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Subsegmental Parsing:
Floating Features in Chaha and Yawelmani

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Floating features, which link to existing segments, and *ghost* or *latent segments*, such as the Slavic yers, which manifest themselves as independent segments when they appear (Clements & Keyser (1983), Hyman (1985), Kenstowicz & Rubach (1987), Archangeli (1991), Tranel (1993), Szpyra (1992), Rubach (1993)), are considered to be distinct entities whose differences correlate with the presence or absence of a root node (1) (Rubach (1993)).

(1)

full segment	latent segment	floating feature
X		
|		
Root	**Root**	
|	|	
π	π	π

The floating feature's lack of a root node allows it to escape being parsed in contexts where full segments must surface. Latent segments likewise have a special immunity from regular parsing constraints, but are thought to require root nodes primarily because of two other traits which distinguish them from floating features: (a) Floating features can move around to find a place to dock while latent segments are restricted to a single position (Swingle (1992)) and (b) Floating features attach to existing segments while latent segments always surface independently. This distinction has necessitated the use of diacritics or the largely redundant X-tier[1] to capture the defective parsing properties of the latent segments. This paper demonstrates that, on the contrary, the potential mobility and independence of a phonological entity are not correlated either with each other or with the presence or absence of a root node, and thus these cannot be used to motivate a structural distinction between latent segments and floating features. By positing instead a unified underlying representation for all instances of latent segments and floating features (2), this account yields a new cross-linguistic typology of the entire range of behavior associated with subminimal phonological units, while allowing a unique characterization of the immunity of both latent segments and floating features from the demands of regular parsing.

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[1]For arguments for redundancy of the skeletal tier for other phenomena see Hyman (1985), McCarthy & Prince (1986), Hayes (1989), Ito (1989).

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(2) full segment — latent segments and floating features

	full segment	latent segments and floating features
	Root	
	|	
	π	π

1 The Non-Distinctness of Latent Segments and Floating Features

Two major reasons why ghosts have been considered to need a root node to distinguish them from floating features are given in (3).[2]

(3)

	Floating features	**Ghosts**
a.	Floating features can move around to find a place to dock	Ghost segments are restricted to a single position
b.	Floating features attach to existing segments	Ghosts always surface as their own segment

These differences are illustrated by the prototypical cases of ghosts and floating features in (4-5). In Chaha (McCarthy (1983), Rose (1994), Archangeli and Pulleyblank (forthcoming)), the third-person singular object is indicated with labialization on the verb (4). Analyzed as a floating feature, it associates to the rightmost palatalizable segment, either a labial or a dorsal consonant. If there is no such consonant the labialization fails to show up, and crucially it never heads a segment on its own.

(4) Chaha object labialization (McCarthy (1983: 179))

		no object	*with object*	
a.	final	dænæg	dænægʷ	*hit*
		nækæb	nækæbʷ	*find*
b.	medial	mækær	mækʷær	*burn*
		sʸæfær	sʸæfʷær	*cover*
c.	initial	qætær	qʷætær	*kill*
		mæsær	mʷæsær	*seem*
d.	none	sædæd	sædæd	*chase*

This contrasts with cases such as the Yawelmani ghost vowel in (5) (Noske (1984), Zoll (1993b) and see below). This vowel surfaces only as a full segment and only in one position. It is parsed just when it becomes necessary to rescue an otherwise unsyllabifiable consonant, an insight first brought to light by Kisseberth (1970).

[2] A third reason is that while floating features appear to be either single features or a single class of features, it is assumed that any segment can be a ghost, and that therefore root nodes are necessary to organize any possible combination of features (see Rubach (1993)). In fact this assumption is also incorrect. See Zoll (1993b) and Zoll (1994) for arguments against it.

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(5)	-m(I) *precative*	(Data from Newman (1944): 135-6)		
a.	/meeð-mI/	með-mI	*með-m	*having swallowed*
b.	/panaa-mI/	panam•	*panaa-mI	*having arrived*

The problem with accounting for the differences between these two types of cases with the representations in (1) is that the dividing line between the two types of phenomena is not clear cut, and the properties listed in (3) do not always correlate with each other. First of all, it is not always the case that a feature which can move around to find a good docking site will never surface as a segment on its own. This is illustrated in (6) with Yawelmani glottalization (Archangeli (1983, 1984), Archangeli and Pulleyblank (forthcoming)). A variety of suffixes in Yawelmani come with a floating glottal feature which glottalizes the rightmost post-vocalic sonorant. In a biconsonantal root with a final sonorant (6a) the target is at the edge, but in a triconsonantal root (6b) glottalization must travel into the root to find the appropriate target (Archangeli (1983)). If there is no such target in a triconsonantal root, glottalization will fail to surface (6c). Thus far the glottal looks simply like a well-behaved floating feature. But in a biconsonantal root which contains no glottalizable sonorants, glottalization will surface as a full glottal stop on its own (6d). In this way it is acting like the other ghost segments in the language (Noske (1984), Archangeli (1991), Zoll (1993b)) which surface only when there is room for them in a syllable. This example illustrates that the ability of a feature to travel does not entail inability to turn up as its own segment.

