Deconstructing subcategorization: Conditions on insertion versus conditions on position

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Accepted at LI (pre-publication version, November 2021)

1 Introduction

The empirical contrast between infixation and suppletive allomorphy is deceptively straightforward to describe. Consider infixation of the Actor Focus exponent *um* in Chamorro: this exponent has a phonological condition on its realization, namely, that it must precede a vowel. When combining with a vowel-initial stem, *um* simply precedes the stem, (1a), but when combining with a consonant-initial stem, *um* must be realized inside the stem in order to satisfy this phonological condition, (1b).

(1) Infixation in Chamorro (Yu 2007, 89, citing Topping 1973, 185)

   a. V-initial stem: *um-epanglo* 'look for crabs' (root: *epanglo*)

   b. C-initial stem: *tr<um>isti* 'become sad' (root: *tristi*)

Now consider the third person possessor exponent *y* in Tzeltal: this exponent also has a phonological condition on its realization, also that it must precede a vowel. With a vowel-initial stem, *y* precedes this stem, (2a), just like *um* in (1a). But, whereas *um* in Chamorro is allowed to show up inside of its stem, (1b), *y* cannot, (2b); instead, a different exponent is chosen for non-vowel-initial stems, *s*.

(2) Suppletive allomorphy in Tzeltal (Paster 2006, 59, citing Slocum 1948, 80)

   a. V-initial stem: *y-ahwal* 'his ruler' (root: *ahwal*)

   b. C-initial stem: **m<y>ul* 'his sin' (root: *mul*) (cf. *s-mul*)

The *y/s* alternation in Tzeltal is a case of phonologically-conditioned suppletive allomorphy.

The question we raise in this squib is as follows. If Tzeltal *y* and Chamorro *um* both have the same (or at least a similar) phonological condition on their realization—they both must precede a vowel—why do the exponents behave differently? More specifically stated: why can *um* show up inside of its stem to satisfy the phonological condition on its realization, while *y* cannot? And more generally stated: what differentiates the behavior of infixes from that of suppletive allomorphs?

We entertain several possible answers, homing in on two hypotheses in particular: (i) an approach we refer to as *enriched subcategorization*, which takes there to be one mechanism governing both infixation and suppletion, with their differences coming from enrichments to the (single) condition on an exponent's realization, and (ii) an opposing approach we refer to as *split subcategorization*, which teases apart a mechanism governing infixation (a condition on an exponent's *position*) from one governing suppletion (a condition on the *choice/insertion* of an exponent). On the basis of a number of empirical and theoretical considerations, we argue for the latter approach: subcategorization must be deconstructed, even at the fine-grained level of interest here, regulating individual exponents.

In this squib, §2 offers a brief introduction to the concept of subcategorization, after which we present our split subcategorization proposal. §3 introduces a set of alternative approaches to the infixation/suppletion distinction, turning to an in-depth comparison in §4 of the split vs. enriched subcategorization approaches. Finally, §5 explores some implications of our findings.

2 Background and proposal

The mechanism of *subcategorization* has been used for decades to account for many sorts of idiosyncratic behaviors of lexical items, ranging from argument structure and syntactic complement selection to second positionhood and prosodic structure building (see, e.g., Chomsky 1965, 1981; Grimshaw 1979; Lieber 1980; Kiparsky 1982; Selkirk 1982; Inkelas 1990; Anderson 1992; Orgun 1996; Siddiqi 2009; Bennett et al. 2018; Sande et al. 2020). In this broad sense, subcategorization is used to specify what is required for the licit realization of a lexical item, i.e., what is "missing" in order for the lexical item to be (in some sense) licensed. We focus on the use of subcategorization for regulating the behaviors of *individual exponents* (a.k.a. morphs, vocabulary items), in particular for infixation and suppletion (see, e.g., Inkelas 1990; Halle and Marantz 1993; Paster 2006, 2009; Yu 2007). For now, we put aside the myriad other uses of subcategorization, though see the end of §5.

At the level of individual exponents, subcategorization has been used to subsume two particular types of restrictions that we'll be interested in here. The first type—which we henceforth refer to as Conditions on Insertion (COINs)—determine *whether* an exponent is allowed to be chosen/inserted in a given environment. Subcategorization frames that impose a COIN are employed for suppletive allomorphy, as well as some cases of morphological compatibility and gaps (see, e.g., Lieber 1980; Jensen 1990; Booij and Lieber 1993; Halle and Marantz 1993, 1994; Booij 1998; Bobaljik 2000; Paster 2005, 2006, 2009; Bye 2008; Hannahs 2013; Harley 2014; McPherson 2014, 2019; *i.a.*). The second type—Conditions on Position (COPs)—regulate *where* an exponent must be positioned relative to a (phonological or prosodic) pivot.[1] Subcategorization frames that impose a COP are used primarily for infixation (see, e.g., Kiparsky 1986; Inkelas 1990; Cohn 1992; Blevins 1999; Yu 2003, 2007). Given that the same machinery (subcategorization) with the same scope (over individual exponents) has been used for both suppletion and infixation, a natural question that arises is whether COINs and COPs are fundamentally the same mechanism or whether they are two different mechanisms.

Our proposal is that COINs and COPs are two formally distinct mechanisms, universally ordered with respect to each other, with COINs taking precedence over COPs. As noted in the introduction, we refer to this approach as *split subcategorization.* COINs are evaluated at the point of choosing an exponent to realize a morpheme, and they place an environmental pre-condition on the insertion of a particular exponent. COPs are evaluated at a derivationally later point and (unlike COINs) can compel displacement of an exponent to satisfy the condition. Speaking in these terms, the difference between Chamorro *um*, (1), and Tzeltal *y*, (2), is as represented in (3).[2]

(3) Split subcategorization restrictions

a. [AF] : *um* / COIN: none; COP: __V (Chamorro)

b. [3POSS] : *y* / COIN: __V; COP: none (Tzeltal)

What (3a) states is that *um* can be inserted with any stem (it has no COIN), but it must end up linearly preceding a vowel. On the other hand, (3b) states that *y* can only be inserted when it combines with a vowel-initial stem, and has no displacement (infixal) properties (it has no COP).

