

On the (non-)transparency of infixes that surface at a morpheme juncture: *Bottoms up!**

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1 Introduction

Locality plays a fundamental role throughout the grammar, constraining e.g.:

- *Semantic relationships*: Compositionality, idioms
- *Syntactic relationships*: Selection, incorporation
- *Morphological relationships*: Allomorphy, feature interactions
- *Phonological interactions*: Assimilation, allophony, etc.

But sometimes, relationships and interactions that are otherwise **strictly local** survive in apparently **non-local** configurations.

- E.g., the persistence of an idiomatic interpretation in (1a) (cf. its failure in (1b)):

- (1) a. **The shit** continued to **hit the fan**.
b. #**The shit** decided to **hit the fan**.

⇒ The survival of a local relationship is a useful diagnostic, showing that the relationship must hold locally at some relevant derivational point or level of representation.

– E.g., returning to (1), diagnosing a raising vs. control environment:¹

- (2) a. [The shit]_i continued [*t*_i to hit the fan] (= raising)
b. #[The shit]_i decided [**PRO**_i to hit the fan] (= control)

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¹On locality and idioms, see, e.g., Chafe 1970, Bach 1974, Chomsky 1995, O'Grady 1998.

The locality-(non-)disruptor of interest today: Infixes

- Infixes are affixes that appear *inside of* the stem they combine with.
- The location of an infix in a string can be described as preceding or following a particular phonological or prosodic pivot (Ultan 1975, Moravcsik 2000, Yu 2007, *i.a.*), e.g.:
 - Preceding the first vowel, as in Leti (Blevins 1999):
(3) **-ni-** (NOM) + kakri (cry) → k<**ni**>akri
 - Preceding the final syllable, as in KiChaga (Yu 2007, citing Inkelas p.c.):
(4) **-N-** (INTENS) + muili (white) → mui<**n**>li
- In canonical cases, infixes disrupt the linear integrity of a **root**, as in (3)-(4) above.
- But, when combining with a complex/multimorphemic stem, an infix can also appear incidentally inside an affix or **at a juncture between morphemes** in its stem, e.g., (5b).
 - Infixation of past in Palauan (Flora 1974:74):
(5) a. **-il-** (PST) + dasaʔ (carve) → d<**il**>asaʔ ‘carved (past participle)’
 b. **-il-** (PST) + m-dasaʔ (VM-carve) → m-<**il**>dasaʔ ‘carved (past middle)’

When an infix (incidentally) appears between two morphemes in its stem, does the infix disrupt relations at/across that morpheme juncture *that we otherwise expect to be strictly local*?

§2 The findings: Infixes disrupt limited types of phonological interactions, but never interrupt semantic, syntactic, or morphological interactions/relationships.

§3 Theoretical implications:

- Novel evidence for...
 - (i) **the post-syntactic nature of morphology**
 - and (ii) **bottom-up exponence**
 - that is (iii) **interleaved with some (morpho)phonological processes**
 - but (iv) **not interleaved with surface phonology**
- This data poses a serious challenge for...
 - Theories of morphology where words are built pre-syntactically
 - Theories of exponence where realization is simultaneous across all morphemes/features in a domain

1.1 A primer on the terminology I'll be using

As is probably obvious, I am using the tools of a piece-based theory of morphology.

- **Morpheme**: an abstract morphological element corresponding to...
 - (i) a (set of) meaning(s)/function(s), and
 - (ii) a (set of) phonological form(s) (= **exponents**, morphs)
- Underlying a word is an abstract morphosyntactic structure that is *hierarchically organized*.

How I will talk about infixation/infixes:

- (6) **Definition of Infixation** (Blevins 2014; emphasis added, modifications in brackets)

Under infixation a *bound [exponent]*

whose phonological form **consists minimally of a single segment**, is **preceded and followed in at least some word-types** by **non-null segmental strings** which together **constitute a relevant form-meaning correspondence of their own**, despite their non-sequential phonological realization.

- (7) Nominalization in Hoava: **-in-** (Blevins 2014, citing Davis 2003)

- a. to (alive) → t<in>o ('life')
- b. hiva (want) → h<in>iva ('wishes')
- c. ta-poni (PASS-give) → t<in>a-poni ('gift')
- d. vari-razae (RECIP-fight) → v<in>ari-razae ('war')
- e. edo (happy) → <in>edo ('happiness')

- The morphological constituent that the infix combines with (and in the usual case linearly disrupts, cf. (7e)) is the **stem of infixation**.
 - The stem of infixation can be morphologically complex, as in (7c,d) and (5).
- Infixes are affixes with a **phonological/prosodic pivot**, requiring them to **surface inside** their stem (in the usual case).
 - Most common pivots: C, V, syllable, foot; can include stress (Yu 2007)

2 When does(n't) an infix disrupt local relationships?

The infixes

In the process of conducting a larger typological survey of infixes (Kalin 2020a), I have identified a total of 9 morphemes that each have at least one exponent that...

- (i) fits the definition of infixation in (6), and
- (ii) can surface incidentally at a morpheme juncture

Family	Language	Morpheme(s)	Source(s)
<i>Afro-Asiatic</i>	Turoyo	PST	Jastrow 1993, Kalin 2020b
<i>Algic</i>	Yurok	ITER	Blevins 2005, 2014
<i>Austroasiatic</i>	Katu	NOM	Costello 1998
	Nancowry	CAUS, INOM	Radhakrishnan 1981, Kalin In press
<i>Austronesian</i>	Palauan	PST	Josephs 1975, Embick 2010
<i>Movima (isolate)</i>	Movima	IRR	Haude 2006
<i>Niger-Congo</i>	Eton	G-FORM	Van de Velde 2008
<i>Northeast Caucasian</i>	Hunzib	VPL	van den Berg 1995

The relationships (and a preview of the findings)

The relationships/interactions among morphemes in the stem of infixation (that are or are not disrupted by the presence of an infix) fall on a cline:

- (8) ↓ *Syntactic/Semantic* ↓
- a. Semantic relationships ★ survive ★ (§2.1)
 - b. Morphosyntactic relationships ★ survive ★ (§2.2)
 - c. Allomorphic (suppletive) relationships ★ survive ★ (§2.3)
 - d. Morphophonological interactions ★ survive ★ (§2.4)
 - e. Phonological interactions ★ do not survive ★ (§2.5)
- ↑ *Phonological* ↑

In this section, I offer case studies for each type of relationship.

2.1 Semantic relationships survive infixation

Baseline Semantic interpretation is highly sensitive to interruption.

