Another Look at Huave Mobile Affixation

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1 Introduction

1.1 Data preview

- San Francisco del Mar Huave (isolate, Mexico; Kim 2008) has "mobile affixes" (Kim 2008, 2010); e.g. COMPLETIVE /t/ (CP).
  - **C(...)V stems (1a):** it appears *after* the root [≈ "suffix"]
  - **V(...)C stems (1b):** it appears *before* the root [≈ "prefix"]

(1) **COMPLETIVE /t/ mobile affixation** [(Kim 2010:140)]
 a. **C(...)V stems:** *mo^{h}ko-**t*** 's/he lay face down' [**t**(a)-mo^{h}ko*]
 b. **V(...)C stems:** ***t**-uc* 'I am pregnant' [*uc-(i)**t***]

- This mobility is at least in part conditioned by *phonological* factors: in (1), the affix lands wherever it can **avoid a cluster/epenthesis** (Kim 2008, 2010).

- When both edges are equivalent in this respect, the mobile affixes always surface as **suffixes**.
  - Both edges are vowels **(2a)**: no cluster would arise either way → *suffix*
  - Both edges are consonants **(2b)**: a cluster requiring epenthesis would arise either way → *suffix*

(2) **Right-orientation of mobile affixes** [(Kim 2010:141, 149)]
 a. **V(...)V stems:** *uju-**m*** (*no gloss*) [**m**-uju*] (/m/ ⇔ "SUBORDINATE")
 b. **C(...)C stems:** *ɲ-uk^{w}al-a̲**s*** 's/he ate' [***s**a̲-ɲ-uk^{w}al*] (/s/ ⇔ 1ST PERS, /n/ ⇔ STATIVE)

> *Kim (2015a,b) suggests an alternative based on avoidance of initial (non-root) vowels. It's not clear if this could work with the analysis I'm proposing. I won't talk about this any further today.*

1.2 Analysis preview

⋆ This distribution can be derived *in the phonology* if {*CC ≫ Dep} dominates **right-oriented (*gradient*) alignment constraints** (McCarthy & Prince 1993) referencing these affixes.

- Kim (2008, 2010) shows that this can be implemented in a cyclic cophonology approach, with the following components:

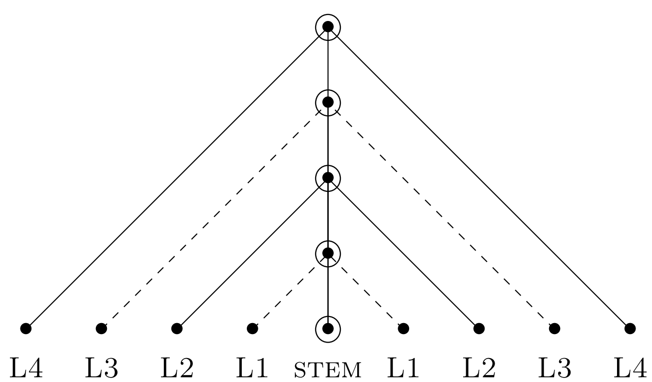
(i) **Different cophonologies:**
  - Some nodes indexed to *"non-mobile"* cophonologies (3a).
    → position *is not* sensitive to cluster avoidance.
  - Other nodes indexed to *"mobile"* cophonologies (3b).
    → position *is* sensitive to cluster avoidance.
  - ⋆ Mobile nodes (dashed in (4)): subset of "Layer 1" [L1] affixes & only "Layer 3" [L3] affix
  - ⋆ Distinction only relevant/observable for consonantal affixes, because {*CC ≫ Dep} doesn't interact with vocalic affixes.

(ii) **Specified hierarchical morphological structure:**
  - Affixes divided up into "layers" (4) [may be just a descriptive device].
    ↪ Some layers have internally ordered structure as well.
  - Cyclic concatenation (governed by the cophonologies) derives correct order and placement.

(3) **Types of cophonologies**

a. Non-mobile cophonologies: **Align-L/R ≫ {*CC ≫ Dep}**
b. Mobile cophonologies: **{*CC ≫ Dep} ≫ Align-R**

(4) **Huave's "layered" morphology** (Kim 2015a:114)



- In Zukoff (2017a,b, 2020), I argue for a **fully parallelist** approach to morpheme ordering:
  → No cyclic concatenation in the morphology (or the phonology, for that matter).
  → All morphemes in a word are present simultaneously in the phonological input, unordered.
  → Order determined by constraint interaction — mostly alignment constraints — in a parallel phonological computation.

⋆ This is obviously not compatible with Kim's implementation. So, today I'm going to show you that you can actually **implement the same analysis in parallel**.

- **New analysis: articulated alignment in Parallel OT**
  (i) Every morpheme indexed to its own alignment constraint: e.g. ALIGN-CP-R, ALIGN-FUT-L
  (ii) Morphemes are unordered in the phonological input; surface order computed entirely in parallel
  (iii) Mobile affixes are morphemes with the properties in (5):

(5) **Defining properties of mobile affixes**
   a. Consist of a single consonant
   b. Have a right-oriented alignment constraint
   c. That alignment constraint ranks below {*CC ≫ DEP}

⋆ The properties of mobile affixes are essentially the same as in Kim's analysis, except that there will be a single place in the language-wide ranking for {*CC ≫ DEP}.

1.3 Roadmap

- In §3, I'll work through the parallel alignment analysis.
  - I'll start with relatively simple forms with just a single mobile affix (§§3.1–3.2).
  - Then build up to more complex forms with multiple mobile affixes (§§3.3–3.5).

⇒ The primary goal is to demonstrate that a single, consistent constraint ranking — just alignment constraints + {*CC ≫ DEP} — can derive the full range of mobility patterns.

- I will though point out one place where the parallel analysis differs from Kim's cyclic analysis: the treatment of the "Aspect" morphemes (§3.4).
  - Cyclic analysis: Completive, Stative, and "Subordinate" act as a single unified class.[1]
  - Parallel analysis: Subordinate patterns differently from the other two in terms of alignment.
    ↪ This probably makes more sense, in terms of the functions of the different categories.