[1] We have adapted this *whether*/*where* framing from Paster (2009, 19-20).

[2] We adopt a simple notation for introducing exponent-specific subcategorization frames, schematized in (i).

(i) [MORPHOSYNTACTIC FEATURE] : *exponent* / CONTEXT__CONTEXT

Whether this is the best way to represent subcategorization frames is an issue outside of the scope of this squib.

We are not the first to propose a split among sub-types of subcategorization. Some kind of split has been argued for in a variety of works, e.g., "passive subcategorization" vs. "active subcategorization" (Inkelas 1990), "anchoring" vs. "selection" (Bye 2008), "linear distribution" vs. "allomorphic selection" (Yu 2017). The split we argue for is not identical to that made in any of these proposals. Still, it should be noted that the COIN/COP split we argue for is *assumed* in much work in Distributed Morphology and related approaches (e.g., Halle and Marantz 1993; Embick 2010; Bye and Svenonius 2012), encoded in the distinction between Vocabulary Insertion (where COINs are evaluated) and later (morpho)phonological operations (where we propose COPs to be evaluated).

Before wrapping up this section, we want to clarify an assumption we make under the split subcategorization approach: neither COINs nor COPs are responsible for generating the *underlying* exponent order, including whether an affix precedes its stem, as a prefix, or follows its stem, as a suffix. We assume that the basic linearized order of exponents is established independently from *and prior to* both COINs and COPs. That said, we leave open the question of exactly what mechanisms come into play in establishing this prior ordering—it may be that this order is read directly off the syntax (*à la* Kayne 1994; Bye and Svenonius 2012), is due to parameterization of head ordering (*à la* Harley 2011), or is established (or at least can be manipulated) early in the morphology (*à la* Embick and Noyer 2001; Arregi and Nevins 2012). The focus of this squib is on idiosyncratic properties of individual exponents, not on regular, class-based behavior—and basic linear order is typically a property of (classes of) *morphemes*, not individual exponents.[3] At the end of §5, we turn to more specific evidence for separating COINs/COPs from basic linear order, based on Kalin 2021a.

3 Alternative accounts

There are several ways to approach infixation and suppletive allomorphy that (unlike split subcategorization, §2) do not take them to result from two distinct mechanisms.[4]

[3] In cases of so-called 'mobile affixation'—where an exponent sometimes precedes and sometimes follows its stem—position change does not feed or co-vary with exponent choice. We thus assume that whatever drives mobile affixation is not part of basic linear ordering, and is (at least potentially) separate from both COIN and COP evaluation.

[4] An alternative we do not discuss in this section, suggested to us by Michal Starke (p.c.), is that it may merely be the existence of a competitor exponent (as is the case for Tzeltal *y* in (2), which has the competitor *s*) vs. the absence of a competitor exponent (as is the case for Chamorro *um* in (1)) that determines whether infixation is allowed, with infixation possible just in case there is no relevant competitor.

However, it is well-documented that an exponent may be prosodically/phonologically circumscribed and also not have a systematic competitor, yet still not be allowed to be an infix. In Maori, for example, the imperative is exponed as *ee* with bimoraic verbs, and is simply unexpressed with longer verbs (McCarthy and Prince 1993a, 116, who cite Hohepa 1967, 19). See also McCarthy and Prince (1993a) on Kinande, and Carstairs-McCarthy (1998) on English and Classical Attic Greek. In §4, we will see several more reasons for teasing apart infixation (being allowed to appear inside a stem) from suppletive allomorphy (having a competitor exponent) as orthogonal conditions.

One potential way to regulate suppletive allomorphy vs. infixation is to appeal to optimization: when infixation will produce a phonotactically well-formed/better output, then an exponent is allowed to be infixal, but when it will produce an ill-formed/worse output, then there is suppletive allomorphy (or perhaps a morphological gap) instead. Such an account would point to the ill-formedness of **m<y>ul*, (2b), as due to a phonotactic problem—this phonotactic problem both prevents *y* from infixing, and stops *y* from appearing prefixally on consonant-initial stems (**y-mul*). However, an account of the infixation/suppletion distinction on purely phonotactic grounds is ultimately untenable—it is well-attested that infixation can be non-optimizing and even anti-optimizing (see, e.g., Blevins 1999; Yu 2007; Kalin In press); infixation is *not* generally blocked by creating a phonotactically ill-formed output. As an illustration of this, consider the fact that it is quite common for infixes to create phonotactic problems that then need to be repaired, e.g., see the glide insertion involved in Hunzib infixation in §4.3 (and for many more cases, see Yu 2007 and Kalin 2021a).

An optimization-based account that is supplemented with certain types of morphological and morphophonological constraints provides a more suitable toolset. For example, McCarthy and Prince (1993a, 120) propose a typology that emerges from three types of constraints, given in (4) (adapted):

(4) a. Edgemostness: An affix should be realized at X edge of the stem (X = left or right)
b. Align-Affix: An affix should be realized at X edge of Y pivot (X = left or right, and Y = a particular phonological/prosodic category)
c. M-Parse: Outputs must be morphologically parsed (i.e., must not be unjoined sets)

Edgemostness compels the prefixal or suffixal positioning of a particular exponent, while an exponent subject to an Align-Affix constraint may exhibit infixal or suppletive behaviors. M-Parse militates against the "Null Parse" (failed output). If both Align-Affix and M-Parse dominate Edgemostness, then infixation will be allowed, because the requirements—to (i) align an affix with respect to a phonological/prosodic pivot and (ii) have a successful morphological parse—are more important than realizing the affix at the edge. This would be the case for Chamorro *um*, (1b). If Edgemostness and Align-Affix dominate M-Parse, then the failure to satisfy both positional requirements simultaneously—being at a particular edge *and* orientation with respect to a pivot—can result in a Null Parse, i.e., a gap, which may or may not be filled by a different (suppletive) exponent. For Tzeltal, *y* would be subject to Edgemostness(Left) as well as an

Align-Affix constraint requiring it to precede a vowel; when *y* combines with a vowel-initial stem, both constraints are simultaneously satisfied, but when the stem is consonant-initial, *y* is not allowed to appear at all, (2b). A similar sort of typology is suggested by Yu (2007), but with infixation blocked in Tzeltal-like cases by a high-ranked constraint enforcing non-interruption of morphological constituents (in place of the Edgemostness constraint). Under both types of accounts, a single Align-Affix constraint has a COIN or COP effect depending on relative constraint rankings.