- Compositional interpretation is interrupted by an intervener, e.g.:

- (9) a. re-lock
- b. re-**un**-lock (≠ un-re-lock)

- Idiomatic interpretation is interrupted by an intervener, e.g.:

- (10) a. goody two shoes
- b. #goody two **ballet** shoes (nonsensical)

- (11) a. green house
- b. green-**ish** house (non-idiomatic meaning only)

⇒ *What happens when the intervener is an infix?*

Movima (language isolate of Bolivia; Haude 2006)

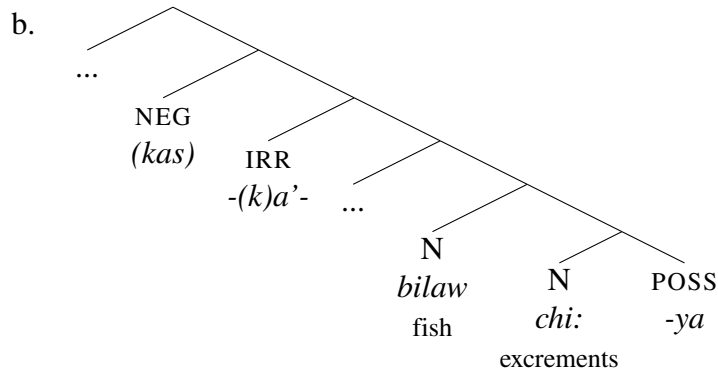
- The infix: Irrealis mood in Movima is marked with the infix $-(k)a'$ - (H:§3.6.2, §10.3).
 - Combines with a verb or a predicate nominal
 - Expresses irrealis mood or existential negation
 - Infix placement: after the first iambic foot of the base (i.e., after initial H, LL, or LH)
 - nb. Initial k of $-(k)a'$ - is absent after consonants, present after vowels (hiatus avoidance)

- (12) a. $-(k)a'$ - (IRR) + salmo (return) → sal<**a'**>mo ('I'll be back') (H:438)
 b. $-(k)a'$ - (IRR) + aroso (rice) → aro<**ka'**>so ('There is no rice') (H:80)

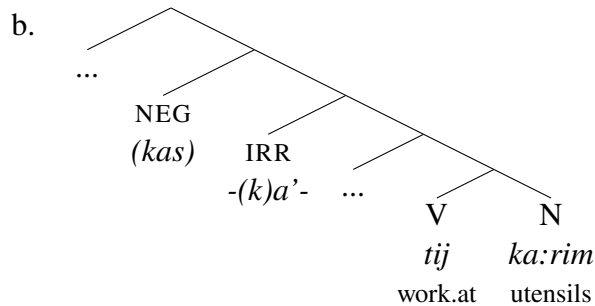
- The (non-)interrupted relationship: Interpretation of compounds

→ Interpretation of compounds **survives infixation**, both compositional interpretation, (13), and non-compositional interpretation, (14):

- (13) a. $-(k)a'$ - (IRR) (H:81)
 + bilaw-chi:-ya (fish-excrements-POSS, 'fish excrements')
 → bilaw<**a'**>-chi:-ya ('there are no fish excrements')



- (14) a. $-(k)a'$ - (IRR) (H:351,439)
 + tij-ka:rim (work.at-utensils, 'work')
 → tij<**a'**>-ka:rim ('nobody is at work')



⇒ *Infixes do not disrupt the semantic composition/interpretation of their stems.*

- Consistent throughout the sample, and evident in many further examples below.
- Core implication: Infixes, even when appearing intermorphemically, have a distinct syntactic location from where they are realized phonologically; in other words, infixation doesn't disrupt underlying constituency/compositionality.

2.2 Morphosyntactic relationships survive infixation

Baseline Morphosyntactic relationships are highly local.

- Productive selectional relationships are interrupted by an intervener, e.g.:
 - *-ly* in English selects adjectives and derives adverbs, (15a), and is relatively productive
 - Satisfaction of this selectional requirement requires immediate adjacency, (15b)

- (15) a. happy-ly
b. *happy-**ness**-ly

- Non-productive selectional relationships are also interrupted by an intervener, e.g.:
 - Comparative *-er* in English is very picky, combining only with certain adjectives²
 - This “picky-ness” requires immediate adjacency, (16b)/(17b)

- (16) a. simpl-er
b. *simpl-**ify-ed**-er (cf. more simplified)

- (17) a. green-er
b. *green-**ish**-er (cf. more greenish)

⇒ *What happens when the intervener is an infix?*

Hunzib (Northeast Caucasian; van den Berg 1995)

- The infix: Hunzib has a verbal plural infix *-á-* (B:81-83).
 - Combines with verbs to mark iterativity or plurality of internal argument
 - Infix placement: before the final consonant of a verb stem
 - nb. Exhibits some surface allomorphy (phonologically-derived)

- (18) a. áhu (take) + **-á-** (VPL) → a<**á**>hu (B:284)
b. ék (fall) + **-á-** (VPL) → e<**yá**>k (B:295)
c. čáx (write) + **-á-** (VPL) → ča<**á**>x (B:292)

²Note that while it is true that *-er* generally combines with mono- or disyllabic adjectives, this is neither a necessary nor sufficient condition for predicting its compatibility with an adjective, cf. the ungrammatical **iller* and the grammatical *unhappier*. See discussion in Bobaljik 2012:Ch. 5.5.

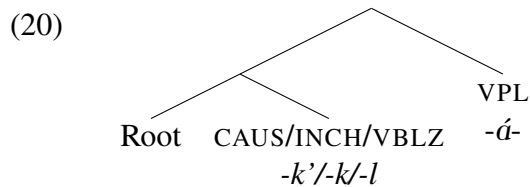
- The (non-)interrupted relationship: Category selection and lexically-specific selection

– 3 relevant derivational suffixes:

- ◇ causative *-k'* (ADJ → trans V; V → V+causer); predictable/productive (B:107)
- ◇ inchoative *-ke* (ADV → intrans V); predictable/unproductive (B:111)
- ◇ verbalizer *-l* (ADJ/V → V); unpredictable/unproductive (B:108)
- ◇ (in §2.4, we'll return to some of these suffixes)

→ The selectional relationship **survives infixation** for all of these suffixes:

- (19) a. *háldu-k'* (white-CAUS) + **-á-** (VPL) → *hald<á>-k'* (B:301)
 b. *λírə-ke* (under-INCH) + **-á-** (VPL) → *λír<á>-ke* (B:316)
 c. *gáme-l* (thin-VBZ) + **-á-** (VPL) → *gam<á>-l* (B:297)



Eton (Niger-Congo); Van de Velde 2008)

- The infix: In Eton, a morpheme called the “G” morpheme derives the verb stem in a number of tense/aspect combinations (V:Ch. 7.2.2).³

- Has several allomorphs, one of which is infixal, *-Lg-* (L = floating low tone)
- Infix placement: before the final vowel of its stem (V:245)
- (The floating low tone (L) interacts in fully predictable ways with the stem.)

