A morphological approach to (apparently) phonologically motivated empty morphs*

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1 Theoretical and empirical context

Two points of interest for morphology–phonology interaction

1. 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. *-ɟr-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 essentially incompatible with a genuinely **empty** morph—form with **no** meaning/function.

→ a realization in standard DM must realize **something**

"something" could be a functional head, or even a dissociated node inserted post-syntactically, but exponence must be an element to be exponed.

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2. Phonologically optimizing morphology

A quite different debate: can phonological factors can motivate morphological realization?

Most of this literature is concerned with **phonologically optimizing suppletive allomorphy** (Paster, 2006).

- The choice of which allomorph occurs in a given context often looks phonologically motivated, as in (2)

(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'	[tʃʰa-ka]	'car.NOM'
[pab-i]	'rice.NOM'	[gogi-ka]	'meat.NOM'
[paɾ-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.)

1 + 2 = yet more puzzling

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

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

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

**1σ word*	σσ *via* yi-	σσ *via* -an/-na	
*dl-a	yi-dl-a	dl-a-na	'eat (IMP)'
*ph-a	yi-ph-a	ph-a-na	'give (IMP)'
*m-a	yi-m-a	m-a-na	'stand/wait (IMP)'
*lw-a	yi-lw-a	lw-a-na	'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—in fact, it resembles the reciprocal verbal suffix

- In the case of Ndebele, there are reasons to think the empty morph in (3) isn't actually the reciprocal suffix—it shows up not only with verbs but with pronouns and demonstratives as well—but in a couple cases we'll see later (in Armenian and Romanian) it really does look like the empty morph is something with another life as an ordinary contentful morpheme.

Plan Today:

- Survey of phonologically-motivated "empty" morphs
- Case study 1: unexpected "plurals" in Armenian possessed nouns
- Case study 2: unexpected "plurals" in Romanian derivation
- Evaluating theoretical approaches

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 in this overview:

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

A partial list: (alphabetical by language family)

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)

(4)
a.	/-bura-/	"to sit"
b.	/ŋa-buri-∅/	"I sat"
c.	/ŋan-ŋu-buri-∅/	"I was going to sit"

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

Also found in Zulu, Chopi (Gowlett, 1984)

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)

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

(5) Xhosa (Buell, 2005, p. 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)

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 (6) 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)

(6)

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.

Armenian (Indo-European) spurious plural: When singular nouns with a monosyllabic root occur with the plural possessor suffix *-ni*, the plural affix *-ɛr* occurs between the root and *-ni*, seemingly to meet a requirement of *-ni* that its base must be disyllabic (Vaux 1998, 2003; to be discussed further in §4).

Catalan (Indo-European: Romance) stem extenders: In some varieties of Catalan, an "extender" [ə] / [gə] / [iɣə] 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)

Italian (Indo-European: 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)

Romanian (Indo-European: Romance) plurals: Monosyllabic nouns that take the plural ending *-uri* (the sole bisyllabic theme) show an unexpected *ur* in derived forms, apparently to optimize their stress pattern; *ur* does not occur in derivations of polysyllabic roots, nor derivations of monosyllabic roots whose plurals are not formed with *-uri* (Steriade 2022; to be discussed further in §5).

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)

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

(7) a. wasi-y "house.1SG.POSS"
b. wasi-yki "house.2SG.POSS"

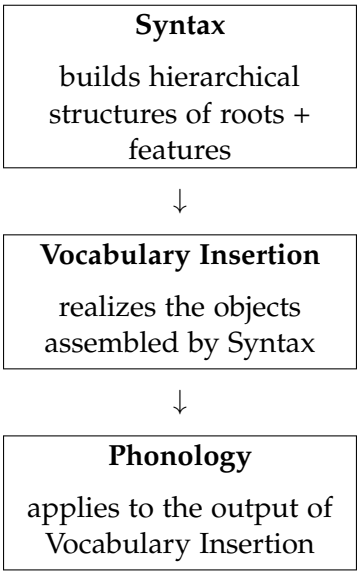
(8) a. yawar-**ni**-y "blood.1SG.POSS"
b. yawar-**ni**-yki "blood.2SG.POSS"

Note that *-ni* still occurs in at least one variety of Quechua that have lost relevant phonotactic constraints (Myler 2024 on Santiago del Estero Quechua).