A third possibility is what we referred to in the introduction as the enriched subcategorization model. Under such a model, infixation and suppletive allomorphy are differentiated using frames enriched with elements like stem boundaries and optional segments (see, e.g., Inkelas 1990; Blevins 1999; Paster 2006; Papillon 2021). Such accounts could model Chamorro *um* vs. Tzeltal *y* as in (5):

(5) a. [AF] : *um* / $[_{STEM}$ (C)(C)__V ...] (Chamorro)

b. [3POSS] : *y* / __$[_{STEM}$ V ...] (Tzeltal)

Since *um*'s frame permits it to appear inside of its stem (after one or two Cs), this exponent may be an infix, while *y*'s frame requires it to appear at the leftmost edge. Similar to the optimality-based accounts, there is no COIN frame distinct from a COP frame; rather, a frame will have a COIN and/or COP *effect* depending on aspects of the frame's enrichments. Note that it is inescapable in the enriched subcategorization model that frames *also* specify the prefixal/suffixal nature of an exponent, unlike what we assume for the split subcategorization model (see end of §2).

Since the optimality-based accounts and enriched subcategorization are similar in their predictions, but the latter is more notationally similar to our approach, we focus on the latter for comparing to split subcategorization, §4. We briefly note the implications for optimality-based accounts in §4.5.

4 Comparing split and enriched subcategorization

In this section, we pit split subcategorization against enriched subcategorization, restated in (6) and (7) to clarify how they treat Conditions on Insertion (COINs) and Conditions on Position (COPs).

(6) **Split subcategorization:** An exponent may be subject to a COIN and/or a COP, which are two distinct types of subcategorization condition.

(7) **Enriched subcategorization:** An exponent may be subject to a single subcategorization condition, which may be enriched in different ways to produce a COIN and/or COP effect.

We leverage four arguments for split subcategorization over enriched subcategorization, in (8):

(8) a. **Condition content**: COINs and COPs display distinct typological profiles; only COINs can refer to specific phonological segments/features and to idiosyncratic classes of roots.

b. **Elsewhere exponents**: Collapsing COINs and COPs sacrifices the true elsewhere distribution of an 'elsewhere' exponent in cases of infixation.

c. **Condition complexity**: By separating COINs and COPs, both types of conditions can be stated simply, locally, and non-disjunctively.

d. **Ordering effects**: A typological gap in infixal allomorphy reveals that COINs are satisfied at a derivationally earlier point than COPs (i.e., they do not apply simultaneously).

The following subsections take up each of these arguments in turn.

4.1 Argument 1: The content of subcategorization frames

We know from Chamorro and Tzeltal, (1)–(2), that COINs and COPs can refer to at least some of the same types of elements in their frames, namely, the vowel/consonant distinction. However, the overlap is not complete—COINs and COPs have different typological profiles as to the substance of their frames, both with respect to phonology and morphosyntax. We do not attempt to exhaustively differentiate the frames of COINs and COPs, but rather, we highlight two major, well-documented differences: (i) COINs can refer to specific segments and fine-grained phonological features, whereas COPs cannot, and (ii) COINs can refer to an idiosyncratic class of roots, whereas COPs cannot.

We'll start by examining the phonological frames of COPs more closely. Recall that the core outcome of a COP is infixation. Yu (2003, 2007) establishes two common crosslinguistic classes of infixal "pivots" (building on Ultan 1975; Moravcsik 1977; *inter alia.*), shown in Table 1. Five phonological elements are relevant: C, V, syllable, foot, and stress. Noticeably absent are numerous additional logical possibilities, notably pivots that involve specific segments or fine-grained phonological features, like [p], [+NASAL], or [−SONORANT] (Yu, 2007, 218ff.). In such a hypothetical case, an exponent would position itself relative to, e.g., the first [+NASAL] segment in its stem.

COINs seem to be able to subcategorize for all the same phonological elements as the COPs

Table 1: Infixal subcategorization (Yu 2007, 67; parentheses = uncommon)

Edge pivots		**Prominence pivots**
First consonant	(Last consonant)	Stressed foot
First vowel	Last vowel	Stressed syllable
(First syllable)	Last syllable	Stressed vowel

above, but in addition, COINs *can* refer to specific segments and phonological features. It is easy to find such examples of segment-conditioned allomorphy. Consider the causative suffix in Turkish (Paster 2006, 55, who cites Lewis 1967; Haig 2004): this suffix has two suppletive allomorphs, *-t* and *-DIr*. The exponent *-DIr* is the elsewhere allomorph, while *-t* appears following polysyllabic stems that end in a vowel, /r/, or /l/, as seen in, e.g., *bekle-t* 'wait-CAUS' ('cause to wait') and *ye-dir* 'eat-CAUS' ('feed'). For many more examples of phonological features and prosodic elements determining allomorphy, see Paster (2005, 2006, 2009).[5]

The asymmetries between COINs and COPs extend beyond phonology, and we briefly mention one such case. COINs commonly subcategorize for a particular root or list of roots, e.g., participle marking in English, which is idiosyncratically *-(e)n* for an arbitrary list of roots (*beat*, *give*, *take*, etc.), but is exponed as *-(e)d* elsewhere. We know of no COPs that subcategorize for a particular root (or list of roots), i.e., where the root (or class of roots) serves as a *pivot* for infixation. In such a hypothetical case, an exponent would require left- or right-adjacency with a particular root (or idiosyncratic class of roots), thereby displacing inside a given morphosyntactic domain until the exponent sits in the specified position (preceding or following) with respect to the root.[6]

Under a split subcategorization approach—especially one where COINs derivationally precede COPs (as we'll argue in §4.4) and so potentially interface with different types of representations—it is natural that the substance of COIN and COP frames could differ. An enriched subcategorization approach, in contrast, predicts the content of the restrictions to fully overlap, counter to fact.

