

# The puzzle of (apparently) phonologically motivated empty morphs\*

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Workshop On Morphology at Princeton (WOMP), March 22–23 2024

## 1 Setting the stage

Two points of debate:

1. Empty morphs
2. Phonologically optimizing morphology

EMPTY MORPHS

Classical **morphemes** are systematic pairings of **form** and **meaning/function**.

Two types of departures from this:

- meaning/function without corresponding form: **zero morphs**
- form without corresponding meaning/function: **empty morphs** (Hockett, 1947)  
(also called “dummy morphs”, “epenthetic morphs”, “stabilizers”)

Some empty morphs seem to be there to meet **morphological well-formedness requirements**:

- (1) Bantu “Final Vowels”, e.g. in Kinande (Jones, 2014)
- a. *-ɪr-e* = perfect / stative
  - b. *-a-e* = subjunctive / imperative
  - c. *-a-a* = imperfective / recent past / future
  - d. *-a* = **all other contexts**

Distributed Morphology (DM) has no issue with zero morphs.

(more controversial in other morphological and syntactic frameworks, perhaps for good reasons)

But DM is essentially incompatible with a genuinely empty morph—form with **no** meaning/function.

- a realization in DM must realize **something**—“something” could be a functional head, or even a dissociated node inserted post-syntactically, but there must be a position of exponence.

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\*Thanks to Donca Steriade and Adam Albright, who taught a seminar in Spring 2022 that inspired this talk, as well as the audience at Morphology in Montreal-Ottawa-Toronto (Mo-MOT) 7 in October 2023. Any errors in data or analysis are my own.

## PHONOLOGICALLY OPTIMIZING MORPHOLOGY

A quite different debate concerns whether phonological factors can motivate morphological realization.

Most of this literature is concerned with **phonologically optimizing suppletive allomorphy**.

- The choice of which allomorph occurs in a given context often looks phonologically motivated:

### (2) Korean nominative case allomorphy

V-initial after Cs		C-initial after Vs	
[hanguk-i]	'Korea.NOM'	[li-ka]	'Lee.NOM'
[saŋ-i]	'prize.NOM'	[tʃ <sup>h</sup> a-ka]	'car.NOM'
[pab-i]	'rice.NOM'	[gogi-ka]	'meat.NOM'
[par-i]	'foot.NOM'	[ʃinho-ka]	'signal.NOM'
[saram-i]	'person.NOM'	[ne-ka]	'1SG.NOM'

- This has led to various proposals that the phonological system—usually OT-style constraints—play a direct role in allomorph selection (Bonet et al. 2007; Mascaró 2007; Wolf 2008; Bermudez-Otero 2012; de Belder 2020; among many others).
- Against this, many have argued on both empirical and theoretical grounds that morphology is **totally insensitive** to phonology → apparent influence arises only indirectly (Paster 2006, 2015; Embick 2010; Pak (2016); Kalin (2020); Rolle (2021); among others)
- Indeed, in classic DM, it is **impossible** for the phonological grammar to directly condition suppletive allomorphy → not only do they belong to separate modules, but morphological realization is derivationally prior to phonology.
  - Of course, this could be an argument against DM, or against the existence of a separation between morphology and phonology more generally, but methodologically we want to try very hard to maintain a **more restrictive theory** if we can.

### A PUZZLE AT THE INTERSECTION OF THESE: PHONOLOGICALLY OPTIMIZING EMPTY MORPHS

The debate on phonologically optimizing morphology has focused on suppletive allomorphy.

But in some cases, **optimization seems to involve empty morphs**.

- and not only that, but seemingly empty morphs that resemble actual morphemes elsewhere in the language.

### (3) Word-minimality effects in Ndebele (Sibanda, 2004, p. 113)

*1σ word	σσ via yi-	σσ via -an	
*dl-a	yi-dl-a	dl-an-a	'eat (IMP)'
*ph-a	yi-ph-a	ph-an-a	'give (IMP)'
*m-a	yi-m-a	m-an-a	'stand/wait (IMP)'
*lw-a	yi-lw-a	lw-an-a	'fight (IMP)'

- In (3), *yi* is plausibly epenthesis of a least-marked vowel + glide onset—a TETU effect.
- But *-an* / *-na* does *not* look like a plausible instance of phonological epenthesis—it resembles the reciprocal verbal suffix, but can occur with pronouns and demonstratives as well.