3 The challenge for realizational morphology

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

Distributed Morphology (Harley and Noyer, 1999; McGinnis-Archibald, 2016; Siddiqi, 2010):



All phonologically optimizing empty morphs present a challenge for a strictly derivational and modular theory of realization, like Distributed Morphology, for at least the following two reasons:

I. There is no obvious syntactic object for the empty morph to realize.

- The association of DM with Minimalist syntax allows this issue to be dodged relatively easily (though maybe that should worry us): we can almost always find *some* plausible functional head F a morph could realize

II. Neither the phonological environment that conditions empty morph insertion, nor the phonological pressures that motivate that insertion, is present at the stage in the derivation where realization occurs.

    - 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"

Three approaches to deal with the phonological issue with realizational morphology:

(a) Allow phonology to directly manipulate morphological operations / elements

(b) Change the output of morphology to something the phonology can manipulate in a constrained way

(c) Deny that the relevant effects are directly phonologically optimizing

(all have been proposed to deal with apparently phonologically optimizing **allomorphy**)

In some ways (b) is the most appealing—least disruption to overall architecture—but may not always be an option

→ if our convenient head F is realized as a **set** {α,∅} (Bonet et al., 2007), then a constraint such as *Struc could prefer the zero realization except when other constraints motivate the overt realization, resulting in something that looks like an empty morph.

→ if our convenient head F is realized as **floating segments**, then either morphology or phonology could provide those segments with positions of exponence.

The most constrained case (in some ways): **repurposed** empty morphs

- In **Armenian** and **Romanian** the phonologically optimizing empty morph appears to be repurposed from a contentful use elsewhere in a noun's inflectional paradigm.
- In §4 and §5 we'll look at these patterns in more detail.

4 Case study 1: unexpected "plurals" in Armenian possessed nouns

Armenian is an Indo-European language spoken in Armenia and in the Armenian diaspora.

Armenian has two standard varieties, Western Armenian and Eastern Armenian; the facts presented in this section are described by Vaux (2003) for Western Armenian.

Preview: singular nouns with plural possessors appear with an unexpected plural suffix, to meet a phonological subcategorization requirement of a further suffix.[1]

Singular possessors:

- Nouns are marked by an enclitic that agrees in person with a singular possessor
- Plural possessed nouns are marked by a suffix whose form is phonologically conditioned: -ər after monosyllabic roots, and -nər after polysyllabic roots.

[1]Thanks to Hossep Dolatian for bringing the Armenian facts to my attention.

(9) Nouns with singular possessors: N-(PL)-AGR (Vaux 2003: p. 113)

	cow (SG)	cows (PL)	cat (SG)	cat (PL)
Bare	gov	gov-eɾ	gɑdu	gɑdu-neɾ
my X	gov-əs	gov-eɾ-əs	gɑdu-s	gɑdu-neɾ-əs
your (sg.) X	gov-ət^h	gov-eɾ-ət^h	gɑdu-t^h	gɑdu-neɾ-ət^h
its/their (sg.) X	gov-ə	gov-eɾ-ə	gɑdu-n[2]	gɑdu-neɾ-ə

Plural possessors:

- When a plural noun is possessed, the same person clitics occur, but the noun bears an additional suffix *ni* that marks the plural possessor. This suffix follows the plural morpheme -əɾ/ -nəɾ.[3]
- But when *ni* follows a monosyllabic root, the plural suffix -əɾ always occurs alongside it, even when the noun is singular.