[5]This assumes that cases of so-called 'melody'-conditioned allomorphy should truly be analyzed as suppletive. For an alternative involving single underlying representations with floating 'rescue segments', see Scheer 2016.

[6]Importantly, this hypothetical does *not* describe certain well-known patterns in the literature that involve affix position interacting with a restricted set of roots. One such pattern is found in Dakota (Boas and Deloria 1941; Yu 2007), where subject markers are prefixes with one class of roots (e.g., *wa-nuni*, 1SG-be.lost), but are infixes with another class (e.g., *ma<wa>ni*, <1SG>walk). The (non-)infixal behavior of the subject marker is dictated by the root, and all subject markers pattern the same with a given root. Therefore, this cannot be determined by an exponent-specific COP, but rather must be attributed to some property of the roots involved, perhaps along the lines of splitting verbs (Awobuluyi 1971) or bipartite stems (DeLancey 1996). Other patterns of position/root interaction are found with 'mobile affixation' (e.g., Noyer 1993), where the position of an exponent depends on the *phonological* form of the root, and in cases where an affix must appear strictly root-adjacent. Neither type of example involves a lexically idiosyncratic set of roots; we do not speculate here about the best way to deal with such cases (cf. fn. 3).

4.2 Argument 2: The elsewhere distribution

A second difference emerges between enriched and split subcategorization in terms of how a productive elsewhere distribution is modeled for an infix. We illustrate this with two case studies.

In Bahnar (Banker, 1964; Banker et al., 1979), an Austroasiatic language of Vietnam, the nominalizer has two suppletive allomorphs, described theory-neutrally in (9), and exemplified in (10).

(9) Bahnar nominalization

a. *bơ* : appears with *m*-initial stems; prefixal

b. *ơn* : appears with all other stems (elsewhere); infixal (after first C)

(10) a. NOM + muih → bơ-muih 'field in the woods'

b. NOM + tăr → t<ơn>ăr 'woven bamboo'

The nominalizer is realized as a prefix, *bơ*, with stems that begin with *m*, and as an infix, *ơn*, after the first consonant with all other stems (i.e., elsewhere).

The Bahnar nominalizer allomorphs are characterized differently under the two competing models we're considering, (11)–(12). Split subcategorization separates exponent choice (encoded with a COIN) from infixation (encoded with a COP), while enriched subcategorization collapses them.

(11) Split subcategorization approach to Bahnar nominalization

a. [NOM] : *bơ* / COIN: __m; COP: none

b. [NOM] : *ơn* / COIN: none; COP: C__

(12) Enriched subcategorization approach to Bahnar nominalization

a. [NOM] : *bơ* / __ $[_{STEM}$ m ...]

b. [NOM] : *ơn* / $[_{STEM}$ C__ ...]

Under split subcategorization, (11), the COINs specify that *bơ* is inserted only when it precedes an *m* and that *ơn* is inserted elsewhere; the COPs specify that *bơ* is not an infix (no COP), and that *ơn* is an infix that goes after a consonant. Recall from §2 that the split subcategorization approach assumes that there is a prior established linear order of the morphemes (separate from COINs and COPs), which here would be that the nominalizer precedes its stem. Thus, the environment relevant for COIN evaluation is the left edge of the stem, and the infixal exponent will also look from this edge to find the closest matching pivot (a consonant). In contrast, under enriched subcategorization, (12), all of this information is encoded in a bundle, requiring *bơ* to be at the left edge of an *m*-initial stem, and *ơn* to follow the consonant at the left edge of a consonant-initial stem.

A close examination of the frames in (11) and (12) reveals a fundamental difference between between the approaches with respect to 'elsewhereness'. Under split subcategorization, (11), *ơn* combines with all non-*m*-initial stems by virtue of having no COIN at all; in other words, *ơn*'s elsewhere distribution falls out from the *lack* of any COIN specification, and as such is a 'true' elsewhere allomorph. Under enriched subcategorization, there is no true elsewhere allomorph in this sense. Instead, as seen in (12), both allomorphs specify some set of stems in the lexicon which they are compatible with, and it is the relative specificity of *m* (in *bơ*'s subcategorization frame) over C (in *ơn*'s subcategorization frame) that determines the broader distribution of *ơn*, assuming some version of the Elsewhere Principle. Since all stems in Bahnar are C-initial, *ơn* will effectively have an elsewhere distribution, as its subcategorization frame is compatible with all stems. But, the cost of enriched subcategorization should be apparent: the frame for an infixal exponent needs to redundantly encode lexicon-wide phonological properties if the infix has an elsewhere distribution.

More generally speaking, under an enriched subcategorization model, the frame of an infix needs to specify the pivot/placement of the infix while *also* specifying any segments that may be present between the stem edge and the infix. Consider, for example, the proposed enriched frame for the nominalizing infix *-ni-* in Leti (which combines with "Class II" verbs), shown in (13):

(13) $[\text{NOM}] : ni \ / \ [_{STEM,CL.II}\ (\text{C})\_\_\text{V}...\ ]$ (adapted from Blevins 1999, (10))

What this frame states is that *ni* must be placed before a V (this is the infixal pivot) that is either at the left edge of its stem, or separated from the edge by a single C (and, the stem must be of Class II). This frame is consistent with all relevant stems, because all Class II verbs begin with V or CV. Just like for Bahnar *ơn*, an enriched subcategorization frame for *ni* in Leti needs to (redundantly) encode phonological facts, in this case about a class of verb stems. (Note that beginning with V/CV crucially does not *determine* membership in this class.) Under a split subcategorization model, *ni* would simply have two separate frames, a COIN restricting *ni* to appearing with Class II verbs, and a COP telling *ni* to go before a vowel; there is no specification of intervening edgemost segments.