**Goal today:** Explore the analytical space available to deal with phonologically motivated empty morphs within DM

PLAN:

- Survey of phonologically-motivated “empty” morphs
- Case study: unexpected “plurals” in Romanian derivation
- Crystallizing the theoretical challenge
- Conclusions

## 2 A survey of phonologically optimizing empty morphs

Or at least of phenomena that plausibly fit that description, based on an in-progress survey.

**Many labels in the literature:**

- “morphological / morphosyntactic epenthesis” (e.g. Aronoff and Repetti 2022)
- “stabilizer” (in Bantu)
- “interfix” (attributed to Malkiel 1970 by Allen 1976)
- “augmentation” (in Athabaskan)
- “peg” (attributed to Sapir 1922 for Athabaskan in Cook 1971)
- “bolt” or “rivet” (attributed to Cusihuaman 1976 in Corbett 1992)

**Criteria for inclusion:**

- Stable segmental string that consists of something other than likely epenthetic segments
  - (*for today*) more than a single segment
  - not a CV sequence consisting of [t] / [ʔ] / glide followed by [a] or [i]
- Distribution characterizable in phonological terms and *not* in morphosyntactic terms
- (*in some cases*) Occurs as a morpheme elsewhere in the language

**Ndebele (Bantu) -na:** Seen above in (3).

Also found in Zulu, Chopi (Gowlett, 1984)

**Xhosa (Bantu) si-:** Occurs only in the present participle and imperative, if the macrostem (object marker + root + final suffix) would otherwise be less than 2 syllables (Gowlett, 1984; Buell, 2005)

(4) Xhosa: Buell (2005, 107)

- a. nì-lw-à  
“you (PL) fight” (no bisyllabicity requirement in this TAM)
- b. ní-sí-lw-à  
“you (PL) fighting” (present ptcp, 2σ requirement met by empty *si*)
- c. ní-wá-lw-à  
“you (PL) fighting them” (present ptcp, 2σ requirement met by object marker)

**Swahili (Bantu) *ku-*:** Much like *si-* in Xhosa, occurs in some tenses (including at least the simple past) in order to meet a 2σ minimality requirement (Buell, 2005, p. 10)

**Italian (Romance) *-isc*:** Occurs with some fourth-conjugation verbs, argued (by some) to occur only when it would be stressed, to prevent stress from occurring on verb roots in some person/number configurations but not others; also borrowed into Maltese (along with verbs borrowed from Italian), where its occurrence is different but argued to still be determined by stress (Aronoff and Repetti 2022 and references cited therein)

**Catalan (Romance) stem extenders:** In some varieties of Catalan, an “extender” [ə] / [gə] / [iyə] appears at the end of singular imperatives, when they are followed by an object clitic; the form of the extender is based on the form of the plural imperative (Bonet and Torres-Tamari, 2010; Aronoff and Repetti, 2022)

**Nunggubuyu (Eastern Arnhem) *ŋu-*:** occurs before a root or derivational affix beginning with a stop, when it occurs after a derivational prefix or “compound initial” or after an inflectional prefix that ends in a stop; may be motivated to prevent lenition rules that would obscure root-initial contrasts (Heath, 1984, pp. 35–37)

- (5) a. /-bura-/ “to sit”  
b. /ŋa-buri-∅/ “I sat”  
c. /ŋan-ŋu-buri-∅/ “I was going to sit”

**Cuzco Quechua (Quechuan) *ni-*:** occurs after nouns, before possessor suffixes, when the noun ends in a consonant, plausibly to avoid illicit CC clusters (Corbett, 1992, p. 176 onwards)

