Asymmetric Infixation*

Kate Mooney
New York University

1 Introduction

In the world's languages, affixation generally has a right-edge bias. Suffixes, for instance, are typologically much more common than prefixes (Greenberg et al. 1963: 92, Hall 1988, Bybee et al. 1990, Dryer 2013, a.o.). This preference is often quite strong: in a survey of 828 languages with inflectional affixes, Dryer (2013) found that 64% (528 languages) had a suffixing bias, whereas only 18% (152 languages) had a prefixing bias.[1]

Infixes, however, appear to have a different typology. Unlike other forms of affixation, infixes have a *left-edge bias*. For example, in the comprehensive typological survey of infixes from Yu (2003), over 63% of infixes surveyed are left-edge oriented, while only 13% appear to be right-edge oriented:[2]

(1) Left-edge bias in infixation: Summary of infix survey from Yu (2003: 282-300)

	Fixed segment	Reduplicative	Overall
Left-edge	40 (71%)	25 (52%)	63%
Right-edge	4 (7%)	10 (21%)	13%
Prominence-oriented	12 (21%)	13 (27%)	24%
Languages surveyed	56	48	

To give an example, this means that there are far more infixes that position themselves after the leftmost consonant of a stem (e.g. Tagalog agent voice, [b⟨um⟩ili] 'AV.buy', cf. [bili] 'buy', Schachter and Otanes 1972: 311) than there are infixes that position themselves before the rightmost consonant of a stem (e.g. Kashaya Pomo pluriactional, [p^hané⟨t^h⟩m-aw] 'hit.pl', cf. [p^hanem] 'hit', Oswalt 1961: 170).

In this paper, I address the positional distribution of infixes. First, the empirical picture: What are the positional asymmetries of infixes, and how do they differ from the positional asymmetries of other phonology (e.g. prefixation/suffixation, stress assignment)? To answer this question, I focus on right-edge infixes, and find that the asymmetries are even more pronounced than Yu (2003)'s initial survey would suggest:

(2) Right-edge infixes only occur in languages with right-edge prosodic prominences.

What this means is that right-edge infixes always surface adjacent to a prosodic prominence, and so they can all be reanalyzed as prominence-oriented infixes. (In comparison, left-edge infixes have no such restriction; they may occur quite far from prosodic prominences.) I conclude that right-edge infixes do not exist.

In order to account for this typology, I expand on Nelson (2003)'s theory of positional anchoring. Nelson (2003) observes that in reduplication and truncation, there is a strong tendency to copy (or preserve) the left edge and prominent constituents, but never the right edge alone. Nelson proposes that the responsible constraint family, ANCHOR, is asymmetric. ANCHOR can target left edges and prosodically prominent constituents, but never the right edge on its own. I propose asymmetric anchoring of this type is also responsible for infix placement.

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[1] The remaining 18% (147 languages) had no strong preference either way.

[2] Note that percentages may not total 100 due to rounding.

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This analysis readily contrasts with models that use ALIGNMENT (McCarthy & Prince 1993, Yu 2003, 2007). These models posit that infixes are directly subcategorized to align with the left or right edge of various psycholinguistically prominent positions in words, including the initial syllable, a prosodically prominent syllable, or the rightmost syllable. While ALIGNMENT can easily generate infixation patterns for individual languages, it does not predict the correct left-edge bias of the typology at large, nor does it predict the typological gap with right-edge infixes.

By contrast, I propose that infix placement is driven by a constraint within the ANCHOR family. In addition to being asymmetric, ANCHOR differs from ALIGNMENT in that it underspecifies the final location of the infix. I define ANCHOR so that it requires an infix to *overlap* with the (leftmost/most prominent) vowel of the stem, using the notion of gestural overlap from Articulatory Phonology (Browman & Goldstein 1987, 1990, et seq.). Beyond this overlap, the position of the infix is free for the phonotactics to determine. Thus, I argue that infix placement is not about aligning an edge of a morpheme to the edge of an abstract segment, but instead is about ensuring simultaneity: some portion of the infix must occur at the same time as the stem's leftmost vowel, or its most prominent vowel.

The paper is structured as follows: Section 2 presents the core generalizations of the study, and then Section 3 summarizes the typological survey responsible for them. Section 4 introduces the analysis and discusses alternatives, and Section 5 concludes.

2 Generalizations

From the typological survey (see Section 3), I draw two main observations about the distribution of infixes. First, the No Right-Edge generalization (3). When we examine putative right-edge infixes, we find that not only do they occur in languages with right-edge metrical prominences, but that the infix itself always surfaces adjacent to a prosodically prominent constituent. There is therefore some ambiguity on if these are truly right-edge infixes, or if they are prominence-oriented ones. Here, I adopt the strongest form of the hypothesis, where I claim there are no right-edge infixes at all.