- (21) a. *bèbè* (look.at) + **-Lg-** (G) → *bèb<g>è*
 b. *kódô* (leave) + **-Lg-** (G) → *kôd<g>ò*

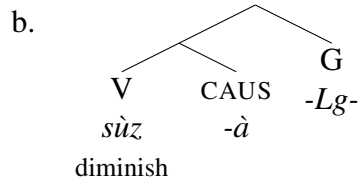
- The relationship: A lexically-picky synthetic causative strategy

- There is a causative suffix in Eton, *-à*
 - ◇ But, this synthetic (suffixal) causative strategy is limited to a restricted, arbitrary class of roots (V:§4.3.1-2).
 - ◇ For all other verbs, the causative must be expressed periphrastically.

→ The idiosyncratic combination of *-(l)a* and a compatible root **survives infixation**, i.e., the periphrastic strategy is not required, (22).

³“The G-form of the verb is used in the Hesternal past perfective, in the Past imperfective, the Relative imperfective, and in the participial involved in the formation of past imperfective verb forms” (V:245).

(22) a. sùz-à (diminish-CAUS) → sùz<g>-à (V:246)



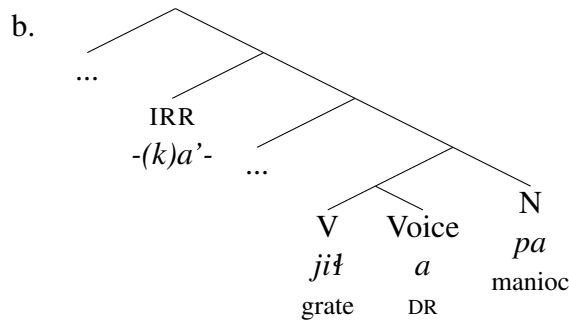
Movima (again) (language isolate of Bolivia; Haude 2006)

- The infix: Irrealis infix $-(k)a'$ -; placement: after first iambic foot (see §2.1)
- The (non-)interrupted relationship: A productive process of object incorporation (H:§7.7)
 - An object that would otherwise be absolutive, (23a), is incorporated into the verb, (23b)
 - nb. the verb is marked with the “direct voice” active transitive suffix, DR (H:368, 374)

(23) a. **wul-na=n** kis **saniya** b. ij **wul-a-saniya**
 sow-DR=2ERG ART.PL melon 2ABS sow-DR-melon
 ‘You sow melon.’ ‘You sow melon.’

→ Object incorporation, (24a), **survives infixation**, (24b):

(24) a. iń jił-a:-pa b. iń jił-a<ka’>-pa
 1ABS grate-DR-manioc 1ABS <IRR>grate-DR-manioc
 ‘I grate manioc.’ ‘I’ll grate manioc.’ (H:79)



⇒ **Infixes do not disrupt morphosyntactic relationships in their stems.**

- Consistent throughout the sample; many cases
- Core implication: Infixes, even when appearing intermorphemically, occupy a distinct (morpho)syntactic location from where they are realized phonologically.

2.3 Suppletive allomorphy survives infixation

Baseline The target and trigger of suppletive allomorphy must be local to each other.⁴

⁴For discussions of exactly what the relevant locality condition on suppletive allomorphy is, which may vary by type of allomorphy, see e.g. Embick 2010, Bobaljik 2012, Merchant 2015, Moskal 2015, Choi and Harley 2019.

- Phonologically-conditioned allomorphy is local

– E.g., English *a/an* allomorphy:

- (25) a. an apple
 b. a **giant** apple
 c. a **non**-apple

- Lexically-conditioned allomorphy is local

– E.g., Kalin and Atlamaz 2018: A particular tense/aspect suffix in Kurmanji has a number of suppletive forms—*-or*, *-i*, *-t*, *-d*, \emptyset , etc.—all lexically conditioned.

– Intervention of the causative morpheme always results in the selection of *-d*, (26b).

- (26) a. kel (boil) + T/Asp → kel-i (‘boiled’)
 b. kel (boil) + **-on** (CAUS) + T/Asp → kel-**on**-d (‘made boil’)

- Grammatically-conditioned allomorphy is local

– See, e.g., Embick 2010, Paparounas 2021

⇒ *What happens when the intervener is an infix?*

Palauan (Austronesian; Flora 1974, Josephs 1975, Embick 2010)

- The infix: The past tense marker in Palauan is an infix, *-il-*

– Infix placement: after the first segment of the stem.

– Appears inside a root when combining with an un-prefixed stem:

- (27) a. **-il-** (PST) + kie (live) → k<**il**>ie (‘lived’) (Embick 2010)
 b. **-il-** (PST) + dɛngʔokl (sit) → d<**il**>ɛngʔokl (‘sat’)

- The (non-)interrupted relationship: Lexically- and phonologically-conditioned allomorphy

– Note: Embick (2010:104-107) offers a case study of Palauan verb marker allomorphy and past tense infixation; the presentation here largely follows Embick’s.

– Most verb stems bear a Verb Marker (VM), excluding some stative ones.

◊ Josephs (1975:148): “It is very difficult to define or specify the meaning of the verb marker; rather, the best we can do is to say that the verb marker simply functions to mark or identify a particular word as a verb.”

– Two suppletive allomorphs of the VM, *m(ə)-* and *o-* (see Josephs 1975:Ch. 6):

◊ Majority of verbs: *m(ə)-* (28a)

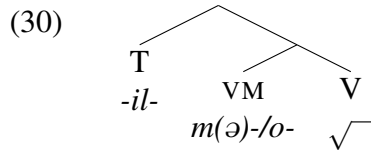
◊ All bilabial-initial verb stems: *o-* (28b)

◊ A small list of non-bilabial-initial verb stems: *o-* (28c)

- (28) a. VM + *dasa?* (carve) → mə-*dasa?* (Flora 1974:99)
 b. VM + *balo?* (shoot) → o-*balo?* (Flora 1974:100)
 c. VM + *siik* (look_for) → o-*siik* (Josephs 1975:133)

→ Verb marker allomorphy, (28), **survives infixation** of the past tense marker, (29).

- (29) a. **-il-** (PST) + VM-carve (28a) → m-<**il**>*dasa?* (Flora 1974:100)
 b. **-il-** (PST) + VM-shoot (28b) → o-<**il**>*balo?* (Flora 1974:101)
 c. **-il-** (PST) + VM-look_for (28c) → o-<**il**>*siik* (Josephs 1975:133)



Nancowry (Austroasiatic; Radhakrishnan 1981, Kalin In press)

- The infix: Nancowry has a number of left-edge prefixes/infixes, one of which is the instrumental nominalizer infix *-in-*

- Derivational affix that combines with verbs and derives instrument nouns
- Infix placement: after the first consonant of the stem (cf. (32))
- (Not relevant here: The instrumental nominalizer exhibits suppletive allomorphy; §3.3.)

