Morphology before phonology: A case study of Turoyo (Neo-Aramaic)*

Laura Kalin

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Abstract

Some models of the morphology-phonology interface take morphology and phonology to be computed in the same component of the grammar, simultaneously, e.g., "P»M" instantiations of Optimality Theory (McCarthy and Prince 1993a,b, Kager 1996, *i.a.*). Other models, e.g., Distributed Morphology (Halle and Marantz 1993, 1994), separate morphology from phonology, with operations that involve morphology preceding those that involve only phonology. I undertake a study of the order of operations needed to derive the form of finite verbs in the Neo-Aramaic language Turoyo (Jastrow 1993). Turoyo furnishes several arguments in favor of a separation of morphology from phonology, including phonologically-conditioned allomorphy that is anti-optimizing and surface opaque (reaffirming the robust earlier findings of Paster 2006) and infixation that in its surface position is invisible to allomorphy, but visible to phonological processes. More specifically, what Turoyo shows is that exponent choice fully precedes, and is oblivious to, phonological considerations.

1 Introduction

Are morphological exponents (suppletive allomorphs) selected in concert with, or apart from, phonological processes and considerations? The answer to this question has broad implications for modeling the morphology-phonology interface, and there is still considerable theoretical debate in this area. One popular view, that of "P»M" instantiations of Optimality Theory (McCarthy and Prince 1993a,b, Mester 1994, Kager 1996, Kim 2010, *i.a.*), holds that certain interactions between morphology and phonology are best modeled by ranking phonological/prosodic considerations over morphological ones; phonological well-formedness and morphological well-formedness thus must be evaluated in parallel, at least to some extent. An alternative view is that morphology is fully separate from, and prior to, phonology—phonological and morphological well-formedness are not evaluated in parallel; this is the

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position of, e.g., Distributed Morphology (Halle and Marantz 1993, 1994, Embick 2010, *i.a.*), certain non-P»M OT models (e.g., Kiparsky 2000), and certain "subcategorization" approaches to morphology-phonology interactions (Paster 2006, 2009, *i.a.*).

In this paper, I undertake a careful study of the order of operations needed to understand the form of finite verbs in the Neo-Aramaic language Turoyo. Turoyo furnishes several arguments in favor of a separation of morphology from phonology: (i) suppletive allomorphy feeds/bleeds phonological operations; (ii) phonologically-conditioned allomorphy can be anti-optimizing and surface opaque; and (iii) phonological displacement of an affix (e.g., infixation) counterbleeds morphological operations but feeds/bleeds phonological operations. While some of the Turoyo findings simply reaffirm previously-established findings (see especially Paster 2006, 2009), a novel argument comes from showing that phonologically-conditioned allomorphy persists across a linearly-intervening (but not structurally-intervening) affix. In addition to the very general timing argument—morphology must precede phonology—Turoyo also clearly illustrates the need for *cyclicity* in modeling exponent choice.

The paper is structured as follows. In §2, I provide the crucial background on Turoyo verbal morphology and phonology that later data and arguments will rest on. In §3, I motivate two core cases of suppletive allomorphy in Turoyo, and show that they present a preliminary indication that exponent choice must fully precede phonological processes and considerations. In §4, I turn to the most interesting of the Turoyo data, showing that, in its surface position, a linearly displaced morpheme is invisible to the allomorphy of §3, but visible to phonological processes; I argue that in order to make sense of this data, the displacement of the affix must be ordered after exponent choice, and before phonology. §5 briefly discusses the theoretical significance of these findings, and concludes.

2 Background on Turoyo

Turoyo is an endangered Central Neo-Aramaic language spoken originally in southeastern Turkey, and spoken today mainly in a widespread diaspora community (Weaver and Kiraz 2016). All the data presented here (including all page numbers cited, unless otherwise noted), and some of the basic generalizations, come from Jastrow's (1993) grammar of Turoyo, which focuses on the Midwoyo dialect of Turoyo, from the village of Mīdin in the Tūr ʿAbdīn region of Turkey. (I also analytically diverge from Jastrow in a number of cases.)

Like all Neo-Aramaic languages, Turoyo has rich verbal morphology. It will be this morphology—in particular, tense and agreement morphology on finite verbs—that interests us here. This section lays out the background that is needed to build up the arguments in later sections: the basic morphological components of Turoyo verbs, §2.1, and a few general phonological processes in Turoyo, §2.2.

Note that throughout the paper, I adopt the practical orthography that Jastrow (1993) uses, with the exception of a few consonants, for which I instead consistently use the corresponding IPA symbol (ʔ, θ); dots underneath consonants indicate pharyngealization.

2.1 Verbal morphology

Finite verbs in Turoyo encode aspect[1] distinctions in the verb "base" (a root-and-template form) and tense distinctions as well as agreement via affixes on the base. The example in (1) below shows a transitive verb (root: *zbṭ* 'catch'), with two arguments indexed on the verb. As pronouns in Turoyo are null except when focused, this verb can stand alone as a well-formed sentence. (Throughout the paper, the morpheme-by-morpheme breakdown in examples gives the forms of the morphemes before any purely phonological processes have taken place; surface forms are given in parentheses.)

(1) zəbṭ -o -ət -l-e (=zəbṭatle)
catch.IMPF -***B***F.SG -***S***2SG -***L***-3M.SG
'you (fem. sg.) catch him' (p. 135)

As can be seen in (1), agreement is suffixal on the verb stem, and is made up of three distinct pieces—these are labeled with bold italic capital letters in the glosses (B, S, L), and each letter represents a different paradigm/pattern of agreement. The "base" set, B, is always the closest to the verb base, and encodes (maximally) the number and gender of an argument, as shown in the forms in Table 1. The plural B morpheme has two allomorphs, bolded in the table, which will be the subject of §3.2.

Table 1: B suffixes in Turoyo (p. 125)

	B form(s)
M.SG	-∅
F.SG	-o
PL	**-i/-ən**

The next agreement morpheme in the verbal complex is S (for "simple") agreement, which encodes (maximally) the person and number of the same argument indexed by the B suffix (whatever that argument is), leading to a partial redundancy in feature-marking. This redundancy can be seen in (1) with B agreement encoding feminine singular and S agreement encoding second person singular—the argument B and S are indexing is second person feminine singular. The full set of S morphemes is given in Table 2.

Finally, furthest out from the verb we see the L set, which consists of a morphologically-separable dative/locative piece, usually *l*, plus a "personal suffix" (found independently on prepositions and as pronominal possessors; see Table 3 in §2.2); I will refer to *l* plus the

[1] Jastrow (1993) refers to the (finite) verb bases as varying based on tense, but it is clear from the existence of separate tense morphemes (and the effect these morphemes have on the interpretation of the verb) that the primary semantic contribution of the verb base is not temporal but rather aspectual. This accords with findings about the verb base in other closely related Neo-Aramaic languages (see, e.g., Hoberman 1989, Coghill 1999).

personal suffix together as the L agreement marker. The L agreement marker can encode a full set of φ-features (thanks to the personal suffix), and always indexes a *distinct* argument from that indexed by B and S. The L paradigm is also shown in Table 2; the bolded initial consonants in the 2PL and 3PL L agreement markers constitute a case of allomorphy that is taken up in §3.1. (Note that I will actually ultimately argue that the two alternating consonants in 2PL and 3PL are *n* and an empty consonant slot, C, not *n* and *l*.)

Table 2: S and L suffixes in Turoyo (p. 128–129)

	S form	L form
1SG	-no	-l-i
1PL	-na	-l-an
2M.SG	-ət	-l-əx
2F.SG		-l-ax
2PL	-ut(u)	**-l**/**n**-xu
3M.SG	-∅	-l-e
3F.SG		-l-a
3PL		**-l**/**n**-Ce[2]

While the basic verbal template seen in (1) is constant (Verb-B-S-L), which agreement suffixes agree with which arguments changes based on transitivity and aspect. This will not be of interest in this paper, but see Kalin 2018 for details.

2.2 Phonology

A number of phonological processes in Turoyo obscure the (full form of) the underlying morphemes in verbs. In (1), two such processes are at play:

(2) a. HIATUS RESOLUTION: When two vowels are adjacent, one is deleted.[3]
b. LOWERING: Short /o/ is realized as [a] in closed syllables.

While it looks like these processes must be ordered to derive the surface form in (1)—ə is deleted and then *o* lowers—in fact the data are consistent with allowing nearly all the purely phonological processes discussed in this paper to apply whenever they can, i.e., no ordering is needed.

Several other sorts of phonological processes will be important for our purposes. The first is assimilation, which falls into two types. Some morphemes contain empty consonant

[2]As will be discussed in §2.2, the personal suffix for the 3rd person plural is best represented as starting with an empty consonant slot.

[3]Vowel hiatus resolution does not consistently delete the first or second vowel in hiatus, but does consistently delete a particular vowel in a given vowel cluster. It is beyond the scope of this paper to determine exactly what features regulate which vowel is deleted. (For variable resolution of vowel hiatus, see Casali 1996.)

slots that take on the features of whatever consonant is immediately adjacent to them, (3); this type of assimilation is *obligatory*.

(3) EMPTY C ASSIMILATION: An empty consonant slot takes on the features of an immediately adjacent consonant.

An example of a morpheme with an empty consonant slot is the plural definite determiner, *ʔaC-*, which is prefixal on nouns:

(4) a. ʔaC- malk-e (=ʔa**mm**alke)
DET.PL- king-PL
'the kings' (p. 37)
b. ʔaC- ʕez-e (=ʔa**ʕʕ**eze)
DET.PL- goat-PL
'the goats' (p. 37)

The final consonant of the definite determiner fully assimilates to the initial consonant of the noun it attaches to. This is a case of regressive EMPTY C ASSIMILATION.