(10) Nouns with plural possessors: N-(PL)-PL.POSS-AGR (Vaux 2003: p. 114)

	cow (SG)	cows (PL)	cat (SG)	cat (PL)
Bare	gov	gov-eɾ	gɑdu	gɑdu-neɾ
my X	gov-$\boxed{\text{eɾ}}$-ni-s	gov-eɾ-ni-s	gɑdu-ni-s	gɑdu-neɾ-ni-s
your (sg.) X	gov-$\boxed{\text{eɾ}}$-ni-t^h	gov-eɾ-ni-t^h	gɑdu-ni-t^h	gɑdu-neɾ-ni-t^h
its/their (sg.) X	gov-$\boxed{\text{eɾ}}$-ni-n	gov-eɾ-ni-n	gɑdu-ni-n	gɑdu-neɾ-ni-n

Vaux (2003): the "spurious" plural in (10) (in $\boxed{\text{boxes}}$) is there because *ni* subcategorizes for a minimally disyllabic base.

→ **this would be a phonologically optimizing empty morph**

To argue that this is indeed the plural suffix -əɾ, and not an accidentally homophonous doppelganger, Vaux observes that older grammars of Armenian report certain irregular (double-marked) plurals showing the same distribution.

(11) Nouns with irregular plurals (Vaux 2003: p. 115)

	finger (SG)	fingers (PL)	eye (SG)	eyes (PL)
Bare	mɑd	mad-və-neɾ	atʃ^h	atʃ^h-və-neɾ
our X	mɑd-$\boxed{\text{və}}$-ni-s	mad-və-(neɾ)-ni-s	atʃ^h-$\boxed{\text{və}}$-ni-s	atʃ^h-və-(neɾ)-ni-s

The question: **How can a plural suffix be spelled out on a singular noun?**

[2]Vaux (2003) argues that the underlying form of the third person enclitic is always *-n*; when following a clitic it triggers schwa-epenthesis and then deletes.

[3]There is another strategy for marking plural possession, in which a separate possessive pronoun occurs before the noun, which is marked by the third-person (default) possessive clitic, but that alternative strategy isn't relevant to the pattern of interest here.

4.1 Wolf (2008, 2013): Morphology in the Phonology

Wolf (2008, 2013) develops an Optimal Interleaving account of the Armenian pattern.

- Optimal Interleaving = OT-CC model
  - implements realizational morphology (DM-like)
  - morphological realization occurs in the phonological component (unlike DM)
- Specifically, input is a morphosyntactic string of terminals: **Morphemes**
  - e.g. [$\sqrt{\text{CAT}}$, PL][4]
- Insertion of **Morphs** (pairs of form and feature content) is one operation that can construct a new candidate
  - e.g. $<$ PL, [−s] $>$
- Subset Principle of DM recast as $\text{DEP}_{\text{Morpheme-Morph}}$(*feature*) constraints, violated by outputs that include morphs with feature content not present in the input.

(12) Subset Principle (Halle, 1997)
"The phonological exponent of a Vocabulary Item is inserted into a morpheme[...] if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary Item contains features not present in the morpheme. Where several Vocabulary Items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen."

In Wolf's analysis of the Armenian facts, the subcategorization requirement of *-ni* is enforced by a constraint *[σ.ni, which assigns a violation if *-ni* is preceded by only one syllable.

(13) Insertion of spurious plural (adapted from Wolf 2013: p. 157)

[$\sqrt{\text{COW}}$-SG-PL.POSS.1person]	*[σ.NI	DEPMM(PLURAL)
☞ a. <$\sqrt{\text{COW}}$, gov>, <PL, əɾ>, <PL.POSS, ni>, <1, s> [go.vəɾ.nis]		∗
b. <$\sqrt{\text{COW}}$, gov>, <SG, ∅>, <PL.POSS, ni>, <1, s> [gov.nis]	∗!	

