Chapter 5

Mobile affixation within a modular approach to the morphology-phonology interface

Yuni Kim

Abstract

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<1> 1 Introduction

The phonological conditioning of mobile affix placement in Huave, as analyzed in Noyer (1994) and Kim (2010), appears to be problematic for a modular feed-forward architecture of grammar in which all morphological operations precede all phonological operations. Following McCarthy & Prince's (1993) approach to phonologically conditioned morphology, the analyses implement a "P >> M" strategy within Optimality Theory where phonological (P) and morphological (M) constraints are evaluated in parallel. Mobile affix positioning then results from a global optimization of phonological structure, at the expense of morphological preferences and defaults. In other words, the outcome of phonological processes such as epenthesis and syllabification must be evaluated in order to determine whether the mobile affix surfaces as a prefix or a suffix, and this type of analysis is incompatible with an ordered separation of the two modules.

On the other hand, Paster (2009) argues that "true" cases of phonological affix order do not exist. In an extensive survey of putative cases of phonological affix order, she finds that nearly all of them are better analyzed as cases of purely phonological operations taking place after affixation, of phonologically conditioned suppletive allomorphy, or of phonological subcategorization (where phonological underlying forms are visible to the morphology, but not touched by it; cf. Bermúdez-Otero's 2012 "insect trapped in amber" analogy), all of which are compatible with a modular feed-forward architecture. Huave is the only case that is not reanalyzed (although a potential direction for reanalysis is suggested), and so the question remains of whether any strictly modular analysis is possible. If so, this is consistent with Paster (2006a, 2009) and Yu (2007)'s arguments against the P >> M model of phonologically conditioned morphology. If not, we are left in the uncomfortable position of having very few counterexamples to the claim that phonologically driven affix ordering does not exist. Aside from Huave, these include Athabaskan (Rice 2011:183) and Moro (Jenks and Rose 2013).

In this chapter I make three points. The first is that Paster's (2009: 34) tentative reanalysis of Huave mobile affix placement, as a phonologically predictable procedure of associating floating features to skeletal positions (cf. Rose 1995), is not compatible with the data. The second is that Huave mobile affixation *is* compatible with a modular feed-forward architecture and the subcategorization-based approach, if we pursue an alternative generalization that allows us to follow Paster's (2009: 35) reanalysis of Afar mobile affixes and view the Huave case as a type of phonologically conditioned suppletive allomorphy. The P >> M architecture is thus no longer strictly needed. The third point, however, is that the suppletion analysis is potentially powerful enough to generate the type of data predicted by P >> M models – i.e., permitting this type of analysis undermines the empirical basis on which phonological affix order has previously been defined. Both the empirical issue and the theoretical debate are consequently rendered less compelling.

It is then an open issue whether there is a more theory-neutral way of understanding and classifying phonological influences on the position of affixes within a word, regardless of where one draws the boundary between what is and is not considered to be "phonological affix order." An issue with this term is that can refer ambiguously to a structurally diverse variety of phonologically conditioned affix orders (i.e. those making reference to phonological structure in any part of the morpheme-linearization algorithm), as noted by Kim (2010: 158) and Rice (2011: 178). For example, it can be deployed in a way that highlights a modular architecture of grammar, referring specifically to the putative subset of affix linearizations that are determined within the phonological component, or otherwise in parallel with phonology, in opposition to phonologically conditioned processes taking place within the morphosyntactic component (see Paster 2009: 23-24).