- In §4 (time permitting), I'll also show that the parallel analysis may provide a (somewhat) principled distinction between mobile and immobile consonantal affixes, which can be related to syntactic structure via the "Mirror Alignment Principle" (Zukoff 2017a,b, 2020).

2 Phonological and Morphological Preliminaries

2.1 Transcription conventions

- All forms are given in IPA notation, as in Kim (2015a,b).
  - [See Kim (2010:134, fn. 2) for the translation algorithm between her earlier conventions and IPA.]
- Candidate outputs are shown *without* the results of allophonic processes (palatalization, diphthongization/vowel breaking; see Kim 2008).
  - Surface forms are accompanied by a phonetic transcription reflecting these processes.
- Epenthetic vowels are italicized in output candidates.

[1] To be clear, Kim only says that the three morphemes are "mutually exclusive" (2008: 331). She does not say that they are all belong to the same category in any meaningful sense.

2.2 Theme vowels

- Huave verbal roots take various kinds of "theme vowels" (see Kim 2008:esp. Ch. 6).
  - Specific verb forms take either a prefixal theme vowel [a] or [u], or a suffixal theme vowel whose quality is determined by vowel harmony.[2]
  - The choice of theme vowel is to some extent related to the transitive/intransitive contrast.
- I basically treat theme vowels as part of the root (sometimes I mark the boundary with "+").

3 Parallel analysis of mobile affixation

3.1 Basic mobility: Root + Aspect

- I'll start with Kim's "Layer 1" mobile affixes (Table 1), which generally appear close to the root.
  - The "Aspect" morphemes — Completive, Stative, Subordinate — cannot co-occur.
  - They (for the most part) behave identically in terms of ordering. (I'll come back to this.)

Table 1: Layer 1 mobile affixes (Kim 2010:139)

"Asp"	/t/	[CP]	Completive	
	/n/	[ST]	Stative	
	/m/	[SB]	Subordinate (/n/ in 1st person [SB1])	
	/r/	[2I]	2nd Person Intransitive	[occurs only in conjunction with 2nd /e/]

- Default right-alignment of mobile affixes can be seen from **V(...)V** roots — (7).
  - None of the phonotactic issues that drive mobility are applicable, so the decision is made by the relevant alignment constraint.
  - Since these affixes end up on the right, we know that these morphemes have right-oriented alignment constraints:

(6) **Align(Aspect, R; Wd, R) [Align-Asp-R]**
Assign one violation mark * for each segment which intervenes between the right edge of the Aspect morpheme and the right edge of the word.

(7) **Mobile affixes to V(...)V roots**

i. Example: uj+u-m
circle-SB
(*no gloss*) [Kim 2010:149, ex. 28]

ii. Tableau:

/uj+u, m_{SB}/	Align-Asp-R
a. ☞ uju-m	
b. m-uju	*!** (u,j,u)

- The same can basically be observed with **C(...)V** roots — (9).
  - Candidate (9b) violates both Align-Asp-R and *CC (8), so either could be driving suffixation.
  - → Consonant clusters are not allowed in the language.

[2] Kim (2015a,b) treats the "suffixal theme vowels" as epenthetic vowels. This is attractive, but incompatible with my analysis, which would then wrongly predict forms like **r-e-mo^{h}k* instead of *i-mo^{h}k+o-r* (15).

(8) ***CC:** Assign one violation mark * for each sequence of two adjacent consonants.

(9) **Mobile affixes to C(...)V roots**

i. Example: mo^{h}k+o-t (*mo^{h}kot*)
face.down-CP
's/he lay face down' [Kim 2010:140, ex. 12h]

ii. Tableau:

/mo^{h}k+o, t_{CP}/	*CC	ALIGN-ASP-R
a. ☞ mo^{h}ko-t		
b. t-mo^{h}ko	*!	*!*** (m,o^h,k,o)

- In **V(...)C** roots (11), ALIGN-ASP-R and *CC are at odds, since right-aligning the Aspect morpheme will lead to a cluster (candidate (11a)). This conflict could be resolved in at least two ways:
  - (i) Deploy the optimal suffixal alignment and epenthesize to resolve the cluster (11b).
  - (ii) Flop the affix to the opposite side where it can attach w/o phonotactic complications (11c).

⇒ Huave chooses the latter. This behavior is what we are referring to as *affix mobility.*
  - Since mobility is preferred to epenthesis, we know that DEP also outranks ALIGN-ASP-R (10).

(10) **Ranking:** *CC, DEP ≫ ALIGN-ASP-R

(11) **Mobile affixes to V(...)C roots**

i. Example: t-u+c (*cuc*)
CP-eat
'. s/he ate' (intransitive) [Kim 2010:140, ex. 12b]

ii. Tableau:

/u+c, t_{CP}/	*CC	DEP	ALIGN-ASP-R
a. uc-t	*!		
b. uc-*i*t		*!	
c. ☞ t-uc			** (u,c)

- No root, together with its theme vowel, both begins and ends in a consonant [**C(...)C**].
  - But this configuration does occur when multiple affixes are present (see §3.4).
- In these cases, the *CC problem would arise whether the affix is prefixed or suffixed.
  - The alignment analysis (both my version and Kim's version) rightly predicts that the affix will surface to the right in these cases.
  - Prefix (13c/d) and suffix candidates (13a/b) tie on *CC or DEP, and the tie is broken by lower-ranked ALIGN-ASP-R in favor of the suffix (13b).
  - From these examples, we see epenthesis is preferred to creating a cluster: *CC ≫ DEP (12).

(12) **Ranking:** *CC ≫ DEP ≫ ALIGN-ASP-R

(13) **Hypothetical mobile affixation to C(...)C root**

/CVC, t_{CP}/	*CC	DEP	ALIGN-ASP-R
a. CVC-t	*!		
b. ☞ CVC-*i*t		*	
c. t-CVC	*!		*** (CVC)
d. t*i*-CVC		*	*!*** (*i*, CVC)

3.2 Mobility of the 2nd Person Intransitive

- Next, consider 2nd person intransitive forms, which are marked by two separate Layer 1 morphemes:
  - The general 2nd person agreement marker ("2") /e/ ([i], roughly, word-initially; [e] elsewhere)
  - The special fusional 2nd person intransitive marker ("2I") /r/.