Some features of this analysis:

- It is crucial that SGis specified in the input, with a faithful realization as ∅
  - If there were **no** SGin the input, the spurious plural would be **epenthetic**—would violate MAXMM(PLURAL).
  - This would make plural insertion **worse than inserting nothing**, and so that candidate chain would not make it to the final evaluation shown in (13)

[4]Wolf actually assumes that only an abstract contentless root, $\sqrt{}$, is present in the input, but I illustrate here with a specific root for clarity.

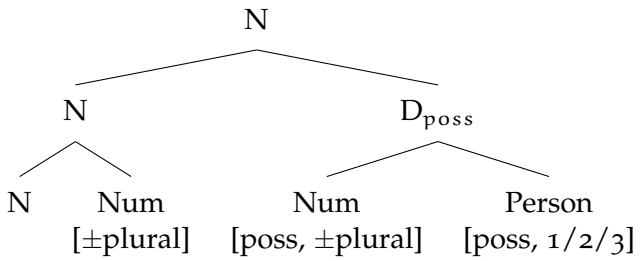
4.2 Arregi et al. (2013): all Morphology, no Phonology

Arregi et al. (2013) develop a purely morphological analysis of the Armenian pattern, in standard DM terms.

Key components of their analysis:

- Arbitrary rules can operate over morphological representations, prior to Vocabulary Insertion
- Source of the spurious plural is actually the *possessive* plural

(14) Syntax of relevant possessed nouns (Arregi et al. (2013), p. 13)



They assume the structure for possessed nouns in (15), and propose the rule of **Possessive Plural Reduplication** in (16):

(15) Possessive Plural Reduplication (Arregi et al. (2013), p. 13)
X [poss, +plural] → X [poss, +plural] [poss, +plural]
where X is monosyllabic

- The rule in (15) applies **after** Vocabulary Insertion applies to X, but **before** it applies to the possessive plural itself.
- The different realization of the two copies of [poss, +plural] is due to different contexts of insertion for the Vocabulary Items:

(16) Vocabulary entries for plural morphemes (Arregi et al. (2013), p. 14)
a. /ni/ ↔ [+plural, poss] / __ [poss]
b. /ɛɾ/ ↔ [+plural] / σ __
c. /nɛɾ/ ↔ [+plural]

This analysis **denies the phonological motivation for spurious plurals**

- The restriction to monosyllabic bases for *-ni* is encoded, but not actually part of the subcategorization for that morpheme.
- Prediction (not tested): an irregular plural that doesn't add a syllable should still show up as a spurious plural in relevant contexts.

  → apparently there was historically such a plural suffix (-k^h), possibly retained in some varieties

Also requires a **maximalist morphological component**, with complex rules like (15)

And the only way for it to get off the ground is that there's a **plural available to copy**.

5 Case study 2: unexpected "plurals" in Romanian derivation

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

Preview: derivatives of monosyllabic nouns contain an empty morph -ur—but only if the noun's plural is formed with the theme -uri

Relevant grammatical properties of Romanian:

- 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
  - *-e*: F, N
  - *-(e)le*: F
  - *-uri*: many N nouns (both count and mass), some F nouns (all mass)
- Stress pattern in nouns (Chitoran, 2002):
  - Primary stress: Evidence of preference for penultimate (rightmost nonfinal), though final closed syllables are stressed,[5] and some nouns with lexically marked stress
  - Secondary stress: initial + every second syllable, avoiding clash with primary stress
  - Stress does not shift with inflection (17), but typically does in derivation (18)

(17) a. kás-e "house"
b. kás-e-lor "house.PL.GEN/DAT"

(18) a. kárt-e 'book'
b. kərt-itʃík-ə "book.DIM" (Chitoran, 2002, p. 84)

An empty "plural" morph in derived words

A morph *-ur*[6] sometimes appears in derived forms (data here from Steriade 2017, 2022 unless otherwise noted):