(6)	Glottalization in Yawelmani		(Archangeli and Pulleyblank (forthcoming))
a.	/caaw-(÷)aa-/	caaw÷aa-	*glottalizes R-most post-vocalic sonorant*
b.	/÷iilk-(÷)aa-/	÷eL÷kaa-	
c.	/hogn- (÷)aa/	hognaa-	*fails to surface*
d.	/maax- (÷)aa/	max÷aa-	*surfaces in biconsonantal root as stop*

Likewise, it is not always the case that things restricted to edges will also be able to head their own segments. This is illustrated by a palatalization process in Chaha (McCarthy (1983), Rose (1994), Archangeli and Pulleyblank (forthcoming)). Imperative palatalization surfaces on the rightmost consonant if palatalizable, where palatalizable consonants include the coronal and velar obstruents (7a-b). Unlike labialization, the imperative palatalization is restricted to the right edge. If the final consonant is not palatalizable then palatalization will fail to materialize (7c). Like labialization, however, the palatalizing features never turn up as their own segment. Thus the inability of a segment to travel does not entail that it will manifest itself as a segment.

(7) Chaha Imperative Palatalization (Archangeli and Pulleyblank (forthcoming: 278)

a.	nËkËs	nËkËs^y	*love*
b.	wËtæq	wËtæq^y	*fall*
c.	qætær	q^wætær	*kill*

Finally, metathesis and infixation appear to involve the movement of undiminished consonants and vowels, so it is not the case that mobile segments necessarily lack root nodes. In Lithuanian (8), for example, a coronal continuant {s,z,ß,Ω} changes places with a following velar stop, {k, g}, when it preceeds a consonant-initial suffix.

(8)	Metathesis in Lithuanian Conjugation			(Halle and Clements (1983: 157))
		3. pres	3. past	inf.	imp.pl.
	tear	dr´:sk^y-a	dre:sk-e:	dre:ks-ti	dre:ks-kite

Likewise infixation, as analyzed by Prince & Smolensky (1993) and McCarthy & Prince (1993a) involves the movement of an entire affix. In Tagalog, the *um-* acts as a prefix before vowel initial words (9a) but appears after the entire onset in verbs which are consonant initial (9b-c).

(10)	Tagalog -*um*- Infixation	(McCarthy and Prince (1993a: 19))	
	Root	-um-	
a.	aral	um-aral	*teach*
b.	sulat	s-um-ulat	*write*
c.	gradwet	gr-um-adwet	*graduate*

Clearly, then, properties (3a) and (3b) do not correlate either with each other or with the presence or absence of a root node. Cases such as Chaha and Yawelmani require the grammar itself to determine the manner in which a floating feature manifests itself, including when it may surface as an independent segment. In this paper I analyze such cases, extending the model for infixation of Prince & Smolensky (1993) and McCarthy & Prince (1993), and demonstrate that the grammar which is necessary to handle these also accounts for the protoypical cases of latent segments and floating features. The distinction reified in (1) between latent segments and floating features thus is neither necessary nor does it accurately characterize the variety of phenomena associated with defective parsing in phonology.

2 Assumptions

Throughout this paper I will be making two assumptions about features and feature geometry which I would like to make explicit at the outset. First of all, I assume that underspecification is restricted to truly redundant values unless there is motivation for underspecifying contrastive values in a particular context (e.g., Turkish devoicing (Inkelas and Orgun (1993)).[3]

In addition I assume a separation between consonantal place features and vocalic place features, following Clements (1991), Clements and Hume (1993), and Ní Chiosain and Padgett (1993). For the purposes of this paper it does not matter whether this separation is effected through independent place nodes or by using different names for the consonantal and vocalic features. Here for clarity of exposition I will use the traditional vowel features {high, low, back, round, ATR, RTR} for vowels and reserve place of articulation names {coronal, dorsal, labial, phar} for consonants.

[3]For deriving the effects of underspecification from markedness theory see also Smolensky (1993), Kiparsky (1994), Calabrese (1994).

Finally, in the arena of ghost segments there is a lot of terminological confusion, since both latent segments which sometimes materialize, for example the French final consonants, and featureless consonant and vowel slots, such as those that have been proposed for French *h-aspiré*, have been called ghosts. I am now in danger of adding to this confusion by equating the featural ghosts with floating features. In an attempt to keep things clear I will refer to features which lack a root node , that is, the floating features and featural ghosts as "latent" features from now on, reserving the term *ghost* for the abstract consonants and vowels that never appear. The term "latent segment" should be considered to mean floating features which materialize as full segments in contexts determined by the grammar.

