús-i	odorous-M.PL
d.	ʃóven-e	young.man-M.SG	ʃúvin-i	young.man-M.PL

Kaplan (2008a; 2015) discusses a number of examples of similar patterns, including umlaut in German and Chamorro, and ATR harmony in Lango. He argues that in all of these, the target of harmony is a prominent position, e.g., primary stressed syllable, or root. To the extent that this sort of analysis accounts for the facts in each language, direct reference to (non-)iterativity is not necessary (see Chapter 23 for more on prominent positions in harmony).

12.2.3 Featural non-intersection

A third type of apparent non-iterativity may emerge when the requisite features of triggers and targets of harmony do not intersect. Consider the example from regressive ATR harmony in Bengali (Mahanta 2008) in (6). In each case, a [-hi, -ATR] vowel surfaces as [+ATR] before a [+hi, +ATR] trigger. Observe that the requirement that triggers be [+hi] precludes any further propagation of [+ATR] since the harmonized mid vowel is not a possible trigger in the language.

(6) Trigger-target non-intersection in Bengali (Mahanta 2008: 152-153)

	Unsuffixed	Gloss	Suffixed	Gloss
a.	pɔt^h	way	pot^{h}ik	traveler
b.	pɔd	position	pɔdobi	position.holder
c.	ɔʃɔt	dishonest	ɔʃoti	dishonest.F

Consider two different rule-based characterizations of the Bengali pattern in (7). Despite the fact that (7a) is formulated as non-iterative while (7b) is iterative, these two rules are extensionally equivalent. Since the targets of harmony can never be the triggers, the iterative rule in (7b) will never actually feed itself.

(7) a. [+syllabic, -high, -low] → [+ATR] / ___ C_0 [+syllabic, +high, +ATR]; [-iterative]
b. [+syllabic, -high, -low] → [+ATR] / ___ C_0 [+syllabic, +high, +ATR]; [+iterative]

Similar patterns are found in Icelandic and Mayak, where high round vowels trigger rounding of low vowels (Anderson 1974; Andersen 1999).[1] In harmonies like these, iterativity is simply precluded by the conditions on triggers and targets.

[1] A well-discussed example of trigger-target non-intersection is n-retroflexion in Sanskrit, also called *nati*; (Whitney 1879; Allen 1951; Kiparsky 1985; Ryan 2017).

12.2.4 Exceptional harmony

In some cases, only a given morpheme or a small set of morphemes may alternate for harmony (e.g. Finley 2010). This stands in contrast to oft-discussed cases where harmony affects all or almost all morphemes in the relevant domain. The type of exceptional morpheme that yields surface non-iterativity is what Finley calls an *exceptional undergoer*. In a language with exceptional undergoers, the result may appear to be non-iterative. That being said, if a language were to possess a set of exceptional undergoers that could co-occur, then one would expect to find harmony extending throughout those morphemes, unlike a truly non-iterative pattern. Like featural non-intersection, in the exceptional harmony patterns attested in languages like Yucatec Maya (Krämer 2001) and Namangan Tatar (Harrison and Kaun 2003), the set of morphemes that may trigger harmony does not intersect the set of morphemes that may undergo harmony. For a list of more exceptional patterns, see Finley (2010: 1563-1564).

12.2.5 True non-iterativity

The four previous patterns are all amenable to Kaplan's analysis because in each, despite the superficial appearance of non-iterativity, the extent of harmony is definable in other terms. Generalizing from such patterns, Kaplan (2008b) predicts that no pattern should exist where the extent of harmony depends on direct reference to non-iterativity. However, such a pattern is robustly attested in the rounding harmony pattern found in the Central dialect of Crimean Tatar (Turkic; Kavitskaya 2010; 2013; McCollum and Kavitskaya 2018, 2021). Throughout, I compare the Central dialect with the Southern dialect, which exhibits an iterative pattern of rounding harmony. Before considering how these two dialects differ from one another, the data in (8) show the core pattern shared by both dialects – high vowels undergo rounding after a round vowel, in addition to a more pervasive pattern of backness harmony. As illustrated by the locative suffix in (8), non-high vowels do not undergo rounding harmony (see also Chs. 5 and 59) in either dialect. In (8), a variety of suffixes with high vowels undergo harmony in these two dialects, including the first- and third-person possessive, and adjectival suffixes,

(8) Rounding harmony in Southern and Central Crimean Tatar

	Gloss	NOM	LOC	POSS.1S	POSS.3S	ADJ
a.	salt	tuz	tuz-da	tuz-um	tuz-u	tuz-lu
b.	autumn	kyz	kyz-de	kyz-ym	kyz-y	kyz-ly
c.	dust	toz	toz-da	toz-um	toz-u	toz-lu
d.	eye	køz	køz-de	køz-ym	køz-y	køz-ly

However, in words with more than one non-initial high vowel, the patterns in these two dialects diverge (9). Whereas the Southern dialect spreads lip rounding to all non-initial high vowels, the Central dialect only rounds the second-syllable high vowel. Observe that this holds true of words derived from monosyllabic (9a-f) and as well as disyllabic roots (9g-i). In both dialects, backness harmony holds regardless of vowel height.