(3) **No Right-Edge:** There are no right-edge infixes, only left-edge or prominence-oriented ones

By contrast, this type of ambiguity is not found for left-edge infixes. In Temiar, for example, there is word-final stress, and yet we have a left-edge infixation pattern (e.g. /⟨ən⟩+goˈlap/ → [g⟨ən⟩oˈlap] 'carrying on shoulder', Benjamin 1976: 175). We can therefore be confident that true left-edge infixes do exist.

The prediction No Right-Edge makes is that there should be no languages that are the inverse of Temiar: There should be no language that has right-oriented infix but left-oriented stress (e.g. /⟨in⟩+ˈpataka/ → *[ˈpatak⟨in⟩a]).

The second generalization, Infix Containment (4), concerns the relationship between infix shape and the possible sets of landing sites. In the typological survey (see (8)), I observe that single-consonant infixes always occur *inside* the targeted syllable of the stem. For instance, there is no prominence-oriented ⟨C⟩ infix that falls outside of the prominent syllable (e.g. *[ba⟨C⟩ˈdupi]). In comparison, infixes containing a vowel may occur adjacent to the targeted syllable. In intuitive terms, this means that infixes will squeeze in to the targeted syllable when they are small enough, but when they are larger, an adjacent syllable will do.

(4) **Infix Containment:** Single-consonant infixes always occur inside the targeted (leftmost/most prominent) syllable, whereas infixes that contain a vowel may occur adjacent to it

The Infix Containment generalization is robust, but it presents some analytical difficulties: Why are single-consonant infixes special? Here, I reformulate the Infix Containment generalization using the notion of overlap from Articulatory Phonology (Browman et al., 1987, 1990; Gafos, 1999). Articulatory Phonology posits that speech sounds are composed of gestures. Gestures are articulatory movements, each with inherent durations that may overlap with one another in time and space. Consonants are assumed to overlap with vowels in the same syllable, whereas vowels are assumed to overlap slightly with vowel gestures in adjacent syllables.

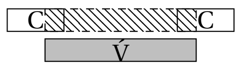
Here, I use this conception of overlap to restate the relationship between infix shape and landing site in the Infix Containment generalization. Namely, an infix must overlap with the targeted vowel:

(5) **Infix Containment (gestural version):** An infix must always overlap with the vowel of the leftmost or most prosodically prominent syllable

For single consonant infixes, this means that they must occur inside the targeted syllable, because consonants only overlap with vowels in the same syllable. Vowel-bearing infixes, in comparison, only need to surface in an adjacent syllable, because two vowels in adjacent syllables are always assumed to overlap slightly, as in (6):

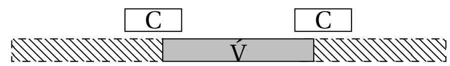
(6)

Single-cons. infixes occur within targeted syllable



e.g. [imanó⟨s⟩kan] 'to be winded'

Vowel-bearing infixes only need to be adjacent



[ok⟨ho⟩čájjan] 'to be alive'

(Koasati plurals, Kimball 1985: 276-277)

I now proceed to Section 3, where I describe the typological survey that informed these generalizations.

3 Typological Survey

This section reports on the typological survey of putative right-edge infixation patterns. In all cases, right-edge infixes occur adjacent to a prosodically prominent constituent.

3.1 *Sampling procedures* The survey included 43 languages from 16 language families (3 isolates). Infixes were selected on the grounds that they or a close relative had been analyzed as a right-edge infix pattern in Yu (2003, 2007), Kalin (2022), Moravcsik (2000), Broselow and McCarthy (1983), or McCarthy and Prince (1993). The list of languages can be found below:

Family	# lgs. surveyed	Languages
Austronesian	7	Amis, Balantak, Chamorro, Nakanai Paiwan, Thao, West Tarangan
Bantu	3	Eton, KiChaga, Kimatuumbi
Caucasian	1	Hunzib
Chadic	2	Hausa, Mupun
Chumash	1	Iñeseno Chumash
Finno-Ugric	1	Estonian
Hokan	6	Kashaya Pomo, Oaxaca Chontal, Salinan Mojave, Southern Pomo, Yuma / Quechan
isolate	3	Huave, Washo, Zuni
Koreanic	1	Korean
Mayan	1	Tzeltal
Misumalpan	1	Ulwa
Muskogean	5	Alabama, Choctaw, Creeek, Koasati, Mikasuki
Salishan	1	Colville
Semitic	3	Jebbali, Levantine Arabic, Tigre
Trans New-Guinea	2	Hua, Nabak
Tupi	1	Kamaiurá
Uto Aztecan	2	Sonora Yaqui, Western Shoshoni
Total	43	

A total of 55 infixes were surveyed (some languages had more than one infix). Of these, 17 infixes were eliminated because they only occurred in monosyllabic stems, and so there was no way to distinguish the edge orientation of the infix. This left a total of 40 putative right-edge infixes.