Assimilation governed by (3), EMPTY C ASSIMILATION, may also be progressive. This is the case for the 3rd person plural personal suffix, *-Ce*: Table 3 gives the surface forms of two inflecting prepositions, which show clearly that the first consonant of the personal suffix in third person plural matches the final consonant of the preposition (relevant forms bolded). (LOWERING is also seen in certain suffixed forms of *xtoθ*, along with vowel reduction in the same environments for *min*.)

Table 3: Inflected prepositions (p. 258, 262)

	min 'with X'	*xtoθ* 'as X'
1SG	min-i	xtoθ-i
1PL	min-an	xtoθ-an
2M.SG	min-əx	xtoθ-əx
2F.SG	min-ax	xtoθ-ax
2PL	mən-xu	xtaθ-xu
3M.SG	min-e	xtoθ-e
3F.SG	min-a	xtoθ-a
3PL	**mən-ne**	**xtaθ-θe**

The second relevant type of assimilation found in Turoyo is a uniformly regressive assimilation process that affects coronal sonorants (*r, l, n*), (5)–(6). Unlike the obligatory assimilation above, this assimilation is probabilistic, taking place around 75% of the time in natural speech (p. 19).

(5) REGRESSIVE SONORANT ASSIMILATION: A coronal sonorant assimilates fully to an immediately following coronal sonorant. (Optional)

(6) a. mər -l-an (=mə**rl**an∼mə**ll**an)
say.PFV -***L***-1PL
'we said' (p. 19)

b. ʕal- riš-e (=ʕa**lr**iše∼ʕa**rr**iše)
on head-3M.SG
'on his head' (p. 19)

c. nafəl -∅ -no (=nafə**ln**o∼nafə**nn**o)
fall.PFV -***B***M.SG -***S***1SG
'I (masc.) fell.' (p. 19)

The profiles of the two types of assimilation are quite different, but both can be understood as purely phonological processes. Note that there is no progressive assimilation in Turoyo apart from that found with empty consonant slots; REGRESSIVE SONORANT ASSIMILATION does not have a progressive counterpart.

Another crucial phonological process for the upcoming argumentation is SHORTENING: long consonants (or two identical adjacent consonants) are only tolerated intervocalically, and so when a long consonant (or identical CC sequence) is word-final or in a cluster with another consonant, the long consonant is shortened (or one of the identical consonants is deleted).

(7) SHORTENING: A long consonant (or a series of adjacent consonants) is shortened non-intervocalically.

(8) a. šarr (=ša**r**)
fight
'a fight' (p. 17)

b. ʔu- šarr -aθθe (=ʔuša**rr**aθθe)
DET.M.SG- fight -3PL.POSS
'their fight' (p. 17)

In (8a), the word-final long consonant is shortened, but in (8b), we see this long consonant survive intact when followed by the vowel-initial possessive suffix.

Finally, there is a process of ə-epenthesis that serves to break up some CC and CCC clusters; this takes place when neighboring consonants in the cluster are distinct, and are such that they cannot be parsed into a well-formed syllable structure, the precise conditions of which will not concern us here.

(9) EPENTHESIS: [ə] is inserted to break up (non-syllabifiable) non-homorganic consonant clusters.

One clear place that EPENTHESIS takes place is when a preposition that consists of a single consonant prefixes to a noun that begins with two consonants, (10).

(10) l- bsorino (=ləbsorino)
to- Baspirin
'to Baspirin (a town in southeast Turkey)' (p. 26)

Note that when SHORTENING can apply, it generally takes place instead of EPENTHESIS. Thus, while (8a) poses a problem for syllabification, it cannot be saved by EPENTHESIS, but rather must undergo SHORTENING.

2.3 Interim summary

The Turoyo verb follows the basic template in (11), with each of B, S, and L referring to a different agreement paradigm, given in Tables 1–2 above.

(11) Verb.ASP-B-S-L

Allomorphy in the L agreement series, §3.1, and allomorphy in the B agreement series, §3.2, will furnish the first arguments for a separation of morphology from phonology, with morphology preceding phonology. The strongest argument will be presented in §4, where we will examine the past tense morpheme and its interaction with §3's allomorphy and §2.2's phonological processes. The complete set of relevant phonological processes are compiled below for ease of reference.

(12) Relevant phonological processes in Turoyo
- a. HIATUS RESOLUTION: When two vowels are adjacent, one is deleted.
- b. LOWERING: Short /o/ is realized as [a] in closed syllables.
- c. EMPTY C ASSIMILATION: An empty consonant slot takes on the features of an immediately adjacent consonant.
- d. REGRESSIVE SONORANT ASSIMILATION: A coronal sonorant assimilates fully to an immediately following coronal sonorant. (Optional)
- e. SHORTENING: A long consonant (or a series of adjacent consonants) is shortened non-intervocalically.
- f. EPENTHESIS: [ə] is inserted to break up (non-syllabifiable) non-homorganic consonant clusters.

3 Morphology before phonology: Allomorphy

In this section, we will take a close look at allomorphy in the verbal complex. Allomorphy of the L morpheme (DAT *l*) in the L agreement series, §3.1, and of the plural B morpheme, §3.2, show us that allomorph choice (i) may be surface opaque, (ii) feeds and bleeds phonological operations, and (iii) may be neutral with respect to phonological optimization (in the case of L allomorphy) or even detrimental to optimization (in the case of B allomorphy). Both cases of allomorphy involve apparent outwardly-sensitive phonological conditioning, which goes against an otherwise robust crosslinguistic generalization that phonologically-

conditioned allomorphy is always inwardly-sensitive (Carstairs 1990, Bobaljik 2000, Paster 2006); to address this, §3.3 briefly investigates the structure of the Turoyo verb-word, and argues (following Kalin 2018, to appear) that Turoyo does not contradict this crosslinguistic generalization.

3.1 L allomorphy

As discussed in §2.1, each member of the L set of agreement markers consists of an L morpheme (a locative/dative piece) plus a personal suffix. The L morpheme, however, is not always realized as *l*: it is sometimes realized as an *n*, §3.1.1–§3.1.2, and sometimes as an empty consonant slot which then undergoes EMPTY C ASSIMILATION, §3.1.3. §3.1.4 puts these observations together to motivate three allomorphs for the L morpheme, previewed in (13).

(13) L → *l* / (= *l* elsewhere)
C / __C (= empty C slot when preceding a consonant)
n / PL__C (= *n* when following a plural feature and preceding a consonant)

As seen throughout this section and as will be highlighted in §3.1.4, the choice of allomorph may be surface opaque (and so must derivationally precede the phonological processes in (12)) and is not phonologically-motivated.

3.1.1 Introducing the *l/n* alternation

The L agreement markers typically begin with the consonant *l* (as is characteristic of the L set); this can be seen above in Table 2 and also in (1). Unlike the other L agreement markers, however, the L morpheme in L2PL and L3PL behaves exceptionally in sometimes being realized as *n*. In particular, the L morpheme in L2PL and L3PL is realized as *n* when the immediately preceding morpheme bears a plural feature.[4] This is schematized in (14).

(14) a. L-3PL → *-l-le* (elsewhere)
→ *-n-ne* / PL__

b. L-2PL → *-l-xu* (elsewhere)
→ *-n-xu* / PL__

[4]Historically, all the plural agreement morphemes ended in *n* (N. Patel, p.c.), which helps us understand the alternation's origin as being due to progressive assimilation. However, there a number of reasons why such an account cannot extend to this synchronic *l/n* alternation: Turoyo does not have any general process of progressive assimilation (apart from EMPTY C ASSIMILATION); both types of assimilation that Turoyo does have (EMPTY C ASSIMILATION and REGRESSIVE SONORANT ASSIMILATION) are bled under surface-intervention, but the *l/n* alternation is *not* bled in these environments (see §4); and finally, a quick glance at Tables 1–2 shows that plural morphemes generally do not end in *n* synchronically in Turoyo.

Note that the alternation in (14a) looks as though it takes place in both the L morpheme and the personal suffix, as the *n* appears in both pieces of L agreement (the L morpheme and the personal suffix). However, recall from §2.2 that the 3PL personal suffix is underlyingly *-Ce* (see Table 3), and so the alternation is really just an alternation in the form of the first consonant, the L morpheme, in both (14a) and (14b).

The examples in (15)–(16) show L3PL and L2PL in a plural environment, where the *n*-form appears. I illustrate here with the plural environment being a 1PL S morpheme, (15), and 2PL S morpheme, (16). (3PL S morphemes come with an additional complication which is taken up in §3.2, but the generalization still holds.)

(15) L3PL and L2PL in the environment of S1PL

a. zəbṭ -i -na -n-Ce (=zəbṭina**nne**)
catch.IMPF -***B***PL -***S***1PL -***L***-3PL
'we catch them' (p. 136)

b. zəbṭ -i -na -n-xu (=zəbṭina**nxu**)
catch.IMPF -***B***PL -***S***1PL -***L***-2PL
'we catch you (pl)' (p. 136)

(16) L3PL and L2PL in the environment of S2PL

a. zəbṭ -i -ut -n-Ce (=zəbṭut**ne**)
catch.IMPF -***B***PL -***S***2PL -***L***-3PL
'you (pl) catch them' (p. 135)

b. zəbṭ -i -ut -n-xu (=zəbṭutə**nxu**)
catch.IMPF -***B***PL -***S***2PL -***L***-2PL
'you (pl) catch yourselves' (p. 135)

Following a plural morpheme, L3PL and L2PL begin with *n*, rather than *l*. As can be seen clearly in these examples, this is not an alternation that is plausibly purely phonological—there is no nasal adjacent to the L marker in (15) and no preceding nasal at all in (16); the *l/n* alternation is morphologically-conditioned.

