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Phonological ambiguity

DOI 10.1515/tl-2015-0004

1 Introduction[1]

In this article I propose an alternative to the model that Péter Rebrus and Miklós Törkenczy develop in their article "Monotonicity and the typology of front/back harmony." In Section 2 I briefly discuss the data that their model is designed to account for. Section 3 presents my alternative, which I claim is much simpler (it can be stated in four lines of text), while accounting for the same empirical findings and generalizations. In Section 4, I make some concluding remarks.

2 The monotonicity model

The article presents a typology of "weak disharmony" in palatal harmony systems (which is disharmony caused by neutral vowels) and develops a formal system to account for certain systematic implicational patterns in cross-linguistic differences. A central claim is that the observed patterns are due to "a very general principle of patterning, namely, monotonicity."

From the work of Pajusalu and Kiparsky (2002) we know that neutral front vowels can display four different behaviors in different languages (see RT 9):

1. (B = back vowel, F = front vowel, N = neutral vowel; B and F = back and front "behavior")

stem contexts (forming a frontness/backness scale)		[*B*]_	[*BN*]_	[*N*]_	[*FN*]_	[*F*]_
attested language types:						
a.	opacity, no-anti-harmony (E. Khanty)	*B*	*F*	*F*	*F*	*F*
b.	transparency, no anti-harmony (Finnish)	*B*	*B*	*F*	*F*	*F*
c.	transparency, anti-harmony (Uyghur)	*B*	*B*	*B*	*F*	*F*
d.	anti-opacity, anti-harmony (E. Vepsian)	*B*	*B*	*B*	*B*	*F*

1 Thanks to Nancy Ritter for valuable comments on an earlier version of this paper.

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The authors introduce the frontness/backness scale as a primitive of their model and they note that given this scale, the harmonic behavior of stems that is empirically attested in languages follows a certain pattern: there can be only one switch from *B* to *F*. To derive this they formulate a function that assigns the values *B* or *F* to the stem types in the scale (see RT 16). A central claim is that the assignment of *B* and *F* values is **monotonic** (see RT 18), which makes it impossible to derive a pattern such as *BFBFF*, which has two points where the value assignment switches. The monotonic function is curtailed by the stipulation of "proper prototypical values" (see RT 24).

A second finding that the authors want to explain is that the "monotonic" pattern extends to two types of **variability**: lexical variability (involving anti-harmony) and vacillation. Hence *F*/*B* (lexical variability) and *F*%*B* (vacillation) values have to be flanked by *B* and *F* values (or by an identical variability value).

The article aims to account for two additional observations:

– *The polysyllabic split* (see RT 28): In the discussion of anti-harmonicity in their section 4.1, the authors show that all neutral vowel roots are all monosyllabic (there are only two exceptions). The account for this "**polysyllabic split**" effect is to add [*NN*+] to the scale of stem types (see RT 29).

2. [*B*]_ [*BN*]_ [*N*]_ [*NN*+]_ [*FN*]_ [*F*]_

– *The count effect*: In section 4.2, the authors discuss variation in transparency. Stems that have more than one neutral vowel following a back vowel display vacillation. This is called the "count effect"; to account for it the scale is expanded further:

3. [*B*]_ [*BN*]_ [*BNN*+]_ [*NN*+]_ [*FN*]_ [*F*]_

Both the polysyllabic effect and the count effect are curtailed by a principle called **harmonic uniformity** (see page 27), which says that the harmonic class of a suffixed stem is identical to the harmonic class of its root, i.e., [[*X*]*F*] ⇒ [[[*X*]*Y*]*F*] and [[*X*]*B*] ⇒ [[[*X*]*Y*]*B*] for all suffixes containing the vowel *Y* (also see Törkenczy, Rebrus and Szigetvári 2013).