⋆ 2 /e/ doesn't show mobility (always a prefix),[3] but 2I /r/ does show mobility. This is exactly what we expect if mobility is driven by phonotactic pressure to avoid clusters:
  → A consonantal affix moves, because it would create a cluster in its otherwise preferred position.
  → A vocalic affix always stays in its preferred location, because it will never create a cluster.

- 2nd person intransitive atemporal verbs can be inflected with just these two affixes. 2 /e/ always surfaces to the left of the root, but the position of 2I /r/ varies by root shape:
  - **C(...)V** (14a): 2I /r/ surfaces at the right edge.
  - **V(...)C** (14b): 2I /r/ surfaces between 2 /e/ and the root.

(14) **Mobility of the 2nd person intransitive in the atemporal paradigm**
  a. **C(...)V** roots: e_2-C(...)V-$\boxed{r_{2I}}$ e.g. *i-mo^{h}ko-r* (**r-e-mo^{h}ko*, **i-r(a)-mo^{h}ko*, etc.)
  b. **V(...)C** roots: e_2-$\boxed{r_{2I}}$-V(...)C e.g. *i-r-uc* (**i-uc-(i)r*, **uc-i-r*, etc.)

- This behavior can be modeled through the ranking of multiple alignment constraints, in conjunction with *CC and Dep.
  - 2 /e/ is unwaveringly prefixal, so it must have a left-alignment constraint: Align-2-L.
  - While other alternatives exist at the moment, let's assume that 2I /r/ has a right-alignment constraint: Align-2I-R.

- These two constraints, independent of their relative ranking, derive the **C(...)V** case — (15).
  - Candidate (15c) *e-mo^{h}ko-r* perfectly left-aligns 2 /e/ and perfectly right-aligns 2I /r/.
  - Because the root ends in a V, right-alignment of 2I /r/ does not raise any phonotactic problems.
  - All other candidates fare worse on alignment, and many have phonotactic problems to boot.

(15) **2nd person intransitives to C(...)V roots**
  i. Example: e-mo^{h}k+o-r (*imo^{h}kor*)
  2-face.down-2I
  'you (sg.) lie face down' [Kim 2010:140, ex. 12j]

  ii. Tableau:

/mo^{h}k+o, r_{2I}, e_2/			Align-2-L	Align-2I-R
a.		mo^{h}ko-e-r	*!*** (m,o^h,k,o)	
b.		mo^{h}ko-r-e	*!**** (m,o^h,k,o, r)	*! (e)
c.	☞	e-mo^{h}ko-r		
d.		r-mo^{h}ko-e	*!**** (r, m,o^h,k,o)	*!**** (m,o^h,k,o, e)
e.		e-r-mo^{h}ko		*!*** (m,o^h,k,o)
f.		r-e-mo^{h}ko	*! (r)	*!**** (e, m,o^h,k,o)

[3] Kim (2008:346–350, 2010:155–157) mentions limited variability in the position of the 2 morpheme in conjunction with the Subordinate. This appears to be based on morphological reanalysis, not affix mobility proper.

- In **V(...)C** roots, the desired right-alignment of 2I /r/ (candidate (18c)) *would* create a consonant cluster. Since other orderings can avoid creating a cluster, this candidate order is discarded.
  - There are two main options for re-ordering: move 2I /r/ leftward or move 2 /e/ rightward.
- What we see is that displacement of 2I /r/ is preferred:
  - Among the phonotactically sound candidates, (18e) [e-r-u-c] ≻ (18a) [uc-e-r]. Therefore:

(16) **Ranking:** ALIGN-2-L ≫ ALIGN-2I-R

- Since mobility is phonotactically driven here, {*CC ≫ DEP} must also dominate ALIGN-2I-R.
  - Hence, (18e) [e-r-u-c] ≻ (18c) [e-uc-(*i*)r].

(17) **Ranking:** *CC ≫ DEP ≫ ALIGN-2I-R

(18) **2nd person intransitives to V(...)C roots**

i. Example: e-r-u+c (*iruc*)
2-2I-eat
'you (sg.) eat' (intransitive) [Kim 2010:140, ex. 12d]

ii. Tableau:

/u+c, r_{2I}, e_2/		*CC/DEP	ALIGN-2-L	ALIGN-2I-R
a.	uc-e-r		*!* (u,c)	
b.	uc-(*i*)r-e	*!	*!**(*) (u,c, (*i*),r)	* (e)
c.	e-uc-(*i*)r	*!		
d.	r-uc-e		*!** (r, u,c)	*** (u,c, e)
e. ☞	e-r-uc			** (u,c)
f.	r-e-uc		*! (r)	*** (e, u,c)

3.3 Multiple mobility with 2I /r/ and Asp

- Now we can start looking at what happens when two mobile affixes co-occur. 2nd person intransitives can be marked for aspect (e.g. CP /t/); for example, to a **C(...)V** root, *t-e-mo^{h}ko-r* (19):

(19) **2nd person intransitive *completives* to C(...)V roots**

i. Example: t-e-mo^{h}k+o-r (*cemo^{h}kor*)
CP-2-face.down-2I
'you (sg.) lay face down' [Kim 2010:140, ex. 12k]

ii. Tableau:

/mo^{h}k+o, r_{2I}, e_2, t_{CP}/		*CC	DEP	ALIGN-2-L	ALIGN-2I-R	ALIGN-ASP-R
a.	mo^{h}ko-t-e-r			**!*** (m,o^h,k,o, t)		** (e, r)
b.	mo^{h}ko-r-e-t			**!*** (m,o^h,k,o, r)	** (e, t)	
c. ☞	t-e-mo^{h}ko-r			* (t)		****** (e, m,o^h,k,o, r)
d.	r-e-mo^{h}ko-t			* (r)	*!**** (e, m,o^h,k,o)	
e.	e-mo^{h}ko-t-*o*r		*!			** (*o*,r)
f.	e-mo^{h}ko-t-r	*!				* (r)

- Both Aspect and 2I /r/ have right-alignment constraints.
  - Both morphemes are single consonants, and respond to the same phonotactic conditions.
  - Since only one morpheme can attain word-final position (assuming no coalescence), their relative left/right order tells us the ranking of their alignment constraints.