The discussion above compared split and enriched subcategorization in terms of the nature of elsewhere distributions for infixes. Under split subcategorization, there can be infixes that are true elsewhere exponents—they have no constraints on their insertion. Under enriched subcategorization, the collapsing of conditions on insertion and position means that there is never a true elsewhere infix in the sense of *lacking* a subcategorization restriction; rather, the elsewhere distribution falls out from relative specificity of frames and the inclusion of all possible segments that may intervene between an infix and the stem edge.

The way that enriched subcategorization frames characterize elsewhere infixes is problematic for two reasons. First, it is redundant. Infixes are generally "edge-oriented" (Yu, 2007): an infix will appear as close to the edge as possible while still satisfying its pivot/placement.[7] The phonotactics of the language determines what can appear between an infix and the stem edge, i.e., this does not need to be specified in subcategorization frames. Second, the fact that optional intervening segments *are* included in enriched frames enables the formulation of frames that describe unattested infix distributions. For example, we might expect to find an infix that goes after an initial C *or* CV:

(14) Hypothetical enriched subcategorization frame: $[_{STEM}$ C(V) ___ ...]

To our knowledge, no infix has this type of variable distribution, without a consistent pivot. (For reference, see the list of infixal pivots in Table 1, and for comparison, see the superfically very similar enriched frame for Hunzib's infix in §4.3 below.) To rule out enriched frames like those in (14), there would need to be stipulated constraints on the location and nature of optional segments. Under a split subcategorization model, no such frames are predicted to exist: infixation is accounted for without specifying optionally-present intervening segments, and the elsewhere distribution is captured by the absence of a COIN. Predictions related to condition complexity are taken up further below.

4.3 Argument 3: Condition complexity

Our third argument for split subcategorization comes from comparing the relative complexity of subcategorization frames across approaches, in particular in terms of locality and disjunctiveness.

The discussion here will anchor around the Northeast Caucasian language Hunzib (van den Berg, 1995; Kalin, 2021b). In Hunzib, the verbal plural morpheme has two suppletive forms, (15)–(16).[8]

[7] Note that a small class of infixes are 'prominence-oriented', but this does not impact the conclusions here.

[8] In the example words in (16), two phonological processes are at play: the final vowel is shortened after suffixation of *-baa* due to stress shift, and a glide may be inserted before the infix to break up vowel hiatus. Also, while the examples given for the exponent *á* do not conclusively show that this infix goes before the final consonant of the stem,

(15) Hunzib verbal plural (van den Berg, 1995, 81-83)

a. *baa* : appears with stems that end in a long vowel; suffixal (16a)

b. *á* : appears with all other stems (elsewhere); infixal (before final C) (16b,c)

(16) a. ʔãqaa + VPL → ʔãqa-baa 'be thirsty (pl)' (van den Berg, 1995, 283)

b. ek + VPL → e<yá>k 'fall (pl)' (van den Berg, 1995, 81)

c. ɑhu + VPL → ɑ<á>hu 'take (pl)' (van den Berg, 1995, 284)

As shown above, *baa* is a suffix on long-vowel-final stems, and *á* (underlyingly stressed) is the elsewhere exponent, an infix that goes before the final consonant of the stem.

Split and enriched subcategorization offer different characterizations of this pattern, (17)–(18).

(17) Split subcategorization approach to Hunzib verbal plural marking

a. [VPL] : *baa* / COIN: Vː__; COP: none

b. [VPL] : *á* / COIN: none; COP: __C

(18) Enriched subcategorization approach to Hunzib verbal plural marking

a. [VPL] : *baa* / [$_{STEM}$ ... Vː]__

b. [VPL] : *á* / [$_{STEM}$ ... __ C(V)]

The split subcategorization approach models the elsewhere distribution of *á* through the absence of a COIN, and its infixal positioning by a simple, locally-stated COP, requiring left-adjacency with a consonant. Recall again that the split approach assumes that morphemes have a linearized order prior to exponence (see discussion at end of §2), which would be the right edge of the stem for the verbal plural; *á* minimally displaces from the right edge to a position where its COP is satisfied. The enriched subcategorization approach has no formal elsewhere (see §4.2), but rather *baa* is compatible with one set of stems (those that end in a long V) and goes after such stems, while *á* is compatible with another set of stems (those that end in a C or short V) and is an infix in those stems.

Several considerations come into play in evaluating the two approaches to Hunzib. With a COIN/COP split, (17), all subcategorized elements can be stated both simply (no optional segments, no stem edges, cf. §4.2) and purely locally—insertion (via the COIN) is conditioned by an immediately adjacent segment, the long vowel, and infixation (via the COP) is determined under

the larger data set available in van den Berg (1995) confirms this. See also Yu 2007, 129-130, and Kalin 2021b.

adjacency as well, necessitating an immediately-following consonant. If the COIN and COP are conflated, (18), the conditions are more complex and they encode both non-locality and disjunctiveness. For choosing *á* over *baa*, the nature of the final segment matters, and this final segment is not always immediately local to the exponent; this can be seen in particular in cases with a final short vowel, like *a<á>hu*, (16c), where the conditioning segment (the stem-final short vowel) is not immediately local to the infix (before the final consonant). Alongside non-locality comes the disjunctive environment, as the frame in (18b) states that *á* is inserted just in case one of two stem-forms holds: the stem ends in a C or CV. Disjunctivity is required because enriched subcategorization needs to express a negative condition—*á* must appear with all stems that *do not* end in a long vowel (i.e., that end with any other phonotactically-allowed sequence). By separating COINs and COPs, the split approach needs neither non-locality nor disjunctiveness, nor the sort of redundancy of §4.2.