- (6) a. wasi-y “house.1SG.POSS” (7) a. yawar-**ni**-y “blood.1SG.POSS”  
b. wasi-yki “house.2SG.POSS” b. yawar-**ni**-yki “blood.2SG.POSS”

However, *-ni* still occurs when *-lla* (‘limitative’) intervenes between the root and the possessive suffix, and would prevent any illicit cluster: *yawar-ni-lla-yki* “just your blood” (cf. \**yawar-lla-yki*) (Corbett, 1992, p. 179)

**Alabama (Muskogean) *-li*:** occurs in affirmative verbs to meet a phonological verb template, i.e. when the word would otherwise end in a heavy syllable (Montler and Hardy, 1991)

**Tsuut’ina (Dene) morpheme (non)omission:** a somewhat different profile, involving not an empty morpheme but a condition on morpheme (non)realization.

The inflectional prefixes in (8) are omitted in some contexts, **unless** their omission would result in no remaining syllable nucleus in the prefix string (Wolf 2008, based on Cook 1971, 1984)

- (8) a. *mi-* 3SG.object  
b. *ni-* 2SG.subject  
c. *ni-* terminative aspect  
d. *si* perfective aspect

[i] is epenthesized if there are no overt prefixes present in the word.

Note, however, that similar patterns in other Dene languages have been accounted for as *morphological* constraints requiring at least one overt prefix.

### 3 Case study: unexpected “plurals” in Romanian derivation

#### 3.1 Background

Romanian is a Romance language spoken primarily in Romania and Moldova; it is one of the languages in the Balkan language area.

Relevant grammatical properties:

- 3 grammatical genders: M, F, and N (N= M in SG, F in PL)
- 4 ways of forming plural nouns:
  - *-i*: all M nouns + some F, N
  - *-uri*: F mass nouns, many N nouns
  - *-e*: F, N
  - *-(e)le*: F
- Stress pattern in nouns (Chitoran, 2002)
  - Primary stress: Evidence of preference for penultimate (rightmost nonfinal); final closed syllables are stressed.<sup>1</sup>
  - Secondary stress: initial + every second syllable, avoiding clash with primary stress
  - Some noun stresses lexically determined: penultimate syllable of the root
  - Stress does not shift with inflection (9), but typically does shift with derivation (10)

- (9) a. kás-e “house”  
b. kás-e-lor “house.PL.GEN/DAT”
- (10) a. kárt-e “book”  
b. kərt-itʃík-ə “book.DIM” (Chitoran, 2002, p. 84)

#### 3.2 An empty “plural” morph in derived words

An *-ur* morph<sup>2</sup>—which looks like part of one of the plural markers—sometimes appears in derived forms (all data here from Steriade 2022):

- (11) a. vînt ‘wind’ (13) a. frig ‘cold’  
b. vînt-ur-i (1--) ‘wind-PL’ b. frig-ur-i (1--) ‘cold-PL’  
c. vînt-ur-a (2-1) ‘shake in the wind’ c. frig-ur-a (2-1) ‘make cold’  
d. vînt-ur-el (2-1) ‘wind-DIM’ d. frig-ur-el (2-1) ‘cold-DIM’
- (12) a. val ‘wave’  
b. val-ur-i (1--) ‘wave-PL’  
c. vâl-ur-el (2-1) ‘wave-DIM’

(stress in parentheses: 1 = primary; 2 = secondary; hyphen = unstressed)

<sup>1</sup>Chitoran (2002) argues that the surface coda of final closed syllables is actually the onset of a syllable with [u], which does not surface, and that the system is thus in fact weight-insensitive. However, the details of this analysis do not concern us here, only the surface generalization.

<sup>2</sup>I am assuming that the morph is *ur*, but it could be *uri* + hiatus resolution.