3.2 *Results* These 40 infixes always surfaced adjacent to a prosodically prominent constituent. Prosodically prominent positions were identified by their bearing (a) stress, (b) a pitch accent that falls in a predictable position (suggesting it is docking on a grid mark), or (c) special tone retraction rules that draw a tone towards a fixed position.

A summary of where the infixes landed relative to the prominent vowel is given in (7). The most common position was for the infix to occur just after the prominent vowel (7d., 22/40 infixes). Whether or not this preference holds for all prominence-oriented infixes is not determined by the data in my survey. Recall, my survey only examined putative right-edge infixes, and so it could simply be that infixes within a stressed syllable were more likely to be analyzed as right-edge. In addition, infixes were found before the prominent syllable (7a.), after the prominent syllable (7c.) or before the prominent foot (7e.).

(7) Landing sites of the surveyed infixes relative to prominence

	Landing site	# of infixes		
a.	. . . ⟨infix⟩CV́C. . .	8	20.0%	*prefix to prominent syllable*
b.	. . . C⟨infix⟩V́C. . .	0	0%	*prefix to prominent vowel*
c.	. . . CV́C⟨infix⟩. . .	5	12.5%	*suffix to prominent syllable*
d.	. . . CV́⟨infix⟩C. . .	22	55.0%	*suffix to prominent vowel*
e.	. . . ⟨infix⟩CV́CV. . . / . . . ⟨infix⟩CVCV́. . .	5	12.5%	*prefix to prominent foot*
	Total	40		

The data in (7) only tell part of the story, however, because there was also a strong connection between the templatic shape of the infix and its landing site. In (8), I show how the templatic shape of the infix matched with different surface positions. For instance, consonant-only infixes (⟨C⟩, first column) always occurred *inside* of their targeted syllable. There were no single-consonant infixes that prefix or suffix to a leftmost or prominent syllable (marked in grey in (8)).

(8) Infix shape (⟨C⟩, ⟨V⟩, ⟨CV⟩/⟨VC⟩/⟨CVC⟩, etc.) versus its surface position

	⟨C⟩	⟨V⟩	⟨CV(C)⟩, ⟨VC⟩	⟨CVCV⟩	
#C⟨infix⟩V. . .	1	1	2	0	*prefix to left vowel*
#CVC⟨infix⟩. . .	0	1	4	0	*suffix to left syllable*
#CV⟨infix⟩C. . .	3	1	2	0	*suffix to left vowel*
. . . ⟨infix⟩CV́. . .	0	3	5	(4)	*prefix to prom. syllable*
. . . CV́C⟨infix⟩. . .	0	1	4	0	*suffix to prom. syllable*
. . . CV́⟨infix⟩C. . .	15	1	6	0	*suffix to prom. vowel*
. . . ⟨infix⟩CV́CV. . . / . . . ⟨infix⟩CVCV́. . .	0	0	0	5	*prefix to foot*
Totals	19	8	23	5	

As a digression, another observation is that of the five infixes that prefix to a CVCV foot (rightmost column), all five of them were reduplicative, copying a codaless CVCV foot (e.g. Amis, [ni⟨aru⟩aˈruʔ] 'village homes', cf. [ni.a.ˈruʔ] 'village home', Ho et al. 1986). The reason why this is notable is because there is some ambiguity on whether these are prefixing to the prominent foot (as given above), or suffixes to the prominent vowel (e.g. [niaru⟨aˈru⟩ʔ] 'village homes'). Later on, I will claim that all infixes overlap with the vowel they subcategorize for, either the initial one in the stem, or the most prominent one. To maintain this claim, it is necessary to capitalize on the ambiguity of which copy is the infix. For trochaic systems, I will claim that the infix must prefix to the CV́CV foot (i.e. . . . ⟨infix⟩CV́CV. . .), but in iambic systems, the infix must suffix to the CVCV́ foot (. . . ⟨infix⟩CVCV́. . .).

In the next section, I present the analysis. In particular, I capitalize on the Infix Containment generalization (or concretely, the greyed-out gaps in the table in (8)) to define an infix placement mechanism, ANCHOR.

4 Analysis

In this section, I present an analysis that accounts for both No Right-Edge and Infix Containment generalizations from Section 2. I propose that infix placement is driven by a mixture of subcategorization and surface phonotactic requirements. Infixes are subcategorized for using a modified form of ANCHOR, which requires that the infix overlap with a certain vowel of the stem, but does not specify its position further. What makes ANCHOR different from traditional ALIGNMENT is the positions it can target: while ALIGNMENT can target both left and right edges, ANCHOR can only see left edges and prosodically prominent positions.