4.4 Argument 4: Ordering effects

A final argument for splitting COINs from COPs comes from a recent typological result. Examining 32 cases of suppletive allomorphy involving an infix, Kalin (2021a) finds that suppletion is *never* conditioned by material that is local to an infix only in the surface, post-infixation environment. In other words, the choice among suppletive allomorphs is never made based on an infix's surroundings in its infixed position, but rather always at the stem edge; this is consistent with both Hunzib and Bahnar above, where exponent choice is governed by an edgemost segment. This suggests that COINs are evaluated based on a distinct, pre-infixation (i.e., pre-COP), edgemost environment.

To illustrate, consider the hypothetical enriched subcategorization frames in (19), modeled on variations on ingredients from the enriched frames for exponents in Bahnar, Hunzib, and Leti:

(19) Hypothetical enriched subcategorization frames

a. [$_{STEM}$ (C)V__m ...]

b. [$_{STEM}$ ... Vː__C(V)]

These frames both impose some additional constraint on an infixal exponent based on its surroundings in its infixed position, beyond the usual 'pivot' (see Table 1). An exponent with the frame in (19a) will only be compatible with stems where it can infix after the first vowel and (in that position) immediately precede *m*. The frame in (19b) requires that an exponent be infixed before the final consonant, but only if in that infixed position the exponent will follow a long vowel. Kalin's (2020a) findings are that such exponent distributions are unattested.

In contrast to the enriched model, the split subcategorization model does not predict any such unattested exponent distributions. In particular, if insertion (via COINs) is separate from and determined before infixed position is determined (via COPs), then it is completely natural that exponent choice should not be able to be impacted by the post-infixation surroundings of an exponent—simply put, the exponent is not yet in an infixal position at the point of COIN evaluation.

4.5 Interim summary and comments

In this section, we have compared split and enriched subcategorization on a number of fronts. We showed that enriched subcategorization has a number of shortcomings: it doesn't predict differences between the substance of COIN and COP frames (§4.1), it may require encoding redundant segments, non-local conditioning environments, and disjunctive environments (§4.2-3), and it predicts a range of exponent distributions that are unattested (§4.2, §4.4).

Optimality-based accounts of suppletion and infixation (see §3) have some of the same shortcomings. In particular, optimality-based accounts predict identical COIN/COP substance (contra the findings in §4.1), and they predict simultaneous evaluation of insertion and position conditions, such that the infixed environment should be able to factor into suppletive exponent choice (contra the findings in §4.4). See Kalin 2021a for more reasons to doubt such approaches to these phenomena.

Split subcategorization fares better than enriched subcategorization as well as optimality-based approaches, and we therefore conclude that this is the model to be preferred—subcategorization at the exponent level must be decomposed into separate conditions regulating exponent choice (COINs) versus those regulating exponent position qua infixation (COPs).

5 Implications

In this squib, we have proposed that subcategorization at the exponent level be deconstructed into (at least) two distinct conditions/mechanisms. We summarize our proposal in (20).

(20) **Split subcategorization:** An exponent may have a condition on its insertion (a COIN) and/or a condition on its position (a COP), which (i) are formally independent of one

Table 2: COIN and COP typology of conditions on exponents

		Has a COP?	
		YES	NO
Has a COIN?	YES	Nancowry INOM *in*	Hunzib VPL *baa*
	NO	Chamorro AF *um*	English PL *z*

another, (ii) operate over an overlapping but distinct set of primitives, and (iii) are ordered with respect to each other—COINs are satisfied before COPs.

The first condition—the COIN—applies early, presumably at or soon after the spell-out of syntax, and governs suppletive exponent choice. The second condition—the COP—applies at a later point, and governs manipulations of exponent position, i.e., infixation.

This proposal predicts a two-by-two typology of COIN and COP configurations for a given exponent, given in Table 2. Two of the cells (having just a COIN, or having just a COP) are instantiated in the case studies above. It's also possible for an exponent to have neither a COIN nor a COP, as is the case for any elsewhere exponent that is non-infixal, like English plural suffix -*z*. It should also be possible according to our proposal for a single exponent to have both a COIN and a COP, and indeed this is borne out, as discussed below.

In Nancowry, an Austroasiatic language of the Nicobar islands, India (Radhakrishnan 1981; Kalin In press; also briefly discussed in Paster 2006), there are several cases of allomorphy that are sensitive to stem size. Of interest here is the instrumental nominalizer (INOM), which is exponed as *in* with disyllabic stems and *an* with monosyllabic stems. Additionally, both exponents are infixes:

(21) Nancowry instrumental nominalizer (Radhakrishnan, 1981; Kalin, In press)

a. *in* : appears with disyllabic stems; infixal (after first C; first V deletes) (22a)

b. *an* : appears with monosyllabic stems; infixal (after first C) (22b)

(22) a. INOM + kurus (scratch) → k<in>rus 'a rake'

b. INOM + top (file) → t<an>op 'a file'

Under our approach to subcategorization, this exponent alternation could be modeled as in (23):[9]

[9]There are other logically-possible ways to work out the details here, e.g., with respect to which of these exponents is the elsewhere, and whether it is syllable count they are sensitive to directly rather than foot size. However, none of this would change the fact that one of the exponents must have both a COIN and a COP.

(23) Split subcategorization approach to Nancowry instrumental nominalization

a. [INOM] : *in* / COIN: __$\text{Ft}_{\sigma\sigma}$; COP: V__

b. [INOM] : *an* / COIN: none; COP: C__

The exponent *in* is (by its COIN) constrained to appearing before a disyllabic foot, and has as its infixal pivot the first vowel (its COP). Following Kalin (In press), we assume that this pivot vowel disappears because of a ban on hiatus in unstressed syllables in Nancowry; in other words, *k<in>rus* from (22a) has an intermediate form *ku<in>rus*, where the COP of *in* is transparently satisfied. The exponent *an* appears elsewhere (has no COIN), and has a simple post-consonantal distribution (per its COP). The Nancowry nominalizer exponent *in* fills the last cell in Table 2.