(9) Non-iterative rounding harmony in Central Crimean Tatar

	Southern	Central	Gloss
a.	tuz-luɣ-u	tuz-luɣ-ɯ	salt-NMLZR-POSS.3S
b.	kyz-lyg-y	kyz-lyg-i	autumn-NMLZR-POSS.3S
c.	toz-luɣ-u	toz-luɣ-ɯ	dust-NMLZR-POSS.3S
d.	køz-lyg-y	køz-lyg-i	eye-NMLZR-POSS.3S
e.	tuz-luɣ-umuz	tuz-luɣ-ɯmɯz	salt-NMLZR-POSS.1P
f.	køz-lyg-ymyz	køz-lyg-imiz	eye-NMLZR-POSS.1P
g.	domuz-u	domuz-ɯ	pig-POSS.3S
h	køʃyg-y	køʃyg-i	villa-POSS.3S
i.	jyzym-y	jyzym-i	grape-POSS.3S

In order to demonstrate that the pattern in Central Crimean Tatar is truly non-iterative, it must be shown that the domain of harmony is not derivable from other factors. First, as noted in (Sevortjan 1966; Kavitskaya 2010), stress regularly falls on the final syllable. However, some descriptions of the language, and the larger Turkic family, suggest that stress may also fall on the initial syllable (Sevortjan 1966: 239; Baski 1986: 119; Johanson 1998: 35). Two pieces of evidence support that stress is word-final, vowel syncope and pre-stressing suffixes. High vowels may be elided in all non-final syllables, but are never elided in final syllables (Kavitskaya 2010: 28-31). Moreover, in my experience, the position in which high vowel deletion is most common is actually the initial syllable (cf. Sevortjan 1966: 239), suggesting that the initial syllable exhibits no special prosodic or metrical privilege. Second, as in many Turkic languages, some suffixes (or alternatively, enclitics) are unstressable, and in these instances, stress shifts to the preceding syllable (Johanson 1998). The existence of such suffixes indicates that the locus of stress is at the right edge of the word. If stress were defined by the left edge of the word, then we might expect to find native words with exceptional stress referencing the left edge of the word. Since the evidence gathered to-date supports a single stress falling on the ultima, two possible metrical analyses could be envisioned for the language. Either the language builds a single, binary foot at the right edge of the word, or a right-headed unbounded foot, both of which are exemplified in (10). It is obvious in (10) that the extent of rounding harmony does not coincide with either possible analysis, reinforcing the independence of rounding harmony from any metrical domain.

(10) Potential foot structures in Central Crimean Tatar

	Binary	Unbounded	Gloss
a.	(tuz.lúq)	(tuz.lúq)	salt-NMLZR
b.	tuz.(lu.ɣɯ́)	(tuz.lu.ɣɯ́)	salt-NMLZR-POSS.3S
c.	tuz.lu.(ɣɯ.mɯ́z)	(tuz.lu.ɣɯ.mɯ́z)	salt-NMLZR-POSS.1P
d.	tuz.lu.ɣɯ.(mɯz.dán)	(tuz.lu.ɣɯ.mɯz.dán)	salt-NMLZR-POSS.1P-ABL

In addition to the evidence above, the complete independence of harmony from any particular word edge is supported by the existence of several suffixes that are invariantly [+round] and may trigger harmony. The gerundial and collective suffixes, like initial-syllable round vowels, trigger harmony on a following high vowel (11). In (11a-c), the gerundial suffix triggers rounding on the third-syllable vowel despite the fact that the initial vowel is unrounded Note also that harmony in (11c) operates between word-medial syllables only; neither the trigger nor target occurs at a word edge. In (11d), the first- and second-syllable vowels are underlyingly round, which results in a three-syllable span of rounding on the surface. These same generalizations hold for the collective suffix, as well (11e-g).