In addition to the *l/n* alternation in (15)–(16), a number of phonological processes are at play in these examples. In (15), the only phonological process we see is in (15a), where there is EMPTY C ASSIMILATION. (16) features several phonological processes in action. In (16a–b), there is HIATUS RESOLUTION across the B and S suffixes. Further out from the root in (16a), we see EMPTY C ASSIMILATION, which feeds SHORTENING. The (phonological) derivation of the surface form in (16a) is laid out in (17). (I break down these phonological processes step-wise to make the surface forms clear, though nothing hinges on a serial derivation in the phonological component. I have left out REGRESSIVE SONORANT ASSIMILATION as the grammar in general gives surface forms in which this probabilistic process has *not* applied.)

(17)

Input (16a):	zəbṭiutnCe
HIATUS RESOLUTION:	zəbṭutnCe
EMPTY C ASSIMILATION:	zəbṭutnne
SHORTENING:	zəbṭutne
EPENTHESIS:	– – – –
Output:	zəbṭutne

In (16b), unlike in (16a), the consonant cluster cannot be resolved by SHORTENING, since none of the adjacent Cs are identical, and so instead this illicit cluster is broken up by EPENTHESIS, as laid out in (18).

(18)

Input (16b):	zəbṭiutnxu
HIATUS RESOLUTION:	zəbṭutnxu
EMPTY C ASSIMILATION:	– – – –
SHORTENING:	– – – –
EPENTHESIS:	zəbṭutənxu
Output:	zəbṭutənxu

It is clear that the choice of allomorph for the L morpheme feeds these phonological processes.

To provide a comparison for L3PL and L2PL, (19) shows that all other L agreement markers stay *l*-initial in plural environments, i.e., the L morpheme does not alternate in any morphologically-conditioned way for these other L markers.

(19)

a. nəšq -i -∅ -l-a (=nəšqi**l**a / *nəšqi**n**a)
kiss.IMPF -***B***PL -***S***3 -***L***-3F.SG
'they kiss her' (p. 133)

b. zəbṭ -i -ut -l-e (=zəbṭut**l**e / *zəbṭut**n**e)
catch.IMPF -***B***PL -***S***2PL -***L***-3M.SG
'you (pl) catch him' (p. 135)

c. zəbṭ -i -na -l-an (=zəbṭina**l**an / *zəbṭina**n**an)
catch.IMPF -***B***PL -***S***1PL -***L***-1PL
'we catch ourselves' (p. 135)

These L suffixes even stay *l*-initial when immediately following an *n*, showing the L marker's normal resistance to progressive assimilation:

(20) səm -l-an -l-e (=səmlan**l**e / *səmlan**n**e)
make.PFV -***L***-1PL -***L***-3M.SG
'we made him' (p. 139)

Examples like (20) could undergo probabilistic REGRESSIVE SONORANT ASSIMILATION in natural speech, but this would derive *səmlalle*, not *səmlanne*.

The *l*/*n* alternation is best characterized as the L morpheme, in certain L agreement markers (L2PL and L3PL), having a different form depending on the morphosyntactic features of the preceding morpheme—namely, whether the preceding morpheme is plural or not; this

gives us part of the environment for the alternation, PL__. In order to understand why it is that the L morpheme in a plural context is only *n* for L2PL and L3PL (but not for any other persons/numbers), I capitalize on the fact that it is only these two L agreement markers that contain a consonant-initial personal suffix, which can be seen in Table 2; this gives us the other component of the environment for the alternation, __C. Put together, I propose that the L morpheme has the form *n* when preceded by a plural morpheme and followed by a consonant, PL__C.

3.1.2 The *l/n* alternation is fully general

The examples of the *l/n* alternation above showed an L morpheme that is conditioned by plural features on an S morpheme. One might wonder, then, whether the alternation is specific to this exact context, or whether it is general. In fact, the alternation is general: the *l/n* alternation occurs in the context of *any* (immediately) preceding plural feature, not just a plural S morpheme.

There are two contexts where we find L agreement markers outside of their canonical position in the verbal complex. The first context is in plural imperatives (multiple addressees), which lack B and S agreement entirely. Instead, plural imperatives, (21b), are distinguished from singular imperatives, (21a), through the plural imperative suffix, which immediately follows the verb base, and through the length of the stem vowel. This plural imperative suffix surfaces as *-u* when the imperative bears no further suffixes (i.e., no further agreement); note that plural imperative *-u* is distinct in form from any of the B, S, or L markers (cf. Tables 1–2).

(21) a. mbal (=mbal)
take.away.IMPER
'take away/take hence!' (addressed to you (sg)) (p. 141)

b. mbāl -u (=mb**ā**l**u**)
take.away.IMPER -IMPER.PL
'take away/take hence!' (addressed to you (pl)) (p. 141)

When an imperative has a dative object, this object appears on the verb in the form of an L agreement marker. Interestingly, in these contexts, the plural imperative *-u* is null (though the long stem vowel persists). For their part, the L agreement markers behave just as they do in a non-imperative: when L3PL and L2PL follow a plural imperative stem, they are *n*-initial, (22); when L3PL follows a singular imperative stem, it is *l*-initial, (23). (L2PL as an object in a singular imperative is ill-formed, since the addressee is singular.)

(22) a. mbāl -∅ -n-Ce (=mbāl**ne**)
take.away.IMPER -IMPER.PL -***L***-3PL
'take them away!' (addressed to you (pl)) (p. 141)

b. mbāl -∅ -n-xu (=mbāl**ənxu**)
take.away.IMPER -IMPER.PL -***L***-2PL
'take yourselves away!' (addressed to you (pl)) (p. 142)

(23) mbal -l-Ce (=mbal**le**)
take.away.IMPER -***L***-3PL
'take them away!' (addressed to you (sg)) (p. 141)

A number of phonological rules come into play here in predictable ways: EMPTY C ASSIMILATION and SHORTENING in (22a) and (23) (much like the derivation shown in (17)), and EPENTHESIS in (22b) (as in (18)).

The second context where we can see the generality of the *l*/*n* alternation is when two L agreement markers are stacked on top of each other. This happens in perfective aspect, where transitive subjects are marked via L agreement rather than B/S agreement, and where certain objects are marked in a second L marker stacked on top of the first. (The precise conditions under which this agreement pattern appears will not concern us here; see Kalin 2018, to appear.) The crucial fact is that when two L markers are stacked, and the first L marker is PL, the second L morpheme appears in its *n* form, (24). (Note that the vowel of the first L marker is reduced to ə because this vowel is unstressed and in a closed syllable.)

(24) a. səm -l-xu -n-Ce (=səmxə**nne**)
make.PFV -***L***-2PL -***L***-3PL
'you (pl) made them' (p. 139)
b. səm -l-xu -n-xu (=səmxə**nxu**)
make.PFV -***L***-2PL -***L***-2PL
'you (pl) made yourselves' (p. 139)

Putting aside for a moment the disappearing L morpheme in the first L marker in both (24a) and (24b) (we'll return to this in the following section), it's clear that the second L marker here is in its *n*-initial form, conditioned by the plurality of the first L marker.

What imperatives and perfectives show us is that the *l*/*n* alternation is fully general: when the L morpheme is preceded by any plural feature, and followed by a consonant (as it is in L3PL and L2PL), it appears as the allomorph *n*.

3.1.3 Another allomorph of the L morpheme

There is one final complication to L allomorphy. The surface form of the first L marker in (24a–b) presents us with a puzzle: why does it look like the first L morpheme (the *l*) has disappeared? All other things being equal, we would expect EPENTHESIS to take place here, yielding *səmə́lxənne* and *səmə́lxənxu*, preserving the *l*. Note that this "disappearing l" is not an exceptional feature of this example, but rather is a systematic behavior of the L morpheme in L3PL and L2PL *outside of* plural contexts, as will be shown below. This leads me to propose that there is a third allomorph of the L morpheme: the L morpheme has the form *C* (empty consonant slot) when it is followed by a consonant, i.e., in L3PL and L2PL.

Let's start with L3PL. In (25a), we see again the same "disappearing *l*" as we saw with L2PL in (24). A minimal comparison is provided with the verb in (25b), which serves as a reality check that the L morpheme doesn't generally assimilate to a preceding consonant, nor does it normally disappear entirely.

(25) a. zəbṭ -∅ -ət -l-Ce (=zəbṭət**t**e)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3PL
'you (masc. sg.) catch them' (p. 135)
b. zəbṭ -∅ -ət -l-e (=zəbṭət**l**e)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3M.SG
'you (masc. sg.) catch him' (p. 134)

The derivation in (26) shows that the underlying morphemes as given in (25a) do not lead to the attested surface form (and in fact the predicted form is that of the surface form of (25b)):

(26) Input (25a), first attempt: zəbṭətlCe
HIATUS RESOLUTION: – – – –
EMPTY C ASSIMILATION: zəbṭətlle
SHORTENING: zəbṭətle
EPENTHESIS: – – – –
Output (incorrect): zəbṭətle

The data above fall into line if the L morpheme has the form *C* when it precedes a consonant. That would mean that a more accurate representation of the L agreement marker in (25a) is *C-Ce*. This leads to a successful derivation:

(27) Input (25a), revised: zəbṭətCCe
HIATUS RESOLUTION: – – – –
EMPTY C ASSIMILATION: zəbṭəttte
SHORTENING: zəbṭətte
EPENTHESIS: – – – –
Output (correct): zəbṭətte

Since both consonants are empty consonant slots, they both assimilate to the final consonant of the stem, and then undergo SHORTENING, which is what makes it look like the L morpheme disappears.

