

*The velar glide in Axininca Campa**

Cari Spring
Ohio State University

The velar glide of Axininca Campa has received attention in past years because of its peculiar behaviour in morphological derivation. Yip (1983) shows that the velar glide deletes if a well-formed syllable results. Black (1991) demonstrates that some verb roots disallow Velar Glide Deletion with some suffixes while requiring it with others, even though a well-formed syllable would result from deletion in each case. He shows that other roots require Velar Glide Deletion in all contexts.

This paper provides new data toward the correct explanation for the behaviour of the velar glide, and an analysis which explains the facts presented in past works and those presented here. This paper argues that in Axininca the morphosyntactic category TENSE subcategorises for a verb root which is, minimally, a prosodic foot. Velar Glide Deletion fails on a root-final velar glide which forms part of the foot required by the tense suffix. The analysis adds evidence to the literature recognising a minimal quantity-sensitive foot as the minimal word of Axininca.

The facts of Velar Glide Deletion are outlined in §1 and the SUBCATEGORISATION ANALYSIS is argued. §2 provides two pieces of phonological evidence supporting the analysis. §3 compares an analysis by Black (1991) in which Velar Glide Deletion is constrained by a special type of quantity-sensitive foot, the DISYLLABIC IAMB, and argues against this proposal. §4 concludes.

1 Tense and Velar Glide Deletion

This section argues that tense suffixes subcategorise for a verb root composed, minimally, of a minimal quantity-sensitive foot. Although the regular syllabification rule of Velar Glide Deletion applies when a well-formed syllable will result, Deletion fails when its application would violate the subcategorisation restriction imposed by tense. Specifically, it fails when the root-final glide is required to meet the minimal foot requirement imposed by tense. Axininca syllabification and Velar Glide Deletion are discussed, then the analysis is presented.

1.1 Velar Glide Deletion

Word-internal syllables in Axininca are composed of at least one onset consonant and one vowel; thus the minimal syllable is a CV sequence. Syllables can contain a geminate vowel and/or a nasal coda; thus the maximal expansion of an Axininca syllable is a CVVN sequence.¹ As shown in (1), Axininca has three vowel segments. Nuclei consist of a single vowel, as given in (1a), a geminate vowel (1b) or one of the diphthongs in (1c):

- (1) a. a o i
 b. aa oo ii
 c. ai oi

Exceptionally, a word can begin with an onsetless syllable, realised as a vowel or a geminate vowel, with or without a nasal coda. This paper assumes without argument that the Axininca syllable template requires an onset, and that word-initial onsetless syllables are extrametrical at lexical level – precisely because they are syllabically ill-formed at the lexical level. This point will be important to the rule of Velar Glide Deletion.²

The segment inventory of Axininca Campa includes a voiced velar glide, represented as /ɣ/, which surfaces under a narrow range of circumstances. The velar glide generally deletes when a single vowel precedes and a single vowel follows, i.e. when a well-formed syllable results after deletion. Examples are given in (2a). Because Axininca syllables allow maximally two vowels per syllable and onsets are required, Velar Glide Deletion fails in (2b) when the result would be an illicit vowel sequence (complete affix glosses are given in the appendix).

- | | | | |
|--------|--------------------------|----------------------------|-------------------------|
| (2) a. | ir-tay-ak-i-ro | [itaakiro] | 'he has burned it' |
| | 3m-burn-PERF-NF-3f | | |
| | no-kay-ak-i | [nokaaki] | 'I have brought water' |
| | 1-bring water-PERF-NF | | |
| | ir-oŋamay-ak-a | [hoŋamaaka] | 'he has killed himself' |
| | 3m-kill-PERF-NFR | | |
| b. | iray-aane ^{hi} | [irayaane ^{hi}] | 'to cry for self' |
| | cry/mourn-INF | | |
| | oyaay-aane ^{hi} | [oyaayaane ^{hi}] | 'to insert' |
| | insert-INF | | |
| | ir-oyaay-ak-i-ro | [hoyaayakiro] | 'he has inserted it' |
| | 3m-insert-PERF-NF-3f | | |
| | ir-mitay-aiy-i-ni | [irimitayaiyini] | 'they jumped' |
| | 3m-jump-PL-NF-PL | | |

Velar Glide Deletion is a lexical syllabification rule which operates unless ill-formed syllable structure would result (cf. Yip 1983; Black 1991); formalisation is given in (3):³

- (3) Delete a velar glide.