Here I follow Manova and Aronoff (2010: 115) in taking phonological conditioning of any kind as the primary defining criterion for "phonological affix order", mainly for heuristic reasons. With the caveat that inclusion or exclusion of specific cases will unavoidably be analysis-dependent, since an analysis in inherent to any generalization, this criterion seems to circumscribe a maximal set of cases that can then be examined to determine the most relevant parameters of pattern description, any unexpected typological gaps, etc.; I suggest a classification in §5. The main thrust of my reanalysis of Huave mobile affixation, then, is just to propose an improved generalization, one that confirms its status as a case of phonologically conditioned affix ordering. At the same time, it moves the phenomenon to a slightly different place in the typology, triggering a need to refine our theories – which, as this case throws into relief, are only as good as the insightfulness of their predictions. It appears that within a modular architecture, we currently lack data on which to base sharper analytical distinctions between morphologically conditioned phonological processes, locally determined suppletion, and global optimization. In the future, more definitive evidence should be sought in interactions of phonologically conditioned affix ordering with other phonological processes, of a kind which to my knowledge are not found in Huave.

<1> 2 Huave affix mobility as epenthesis avoidance?

Kim (2010) characterizes Huave verb structure as basically hierarchical, with affixes surfacing at a morphologically specified distance from the stem relative to other affixes. The point of interest is that Huave has not only fixed prefixes and fixed suffixes, but also mobile affixes that can surface on either side of the root. Regardless of whether a mobile affix is a prefix or a suffix, however, it still appears at its fixed hierarchical distance from the stem. Kim (2010: 135) models the Huave verb template with symmetrical "layers" numbered L1 through L4 expanding from either side of the stem, as in (1); Layer 0 is unproductive and does not figure further in the analysis.

(1) [L4 [L3 [L2 [L1 [[Stem] L0] L1] L2] L3] L4]

Layers 1 and 3 contain mobile affixes. In (2a) in the word *ʃ-i-n-a-mut* 'I will write (it)', we see the Layer 1 mobile affix *n-* surfacing in prefixal position adjacent to the stem, while the Layer 3 first-person mobile affix *s-* (allophonically realized as *ʃ-*) occurs farther outside. The mirror-image case is the word *ndil-i-t-ej-as* 'I turned around; I came back' in (2b), where the Layer 1 mobile affix *-t* surfaces in suffixal position next to the stem, while the first-person *s* is realized suffixally but again in an outside position. Note the presence of a preceding vowel, which is epenthetic.

(2)	[L4	[L3	[L2	[L1	[[Stem]	L1]	L2]	L3]	L4]
a.		ʃ-	i-	n-	a-mut				

1	FUT	1SUB	TV-write

b.	ndil-i	-t	-ej	-as
	turn-V	CPL	RFL	1

The generalization in Kim (2010) is that mobile affixes surface by default as suffixes but are placed in prefixal position wherever this would obviate the need for epenthesis (since Huave does not allow consonant clusters). In (2b), epenthesis is tolerated in the first-person suffix *-s*, but since the base begins with a consonant, prefixation would equally have required epenthesis; so the default preference emerges. However, since the base in (2a) is vowel-initial (but ends with a consonant), moving the first-person affix to prefixal position is the option that will avoid epenthesis. The formal analysis is implemented in Optimality Theory, with phonological epenthesis-avoidance constraints outranking morphological constraints that require mobile affixes to be suffixal. Since phonological factors determine the linear placement of affixes with respect to other affixes in this description and analysis of the phenomenon, it appears to be a clear case of phonologically driven affix ordering.

I will expand on Paster's (2009: 34) suggestion for an alternative analysis in §3, before proposing an new generalization and analysis in §4. The new generalization is argued to be preferable, in that it also accounts for some exceptions to the epenthesis-avoidance story.

<1> 3 Floating-feature analysis

Paster (2009: 34) proposes that a different analysis of Huave affix placement could be attempted by assuming that a mobile affix consists of two objects: a skeletal slot (or slots, such as CV), plus unassociated segmental material (cf. Rose 1995 on Chaha). After affixation has taken place in the morphology, the phonological component associates floating segments left-to-right (or by another standard phonological association convention) to empty slots in the template. A principled separation between morphology and phonology could thus be maintained.

