When allomorphy meets infixation: Cyclicity and separation[1]

BCGL 12, December 16, 2019

Laura Kalin, Princeton University

1 Introduction

How are abstract (morpho)syntactic structures realized as linear phonological sequences?

- Is there a serial derivation separating (at least) morphology and phonology, or are morphological and phonological calculations made simultaneously?
- How/when do affixes get to be infixes? Are infixes prefixes and suffixes gone astray, or are they infixes through and through?

We'll investigate interactions between two interface phenomena, (i) **allomorphy** and (ii) **infixation**, to shed light on these questions:

- Evidence for **ordered derivations** that are **cyclic** (begin from the most embedded morpheme, and apply in cycles).
- Evidence that **infixes are prefixes/suffixes** (linearized as preceding/following their stem) that later go astray.

1.1 The phenomena at hand

- **Infixation:** The appearance of an affix inside of the stem it combines with rather than linearly concatenated with it

(1) Leti nominalization (Blevins 1999)
  a. *kasi* 'to dig' (V); *-ni-* NOMZN
  → *k<ni>asi* 'act of digging' (N)

- **Suppletive allomorphy:** Multiple replacive exponents of a morpheme, distributed based on its phonological,[2] morphosyntactic, and/or lexical environment

(2) Some English PL exponents:
  a. PL → *-ren* / CHILD__ (*child/children*)
  b. PL → *-∅* / {FISH,DEER,MOOSE,...}__ (*fish/fish*)
  c. PL → *-s* / elsewhere (*cat/cats*)

- **Morphophonological allomorphy:** Multiple phonological alternants of an exponent, distributed based on its phonological, morphosyntactic, and/or lexical environment

  – Not predictable given a language's general phonology

(3) Some English root alternants in PL environments:
  a. *leaf* → *leav* / __PL (*leaf/leaves*)
  b. *hou[s]e* → *hou[z]e* / __PL (*hou[s]e/hou[z]es*)

- **Surface allomorphy:** Multiple phonological alternants of an exponent, distributed based on its phonological environment

  – Predictable (for the most part) from a language's phonology

(4) English PL /-z/ alternants:
  a. [-s] / voiceless non-sibilant__ (*cat[s]*)
  b. [-əz] / sibilant__ (*hors[əz]*)
  c. [-z] / elsewhere (*dog[z]*)

[1]Thank you to Byron Ahn, Jonathan Bobaljik, Florian Lionnet, Nik Rolle, Hannah Sande, and Sam Zukoff, and to audiences at MIT, AIMM 2019, McGill's Parameters Workshop, UPenn's FMART, Nanolab, and NYU.

[2]Scheer (2016) has argued that the only "true" phonologically-conditioned suppletive allomorphy (PCSA) is non-melodic, i.e., is based on higher-level factors like syllable structure, stress, and sonority; he proposes that all apparent cases of melodic PCSA are analyzable without true allomorphy (without separate phonological representations for the lexical item). As we will see, my sample contains two counterexamples to this generalization, from Bahnar and Hunzib, which are notably *not* good candidates for a Scheer-style re-analysis because the suppletive exponents have a different positional status (one infixal, one not). I will therefore not adopt Scheer's more restricted view of PCSA here, though I will note that none of my overall findings hinges on just Bahnar and Hunzib. Thank you to Michal Starke for bringing Scheer 2016 to my attention.

1.2 Previous work on allomorphy and infixation

- Crosslinguistic studies on the behavior of these phenomena:
  - Allomorphy: Carstairs 1987, Paster 2006, Bobaljik 2012
  - Infixation: Ultan 1975, Moravcsik 1977, Yu 2007
- Most investigations of (suppletive) allomorphy are studies at the morphology/syntax interface
  - E.g., Bobaljik 2000, Embick 2010, Deal and Wolf 2017, Gribanova and Harizanov 2017 (cf. Kager 1996, Paster 2006)
- Investigations of infixation concern themselves mainly with the morphology/phonology interface
  - E.g., McCarthy and Prince 1993a,b, Hyman and Inkelas 1997, Blevins 1999, Klein 2005, Yu 2007
- Some holistic morpho(phono)logical theories cover both infixation and allomorphy, and make different sorts of claims about how they are related:
  - Infixation & allomorphy universally occur simultaneously (McCarthy and Prince 1993a,b)
  - Infixation & allomorphy universally occur in a fixed order (Embick 2010, Bye and Svenonius 2012)
  - The relationship between infixation and allomorphy is variable (Wolf 2008)

→ *To my knowledge, the predictions made by all the aforementioned works as to* ***how allomorphy and infixation should interact*** *have gone unexplored/untested.*

1.3 Current project: Allomorphy × Infixation

Empirical scope: 29 languages

- Allomorphy of infixes — 26 languages in the sample
- Allomorphy around infixes — 3 languages in the sample

A. **Allomorphy *of* infixes**

– E.g., Nominalization in Bahnar (Mon-Khmer, S. Vietnam; Banker 1964, Banker et al. 1979)