(4) demonstrates Velar (vowels are moraic (see syllabification proceeds pheme to build the Axir The derivation in (4) assi proposal that syllabificati of the severe restrictio consonants are either pos direction of syllabificati equivalent results. See structure.) In (4a) the because it is vowel-initia Following Itô's proposa consonants on edges of m in (4b) as an onset (recall While Itô proposes that extraprosodic until an a lexical level), (4) shows consonants syllabify alor Spring 1990 and §§1.2, the environment for Ve resyllabification provide

- (4) a. $\begin{array}{c} (\sigma) \quad \sigma \quad \sigma \\ | \quad / \quad / \\ \mu \quad \mu \quad \mu \\ | \quad | \quad | \\ i \quad m \quad i \quad t \quad a \quad \gamma \end{array}$
- c. $\begin{array}{c} (\sigma) \quad \sigma \quad \sigma \\ | \quad / \quad / \\ \mu \quad \mu \quad \mu \\ | \quad | \quad | \\ i \quad m \quad i \quad t \quad a \quad \gamma \end{array}$

The velar glide surf adjoined on both sides followed by a suffix beɣ glide takes its place for palatal glide, [y], as sho

- (5) a. ir-iray-i-ro
 3m-mourn-N
 ir-tay-i-ro
 3m-burn-NF-
 no-ay-i
 1-take-FUT

posed of at least one onset syllable is a CV sequence, /or a nasal coda; thus the is a CVVN sequence.¹ As its. Nuclei consist of a single or one of the diphthongs in

setless syllable, realised as a it a nasal coda. This paper syllable template requires an s are extrametrical at lexical ill-formed at the lexical level. Velar Glide Deletion.²

mpa includes a voiced velar under a narrow range of eletes when a single vowel when a well-formed syllable in (2a). Because Axininca lable and onsets are required, sult would be an illicit vowel i the appendix).

'he has burned it'

'I have brought water'

aka] 'he has killed himself'

^hi] 'to cry for self'

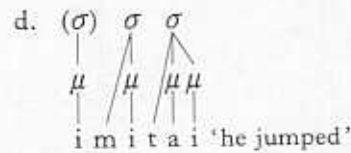
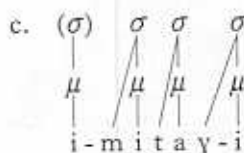
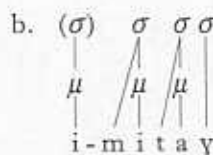
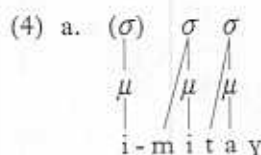
^he^hi] 'to insert'

kiro] 'he has inserted it'

yini] 'they jumped'

fication rule which operates result (cf. Yip 1983; Black

(4) demonstrates Velar Glide Deletion. I assume for the moment that vowels are moraic (see §1.2 for arguments). Following Itô (1986), syllabification proceeds segment by segment and morpheme by morpheme to build the Axininca syllable template given above, CV(V)(N). The derivation in (4) assumes left-to-right syllabification, following Itô's proposal that syllabification is a directional operation. (However, because of the severe restrictions on Axininca syllable structure, where all consonants are either possible onset material or possible coda material, the direction of syllabification could proceed from either direction with equivalent results. See Spring (1990) for review of Axininca syllable structure.) In (4a) the prefix syllabifies and is marked extrametrical because it is vowel-initial: the initial four segments of the root syllabify. Following Itô's proposal that at the lexical level of a derivation, bare consonants on edges of morphemes syllabify, the root-final glide syllabifies in (4b) as an onset (recall that the only possible coda consonant is a nasal). While Itô proposes that lone consonants at the edge of a morpheme are extraprosodic until an affix renders them non-peripheral (or until post-lexical level), (4) shows that in Axininca this is not the case; rather edge consonants syllabify along with the other segments of the morpheme (see Spring 1990 and §§1.2, 2.1 for arguments). The suffix syllabifies in (4c), the environment for Velar Glide Deletion is met, the glide deletes and resyllabification provides the final licit syllable in (4d):



The velar glide surfaces with a velar place specification only when adjoined on both sides by the vowel [a], as exemplified in (2b). When followed by a suffix beginning with a high front vowel, a root-final velar glide takes its place from the initial vowel of the suffix; it is realised as the palatal glide, [y], as shown by forms in (5):⁴

(5) a.	ir-iray-i-ro	[hirayiro]	'he mourned it'
	3m-mourn-NF-3f		
	ir-tay-i-ro	[itayiro]	'he burned it'
	3m-burn-NF-3f		
	no-ay-i	[nayi]	'I will take'
	1-take-FUT		

inserted it'

ir-tay-ak-i-ro

[itaakiro]