3 Infixation

As we saw in the introduction, the distinction between objects that are restricted to edges and those that can move to find a suitable resting place is not restricted to latent features. It is the same distinction that holds between immobile affixes, such as prefixes and suffixes, as opposed to infixes. Prince & Smolensky (1993) and McCarthy & Prince (1993a) argue that infixes do not constitute a distinct third class of affixes, but rather that they differ from fixed affixes in that prosodic constraints outweigh the affix's alignment needs. For the Tagalog data in (9), Prince & Smolensky (1993) propose that the position of *-um-* is determined by the interaction of the familiar NO-CODA constraint (10a) with the alignment constraint that says that *-um-* wants to be at the left edge of the stem, in other words, that *-um-* is essentially a prefix (10b).

(10) Tagalog Constraints (McCarthy and Prince (1993a: 20))
a. NO-CODA Syllables are open
b. ALIGN-*um* Align ([*um*]$_{Af}$, L, Stem, L)

As shown in the tableau in (11), because NO-CODA outranks ALIGN-L the affix will turn up in the leftmost position at which it can avoid violating NO-CODA. For vowel initial roots it can stay at the beginning, but for any form which begins with one or more Cs it must go after the entire onset. The candidate in (11c) wins because there the infix avoids creating an additional coda. It is optimal despite the misalignment of the prefix, because ALIGN violations are less serious than those of the more highly esteemed NO-CODA.

(11) NO-CODA » ALIGN-*um* , from {*um*, *gradwet*}$_{Stem}$

	Candidates	NO-CODA	ALIGN-*um*
a.	[-um.grad.wet	***!	
b.	[g-um.rad.wet	***!	g
c. p	[gr-u.mad.wet	**	gr
d.	[grad.w-u.met	**	gradw!

In the cases discussed in Prince & Smolensky (1993) and McCarthy & Prince (1993a) the crucial interaction leading to infixation is between alignment and syllable structure constraints, but their account easily extends to latent features.[4] To illustrate we turn to Yokuts, which contains examples of several types of latent feature behavior, all of which follow from a single constraint ranking.

4 Yawelmani

4.1 Three Kinds of Latent Segments

In the introduction I presented the Yawelmani glottalization process as an example of a latent feature which will either move to find a suitable docking site or will sprout its own root node, depending on context. The data is repeated in (11). The glottalization surfaces on the rightmost post-vocalic sonorant if there is one. Otherwise, in a biconsonantal root it will manifest itself as a suffix initial glottal stop (11d). Note that in (11a) vowel shortening is unnecessary since [constricted glottis] can dock as a secondary feature on the preceding sonorant, whereas in (11d), a biconsonantal stem with no glottalizable sonorant, vowel length is sacrificed to the parsing of the full glottal. In the triconsonantal root in (12c) there is no way to parse the feature since there is no post-vocalic sonorant, nor is there space for a full glottal stop without epenthesizing a vowel, so the feature is not expressed.

(12) Yawelmani glottalization

a.	/caaw-(÷)aa-/	caaw÷aa-	*shout*	
b.	/÷IILK-(÷)aa-/	÷EL÷kaa-	*sing*	
c.	/hogn- (÷)aa-/	hognaa-	*float*	(*hognV÷aa)
d.	/maax- (÷)aa-/	max÷aa-	*procure*	

This sort of dual behavior of the glottal contrasts with that of other latent segments in Yawelmani. A list of the suffixes containing other latent consonants, shown in parentheses, is provided in (13).

(13) Yawelmani suffixes with latent features (Archangeli (1984))

(h)nel	*passive adjunctive*
(m)aam	*decedent*
(l)saa	*causative repetitive*
(n)iit	*decedent*

What distinguishes these latent segments from regular consonants is that they delete rather than trigger epenthesis, a situation exactly parallel to the case of the glottal above. An example is shown in (14). The *h* in *hin* is a full segment. In (14a) suffixation results in a triconsonantal *gnh* cluster. Something has to be done about a cluster this size since the biggest possible syllable in Yawelmani is CV(X). Because all three are full segments they must all be parsed, and therefore a vowel is epenthesized.[5]

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[4] See Akinlabi (1994) for a somewhat different implementation of this idea.

[5] See Broselow (1993), Zoll (1993a), Archangeli (1991), and Noske (1984) for choice of epenthesis site in clusters.

Likewise in (14b) a triconsonantal cluster arises, but since here the suffixal *h* is a latent feature it fails to manifest itself, analogous to the glottal discussed above. It is the hallmark property of these latent features that they never trigger epenthesis of a vowel to save themselves, although as we can see again in (14c) vowel length will be sacrificed to spare a latent segment.