(11) Rounding harmony after GER and COLL in Central Crimean Tatar

a.	/as-uv-lɯ/	→	[as-uv-lu]	hang-GER-ADJ
b.	/atʃ-uv-ɯ/	→	[atʃ-uv-u]	open-GER-POSS.3
c.	/atʃ-uv-ɯ-dan/	→	[atʃ-uv-u-ndan]	open-GER-POSS.3-ABL
d.	/qoj-uv-ɯ/	→	[qoj-uv-u]	put-GER-POSS.3
e.	/bir-ju-ɯ-n/	→	[bir-jy-y-n]	one-COLL-POSS.3-ACC
f.	/ek-ju-ɯ-n/	→	[ek-jy-y-n]	two-COLL-POSS.3-ACC
g.	/ytʃ-ju-ɯ-n/	→	[ytʃ-jy-y-n]	three-COLL-POSS.3-ACC

The data in (12) further demonstrate the independence of the pattern from any word edge. In (12a), the initial-syllable vowel triggers harmony on the past tense suffix. In (12b), the same root-internal vowel triggers rounding of the causative suffix but not the third-syllable past tense suffix. In (12c), both the initial-syllable and the third-syllable [+round] vowels trigger harmony on the following high vowels, resulting in a four-syllable span of round vowels. In (12d,e), longer words show that the four contiguous [+round] syllables in (12c) must be derived from two separate instances of non-iterative harmony.

(12) Multiple instances of non-iterative harmony within a single word

a.	/tol-dɯ/	→ [tol-du]	fill-PST.3S
b.	/tol-dɯr-dɯ/	→ [tol-dur-dɯ]	fill-CAUS-PST.3S
c.	/tol-dɯr-uv-ɯ/	→ [tol-dur-uv-u]	fill-CAUS-GER-POSS.3S
d.	/tol-dɯr-ɯl-uv-ɯ/	→ [tol-dur-ɯl-uv-u]	fill-CAUS-PASS-GER-POSS.3S
e.	/tol-dɯr-ɯl-uv-ɯ-nɯ /	→ [tol-dur-ɯl-uv-u-nɯ]	fill-CAUS-PASS-GER-POSS.3S-ACC

The pattern in Central Crimean Tatar is strikingly clear, and it is not the only attested case of truly non-iterative harmony. A number of other languages with similar patterns are listed in (13). Note that some of these patterns involve optionality. In Kazakh, rounding does not always obtain on the second syllable (McCollum 2018). Moreover, in Noghay, Baskakov (1940:11) describes three domains of rounding, no harmony, non-iterative harmony, and iterative harmony. He illustrates with the underlying form /kyn-lAr-ImIz-GA/ 'day-PL-POSS.1P-DAT'. Again, harmony is optional, and may result in one of the three following forms: rounding on the first syllable only [kynlerimizge], rounding on the first two syllables [kynlørimizge], and rounding on all syllables [kynlørymyzgø].

Almost all of the patterns in (13) come from Turkic rounding harmony. This is certainly a byproduct of my own biases, but note that two non-Turkic languages are included in (13). While the pattern in Asia Minor dialects of Greek (13e) is likely contact-induced, the non-iterative ATR harmony pattern in the Nilotic language Kumam (13f) provides reasonable evidence that non-iterative vowel harmony may exist elsewhere among the world's languages.

(13) Languages with non-iterative vowel harmony

a. Central Crimean Tatar rounding harmony (Kavitskaya 2010, McCollum and Kavitskaya 2021)
b. Kazakh rounding harmony (Balakaev 1962; McCollum 2018)
c. Karakalpak rounding harmony (Menges 1947)
d. Noghay rounding harmony (Baskakov 1940)
e. Asia Minor Greek backness harmony (Ch. 71; see also Revithiadou et al. 2017)\
f. Kumam ATR harmony (Hieda 2011: 5)

In addition to word-internal harmonies discussed here, a number of phrasal harmonies also exhibit non-iterativity, (Ch. 20; see also, Ampofo and Rasin 2020; Obiri-Yeboah and Rose 2021; cf. Kaplan 2008b: ch. 5).

Returning to Kaplan's (2008b) claim, if non-iterative harmony is not always derivable from independent processes in a language, there appears to be no obvious way to sidestep encoding this fact in the grammar. In many cases, an analysis predicated on non-iterative feature spreading is extensionally equivalent to one derived from other well-attested processes.

However, in other cases, e.g., Central Crimean Tatar, the evidence clearly points to a grammatical distinction between iterative and non-iterative processes, supporting the necessary existence of iterativity and non-iterativity in the phonological grammar.

12.3 Bounded iterativity

If vowel harmony may trigger alternations on a single vowel within a given domain or iterate throughout that domain, an ancillary question arises – can vowel harmony trigger alternations on *n* vowels within a given domain? Although there is some evidence that tonal patterns may be able to count beyond two (Marlo, Mwita, and Paster 2015), there is very little evidence that harmony may operate with *n*-ary domains. Perhaps the most suggestive evidence comes from one of the languages already discussed, Veps (see also Noonan 1992: 32, 79 for evidence from Lango). In (4), Veps is presented as foot-bounded harmony, which is consistent with the transcriptions in Zaiceva (1981). However, Zaiceva (1981, 306) states, "Vowel harmony in the Veps language is only partial. It is most widely represented in the Southern dialect. However, there it does not spread beyond the second or third syllable [my translation]." If harmony may optionally target a third-syllable in Veps, then one might expect harmony within a three- or four- or even five-syllable domain. However, in the absence of conclusive evidence supporting such a domain in harmony, I will leave the question of bounded iterativity to further work.