For example, (3) shows the derivation of *t-a-mut-us* 'I wrote (it)', which contains the stem *a-mut* and the mobile affixes *t* (completive; Layer 1) and *s* (1st person; Layer 3). The floating segments associate left-to-right to empty slots around the stem; in the absence of another deciding factor, association happens in the morphological order of attachment: first *t*, then *s*. An epenthetic vowel, indicated here in parentheses, would then be inserted to break up the final consonant cluster. The illustration in (3) is schematic; for expository purposes I show association to a slot of the corresponding Layer number, wherever there are several empty ones that would produce the same linear affix order. I do not resolve issues such as which of whether the L2 slots would be present in the absence of L2 affixation, or the precise shape of the skeletal components of the affixes. In any case, the result of *t*-prefixation and *s*-suffixation is correctly obtained.

(3) Derivation of *t-a-mut-(u)s* 'I wrote (it)'

L3	L2	L1	Stem	L1	L2	L3
CV	CV	CV	CVC	VC	VC	VC
		|	| | |			
		a	m u t			
		TV	write			

t	s
CPL	1

To get the basic pattern of mobile-affix suffixation, it is necessary to stipulate that a consonant can associate to the C slot of a CV morphological unit if and only if the V is already filled. Otherwise, it must look for the next available empty slot. An example of this type is shown in (4); again, epenthetic segments are indicated by parentheses. Here, both affixes surface as suffixes because the lack of a base-initial vowel prevents their association in prefixal positions.

(4) Derivation of *ndil-i-t-ej-(a)s* ‘I turned around’

L3	L2	L1	Stem	L1	L2	L3
CV	CV	CV	CVCV	C	VC	VC
			| | | |		|	
			ndi l- i		ej	
			turn- V		RFL	
			t	s		
			CPL	1		

Fell-swoop association of all floating affixes at once, such as in (3) and (4), can only account for cases where the left-to-right order of mobile affixes mirrors their order of attachment. As can be seen from the symmetrical order of layers on either side of the stem, this is not the case in words where two mobile affixes both surface as prefixes, like in (5).

(5) Structure of *ʃ-i-n-a-mut* ‘I will write (it)’

L3	L2	L1	Stem	L1	L2	L3
s	i	n	a-mut			
1	FUT	1SUB	TV-write			

Left-to-right attachment, illustrated in (6), incorrectly predicts **n-i-s-a-mut*. Because both linear orders are possible, a post-morphological association procedure fails.

(6) Incorrect derivation of *ʃ-i-n-a-mut* ‘I will write (it)’

L3	L2	L1	Stem	L1	L2	L3
CV	CV	CV	CVC	VC	VC	VC
	|	|	| | |			
	i	a	m u t			
	FUT	TV	write			
			n	s		
			1SUB	1		

An obvious solution is to interleave morphology and phonology (Kiparsky 1982) such that the 1SUB Layer 1 affix *n* is already attached by the time Layer 3 is added. The 1st person *s*, being the only floating segment at this stage, will associate to the first available slot, which will be some consonantal position preceding the vowel *i* of the future prefix.

(7) Cyclic derivation of *f-i-n-a-mut* 'I will write (it)'

L3	L2	L1	Stem	L1	L2	L3
CV	CV	CV	CVC	VC	VC	VC
	|	| |	| | |			
	i	n-a	m u t			
	FUT	1SUB-TV-write				
			s			
			1			

Complications arise when the morphological identity of the pre-associated segments must be known in order to determine a floating segment's eligibility for attachment to a preceding position. The condition in (2) that association to a C slot must be licensed by a following V is stated purely phonologically and is thus compatible with strict modularity. However, recall that stems of the shape VCV behave differently depending on which of the vowels is a root vowel and which is a stem-formative. The examples in (8) illustrate the differential placement of the subordinate affix *m*, as a prefix in (8a) but a suffix in (8b).