The split subcategorization proposal has a number of implications for the architecture of the morphosyntax-phonology interface. Regardless of their absolute timing, it must be that COINs hold at a derivationally earlier point than COPs. Our proposal thus requires an intermediate level of representation after syntax but before phonology. Therefore, a parallel P-with-M model (e.g., McCarthy and Prince 1993b,a; Mester 1994; Kager 1996; Mascaró 1996, 2007; Hyman and Inkelas 1997; Tranel 1998; Horwood 2002; Bonet 2004), whereby morphological and phonological constraints are evaluated at once, is insufficient. Our proposal also supports models which deny a role of surface optimization in dictating allomorph choice (in line with, e.g. Halle and Marantz 1993; Paster 2006; Bye 2008; Embick 2010; Bye and Svenonius 2012; Kalin 2020; Rolle 2021; *inter alia*), and equally, it counters those which allow it (e.g., Lapointe 2001; Bermúdez-Otero 2016; de Belder 2020).

Finally, to wrap up this squib, we want to zoom out to a wider perspective on subcategorization. As noted at the outset of §2, subcategorization is used for a wide variety of phenomena apart from suppletive allomorphy and infixation, including argument structure, syntactic complement selection, morphological compatibility and gaps, prefixhood/suffixhood, affix ordering, clitic second positionhood, idiosyncratic prosodic domains, and phonological rule blocking. Can any of these be collapsed with each other and/or be subsumed under COINs or COPs?

We have taken a stance on one of these other uses of subcategorization (see the end of §2): prefixhood vs. suffixhood should *not* be collapsed with COINs nor COPs. One motivation for this is the benefit accrued in frame simplicity (see §4.2-3). The other core motivation follows the line of argumentation from Kalin 2021a, which (as mentioned in §4.4) includes a study of 32 cases of suppletive allomorphy involving an infix. Kalin finds that all suppletive exponents of a morpheme (including infixal exponents) cluster at the same edge of the stem (left or right), and that suppletive conditioning environments are uniformly found at (or looking inward from) this stem edge. These findings suggest that basic linearization with respect to a stem is determined prior to the evaluation of *both* COINs and COPs.[10] Otherwise, edge orientation should be able to co-vary with suppletive exponents, and opposite-edge conditioning should be possible.[11]

As for the other uses of subcategorization, we do not attempt to address them here, but hope that we have shown *how* to argue for or against the use of a single mechanism for multiple of these purposes. In doing so, one should consider (i) whether the restrictions operate at the same level (e.g., over exponents vs. morphemes), (ii) whether the restrictions operate over the same type of elements (e.g., over particular levels of featural, segmental, prosodic, and morphosyntactic structure), (iii) whether the restrictions are derivationally ordered with respect to others, (iv) whether the input can be altered to satisfy the restriction, (v) what types of notational complexities need to be introduced, and (vi) whether the full set of predicted patterns are attested. While we should of course be wary of proliferating theoretical mechanisms, we should be equally careful in collapsing them.

References

Anderson, Stephen. 1972. On nasalization in Sundanese. *Linguistic Inquiry* 3:253–268.

Anderson, Stephen. 1992. *A-morphous morphology*. Cambridge: Cambridge University Press.

Arregi, Karlos, and Andrew Nevins. 2012. *Morphotactics: Basque auxiliaries and the structure of spellout*. Dordrecht: Springer.

Awobuluyi, Oladele. 1971. Splitting verbs in yoruba. *Annnales de l'université d'Abidjan, Serie H: Linguistique* 1:151–164.

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.

[10]This proposal is in accordance with other 'indirect' accounts of infixation (see, e.g., Anderson 1972; Moravcsik 1977; Halle 2001; Horwood 2002; Plank 2007; Embick 2010; Bye and Svenonius 2012). As discussed at the end of §2, we leave open the question of where exactly basic linearized order comes from.

[11]See Kalin 2021a, §3.4 for further discussion.

de Belder, Marijke. 2020. A split approach to the selection of allomorphs: Vowel length alternating allomorphy in Dutch. *Glossa* 5. URL `https://ling.auf.net/lingbuzz/005034`.

Bennett, Ryan, Boris Harizanov, and Robert Henderson. 2018. Prosodic smothering in Macedonian and Kaqchikel. *Linguistic Inquiry* 49:195–246.

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

Bermúdez-Otero, Ricardo. 2016. We do not need structuralist morphemes, but we do need constituent structure. In *Morphological metatheory*, ed. Daniel Siddiqi and Heidi Harley, 387–430. Amsterdam: John Benjamins.

Blevins, Juliette. 1999. Untangling Leti infixation. *Oceanic Linguistics* 38:383–403.

Boas, Franz, and Ella Deloria. 1941. *Dakota Grammar*, volume 23:2 of *National Academy of Science Memoirs*. Washington, D.C.: National Academy of Science.

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.

Bonet, Eulàlia. 2004. Morph insertion and allomorphy in Optimality Theory. *International Journal of English Studies* 4:73–104.

Booij, Geert. 1998. Phonological output constraints in morphology. In *Phonology and morphology of the Germanic languages*, ed. Wolfgang Kehrein and Richard Wiese, 143–163. Tübingen: Niemeyer.

Booij, Geert, and Rochelle Lieber. 1993. On the Simultaneity of Morphological and Prosodic Structure. In *Studies in lexical phonology*, 23–44.

Bye, Patrik. 2008. Allomorphy — selection, not optimization. In *Freedom of Analysis?*, ed. Sylvia Blaho, Patrik Bye, and Martin Krämer, 63–92. Berlin, Boston: De Gruyter Mouton. URL `https://www.degruyter.com/view/product/178827`.

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-McCarthy, Andrew. 1998. Phonological constraints on morphological rules. In *The handbook of morphology*, ed. Andrew Spencer and Arnold Zwicky, 144–148. Oxford: Blackwell.

Chomsky, Noam. 1965. *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, Noam. 1981. *Lectures on government and binding*. Dordrecht: Foris.

Cohn, Abigail C. 1992. The consequences of dissimilation in Sundanese. *Phonology* 9:199–220.

DeLancey, Scott. 1996. The bipartite stem belt: Disentangling areal and genetic correspondences. In *Annual Meeting of the Berkeley Linguistics Society*, volume 22, 37–54.