This same explanation—that the L morpheme has the allomorph *C* when followed by a consonant—extends to the surface form of the L marker in (28), as well as the surface form of the first L marker in (24). (Note that in the morpheme-by-morpheme breakdown in examples from here on out, I represent the L morpheme before a consonant as *C*.)

(28) nšəq -∅ -∅ -C-xu (=nšəq**xu**)
kiss.PFV -***B***M.SG -***S***3 -***L***-2PL
'you (pl) kissed him' (p. 130)

(29)

Input (28):	nšəqCxu
HIATUS RESOLUTION:	– – – –
EMPTY C ASSIMILATION:	nšəqqxu[5]
SHORTENING:	nšəqxu
EPENTHESIS:	– – – –
Output:	nšəqxu

Again, here there is EMPTY C ASSIMILATION followed by SHORTENING, giving the appearance that the L morpheme has disappeared.

To complete the picture here, we need to recognize some sort of default realization of empty consonant slots as *l* when they are not otherwise supplied with phonological features. This default realization is needed to understand examples like (30), where the L morpheme in L2PL and L3PL is realized as *l* when there is no immediately preceding consonant for *C* to assimilate to.

(30) The elsewhere *l* form of L3PL and L2PL

a. nəšq -o -∅ -C-Ce (=nəšqa**lle**)
kiss.IMPF -***B***F.SG -***S***3 -***L***-3PL
'she kisses them' (p. 133)

b. nəšq -o -∅ -C-xu (=nəšqa**lxu**)
kiss.IMPF -***B***F.SG -***S***3 -***L***-2PL
'she kisses you (pl)' (p. 133)

This default realization of empty consonant slots as *l* is consistent with being a language-wide rule, though I have found no other context in which it is clearly testable.[6] Note that examples like (30) also show us that it cannot simply be that the L morpheme has a zero allomorph before a consonant.[7]

[5]I have shown the empty C assimilating to the preceding consonant, *q*. Nothing will change in the surface form here if *C* in fact assimilates to the following consonant, *x*. However, it seems more generally that the *C* L morpheme de facto never assimilates to a following consonant, only to a preceding consonant, as will be clear from the absence of assimilation in (30b) and also plays a role in understanding (10). An investigation of the possible reasons for this is outside the scope of this paper.

[6]One might wonder about testing this default *l* hypothesis with the plural definite determiner, *ʔaC-*, seen in (4), but the situation is not so clear. Nouns that look vowel-initial are often actually glottal-initial, and indeed this glottal can be geminated, as in *ʔa**ʔ-ʔ**abn-e* 'the sons' (p. 37). However, Jastrow notes that geminating the glottal is less common than choosing what he calls an allomorph of the plural determiner, *ʔann-*, and prefixing this to the noun (without the initial glottal consonant), leading to a second acceptable realization of 'the sons' as *ʔa**nn**-abn-e* (p. 37). This could be evidence for a different default realization of an empty consonant slot (as *n* rather than *l*), or it could be that (as Jastrow says) *ʔann-* is a suppletive allomorph of the plural definite determiner. A perhaps even more intriguing alternative is that the *n* that surfaces here is related to the appearance of *n* in the environment PL__C that we saw for the L morpheme—note that the environment of (the first) *n* in the plural determiner is nearly identical to the environment for the L morpheme's *n*.

[7]Other tempting but ultimately untenable alternative analyses are that the L morpheme has a zero allomorph interconsonantally or deletes interconsonantally. There are two arguments against these analyses. First, we have seen that the L morpheme can survive interconsonantally thanks to EPENTHESIS, (16b) and

3.1.4 Interim findings: L allomorphy

In the preceding sections, I have motivated the following three allomorphs of the L morpheme (repeated from (13)):

(31) L → *l* / (= *l* elsewhere)
C / __C (= empty C slot when preceding a consonant)
n / PL__C (= *n* when following a plural feature and preceding a consonant)

I assume that the most specific allomorph (i.e., the one with the most specific environment met) is the one that is chosen; since the environment that conditions the *C* allomorph is a proper subset of the environment that conditions *n*, *n* will appear whenever its more specific environment is met. In practice, both the *C* and *n* allomorphs will only ever surface when the personal suffix in the L marker is 2PL or 3PL, because these are the only personal suffixes that are consonant-initial.

It is important to note that the allomorphs in (31) cannot be understood in purely phonological terms. Synchronically in Turoyo, there is nothing about the phonology of plural agreement markers that should cause the L morpheme to nasalize. (And even if there were a hidden floating nasal feature associated with every plural agreement marker, we will see in §4 that even this is not a tenable analysis of the *l*/*n* alternation.) Nor is there a general phonological process in Turoyo whereby consonants adjacent to other consonants become featurally empty consonant slots. The *l*/*C*/*n* alternation is specific to the L morpheme, and must be understood as morphological.

(22b), which it does just in case the L morpheme is in an *n* environment (PL__C). This is a problem for a deletion analysis, because either this deletion operation would have to be tagged to occur only in non-plural environments, or EPENTHESIS would need to be tagged to occur only in plural environments; both hypothetical conditions make the non-overlap of deletion and the *n* allomorph totally accidental, and the latter is completely implausible given that EPENTHESIS clearly applies outside of plural environments, as in (10). (16b) and (22b) are also a problem for a zero allomorph analysis, because both the zero allomorph (hypothetical conditioning environment C__C) and the *n* allomorph (conditioning environment: PL__C) would have their conditioning environments met in these examples; to ensure that the latter environment wins, the *n* allomorph would have to be given precedence over the zero allomorph, an extrinsic ordering that is otherwise unnecessary.

The second argument against these alternative analyses is that there is evidence that EMPTY C ASSIMILATION can take place over a short vowel, with an *n* in particular (but apparently no other consonants):

(i) a. zobaṭ -∅ -no -C-Ce (=zobaṭna**nne**)
catch.IMPF -***B***M.SG -***S***1SG -***L***-3PL
'I (masc. sg.) catch them' (p. 135)
b. zobaṭ -∅ -no -C-xu (=zobaṭna**nxu**)
catch.IMPF -***B***M.SG -***S***1SG -***L***-2PL
'I (masc. sg.) catch you (pl)' (p. 136)

Note that (i) is not a plural environment, and so the *n* form of the L morpheme is not otherwise motivated. The empty consonant analysis provides a natural explanation for the otherwise spurious *n* forms in (i).

Now that we have a handle on all this data, we can see clearly that the choice of allomorph for the L marker must crucially precede all phonological processes, as it feeds them. In addition, we can also see that the choice of allomorph is often opaque on the surface, as the phonological environment for its insertion is no longer present after phonological processes have taken place. This is the case, for example, for (25a), repeated in (32).

(32) zəbṭ -∅ -ət -l-Ce (=zəbṭətt**e**)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3PL
'you (masc. sg.) catch them' (p. 135)

The environment for the choice of the *C* allomorph of the L morpheme is when the L morpheme precedes a consonant; but the L morpheme does not precede a consonant on the surface in (32), due to SHORTENING. To see an example involving the *n* allomorph, we can look to (16a), repeated below in (33).

(33) zəbṭ -i -ut -n-Ce (=zəbṭut**ne**)
catch.IMPF -***B***PL -***S***2PL -***L***-3PL
'you (pl) catch them' (p. 135)

The *n* on the surface does not precede a consonant, and so the environment for the choice of the *n* allomorph (PL__C) is not met on the surface, only underlyingly. This is consistent with the robust crosslinguistic findings of Paster (2006) about phonologically-conditioned allomorphy.

There is another level of opacity here as well—the *l, n,* and *C* allomorphs are not consistently distinguishable from each other on the surface: when the *C* allomorph follows a vowel (e.g. in (30)), it becomes indistinguishable on the surface from the elsewhere *l* allomorph; and when *C* immediately follows an *n* or an *l*, it becomes surface-indistinguishable from the *n* and *l* allomorphs (respectively), as for *l* in (23).

Finally, even though part of the conditioning environment for the allomorphs of L is phonological (__C), the choice is not phonologically-motivated in the sense of contributing to a phonotactically well-formed output. Rather, the choice of allomorph generally has no impact on output markedness, e.g., it would already have been well-formed as in (15), or it would have needed a phonological "repair" and still does as in (16b). Perhaps the most compelling evidence against a well-formedness motivation for this allomorphy comes from the fact that, in some cases, if the elsewhere allomorph *l* were chosen, it would lead to an output that is in fact the well-formed output for a different verb form. This can be seen in the pair of examples in (25).

(34) a. zəbṭ -∅ -ət -C-Ce (=zəbṭətt**e**)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3PL
'you (masc. sg.) catch them' (p. 135)
b. zəbṭ -∅ -ət -l-e (=zəbṭətl**e**)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3M.SG
'you (masc. sg.) catch him' (p. 134)

If the elsewhere allomorph had been chosen in (34a), the surface form of (34a) would be identical to the surface form of (34b), and would in fact undergo fewer phonological processes (as there would be just SHORTENING, and no EMPTY C ASSIMILATION); so it cannot be that *C* is chosen for well-formedness reasons. (Note also that an account that appeals to homophony-avoidance in allomorph-choice can only explain a small subset of the examples, as in most cases, there is no homophonous output found in another verb form.)