- (31) a. **-in-** (INOM) + *caluak* (swallow) → c<**in**>*luak* (‘a throat’) (R:146)
 b. **-in-** (INOM) + *tiko?* (prod) → t<**in**>*ko?* (‘a prod’) (R:97)

- Kalin (In press): *-in-*’s placement is actually after the first vowel
 - ◇ In that post-vocalic position, the infix creates vowel hiatus, which is disallowed in unstressed syllables in Nancowry; the stem vowel deletes, e.g., for (31a):

(32) **-in-** + *caluak* → ca<**in**>*luak* → c<**in**>*luak*

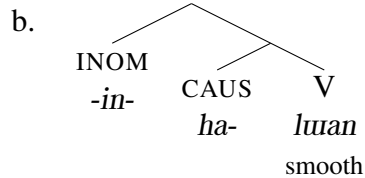
- The (non-)interrupted relationship: Prosodically-conditioned allomorphy

- The causative morpheme in Nancowry has two prosodically-conditioned suppletive forms (one of which is itself an infix):

- (33) a. CAUS ↔ ha- / monosyllabic stems (34a)
 b. CAUS ↔ -um- / disyllabic stems (34b)
- (34) a. CAUS + *luan* (smooth) → ha-*luan* (‘to smoothen’) (R:146)
 b. CAUS + *palo?* (loose) → p<um>*lo?* (‘to loosen’) (R:150)

→ Allomorphy of the causative **survives infixation** of the nominalizer:⁵

(35) a. **-in-** (INOM) + CAUS-smooth (34a) → h-<in>luan ('thing used to smoothen')



⇒ *Infixes do not disrupt suppletive allomorphy in their stems.*

- Consistent throughout the sample; other cases:
 - Katu (Costello 1998): lexically-conditioned allomorphy of the causative morpheme survives infixation of a nominalizer
 - Turoyo (Kalin 2020b): grammatically-conditioned allomorphy of the dative marker and phonologically-conditioned allomorphy of “B” agreement survive infixation of past
 - Nancowry (Kalin In press): prosodically-conditioned allomorphy of the causative morpheme survives infixation of a second causative (creating a double causative)
- Core implication: Exponent choice, for the morphemes that constitute the stem of infixation, happens *before* infixation.

2.4 Morphophonology survives infixation

Baseline Morphophonological interactions are highly local

- E.g., in English, some nouns ending in a voiceless fricative undergo voicing in the plural:

(36) a. lea[f] / lea[v]-es
 b. hou[s]e / hou[z]-es
 c. mou[θ] / mou[ð]-s

- This voicing doesn’t happen when there is an intervener, (37b):

(37) a. leaf + PL → lea[v]-es
 b. leaf + -let + PL → lea[f]-let-s (*leav-let-s)

- (See Embick and Shwayder 2018 for a discussion of locality and how it might be somewhat different for different types of morphophonological processes.)

⇒ *What happens when the intervener is an infix?*

⁵I do not show the *-um-* allomorph surviving infixation of the nominalizer because infixation of *-um-* followed by infixation of *-in-* actually results in the surface-disappearance of *-um-*; this can be explained by completely predictable phonological/phonotactic repairs within the language, but would take us too far afield here. See Kalin In press:13-14.

Hunzib (again) (Northeast Caucasian; van den Berg 1995)

- The infix: Verbal plural infix *-á-*; placement: before the final consonant (see §2.2)
 - The (non-)interrupted relationship: Morphophonological conditioning of suffix vowel
 - Some of the derivational suffixes of §2.2 have two distinct (non-suppletive) shapes:
 - ◇ **causative**; highly productive/predictable (B:107)
 - -k' / stem ending in vowel
 - -k'e / stem ending in consonant
- (38) a. haldu (white) + CAUS → haldu-k' ('make white')
- b. uλ' (end) + CAUS → uλ'-k'e ('make end')
- ◇ **verbalizer**; uproductive, unpredictable meaning (B:108)
 - -l / stem ending in vowel
 - -le / stem ending in consonant
- (39) a. haldu (white) + VBZ → haldu-l ('be white')
- b. ek (fall) + VBZ → ek-le ('let fall, drop')
- This is morphophonology, not surface phonology:
 - ◇ While the epenthetic vowel is generally *e* across Hunzib, its position with respect to a consonantal suffix varies depending on the suffix.
 - ◇ The choice to add (or not add) *e* is made based on the nature of the preceding segment, oblivious to the shape of other (less embedded) affixes.
- Morphophonologically-conditioned epenthesis **survives infixation**, (40b)/(41b):

- (40) a. haldu-l ('be white') + VPL → hald<á>-l
- b. ix-lə⁶ ('warm oneself') + VPL → ix<á>-le (*ix<á>-l)
- (41) a. haldu-k ('make white') + VPL → hald<á>-k'
- b. ix-k'ə ('warm up') + VPL → ix<á>-k'e (*ix<á>-k')

Movima (again) (language isolate of Bolivia; Haude 2006)

- The infix: Irrealis infix *-(k)a'*-; placement: after first iambic foot (see §2.1)
 - The (non-)interrupted relationship: Morphophonological reduplication process
 - In nominal compounds derived from a verb root, the verb root is reduplicated (H:§5.2.2):
- (42) a. sam (twist) + di (long.thin) → sam-sam-di ('rope')
- b. dan (chew) + so (chicha) → dan-dan-so ('chicha made of chewed maize')

⁶This is predictable vowel harmony of *e* with a preceding central non-low vowel; more on this in §2.5.

→ Reduplication **survives infixation**, (43):

(43) (k)a' (IRR) + sam-sam-di ('rope') → sam-<a'>sam-di

⇒ **Infixes do not disrupt morphophonology in their stems.**

- One other case in the sample: monosyllabic lengthening in Yurok (Algic) can survive the intrusion of an infix (Blevins 2014)
- Core implication: Morphophonology in the stem of infixation *precedes* infixation.