- In optimal candidate (19c) *t-e-mo*^{h}*ko-r*, 2ɪ /r/ (successfully) surfaces in word-final position, whereas CP /t/ is displaced all the way to word-*initial* position; therefore:

(20) **Ranking:** Align-2ɪ-R ≫ Align-Asp-R

- In most languages, the result of this competition would be a form like **e-mo*^{h}*ko-t(o)r* (19e/f), where both affixes end up as suffixes, in the order determined by the alignment ranking.
  - This would violate either Dep (19e) or *CC (19f), but ordering considerations would prevail.

⋆ **What's different in Huave is the tolerance of mobility in the service of these phonological problems.**
  → Because the morphology happens to furnish an additional vowel (the 2 morpheme /e/), the cluster problems faced by (19e,f) can be avoided by "movement" of one of the affixes:
    (i) CP /t/ could move left, before 2 /e/, as in (19c); or
    (ii) 2 /e/ could move right, between the mobile affixes, as in (19a).
  - If Align-2-L ≫ Align-Asp-R (which follows from transitivity; cf. (16) and (20)), leftward displacement of CP /t/ (19c) will be preferred.

- Note, nonetheless, that Align-2-L satisfaction is not perfect. The 2 /e/ morpheme is still displaced from the left edge by CP /t/, just minimally so.
  - This violation is driven by the higher ranking of {*CC ≫ Dep}.
  ⇒ The resulting order is determined by optimizing alignment over whatever candidates remain.

(21) **Ranking:** *CC ≫ Dep ≫ Align-2-L ≫ Align-2ɪ-R ≫ Align-Asp-R

- 2nd intransitive completives of **V(...)C** roots, e.g. *t-e-r-uc* (22), follow from the same ranking.
  - Here, the two available vowels are both on the left side of the root, and therefore the two consonantal affixes surface on that side.
  - Nevertheless, the relative linear order of the two consonantal affixes is maintained: 2ɪ /r/ is further right than CP /t/, because Align-2ɪ-R ≫ Align-Asp-R.

(22) **2nd person intransitive *completives* to V(...)C roots**
i. Example: t-e-r-u+c (*ceruc*)
CP-2-2ɪ-eat
'you (sg.) ate' (intransitive) [Kim 2010:140, ex. 12e]

ii. Tableau:

/u+c, r_{2I}, e_2, t_{CP}/	*CC/Dep	Align-2-L	Align-2ɪ-R	Align-Asp-R
a. t-uc-e-r		**!* (t, u,c)		**** (u,c, e, r)
b. r-uc-e-t		**!* (r, u,c)	**** (u,c, e, t)	
c. ☞ t-e-r-uc		* (t)	** (u,c)	**** (e, r, u,c)
d. r-e-t-uc		* (r)	***!* (e, t, u,c)	** (u,c)
d. e-t-uc-(*i*)r	*!			***(*) (u,c, (*i*),r)

3.4 Mobile 1st person /s/ and its interaction with "Aspect"

- The last mobile affix is the 1st person agreement morpheme /s/ (abbreviated "1").
  - Kim assigns it to "Layer 3"; it tends to occur "outside" of the Layer 1 & 2 affixes.
  - The Layer 2 affix relevant here is the prefixal Future marker /i/.

- Morphology prevents minimal pairs, but the mobility of 1 /s/ can be seen in the contrast between:
  - (i) **Prefix** in **V(...)C** roots (23) [Examples from Kim 2008:249, 252]
  - (ii) **Suffix** in **C(...)V** *stems* [root (+ theme vowel) + intransitive suffix /u/] (24)

(23) **Prefixal [s] to V(...)C roots**
- a. [s]-a+ⁿɟim (*saⁿɟjom*) 'I want'
- b. [s]-a+ʰʧ (*saʰʧ*) 'I give'

(24) **Suffixal [s] to C(...)V stems**
- a. wic+i-u-[s] (*wi.cjo.us*) 'I rise'
- b. peʰ-u-[s] (*pjaʰ.us*) 'I lie'

3.4.1 Completive and Stative

- 1 /s/ can co-occur with the Aspect markers — Completive, Stative, and Subordinate.[4] The clearest interaction between 1 /s/ and Aspect is in the 1st sg. Completive or Stative of **V(...)C** roots (25):

(25) **1st person singular Completive/Stative of V(...)C roots** [(Kim 2010:141)]

a. n-u+kʷal-*as* (*ɲukʷalas*)
ST-child-1
'I am pregnant'

b. t-a+ʰʧ-*is* (*taʰʧjus*)
CP-give-1
'I gave (it)'

- Like with 2I + Asp (§3.3), these forms have two mobile consonantal affixes. But unlike those cases, there is only *one* available vowel (the theme vowel at the left edge of the root).
  - ○ One affix will attach to that V (avoiding a cluster), but the other will be stuck next to a C.
  - → This is the first (real) case where epenthesis is unavoidable.
- Nevertheless, the relative left/right order of 1 /s/ and Asp reveals the relative ranking of their alignment constraints.
  - ○ 1 /s/ surfaces at the right edge while Asp is displaced all the way to the left; therefore:

(26) **Ranking:** ALIGN-1-R ≫ ALIGN-ASP-R

- Notably, even though Asp is attaching in the phonotactically preferred location, it is 1 /s/ whose alignment preferences are being satisfied.
  - ○ Therefore, under this analysis, there is no direct connection between morphological priority and phonotactic optimization. The two considerations co-exist, but are distinct.