(5) Suppletive allomorphs of the nominalizer
  a. *bơ-* / __m (prefixal on m-initial stems)
  b. *-ơn-* / elsewhere (linearizes after first C)

(6) a. *muih* 'to make a field in the woods'
  → *bơ-muih* 'a field in the woods' (5a)

  b. *tăr* 'to weave'
  → *t<ơn>ăr* 'woven bamboo' (5b)

  c. *krŏu* 'to poison fish'
  → *k<ơd>rŏu* 'fish poison' ∼(5b), nb. **nr*

B. **Allomorphy *around* infixes**

– E.g., Verbs in Turoyo (Neo-Aramaic, Turkey; Kalin 2018)

(7) a. nəšq -o -∅ **-lle**
  kiss.IMPF -*B*F.SG -*S*3 **-*L*3PL**
  'she kisses them' (Jastrow 1993:133)

  b. zəbṭ -i -ut **-nne**
  catch.IMPF -*B*PL -*S*2PL **-*L*3PL**
  'you (pl) catch them' (ibid:135)

  c. zəbṭ -i -ut <wa> **-nne**
  catch.IMPF -*B*PL -*S*2PL <PST> **-*L*3PL**
  'you (pl) used to catch them' (ibid:135)

The overall picture that has emerged: Each of these types of interactions displays *consistent* and *systematic* characteristics.

⇒ Allomorphy and infixation interact in a **constrained, universal way** that should inform our understanding of the syntax/morphology-phonology interface

Today's agenda: §2 case studies; §3 larger sample; §4 implications

2 Case studies of allomorphy × infixation

2.1 Case study 1: Hunzib (NE Caucasian; Dagestan)

Basic morphophonology (van den Berg 1995):

- (C)V(C) syllables; stress usually on penultimate vocalic mora
- A few relevant phonotactic constraints on vowels
  - Vowel length is contrastive for all vowel qualities, but /aa/ is by far the most common long vowel
  - Long vowels may occur via morphological concatenation
  - But, long vowels can only surface in stressed syllables
  - Sequences of non-identical vowels are not tolerated
- Rich verbal morphology (class prefixes, der. and infl. suffixes)

Verbal plural marking (van den Berg 1995):

- ∼40% of verbs can take a verbal plural marker (indicates iterativity or plurality of intransitive subject/transitive object).

(8) Suppletive allomorphs of the verbal plural marker[3]

a. -báa / aa__ (suffixal on aa-final stems)

b. -(y/w)*á*- / elsewhere (linearizes before final C)

(9) Suffixal allomorph -*báa* (aa__)

a. miyawdáa 'mew'
→ miyawda-báa 'mew (pl)'

b. ũcu-láa 'hide-AP'
→ ucu-la-báa 'hide-AP (pl)'

- The morphophonological form of the infixal allomorph is predictable based on neighboring segments in the infixed position.
  - → The changes in the infix's form are clearly phonological in nature and in reaction to phonotactic constraints.
  - → But, the "repairs" are morpheme-specific (not general)
  - A (non-exhaustive) list of the infix's forms:
    - ◇ -*á*- after α, (10a)
    - ◇ -y*á*- after front non-low vowels, (10b)
    - ◇ -w*á*- after non-front non-low vowels, (10c)
    - ◇ -á- between consonants, (10d)

(10) Morphophonological alternants of infix -*(y/w)á*-

a. αhu 'take'
→ α<*á*>hu 'take (pl)'

b. ek'e 'burn'
→ e<y*á*>k'e 'burn (pl)'

c. k'ok'o 'be ill'
→ k'o<w*á*>k'e 'be ill (pl)'[4]

d. ɨxlə 'warm'
→ ɨx<á>le 'warm (pl)'

nb. The infix is underlyingly stressed.

Observations about this data:

- All allomorphs are oriented wrt the right edge of the stem.
- **On optimization:** Neither suppletive allomorph choice nor the infix's location seems optimizing.
- **On timing of processes:**
  - Suppletive allomorph choice is surface opaque (due to V shortening), (9); *precedes stem surface phonology*
  - Suppletive allomorph choice is necessarily made in the stem-final (non-infixed) position; *precedes infixation.*
    - ◇ The infix linearizes pre-final consonant, but suppletive allomorphy is conditioned by the final vowel.
  - Morphophonological allomorphy, (10), is determined in the infix's surface (infixed) position; *follows infixation.*

[3] There are also 13 verbs that, idiosyncratically, take *báa* as an infix.

[4] There is often neutralization of stem-final vowels in Hunzib. In the verbal plural, stem-final [o, u, ə] typically change to [e].

2.2 Case study 2: Palauan (Austronesian; Palau)

Basic morphophonology (Josephs 1975):

- (C)(C)V(C) syllable structure
- Illegal consonant clusters are broken up by [ə]-insertion
- Vowel clusters are permitted
  - Depending on stress and surrounding segments, there may be vowel assimilation, reduction, and/or glide-formation
  - Long vowels cannot appear in clusters
- Rich verbal morphology, marking tense, aspect, mood, transitivity, voice, stativity, agreement, etc.
- Most verbs (excluding some stative verbs) appear with a prefixal "verb marker", conditioned lexically by verb class:

(11) Suppletive allomorphs of the verb marker
  a. o- / __{LOOK FOR, ASK, BEGIN, COUNT, ...}
  b. m- / elsewhere

Past tense marking (Josephs 1975, Embick 2010):

- The past tense marker is a left-edge infix, *-il-*, (12).