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

Embick, David, and Rolf Noyer. 2001. Movement operations after syntax. *Linguistic Inquiry* 555–595.

Grimshaw, Jane. 1979. Complement selection and the lexicon. *Linguistic Inquiry* 10:279–326.

Haig, Geoffrey. 2004. Constraints on morpheme repetition in Turkish? In *Current research in Turkish linguistics*, ed. Kamile İmer and Gürkan Dogan, 3–12. Gazimagusa: Eastern Mediterranean 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.

Hannahs, S.J. 2013. Celtic initial mutation: pattern extraction and subcategorisation. *Word Structure* 6:1–20. URL `https://www.euppublishing.com/doi/abs/10.3366/word.2013.0033`.

Harley, Heidi. 2011. Affixation and the Mirror Principle. In *Interfaces in linguistics*, ed. Rafaella Folli and Christiane Ullbricht, 166–186. Oxford: Oxford University Press.

Harley, Heidi. 2014. On the identity of roots. *Theoretical Linguistics* 40:225–276.

Hohepa, Patrick W. 1967. *A profile of generative grammar of maori*, volume International Journal of American Linguistics Memoir. Bloomington, IN: Indiana University Publications in Anthropology and Linguistics.

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, 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.

Inkelas, Sharon. 1990. *Prosodic constituency in the lexicon*. New York/London: Garland.

Jensen, John T. 1990. *Morphology: Word structure in generative grammar*, volume 70. John Benjamins Publishing.

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

Kalin, Laura. 2020. Morphology before phonology: A case study of Turoyo (Neo-Aramaic). *Morphology* 30:135–184.

Kalin, Laura. 2021a. Infixes really are (underlyingly) prefixes/suffixes: Evidence from allomorphy on the fine timing of infixation. Ms. Princeton University.

Kalin, Laura. 2021b. Verbal plural marking in Hunzib and its implications for the morphosyntax-phonology interface. Ms. Princeton University.

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.

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

Kiparsky, Paul. 1982. From cyclic phonology to lexical phonology. In *The structure of phonological representations*, ed. Harry van der Hulst and Norval Smith, volume 1, 131–175. Dordrecht: Foris.

Kiparsky, Paul. 1986. The phonology of reduplication. M.s. Stanford University.

Lapointe, Steven G. 2001. Stem selection and OT. In *Yearbook of Morphology 1999*, ed. Geert Booij and Jaap Van Marle, 263–297. Dordrecht: Springer.

Lewis, Geoffrey. 1967. *Turkish grammar*. Oxford: Clarendon Press.

Lieber, Rochelle. 1980. On the organization of the lexicon. PhD Thesis, Massachusetts Institute of Technology.

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.

Mascaró, Joan. 2007. External allomorphy and lexical representation. *Linguistic Inquiry* 38:715–735.

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

McCarthy, John J, and Alan Prince. 1993b. Generalized alignment. In *Yearbook of morphology 1993*, 79–153. Springer.

McPherson, Laura. 2014. Replacive grammatical tone in the Dogon languages. Doctoral Dissertation, UCLA.

McPherson, Laura. 2019. Seenku argument-head tone sandhi: Allomorph selection in a cyclic grammar. *Glossa: a journal of general linguistics* 4. URL `http://www.glossa-journal.org//articles/10.5334/gjgl.798/`.

Mester, Armin R. 1994. The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12:1–61.

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

Noyer, Rolf. 1993. Mobile affixes in Huave: Optimality and morphological wellformedness. In *Proceedings of the 12th West Coast Conference on Formal Linguistics*, ed. Eric Duncan, Donka Farkas, and Philip Spaelti, 67–82. Stanford: CSLI.

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

Papillon, Maxime. 2021. Infixes as infixes: A response to laura kalin. Ms. University of Concordia.

Paster, Mary. 2005. Subcategorization vs. output optimization in syllable-counting allomorphy. In *Proceedings of the 24th West Coast Conference on Formal Linguistics*, ed. John Alderete, Chung-Hye Han, and Alexei Kochetov, 326–333. Somerville, MA: Cascadilla Proceedings Project.

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

Paster, Mary. 2009. Explaining phonological conditions on affixation: Evidence from suppletive allomorphy and affix ordering. *Word Structure* 2:18–47.

Plank, Frans. 2007. Extent and limits of linguistic diversity as the remit of typology – but through constraints on what is diversity limited? *Linguistic Typology* 11:43–68.

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

Rolle, Nicholas. 2021. Against phonologically-optimizing suppletive allomorphy (POSA) in Irish, Tiene, Katu, and Konni. *Acta Linguistica Academica* 68:103–138.

Sande, Hannah, Peter Jenks, and Sharon Inkelas. 2020. Cophonologies by ph(r)ase. *Natural Language and Linguistic Theory* 38:1211–1261.

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

Selkirk, Elisabeth O. 1982. *The syntax of words*. 7. Cambridge, Mass.: Linguistic Inquiry Monographs.

Siddiqi, Daniel. 2009. *Syntax within the word: Economy, allomorphy, and argument selection in Distributed Morphology*, volume 138. John Benjamins Publishing.

Slocum, Marianna C. 1948. Tzeltal (Mayan) Noun and Verb Morphology. *International Journal of American Linguistics; New York* 14:77–86. URL http://search.proquest.com/docview/1290441454?pq-origsite=summon.

Topping, Donald M. 1973. *Chamorro reference grammar*. Honolulu: University Press of Hawaii.

Tranel, Bernard. 1998. Suppletion and OT: On the issue of the syntax/phonology interaction. In *Proceedings of the West Coast Conference on Formal Linguistics*, volume 16, 415–429.

Ultan, Russell. 1975. Infixes and their origin. *Linguistic Workshop* 3:156–205.

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 C.L. 2017. Global optimization in Allomorph Selection: two case studies. In *The Morphosyntax-Phonology Connection: Locality and Directionality at the Interface*, 3–27. Oxford: OUP.