(19) a. vânt 'wind'
b. vânt-ur-i (1--) 'wind-PL'
c. vânt-ur-a (2-1) 'shake in the wind'
d. vânt-ur-el (2-1) 'wind-DIM'

(20) a. val 'wave'
b. val-ur-i (1--) 'wave-PL'
c. văl-ur-el (2-1) 'wave-DIM'

(21) a. frig 'cold'
b. frig-ur-i (1--) 'cold-PL'
c. frig-ur-a (2-1) 'make cold'
d. frig-ur-el (2-1) 'cold-DIM'

(22) a. râu 'river'
b. râuri 'river-PL'
c. râura 'flow like a river'
d. râurean 'river dweller'
(from dexonline.ro)

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

[5] 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.

[6] For expository purposes I describe this morph is *ur*, which is how it always surfaces, but it could be *uri* + hiatus resolution.

Two claims:

1. *-ur* occurs to permit an initial secondary stress to surface without inducing stress clash

   → **phonological optimization**

2. the *-ur* that shows up in derived forms is the same morph that shows up in the plural, even though the derivatives have no plural semantics

   → **via a repurposed empty morph**

Evidence for 1: *-ur* only occurs in the derivations of monosyllabic roots; it does not occur with polysyllabic roots, even those whose plurals end in *-uri*.

(23)	a.	vârtej	(-1)	'swirl'	
	b.	vârtej-ur-i	(-1--)	'swirl-PL'	
	c.	vârtej-el	(2-1)	'swirl-DIM'	(*vîrtej-ur-el)
(24)	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 I: If the plural doesn't have *-ur*, no *-ur* in derivatives.

(25)	a.	drac	(1)	'devil'	
	b.	drac-i	(1-)	'devil-PL'	
	c.	drăc-el	(-1)	'devil-DIM'	(*drăc-ur-el)
(26)	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)

Steriade (2022) identifies only two exceptions to the generalization for diminutives, based on 255 *-(ur)el* diminutives from dexonline.ro (Table in (27) reproduced from Steriade 2022):

(27)

		DIM= *-ur-el*	DIM= *-el*
PL=*uri*	1σ root	38 (val, val-ur-i, val-ur-el)	1 (ciur, ciur-ur-i, **ciur-el**)
	2+σ root	0	23 (vârtej, vârtej-ur-i, vârtej-el)
PL≠*uri*	1σ root	1 (şarp-e, şerp-i, **şerp-ur-el**)	13 (drac, drac-i, drăc-el)
	2+σ root	0	179 (brotac, brotac-i, brotăc-el)

In slightly larger font, the two exceptions are:

(28)	a.	ciur	'screen, sieve'	
	b.	ciur-ur-i	PL	
	c.	ciur-el	DIM	(predicted **ciur-ur-el*) ← haplology?
(29)	a.	şarp-e	'snake'	
	b.	şerp-i	PL	
	c.	şerp-ur-el	DIM	(predicted **şerp-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.

(30)	a.	om	'man'		
	b.	oamen-i	(1--)	'men'	
	c.	omen-os	(2-1)	'humane'[7]	
	d.	omen-i	(2-1)	'treat kindly'	
	e.	omen-esc	(2-1)	'human'	
	f.	om-uleț	(2-1)	'man-DIM'	(**òmen-ulét̀*)

- (30-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.

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.

Also: diminutives in *-uleţ* occur only with masculine nouns whose definite ends in *ul*

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

- As in Armenian, the relevant morph occurs elsewhere as a regular inflectional morpheme (plural ending for one class of nouns)
- *Unlike* Armenian, there is no plausible source for a morphosyntactic PL feature.
- The morph is also restricted to a specific (non-default) lexical class of roots, the ones that occur with it in its life as a regular inflectional morpheme

Once again...

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?

[7]Initial [oa] reduces to [o] due to not bearing primary stress, as a matter of regular phonology.

Recall, 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

- 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**.