- The tableaux in (27–28) illustrate how this works. (27) contains the maximal assortment of candidates, with all possible orderings of the three morphemes. The candidates are organized pairwise:
  - (i) The first shows a particular order without cluster-breaking epenthesis;
  - (ii) The second shows that same order with all clusters broken up by an epenthetic vowel.
- *CC ≫ DEP automatically prefers the epenthesis candidates to the cluster candidates.
  - ○ Since there are no orderings that, without epenthesis, lack clusters, the winning candidate will violate DEP (minimally).
  - ○ Extra DEP violations (27f,h) are not tolerated if mis-alignment (=mobility) is possible.
- The choice among the minimal DEP violators — pulled out in (28) — is adjudicated by the highest-ranked alignment constraint: ALIGN-1-R.
  - ⇒ Avoidance of the extra DEP violation causes mobility of Stative /n/ ([ɲ]) in this case.

[4] It is apparently blocked from occurring with the subordinate by the more specific 1st person Subordinate portmanteau morpheme /n/, except when the Future morpheme /i/ is also present.

(27) **Tableau for (25a) [n-u+k^{w}al-*a*s] (*ɲuk^{w}alas*)** (equivalent to (25b) as well)

/u+k^{w}al, n$_{ST}$, s$_1$/	*CC	Dep	Align-1-R	Align-Asp-R
a. s-uk^{w}al-n	*!		***** (u,k^w,a,l, n)	
b. s-uk^{w}al-*a*n		*	*!***** (u,k^w,a,l, *a*,n)	
c. n-uk^{w}al-s	*!			***** (u,k^w,a,l, s)
d. ☞ n-uk^{w}al-*a*s		*		****** (u,k^w,a,l, *a*,s)
e. uk^{w}al-s-n	*!*		* (n)	
f. uk^{w}al-*a*s-*a*n		**!	** (*a*,n)	
g. uk^{w}al-n-s	*!*			* (s)
h. uk^{w}al-*a*n-*a*s		**!		** (*a*,s)
i. s-n-uk^{w}al	*!		***** (n, u,k^w,a,l)	**** (u,k^w,a,l)
j. s*a*-n-uk^{w}al		*	*!***** (*a*n, u,k^w,a,l)	**** (u,k^w,a,l)
k. n-s-uk^{w}al	*!		**** (u,k^w,a,l)	***** (s, u,k^w,a,l)
l. n*a*-s-uk^{w}al		*	*!*** (u,k^w,a,l)	****** (*a*,s, u,k^w,a,l)

(28) **Reduced tableau for (25a) [n-u+k^{w}al-*a*s] (*ɲuk^{w}alas*)**

/u+k^{w}al, n$_{ST}$, s$_1$/	*CC	Dep	Align-1-R	Align-Asp-R
b. s-uk^{w}al-*a*n		*	*!***** (u,k^w,a,l, *a*,n)	
d. ☞ n-uk^{w}al-*a*s		*		****** (u,k^w,a,l, *a*,s)
j. s*a*-n-uk^{w}al		*	*!***** (*a*n, u,k^w,a,l)	**** (u,k^w,a,l)
l. n*a*-s-uk^{w}al		*	*!*** (u,k^w,a,l)	****** (*a*,s, u,k^w,a,l)

- Crucial rankings, and supporting candidate comparisons, are identified in (29):

(29) **Rankings:**

a. *CC ≫ Dep [(27d) ≻ (27c)]
b. Dep ≫ Align-Asp-R [(27d) ≻ (27h)]
c. Align-1-R ≫ Align-Asp-R [(27d) ≻ (27b,j)]

- The morphology again conspires to make a perfect **C(...)V** root minimal pair unavailable, because the intransitive suffix /u/ is required with such roots.[5]
  - The vowel of itr /u/ allows for optimal alignment without phonotactic problems.
  - So, Align-1-R ≫ Align-Asp-R (ranking (29c)) determines the outcome all on its own:

(30) **1st person singular Completive/Stative (Intransitive) of C(...)V roots**

i. Example: ʧut+u-t-u-s (*ʧututus*)
sit-cp-itr-1
'I sat down' (intransitive) [Kim 2010:141, ex. 15g]

ii. Tableau:

/ʧut+u, t$_{CP}$, u$_{ITR}$, s$_1$/	*CC/Dep	Align-1-R	Align-Asp-R
a. ʧutu-s-u-t		*!* (u, t)	
b. ☞ ʧutu-t-u-s			** (u, s)
c. s-u-ʧutu-t		*!***** (u, ʧ,u,t,u, t)	
d. t-u-ʧutu-s			***!*** (u, ʧ,u,t,u, s)

- This shows that the interactive mobility of 1 /s/ and Completive/Stative can be explained in exactly the same way as the other types of mobility discussed thus far.

[5] With examples like (30), the Intransitive morpheme's alignment constraint (Align-itr-R) turns out to do no work, and not be involved in any critical rankings (verified using OTSoft (Hayes, Tesar, & Zuraw 2013)).

3.4.2 Subordinate

- In Kim's (2008, 2010) analysis, the Subordinate patterns exactly like the Completive and the Stative. But the parallel analysis actually picks out a distinction.

- The Subordinate has a special portmanteau allomorph /n/ for 1st person forms (SB1).
  - In simple Subordinates (Table 2a), 1 /s/ is absent (SB1 /n/ apparently expones 1st person).
  - Compare these to equivalent Completives (Table 2b), which have both CP /t/ and 1 /s/.
- Therefore, we cannot test the relative ordering properties of the Subordinate morpheme and the 1 morpheme in the basic Subordinate construction.