(12) a. *kie* 'live' b. *k<il>ie* 'lived'
  c. *dəngʔokl* 'sit' d. *d<il>əngʔokl* 'sat'

- The past marker can combine with a verb stem bearing a VM

  ⇒ The past infix lodges linearly between the root and VM

(13) a. *mə-lim* 'drink' (VM-drink)
  b. *m-<il>lim* 'drank' (from [*il* [STEM *m-lim*]])

(14) a. *o-siik* 'look for' (VM-look.for)
  b. *u-<l>siik* 'looked for' (from [*il* [STEM *o-siik*]])

Observations about this data:

- **On optimization:**
  - The choice of one suppletive allomorph (of the VM) over the other, (21), is sometimes optimizing
    - ◇ All labial-initial roots belong to the special class
    - ◇ But, there are also a number of non-labial-initial roots in this class, e.g., (14)
  - The fact that the past tense morpheme *il* is an infix can be seen as sometimes optimizing
    - ◇ In C-initial stems, avoids an onsetless syllable; but in V-initial stems, causes vowel hiatus
    - ◇ Note that there *are* vowel-initial and consonant-final prefixes (e.g., the causative)
- **On timing of processes:**
  - Suppletive allomorphy of the VM (*m(ə)-/o-*) persists across the linearly-intervening infix, (13)/(14).
    - ◇ *Exponent choice in the stem precedes infixation.*[5]
  - Phonological processes only see the infix in its infixed position; *infixation precedes surface phonology.*
    - ◇ (13): Infixation bleeds ə-insertion in the stem
    - ◇ (14): Infixation feeds vowel assimilation and reduction (/o/ + /i/ = [u])

Case studies that confirm these general findings:

- Turoyo (Kalin 2018): Featurally- and phonologically-conditioned suppletive allomorphy in the stem persists across an infix.
  - But surface phonology in the stem is fed/bled by the infix.
- ChiBemba (Hyman 1994, Orgun 1996): Morphophonological allomorphy in the stem of infixation persists across an infix.

[5] It's possible that the allomorphy in (11) is better characterized as morphophonological. In this case, the finding would be that morphophonology in the stem precedes infixation, which is consistent with findings from Chibemba.

3 Empirical patterns across the sample

The sample (see Appendix for the complete list of languages):

- 29 cases of infixation interacting with allomorphy, each from a different language
- 13 different language families
- Geographically diverse

While the sample size is small, striking generalizations emerge from my survey, which I formulate as five (tentative) universals below.

3.1 Allomorphy *of* infixes

Universal 1: When a morpheme has multiple allomorphs, at least one of which is infixal, all the allomorphs orient with respect to the same edge of the stem.[6,7]

- If there's a left-edge infix, then other allomorphs are prefixes or left-edge-oriented infixes.
- If there's a right-edge infix, then other allomorphs are suffixes or right-edge-oriented infixes.

⇒ Edge-orientation is a property of (holds over) a morpheme, not its individual allomorphs.

Universal 2: Infixes never supplete based on their surface (infixed) environment.

- Robust triggers of suppletion of infixes:
  - Lexical class (e.g., Bole pluractional, Leti nominalizer)
  - Phonological properties of the whole stem (e.g., Upriver Halkomelem verbal plural, Nancowry instrumental)
  - Phonology at the stem edge that the morpheme is oriented towards (e.g., Bahnar nominalizer §1.3, Hunzib verbal plural §2.1, Puyuma Actor Voice) ⋆⋆⋆

⇒ Suppletive allomorphy cannot "see" an infix in its infixed position, but *can* "see" the properties of the relevant edge.

Universal 3: Infixes undergo morphophonological and surface allomorphy exclusively in their surface (infixed) environment.

- The stem edge (apart from adjacent segments) does not play a role in allomorphy that is non-suppletive.

⇒ Unlike for suppletive allomorphy, morphophonology and phonology *only* "see" the infix in its infixed position.

3.2 Allomorphy *around* infixes

Universal 4: Suppletive and morphophonological allomorphy in the stem of infixation *is unaffected* by the infix.

- If a stem would contain suppletive or morphophonological allomorphy without an infix, then it still does with the infix.

⇒ Opacity: Infixation counterfeeds/counterbleeds suppletion and morphophonology in a stem.

Universal 5: Surface allomorphy (surface phonology) within the stem of infixation *is affected* by the infix.[8]

- When phonological processes apply, they take into account not the form of the stem prior to infixation, but rather the whole form including the infix.

⇒ No opacity: Infixation feeds/bleeds surface phonology.

[6] Note that this is only clearly testable for edge-oriented, and not for prominence/stress-oriented, infixes.