'he has burned it'

a will insert it'

3m-burn-PERF-NF-3f

ir-tay-ant-a-ro-ri

[itaantaʋori]

'(reason) that he
burned it'

ar glide is illustrated in (5a),
well-formed syllable rhyme,
k 1991). In (5b) Velar Glide
ice would result. More ex-
tedly fails are given in (6).
t the fact that the velar glide
ide Deletion, since Deletion
ice level:

3m-burn-RSN-NFR-3f-REL

ir-iray-ant-a-ro-ri

[hiraantaʋori]

'(reason) that he
mourned it'

3m-mourn-RSN-NFR-3f-REL

The connection between the failure of Velar Glide Deletion and its context is identified and analysed in the next section.

1.2 Tense subcategorises for a minimal word root

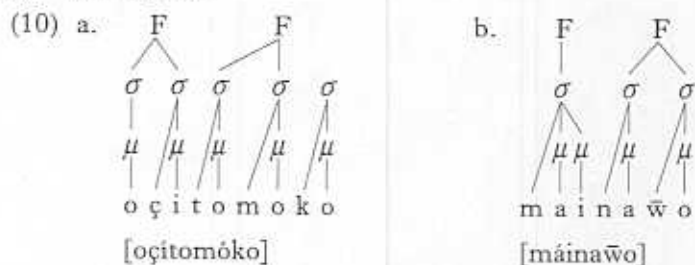
This section shows that tense suffixes subcategorise for a verb root composed of a prosodic word, where the minimal realisation of the prosodic word is a minimal quantity-sensitive foot. The minimal quantity-sensitive foot is a bimoraic monosyllabic foot ($\sigma_{\mu\mu}$) or a disyllabic foot ($\sigma\sigma$). Velar Glide Deletion fails when the final glide is crucial to satisfy the foot composed on the root. Because the analysis of the failure of Velar Glide Deletion relies on a footing constraint, Axininca stress and prosodic morphology are first discussed, then the analysis is given (on the theory of Prosodic Morphology, see McCarthy & Prince 1986, 1990, 1991).

Axininca has an alternating, quantity-sensitive stress pattern (discussion of Axininca stress in this paper assumes the analysis of stress presented in Payne *et al.* 1982). As exemplified in (9), stress occurs on every second syllable starting from the left edge, (9a-c) (final light syllables are not stressed). A heavy syllable, composed of CVV, CVN or CVVN, is stressed regardless of position, as exemplified in (9d-f). The alternating stress pattern resumes after the stressed heavy syllable. In a clash between a light and heavy syllable the stress on the light syllable deletes, as in (9e). Initial vowels count in determining even and odd numbered syllables, as shown by (9c) (and initial long vowels are stressed). Thus the extrametricality of the vowel-initial syllable present in lexical operations is lost at word level, where stress occurs.⁵

- (9) a. č^horína 'palm species'
b. kimítaka 'maybe'
c. oçítomóko 'monkey'
d. máinaʋo 'senorita'
e. noʋaʋáitáiyani 'we have continued eating'
f. kánciríki 'basket'

The quantity-sensitive, iambic stress system is exemplified in (9). In (10), the footing algorithm groups syllables into iambs, proceeding from the left edge; feet are minimally realised as one heavy or two light syllables. Stress applies to the righthand member:

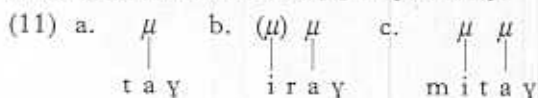
'he has taken it'



The facts of Axininca surface level stress are more complex (see Payne *et al.* 1982; Spring 1989b, 1990); however, the basic pattern is quantity-sensitive.

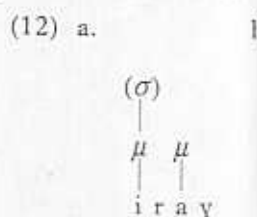
In addition to the quantity-sensitive nature of stress, many morphological operations of Axininca are sensitive to quantity-sensitive prosodic characteristics; often the 'minimal word foot' is involved. Analyses converge on the view that these operations refer to a minimal prosodic word = minimal quantity-sensitive foot, realised as a bimoraic monosyllabic or a disyllabic foot (see Spring 1991, to appear; Golston 1991; McCarthy & Prince 1991).