Table 2: 1st person Subordinates vs. 1st person Completives

		1st singular	1st plural	
a.	**Subordinate**	**n**-a+ra^{ŋ}g (*nara^{ŋ}g*) SB1-do	**n**-a+ra^{ŋ}g-an (*nara^{ŋ}gan*) SB1-do-PL	[Kim 2008:263]
		we^{h}k+e-**n** (*we^{h}kjan*) born-SB1	we^{h}k+e-**n**-u-n (*we^{h}kjanun*) born-SB1-ITR-PL	[Kim 2008:263]
b.	**Completive**	**t**-a+ra^{ŋ}g-***as*** (*tara^{ŋ}gas*) CP-do-1	**t**-a+ra^{ŋ}g-***as***-an (*tara^{ŋ}gasan*) CP-do-1-PL	[Kim 2008:276]
		wic+i-**t**-u-**s** (*wicjotus*) rise-CP-ITR-1	wic+i-**t**-u-**s**-un (*wicjotusun*) rise-CP-ITR-1-PL	[Kim 2008:277]

- However, the *Future* Subordinate *does* allow (in fact requires) SB1 /n/ to co-occur with 1 /s/.
  - With the extra vowel provided by FUT /i/, these two consonantal affixes display typical interactive mobility, exactly parallel to the 2nd person Completive/Stative Intransitives.
  - In these cases (32–33), SB1 /n/ always surfaces further to the right than 1 /s/; therefore:

(31) **Ranking:** ALIGN-SB-R ≫ ALIGN-1-R

- Since FUT /i/, just like 2 /e/, always surfaces on the left, we can give it a left-alignment constraint.
  - As long as ALIGN-FUT-L ≫ ALIGN-SB-R, we derive the correct outcomes for the two respective root shapes, as shown in (32) and (33).

(32) **1st person Future Subordinate of V(...)C roots**

i. Example: s-i-n-a+^{h}ʧ (*ʃina^{h}ʧ*)
1-FUT-SB1-give
'(that) I will give (it)' [Kim 2010:141, ex. 15b]

ii. Tableau:

/a+^{h}ʧ, n_{SB1}, i_{FUT}, s_1/		ALIGN-FUT-L	ALIGN-SB-R	ALIGN-1-R
a.	s-a^{h}ʧ-i-n	**!* (s, a^{h},ʧ)		
b.	n-a^{h}ʧ-i-s	**!* (n, a^{h},ʧ)	**** (a^{h},ʧ, i, s)	
c. ☞	s-i-n-a^{h}ʧ	* (s)	** (a^{h},ʧ)	**** (i, n, a^{h},ʧ)
d.	n-i-s-a^{h}ʧ	* (n)	***!* (i, s, a^{h},ʧ)	** (a^{h},ʧ)

(33) **1st person Future Subordinate of C(...)V roots**

i. Example: s-i-ʧut+u-n (*ʃiʧutun*)
1-FUT-sit-SB1
'(that) I will sit' [Kim 2010:141, ex. 15c]

ii. Tableau:

/ʧut+u, n_{SB1}, i_{FUT}, s_1/	ALIGN-FUT-L	ALIGN-SB-R	ALIGN-1-R
a. ʧutu-s-i-n	**!*** (ʧ,u,t,u, s)		** (i, n)
b. ʧutu-n-i-s	**!*** (ʧ,u,t,u, n)	** (i, s)	
c. ☞ s-i-ʧutu-n	* (s)		****** (i, ʧ,u,t,u, n)
d. n-i-ʧutu-s	* (n)	*!**** (i, ʧ,u,t,u)	

- {*CC ≫ DEP} must dominate ALIGN-FUT-L in order to avoid better-aligned epenthesis candidates, e.g. *[i-ʧutu-s-*u*n] for tableau (33). The full rankings (all crucial) are pulled out in (34):

(34) **Rankings:** *CC ≫ DEP ≫ ALIGN-FUT-L ≫ ALIGN-SB-R ≫ ALIGN-1-R[6]

⋆ The conflation of Completive/Stative with Subordinate is no longer tenable:

(35) **Paradoxical Asp rankings**

a. Ranking (34): ALIGN-SB-R ≫ ALIGN-1-R
b. Ranking (29): ALIGN-1-R ≫ ALIGN-"ASP"-R ["ASP" = {CP,ST}]

- This is because it is purely left/right order that reflects alignment rankings (see Trommer 2001), unlike Kim's cyclic layered system, where sequential attachment is reflected by inside-out ordering.

- Separating out Subordinate from Completive and Stative is probably desirable.[7]
  - Completive and Stative are clearly aspectual morphemes.
  - But Subordinate explicitly *does not* carry aspectual information (Kim 2008:263), and should probably rather be characterized as some sort of mood morpheme (ibid.: Ch. 6.2.1).

3.5 2nd person Intransitive Future Subordinate [for completeness]

- A few alignment rankings remain unresolved. They can all be resolved by looking at the 2nd person Intransitive Future Subordinate (36).

(36) **2nd person Intransitive Future Subordinate**

a. **V(...)C root**
i-m-e-r-u+c (*imeruc*)
FUT-SB-2-2I-eat
'you (sg.) will eat' [Kim 2010:141, ex. 14b]

b. **C(...)V root**
i-m-e-wic+i-r (*imewicjor*)
FUT-SB-2-rise-2I
'you (sg.) will get up' [Kim 2010:141, ex. 14c]

6 Note that we now have evidence for the ranking of DEP over ALIGN-1-R via transitivity.

7 Again, Kim only says that the three morphemes are "mutually exclusive" (2008: 331). She does not say that they are all belong to the same category in any meaningful sense.

- fut /i/ always appears further left than 2 /e/, and both are left-aligned morphemes, so:

(37) **Ranking:** Align-fut-L ≫ Align-2-L

- 2i /r/ always appears further right than sb /m/, and both are right-aligned morphemes, so:

(38) **Ranking:** Align-2i-R ≫ Align-sb-R

3.6 Ranking summary

(39) **Hasse diagram for Huave**

*CC
|
Dep
|
Align-fut-L
|
Align-2-L
|
Align-2i-R
|
Align-sb-R
|
Align-1-R
|
Align-Asp-R

4 The plural morphemes and unexpected epenthesis

- The analysis developed above makes a prediction... which is wrong, but in exactly the right way.
  ↪ The cyclic analysis doesn't (inherently) make this prediction.

(40) **Prediction:**
No verb-word that begins in a vowel should ever display cluster-breaking epenthesis.

- This has been true of all cases examined thus far. However, one other (class of) affix consistently violates this prediction: *plural agreement*.

4.1 Data and analysis

- The default plural agreement marker is /n/.[8] It always surfaces as a suffix, rightmost in the word.
  - In (41a), where there are enough right-side vowels for all the right-oriented consonantal affixes, pl /n/ surfaces as the rightmost suffix with no epenthesis.
  - In (41b), where there aren't enough right-side vowels, it surfaces as the rightmost suffix with preceding epenthesis, along with prefixal realization of 1 /s/.
- This is what we'd expect from a consonantal affix with a high-ranking right-alignment constraint.