5.1 Morphology in the Phonology

Steriade (2022) proposes an analysis of Romanian where phonology has two types of access to morphology:

- Following Wolf (2008), phonology insert morphs (or at least can)
- Augmented by **base-derivative correspondence**: candidates need not be faithful only to their input, but also to inflectionally related forms of the base.

Insertion of *-ur* governed by EXPONENCE (cf. Wolf 2008 DEPMM)

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

StressL: enforces initial secondary stress

Dep_{lex}-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 evaluation includes **both** the morphosyntactic items to be realized **and** a set of relevant related inflected forms.

(31) 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)	*!*		

(32) No *-ur* in any inflected form, thus inserting it violates DEP_{LEX}-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)		*	*!

(33) 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. vârtej-ur-el (2001)			*!
☞ b. vârtej-el (201)			

Some features of this analysis:

- 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

5.2 Phonology selects among options provided by Morphology

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** {∅, *-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

(34)

frig-{∅,ur}-el	*Clash	StressL	*Structure
☞ a. frig-ur-el (201)			***
b. frig-el (01)		*!	**
c. frig-el (21)	*!		**

(35)

drac-{∅}-el	*Clash	StressL	*Structure
☞ a. drac-el (01)		*	**
b. drac-el (21)	*!		**

(36)

vârtéj-{∅,ur}-el	*Clash	StressL	*Structure
a. vârtej-ur-el (2001)			***!
☞ b. vârtej-el (201)			**

- But 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 (actually the bigger problem) ensure that it *always* shows up in the plural?

→ back to Base-Derivative correspondence

5.3 All Morphology, no Phonology

As with Armenian, we could simply deny that the effect is phonologically motivated.

Indirect motivation: the existence of phonologically **non-**optimizing allomorphy

(37) Example: Kreyòl (Hatian Creole) definite determiner allomorphy

a.	panie	'basket'	paniea	'the basket'
b.	trou	'hole'	troua	'the hole'
c.	chẽ	'dog'	chẽã	'the dog'
d.	pitit	'child'	pititla	'the child'
e.	ãj	'angel'	ãjla	'the angel'
f.	madãm	'lady'	madãmla	'the lady'

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

Idea in this literature:

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

Drawbacks:

- For Romanian, we have to state the phonological generalization as a morphological stipulation. Two ways to do this:
  1. **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* = ɲ)
     - For derivatives: Phonologically-conditioned distribution (< σσ) that happens to be restricted to the same lexical set as in plurals

     (suppletive stems = something else entirely?)
  2. arbitrary rule that **inserts** a plural feature in the context of 1σ roots that belong to the appropriate lexical class.
     - The inverse of Impoverishment (which some already argue is more powerful than we'd like...)
- 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 an apparent phonologically optimizing repurposed empty morph (other is *-uléț* diminutives, almost all restricted to M nouns with *-ul* definite)

5.4 A middle path? Distributed representations

Could we take an alternative **representational** approach to the distribution of *ur*?

- Key idea: a morpheme that only surfaces in some contexts does so because its phonological form consists of **only floating segments**, cf. Lownstamm (1996) in strict CV terms[8]
- Realization of low ɲ / DIV for the relevant declension class: *floating* segments < ʊri >
- Two ways for these floating segments to surface:
  - **Realization** of NUM[PL] for the relevant declension class as skeletal slots VCV
  - **Epenthesis** of empty skeletal / prosodic structure that allows VC to surface
- All other thematic endings (singular and plural) realized as ordinary linked segments—behaviour of this class is exceptional.
- To **prevent** epenthesis in derivatives of other declension classes: need **lexically indexed constraints**

[8]Thanks to Heather Newell for suggesting this line of analysis to me. A floating segment analysis of certain patterns in Armenian definites—distinct from the facts discussed in §4—is presented in Dolatian (2022).

By abandoning Base-Derivative correspondence, this approach loses any unification with other patterns in Romanian described in those terms by e.g.

Is this an improvement?