(8)	a.	m-a-la	b.	uy-u-m
		SUB-TV-gobble		circle-V-SUB
		'that s/he gobbles (it)'		'that it spins'

Since a main advantage of the floating-feature analysis was that its phonological nature and lack of reference to morphological conditioning made it compatible with a modular architecture, the data in (8) represent a challenge; it is not clear how the more restrictive theory can model them. In the P >> M analysis in Kim (2010), the non-modular nature of evaluation and operations enable constraints to refer simultaneously to morphological and phonological information. This type of mechanism was used to argue that the constraints responsible for the basic phonological pattern were sometimes outranked by a higher, morphologically sensitive constraint (i.e. AFFIXSYLL, a constraint requiring affixes to consist minimally of one syllable).

<1> 4 A suppletive allomorphy analysis

A second type of alternative analysis is that prefixal and suffixal variants are not in fact the same affix, but rather suppletive allomorphs. The issue then shifts from determining the algorithm for placement of a mobile affix, to determining which of the allomorphs will surface in any given form. For example, the completive *t* would have the prefixal allomorph *t-* and the suffixal allomorph *-t*. This analysis has the theoretical advantage of being compatible with the more restrictive, modular feed-forward architecture. Allomorph selection is done entirely within the morphology, with conditioning either from morphosyntactic features, or from the phonological environment in lexically underlying forms; Paster's (2006a) Phonological Subcategorization theory of phonologically conditioned suppletive allomorphy is an extended treatment of the latter case.

The original justification for a phonological analysis of Huave mobile affixes is that the morphosyntactic contexts for prefixal and suffixal realizations are not coherent. Taking into account the lexical-semantic distinction between verbs with a prefixal theme vowel (the majority; labelled "prefixing" in Kim 2010) and verbs without one ("suffixing"; argued by Kim 2009 to be the set of externally caused change-of-state verbs, and abbreviated here as

ExtCoS), one possible characterization of the morphosyntactic contexts for the prefixal and suffixal allomorphs of completive marker *t* and first-person marker *s* is listed in (9).

(9) Suppletive allomorphy analysis: morphosyntactic subcategorization

a.	Completive -*t*	ExtCoS non-2nd person
b.	Completive *t*-	Everywhere else
c.	1st person -*s*	Completive; ExtCoS (all TAM)
d.	1st person *s*-	Everywhere else

For both, the prefixal allomorph (9bd) can be seen as a default. The suffixal allomorph of the completive marker only appears in a special subset of intransitive verbs in the 1st (both inclusive and exclusive) and 3rd persons. The suffixal allomorph of the first-person marker appears in the completive of all verbs, and in all TAM categories for the special set of intransitives.

These sets of morphosyntactic environments are arguably not complicated to the point of unlearnability, but they do reduce to a more streamlined list if reconfigured in morphophonological terms, as in (10). Seen this way, the suffixal allomorph is the default: the prefixal allomorph has priority and appears wherever the base-initial segment is a non-root vowel. The suffixal allomorph only chosen if the base is consonant-initial or begins with a vowel belonging to the root, as in (8b). This analysis is similar to Paster's (2009: 35) reanalysis of phonologically conditioned affix mobility in Afar, although the relevant environment in Afar is stateable purely in phonological terms (rather than incorporating morphological information as is done here).

(10) Suppletive allomorphy analysis: morphophonological subcategorization

a.	Completive *t*-	[$V_{[\text{-root}]}$
b.	Completive -*t*	Everywhere else
c.	1st person *s*-	[$V_{[\text{-root}]}$
d.	1st person -*s*	Everywhere else

The morphophonological subcategorization analysis captures the entire pattern of Huave affix mobility, including the problematic cases in (8), in a simple way. Because it is applicable to all mobile affixes (beyond the two shown here), it preserves the generalization in the Kim (2010) analysis that all mobile affixes are placed according to a unified algorithm, with the added advantage that further add-ons such as the AffixSyll constraint are not needed. Allomorph selection is done without look-ahead to phonological processes such as vowel epenthesis, and without a global optimization procedure. Therefore, we can conclude that the P >> M model is not needed for the analysis of Huave mobile affix placement, and that this particular pattern does not provide conclusive evidence against the modular feed-forward architecture of grammar.