(14) (Data from Archangeli (1991))

a.	-hin		/hogn-hin/	ho. g[i] n-hin
b.	-(h)nel		/hogon-(h)nel/	ho. gon. -•nel
c.		cf.	/maxaa-(h)nel/	ma. xa-h. nel

Like the glottal stop, then, the latent consonants fail to materialize when there is no room for them in an existing syllable. Unlike the glottal however, their features never show up secondarily on another segment.

Yet a third kind of behavior is exhibited by latent vowels, illustrated in (15). Latent vowels, like the latent consonants, sometimes fail to surface. Unlike the consonants, however, these vowels are parsed only when necessary. So in (15a) the final vowel is required to syllabify the suffixal ***m***. In (15b), on the other hand, this ***m*** becomes the coda of the preceding open syllable. The vowel could show up, but as it is not necessary for any other reason it does not materialize.

(15) Vowel/ø alternation: Latent vowels surface only when they are necessary
-m(I) *precative* (Data from Newman (1944): 135)

a.	/amic-mI/	amic-mI	*amic-m•	*having approached*
b.	/panaa-mI/	panam•	*panaa-mI	*having arrived*

This is not simply a vowel deletion rule, since not all expendable final vowels are deleted (Noske (1984)). As shown in (16), for example, the indirect object suffix *ni* holds on to its final vowel even suffixed to a vowel final root.

(16) Not Final Vowel Deletion: (Noske (1984))
Compare *ni* ‘ indirect object ‘ (Newman, p.201)

a.	/talaap-ni/	talapni		*bow-IO*
b.	/xataa-ni/	xataani	*xatan•	*food-IO*

Superficially it appears then that there are three different kinds of latent segments in Yawelmani: (i) glottals which show up wherever they can either as full segments or secondary features, (ii) other latent consonants which only come to light as full segments when there is room for them, and (iii) latent vowels which turn up only when they are absolutely necessary, these latter two always as independent segments. All three of these contrast with full segments which are always parsed even if it requires epenthesis. I will now show that once we have made the distinction between full segments (which have a root node) and latent features (which lack a root node), the varied behavior of the different latent features follows from the constraints in (17) ranked as in (17e).

(17) Yawelmani constraint families and ranking

a. Segment Structure Constraints
b. *STRUC(σ): Minimize number of syllables in a word
c. PARSE-Feature Features should be parsed
d. ALIGN-suffix Establishes edge affinity for morphemes

e. <u>Ranking</u>:
Segment Structure Constraints , *STRUC(σ) » PARSE-Feature » ALIGN

4.2 Glottalization

Following Archangeli (1983) the suffix induced glottalization is represented as floating [constricted glottis]. Since it moves in search of an appropriate target it must be that the need to parse [constricted glottis] exceeds the importance of aligning it with the edge of the stem, parallel to the case of the Tagalog infix. Thus PARSE-FEATURE must outrank the affix's ALIGNconstraint (18). In this case the alignment constraint wants to line up the left edge of the suffix with the right edge of the root. Any suffixal material which moves leftward away from the root's edge into the root will constitute a violation.

(18) a. PARSE-Feature Features should be parsed
b. ALIGN-suffix Align (affix,L,root, R)

c. Ranking: PARSE-Feature » ALIGN-suffix
Rationale: [c.g] moves to find well-formed docking site

This is illustrated by the tableau in (19). The number of ALIGN violations in the chart reflects the number of root nodes between the segment to which glottalization attaches and the right edge of the root. Note that here the glottal cannot surface as an onset to the suffix since this would create an ill-formed trisyllabic cluster (**÷elk÷aa*). Neither is the root final consonant a licit docking site, since only post-vocalic sonorants are eligible targets (**k÷*). Of the two most likely candidates, the optimal one (19b) has glottalization two root nodes to the left, violating ALIGN twice. This is preferable to simply leaving the feature unparsed (19a) however, since PARSE-FEATURE outranks the alignment constraint.

(19) PARSE-FEATURE » ALIGN

		PARSE-FEATURE	ALIGN
a.	÷ELK-<[c.g]>aa	*!	
b. p	÷el÷k-aa		** (lk)

The impossibility of glottalizing the root final consonant here follows from the set of SEGMENT STRUCTURE constraints. SEGMENT STRUCTURE is used in this paper as a convenient cover term for the group of undominated constraints which render certain combinations of features impossible in a particular situation, and which will always be unviolated (20).[6] As we saw above in (12), affix-induced glottalization is restricted to what Archangeli and Pulleyblank (forthcoming) describe as a "post-vocalic sonorant", either in the onset or coda (Archangeli and Pulleyblank (forthcoming: 305) on authority of Newman (1944:15)).[7] Therefore in this case the role of SEGMENT STRUCTURE is to keep the glottal from docking on obstruents and postconsonantal sonorants. These constraints must dominate the PARSE-FEATURE constraint since the [constricted glottis] feature will fail to make an appearance when it cannot find a place to dock.