**Two claims:**

1. *-ur* occurs to permit an initial secondary stress to surface without inducing stress clash
2. the *-ur* that shows up in derived forms is the same morph that shows up in the plural

**Evidence for 1:** If the stem (or the suffix) is disyllabic or longer, *-ur* does not appear in derived forms, even if it is present in the plural

- (14) a. vârtej (-1) 'swirl'  
 b. vârtej-ur-i (-1-) 'swirl-PL'  
 c. vârtej-el (2-1) 'swirl-DIM' (\*vârtej-ur-el)
- (15) a. postav (-1) 'felt'  
 b. postav-ur-i (-1-) 'felt-PL'  
 c. postăv-el (2-1) 'felt-DIM' (\*postăv-ur-el)

**Evidence for 2, part 1:** If the plural doesn't have *-ur*, no *-ur* in derivatives.

- (16) a. drac (1) 'devil'  
 b. drac-i (1-) 'devil-PL'  
 c. drăc-el (-1) 'devil-DIM' (\*drăc-ur-el)
- (17) a. alb (1) 'white'  
 b. alb-i (1-) 'white-PL'  
 c. alb-i (-1) 'make white' (\*alb-ur-i)  
 d. alb-el (-1) 'white-DIM' (\*alb-ur-el)

Similar evidence for derivation from nouns to both verbs and adjectives:

- (18) a. năz-ur-í "to dream up" (naz, năz-uri "tantrum")  
 → cf. păz-í "to guard" (păz-ă, păz-i "guard")  
 b. colț-ur-ós "rough" (colț, colț-uri "fang, angle")  
 → cf. muc-ós "snot-nose" (muc, muc-i "snot")  
 c. nēm-ur-ésc "of kin" (neam, neám-uri "kin")  
 → cf. frăț-ésc "brotherly" (frát-e, fraț-i "brother")

Steriade (2022) identifies only two exceptions to the generalization for diminutives, based on 255 *-(ur)el* diminutives from dexonline.ro (Table in (19) reproduced from Steriade 2022):

(19)

	DIM= <i>-ur-el</i>	DIM= <i>-el</i>
1σ root	38	<b>1</b>
PL= <i>uri</i>	(val, val-ur-i, val-ur-el)	(ciur, ciur-ur-i, <b>ciur-el</b> )
2+σ root	0	23
		(vârtej, vârtej-ur-i, vârtej-el)
1σ root	<b>1</b>	13
PL≠ <i>uri</i>	(șarp-e, șerp-i, <b>șerp-ur-el</b> )	(drac, drac-i, drăc-el)
2+σ root	0	179
		(brotac, brotac-i, brotăc-el)

In slightly larger font, the two exceptions are:

- (20) a. ciur 'screen, sieve'  
b. ciur-ur-i PL  
c. ciur-el DIM (predicted \*ciur-ur-el) ← haplology
- (21) a. șarp-e 'snake'  
b. șerp-i PL  
c. șerp-ur-el DIM (predicted \*șerp-el)

**Evidence for 2, part 2:** At least one suppletive roots with a bisyllabic form in the plural uses its bisyllabic allomorph in the same contexts where *-ur* shows up with non-suppletive roots.

- So this isn't just about *-ur*—it's about repurposing morphology from the plural, if that morphology gets you a better syllable count.

- (22) a. om 'man'  
b. oamen-i (1--) 'men'  
c. omen-os (2-1) 'humane'<sup>3</sup>  
d. omen-i (2-1) 'treat kindly'  
e. omen-esc (2-1) 'human'  
f. om-uleț (2-1) 'man-DIM' (\*òmen-ulét)

- (22-f) provides further evidence that this is about the overall position of stress, not merely the size of the stem: the disyllabic suffix reverts back to the one-syllable allomorph of the root.

**Summary:** Romanian exhibits a phonologically optimizing empty morph (or at least, a pattern that plausibly, but with details that make it particularly interesting:

- The morph occurs elsewhere as a regular inflectional morpheme (plural ending for one class of nouns)
- The morph is only available in derivatives for roots that occur with it in its life as a regular inflectional morpheme
- The same pattern arises for phonologically optimizing root allomorph selection

This isn't the only pattern of this type in Romanian: Steriade (2008) discusses several phonological alternations that are only available if they occur independently in related morphological forms

## 4 Theoretical Approaches

**The problem:** If morphology is derivationally prior to phonology, there's no way for phonological factors to influence morphological exponence.