2.5 Surface phonology is lost under infixation

Baseline Surface phonology takes place under strictly local conditions

- E.g., in English, *l* and *n* assimilate to a following dental (θ , δ), (44a)/(45a)
- When something interferes between *l/n* and the dental, assimilation is *bled*, (44b)/(45b)

(44) a. u[n̩]-**thinkable**
b. u[n]-re**thinkable**

(45) a. mi[l̩] **theater**
b. mi[l]er **theater**

⇒ *What happens when the intervener is an infix?*

Movima (again) (language isolate of Bolivia; Haude 2006)

- The infix: Irrealis infix $-(k)a'$ -; placement: after first iambic foot (see §2.1)
- The (non-)interrupted relationship: Allophonic nasal assimilation
 - The phoneme *n* always assimilates to a following consonant with respect to place (H:34)
 - An environment where we can see this assimilation:
 - ◇ Nominal bases ending in a certain set of syllables (e.g., *wa*, *ra*, *di*, *ti*) take a “linking nasal” (underlyingly *n*) when followed by another morpheme (H:58-59):.

(46) a. maropa-[n̩]-di (papaya-LINK-grain) ‘papaya seed’
b. lora-[ŋ̩]-kwa (leaf-LINK-ABS) ‘leaf’
c. ariwa-[m̩]-mah (top-LINK-VLC) ‘to be on top’

→ When the irrealis infix intervenes between the nasal and a consonant it normally assimilates to, assimilation **is bled by infixation**, and underlying *n* surfaces instead.

(47) **-(k)a'**- (IRR) (H:81)
+ kweya-[m̩]-poy (woman-LINK-animal, ‘female animal’)
→ kweya-[n̩]<a'>-poy ‘there is no female animal’

Hunzib (again) (Northeast Caucasian; van den Berg 1995)

- The infix: Verbal plural infix $-á-$; placement: before the final consonant (see §2.2)
- The (non-)interrupted relationship: Vowel harmony
 - Recall the causative and verbalizer suffixes from §2.4 (modified for accuracy):
 - ◇ Causative $-k'(e)$
 - ◇ Verbalizer $-l(e)$
 - The quality of the final vowel (B:75):
 - ◇ Usually e , (48a)/(49a)
 - ◇ Harmonizes to ə when after a central non-low vowel ($i, \text{ə}$), (48b)/(49b)
 - ◇ Consistent with a language-wide generalization, that e never follows a central non-low vowel⁷

(48) a. $u\lambda'$ (end) + CAUS $\rightarrow u\lambda'-k'[\text{e}]$ ('make end')

b. ix (warm) + CAUS $\rightarrow ix-k'[\text{ə}]$ ('warm up')

(49) a. ek (fall) + VBZ $\rightarrow ek-l[\text{e}]$ ('let fall, drop')

b. ix (warm) + VBZ $\rightarrow ix-l[\text{ə}]$ ('warm oneself')

\rightarrow When the irrealis infix intervenes between the harmonizing suffix and the root vowel, vowel harmony **is bled by infixation**, and underlying e surfaces instead, (50).

(50) a. $ix-k'[\text{ə}]$ ('warm up') + VPL $\rightarrow ix\langle\grave{a}\rangle-k'[\text{e}]$

b. $ix-l[\text{ə}]$ ('warm oneself') + VPL $\rightarrow ix\langle\grave{a}\rangle-l[\text{e}]$

\Rightarrow *Infixes always disrupt surface phonology in their stems.*

- One other case in the sample: in Turoyo, shortening, feature-spreading, and vowel-lowering are all bled by infixation (Kalin 2020b)
- Core implication: Surface phonology applies only over a larger domain, and so does *not* take place in the stem of infixation, before infixation.

2.6 Interim summary

Core findings:

- Morphophonological, allomorphic, morphosyntactic, and semantic relationships/interactions survive infixation. Phonological relationships/interactions do not survive infixation.

Core implications:

- The relationships that feed or are a part of morphology, syntax, and semantics in the stem of infixation are established *prior to* infixation.
- Phonological relationships/interactions apply in the stem of infixation only *after* infixation.

⁷There is a single exception, the inchoative morpheme $-ke$ from §2.2, which resists harmony.

3 Implications

In this section, I'll explore implications of these findings for the timing/place of infixation in the grammar and for theories of exponence.

Two preliminary assumptions

1. Exponence is *realizational* (“late”)

- Realizational theories: The form of a word reflects meaning/features that are independently present/given. (\approx *features first*)
 - Paradigm Function Morphology (Stump 2001, 2016):
 - ◊ Words correspond to morphosyntactic property sets (paired with a root)
 - ◊ Realization is process-based (“inferential”); via Realization Rules
 - Distributed Morphology (Halle and Marantz 1993, 1994):
 - ◊ Words correspond to morpheme-based morphosyntactic structures (generally built around a root morpheme)
 - ◊ Realization is piece-based (“lexical”); via Vocabulary Insertion
 - And many more, e.g., Nanosyntax (Starke 2009), Consolidated Morphology (Bruening 2017), OT-DM combinations (Trommer 2001, Bye and Svenonius 2012, Rolle 2018)
 - vs. Incremental theories: The form of a word is tied directly to additive phonological pieces or processes that introduce meaning/features into the word. (\approx *form first*)
 - e.g., Lieber 1992, Wunderlich 1996, Collins and Kayne 2021
- There is abundant evidence for realizational over incremental models (see, e.g., Halle and Marantz 1993, Stump 2001, Kalin and Weisser 2021), especially:
- Many-to-one mappings of form to meaning/function (visible in suppletive allomorphy and extended/multiple exponence)
 - One-to-many mappings of form to meaning/function (i.e., underspecification)
 - Lack of the influence of form (phonology) on syntax (Zwicky and Pullum 1986)

2. Infixation is an aspect of exponence

- Kalin 2020a: In the usual case, the property of being infixal or not is a property of *individual exponents* (not the morphemes/features that they realize).
 - If a morpheme can be realized by multiple exponents (suppletive allomorphs), the property of being an infix (vs. not) nearly always varies across exponents
 - Typically, a given exponent is consistently an infix or consistently not an infix
 - Often, the infixal nature of an exponent is arbitrary, i.e., is not predicted on “optimizing” grounds (see also Blevins 1999, Yu 2007)

- Given that infixes are phonologically/prosodically-placed (see, e.g., Ultan 1975, Yu 2007), it must be that there is phonological/prosodic content for them to be placed *into*.

– This is only possible once exponence is underway.