12.4 Analyzing non-iterativity

The claim advanced herein – that non-iterativity is not emergent – has significant consequences for theoretical analysis. In most rule-based formalisms, encoding non-iterativity is unproblematic, as these formalisms have dedicated parameters by which to control the iterativity of a given rule. For OT however, this is a real challenge. Consider the tableau below for [tuz-luɣ-ɯ] in Central Crimean Tatar (14). If the markedness constraint driving harmony outranks the relevant faithfulness constraint, iterative harmony is generated (as in the Southern dialect). If, however, the ranking is reversed, no harmony is preferred; the non-iterative candidate is harmonically bounded, as no ranking of these constraints can motivate non-iterative harmony.

(14)

/tuz-lɯq-ɯ/	*[+RD][+HI, +RD]	IDENT-IO[RD]	
tuz-lɯɣ-ɯ	*!*		*no harmony*
tuz-luɣ-ɯ	*!	*	*non-iterative harmony*
☞ tuz-luɣ-u		**	*iterative harmony*

However, the inability to generate non-iterative harmony in (14) is really due to the particular constraints invoked, not the larger constraint-based formalism. Here I list a few types of analyses that are able to generate non-iterative harmony. In Agreement-by-Correspondence (Rose and Walker 2004; Hansson 2010; Bennett 2013), a highly-ranked PROXIMITY constraint can limit correspondence to two syllables, which in turn limits harmony to a binary domain. In Optimal Domains Theory (Cole and Kisseberth 1994; Cassimjee and Kisseberth 1998), the constraint *MONO penalizes any domain that is monosyllabic. Under a variety of rankings, the optimal way to satisfy this constraint is by constructing a binary (non-iterative) harmonic domain. A similar analysis is possible in McCarthy's Span Theory (McCarthy 2004: footnote 9), which relies on autosegmental representations.

Independent of Span Theory, autosegmental representations allow an OT analysis of non-iterativity via an ADJACENCY constraint (McCollum & Kavitskaya 2021), which penalizes an autosegment linked to elements that are not syllable-adjacent. If ADJACENCY outranks a harmony-driver like Walker's (2011) maximal harmony constraint, autosegmental spreading is limited to a single adjacent syllable, as in (15).

(15) Non-iterative harmony with autosegmental representations

[rd] | /tuz-lɯq-ɯ/	ADJACENCY [RD]	∀-HARMONY-R ([RD],V)	IDENT-IO[RD]	
[rd] | \ \ tuz-luɣ-u	*!		**	*iterative harmony via spreading*
[rd][rd] | | tuz-luɣ-ɯ		**!	*	*non-iterative harmony via feature copying*
[rd] | tuz-lɯɣ-ɯ		**!		*no harmony*
☞ [rd] | \ tuz-luɣ-ɯ		*	*	*non-iterative harmony via spreading*

The preceding sketch should make it clear that non-iterativity is not an insurmountable challenge for OT. That being said, it is important to recognize that the term 'non-iterativity' in the phonological literature assumes a derivational grammar. Moreover, given the nature of the grammatical architecture in OT, constructs like iterativity and non-iterativity, as well as much-discussed topics like contrast have no obvious formal status – these all fall out from constraint interaction, and have no unique ontological standing on their own. Beyond these architectural differences, the predictions of constraint- and rule-based theories of non-iterativity are not identical; they are each rough approximations of the other, sharing many but not all of the same predicted outputs. As an example, a rule-based approach predicts the possibility of bidirectional non-iterative harmony, but this kind of pattern is precluded by a number of constraints just discussed. Such a pattern would result in either a sequence of three vowels linked to the same autosegment, violating ADJACENCY, or long-distance correspondence, violating PROXIMITY in a correspondence-based analysis. For more discussion of the analysis and typological frequency of non-iterativity, see McCollum and Kavitskaya (2021).

12.5 Conclusion

I thus disagree with both of Kaplan's (2008b) claims. First, it is clear that non-iterativity does not always fall out from the kinds of independent forces discussed above. Rather, based on the presence of patterns like rounding harmony in Central Crimean Tatar, I conclude that all non-iterativity is not epiphenomenal. Second, while Kaplan contends that OT cannot generate non-iterative patterns, this issue depends entirely on the particular constraints used. In a number of cases, existing constraints and representations can readily model patterns that are extensionally quite similar to a serial rule-based account of non-iterative feature spreading.

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