- The question is really: **are phonologically optimizing empty morphs actually phonologically optimizing?**
- A lot depends on how seriously you take a (very) small number of counterexamples.

6 Zooming back out: Empty morphs in general

Our attention today has been on (apparently) phonologically optimizing empty morphs that are **repurposed** from a contentful use elsewhere in the language.

→ To what extent do these approaches offer the prospect of a **unified** approach to empty morphs in general?

Morphology in the Phonology: Good, the theory is very well set up to do this (see Wolf 2008 for specific case studies)

Base-Derivative Correspondence: Poor, since "pure" empty morphs are defined by **not** having a canonical use elsewhere in the system

All Morphology, no Phonology: Poor/Average (depending on your metatheoretical priors)—requires reducing all such patterns to morpheme subcategorization *or* morphological well-formedness, and "morphological wellformedness" is not particularly well modelled in classic DM.

In summary / conclusion:

- The existence of phonologically **non**optimizing 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 (and others not discussed here, but described by Steriade) 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 segemental 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

References

Allen, Andrew. 1976. Interfixes preserve syllables and word roots. In *Proceedings of the 2nd Annual Meeting of the Berkeley Linguistics Society*, 31–35.

Aronoff, Mark, and Lori Repetti. 2022. Conditioned epenthesis in romance. In *Periphrasis and inflexion in diachrony: A view from romance*, 362–380. Oxford University Press London.

Arregi, Karlos, Neil Myler, and Bert Vaux. 2013. Number marking in Western Armenian: A non-argument for outwardly-sensitive phonologically conditioned allomorphy. In *Proceedings of the 87th Linguistic Society of America Annual Meeting*.

de Belder, Marijke. 2020. A split approach to the selection of allomorphs: Vowel length alternating allomorphy in dutch. *Glossa* 5.

Bermudez-Otero, Ricardo. 2012. The architecture of grammar and the division of labour in exponence. In *The morphology and phonology of exponence*, ed. Jochen Trommer. Oxford University Press.

Bonet, Eulàlia, Maria-Rosa Lloret, and Joan Mascaró. 2007. Allomorph selection and lexical preferences: Two case studies. *Lingua* 117:903–927. URL `https://api.semanticscholar.org/CorpusID:170208912`.

Bonet, Eulàlia, and Francesc Torres-Tamari. 2010. Allomorphy in pre-clitic imperatives in Formenteran Catalan. In *Romance linguistics 2009*, ed. Sonia Colina, Antxon Olarrea, and Ana Maria Carvalho, number 315 in Current Issues in Linguistic Theory, 337–352. John Benjamins.

Buell, Leston. 2005. Issues in Zulu morphosyntax. Doctoral Dissertation, UCLA.

Chitoran, Ioana. 2002. *The phonology of Romanian: A constraint-based approach*. Number 56 in Studies in Generative Grammar. Mouton de Gruyter.

Cook, Eung-Do. 1971. Phonological constraint and syntactic rule. *Linguistic Inquiry* 2:465–478.

Cook, Eung-Do. 1984. *A Sarcee grammar*. UBC Press.

Corbett, Anne F. 1992. The nature and cuases of allomorphy in Cuzco Quechua, with special reference to the marking of person and the 'empty morph' -ni-. Doctoral Dissertation, St. Andrews.

Dolatian, Hossep. 2022. An apparent case of outwardly-sensitive allomorphy in the Armenian definite. *Glossa* 7.

Embick, David. 2010. *Localism versus globalism in morphology and phonology.*. Cambridge, MA: MIT Press.

Gowlett, D.F. 1984. Stabilization in Bantu. *African Studies* 43:187–203.

Halle, Morris. 1997. Distributed Morphology: Impoverishment and Fission. *MIT Working Papers in Linguistics* 30:425–449.

Harley, Heidi, and Rolf Noyer. 1999. Distributed morphology. *Glot International* 4:3–9.