1. + 2. = infixation is late (part of realization)

3.1 The broadest view

Inflection does NOT disrupt:

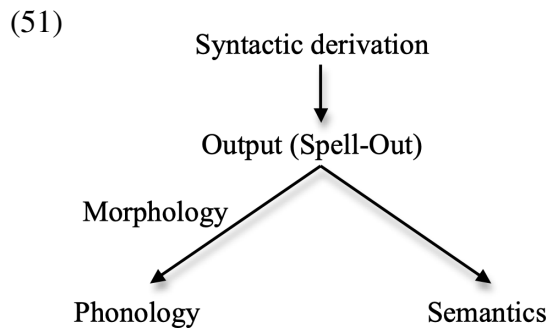
- Semantic composition (§2.1)
- Morphosyntactic relationships (§2.2)

⇒ Since inflection is an exponent-level property (see above and Kalin 2020a), this is good news under a realizational/late model of morphology! (phew)

Inflection can surface inside of constituents built by the (morpho)syntax, e.g., object incorporation structures, synthetic constructions that vary with periphrastic ones, compounds (§2)

- Syntax/morphosyntax *feeds* exponence/inflection

⇒ Naturally understood under a *post-syntactic* model of morphology, as represented in (51) (diagram from Bobaljik 2017):



→ Challenging for pre-syntactic models of morphology (e.g., Wunderlich 1996, Müller 2021)

3.2 The nature of exponence

Where we are: Inflection is a part of exponence, and is on the branch to Phonology in (51)

⇒ *But how does exponence itself proceed?*

Theories of exponence:

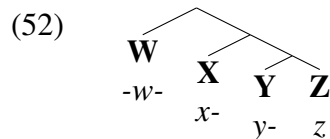
- Bottom-up exponence: Exponence starts from the most embedded component of a morphosyntactic structure or feature set (usually the root) and proceeds upward/outward

- PFM: Realization rules apply sequentially, in a particular order, inside out
- Some varieties of DM: Vocabulary insertion proceeds from the most embedded node upward (Bobaljik 2000, Embick 2010, Myler 2017)
- And other diverse theories, like that of Starke 2009, Bruening 2017, and Müller 2021
- Also essentially built into incremental theories, e.g., Lieber 1992, Wunderlich 1996
- Simultaneous exponence: Within a particular domain, exponence is simultaneous, realizing all morphemes/features in the domain at the same time
 - Popular within a number of OT-based models, e.g., Prince and Smolensky 1993, Mester 1994, Mascaró 1996
 - And argued for in some varieties/offshoots of DM: Svenonius 2012, Rolle 2018
- Hybrid model: Bottom-up insertion is possible (perhaps even default), but so is simultaneous or top-down/outside-in insertion
 - E.g., Carstairs 1990, Wolf 2008, and Deal and Wolf 2017

Infixation in a bottom-up exponence model

Take a structure like that in (52), where W is a morpheme that will be exponed by an infix -w-.

- Let's assume that -w-, when it infixes, can incidentally surface between x- and y-.



- Order of exponence (see Myler 2017):

- | | |
|------------|--------|
| 1. Z ↔ z | z |
| 2. Y ↔ y- | yz |
| 3. X ↔ x- | xyz |
| 4. W ↔ -w- | x<w>yz |

⇒ Predictions:

- Infixation of -w- will not interfere with exponence of X, Y, or Z, because they are all exponed before W is.
- There is the possibility for z, y-, and x- to interact (morpho)phonologically, because they are adjacent at some derivational stage / level of representation.

→ Crucially, these are the right predictions, as shown in §2.3 and §2.4

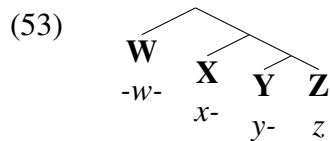
Infixation in a simultaneous exponence model

Under a simultaneous model, there are two possible ways to incorporate infixation, in terms of timing with respect to exponent choice:

- Infixation of an infixal exponent could be *simultaneous with* exponence (model A below)
- Infixation of an infixal exponent could be *after* exponence (model B below)

A. Infixation could happen alongside simultaneous exponence.

- The schematic structure again (W expounded by -w-, which can surface between x- and y-):



- Simultaneous operations/processes (all happening at the same time):
 - W, X, Y, Z are expounded as -w-, x-, y-, z
 - -w- is infixal, deriving $x<w>y$
- What this would mean: There is no point at which exponents are ordered in any other way than their surface order, $x<w>y$.

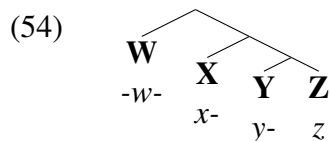
→ Predictions:

- x- and y- should not interact (morpho)phonologically in any capacity
- Suppletive allomorphy arising between X/x- and Y/y- should be disrupted by the infix

→ Both predictions are falsified by the present data (§2.3, §2.4).

B. Infixation could happen after simultaneous exponence.

- The schematic structure again (W expounded by -w-, which can surface between x- and y-):



- Sequence of operations:
 1. W, X, Y, Z are expounded as -w-, x-, y-, z all at the same time, deriving $wxyz$
 2. -w- is infixal, deriving $x<w>y$
- What this would mean: There is a point at which exponents are inserted and ordered in their *underlying order*, $wxyz$, prior to the intrusion of the infix.

- Predictions:
 - Some desirable payoff...
 - ◊ Infixation *won't* disrupt suppletive allomorphy (§2.3)
 - ◊ *x-* and *y-* *can* interact (morpho)phonologically (§2.4)
 - BUT, to achieve the above payoff, it must be that at least some (morpho)phonology can apply to the **wxyz** sequence prior to infixation of *-w...*
 - ◊ So *-w-* should be able to undergo (morpho)phonological changes (or trigger them) from its pre-infixation position.
- ⇒ **Not attested** (see, e.g., Yu 2007, Kalin 2020a)

The only model that accommodates findings about infixation is bottom-up exponence.

3.3 On the interaction of morphology and phonology

Where we've arrived:

- (i) A realizational theory
- (ii) Exponence/infixation are post-syntactic
- (iii) Exponence proceeds from the bottom up
- (iv) Some phonological interactions among morphemes (morphophonology) happen along the way, interspersed with exponence

The final piece:

- Surface phonology does *not* survive infixation (§2.5)
 - (v) Some phonological interactions are late, applying only over larger domains (not interspersed with exponent choice)
- ⇒ In line with models that posit a distinction between the timing of types of phonological processes, with some applying cyclically/early and others not (e.g., Kiparsky 1982, Booij and Rubach 1987, Stump 2001, Bermudez-Otero 2012, Inkelas 2014)

Putting it all together (and filling in some missing details based on Kalin 2020a)

Case study: Prosodically-conditioned exponent choice in Nancowry

- Recall the pattern (§2.3): There is prosodically-conditioned suppletive allomorphy of the causative, (55), that is not disrupted by the nominalizer infix, (56).