The facts as they stand follow naturally from a model of the morphology/phonology interface in which allomorph choice takes place in the morphological component of the grammar, which precedes the phonological component, and so is oblivious to phonological considerations.

3.2 B allomorphy

The second important case of allomorphy in the verb is found in the B series, in particular, when B agreement encodes a plural, (35).

(35) a. BPL → *-i* / ___CV or ___# (p. 127)
(= in an open syllable)

b. BPL → *-ən* / ___CC
(= in a closed syllable)

I take *-i* to be the elsewhere form of BPL, and we have already seen it appear in its __CV environment in (15)–(19); an additional example showing this allomorph word-finally is given in (36).

(36) gaḥik -i -∅ (=gaḥik**i**)
laugh.PFV -***B***PL -***S***3
'they laughed' (p. 129)

BPL has a phonologically-conditioned suppletive allomorph, *-ən*, which surfaces when BPL precedes a CC cluster (i.e., in closed syllables). Given the pieces of suffixal inflection, Tables 1–2, this arises only in two very specific situations, namely, when both the S marker is null (so 3rd person) and the L marker begins with two consonants, which brings us back to our old friends from §3.1, L3PL and L2PL. The allomorph *-ən* is shown in its two environments in (37).

(37) L3PL and L2PL following B/S3PL

a. nəšq -ən -∅[8] -n-Ce (=nəšq**ən**ne)
kiss.IMPF -***B***PL -***S***3 -***L***-3PL
'they kiss them' (p. 127)

b. nəšq -ən -∅ -n-xu (=nəšq**ən**xu)
kiss.IMPF -***B***PL -***S***3 -***L***-2PL

'they kiss you (pl)' (p. 127)

Notably, the choice of *-ən* creates a phonotactic problem where there previously would not have been one (if elsewhere *-i* were chosen), requiring SHORTENING to resolve it. The derivation of (37b) is shown in (38).

(38)

Input (37b):	nəšqənnxu
HIATUS RESOLUTION:	– – – –
EMPTY C ASSIMILATION:	– – – –
SHORTENING:	nəšqənxu
EPENTHESIS:	– – – –
Output:	nəšqənxu

If *-i* were chosen as the allomorph of BPL in (38), there would be no unsyllabifiable consonant cluster at all. This makes the allomorph-choice here "perverse", in Paster's (2006) words, and in fact it is not uncommon for phonologically-conditioned allomorphy to be anti-optimizing.

It is important to note that the SHORTENING that takes place in (38) means that on the surface, there is essentially no evidence that there is allomorphy at all; instead, it could just be a purely phonological process: vowel reduction of the elsewhere plural allomorph *-i* to *-ə* in a closed syllable. If this could just be a case of vowel reduction, then why posit BPL allomorphy at all? The answer is because there is a context where BPL *-ən* surfaces intact, and that is when the verb is in the past tense. The past tense morpheme, *-wa*, which will be discussed extensively in §4, is completely ignored for the purposes of allomorph-choice, even when it linearly intervenes in the conditioning environment of the allomorph. Thus we see all three consonants that enter into the underlying cluster in (37)/(38) can survive on the surface, (39):[9]

(39)

a. nəšq -ən -∅ -wa -n-Ce (=nəšq**ən**wanne)
kiss.IMPF -***B***PL -***S***3 -PST -***L***-3PL
'they used to kiss them' (p. 134)

b. nəšq -ən -∅ -wa -n-xu (=nəšq**ən**wanxu)
kiss.IMPF -***B***PL -***S***3 -PST -***L***-2PL
'they used to kiss you (pl)' (p. 134)

[8] I assume that the S suffix, though not overtly displaying a number distinction in 3rd person, cf. Table 2, still abstractly contains number in 3rd person, and hence the L allomorph *n* is still triggered. Alternatively, it could be that the *n* allomorph is triggered by plural on the closest overt morpheme, the B marker, or that featural conditioning can be non-local.

[9] The reader can now see why I did not include these examples in §3.1, as these cases of the *n* allomorph of the L morpheme look like they could simply be derived with the *C* allomorph of the L morpheme followed by EMPTY C ASSIMILATION to the *n* of *-ən*. (Note that this cannot be REGRESSIVE SONORANT ASSIMILATION because that is uniformly regressive.) The other environments of the *n* allomorph show clearly that this allomorph cannot be generally accounted for as an assimilation process, but in addition, §4 will show that even this particular case of the *n* allomorph cannot be understood as resulting from assimilation, because assimilation *is* bled by the intervention of *-wa*.

In order to understand the forms in (39), we must recognize the distinct *-ən* allomorph of BPL—there is no general process of nasal-insertion (or deletion) in Turoyo that could account for the appearance of this unexpected *n* before the past tense marker, nor could there be a phonotactic explanation for it: in (39), the *n* creates a slightly more marked syllable structure than it would have had otherwise with the elsewhere *-i* form of BPL (as it creates a closed syllable).

Two alternative hypotheses about the *-i/-ən* allomorphy are worth addressing and ruling out. The first capitalizes on the fact that the only CC-initial L markers are L2PL and L3PL. Thus, one might wonder whether BPL allomorphy is better characterized as being featurally-triggered, by being followed by a plural non-first person, rather than being phonologically-triggered. However, this cannot be the right characterization of the allomorphy, as the *-ən* allomorph is crucially not triggered when the closer morpheme to it, the S morpheme, itself marks a plural non-first person; this can be seen in (40a) for a 3rd person plural S marker and (40b) for 2nd person plural. (In (40b), HIATUS RESOLUTION obscures the B plural morpheme; but there would have been no hiatus at all if the allomorph here were *-ən*.)

(40) a. nəšq -i -∅ -l-a (=nəšq**i**la, *nəšqənla)
kiss.IMPF -***B***PL -***S***3 -***L***-3F.SG
'they kiss her' (p. 133)

b. zəbṭ -i -ut -l-e (=zəbṭutle; *zəbṭənutle)
catch.IMPF -***B***PL -***S***2PL -***L***-3M.SG
'you (pl) catch him' (p. 135)

The examples in (40) feature a plural B marker followed immediately by a plural non-first person marker, and yet the elsewhere allomorph *-i* is chosen. The *-ən* allomorph therefore cannot be understood as occurring in the environment __[PL, –AUTH], as it is not triggered in (40).

Second, it could be, from what we have seen so far, that BPL takes the form *-ən* when preceding the past tense morpheme. This, too, can readily be shown to be incorrect:

(41) zəbṭ -i -wa -na -l-a (=zəbṭi**way**nala)[10]
catch.IMPF -***B***PL -PST -***S***1PL -***L***-3FS
'we used to catch her' (p. 136)

The *-ən* allomorph cannot be understood as occurring in the environment __[PAST], as it is not triggered in (41). (It is only triggered when what *follows* past tense is L3PL or L2PL, i.e., a CC sequence.)

Summing up what we have seen so far, the only unified characterization of the *-ən* allomorph is that it appears in the environment __CC. The choice of this allomorph is *always* surface-opaque. In non-past verbs, like (37), the CCC sequence is simplified by SHORTENING, which obscures the allomorph of BPL: it looks like it is just *-ə*, concurrent with the *n* allomorph of the L morpheme. The surface form also obscures the *environment* that triggers

[10]The past tense morpheme *-wa* has the allomorph *-way* when it precedes CV (but not at the end of a word, hence not just in any open syllable).

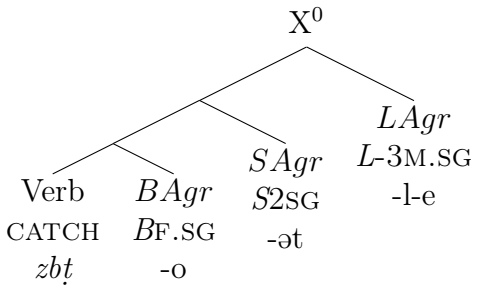
the allomorphy, as on the surface, the -*ən* allomorph does not precede CC, but rather CV (*xu* or *ne*). In past tense verbs, like (39), the -*ən* allomorph does not precede CC, but rather the CV form of the past tense suffix, -*wa*, yet another layer of opacity. (This surprising fact is taken up in §4.)

3.3 An aside: The structure of the verb word

Before turning to the past tense morpheme, an additional remark is in order about the allomorphy motivated above. Both L and B allomorphy are at least in part phonologically-conditioned, and in both cases, the phonological trigger is *further* from the root of the word than the allomorph—these allomorphs are sensitive to (conditioned by) what looks like outer phonological material. This is surprising, given a particular crosslinguistic generalization about when allomorphy can have a phonological trigger (Carstairs 1990, Bobaljik 2000, Paster 2006, *i.a.*): generally speaking, allomorphy that is conditioned by phonology can be "inwardly" sensitive, but not "outwardly" sensitive; in other words, a morpheme may vary in form based on the phonological properties of elements that are *more embedded* than the morpheme itself, but not *less embedded*.[11] To use a quick example, in Modern Western Armenian, the definite article (a nominal suffix) has two contextual allomorphs, taking the form -*n* when the noun root ends in a vowel, and -*ə* when it ends in a consonant, e.g., *lezu-n* 'the tongue' vs. *kirk-ə* 'the book' (Andonian 1999, cited by Paster 2006); this is phonologically-conditioned allomorphy that is inwardly-sensitive, and so goes in the expected direction. A common explanation for this generalization that holds across morphological frameworks (see, e.g., Kiparsky 1982, Carstairs 1987, Anderson 1992, Halle and Marantz 1993, Bobaljik 2000) is that words are in some sense phonologically built from the most-embedded part (typically the root) to the least-embedded part; it thus follows naturally that an outer morpheme can only be sensitive to (can only "see") the phonology of a morpheme that is more deeply embedded than it.