- Not merely a phonologically motivated empty morph, but an empty morph repurposed from a contentful use elsewhere.

**So how does a "plural" morph (*-ur* or a root allomorph) end up in non-plural derivatives?**

In classic DM the derivation proceeds as follows:

<sup>3</sup>Initial [oa] reduces to [o] due to not bearing primary stress, as a matter of regular phonology.

1. **Syntax**: builds hierarchical structures of roots + features.
2. **Vocabulary Insertion**: realizes the objects assembled by Syntax.
3. **Phonology**: applies to the output of Vocabulary Insertion.
  - Even if Vocabulary Insertion can be phonologically sensitive (inside-out), and even if Phonology applies cyclicly to its output, this type of model doesn't have space for morphology to be motivated by phonological concerns like "have a better stress pattern"

The same issue arises in other morphological frameworks:

- In models with Rules of Referral (Aronoff 1994) or similar mechanisms, it is straightforward to say: "in these morphological environments, use the plural stem instead."
 

Indeed, something like this might even be possible in DM, via post-syntactic morphological operations.
- But crucially this would only be describing the morphological environments—the appearance of a plural stem isn't **motivated** by phonological factors.

Three types of solutions:

- (a) Allow phonology to directly manipulate morphological operations / elements
- (b) Change the output of morphology: set of allomorphs among which phonology can select
- (c) Deny that the relevant effects are directly phonologically optimizing

(these are all solutions developed to deal with apparently phonologically optimizing **allomorphy**)

- To deal with the Romanian pattern—"insert a morph, but only if that morph already occurs in a morphologically related form"—both (a) and (b) also require **Output-Output correspondence constraints**.

#### 4.1 Phonology directly manipulating morphology

One approach to phonologically optimizing morphology allows phonology to insert / manipulate morphs directly.

- Weaker versions: Ordinary morphological realization takes place in a separate component, but phonology can insert / delete morphs
- Stronger versions: Morphological realization is fully embedded in the phonological component.

e.g. Wolf (2008) Optimal Interleaving

- DM-style realization occurs in the phonological grammar, which is a version of OT (Harmonic Serialism)
- Subset principle enforced as a violable constraint

Steriade (2022) proposes an analysis of Romanian that adopts a version of this.

- insertion of *-ur* governed by EXPONENCE (Wolf 2008: DEP-MORPH)

**Exponence**: "don't insert a morph unless its associated syntactic feature structure matches the syntactic context of insertion"

**StressL**: enforces initial secondary stress



**Dep<sub>lex</sub>-BD:** violated by segments in a derived form that do not appear in the base or inflectionally related forms of the base

- The input for each evaluation includes **both** the morphosyntactic items to be realized **and** a set of relevant related inflected forms.

(23) The presence of *-ur* in *fríguri* allows it to appear in the diminutive:

{frig, fríguri} [ $\sqrt{\text{COLD-DIM}}$ ]	DEP-BD	STRESSL	EXPONENCE
☞ a. frig-ur-el (201)			*
b. frig-el (01)		*!	
c. frig-ot-el (201)	*!*		

(24) No *-ur* in any inflected form, thus inserting it violates DEP<sub>LEX</sub>-BD:

{drac, draci} [ $\sqrt{\text{DEVIL-DIM}}$ ]	DEP-BD	STRESSL	EXPONENCE
a. drac-ur-el (201)	*!*		
☞ b. drac-el (01)		*	
c. drac-j-el (01)		*	*!