(20) Ranking: SEGMENT STRUCTURE » PARSE-Feature
Rationale: [c.g] fails to surface in absence of eligible target

This is illustrated by the tableau in (21) for the triconsonantal root *hogn* . The CVX maximal syllable limit keeps [c.g.] from surfacing as a full glottal stop. It cannot manifest itself as the release of an existing segment since there is no sonorant following a vowel (21a-c). Therefore the most harmonic candidate fails to parse [constricted glottis],

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[6] For discussion of the nuances of segment structure in OT see Prince and Smolensky (1993) and Smolensky (1994). A more detailed dissection of structure preservation will be necessary for cases where some targets are better than others such as Japanese mimetic palatalization (Mester and Ito (1989)), palatalization in Gude (Hoskison (1974)), and Kurdish emphasis (Hoberman (1989)).

[7] Yawelmani does have underlying glottalized obstruents, but obstruents are never targets for affix-induced glottalization. See Archangeli & Pulleyblank (forthcoming: Chapter 3) for a discussion of this in terms of grounding, and McCarthy and Prince (1993/4) for emergence of the unmarked in derived environments.

thereby avoiding the more serious SEGMENT STRUCTURE violations which would otherwise ensue.

(21) SEGMENT STRUCTURE » PARSE-FEATURE

	Candidates	SEGMENT STRUCTURE	PARSE-FEATURE
a.	hogn÷-aa	*!	
b.	hog÷n-aa	*!	
c.	h÷ogn-aa	*!	
d. p	hogn- <[c.g.]> aa		*

We now know the ranking in (22).

(22) SEGMENT STRUCTURE » PARSE-FEATURE » ALIGN

We have seen that SEGMENT STRUCTURE determines the range of appropriate docking sites. The lack of a sanctioned mooring at the edge of the root can send a latent feature sailing inside to look for one, if its need to be parsed exceeds the importance of alignment. But what sets the Yawelmani glottalization apart from prototypical examples of floating features is that under certain circumstances it does show up as an autonomous segment. This likewise follows directly from the analysis developed here. Where there is no glottalizable sonorant, [c.g] will emerge as a full segment if, in the process, it neither displaces a full consonant nor requires vowel epenthesis. Due to the templatic restrictions on the form of Yawelmani words, this boils down to the statement that [constricted glottis] comes out as a full glottal stop in biconsonantal roots which contain no glottalizable sonorant.

This is illustrated by the tableau in (23). There is no glottalizable (post-vocalic) sonorant in *maax* so secondary glottalization is impossible. The only way PARSE-FEATURE can be satisfied then is by the insertion of a full glottal stop (23b), despite the resulting vowel shortening. The need to parse the feature outweighs any cost incurred by shortening.[8] Note that the ALIGN constraint operates here to make sure that the resulting glottal stop surfaces as the onset to the suffix. Therefore the logically possible candidate in (23c), where metathesis has taken place, will never be optimal in Yawelmani.

(23) PARSE-FEATURE » *preserve CVV template* , ALIGN

	Candidates	PARSE-F	*preserve CVV template*	ALIGN
a.	maa. x- <[c.g.]> aa	*!		
b. p	max-÷aa		*	
c.	ma÷x- aa		*	*!

Finally, in a biconsonantal root such as *caaw* which contains a glottalizable sonorant, [c.g.] turns up as glottalization on the final consonant, *caaw÷*, even though alignment is thereby violated. As illustrated by the tableau in (24), this indicates that the templatic constraints which mitigate against vowel shortening must ourank ALIGN.

[8] For discussion of the function of template preservation in Yawelmani see Zoll (1993b) and Broselow (1993).

(24) *preserve CVV template* » ALIGN

	Candidates	PARSE-F	*preserve CVV template*	ALIGN
a. p	caa. w÷ - aa			*
b.	caw-÷ aa		*!	
c.	caaw-<÷>aa	*!		

We have seen that it is least disruptive to the templatic morphology if [constricted glottis] can glottalize an existing segment, but in biconsonantal roots with no post -vocalic sonorant it will materialize as a full stop itself. Let's return now to the triconsonantal root *hogn* which has no eligible docking site. Here, in contrast to the biconsonantal cases, [constricted glottis] simply fails to be parsed. What keeps it from surfacing here is that there is no room for it. The only way to parse it as a segment is to epenthesize a vowel to head a new syllable. I have argued (Zoll (1993b)) that what prevents epenthesis is *STRUC (σ) which tries to minimize the number of syllables (25).