My goal here is to show that there is a much simpler account than the RT model that is proposed in the article which appeals to a rather extensive collection of formal statements and mechanisms. My alternative account, as I will show, predicts the set of attested patterns more precisely (thus excluding non-attested patterns that are permitted, by their own admission, by the RT model). It even explains, without additional machinery, the polysyllabic split and count effect, as well as the paradigm uniformity effects that are attributed to harmonic uniformity.

3 The alternative proposal

3.1 Possible behavior of (front) neutral vowels

Note that the distinction between stem context/type and value in the RT model is much like the old distinction between surface and underlying representation (as, for example, in generative phonology). The values (like underlying representation) indicate how a stem context behaves (i.e., whether it induces frontness or backness), while the stem context/type represents the phonetic surface form.

Assuming then that the mapping from surface phonetic form to underlying form is the central task, I propose the following set of mappings as the only possible functions that assign an underlying, phonemic value to the surface phonetic segment [i] that is *phonetically neutral* in the sense that it is not in contrast with a back counterpart [ɨ]:

4.	a:	[i] is always /i/	(context-free frontness)
	b:	[i] is /ɨ/ after a back vowel, else /i/	(context-sensitive backness)
	c:	[i] is /i/ after a front vowel, else /ɨ/	(context-sensitive frontness)
	d:	[i] is always /ɨ/	(context-free backness)

In (4b) and (4c) the contextual restriction is completely "natural" in that it links the front/back specification of the underlying phoneme to the immediate context. In fact, to see a scalar pattern, we need to reverse cases (4b) and (4c):

5.	a:	E. Khanty: [i] is always /i/	(context-free frontness)
	b:	Uyghur: [i] is /i/ after a front vowel, else /ɨ/	(context-sensitive frontness)
	c:	Finnish [i] is /ɨ/ after a back vowel, else /i/	(context-sensitive backness)
	d:	E. Vepsian: [i] is always /ɨ/	(context-free backness)

Cases (5a)–(5d) show an increase in violating "the naturalness condition" which prefers the underlying representation to be "the same" as the phonetic representation. This is fully observed in (5a) and fully violated in (5d), with (5b) and (5c) being the only two intermediate cases that seem possible given that in context-sensitive statements there will always be a relationship between the phonemic representation that is assigned and the context. (We do not expect a statement like this: [i] is /ɨ/ after a front vowel, else /i/.) Of the four rules in (5), (5d) is clearly to be the most "unnatural" rule (and thus perhaps unstable, rarer, etc.), as well as a more difficult case to learn.

In this suggested alternative there is no appeal to a front/backness scale, whereas the "function" (or set of functions) that assigns underlying phonemes to surface sounds is completely straightforward and natural. The phonemic frontness of a phonetic front vowel [i] is either present (case 5a) or absent (case 5d), or contextual (case 5b and 5c). I will now show that (5) is all we need to account for the patterns and effects that the RT model is designed to account for. For starters, (5) accounts for the four attested patterns in (1) without any appeal to a requirement that enforces monotonicity.

Note that in this account Uyghur and Finnish, while having phonetic neutralization, do not have phonemic neutralization, much as in early generative abstract approaches (see, for example, Vago 1973). The underlying theory here is that underlying /i/ and /ɨ/ can receive the same phonetic interpretation [i], which implies that [i] is phonemically ambiguous. I refer to van der Hulst (in prep.) for a full statement of this theory, which includes representations of phonological segments in terms of unary elements.

3.2 Lexical variability and vacillation

In my alternative approach, we can also easily account for the two types of variability that RT discusses: lexical variability and vacillation.