Is Huave then not a robust case of phonologically conditioned affix ordering? Before drawing this conclusion, it is necessary to reconsider the definition of the phenomenon. Paster (2009: 23) characterizes it as follows: "Phonology can produce morpheme orderings that disobey other principles." Identification of phonologically conditioned affix order is thus dependent on an analysis of what the default or basic principles are. In many cases, sustained research will converge on a generally accepted best analysis of what the principles are, however they may be formalized. Nevertheless, where these principles are defined in terms of phonology, as in the phonological subcategorization approach, the lines may become blurred.

Huave is a case in point. If we accept that phonology has some effect on whether completive marking manifests itself as a prefix or a suffix, the analytical problem is how to analyze this conditioning. The essence of the suppletive-allomorphy analysis is that each distinct phonological environment is considered as evidence for a separate allomorph, despite all allomorphs being homophonous. Presumably, then, any case of phonologically influenced affix positioning could be modelled in this way, and any case of "deviance" from an otherwise robust principle would be considered a separate allomorph. Without further constraints on what can be considered a suppletive allomorph, claims about the presence or absence of phonologically driven affix order risk becoming unfalsifiable.

I illustrate the problem with the hypothetical language in (11), which illustrates a pattern of apparent global optimization of affix order of the kind predicted not to exist in Paster (2006b). This language has three prefixes, *b*, *l*, and *a*, which configure themselves in order to avoid vowel hiatus (11ac) and coda consonants (11bd). From (11e) we assume that *b* is structurally an inner affix whereas *l* is an outer one, since *l-a-bag* and **b-a-lag* would have been phonotactically legal. In (11fgh), though, we see that they can be reordered to avoid vowel epenthesis wherever possible (given that *bl* is a legal cluster), so that we get *b-l-ag* rather than **lə-b-ag.*

(11)		V-initial root		C-initial root
	a.	a-l-ag	b.	l-a-ga
	c.	a-b-ad	d.	b-a-ga
	e.	l-a-b-ag	f.	b-l-a-ga
	g.	b-l-ag	h.	b-lə-ga

Assuming for the sake of illustration that the prefix *a* is attached first with no phonological conditions, followed by *b* and then *l*, one possible suppletive-allomorphy analysis of this toy data set is given in (12). The allomorphs are listed in order of priority. Here I assume that the order follows automatically from degree of specificity, since the environments form a nest of proper subsets, but an analysis drawing on the formal Priority concept of Bonet, Lloret, and Mascaró (2007) and Mascaró (2007) would also be conceivable. First is the allomorph subcategorized to appear intervocalically, but if no suitable environment is present, a prevocalic version will surface. Failing that, the affix attaches to the left edge of any other base (i.e. a consonant-initial one) and phonology supplies an epenthetic vowel. Epenthesis feeds cyclic allomorph selection such that (11h) goes from *b-ga* to *bə-ga* upon prefixation of *b*, providing a site for Allomorph 2 of the *l* prefix to attach.

(10) Suppletion analysis of phonologically driven, globally optimizing affix order

		b	*l*
a.	Allomorph 1	V] _ [V	V] _ [V
b.	Allomorph 2	_ [V	_ [V
c.	Allomorph 3	_ [	_ [