(25) ***STRUC(σ)**:[9] Minimize number of syllables in a word
i.e., 'Don't add unnecessary syllables'

b. Ranking:
*STRUC(σ) » PARSE-FEATURE » ALIGN
c. Rationale: Feature deletes rather than trigger epenthesis

In *max÷aa* above, the glottal stop itself does not trigger a violation of *STRUC(σ) because its presence does not add to the syllable count. *STRUC(σ) will never be violated by a consonant slipping into an existing syllable since it only cares about the total number of syllables in a word, and not about the internal complexity of those syllables. But when the root is triconsonantal and contains no glottalizable sonorant, as shown in the tableau in (26), the only way for the glottal to come to light would be if an extra vowel were epenthesized, and thus an additional syllable created. Since this does not occur, *STRUC(σ) must dominate PARSE-FEATURE and therefore also ALIGN. The optimal candidate (26b) wins because it has the fewest number of syllables even though [constricted glottis] has failed to be parsed.

(26) *STRUC (σ) » PARSE-F

	Candidates	*STRUC(σ)	PARSE-F	ALIGN-suffix
a.	ho. g**V**n. ÷aa-	***!		
b. p	hog. naa- <[c.g.]>	**	*	

Thus the mixed behavior of the Yawelmani glottal follows from the interaction of a hierarchy of general constraints with the latent (rootless) feature. In the next two

[9] This is an OT implementation of Selkirk (1981)'s *Syllable Minimization Principle*. See alse Noske (1984) for very different implementation of a similar insight. (cf. Ito (1989) on minimality).

sections I will show how the same constraints also make the right predictions with regard to the prototypical latent consonants and vowels.

4.3 Latent Consonants

We saw in the previous section that this constraint hierarchy interacts with a latent feature such that it will dock on an existing segment where it can, will minimally disrupt the template and emerge as a full segment if it must, but in the face of impending epenthesis it will fail to be parsed. The only thing that sets the behavior of the other latent consonants apart from the glottal is that they never dock secondarily on an existing segment. I have repeated the data and the list of suffixes in (27-28).

(27) Yawelmani suffixes with latent C

		proposed UR
(h)nel	*passive adjunctive*	[asp]
(m)aam	*decedent*	[lab]
(l)saa	*causative repetitive*	[lat]
(n)iit	*decedent*	[cor]

(28) (Data from Archangeli (1991))

a. -hin /hogn-hin/ ho. g[i] n-hin *gloss*

b. -(h)nel /hogon-(h)nel/ ho. gon. -•nel *gloss*

c. cf. /maxaa-(h)nel/ ma. xa-h. nel *gloss*

Under an account where the latent consonants are represented as floating CPlace or laryngeal features (Zoll (1994)), the role of SEGMENT STRUCTURE is clear, since there is no secondary articulation in Yawelmani which corresponds to these features (Newman (1944)). SEGMENT STRUCTURE keeps them from turning up anywhere except as the primary articulation on an inserted root node. ALIGN insures that when there is room for the epenthetic root node it will be inserted suffix initially, so we need not depend on underlying root nodes to keep latent features in place. The ranking of *STRUC (σ) above PARSE-FEATURE entails that when there is no available spot in an existing syllable, the features will fail to appear. This is illustrated by the tableaux in (29) and (30). In (29), the only way for the latent *(h)* to surface would be through epenthesis of a vocalic nucleus. The consequent addition of an additional syllable produces a fatal violation of *STRUC, so instead the best choice (29b) is to let the feature go.

(29) *STRUC (σ) » PARSE-F

	Candidates	*STRUC(σ)	PARSE-F	ALIGN
a.	ho. gON. HV nel	*!***		
b. p	ho. gON. nel < [asp]>	***	*	

Compare that result to the biconsonantal root *max*. Here with vowel shortening in (30a) the optimal candidate has room for the latent feature to surface as an independent segment. This candidate beats (30b) where the feature is left unparsed. Note again that a candidate like (30c), which differs from the winner only in that the inserted root appears further to the left, loses on the grounds that it violates ALIGN.

(30) Compare {maxaa, (h)nel}

	Candidates	*STRUC(σ)	PARSE-F	ALIGN
a. p	ma. xa-h. nel	***		
b.	ma. xaa- nel < [asp]>	***	*!	
c.	mah. xaa- nel	***		***!

What differentiates the so-called floating glottal from the other latent consonants is that the only secondary release possible in Yawelmani is glottalization. The other potentially mobile consonantal features can only turn up as primary articulations on an epenthetic root. Again ALIGN functions to keep that root at the beginning of the suffix. Thus the behavior of the latent consonants does not entail that they have an underlying root node, since their presence or absence is completely predictable from the grammar.

4.4 Latent Vowels

Finally we return to the latent vowels. The relevant data is repeated in (31). Their behavior differs from that of the latent consonants, including the glottal, in that they do not materialize every time there is room for them, rather they appear only when called upon to rescue an otherwise unparseable consonant, as in (31a).