3.2.1 Lexical variability

In Hungarian the so-called neutral vowel roots come in two categories. The regular case (in which such roots take front suffix vowels) as in Finnish, whereas the irregular case (in which such roots, being anti-harmonic, take back suffix vowels) is as in Uyghur:

6. a. Regular harmonic: víz - nek
   b. Anti-harmonic: híd - nak

The question is how we explain the minor class of anti-harmonic roots. The simplest approach is to say that Hungarian stands mid-way between Uyghur and Finnish. As such it combines (5b) and (5c). Since (5c) is clearly dominant in Hungarian, adherence to (5b) is exceptional. We could thus simply say that anti-harmonic roots are exceptions to (5c). We must bear in mind that the rules in (5) are strategies for setting up underlying representations for root morphemes. The learner of Hungarian can readily observe, from positive evidence, that anti-harmonic roots act in contradiction to their dominant learning strategy, i.e., (5c), and thus set up a lexical representation for anti-harmonic roots that runs counter to (5c). Note that this account explains the monotonic pattern that is observed for lexical variation.

3.2.2 Vacillation

Vacillation occurs in the context [*BN*]_. In other words, [ɛ] can behave as a back vowel or as a front vowel:

7. a. haver-nak ~ haver-nek "friend-DAT"
   b. arzén-nak ~ arzén- nek 'arsenic-DAT'

According to the learning strategy (5c), Hungarian learners should set up a back vowel for [ɛ] and [e:]. Why would they be inclined to postulate an alternative, a front vowel? And why would they fail to do that for roots like *radír* 'eraser' that have [i:] instead of [ɛ] or [e:]? The key to this puzzle is that both short [ɛ] and long [e:] alternate with short sort [ɔ] and long [a:], respectively, witnessed by suffix alternations:

8. a. város-nak / nál "city-DAT/ADES"
   b. öröm-nek / nél "joy-DAT/ADES"

The alternation with low vowels in (7) and (8) suggests that [ɛ] and [e:] *as alternating vowels* are low.

At the same time both vowels also act as non-low, namely in their behavior as "phonetically neutral vowels," given that "neutrality" has been accounted for by assuming that corresponding to both [ɛ] and [e:] there are two underlying sources (just like short and long [i]), namely front /e/ and back /ɘ/ (long and short). This means that [ɛ] and [e:] have three sources:

9.	Roots	Suffixes
	a. non-low front üveg ‘glass’ (üveg-nek)	c. low front -nek (alternating with –nak)
	b. non-low back haver (haver-nak)	

The vacillation for *haver* can now be accounted for by assuming that the [ɛ] in this type of word can be either represented as the expected non-low back vowel (according to [9b]) or as the low vowel that normally only occurs in suffixes (as in [9c]). While the non-low vowels are regular in suffixes, the occurrence of non-low [ɛ] and [e:] in a root is exceptional.

The observed monotonic pattern for vacillation follows from this account. The ambiguity (between a non-low and a low vowel) can only occur, with observable difference in behavior, in the second stem context:

10. [*B*]_ [*BN*]_ [*N*]_ [*FN*]_ [*F*]_

The second stem context represents the *haver* case. Here and only here does the ambiguity between the low and non-low sources for [ɛ] and [e:] correlate with different behaviors:

11.	ha	ver	-nak	ha	ver	-nek
		non-low			low	
		back			front	

It is true that this ambiguity can also occur for the third stem context (the neutral vowel root) and the fourth stem context, but in these two cases postulating a low or a non-low front vowel produces the same behavior, namely the selection of front suffix vowels. While neutral vowel roots allow an underlying back vowel (when they are anti-harmonic), crucially, the fourth context does not allow that option because rule (5c) cannot account for the occurrence of a back non-low /ɘ/ after a front harmonic vowel.

This account explains why there is no vacillation for roots like *radír* because (in addition to the front and back ambiguity for all phonetically neutral vowels) there is no similar additional ambiguity for [i]. Note that this account explains the monotonic pattern that is observed for vacillation.

3.3 The count effect

The following stem contexts induce vacillation:

12.	alibi-val/-vel	"with alibi"
	klarinét-nak/-nek	"clarinet-DAT"

Recall the rule in (5c) that is dominant in Hungarian, the c-part of which states:

13. [i] is /ɨ/ after a back vowel

When we apply this rule to the stems in (14), its context is met twice:

14.	a	l[i]	b[i]
		↓	↓
		/ɨ/	?