Heath, Jeffrey. 1984. *Functional grammar of Nunggubuyu*. Australian Institute of Aboriginal Studies.

Hockett, Charles F. 1947. Problems of morphemic analysis. *Language* 23:321–343.

Jones, Patrick. 2014. Tonal interaction in Kinande: Cyclicity, opacity, and morphosyntactic structure. Doctoral Dissertation, MIT.

Kalin, Laura. 2020. Morphology before phonology: A case study of turoyo (neo-aramaic). *Morphology* 30:135 – 184. URL `https://api.semanticscholar.org/CorpusID:225358071`.

Lownstamm, Jean. 1996. CV as the only syllable type. In *Current trends in phonology: Models and methods*, ed. Jacques Durand and Bernard Laks, volume 2, 419–441.

Mascaró, Joan. 2007. External allomorphy and lexical representation. *Linguistic Inquiry* 38:715–735. URL `https://api.semanticscholar.org/CorpusID:122816199`.

McGinnis-Archibald, Martha. 2016. Distributed morphology. In *The cambridge handbook of morphology*, ed. Andrew Hippisley and Gregory Stump, Cambridge Handbooks in Language and Linguistics, 390–423. Cambridge: Cambridge University Press.

Montler, Timothy R., and Heather K. Hardy. 1991. The phonology of negation in Alabama. *International Journal of American Linguistics* 57:1–23.

Myler, Neil. 2024. Some puzzles in quechua phonotactics (with special reference to Santiago del Estero Quechua) phonotactics (with special reference to santiago del estero quechua). Handout from talk given at the Structure of Under-researched Languages Lab Meeting, Boston University, February 2024.

Pak, Marjorie. 2016. How allomorphic is English article allomorphy? *Glossa* .

Paster, Mary. 2006. Phonological conditions on affixation. Doctoral Dissertation, UC Berkeley.

Paster, Mary. 2009. Explaining phonological conditions on affixation: Evidence from suppletive allomorphy and affix ordering. *Word Structure* 2:18–37.

Paster, Mary. 2015. Phonologically conditioned suppletive allomorphy: Cross-linguistic results and theoretical consequences. In *Understanding allomorphy: Perspectives from optimality theory.*, ed. Eulàlia Bonet, Maria-Rosa Lloret, and Joan Mascaró, 218–253. Equinox.

Rolle, Nicholas. 2021. Against phonologically-optimizing suppletive allomorphy (posa) in irish, tiene, katu, and konni. *Acta Linguistica Academica* 68:103–138.

Sibanda, Galen. 2004. Verbal phonology and morphology of ndebele. Doctoral Dissertation, University of California, Berkeley.

Siddiqi, Daniel. 2010. Distributed Morphology. *Language and Linguistics Compass* 4:524–542.

Stanton, Juliet. 2021. Allomorph selection precedes phonology: Evidence from Yindjibarndi. *Natural Language & Linguistic Theory* .

Steriade, Donca. 2008. A pseudo-cyclic effect in Romanian morphophonology. In *Inflectional identity*, ed. Asaf Bacharach and Andrew Nevins, 313–360. Oxford University Press.

Steriade, Donca. 2017. Cyclic and pseudo-cyclic derivations: evidence from Romanian. Handout from talk given at *Going Romance 31*, Universitatea din București, December 2017.

Steriade, Donca. 2022. Topics in phonology: Class 9 romanian stress. Class Handout.

Vaux, Bert. 1998. *The phonology of Armenian*. Oxford: Clarendon Press.

Vaux, Bert. 2003. Syllabification in Armenian, Universal Grammar, and the lexicon. *Linguistic Inquiry* 34:91–125.

Wolf, Matthew. 2013. Candidate chains, unfaithful spell-out, and outwards-looking phonologically-conditioned allomorphy. *Morphology* 23:145–178.

Wolf, Matthew A. 2008. Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model. Doctoral Dissertation, University of Massachusetts at Amherst.