[7] This likely can be more generally stated: When a morpheme has multiple allomorphs, all the allomorphs orient with respect to the same edge of the stem. (Thank you to Philipp Weisser for this observation.) This version of the universal, however, has at least apparent counterexamples.

[8] I have come across a few apparent counterexamples to this outside my current sample, e.g., nasal harmony in Sundanese (Wolf 2008:421). However, I'm not (yet) convinced these are deep counterexamples. There are two possible explanations for such counterexamples: (i) there is a phase/domain boundary between the stem and the infix, such that a full cycle of phonology has already run; (ii) the process identified as surface phonology is actually morphophonology (i.e., not fully general). I leave these cases for further research.

4 Theoretical implications

4.1 Derivational timing

Universal 1: When a morpheme has multiple allomorphs, at least one of which is infixal, all the allomorphs orient with respect to the same edge of the stem.

⇒ *Implication:* Linearization of an affix (as preceding or following the stem it combines with) precedes both exponent choice and infixation of an infixal exponent.

= linearization > exponent choice & infixation

Universal 2: Infixes never supplete based on their surface (infixed) environment.

⇒ *Implication:* Exponent choice precedes infixation of an infixal exponent.

= exponent choice > infixation

Universal 3: Infixes undergo morphophonological and surface allomorphy exclusively in their surface (infixed) environment.

⇒ *Implication:* Infixation precedes morphophonological and surface allomorphy of the infix.

= infixation > (morpho)phonology

Universal 4: Suppletive and morphophonological allomorphy in the stem of infixation *is unaffected* by the infix.

⇒ *Implication:* Stems undergo a cycle of suppletion and morphophonology prior to the addition of an infix.

= stem suppletion/morphophono > infixation

Universal 5: Surface allomorphy (surface phonology) within the stem of infixation *is affected* by the infix.

⇒ *Implication:* Stems do *not* (at least necessarily) undergo surface phonology prior to the addition of an infix.

= infixation > stem surface phonology

4.2 Putting it all together

(15) Derivational ordering:

a. Build the abstract (morpho)syntactic structure

b. Go to the most embedded unexponed morpheme, and apply a cycle of morphology and morphophonology:

(i) Linear concatenation (nb. could be earlier)[9]

(ii) Exponent choice (**suppletive allomorphy**)

(iii) Linear displacement (if it's an infixal exponent)

(iv) Morphophonology (**mp allomorphy**)

c. *Repeat the cycle above for all morphemes in domain*

d. Surface phonology (**surface allomorphy**)

4.2.1 Example: Hunzib

Recall from §2.1:

(16) Suppletive allomorphs of the verbal plural marker

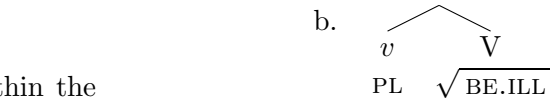
a. -báa / aa__ (suffixal on aa-final stems)

b. -(y/w)*ά*- / elsewhere (linearizes before final C)

- The infix has various morphophonological alternants that depend on the vowel that the infix lands after.
- In the verbal plural, stem-final [o, u, ə] neutralize to [e].

Derivation:

(17) a. *k'o<wά>k'e* 'be ill (pl)'

b. 

[9] The data are compatible with this preliminary step of linearization being a by-product of the (morpho)syntactic structure, e.g., via the LCA (Kayne 1994), or being a property of individual morphemes (i.e., whether they precede or follow their complement/stem). What the data at hand clearly show is just that this step of linearization is early, prior to exponent choice, infixation, etc.

(18) a. Linear concatenation of $\sqrt{\text{BE.ILL}}$: $\sqrt{\text{BE.ILL}}$
b. Exponent choice: *k'ok'o*
c. Linear displacement: - - -
d. Morphophonological processes: - - -
→ Output: *k'ok'o*

(19) a. Linear concatenation of PL: *k'ok'o*-PL
b. Exponent choice: *k'ok'o-á*
c. Linear displacement: *k'o<á>k'o*
d. Morphophonological processes: *k'o<wá>k'o*
→ Output: *k'owák'o*

(20) Surface phonology: **k'owák'e**

4.2.2 Example: Palauan

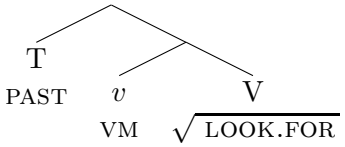
Recall from §2.2:

(21) Suppletive allomorphs of the verb marker
a. o- / __{LOOK FOR, ASK, BEGIN, COUNT, ...}
b. m- / elsewhere

- Past tense is marked by the infix *-il-*, which linearizes after the first segment.

Derivation:

(22) a. *u-<l>siik* 'looked for'
b.



(23) a. Linear concatenation of $\sqrt{\text{LOOK.FOR}}$: $\sqrt{\text{LOOK.FOR}}$
b. Exponent choice: *siik*
c. Linear displacement: - - -
d. Morphophonological processes: - - -
→ Output: *siik*

(24) a. Linear concatenation of VM: VM-*siik*
b. Exponent choice: *o-siik*
c. Linear displacement: - - -
d. Morphophonological processes: - - -
→ Output: *osiik*

(25) a. Linear concatenation of PAST: PAST-*osiik*
b. Exponent choice: *il-osiik*
c. Linear displacement: *o<il>siik*
d. Morphophonological processes: - - -
→ Output: *oilsiik*

(26) Surface phonology: **ulsiik**

4.3 Taking stock

What's universal/invariable in this model?