I then compare my analysis to models of infixation that use ALIGNMENT. ALIGNMENT-based analyses are powerful, but they do not predict the restricted typology seen in the No Right-Edge and Infix Containment generalizations. The core benefit of the ANCHOR-based analysis is clear: it predicts that there should be two distinct typologies for the positional asymmetries of affixes. On one hand, we have ANCHOR, which favors the left edge and is responsible for the positional restrictions on both infixes and reduplicants. On the other hand, we have ALIGNMENT, which favors the right edge and is responsible for stress and ordinary affixation.

4.1 *The proposal.* I propose that infix placement is governed by a family of ANCHOR constraints, rather than ALIGNMENT. Traditionally, ANCHOR has been used to restrict what part of a stem a reduplicant can copy (McCarthy and Prince, 1995, 1999). For instance, ANCHOR-LEFT will require any reduplicant to correspond with segments at the left edge of a stem (McCarthy and Prince 1995: 123). While this may seem rather tangential to infixation, there is a common theme: unlike ALIGNMENT, ANCHOR is asymmetric.

Asymmetric ANCHOR is an idea that comes from Nelson (2003), who proposes that unlike other constraints, ANCHOR constraints are asymmetric. They can reference left edges or prominent syllables, but never right edges alone. Nelson uses this fact to capture the typology of truncation and reduplicative affixes, which (like infixes) have a bias towards the left edge.

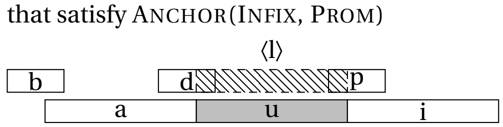
Here I propose that there is a larger family of ANCHOR-type constraints, one of which, I argue, is used to position infixes. The fact that the family of ANCHOR constraints is asymmetric will allow us to capture the No Right-Edge generalization.

I introduce the constraint ANCHOR(INFIX, LEFT/PROM), which coarsely subcategorizes an infix to overlap with either the leftmost or most prominent vowel of a stem. The definition is given below:

(9) ANCHOR(INFIX, LEFT/PROM): For ⟨*infix*⟩ in the input, assign a violation if no segment of ⟨*infix*⟩ overlaps with vowel V_y in the output, where V_x is the [leftmost/most prominent] vowel in the input and V_xCorrV_y.

To satisfy ANCHOR, an infix must overlap with the subcategorized vowel gesture. In a nonce word example, I show how ANCHOR(INFIX, PROM) evaluates different landing sites for an ⟨*l*⟩ in /baˈdupi/. This is shown schematically in (10) and in tableau form in (11):

(10) Possible landing sites of ⟨*l*⟩ in /baˈdupi/ that satisfy ANCHOR(INFIX, PROM)



Examples:
bad⟨l⟩úpi CVC⟨C⟩VCi ✓
badú⟨l⟩pi CVCV⟨C⟩Ci ✓
*ba⟨l⟩dúpi *CV⟨C⟩CVCi ✗

(11)

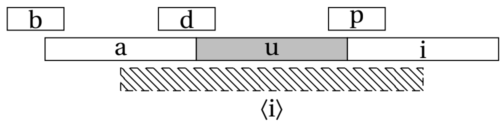
/⟨l⟩+baˈdupi/	ANCHOR(INFIX, PROM)	CONTIG
a. l-baˈdupi	*!	
b. b⟨l⟩aˈdupi	*!	*
c. ba⟨l⟩ˈdupi	*!	*
d. badˈ⟨l⟩upi		*
e. baˈdu⟨l⟩.pi		*
f. baˈdup.⟨l⟩i	*!	*
g. baˈdupi-l	*!	

For a single-consonant infix to overlap with a targeted vowel (here the prosodically prominent one), it must occur inside that syllable.

Consonants and vowels have different properties of overlap, and so the distribution of infixes consisting of a single consonant should differ from the distribution of infixes that bear vowels. The core assumption I make use of here is vowel-vowel contiguity, which states that the vowels in two adjacent syllables are always assumed to overlap slightly as they transition from one into another (Browman et al. 1987: 11).

With ANCHOR, vowel-vowel contiguity buys us considerable empirical mileage. While single consonant infixes must land inside their targeted syllable (as in (10)), vowel-bearing infixes may land in an adjacent syllable (12)-(13):

(12) Possible landing sites of ⟨*i*⟩ in /baˈdupi/ that satisfy ANCHOR(INFIX, PROM)



Examples:		
	bad⟨i⟩úpi	CVC⟨V⟩VCi ✓
	badú⟨i⟩pi	CVCV⟨V⟩Ci ✓
	ba⟨i⟩dúpi	CV⟨V⟩CVCi ✓
	*b⟨i⟩adúpi	*C⟨V⟩CVCi ✗

(13)

/⟨i⟩+baˈdupi/	ANCHOR(INFIX, PROM)	CONTIG
a. i-baˈdupi	*!	
b. b⟨i⟩aˈdupi	*!	*
c. ba⟨i⟩ˈdupi		*
d. bad⟨i⟩ˈupi		*
e. baˈdu⟨i⟩pi		*
f. baˈdup⟨i⟩i		*
g. baˈdupi-i	*!	