(25) With longer roots *-ur* does not improve STRESSL, so EXPONENCE violation is fatal:

{vârtéj, vârtéj-uri} [ $\sqrt{\text{SWIRL-DIM}}$ ]	DEP-BD	STRESSL	EXPONENCE
a. vârtéj-ur-el (2001)			*!
☞ b. vârtéj-el (201)			

#### Drawbacks:

- Requires transderivational comparison between derivatives and a *set* of inflectionally related forms of the base.
- GEN freely inserts morphs that don't realize any input content

#### 4.2 Phonology selecting among allomorphs

A **slightly less powerful option:** Phonology doesn't control exponence, but it gets to select among allomorphs (Mascaró, 2007; Bonet et al., 2007)

Key for this type of approach: *-ur* can't actually be plural—must be an allomorph of something else

- *-ur* is outside the stress domain in inflected plurals, but not in derived forms
  - Stress domain: first phase—highest category-defining head. Proposal: *-ur* = n
- Idea: For nouns with *-ur-i* plurals, the realization of n is a **set** { $\emptyset$ , *-ur*}

Once *-ur* is available as an allomorph of n, it will always be available if its presence improves the phonology.

However, insertion of *-ur* is mitigated against by a constraint like \*STRUCTURE

frig-{ $\emptyset$ ,ur}-el	*CLASH	STRESSL	*STRUCTURE
☞ a. frig-ur-el (201)			***
b. frig-el (01)		*!	**
c. frig-el (21)	*!		**

	drac-{\emptyset}-el	*CLASH	STRESSL	*STRUCTURE
(27)	☞ a. drac-el (01)		*	**
	b. drac-el (21)	*!		**

	vârtěj-{\emptyset,ur}-el	*CLASH	STRESSL	*STRUCTURE
(28)	a. vârtěj-ur-el (2001)			***!
	☞ b. vârtěj-el (201)			**

#### Drawbacks:

- If *-ur* is always available as an allomorph of *n* for nouns in certain declension classes, how do we *stop* it from showing up in the singular, and ensure that it *always* shows up in the plural?

→ back to OO-correspondence

### 4.3 Phonological Optimization as Illusory

**A problem for the above approaches:** the existence of phonologically **non-optimizing** allomorphy

(29) Example: Kreyòl (Haitian Creole) definite determiner allomorphy

a.	panie	'basket'	paniea	'the basket'
b.	trou	'hole'	troua	'the hole'
c.	chě	'dog'	chěã	'the dog'
d.	pitit	'child'	pititla	'the child'
e.	āj	'angel'	ājla	'the angel'
f.	madām	'lady'	madāmla	'the lady'

The existence of phonologically non-optimizing allomorphy argues against letting phonology control exponence. (Paster 2009, 2006; Kalin 2020; Stanton 2021; Rolle 2021)

Everything that looks like phonological optimization is actually inwards sensitive phonologically sensitive allomorphy—phonological optimization is an accidental byproduct.

#### Drawbacks:

- Requires either **disjunctive** contexts of insertion so that *-ur* is **not** the same morph in plurals as in derivatives:
  - For plurals: Lexically-conditioned distribution, sensitive to number (still assuming *-ur* = *n*)
  - For derivatives: Phonologically-conditioned distribution ( $< \sigma\sigma$ ) that happens to be restricted to the same lexical set as in plurals
  - Suppletive stems = something else entirely?
- Apparent phonological conditioning becomes a residue of extra-grammatical factors
- As noted above, this is not the only instance of inflection-dependent allomorphy in Romanian—not even the only case of apparent phonologically-motivated repurposing of an otherwise-contentful morph (other is *-ulêt* diminutives, almost all restricted to *m* nouns with *-ul* definite)

## 5 Conclusions / Discussion

- The existence of phonologically **nonoptimizing** allomorphy seems to argue strongly against putting all morphological realization into a global phonological computation.
- But patterns like the one we've seen in Romanian seem to call for two types of morphological power in phonological computation:
  - Appearance of fixed segmental content (morphs) motivated by phonological factors
  - Reference to morphologically related forms to determine availability of fixed segmental content
- The tension of these considerations seems to lead to a minimally restrictive theory:
  - Morphology derivationally prior to phonology, sensitive to phonological content (inside-out)
  - Phonology not only sensitive to morphological information (boundaries, lexical class), but able to insert or remove morphs
  - Reference in the phonological computation to transderivational OO-correspondence
- Is there a way out of this conclusion?
- If not, what restrictions exist on the ability of phonology to edit the morphological string in its input?

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