- The model is...
  - Serial (derivationally ordered)
  - Realizational (exponents are chosen "late")
  - Cyclic (derivations proceed from the most embedded morpheme outwards, and run in cycles)
- Morphology precedes phonology within each (sub-)cycle
  - First are operations that are phonology-free (structure-building, linearization of abstract morphemes)
  - Next is the morphological operation that inserts phonological forms (exponent choice)
  - Next, operations that perform phonological manipulations on morphological pieces (infixation, morphophonology)
  - Finally, each phase/domain culminates in the application of surface phonology

⇒ Can be seen as a logical transition from purely abstract to purely phonological; every step takes place as soon as it logically can—*intrinsic ordering*

What's variable in this model?

- *Morpheme/exponent-specific variation:*
  - A given abstract morpheme may or may not have multiple exponents (and if it does, these exponents may be conditioned by phonology, morphosyntax, or lexical class).
  - A given exponent may or may not be infixal.
- *Language-wide variation:*
  - The location/activity of phase/domain boundaries
  - The mechanism(s) at play in complex word formation (or the lack of complex word formation)
  - The general phonology and phonotactics of a language

A final note: Findings on optimization

- The choice of one suppletive exponent over another typically does *not* seem to have a phonotactic/phonological motivation (e.g., Bahnar, Hunzib, Palauan).
  - But, there are optimizing cases (e.g., Nakanai, Tiene)[10]
  - This is consistent with larger-scale findings on suppletive allomorphy (Paster 2006, i.a.).

  nb. In the model I've proposed, this falls out from the timing of exponent choice (it is always prior to phonology).
- Whether a particular exponent is infixal or non-infixal (and, if infixal, its surface position) often seems to have a phonotactic/phonological motivation (e.g., Bahnar, Huave).
  - But, there are non-optimizing cases (e.g., Hunzib, Leti, Palauan).
  - This is consistent with larger-scale findings on infixation (Yu 2007, i.a.).

  nb. The model I've proposed, as it stands, cannot accommodate phonological optimization determining infix placement in any straightforward way.

[10] I'd like to thank Donca Steriade for a very helpful discussion of Nakanai.

4.4 Theories of morpho(phono)logy

Morpho(phono)logical approaches to allomorphy and infixation can be differentiated along the following two dimensions:

(i) Is morphology (in particular, exponent choice/suppletive allomorphy) evaluated alongside phonology? **(M w/P)**

Or does morphology precede phonology? **(M bef.P)**

(ii) Does an infix linearly concatenate with the stem it combines with (i.e., as following or preceding the stem) before taking its surface (infixed) position inside the stem? **(LIN)**

Or does an infix slot directly into its infixed position without a preliminary step of linear concatenation? **(NO LIN)**

	NO LIN	LIN
M w/P	McCarthy and Prince 1993a Hyman and Inkelas 1997 Wolf 2008, Samuels 2009	Horwood 2002
M bef.P	Yu 2007 (mostly)	Embick 2010 Bye and Svenonius 2012

Navigating this theoretical landscape:

- Is there linear concatenation prior to infixation?
  - YES (Universals 1 and 2)
- Is exponent choice before/separate from (morpho)phonology?
  - YES (Universals 2 through 5)

⇒ Compatible sorts of accounts:

- Those that fit in the bottom-right quadrant, e.g. Embick 2010, Bye and Svenonius 2012 (Distributed Morphology)
- Those that allow a language (or perhaps even a specific morpheme/exponent) to appear in any of the quadrants
  - → But, such accounts fail to predict the constrained nature of the data—they predict unattested patterns.

5 Summing up and looking ahead

We are now in a position to answer a few general theoretical questions, that bear on all theories of morphology:

1. Is infixation a property of abstract morphemes or of exponents?

   → *Empirical finding: Infixal status/location varies with the exponents (suppletive allomorphs) of a morpheme*

   ⇒ Implication: Infixation is a property of exponents.

2. Are infixes, at some level, formally prefixes/suffixes (linearly concatenated), or are they infixes through and through?

   → *Empirical findings:*

   ◇ *Infixal and non-infixal exponents always orient w.r.t. the same edge of the stem*

   ◇ *Exponent choice is regulated at the stem edge, not in the landing site of the infix*

   ⇒ Implication: Infixes are linearly concatenated with their stem prior to undergoing linear displacement/infixation.

3. Are suppletive allomorphy, morphophonological allomorphy, and surface allomorphy actually all distinct from each other?

   → *Empirical findings:*

   ◇ *Suppletive allomorphy of an infix is calculated in its non-infixed position, while morphophonological and surface allomorphy are calculated in infixed position.*

   ◇ *Within the stem an infix combines with, suppletive and morphophonological allomorphy ignore the infix, while surface allomorphy/phonology does not.*

   ⇒ Implication: All three types of allomorphy are separate.