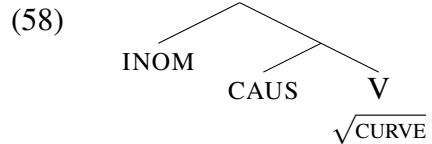
- (55)
- a. CAUS ↔ ha- / monosyllabic stems
 - b. CAUS ↔ -um- / disyllabic stems (placement: after first V)

(56) a. **-in-** (INOM) + ha-luan (CAUS-smooth) → h-<**in**>luan (‘thing used to smoothen’)

- Note that the nominalizer itself has two suppletive allomorphs (Kalin In press):

(57) a. INOM ↔ -an- / monosyllabic stems (placement: after first C)
 b. INOM ↔ **-in-** / disyllabic stems (elsewhere) (placement: after first V)

Step 1: Building the morphosyntactic structure



Step 2: Cyclic operations

(59) **Cycle 1**

a. Exponence: $\sqrt{\text{CURVE}} \leftrightarrow \text{kuãt}$ kuãt
 b. Cyclic (morpho)phonology: prosodification⁸ [_σ kuãt]

(60) **Cycle 2**

a. Exponence: CAUS ↔ ha- / __σ ha-[_σ kuãt]
 b. Cyclic (morpho)phonology: prosodification [_σ ha] [_σ kuãt]

(61) **Cycle 3**

a. Exponence (incl. infixation): INOM ↔ -in- / elsewhere [_σ ha]<in>[_σ kuãt]
 b. Cyclic (morpho)phonology: prosodification [_σ ha<in>] [_σ kuãt]

Step 3: Surface phonology

(62) Vowel hiatus resolution: [_σ hin] [_σ kuãt]

⇒ *This is the desired result, (56). Bottom-up exponence guarantees that suppletive allomorphy will survive infixation.*

4 Conclusion

In this talk, I have reported novel typological findings related to the transparency (or not) of infixes when they appear (incidentally) at a morpheme juncture in their stem.

- The relationships/interactions that *survive* infixation must be established prior to infixation (or stem from such relationships/interactions).
- The relationships/interactions that *do not survive* must be established after infixation.

⁸Evidence for cyclic (re-)prosodification comes from prosodically-conditioned suppletive allomorphy (like that found in Nancowry), as well as prosodically-placed infixes (like in Movima), cyclic stress placement, etc.

I have argued that the findings provide evidence for the following:

- (i) **the post-syntactic nature of morphology** (à la Halle and Marantz 1993, 1994)
- and (ii) **bottom-up exponent choice** (Bobaljik 2000, Embick 2010, Myler 2017, *i.a.*)
- that is (iii) **interleaved with (morpho)phonological processes**, but (iv) **not interleaved with surface phonology** (Kiparsky 1982, Booij and Rubach 1987, Stump 2001, Bermudez-Otero 2012, Inkelas 2014, *i.a.*)

⇒ **Of these, I take bottom-up exponence to be the central, most robust finding**

- There is converging evidence for bottom-up exponence from a variety of domains:
 - Phonologically-conditioned suppletive allomorphy is inwardly-sensitive (Carstairs 1987, 1990, Dolbey 1997, Paster 2006, Embick 2010, though cf. Anderson 2008, Svenonius 2012, Deal and Wolf 2017,⁹ Rolle and Bickmore 2020)
 - Infixation is only inward-looking/inward-displacing (Kalin 2020a)
 - Replacive grammatical tone can only be imposed inwardly (Rolle 2018)
 - Non-local phonological interactions are possible among certain morphemes in Mirror-Principle violating structures (Myler 2017)
- For future research: Given this converging evidence, and so assuming exponence indeed proceeds from the bottom up... how do we account for apparent exceptions?
 - Can insertion sometimes be top-down or simultaneous? (see, e.g., Deal and Wolf 2017)
 - Or is something else going on in these cases?
 - ◇ See Kalin 2020b for a morphosyntactic solution to an apparent exception in Turoyo
 - ◇ See Kiparsky to appear for a phonological solution to an apparent exception in Nez Perce

A final note:

- The findings here do not differentiate piece-based vs. process-based theories
- But, other typological results about infixation show the need for separating **concatenation** from **exponent choice**, and separating **exponent choice** from **infixation**, which is not easily accommodated in a PFM-based model.
 - *Feel free to ask me about this! And if you're interested, see Kalin 2020a.*
- Further, the case studies here do not support a differentiation of inflectional and derivational morphology, neither in terms of transparency in the stem nor in the behavior of infixes.
 - Surprising if there are fundamental differences between these types of morphology

⁹But, see Kiparsky to appear for a reply.

References

- Anderson, Stephen. 2008. Phonologically conditioned allomorphy in the morphology of surmiran (rumantsch). *Word Structure* 1:109–134.
- Bach, Emmon. 1974. *Syntactic theory*. New York: Holt, Rinehart & Winston.
- van den Berg, Helma. 1995. *A grammar of Hunzib (with texts and lexicon)*. Munich and Newcastle: Lincom Europa.
- 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 Studies in Theoretical Linguistics 41, 8–83. Oxford: Oxford University Press.
- Blevins, Juliette. 1999. Untangling Leti infixation. *Oceanic Linguistics* 38.
- Blevins, Juliette. 2005. Yurok verb classes. *International Journal of American Linguistics* 71:327–349.
- Blevins, Juliette. 2014. Infixation. In *The Oxford Handbook of derivational morphology*, ed. Rochelle Lieber and Pavol Štekauer. Oxford: Oxford University Press.
- 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.
- Bobaljik, Jonathan. 2017. Distributed Morphology. <https://oxfordre.com/linguistics>.
- Booij, Geert, and Jerzy Rubach. 1987. Postcyclic versus postlexical rules in lexical phonology. *Linguistic Inquiry* 18:1–44.
- Bruening, Benjamin. 2017. Consolidated morphology: A non-distributed, purely syntactic theory of morphology. Ms. University of Delaware.
- 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.
- Carstairs, Andrew. 1990. Phonologically conditioned suppletion. In *Contemporary morphology*, ed. Wolfgang Dressler, Hans Luschützky, Oskar Pfeiffer, and John Rennison, 17–23. New York: Mouton de Gruyter.
- Chafe, Wallace. 1970. *Meaning and the structure of language*. Chicago: University of Chicago Press.
- Choi, Jeahoon, and Heidi Harley. 2019. Locality domains and morphological rules. *Natural Language and Linguistic Theory* 37:1319–1365.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
- Collins, Chris, and Richard Kayne. 2021. Towards a theory of morphology as syntax. Ms. New York University.
- Costello, Nancy A. 1998. Affixes in Katu of the Lao P.D.R. *Mon-Khmer Studies* 28:31–42.
- Davis, Karen. 2003. *A grammar of the Hoava language, Western Solomons*. Pacific Linguistics, 535. Canberra: Australian National University.
- 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 Griбанова and Stephanie Shih, 29–60. Oxford University Press.
- Dolbey, Andrew. 1997. Output optimization and cyclic allomorph selection. In *Proceedings of the*