Working just from the basic information about Turoyo verbs provided in §2, and with no deeper investigation of the language, one might posit a structure for the verb in (1) that looks like (42), with the verb root being the most deeply embedded piece, and the L marker being the least embedded. (I put aside the aspectual vowel pattern here, as well as the internal structure of the L marker.)

(42)

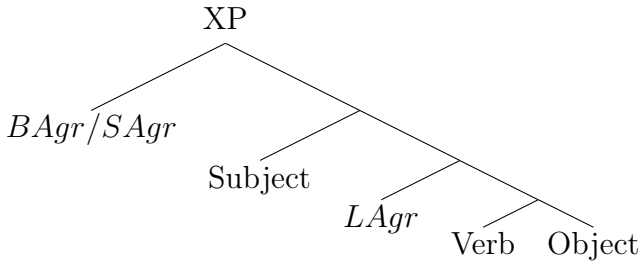


[11] There are, of course, at least purported counter-examples. See e.g. Carstairs (1990) and Deal and Wolf (2017) for a few counter-examples and ways to understand them without (at least fully) abandoning the larger generalization.

This structure is problematic when considered with respect to (at least) B allomorphy, as the phonological word would need to be built starting from the *highest* morpheme in order to understand how Bpl can be sensitive to the phonological form of the S and L markers. In the structure in (42), allomorphy of the plural B morpheme would be outwardly-sensitive to phonology.

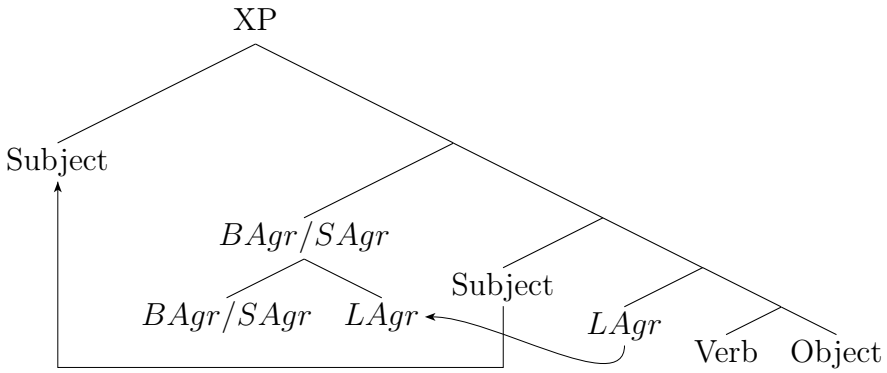
The facts of phonologically-conditioned allomorphy in Turoyo are enough to reconsider whether (42) is the right structure for the verb word. But in fact a fully distinct argument from split-ergativity and agreement restrictions in Turoyo also supports the rejection of (42) as the structure of the verb word (Kalin to appear). In very brief, when B/S index an object, which happens in perfective aspect, the object is restricted to 3rd person. This suggests that B/S agreement is *high* in the syntactic structure, separated from the object by an intervening argument (the subject), resulting in the person restriction. The L marker, on the other hand, is unrestricted regardless of what argument it agrees with, and this suggests it originates *low* in the structure, from which position both the subject and the object are accessible without intervention. The motivated syntactic structure is roughly schematized in (43).

(43)

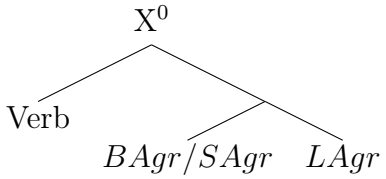


Kalin to appear also considers several paths to the wordhood of the verbal complex from the underlying syntactic structure in (43). For concreteness, I will adopt one of these possibilities here, namely that there is traditional head movement (Travis 1984) combined with a general operation of Merger Under Adjacency (Marantz 1984, Bobaljik 1994, Harley 2013, *i.a.*). Inspired by an analysis of Cupeño verbs (Barragan 2003, Harley 2013), this approach would have L raise to B/S (adjoining to B/S as a prefix) in the syntax, (44a). (For completeness, I show the subject raising from its base position to a high clausal position.) In the post-syntax, the verb merges-under-adjacency with the linearly adjacent head-complex (B/S-L), adjoining at the X^0 level and left-aligning to it, producing the morphological structure in (44b). (*nb.* Lowering the complex B/S node to V after (44a) would also produce (44b).)

(44) a.



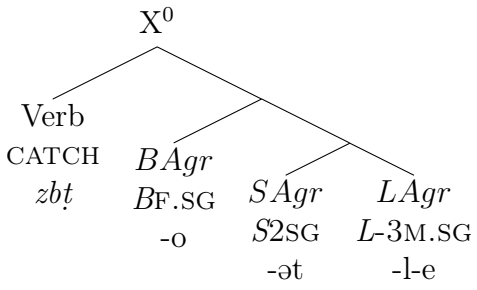
b.



The structure and derivation in (44) gets the morphemes in the right order, while respecting the underlying syntactic structure that is motivated by person restrictions in the perfective, (43). (44) also solves the outward-sensitivity puzzle: counter to appearances, the verb base is *not* the most embedded component of the verb word; rather, L agreement is the most embedded. The plural B marker is thus actually *inwardly-sensitive* to the phonological forms of S and L agreement, and so is not exceptional at all in this respect.

The crucial takeaway here is that both allomorphy and agreement restrictions converge in supporting a structure in which the B marker is morphosyntactically high and the L marker is low. For a more articulated word structure going forward, I adopt (45) as the representation of the morphological structure of a verb like that in (1).

(45)



4 Morphology before phonology: Displacement

The previous section motivated two cases of allomorphy in the verbal complex, repeated for easy reference in (46)–(47), and showed that they are neutral or "perverse" with respect to phonological optimization, and may be opaque.

(46) L → *l* / (= *l* elsewhere)
C / __C (= empty C slot when preceding a consonant)
n / PL__C (= *n* when following a plural feature and preceding a consonant)

(47) BPL → -*i* / (= -*i* elsewhere)
-*ən* / __CC (= -*ən* in a closed syllable)

We turn now to the most revealing aspect of Turoyo verbal morphology with respect to illuminating the morphology-phonology interface, the behavior of the past tense morpheme, -*wa*. As we will see in §4.1, -*wa* has a variable surface position, sometimes appearing between the B and S markers and sometimes between the S and L markers. §4.2 shows that in its surface position, -*wa* is completely ignored for the purposes of the allomorphy noted in §3, which is especially surprising with respect to phonologically-conditioned B allomorphy, as -*wa* intervenes in its conditioning environment. Whereas -*wa* is invisible to morphological processes, it is treated as visible and present in its surface position for all the phonological processes introduced in §2.2.

In §4.3, I will argue that -*wa* is morphosyntactically between the verb stem and the B marker, taking its surface position further from the verb stem via phonological infixation. If morphology (in particular, exponent choice) is a necessary precursor to phonological infixation, it is natural that morphology should not be sensitive to -*wa* in its surface position, since it isn't yet in that position. But what this also shows is that morphology and phonology are not intertwined—exponent choice (for morphemes more embedded than -*wa*) fully precedes -*wa* taking its surface position, which itself precedes all other phonological processes.

4.1 The placement of -*wa*

The past tense morpheme -*wa* always follows the verb stem, but depending on the particular B and S morphemes present, may precede or follow the S marker. The complete set of possibilities for -*wa*'s position is shown in Table 4. Some notes about this table: (i) each row presents a different φ-feature combination for the subject of the verb 'laugh' (recall that B and S markers always agree with the same argument); (ii) each column lays out (in surface linear order) the morphemes that are part of the verbal complex corresponding to a particular φ-feature combination; (iii) all columns except the last give underlying (pre-phonological-process) forms, (iv) the last column gives the surface form of the complete verb, and (v) -*wa* is given in parentheses before the S marker in the 3rd person because it is actually impossible to tell in these cases whether -*wa* precedes or follows the S marker (because the S marker is null). Recall also from fn. 10 that -*wa* has the allomorph -*way* before CV, which we can now see clearly is determined based on its surface position.

There are a number of generalizations one can make about the position of -*wa*. Perhaps the most obvious is that -*wa* precedes the S marker when the S marker is 1st person, but

Table 4: Surface position of *-wa* in the verb (p. 154)

B*+*S	'laugh.PFV'	***B***	PAST	***S***	PAST	surface form
1M.SG	gaḥik	-∅	-wa	-no		= gaḥək**way**no
1F.SG	gaḥik	-o	-wa	-no		= gaḥiko**way**no
1PL	gaḥik	-i	-wa	-na		= gaḥiki**way**na
2M.SG	gaḥik	-∅		-ət	-wa	= gaḥikət**wa**
2F.SG	gaḥik	-o		-ət	-wa	= gaḥikat**wa**
2PL	gaḥik	-i		-ut	-wa	= gaḥikut**wa**
3M.SG	gaḥik	-∅	(-wa)	-∅	-wa	= gaḥək**wa**
3F.SG	gaḥik	-o	(-wa)	-∅	-wa	= gaḥiko**wa**
3PL	gaḥik	-i	(-wa)	-∅	-wa	= gaḥiki**wa**

follows the S marker otherwise.[12] This, in fact, is the generalization offered by Jastrow (1993:150). Another way to describe the position of *-wa* is to say that it precedes the S marker when the S marker is consonant-initial, but follows the S marker when the S marker is vowel-initial. This description characterizes the alternation as essentially being a case of phonologically-conditioned affix ordering.