The reader will notice that ANCHOR allows us to perfectly capture the Infix Containment generalization. Single-consonant infixes must land inside the targeted syllable, but infixes bearing vowels may land anywhere adjacent to it.

I now turn to the No Right-Edge generalization. As mentioned at the start of this section, ALIGNMENT is the traditional way to capture infix subcategorization (McCarthy and Prince 1993, Yu 2003, 2007, a.o.), but here I have used ANCHOR. On a certain level, ALIGNMENT and ANCHOR are quite similar: they have both been used in the past to position reduplicants (McCarthy & Prince 1993: 67, 1995: 123), and here they both position an infix within a stem. Recall, the core difference between them is that ANCHOR constraints are asymmetric: there is no ANCHOR(INFIX, RIGHT).

The empirical prediction this makes is that infixes should only surface at the right edge in very restricted circumstances. For instance, an infix will surface at the right edge only (a) if it is the right edge of a monosyllabic stem, allowing it to be targeted by ANCHOR-LEFT, or (b) if it contains the prosodic prominence, allowing it to be targeted by ANCHOR-PROM. This predicts the content of the No Right-Edge generalization: infixes can only surface at the right edge in languages with right-edge prosodic prominences.

To sum up, ANCHOR positions infixes in one of two positions: overlapping with the leftmost vowel of the stem, or overlapping with the most prosodically prominent vowel of the stem. This placement differs with traditional ALIGNMENT in two ways. It is asymmetric, meaning that right edges cannot be targeted, and it is underspecified, since ANCHOR will be satisfied so long as the infix and vowel overlap *somewhere*.

I now go through a brief case study on Koasati plurals, which shows how ANCHOR only offers a coarse level of placement; all remaining positioning (such as of the infix relative to consonants) is determined by the phonotactics.

4.2 *Case study: Koasati plurals.* In Koasati (Muskogean), plurals are often created via infixation (Kimball, 1985, 1991). The plural infix can be spelled out as one of three distinct, lexically-conditioned allomorphs (⟨*s*⟩, ⟨*ho*⟩, and ⟨*Có:*⟩). Each of these allomorphs surfaces near the penultimate vowel of the stem, which bears a predictable pitch accent. Depending on the allomorph, the infix will surface as a suffix to the accented vowel (⟨*s*⟩ allomorph, 14a.), prefix to the accented syllable (⟨*ho*⟩, 14b.) or as a suffix to the accented syllable (⟨*Có:*⟩, 14c.)

(14) Koasati plural infixes target the accented penult, but vary on precise landing site

a. Suffix to accented vowel: ⟨*s*⟩ *allomorph*

singular	plural	gloss
akánon	aká⟨s⟩snon	'to be hungry'
imanó:kan	imanó⟨s⟩kan	'to be winded'
maká:lin	maká⟨s⟩lin	'to open the eyes'

b. Prefix to accented syllable: ⟨*ho*⟩ *allomorph*

akɬátlin	ak⟨ho⟩ɬátlin	'to be loose'
okčájjan	ok⟨ho⟩čájjan	'to be alive'

c. Suffix to accented syllable: ⟨*Có:*⟩ *allomorph (partial reduplication)*

aló:tkan	alot⟨ló:⟩kan	'to be full'
copóksin	copok⟨čó:⟩sin	'to be a hill'
lapátkin	lapat⟨ló:⟩kin	'to be narrow'

(Kimball 1985: 276, 327)

Here, I provide an analysis that shows how ANCHOR provides a coarse level of positioning (near the accented syllable), but where the precise landing site is determined by phonotactics.

To begin, I assume that ANCHOR(INFIX, PROM) is undominated in the language, meaning that every infix (⟨*s*⟩, ⟨*ho*⟩, ⟨*Có:*⟩) must overlap with the accented penultimate vowel. Koasati verbs have predictable penultimate pitch accent on their stem, and so without going into details on how this occurs, I introduce the cover constraint PENULT-ACC, which requires each verbal stem to have exactly one penultimate pitch accent. The PENULT-ACC constraint must be evaluated cyclically, where the accent is assigned before infixation occurs.[3] Lastly, I introduce a cover constraint ACCENT-FAITH, a prosodic faithfulness constraint that penalizes modification of the accented syllable (Steriade, 1994; Beckman, 1998).

(15) PENULT-ACC: Assign a violation for a verbal stem that does not have a penultimate pitch accent.

(16) ANCHOR(INFIX, PROM): The plural infixes must overlap with the accented vowel in the stem.

(17) ACCENT-FAITH: The accented syllable in the input must be segmentally identical in the output.