[8] There is also a special 3rd person plural agreement marker /hw/ (which predictably alternates between [-*V*f, -*V*w, -*V*h, -*V*Ø]) and 1st person inclusive "plural" markers /-r, -$^{(h)}$ts/. These behave exactly like /n/.

(41) a. **2nd person plural intransitive of a C(...)V root**
iwicjorun [i$_2$-wic+i-r$_{2\text{I}}$-u$_{\text{ITR}}$-$\boxed{\text{n}_{\text{PL}}}$] 'you (pl.) rise' (Kim 2008:252)

b. **1st person plural atemporal of a V(...)C root**
sa^{n}ɟjoman [s$_1$-a+^{n}ɟim-$\boxed{an_{\text{PL}}}$] 'we (excl.) want' (Kim 2008:249)

⋆ However, as shown in Table 3, when PL /n/ attaches to **V(...)C** stem, we find something unexpected: *it surfaces in suffixal position* ***and*** *requires epenthesis.*[9]

• If it were behaving like a normal affix, the uncovered initial vowel would have led it (or another consonantal affix) to migrate leftward to avoid the need for epenthesis.

Table 3: Phonotactically unnecessary epenthesis in plural forms

	Attested epenthetic suffixal form		**Alternative non-epenthetic forms**	
a.	e-^{n}ɟim-$\boxed{an}$ 2-want-PL 'you (pl.) want'	(*i^{n}ɟjoman*)	*$\boxed{\text{n}}$-e-^{n}ɟim, *e-$\boxed{\text{n}}$-a+^{n}ɟim	(Kim 2008:249)
b.	e-^{h}ʧ-$\boxed{in}$ 2-give-PL 'you (pl.) give'	(*i^{h}ʧjon*)	*$\boxed{\text{n}}$-e-^{h}ʧ, *e-$\boxed{\text{n}}$-a+^{h}ʧ	(Kim 2008:249)
c.	e-c-$\boxed{in}$ 2-eat-PL 'you (pl.) eat (s.t.)'	(*icjon*)	*$\boxed{\text{n}}$-e-c, *e-$\boxed{\text{n}}$-a+c	(Kim 2008:257)
d.	e-r-u+c-$\boxed{in}$ 2-2I-eat-PL 'you (pl.) eat' (generic)	(*irucjon*)	*$\boxed{\text{n}}$-e-r-u+c, *r-e-$\boxed{\text{n}}$-u+c	(Kim 2008:257)
e.	i-m-e^{h}ʧ-$\boxed{in}$ FUT-SB-2-give-PL 'you (pl.) will give'	(*ime^{h}ʧjon*)	*$\boxed{\text{n}}$-i-m-e-^{h}ʧ, *m-i-$\boxed{\text{n}}$-e-^{h}ʧ, *i-m-e-$\boxed{\text{n}}$-a+^{h}ʧ	(Kim 2008:279)

• We can characterize this unexpected behavior in a simple way: *right-alignment of the plural affix is* ***more important*** *than avoiding epenthesis.* In terms of ranking, this translates into (42):

(42) **Ranking:** ALIGN-PL-R ≫ DEP

• Integrating this fragment, we derive the desired results, as shown in (43) for the 2nd person plural intransitive of a **V(...)C** root (Table 3d). [*CC-violating candidates like *[i-r-uc-n] are omitted.]

(43) **2nd person *plural* intransitives to V(...)C roots**

i. Example: e-r-u+c-*i*n (*irucjon*)
2-2I-eat-PL
'you (pl.) eat' (intransitive) [Kim 2008:257]

ii. Tableau:

/u+c, r$_{2\text{I}}$, e$_2$, n$_{\text{PL}}$/	ALIGN-PL-R	DEP	ALIGN-2-L	ALIGN-2I-R
a. uc-e-r-*a*n		*	*!* (u,c)	** (*a*,n)
b. ☞ e-r-uc-*i*n		*		**** (u,c, *i*,n)
c. r-e-n-uc	*!* (u,c)		* (r)	**** (e, n, u,c)

9 The (intransitive) prefixal theme vowel /a/ is absent on the surface in Table 3a–c,e (though present elsewhere in the respective paradigms). It is not clear whether this is deletion under hiatus or morphological non-insertion.

- The ranking Align-pl-R ≫ Dep means that pl /n/ must surface at the right edge at all costs.
  - This rules out the phonotactically well-formed, epenthesis-avoiding candidate (43c), where pl /n/ is shifted to the left of the root, and 2i /r/ is shifted to left of 2 /e/.
  - All remaining candidates have to violate Dep (or, worse yet, *CC if they don't epenthesize).
  - Among these, the one whose remaining relevant alignment constraints are optimized — (43b), which maximally satisfies Align-2-L with leftmost 2 /e/ ([i]) — is selected as the winner.
- Thus we see that the high ranking of an alignment constraint, not just phonotactics *per se*, can also be sufficient to induce Dep violations.

- In Kim's cyclic analysis, the distribution of mobile and immobile consonantal affixes is arbitrary, based on which cophonology it happens to have.
  - There is no correlation between (im)mobility and hierarchical structure or linear order.

⋆ The parallel analysis *does* correlate position with immobility (i.e. epenthesis-tolerance):
  - Plural morphemes are immobile because their alignment constraint outranks Dep.
    - ↪ All other consonantal morphemes (with one caveat)[10] are mobile because their alignment constraint ranks below Dep.
  - Align-pl-R's outranking of Dep means it also outranks all other alignment constraints.
    - ↪ Therefore, plural is always rightmost.

⋆ This correlation might yield further insights via the "Mirror Alignment Principle".