Zooming out: The fact that allomorphy and infixation interact crosslinguistically in a consistent set of ways is a non-trivial result, supporting a cyclic, serial, realizational morphological grammar.

- This data is very naturally accommodated within a general architecture like that assumed by **Distributed Morphology** (Halle and Marantz 1993, 1994), providing strong novel support for this type of theory of morphology.
- Notably, this data is *not* compatible with theories that take infixation to be "direct", that make morphological choices in the phonology, or that collapse all types of allomorphy.
- Similar conclusions have been reached by recent investigations of root-and-template morphology (see, e.g., Kastner 2019).

There's a lot still do to...

- Morphophonology: Is this just domain-specific phonology?
- *Each individual empirical case needs careful investigation!*
  - Suppletive allomorphy vs. non-suppletive allomorphy
  - Morphophonology vs. (general) phonology
- Collecting more case studies, from a wider variety of language families, and with a wider variety of empirical profiles, e.g.:
  - Infixes that are reduplicants
  - Exponents that are sometimes infixes, sometimes not
  - Multiple exponence of an infix + one of its allomorphs

References

Alekseev, Mikhail E. 1994. Budukh. In *The indigenous languages of the caucasus*, ed. Rieks Smeets, volume 4, 259–296. Delmar and New York: Caravan Books.

Banker, Elizabeth. 1964. Bahnar affixation. *Mon-Khmer Studies Journal* 1:99–117.

Banker, John, Elizabeth Banker, and Mơ. 1979. *Bahnar dictionary*. Huntington Beach, CA: Summer Institute of Linguistics.

van den Berg, Helma. 1995. *A grammar of hunzib (with texts and lexicon)*. Munich and Newcastle: Lincom Europa.

Blevins, Juliette. 1999. Untangling Leti infixation. *Oceanic Linguistics* 38.

Bobaljik, Jonathan. 2000. The ins and outs of contextual allomorphy. In *University of maryland working papers in linguistics*, ed. Kleanthes K. Grohmann and Caro Struijke, volume 10, 35–71. College Park: University of Maryland, Dept. of Linguistics.

Bobaljik, Jonathan. 2012. *Universals in comparative morphology*. Cambridge: MIT Press.

Buckley, Eugene. 1997. Explaining Kashaya infixation. In *Proceedings of the 23rd annual meeting of the Berkeley Linguistics Society*, ed. Matthew L. Juge and Jeri L. Moxley, 14–25. Berkeley: Berkeley Linguistics Society.

Bye, Patrik, and Peter Svenonius. 2012. Nonconcatenative morphology as epiphenomenon. In *The morphology and phonology of exponence: The state of the art*, ed. Jochen Trommer, 427–495. Oxford: Oxford University Press.

Carstairs, Andrew. 1987. *Allomorphy in inflexion*. London: Croom Helm.

Deal, Amy Rose, and Matthew Wolf. 2017. Outwards-sensitive phonologically-conditioned allomorphy in Nez Perce. In *The morphosyntax-phonology connection: Locality and directionality at the interface*, ed. Vera Gribanova and Stephanie Shih, 29–60. Oxford University Press.

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

Galloway, Brent Douglas. 1993. *A grammar of Upriver Halkomelem*. Berkeley and Los Angeles: University of California Press.

Gimba, Alhaji Maina. 2000. Bole verb morphology. Doctoral Dissertation, University of California, Los Angeles.

Green, Thomas Michael. 1999. A lexicographic study of Ulwa. Doctoral Dissertation, Massachusetts Institute of Technology, Cambridge, MA.

Gribanova, Vera, and Boris Harizanov. 2017. Locality and directionality in inward-sensitive allomorphy: Russian and Bulgarian. In *The morphosyntax-phonology connection: Locality and directionality at the interface*, ed. Vera Gribanova and Stephanie Shih, 61–90. Oxford University Press.

Halle, Morris. 2001. Infixation versus onset metathesis in Tagalog, Chamorro, and Toba Batak. In *Ken Hale: A life in language*, ed. Michael Kenstowicz, 153–168. Cambridge, MA: MIT Press.

Halle, Morris, and Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In *The view from building 20*, ed. Kenneth Hale and Samuel Jay Keyser, 111–176. Cambridge, Massachusetts: MIT Press.

Halle, Morris, and Alec Marantz. 1994. Some key features of Distributed Morphology. In *MITWPL 21: Papers on phonology and morphology*, ed. Andrew Carnie, Heidi Harley, and Tony Bures, 275–288. Cambridge, MA: MIT Working Papers in Linguistics.

Halpern, Abraham M. 1947. Yuma V: Conjugation of the verb theme. *International Journal of American Linguistics* 13:92–107.

Himmelmann, Nikolaus, and John U. Wolff. 1999. *Toratán (Ratahan)*. Munich and Newcastle: Lincom Europa.

Horwood, Graham. 2002. Precedence faithfulness governs morpheme position. In *Proceedings of WCCFL 21*, ed. Line Mikkelsen and Chris Potts, 166–179. Somerville, MA: Cascadilla Press.