For the ⟨*ho*⟩ allomorph, these constraints are enough. The infix must prefix to the accented vowel, as this is the best way to overlap with the prominent vowel while not changing the accented penult.

(18)

/⟨ho⟩+okčájjan/	PENULT-ACC	ANCHOR(INFIX, PROM)	ACCENT-FAITH	CONTIG
a. ho-okčájjan		*!		
☞b. ok-ho-čájjan				*
c. okčáj-ho-jan	*!			*
d. okč-ho-ájjan			*!	*

Turning to the ⟨*s*⟩ allomorph, the range of acceptable landing sites narrows, because a single-consonant infix must occur inside the accented syllable to satisfy ANCHOR(INFIX, PROM) (see Infix Containment, Section 2). The ⟨*s*⟩ infix surfaces as a coda to the accented vowel, because cross-linguistically, onsets tend to resist modification more strongly than codas, allowing a wider range of contrasts to surface (ONSET-FAITH, Lombardi 1999, 2001, Padgett 1995, Beckman 1998: 22).

(19)

/⟨s⟩+imanókan/	PENULT-ACC	ANCHOR(INFIX, PROM)	ACCENT-FAITH	ONSET-FAITH
a. ⟨s⟩-imanókan		*!		
b. ⟨s⟩-ímanokan	*!		*	
☞c. imanó⟨s⟩kan			*	
d. iman⟨s⟩ókan			*	*!
e. ima⟨s⟩nókan		*!		

This explanation of positional faith predicts that single-consonant infixes that suffix to the targeted vowel (e.g. #CV⟨C⟩C..., ...CV́⟨C⟩C...) should be much more common than prefixing ones (e.g. #C⟨C⟩VC). From the typological survey in Section 3.2, this is the case: 19 single-consonant infixes occur between the vowel and its coda, but only one language had an infix that occurred between a vowel and its onset (Mojave verbal plural[4], [m-s⟨uː⟩vaːr-k] ‘you (pl.) sang’, cf. singular [isvaːr] ‘sing’, Munro 1976: 14).

Lastly, let us consider the reduplicative allomorph ⟨*Có:*⟩, which copies the initial consonant of the base followed by a long [oː]. This allomorph is exceptional in that in induces accent shift, where the reduplicated syllable must bear the verb’s pitch accent. I introduce the constraint REDUP-ACC, which requires the reduplicant to bear a pitch accent:

(20) REDUP-ACC: Assign a violation if a syllable containing a reduplicant does not bear a pitch accent.

Koasati only allows one penultimate pitch accent in each verb stem (PENULT-ACC), and so the reduplicative allomorph ⟨*Có:*⟩ must suffix to the penult, overwriting its accent (candidate b.).[5] Note that infixation within the accented syllable will induce one violation of ACCENT-FAITH (candidates c. & d.), because the coda of the accented syllable is no longer a coda of that same syllable in the output.

[3] Note here that there is the lingering issue of exactly how infixation interleaves with cyclic prosodification. This issue deserves further study, but as it is an issue for all prominence-based infixes, I set it aside for future work.

[4] The Mojave verbal plurals were extremely irregular, and may be better reanalyzed as suppletive allomorphy.

[5] I assume that deletion of a pitch accent violates dominated MAX-ACCENT, which is not shown in (21).

(21)

/⟨Cóː⟩+copóksin/	PENULT-ACC	REDUP-ACC	ANCHOR(INFIX, PROM)	ACCENT-FAITH
a. ⟨cóː⟩copoksin	*!			
☞b. copok⟨cóː⟩sin				
c. copo⟨cóː⟩ksin				*!
d. copó⟨cóː⟩ksin	*(!)	*(!)		*
e. co⟨cóː⟩póksin	*!			
f. co⟨cóː⟩pòksin			*!	

This pattern is opaque, as it obscures the accent that was the original target for the infix. Similar opaque infixation patterns are also found in Ineseño Chumash (Applegate 1972: 128) and Hunzib (van den Berg 1995: 81).

As a brief aside, I note that while the infix must land near the prominent syllable, the ⟨*Cóː*⟩ reduplicant can only copy from the left edge. In other words, the reduplicant will copy the first consonant of the base (LEFT-ANCHOR), even though this requires non-local copying, violating LOCALITY:

(22)

/⟨Cóː⟩+copóksin/	LEFT-ANCHOR	LOCALITY
a. copok-póː-sin	*!	
☞b. copok-cóː-sin		****

The reason why this is significant is because it shows us that Koasati needs two distinct ANCHOR constraints: ANCHOR(INFIX, PROM) for infixes and ANCHOR-LEFT for reduplicants. If we were to attempt to collapse them, we would predict that either (a) Koasati infixes should be left edge oriented, or (b) the ⟨*Cóː*⟩ allomorph should copy the prominent syllable, not the initial one. So, while the ANCHOR family of constraints share the same general asymmetries, they cannot be collapsed into a single constraint.