Given the formulation of (13) = (5c), the second application causes "confusion" since the vowel preceding the second [i] is *phonemically* back (/ɨ/), but *phonetically* front ([i]). In all other cases it does not matter whether the description "back vowel" refers to the phonemic or to the phonetic representation, so the stems in (12) are the only ones that pose a problem. This, I suggest, is the reason for why speakers go back and forth between postulating phonemic /ɨ/ (causing a back suffix vowel) or phonemic /i/ (causing a front suffix vowel).

3.4 Polysyllabic split

Neutral vowel roots only display lexical variability if they contain just one neutral vowel. Thus, stem types like [*NN*] always take front suffixes (i.e., they get the *F* value in the RT system):

15.	kilincs-ek/*-ok	/kilinʧɛk/	"door handle-PL,"
	bibic-nek/*-nak	/bi:biʦnɛk/	"pewit-DAT,"
	ribizli-vel/*-val	/ribizlivɛl/	"redcurrant-INST."

This fact is reminiscent of the count effect. The difference is that in stem contexts in (15) there is no evidence from a preceding back vowel to represent the first [i] as /ɨ/, i.e., (13) does not apply. Nor is there evidence of anti-harmonic behavior for the first [i]. Given then that the first [i] can only be /i/, there is no hesitation for the second [i]:

16. b[i] b[i]c
↓ ↓
/i/ /i/

3.5 Harmonic uniformity is unnecessary

The authors mention on p. 27 that the vacillation observed in (12) only occurs when the two [i]s belong to the root morpheme (see Törkenczy et al. 2013 for a more extensive discussion of these facts):

17. a. Madrid-nak “Madrid-DAT”
b. Madrid-i-nak “Madrid-ADJ-DAT”

Their account is to postulate harmonic uniformity that is referred to in their article. However, if we take the rules in (5) to be morpheme structure constraints, specifically root structure constraints, it follows that they do not apply in derived environments.[2] Thus both [i]s in (17b) will be represented as /ɨ/, inducing a back suffix vowel. This makes an appeal to harmonic uniformity unnecessary.

The same principle is also invoked to explain that an anti-harmonic root will select back suffix vowels even when a suffix with a neutral vowel intervenes:

18. híd-é-*nek/nak

This requires an explanation because again we see that a sequence of two neutral vowels does not cause vacillation (as it does when the two neutral vowels belong to the root, as in [12]). But here too we do not need the uniformity principle given that what causes vacillation in the form in (12) is due to a morpheme constraint, which has no relevance in a derived environment such as in (18).

2 I assume that suffix vowels cannot be specified with the front element. This accounts for the fact that Hungarian is a so-called root control system; see van der Hulst (2012) and van der Hulst (in prep.) for details.

4 Conclusion

I have shown that the empirical generalizations that the RT model is designed to explain can be explained in what I claim to be a much simpler way. In fact, as shown, everything about Hungarian that the authors discuss follows from (5c), a single statement. The authors design an admirably intricate set of formal devices (considering various alternatives along the way), but I fail to see that all this machinery is necessary for our understanding and explanations of the empirical generalizations that are discussed in their article. The idea that stem contexts are mapped onto values essentially means "assigning phonological (or phonemic) representations to surface pattern." I have shown that a small and natural set of mapping rules accounts for the attested variation and for various additional patterns or effects. A crucial property of my account is that there is no escaping from postulating different phonemic sources for what appears in the surface as one phonetic segment. This kind of abstractness came under scrutiny after a critical discussion of "abstractness abuse" in Kiparsky (1968). However, as is shown in this article, if properly constrained (see van der Hulst 2012, van der Hulst in prep for details), phonological ambiguity provides an explanatory account of synchronic states in which certain phonetic segments display more than one kind of phonological behavior.

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