Hyman, Larry. 1994. Cyclic phonology and morphology in Cibemba. In *Perspectives in phonology*, ed. Jennifer Cole and Charles Kisseberth, 81–112. Stanford: CSLI.

Hyman, Larry, and Sharon Inkelas. 1997. Emergent templates: The unusual case of Tiene. In *University of Maryland Working Papers in Linguistics: Selected Phonology Papers from H-OT-97*, ed. Bruce T. Morén and Viola Miglio, 92–116. College Park: University of Maryland, Department of Linguistics.

Jastrow, Otto. 1993. *Laut- und Formenlehre des neuaramäischen Dialekts von Mīdin im Ṭūr ʿAbdīn*, volume Semitica Viva 9. Wiesbaden: Harrassowitz Verlag.

Johnston, Raymond Leslie. 1980. *Nakanai of New Britain: The grammar of an Oceanic language*. Canberra, Australia: Pacific Linguistics.

Josephs, Lewis. 1975. *Palauan reference grammar*. Honolulu: The University Press of Hawaii.

Kager, Rene. 1996. On affix allomorphy and syllable counting. In *Interfaces in phonology*, ed. Ursula Kleinhenz, Studia Grammatica 41, 155–171. Berlin: Akademie Verlag.

Kalin, Laura. 2018. Morphology before phonology: A case study of Turoyo (Neo-Aramaic). Ms. Princeton University.

Kastner, Itamar. 2019. Templatic morphology as an emergent property: Roots and functional heads in Hebrew. *Natural Language and Linguistic Theory* 37:571–619.

Kayne, Richard. 1994. *The antisymmetry of syntax*. Cambridge, MA: MIT Press.

Kibrik, Aleksandr E. 1994. Archi. In *The indigenous languages of the caucasus*, ed. Rieks Smeets, volume 4, 297–365. Delmar and New York: Caravan Books.

Kibrik, Aleksandr E. 1998. Archi (caucasian – daghestanian). In *The handbook of morphology*, ed. Andrew Spencer and Arnold Zwicky, 455–476. Oxford: Blackwell.

Kim, Yuni. 2008. Topics in the phonology and morphology of San Francisco del Mar Huave. Doctoral Dissertation, University of California, Berkeley.

Kimball, Geoffrey. 1991. *Koasati grammar*. Nebraska: University of Nebraska Press.

Klein, Thomas B. 2005. Infixation and segmental constraint effects: UM and IN in Tagalog, Chamorro, and Toba Batak. *Lingua* 115:959–995.

Lombardi, Linda, and John McCarthy. 1991. Prosodic circumscription in Choctaw morphology. *Phonology* 8:37–72.

Martin, Jack B., and Pamela Munro. 2005. Proto-Muskogean morphology. In *Native languages of the southeastern United States*, ed. Heather K. Hardy and Janine Scancarelli, 299–320. Lincoln and London: University of Nebraska Press.

McCarthy, John, and Alan Prince. 1993a. Generalized alignment. *Yearbook of Morphology* 12:79–153.

McCarthy, John, and Alan Prince. 1993b. Prosodic morphology: Constraint interaction and satisfaction. University of Massachusetts, Amherst and Rutgers University.

Moravcsik, Edith. 1977. *On rules of infixing*. Bloomington, IN: Indiana University Linguistics Club.

Munro, Pamela, and Catherine Willmond. 1994. *Chickasaw: An analytical dictionary*. Norman and London: University of Oklahoma Press.

Odden, David. 1996. *The phonology and morphology of Kimatuumbi*. Oxford: Clarendon Press Press.

Orgun, Cemil Orhan. 1996. Sign-based morphology and phonology with special attention to Optimality Theory. Doctoral Dissertation, University of California, Berkeley.

Paster, Mary. 2006. Phonological conditions on affixation. Doctoral Dissertation, University of California, Berkeley.

Radhakrishnan, R. 1981. *The nancowry word: phonology, affixal morphology and roots of a Nicobarese language*. Carbondale, Illinois: Linguistic Research.

Rischel, Jørgen. 1995. *Minor Mlabri: A hunter-gatherer language of Northern Indochina*. Copenhagen: Museum Tusculanum Press.

Samuels, Bridget. 2009. The structure of phonological theory. Doctoral Dissertation, Harvard University, Cambridge, MA.

Scheer, Tobias. 2016. Melody-free syntax and phonologically conditioned allomorphy. *Morphology* 26:341–378.

Schuh, Russell. 2002. The locus pluractional reduplication in West Chadic. Ms. University of California, Los Angeles.

Stairs, Emily F., and Barbara E. Hollenbach. 1969. Huave verb morphology. *International Journal of American Linguistics* 35:38–53.

Teng, Stacy Fang-Ching. 2008. *A reference grammar of Puyuma, an Austronesian language of Taiwan*. Canberra, Australia: Pacific Linguistics.