In sum, the Koasati plurals show us that the subcategorization requirement of ANCHOR(INFIX) is quite coarse, and leaves much of infix placement underspecified. The position of the infix relative to consonants is thus determined via phonotactics, such as onset and coda requirements.

4.3 *Comparison with Alignment.* Alignment is the traditional way of handling infixation, dating back to McCarthy & Prince's (1993). ALIGNMENT is similar to ANCHOR(INFIX) approach here in that it operates as a parochial subcategorization frame. The ALIGNMENT constraint specifies how an infix can align with a prosodic constituent, and this outranks other phonotactic constraints. At this point, it may seem to the reader that ANCHOR(INFIX) is simply a relabeling of ALIGNMENT, because after all, it accomplishes a similar thing: positioning an one morphophonological entity relative to another. In this section, I present some brief arguments in favor of separating these two constraint families.

First, the positional asymmetries of infixation do not match the positional asymmetries of other phonology. Let us first consider the other phonology typically handled via ALIGNMENT: stress assignment and affixation. Unlike infixes, both of these phenomena have a right-edge bias. For instance, in languages with fixed stress, right-edge stress systems are more common than those with left-edge stress (23):

(23) Languages with fixed stress have a right-edge bias (Goedemans and van der Hulst, 2013)

Left Edge	Initial:	92	38.7%
	Second:	16	
	Third:	1	
Right Edge	Antepenultimate:	12	61.3%
	Penultimate:	110	
	Ultimate:	51	
	Total:	282	

Similarly, affixation also generally has a right-edge bias, favoring suffixation over prefixation (24):[6]

(24) Languages with inflectional morphology have a bias in favor of suffixes (Dryer, 2013)

Moderate preference for prefixing	94	18.4%
Predominantly prefixing	58	
Approximately equal amounts of suffixing and prefixing	147	17.8%
Predominantly suffixing	406	63.9%
Moderate preference for suffixing	123	
Total	828	

If we were to use ALIGNMENT for infixation, stress, and prefixation/suffixation, then the difference in positional asymmetries would still need to be explained. By contrast, the ANCHOR hypothesis is consistent with the observation that there are two distinct typologies at play: infixation and reduplication, which favor the left edge, and stress and affixation, which favor the right.

The second argument against ALIGNMENT concerns the predictions it makes for the phonology of a language. ALIGNMENT fully specifies the landing site of an infix: it must occur at the left or right edge of a prominent consonant, vowel, syllable, or foot (Yu 2003, 2007). What this predicts is that infix position may be entirely unpredictable from the global phonotactics of a language. So in concrete terms, ALIGNMENT models will not predict the Infix Containment generalization (that single-consonant infixes must land adjacent to the targeted vowel). There should be no relationship between infix shape and landing site, aside from the diachronic forces that allow such patterns to arise.

In comparison, ANCHOR is overlap-based, and so there is a relationship between infix shape and its landing site. The ANCHOR approach already predicts Infix Containment (see Section 2). Aside from this, ANCHOR also underspecifies the position of the infix: it is required to overlap with the targeted vowel, but beyond that, its position should be phonotactically optimizing. The ANCHOR-based models thus predict that there is a relationship between ordinary phonotactics and infix placement, but it is simply limited to where the infix lands relative to consonants.

In this arena, ANCHOR is clearly the more restrictive hypothesis. While infixation has been argued to be phonotactically non-optimizing, most of these arguments only hold for fully unrestricted models of infix placement that lack a subcategorization component (e.g. P ≫ M models, McCarthy and Prince 1993, Horwood 2004, Wolf 2008, a.o., see Kalin (2022) for discussion). It still needs to be tested whether infix placement is partially optimizing, as ANCHOR would predict.

To give an example, Leti nominalization is the classic example of non-optimizing infixation (e.g. [k⟨n⟩ili] 'act of looking', cf. [kili] 'look', Blevins 1999: 401). It has been described as non-optimizing because it creates marked CC clusters in the language (Blevins 1999: 397). However, under the ANCHOR hypothesis, there is only one other possible landing site for infixal ⟨n⟩ that satisfies ANCHOR(INFIX), which is *[ki⟨n⟩li]. Thus, in order to prefer [k⟨n⟩ili] over *[ki⟨n⟩li], it is only necessary for *#kn to be dominated by a constraint that rules out *[ki⟨n⟩li], such as *HEAVY-LIGHT ≫ *#kn. This type of ranking is compatible with *#kn clusters being marked in the language — in this case, having a sequence of heavy-light syllables must simply be worse.