4.2 The Mirror Alignment Principle **[probably stopping here for time]**

- As alluded to earlier, in Zukoff (2017a,b, 2020), I propose a framework for morpheme ordering using fully parallel alignment, where the ranking of alignment constraints is tied to (morpho)syntactic structure according to the "Mirror Alignment Principle":

(44) **The Mirror Alignment Principle (The MAP)**

a. If a terminal node α *asymmetrically c-commands* a terminal node β, then the alignment constraint referencing α *dominates* the alignment constraint referencing β.

b. *Shorthand*: If α c-commands β → Align-α ≫ Align-β

[10] There *is* one other immobile consonantal affix: Causative /^{h}ʧ/, exemplified in (i). caus appears close to the root, so it should have a low-ranking alignment constraint. This means it should move around to satisfy Dep. Example (i.c) shows that this is (probably) not the case. It should be noted that this affix isn't productive.

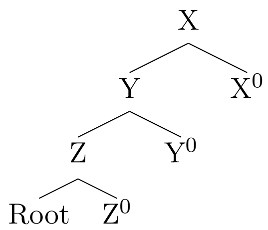
(i) a. **Causative with multiple other affixes** [(Kim 2010:138)]
t-a+ʧup-*i*$^{\mathbf{h}}$**ʧ**-*i*s-*a*n (*taʧupi^{h}ʧisan*)
cp-fill-caus-1-pl
'We (excl.) filled (it)'

b. **Causative with suffixal theme vowel**
le^{ŋ}g+e-$^{\mathbf{h}}$**ʧ**-*e*t (*le^{ŋ}ge^{h}ʧjat*)
straighten-caus-cp
'It straightened'

c. **Causative with prefixal theme vowel**
a+wi^{n}d-*i̲*$^{\mathbf{h}}$**ʧ**-e (*awi^{n}di^{h}ʧe*) [*$^{\mathbf{(h)}}$**ʧ**-a+wi^{n}d-e, *a+wi^{n}d-e-$^{\mathbf{h}}$**ʧ**]
twist-caus-refl
'S/he twists and stretches (his/her body)'

- This approach generates "Mirror Principle" (MP) ordering (Baker 1985), where exponents of morphemes lower down in the syntactic tree appear closer to the root than exponents of morphemes higher up in the tree. This can be demonstrated with the following schematic example:

(45) **Schematic tree structure** (complex head)



- The MAP converts this tree structure into ranking relations. [I'll ignore the Root here, but see Zukoff (2020) for how root-alignment can work.]

(46) **MAP-determined rankings for (45)**

a. X^0 c-commands Y^0 and Z^0 → Align-X-R ≫ Align-Y-R, Align-Z-R
b. Y^0 c-commands Z^0 → Align-Y-R ≫ Align-Z-R
⇒ Align-X-R ≫ Align-Y-R ≫ Align-Z-R

- This generates MP-compliant order. [I give right-alignment constraints for the affixes here, but any combination of alignment direction will yield MP-compliance.]

(47) **MAP-driven MP-compliant order**

/Root, X, Y, Z/			Align-X-R	Align-Y-R	Align-Z-R
a.		Root-X-Y-Z	*!*	*	
b.		Root-Y-X-Z	*!	**	
c.		Root-X-Z-Y	*!*		*
d.		Root-Z-X-Y	*!		**
e.		Root-Y-Z-X		**!	*
f.	☞	Root-Z-Y-X		*	**

- The MAP allows us to make (preliminary) predictions about hierarchical structure *from the phonological analysis*:

(48) **MAP-based reverse engineering:** a crucial ranking between alignment constraints in the phonology implies an asymmetric c-command relation in the (morpho)syntax.

⋆ **Caveat:** The MAP is not fully bidirectional — alignment rankings can come about in ways other than asymmetric c-command in the course of the PF derivation (Zukoff 2020). This means that the MAP should only serve as a hypothesis generator; it does not prove structure.

4.3 The MAP and Person/Number in Huave

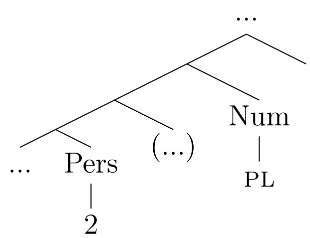
- Now recall the ranking from (43):

(49) **Ranking:** Align-pl-R ≫ Dep ≫ Align-2-L

- This ranking was determined based on *phonological analysis* alone. The relative ranking of Align-pl-R and Align-2-L can be determined only based on their joint interaction with epenthesis.

- Using MAP-based reverse engineering, we generate a hypothesis something like (50), where the NUMBER head is (morpho)syntactically *higher* than the PERSON head:[11]

(50) **Reverse-engineered morphosyntactic structure of Number and Person**



- Much of the literature (e.g. Trommer 2001, Harbour 2016) from various domains (including semantics, syntax, and morphology) has been converging on the idea that, cross-linguistically, NUMBER is structurally higher than PERSON (at least typically, maybe *universally*).

⇒ Through the lens of the MAP, Huave presents *phonological* evidence for this same conclusion.
  - It should be noted that Kim's layer-based analysis is consistent with this view as well.

5 Conclusion

- This talk has demonstrated that mobile affixation in Huave can be modeled **in the phonology, fully in parallel**, in contrast to a "cyclic, layered" approach (Kim 2008, 2010, 2015a,b).
  - Ranked, violable, gradient alignment constraints indexed to individual morphemes govern competition between those morphemes for position in the output.
  - The "desired" order (in terms of alignment) can be interrupted by the force of higher-ranked constraints against consonant clusters (*CC) and epenthesis (DEP).
    - ↪ This explains why only consonantal affixes are mobile.

⇒ "Mobility" can thus be characterized as excess alignment violation to avoid a cluster/epenthesis.

- One noteworthy difference from Kim's analysis is that the immobility of the plural morphemes correlates with their order.
  - This generalization can only be captured in a parallelist approach. [Perhaps *Cophonology by Phase* (Sande, Jenks, & Inkelas 2020) would have something to say about this?]
- When further tied in with the Mirror Alignment Principle (Zukoff 2017a,b, 2020), this same distinction comports with cross-linguistic tendencies(/universals?) about the relative structure of Person and Number.

[11] The same relationship can be gleaned from 1st person plural forms like *[s]a^{n}ɟjoma[n]* (**[n]a^{n}ɟjoma[s]*) (Kim 2008:249) based purely on alignment.

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