Both of the above characterizations of *-wa*'s placement rely on it being able to "see" morphemes/morpheme boundaries. However, another characterization is possible, which is almost entirely phonological (and we will see later how a purely phonological explanation can be given for it): *-wa* appears at the first syllable boundary after the verb base (the root-and-template form, here ending in the root consonant *k*). Take, for example, 1st person masculine singular *ga.ḥək.no*, which in the past is *ga.ḥək.wa.no*; 2nd feminine singular *ga.ḥi.kat*, which in the past is *ga.ḥi.kat.wa*; 3rd plural *ga.ḥi.ki*, *ga.ḥi.ki.wa* in the past; and so on. This description of *-wa*'s position holds that it is essentially an infix, and it is this characterization that I will argue is the right one. Note that Table 4 shows the forms of an intransitive verb, and so there is no L agreement marker. L markers never affect the position of *-wa*, and so seem to be outside of the calculation of its placement.[13]

4.2 Allomorphy, phonological processes, and *-wa*

The most remarkable fact about *-wa* is its differential behavior with respect to morphological processes and phonological processes. As this section will demonstrate, phonological processes (unremarkably) treat *-wa* as a normal and integrated part of the verb word—-

[12]Because the 3rd person S marker is null, this could equivalently be stated as *-wa* following the S marker when when S marker is 2nd person, but preceding the S marker otherwise.

[13]Note that if L markers were *not* outside the calculation of *-wa*'s placement, we *would* expect that they could sometimes influence its placement (under the characterization that relies on syllable structure). Take, for example, the verb form from (30b), *nəš.qol.xu*, 'she kisses you (pl)'; if L markers were taken into account, we would expect the past form of this to be *nəš.qol.wa.xu*, but in fact it is *nəš.qo.wal.xu*—in other words, *-wa* has the same position it would have had if the L marker were absent altogether.

wa in its surface position factors into all phonological processes—whereas allomorph-choice (remarkably) proceeds as though *-wa* were not there.

Let's start with an examination of phonological processes and *-wa*. In present tense (48a), there are two phonological processes taking place: (i) EMPTY C ASSIMILATION to *t*, and subsequent (ii) SHORTENING. In the past tense form of this verb, (48b), *-wa*'s appearance bleeds both processes—so instead, *C* receives its default realization as *l* (cf. the discussion around (30)), and no SHORTENING is triggered. (Note that the L morpheme has its allomorph *C* because it immediately precedes a consonant.)

(48) a. zəbṭ -∅ -ət -C-Ce (=zəbṭə**tt**e)
catch.IMPF -***B***M.SG -***S***2SG -***L***-3PL
'you (masc. sg.) catch them' (p. 135)
b. zəbṭ -∅ -ət -wa -C-Ce (=zəbṭə**t**wa**ll**e)
catch.IMPF -***B***M.SG -***S***2SG -PST -***L***-3PL
'you (masc. sg.) used to catch them' (p. 135)

Unsurprisingly, the phonology "sees" *-wa* in its surface position. If *-wa* took its surface position after some or all phonological processes had taken place, we would expect *C* to assimilate to *t* in (48b), resulting in a surface form like *zəbṭətwate* (if SHORTENING also took place before *-wa*'s placement) or *zəbṭətwatte* (if *-wa* were inserted after EMPTY C ASSIMILATION but before SHORTENING), but this is not what we find.[14] Along the same lines, the pair of verbs in (49) shows that LOWERING too is bled by *-wa*, as there is LOWERING in present tense (49a) but not in past tense (49b).

(49) a. nəšq -o -∅ -C-Ce (=nəšq**a**lle)
kiss.IMPF -***B***F.SG -***S***3 -***L***-3PL
'she kisses them' (p. 133)
b. nəšq -o -∅ -wa -C-Ce (=nəšq**o**walle)
kiss.IMPF -***B***F.SG -***S***3 -PST -***L***-3PL
'she used to kiss them' (p. 133)

If LOWERING occurred before *-wa* took its surface linear position, we would expect *nəšqawalle* in (49b), but again this is not what we find. *-wa* is consistently visible to the phonology, and there is no evidence that there was a cycle of phonology without *-wa* in its surface position.

Unlike phonological processes, allomorphy is completely impervious to (unaffected by) *-wa*. Perhaps the less surprising case comes from the persistence of the *n* allomorph of the L morpheme across *-wa*. Recall from §3.1 that L has the allomorph *n* in the environment PL__C. When the plural in the triggering environment is a second person plural, *-wa* intervenes

[14] Assimilation is in fact always bled by *-wa*, both EMPTY C ASSIMILATION and REGRESSIVE SONORANT ASSIMILATION. This means that any account of the *l*/*n* alternation of the L morpheme cannot be purely phonologically, triggered by a floating nasal that is (in most cases covertly) attached to every plural morpheme. If this were the right account of the *n* allomorph, then *n* allomorphy should be bled by *-wa* just like all other assimilation is, but it is not bled by *-wa*. In this way, *-wa* enables us to draw a neat line between what is purely phonological, and what is not.

between the plural S marker and the L morpheme (see *-wa*'s position in the 2PL row in Table 4)—on the surface, the L morpheme's environment is PL-*wa*__C. Since *-wa* linearly disrupts the environment for choosing *n*, we might therefore expect this allomorph to be bled by the appearance of *-wa*, with the elsewhere allomorph *l* or the preconsonantal allomorph *C* appearing instead. However, the minimal pairs in (50)–(51) show clearly that this is not what we find:

(50) a. zəbṭ -i -ut -n-Ce (=zəbṭut**ne**)
catch.IMPF -***B***PL -***S***2PL -***L***-3PL
'you (pl) catch them' (p. 135)

b. zəbṭ -i -ut -wa -n-Ce (=zəbṭutwa**nne**)
catch.IMPF -***B***PL -***S***2PL -PST -***L***-3PL
'you (pl) used to catch them' (p. 135)

(51) a. zəbṭ -i -ut -n-xu (=zəbṭutə**nxu**)
catch.IMPF -***B***PL -***S***2PL -***L***-2PL
'you (pl) catch yourselves' (p. 135)

b. zəbṭ -i -ut -wa -n-xu (=zəbṭutwa**nxu**)
catch.IMPF -***B***PL -***S***2PL -PST -***L***-2PL
'you (pl) used to catch yourselves' (p. 135)

Even though *-wa* intervenes between the L morpheme and the preceding plural in (50b) and (51b), *n* is still the allomorph that is chosen. Note that since the trigger here is a morphological feature (plural), some formulations of locality actually do permit this allomorphy to persist across an intervener (see, e.g., Bobaljik 2000, Harley and Choi 2016, cf. Embick 2010), and so this is not as of yet particularly shocking.

The more surprising case of allomorphy comes from the persistence of phonologically-conditioned allomorphy across *-wa*. This is found with the *-i*/*-ən* allomorphy of the BPL morpheme, §3.2, where *-ən* appears in the environment __CC. As should be clear from §4.1, *-wa* will always appear between the plural B morpheme and any L markers, including those that provide the CC environment for BPL *-ən*—the surface string of the environment for BPL in the past tense is __-*wa*-CC, when the L markers are 3PL or 2PL. As shown first in (39) and repeated in minimal pairs below, *-wa* nevertheless does not block B allomorphy:

(52) a. nəšq -ən -∅ -n-xu (nəšq**ən**xu)
kiss.IMPF -***B***PL -***S***3 -***L***-2PL
'they kiss you (pl)' (p. 127)

b. nəšq -ən -∅ -wa -n-xu (=nəšq**ən**wanxu)
kiss.IMPF -***B***PL -***S***3 -PST -***L***-2PL
'they used to kiss you (pl)' (p. 134)

(53) a. nəšq -ən -∅ -n-Ce (=nəšq**ən**ne)
kiss.IMPF -***B***PL -***S***3 -***L***-3PL
'they kiss them' (p. 127)

b. nəšq -ən -∅ -wa -n-Ce (=nəšq**ən**wanne)
kiss.IMPF -***B***PL -***S***3 -PST -***L***-3PL
'they used to kiss them' (p. 134)

If *-wa* were in its surface linear position when the allomorph of BPL were chosen, we would expect elsewhere *-i* to surface, giving us (counter to fact) *nəšqiwanxu* for (52b) and *nəšqiwanne* for (53b). Unlike the morphologically-conditioned allomorphy, which could in theory happen across an intervening morpheme, phonologically-conditioned allomorphy is not expected to behave this way under any theory of locality—in the absence of the right phonological environment, the allomorphy should not take place. Since phonologically-conditioned allomorphy *does* persist here, an explanation is called for.

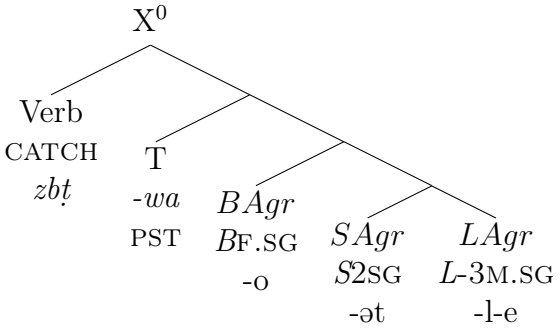
4.3 Analysis of *-wa*

Putting together the observations in §4.1 and §4.2, *-wa* draws a dividing line between what is phonological and what is morphological—the morphology ignores *-wa*, while the phonology doesn't. Put another way, *-wa* does not seem to be in its surface (intervening) position at the point of exponent choice, but *is* in its surface position by the time phonological processes apply. This state of affairs is only understandable if exponent choice is separate from and precedes phonology; the morphology and phonology must *not* be collapsed in one grammatical module.