Ultan, Russell. 1975. Infixes and their origin. *Linguistic Workshop* 3:156–205.
Wolf, Matthew. 2008. Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model. Doctoral Dissertation, University of Massachusetts Amherst.
Yu, Alan. 2003. The morphology and phonology of infixation. Doctoral Dissertation, University of California, Berkeley.
Yu, Alan. 2007. *A natural history of infixation*. Oxford: Oxford University Press.
Yu, Alan. 2017. Global optimization in allomorph selection: Two case studies. In *The morphosyntax-phonology connection: Locality and directionality at the interface*, ed. Vera Gribanova and Stephanie Shih, 1–27. Oxford University Press.

Appendix: The sample

- **Archi** (Northeast Caucasian; Dagestan, Russia)
  - Abstract morpheme: Class-number marker
  - *Sources: Kibrik 1994, 1998, Yu 2007*
- **Alabama** (Muskogean; USA)
  - Abstract morpheme: Mediopassive
  - *Sources: Martin and Munro 2005, Yu 2007*
- **Bahnar** (Austroasiatic; Vietnam)
  - Abstract morpheme: Nominalizer
  - *Sources: Banker 1964, Banker et al. 1979*
- **Bole** (Afro-Asiatic; Chad)
  - Abstract morpheme: Pluractional
  - *Sources: Gimba 2000, Schuh 2002*
- **Budukh** (Northeast Caucasian; Azerbaijan)
  - Abstract morpheme: Durative
  - *Sources: Alekseev 1994, Yu 2007*
- **Bunun** (Austronesian; Taiwan)
  - Abstract morpheme: Completed action
  - *Sources: Yu 2007*
- **Chibemba** (Bantu, Niger-Congo; mainly Zambia)
  - Abstract morpheme: Applicative
  - *Sources: Hyman 1994, Orgun 1996*
- **Chickasaw** (Muskogean; USA)
  - Abstract morpheme: Mediopassive
  - *Sources: Munro and Willmond 1994, Yu 2007*
- **Choctaw** (Muskogean; USA)
  - Abstract morpheme: Instantaneous
  - *Sources: Lombardi and McCarthy 1991*
- **Huave** (isolate; Mexico)
  - Abstract morpheme: Passive
  - *Sources: Stairs and Hollenbach 1969, Kim 2008*
- **Hunzib** (Northeast Caucasian; Dagestan)
  - Abstract morpheme: Verbal plural
  - *Sources: van den Berg 1995*
- **Kashaya Pomo** (Pomoan; USA)
  - Abstract morpheme: Verbal plural
  - *Sources: Buckley 1997*
- **Katu** (Austroasiatic; Vietnam)
  - Abstract morpheme: Nominalizer
  - *Sources: Yu 2017*
- **Kichaga** (Bantu, Niger-Congo; Tanzania)
  - Abstract morpheme: Intensive
  - *Sources: Yu 2007, who cites Inkelas p.c.*

- **Kimatuumbi** (Bantu, Niger-Congo; Tanzania)
  - Abstract morpheme: Perfective
  - *Sources: Odden 1996, Paster 2006*
- **Koasati** (Muskogean; USA)
  - Abstract morpheme: Verbal plural
  - *Sources: Kimball 1991, Yu 2007*
- **Leti** (Austronesian; Indonesia)
  - Abstract morpheme: Nominalizer
  - *Sources: Blevins 1999*
- **Nakanai** (Austronesian; Papua New Guinea)
  - Abstract morpheme: Nominalizer
  - *Sources: Johnston 1980, Yu 2007*
- **Nancowry** (Austroasiatic; India)
  - Abstract morpheme: Instrumental
  - *Sources: Radhakrishnan 1981, Paster 2006*
- **Mlabri** (Austroasiatic; Thailand, Laos)
  - Abstract morpheme: Nominalizer
  - *Sources: Rischel 1995*
- **Palauan** (Austronesian; Palau)
  - Abstract morpheme: Past tense
  - *Sources: Josephs 1975, Embick 2010*
- **Puyuma** (Austronesian; Taiwan)
  - Abstract morpheme: Actor Voice
  - *Sources: Teng 2008*
- **Tiene** (Bantu, Niger-Congo; Democratic Republic of Congo)
  - Abstract morphemes: Stative; reversive
  - *Sources: Hyman and Inkelas 1997, Yu 2017*
- **Toba Batak** (Austronesian; Indonesia)
  - Abstract morpheme: Passive completive
  - *Sources: Halle 2001*
- **Turoyo** (Neo-Aramaic, Semitic; Turkey, Syria)
  - Abstract morpheme: Past tense
  - *Sources: Jastrow 1993, Kalin 2018*
- **Toratan** (Austronesian; Indonesia)
  - Abstract morpheme: Non-past agent voice
  - *Sources: Himmelmann and Wolff 1999*
- **Ulwa** (Misumalpan; Nicaragua)
  - Abstract morpheme: Construct state
  - *Sources: Green 1999, Yu 2007*
- **Upriver Halkomelem** (Coast Salish; Canada)
  - Abstract morpheme: Verbal plural
  - *Sources: Galloway 1993, Yu 2007*
- **Yuma** (Yuman; USA)
  - Abstract morpheme: Distributive object marker
  - *Sources: Halpern 1947, Yu 2003*