- 15th west coast conference on formal linguistics*, 97–112. CSLI.
- Embick, David. 2010. *Localism versus globalism in morphology and phonology*. Cambridge, MA: MIT Press.
- Embick, David, and Kobey Shwayder. 2018. Deriving morphophonological (mis)applications. In *From sounds to structures: Beyond the veil of maya*, ed. Roberto Petrosino, Pietro Cerrone, and Harry van der Hulst, 193–248. Mouton de Gruyter.
- Flora, Marie Jo Ann. 1974. Palauan phonology and morphology. Doctoral Dissertation, University of California San Diego, San Diego, CA.
- 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.
- Haude, Katharina. 2006. A grammar of Movima. Doctoral Dissertation, Radboud University of Nijmegen.
- Inkelas, Sharon. 2014. *The interplay of morphology and phonology*. Oxford: Oxford University Press.
- Jastrow, Otto. 1993. *Laut- und Formenlehre des neuaramäischen Dialekts von Midin im Ṭūr ‘Abdīn*, volume Semitica Viva 9. Wiesbaden: Harrassowitz Verlag.
- Josephs, Lewis. 1975. *Palauan reference grammar*. Honolulu: The University Press of Hawaii.
- Kalin, Laura. 2020a. Infixes really are (underlyingly) prefixes/suffixes: Evidence from allomorphy on the fine timing of infixation. Ms. Princeton University.
- Kalin, Laura. 2020b. Morphology before phonology: A case study of Turoyo (Neo-Aramaic). *Morphology* 30:135–184.
- Kalin, Laura. In press. When size matters in infix allomorphy: A unique window into the morphology-phonology interface. In *The size of things II: Movement, features, and interpretation*, ed. Sabine Laszakovitz and Zheng Shen, chapter 11. Berlin: Language Science Press.
- Kalin, Laura, and Ümit Atlamaz. 2018. Reanalyzing Indo-Iranian “stems”: A case study of adıya-man kurmanji. In *Proceedings of the first workshop on Turkish, Turkic and the languages of Turkey*, ed. Faruk Akkuş, İsa Kerem Bayırlı, and Deniz Özyıldız, 85–98. Amherst, MA: GLSA.
- Kalin, Laura, and Nicholas Rolle. 2021. Deconstructing subcategorization: Conditions on insertion versus position. Ms. Princeton University and ZAS Berlin.
- Kalin, Laura, and Philipp Weisser. 2021. Minimalism, morphology, and the lexicon: Then and now. Ms. Princeton University and Leipzig University, for the Cambridge Handbook of Minimalism.
- Kiparsky, Paul. 1982. Lexical morphology and phonology. In *Linguistics in the morning calm*, ed. The Linguistic Society of Korea, 3–92. Seoul: Hanshin Publishing.
- Kiparsky, Paul. to appear. Phonology to the rescue: Nez Perce morphology revisited. *The Linguistic Review*.
- Lieber, Rochelle. 1992. *Deconstructing morphology: Word formation in syntactic theory*. University of Chicago Press.
- Mascaró, Joan. 1996. External allomorphy as emergence of the unmarked. In *Current trends in phonology: Models and methods*, ed. Jacques Durand and Bernard Laks, 473–483. Salford, Manchester: University of Salford, European Studies Research Institute.
- Merchant, Jason. 2015. How much context is enough? Two cases of span-conditioned stem allo-

- morphy. *Linguistic Inquiry* 46:273–303.
- Mester, Armin R. 1994. The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12:1–61.
- Moravcsik, Edith. 2000. Infixation. In *Morphology: an international handbook on inflection and word-formation*, ed. Geert Booij, volume 1, 545–552. Berlin: Walter de Gruyter.
- Moskal, Beata. 2015. Domains on the border: Between morphology and phonology. Doctoral Dissertation, UConn, Storrs, CT.
- Müller, Gereon. 2021. *Inflectional morphology in harmonic serialism*. Sheffield, UK: Equinox publishing.
- Myler, Neil. 2017. Exceptions to the Mirror Principle and morphophonological ‘action at a distance’. In *The structure of words at the interfaces*, ed. Heather Newell, Máire Noonan, Glyne Piggott, and Lisa deMena Travis, 100–125. Oxford: Oxford University Press.
- O’Grady, William. 1998. The syntax of idioms. *Natural Language and Linguistic Theory* 16:279–312.
- Paparounas, Lefteris. 2021. Default by intervention: Allomorphy and locality in the Modern Greek verb. *Proceedings of the Linguistic Society of America* 6:499–513.
- Paster, Mary. 2006. Phonological conditions on affixation. Doctoral Dissertation, University of California, Berkeley.
- Prince, Alan, and Paul Smolensky. 1993. *Optimality Theory: constraint interaction in generative grammar*. Piscataway, NJ: Rutgers University Center for Cognitive Science.
- Radhakrishnan, Ramaswami. 1981. *The Nancowry word: phonology, affixal morphology and roots of a Nicobarese language*. Carbondale, Illinois: Linguistic Research.
- Rolle, Nicholas. 2018. Grammatical tone: Typology and theory. Doctoral Dissertation, University of California, Berkeley, Berkeley, CA.
- Rolle, Nicholas, and Lee S. Bickmore. 2020. Outward-looking phonologically-conditioned allomorphy versus first-last tone harmony in Cilungu. Ms. ZAS-Berlin and University at Albany.
- Starke, Michal. 2009. Nanosyntax: A short primer to a new approach to language. *Nordlyd* 36:1–6.
- Stump, Gregory. 2016. *Inflectional paradigms: Content and form at the syntax-morphology interface*. Cambridge: Cambridge University Press.
- Stump, Gregory T. 2001. *Inflectional morphology: A theory of paradigm structure*. Cambridge: Cambridge University Press.
- Svenonius, Peter. 2012. Spanning. Ms., University of Tromsø, CASTL.
- Trommer, Jochen. 2001. Distributed optimality. Doctoral Dissertation, Universität Potsdam.
- Ultan, Russell. 1975. Infixes and their origin. *Linguistic Workshop* 3:156–205.
- Van de Velde, Mark L. O. 2008. *A grammar of Eton*. Berlin/New York: Mouton de Gruyter.
- Wolf, Matthew. 2008. Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model. Doctoral Dissertation, University of Massachusetts Amherst.
- Wunderlich, Dieter. 1996. Minimalist Morphology: The role of paradigms. In *Yearbook of morphology 1995*, ed. Geert Booij and Jaap van Marle, 93–114. Dordrecht: Kluwer.
- Yu, Alan. 2007. *A natural history of infixation*. Oxford: Oxford University Press.
- Zwicky, Arnold, and Geoffrey K. Pullum. 1986. The principle of phonology-free syntax: introductory remarks. *OSU Working Papers* 32:63–91.