Going one step further, an analysis of *-wa* as a phonological infix can naturally capture its behavior in terms of both allomorphy and phonological processes. In particular, what I propose is that *-wa* is morphosyntactically adjacent to the verb base but has a phonological condition on its placement (à la Yu 2007); *-wa* satisfies its phonological requirement as soon as it can, which is *after* morphological processes/word-building (i.e., after exponent choice), but *before* (most of) phonology. The proposed underlying position of *-wa* in the verbal complex is shown in (54) (an expansion of (45)), and its phonological subcategorization properties are given in (55).

(54) a. V-PAST-B-S-L

b.



(55) Phonological subcategorization of PAST: $]_{\sigma}$__

Based on the structural position of *-wa*, it should appear between the verb stem and the B marker, but due to an additional requirement that it must right-align to a syllable boundary, *-wa* may appear displaced from this position on the surface.[15]

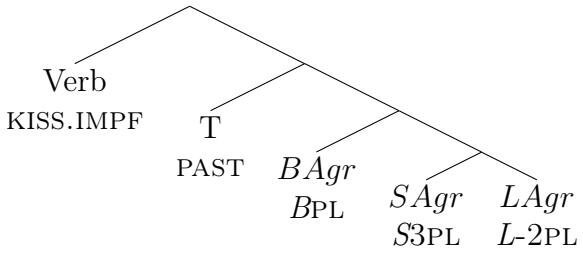
In addition to the proposal that *-wa* is an infix, I assume that exponent choice is cyclic, starting from the most deeply embedded node (Carstairs 1987, Bobaljik 2000, Carstairs-McCarthy 2001, Adger et al. 2003, Embick 2010, *i.a.*), and that at each node, any other conditions on the realization of that node are satisfied alongside exponent choice. Concretely for our purposes here, this will mean that exponent choice starts with L agreement and ends with the verb base, and that *-wa* will be infixed as soon as T is reached, which will be after B, S, and L agreement markers have phonological forms.

Let's run through an example derivation for the verb in (56) to see how the above proposal accounts for the facts in §4; (56) features both BPL allomorphy and L allomorphy, alongside the surface-intervening past tense morpheme.

(56) nəšq -ən -∅ -wa -n-xu (=nəšqənwanxu)
kiss.IMPF -***B***PL -***S***3 -PAST -***L***-2PL
'they used to kiss you (pl.)' (p. 134)

First, the morphosyntax assembles the abstract morphemes that are involved, (57). (See §3.3.)

(57)



[15]There are other ways this movement of *-wa* can be modeled that do not impact the broad conclusions here, though there are reasons to disprefer them analytically. One alternative is for the displacement condition on *-wa* to be morphosyntactic in nature, e.g., Local Dislocation of T (à la Embick and Noyer 2001). To get the allomorphy facts right, T would still need to originate above B agreement, while to get the linearization facts right, T would need to *always* dislocate to a position below B agreement, and then only sometimes *additionally* dislocate to a position below S agreement. It is not clear that Local Dislocation can be successive in this way.

Another alternative to modeling the displacement of *-wa* is to take it to be a purely phonological re-ordering of affixes, though this requires that the relevant morphological information persist into the phonological component of the grammar, where the reordering takes place. However, true phonologically-conditioned affix ordering is exceedingly rare, and in fact has been argued to not exist (Paster 2009). (See also significant relevant discussion in Kim 2015.) A problem with implementing this sort of analysis is that—assuming that phonologically-conditioned affix ordering minimally reorders elements—*-wa* should underlyingly be structurally between B agreement and L agreement, and simply linearly unordered with respect to S agreement. In this position, *-wa* should block BPL allomorphy, but it in fact doesn't. In addition to this challenge to such an account, there is no clear phonological motivation for this reordering—it does not help to optimize the word in most cases.

Next, exponent choice proceeds from the most deeply embedded node up, satisfying any additional conditions a morpheme has at the same time. This is schematized in (58), starting with the first choice of exponent (which I take to be the personal suffix component of L agreement) and working up the structure, keeping track of the resulting surface string along the way.

(58)
a. 2PL → *-xu* = *xu*
b. L → *n* / PL__C = *nxu*
c. S3PL → *-∅* = *nxu*
d. BPL → *-ən* / __CC = *ənnxu*
e. PAST
   (i) Syllabification = *ən.nxu*
   (ii) Infixation of PAST = *ən*-PAST-*nxu*
   (iii) PAST → *-wa* = *ənwanxu*
f. KISS.IMPF → *nəšq* = *nəšqənwanxu*

Finally, the verb word is sent to the phonology.[16] The output *nəšqənwanxu* is already phonologically well-formed, so no phonological processes are triggered. But crucially, what the phonology sees is the fully-assembled verb, post-allomorphy, and post-infixation.

A few notes are in order about (58e). First of all, I ordered exponent choice last out of the operations relevant to T in order to naturally account for the alternation of *-wa* with *-way* depending on its surface phonological environment—*-wa* elsewhere, *-way* before CV. This analysis presupposes that *-wa* and *-way* are suppletive allomorphs of PAST. An equally valid alternative would be to take *-way* to be derived from *-wa* by a morphophonological process (nb. this does not correspond to a general phonological process of Turoyo); this analysis would not require any ordering between exponent choice for PAST and infixation of PAST/*-wa*.

Second, I assume that syllabification of the already-exponed form is triggered by *-wa*'s need to align after a syllable boundary (otherwise, it could not align in the right place). The precise details of how this syllabification works are not trivial; I lay these details out here briefly, but they merit a deeper investigation that is outside the scope of this paper. The first thing to note is that all syllables in Turoyo must have an onset (p. 24), and so I assume that in the syllabification process, vowel-initial sequences do not delineate a syllable boundary at their left edge. This is needed to understand why *-wa* does not just always linearize at the left edge of the agreement sequence, though it can (e.g., in 1st person masculine singular, as seen in Table 4: *gaḥəkwayno*). The second thing to note, though it doesn't have any impact in (58) because of where the syllable boundary falls naturally, is that L agreement is not part of the syllabification domain. This cordoning off of L agreement is necessary to prevent *-wa* from floating into the L agreement marker; see fn. 13. There are independent reasons to think that L agreement is not in exactly the same minimal domain as B and S agreement, as

[16]Note that if every instance of exponent choice triggered phonological processes (à la Myler 2017), we would not arrive at the right surface form here, as *nn* would undergo SHORTENING.

main verb stress can never shift to the L marker, even when the conditions otherwise predict that stress should fall there. I do not delve more deeply here into this syllabification process.

What exactly does this analysis buy us? First, *-wa* is morphosyntactically outside of all the environments for allomorphy discussed in §3. This means that as exponents are chosen for the B, S, and L markers, *-wa* does not linearly intervene, and so does not disrupt any of this allomorphy. Second, *-wa* infixes to its right, not its left into the verb base, because at the point where *-wa* seeks to satisfy its phonological condition, only the structure that is more deeply embedded has a phonological form. Finally, since *-wa* takes its surface position before the verb word is sent to the phonology, it is visible in its surface position for all phonological processes.

4.4 Summary

In this section, I showed that the past tense morpheme *-wa* has a variable surface position, and that in this surface position, it is visible to phonology but invisible to exponent choice—both Bpl and L allomorphy take place *over* the past tense morpheme; this is especially surprising for phonologically-conditioned Bpl allomorphy. To understand this data, I proposed that *-wa* is a phonological infix that linearizes at the closest syllable boundary. This proposal along with a cyclic model of exponent choice naturally derives the differentiating behavior of *-wa*: B, S, and L agreement are all exponed before *-wa* takes its surface position, and only after the verb word is built is the whole form considered for phonological well-formedness.

5 Implications for the morphology-phonology interface

In this paper, I have carefully considered the complex morphophonology of verbs in the Neo-Aramaic language Turoyo. This data argues strongly for a separation of morphology and phonology, in particular with exponent choice fully preceding purely phonological processes. Allomorphy in Turoyo feeds and bleeds phonological processes, can be non-optimizing and anti-optimizing, and can be opaque on the surface. These results are in line with much earlier work; see especially Paster 2006, 2009. In addition, a variably-placed morpheme which I argued is an infix counterfeeds and counterbleeds allomorphy (even phonologically-conditioned allomorphy), while feeding and bleeding phonological processes. To my knowledge, the latter evidence involving phonologically-conditioned allomorphy is novel, though not wholly dissimilar from other cases of displacement and morphophonology discussed by Embick (2010:Ch. 3.4.3) and Myler (2017).

The Turoyo data and the conclusions it motivates are in conflict with a popular way of modeling phonologically-conditioned allomorphy and infixation (see McCarthy and Prince 1993a,b, Mester 1994, Kager 1996, Kim 2010, *i.a.*). The basic component of such models that is in conflict with Turoyo is that phonology and morphology take place (are evaluated) in parallel. More concretely, infixation is modeled as the result of a morphological alignment preference being overruled by a prosodic alignment preference, and phonologically-

conditioned allomorphy as the result of a morphological default being overruled by phonological well-formedness considerations. Since they involve a phonological or prosodic constraint outranking a morphological one, these sorts of accounts are referred to under the label "P»M".

Some infixation and some phonologically-conditioned allomorphy is indeed optimizing. Models that separate morphology from phonology lose the intuitively appealing explanation for this optimization that P»M models can capture so well. What I hope to have done in this paper is to add to the body of evidence arguing for a separation of morphology from phonology, and for divorcing phonological well-formedness from both infixation and allomorphy.

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