(31) Vowel/ø alternation: Latent vowels surface only when they are necessary
-m(I) *precative* (Data from Newman (1944): 135)

a.	/amic-mI/	amic-mI	*amic-m•	*having approached*
b.	/panaa-mI/	panam•	*panaa-mI	*having arrived*

The behavior of the latent vowels, analyzed as floating V-place features, also follows from the constraint hierarchy already established. It is the *STRUC(σ) constraint, which militates against superfluous syllable building, that distinguishes the behavior of the latent vowels from the latent consonants. This constraint had no impact on the consonants themselves, since they emerge by simply slipping into existing syllable structure. The constraint functioned there only to exclude vowel epenthesis whose only purpose would have been to rescue an otherwise doomed latent feature. *STRUC(σ) will limit the realization of latent vowels themselves, on the other hand, because a vowel always heads its own syllable in this language. Every time a vowel comes on the scene, it triggers a violation of *STRUC(σ), so latent vowels only show up when violation of *STRUC(σ) is forced by some higher constraint, in this case the need to parse a full segment. Since the language has no secondary vocalic articulations, SEGMENT STRUCTURE prevents them from otherwise docking on existing full segments. This state of affairs is illustrated by the tableaux in (32-33). The winner, in (32a), succeeds in parsing all the full segments into only two syllables so violates *STRUC (σ) only twice, while parsing the latent vowel in the non-optimal (32b) requires three syllables.

(32)

		PARSE-SEG	*STRUC(σ)	PARSE-F	ALIGN-R
a. p	panam-<[hi]>		**	*	

b.	panaa-mI		*!**		

In the tableau in (33), on the other hand, the latent vowel is needed to rescue the otherwise unparseable *m* . This causes an additional *STRUC violation but is necessary in order to avoid deleting a full segment. Therefore (33b) is optimal. Again note that ALIGN rules out the metathetic candidate (33c).

(33)

		PARSE-SEG	*STRUC(σ)	PARSE-F	ALIGN-R
a.	amic<**m**>$^{<[hi]>}$	*!	*	*	
b. p	amic-mI		**		
c.	amic-Im		**		*!

Thus in Yawelmani there is no need to distinguish mobile features from those which must remain at the edge, since both their movement and/or possible segmenthood is predictable from the interaction of SEGMENT STRUCTURE with the three constraints ranked as in (34).

(34) SEGMENT STRUCTURE » *STRUC » PARSE-FEATURE » ALIGN

In the next section we will look at Chaha, where the latent features never project a root node and show how this follows from the same families of constraints.

5 Chaha

5.1 Two Kinds of Floating Features

As we saw in the introduction, whether or not a latent feature was restricted to an edge is completely independent of whether or not it will ever head its own segment. This was exemplified by Chaha, a Gurage (Ethiopian Semitic) language, which has examples of both possibilities (McCarthy (1983), Archangeli and Pulleyblank (forthcoming), Rose (1994) and many earlier sources). Recall that the third person masculine singular object morpheme is a floating [round] feature, repeated here in (35). Labialization shows up on the rightmost labializable consonant (McCarthy (1983)), where labializable consonants include labials and velars (35a-c). If there is no such consonant then the feature fails to emerge anywhere (35d).

(35) Chaha object labialization (McCarthy (1983: 179))

		no object	*with object*	
a.	final	dænæg	dænæg^w	*hit*
		nækæb	nækæb^w	*find*
b.	medial	mækær	mæk^{w}ær	*burn*
		s^{y}æfær	s^{y}æf^{w}ær	*cover*
c.	initial	qætær	q^{w}ætær	*kill*
		mæsær	m^{w}æsær	*seem*
d.	none	sædæd	sædæd	*chase*

This situation contrasts in Chaha with, for example, imperative and impersonal palatalization (36). This feature turns up on the rightmost consonant if palatalizable, where palatalizable consonants include the coronal and velar obstruents (36a-b). Unlike labialization, palatalization is restricted to the right edge. If the final consonant is not palatalizable then palatalization will fail to appear (36c).

(36) Chaha Imperative Palatalization (Archangeli and Pulleyblank (forthcoming: 278)

a.	nËkËs	nËkËs^y	*love*
b.	wËtæq	wËtæq^y	*fall*
c.	qætær	q^wætær	*kill*

The Chaha consonant inventory is shown in (37) (McCarthy (1983: 177)). Only labials and velars have labialized counterparts, while the only palatalized segments are coronals and velars. The realization of the floating features is thus governed by certain inviolable constraints of SEGMENT STRUCTURE.