One possible objection is that the subcategorization frame in (12a) violates the normal assumption that affixes subcategorize for either the left-hand and right-hand environment, but not both (Anderson 1992: 210, Yu 2007: 49). However, alternative non-optimization analyses are available. The examples in (9fgh), where *l* and *b* are rearranged to create a well-formed onset cluster *bl*, could be analyzed as purely phonological (albeit possibly morphologically specific) metathesis, along the lines of Paster's (2009: 31ff.) reanalyses of Doyayo (Wiering & Wiering 1994), Witsuwit'en (Hargus & Tuttle 1997), and Hamer (Zoll 1998). Or, one or more of the affixes could be analyzed as floating, being associated to a phonotactically appropriate slot later on in a phonological part of the derivation (assuming that it is truly floating, i.e. that its position in the morphological hierarchy does not impose strict linear precedence relations with respect to other morphemes). In short, the available mechanisms seem powerful enough to derive a large array of patterns that are also compatible with a "P >> M" phonological optimization analysis. The more fruitful challenge may be to pursue a different theoretical approach that still incorporates the morphophonological conditions in (10). As Manova and Aronoff (2010: 116) observe, "Of course, it is also possible that affixation uses phonological and morphological information at the same time."

<1> 5 Conclusion

I have argued, contra Kim (2010), that epenthesis avoidance may not be the driving principle behind Huave mobile affix ordering, even though it may still be considered under the umbrella of phonological affix ordering. This leaves only a few remaining challenges to Paster's (2009) hypothesis that there is no language where "phonology can produce morpheme orderings that disobey other principles." Jenks and Rose (2013) argue that in the Kordofanian language Moro, mobile affix placement depends on the tonal composition of the base, and is driven by tonal well-formedness factors. In several Athabaskan languages, Rice (2011: 183) argues that there is a set of morphemes that is ordered from prosodically shortest to prosodically longest.

Generally, analyses of phonological affix ordering have differed in whether the relevant phonological conditions are attributed to the lexical entries of individual affixes, to the phonology of the language in general, or to a certain morphological domain, context, or construction (Paster 2009: 23-24; see also Kim 2010: 158). The revised analysis presented here changes Huave's place in the typology: it is now a variant of the type where affix-specific subcategorization frames require an affix to be placed in specific phonological environments, e.g. Chintang (Bickel et al. 2007) and Choguita Rarámuri (Caballero 2010); in Huave, the relevant environment is defined both morphologically and phonologically. Conversely, in Moro (Rose and Jenks 2013) and the Kim (2010) analysis of Huave, the placement of an individual affix is driven by phonological requirements independent of the affix itself; and in Athabaskan (Rice 2011: 183), a set of multiple affixes is ordered along a single phonologically defined scale. Paster (2006b) argues convincingly that Pulaar is precisely *not* a case of this last type.

It is not yet clear whether there is an objective and discrete empirical break between affix ordering based on phonological principles, and affix placement based on phonological subcategorization. As more languages are studied (and the same languages are studied more), the typology of phonological influences on affix placement is continuously refined, and it is from the porous membrane between empirical generalizations and corresponding theoretical analyses that changes in our concept of the landscape arise. For phonologically conditioned allomorphy in general, however, Paster (2006a), Embick (2010), and Bermúdez-Otero (2013) point out one crucial difference in prediction: phonological subcategorization should be sensitive to underlying forms, while output-driven optimization must be conditioned by derived phonological properties; see also Deal & Wolf (2013) on Nez Perce. We have not been able to test this prediction for Huave, since known phonological processes in Huave do not affect the conditions for mobile affixation. If more languages with mobile affixation are found, interactions between phonological processes and affix placement would provide key data.

It is worth noting that the subcategorization analysis in (12) of the prototypically optimizing pattern, while possible, is impressionistically somewhat ugly, and this may not be unconnected to the fact that such clear cases of this type are not really attested (Paster 2006b). Meanwhile, the subcategorization analysis in (10) of Huave, which is attested, arguably achieves more generality with less theoretical apparatus than does the non-modular P >> M approach. Overall, previous literature (including Yu 2007 on infixation) provides a strong case for the existence of phonologically conditioned alternations in surface morpheme order; but deeper analysis of a wider variety of languages will be needed in order to establish a solid typology of the grammatical sources of these effects.

Abbreviations

1	first person
1SUB	first-person subordinate
CPL	completive
FUT	future
RFL	reflexive
SUB	subordinate
TV	theme vowel
V	stem vowel

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