To sum up, there are two main reasons to favor ANCHOR over an ALIGNMENT-based model. First, ANCHOR captures the positional asymmetries of infixes, whereas ALIGNMENT collapses them together with stress and ordinary affixation. There is reason to think that these typologies should remain distinct. Second, ANCHOR is the more restrictive hypothesis when it comes to how infixes interface with the global phonotactics of a language. ALIGNMENT predicts that there is no relationship between infix shape and infix landing site, but ANCHOR predicts that infixation is *partially* phonotactically optimizing. Due to space concerns, I let this issue rest, and simply say at this point that it is better to proceed with the more restrictive hypothesis, since it should be easier to disprove.

Before concluding, I want to raise an important substantive question here, which is why we should consider ANCHOR a unified constraint family. When we put the asymmetries aside, the two uses for ANCHOR-type constraints appear quite formally disparate. On one hand reduplicative ANCHOR restricts

[6] Percentages may not equal 100 due to rounding.

correspondence between reduplicant and base, but on the other, infixal ANCHOR requires articulatory overlap. Admittedly, this is a problem. Even in general terms, reduplicative ANCHOR requires identity, but infixal ANCHOR requires locality:

(25) Reduplicative ANCHOR: A reduplicant must be articulatorily identical to the left edge / prominent constituent of the base

(26) Infixal ANCHOR: An infix must be articulatorily local to the left edge / prominent constituent of the base

So far in Optimality Theory, we have classified constraints based on their formal characteristics: constraints regarding identity are grouped together, those regarding locality are grouped separately. Here, I have taken a different approach, where instead the positional asymmetries inherent to the constraint are enough to classify it as a constraint family.

But, back to more concrete matters. If the ANCHOR hypothesis is on the right track, then there are several predictions this account makes for both reduplicants and infixes, which can be tested in phonetic studies. I provide two such predictions below.

(27) **Prediction 1: Infix-Vowel Overlap.** When single-consonant infixes occur inside a consonant cluster (e.g. $C_1\langle C_{\text{infix}}\rangle C_2V\ldots$), the vowel should reach its target before the release of C_{infix}.

(28) **Prediction 2: Gradient Reduplicative Identity.** If reduplicative ANCHOR and infixal ANCHOR are parallel (as in (25)-(26)), then reduplicants should *phonetically* match their bases as closely as possible.

Prediction 2 tests whether reduplicative ANCHOR directly interfaces with gradient gestural representations. If this is true, then we can take it as evidence that positional asymmetries can be used to identify constraint families, as I have done with ANCHOR.

On the other hand, Prediction 1 provides the means to falsify the ANCHOR hypothesis. If we find a language that has this type of infixation and also has open CC transitions, then we predict that the beginning of the vowel gesture should be visible between the release of C_{infix} and the onset of C_1. If Prediction 1 is proven false (such as by there being no excrescent vowel during this transition), then we have reason to return to an ALIGNMENT-based model.

By contrast, an ALIGNMENT based model is difficult to falsify on its own terms. ALIGNMENT is supposed to only be sensitive to psycholinguistically prominent constituents (Yu, 2003, 2007), but beyond that, it doesn't say anything specific about the phonetic implementation, and therefore leaves several questions unasked. If ALIGNMENT is truly responsible for infixation, what types of representations does it have access to? Does it only have access to discrete representations like segments and syllables, or can ALIGNMENT reference gestures directly? These are some of the questions I aim to raise with the ANCHOR hypothesis. The hope is that through probing the differences between ANCHOR and ALIGNMENT, that we gain better understanding of what representations are necessary for morphophonological grammar.

5 Conclusion

In this paper, I focused on the positional asymmetries of infixes. Based on a typological survey of all known right-edge infixation patterns (55 infixes), I conclude that the evidence supporting the existence of right-edge infixes is uncertain at best. I posit the No Right-Edge Generalization: right edge infixes only occur in languages with right-edge metrical prominences.

The No Right-Edge generalization is significant because it means that all putative right-edge infixes can be reanalyzed as prominence-oriented infixes. The positional distribution of infixes may therefore be more asymmetric than previously thought: around 65% of infixes are left-edge oriented, but the remaining 35% can be treated as prominence oriented.

To capture this typology, I argue that infixation is handled by a variant of ANCHOR, rather than ALIGNMENT. Following Nelson (2003), I claim that ANCHOR is an asymmetric constraint family, where it can target the left edge or a prosodically prominent constituent, but crucially never the right edge alone. This allows us to capture the No Right-Edge Generalization — reduplicants and infixes can only target left edges and prominent positions, and are blind to the right edge.

(29)

ANCHOR family	ALIGNMENT family
Can target left edges or prominences	Can target left and right edges
Responsible for reduplication & infixation	Responsible for stress, prefixation/suffixation
Has a left-edge bias	Has a right-edge bias

By contrast, ALIGNMENT has a different distribution. I maintain that ALIGNMENT is used for both (i) prefixation/suffixation, and (b) stress assignment, which both have a bias in favor of right edges. The fact that infixes do not share this distribution is therefore an argument against using a single mechanism for infixes and these other phenomena.

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