(37) Chaha Consonants (McCarthy (1983: 177))

plain:	b, p	d, t		g, k
		ṭ		q
	m	n, r		
	f	z, s		x
	w	y		
palatalized :		d^y, t^y	(=Δ, ç)	g^y, k^y
		ṭ ^{y}	(= ç̣)	
		z^y, s^y	(=Ω, ß)	x^y
				q^y
labialized :	b^w, p^w			g^w, k^w
	fw			x^w
	m^w			q^w

Both labialization and palatalization are prototypical floating features in that they never head their own segments. But they differ from each other in that while labial can move to find an appropriate mooring, palatalization must either find a place at the edge of the root or it will fail to surface entirely. First we will look at labialization, which, like the Yawelmani glottal, is mobile. But it differs in that it is completely restricted to a secondary vocalic articulation and will never manifest itself as an independent segment. This follows from the functioning of *STRUC(σ), which allows latent consonants to pop up as part of existing syllables but prevents vowels unless they are needed independently. The constraints which govern its behavior are given in (38). The individual morpheme's alignment constraints are spelled out in 38c-d.

(38) Chaha Constraints

- a. *STRUC (σ)
- b. PARSE-FEATURE
- c. ALIGN-object Align (object, R, Stem, R)
- d. ALIGN-imperative Align (imperative, R, Stem, R)

- d. *STRUC » ALIGN-imperative » PARSE-FEATURE » ALIGN-object

5.2 Labialization

Let’s now motivate this hierarchy for Chaha labialization using the tableau in (39). First of all, the latent features cannot head their own segment since this will cause an additional violation of *STRUC (σ), so the candidate in (39a) is ruled out . The fact that (50b) is non-optimal motivates the ranking of PARSE-FEATURE over ALIGN-obj. It is more important to parse the object mropheme than to align it with the edge, since the feature will move away to find an appropriate place to dock. The winning candidate (39d), where the middle consonant is labialized, is more harmonic than (39b) because (39d) minimally violates align.

(39) PARSE-FEATURE » ALIGN-obj

	Candidates	*STRUC	PARSE-F	ALIGN-obj
a.	mækærU	*!		
b.	mækær <[round]>		*!	
c.	m^{w}ækær			****!
d. p	mæk^{w}ær			**

The motivation for the domination of PARSE-FEATURE by *STRUC(σ) is shown in the tableau in (40). Here, since all of the root consonants are coronals, labialization is impossible. In theory the round feature could project its own vowel but is kept from doing so by the highly ranked *STRUC (σ). It is thus a better choice to violate the lower ranked PARSE-FEATURE by simply sinking the floating feature.

(40) *STRUC (σ) » PARSE-FEATURE

		*STRUC(σ)	PARSE-F	ALIGN-obj
a.	sædæd**U**	***!		
b. p	sædæd <[round]>	**	*	

5.3 Palatalization

Palatalization differs from labialization in that it only appears if it can do so on the rightmost consonant, where palatalizable consonants comprise coronal and velar obstruents. The data is repeated here in (41).

(41) Chaha Imperative Palatalization (Archangeli and Pulleyblank (forthcoming: 278)

a. nËkËs nËkËs^{y} *love*

b. wËtæq wËtæq^{y} *fall*

c. qætær q^{w}ætær *kill*

The failure of the palatalization to float is illustrated by the tableau in (42). Like labialization, the features never manifest themselves as a full vowel since *STRUC (σ) dominates the hierarchy. In contrast with labialization, however, the fact that the feature is restricted to an edge indicates that this morpheme’s alignment constraint must dominate PARSE-FEATURE. In this case it is better to fail to parse the feature (42c) rather than to violate ALIGN (42b). Therefore (42c) is the optimal form.

(42) *STRUC (σ) » ALIGN-imperative » PARSE-FEATURE

		*STRUC(σ)	ALIGN-imp	PARSE-F
a.	q^wætærI	****!		
b.	q^wæt^{y}ær[10]	***	*!	
c. p	q^wætær <[hi]>	***		*

The resulting rankings for both Chaha and Yawelmani are given in (43). Thus the same constraint family which accounted for the "ghost segments" and schizophrenic glottal in Yokuts also makes the right predictions about the behavior of both the mobile and non-mobile latent features in Chaha.

(43) a. Chaha
SEGMENT STRUCTURE » *STRUC(σ) » ALIGN-imp » PARSE-FEATURE » ALIGN-obj

b. Yawlmani
SEGMENT STRUCTURE » *STRUC(σ) » PARSE-F » ALIGN

6 Conclusion

This paper demonstrates that a representational distinction between latent "segments" and floating "features" is both unnecessary and undesirable in light of the fact that the properties assumed to distinguish the two—whether or not the latent features are edge-bound and whether or not they head their own segment—are completely independent of each other. In this paper a unified account of latent "segments" and floating "features" has been developed. The analysis proposed in this paper derives the variety of patterns from the independently needed SEGMENT STRUCTURE, the different possible relations between PARSE and ALIGN in the hierarchy, and the role of *STRUC (σ) in keeping down the number of syllables in the output.

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[10] Palatalization and labialization CAN co-occur in the same word. See for example *s^{y}äg^{w}är* 'change'

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