Stress and prosodic morphology in Axininca, then, show that vowels are moraic (see Hyman 1985 on the moraic theory of phonological weight and moraic syllabification): CVV syllables attract stress, i.e. are bimoraic, while CV syllables are stressed by position, i.e. are monomoraic. Recall that there are no CVC syllables since there are no coda consonants except for a nasal.⁶ Looking back on forms in (2)–(8) we see that excluding morae contained in any extrametrical syllable, velar glide-final verb roots are monomoraic (contain a single vowel) as in (6), or are bimoraic or bigger (contain two or more vowels), as in (7). Thus the moraic structure of verb roots provides no foot – the monomoraic case – or provides at least a foot – the bimoraic case – as exemplified in (11). In (11a), the root is straightforwardly monomoraic; in (11b) an initial mora is extrametrical – following from initial syllable extrametricality – and the root is monomoraic; and in (11c), the root is bimoraic. The final glide in each form is not moraic – since the glide is only a possible syllable onset. I follow Black (1991) in assuming that the glides [w], [y] and [ɣ] are the non-moraic counterparts of [o], [i] and [a] respectively.⁷

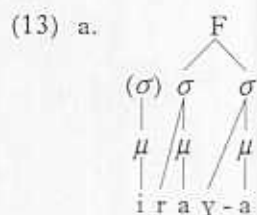


The important point about the forms in (6) is that the root is monomoraic and Velar Glide Deletion fails: in other words, when Deletion fails, the *moraic* content of the verb root fails to provide a minimal quantity-sensitive foot. In just such cases the root-final glide supplies the second syllable of a minimal quantity-sensitive foot, as exemplified in (12). In (12a) the initial vowel is syllabified and marked

extrametrical. In (12b), root syllabify to provide syllabifies as an onset



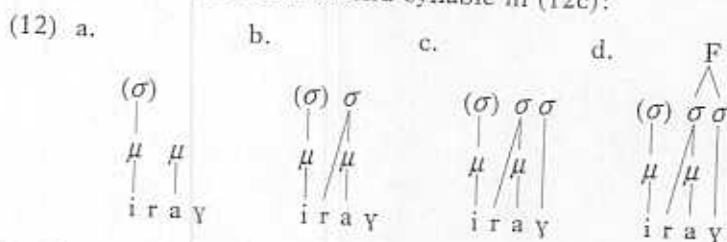
Since the root is monosyllabic of a minimal quantity-sensitive foot (shown in (12d)). This foot is right, with equivalent triggers Velar Glide Deletion root-final velar, as in (1) i.e. would no longer be a tense marker into the vowel of a minimal quantity-sensitive foot (13c), Velar Glide Deletion a foot:



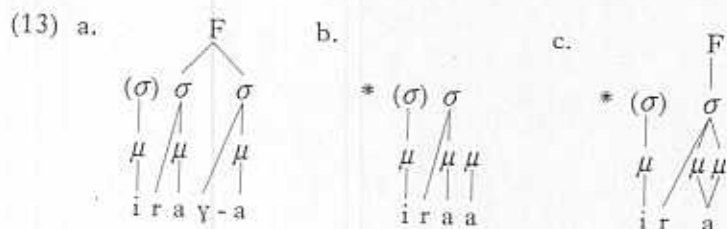
This prosodic condition on suffixes in Axininca. We find that a tense marker – immediately preceding the TENSE are that (i) tense marker – obligatory suffix of inflectional pattern as a set with suffixes; affixes on inflectional-directional-aspect (Payne 1981; Payne *et al.* 1982: 300–301). Deletion applies even to extrametrical syllable), not a tense marker, rather a modal (reason) and

These data show that

extrametrical. In (12b) the next consonant and vowel sequence of the verb root syllabify to produce a well-formed syllable, and the final glide syllabifies as an onset of a second syllable in (12c):

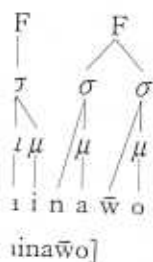


Since the root is monomoraic, the final velar glide forms the crucial second syllable of a minimal quantity-sensitive foot composed on the root, as shown in (12d). This foot could be constructed from right to left or left to right, with equivalent results. After suffixation, a context which normally triggers Velar Glide Deletion, were Velar Glide Deletion to apply to the root-final velar, as in (13b), note that the verb root would be monomoraic, i.e. would no longer be a foot. Even though further syllabification of the tense marker into the verb root would result in a well-formed instantiation of a minimal quantity-sensitive foot, a monosyllabic, bimoraic foot in (13c), Velar Glide Deletion fails because it is the *verb root* which must be a foot:



This prosodic condition on the verb root occurs only with a small set of suffixes in Axininca. Where Velar Glide Deletion fails, (5a) and (6), we find that a tense marker – the future, non-future or non-future reflexive marker – immediately follows. Distinguishing properties of the category TENSE are that (i) tense markers pattern as a class in being the only obligatory suffix of inflected verbs, and (ii) members of the tense category pattern as a set with respect to their position in the string of verbal suffixes; affixes on inflected verbs are ordered as follows: prefix-verb-modal-directional-aspect-TENSE-absolutive-plural-subordinate-mode (cf. Payne 1981; Payne *et al.* 1982; Appendix). In (8), where Velar Glide Deletion applies even though the roots are monomoraic (*modulo* any initial extrametrical syllable), the suffix immediately following the verb root is not a tense marker, rather is a suffix of some other category, e.g. /-ant/ is a modal (reason) and /-ak/ is a member of the aspect class (see Payne *et al.* 1982: 300–301).

These data show that the subcategorisation of tense specifies that a verb



ore complex (see Payne *et al.* 1982: 300–301) basic pattern is quantity-

re of stress, many morae are involved. 'word foot' is involved. The analysis refers to a minimal quantity-sensitive foot, realised as a bimoraic foot, as in (1991, to appear; Golston

then, show that vowels are involved in phonological weight and stress, i.e. are bimoraic, and consonants are monomoraic. Recall that coda consonants except for the glide-final verb roots are monomoraic or are bimoraic or bigger. The moraic structure of verb roots provides at least a foot for the root. In (11a), the root is extrametrical – fol- is extrametrical – fol- is extrametrical; the root is monomoraic; the glide in each form is not the onset. I follow Black (1991) [y] are the non-moraic

(6) is that the root is extrametrical, when the root fails to provide a quantity-sensitive foot, as in (6) the root is syllabified and marked

root is a PROSODIC WORD, realised minimally as a minimal quantity-sensitive foot, when tense directly follows. Because the tense marker is the only obligatory affix in inflected verbal morphology (see Payne 1981) tense might well be expected to require a verb root which is a minimal word, since the output of tense suffixation to a verb root could potentially be a surface-level word. (14) formalises the subcategorisation frame of the tense suffix. As shown, tense subcategorises for a verbal sequence. The prosodic word (PW), a unit which requires a foot to be well-formed, is required of the verb root if tense is suffixed to the root. Thus, (14) proposes that when it is directly adjoined to the verb root, tense requires the root to consist of at least one foot. This MINIMAL WORD foot is not an explicit element of the subcategorisation frame; rather, as discussed above, the minimal word foot of Axininca lexical operations is generally a minimal quantity-sensitive foot, realised as a monosyllabic or disyllabic foot (this formalisation follows McCarthy & Prince 1986 and Inkelas 1989 in assuming that prosodic constraints can be specified as necessary conditions on morphological operations).⁸

- (14) Subcategorisation: [[+verbal] tense]
 Condition: if [[verb root] tense] then [[PW] tense]

This section has shown that Velar Glide Deletion is a lexical level syllabification rule of Axininca which applies if a well-formed syllable will result after its application. However, this rule fails when a tense marker follows a glide-final monomoraic verb root because the final glide forms part of the minimal prosodic word required by the tense marker. Velar Glide Deletion provides further evidence that the minimal word of Axininca is a minimal quantity-sensitive foot, realised as a bimoraic monosyllabic or a disyllabic foot.

The innovation of the SUBCATEGORISATION ANALYSIS is that the velar glide alone forms the second syllable of the minimal word foot when the prosodic condition on tense is computed; in other words, the right branch of the minimal quantity-sensitive foot is non-moraic at the point that the minimal word condition is imposed. This footing, in turn, rests on the analysis of syllabification: an edge consonant, here the velar glide, syllabifies on the same pass as the other consonants of the root (see (4) and (12)), i.e. before the suffix syllabifies. This syllabification algorithm contrasts with Itô (1986), where edge consonants are argued to be extraprosodic until further suffixation renders the edge consonant no longer peripheral.

Supporting evidence for this subcategorisation analysis, data not considered in previous discussions of the velar glide, is provided in the next section. At the same time, further evidence for the syllabification algorithm seen above, where edge consonants syllabify before further suffixation renders them non-peripheral, is given.

2 Evidence for the

This section presents t
 egorisation analysis: (i)
 reduplication, and (ii)
 Caquinte Campa.

2.1 Epenthesis and V

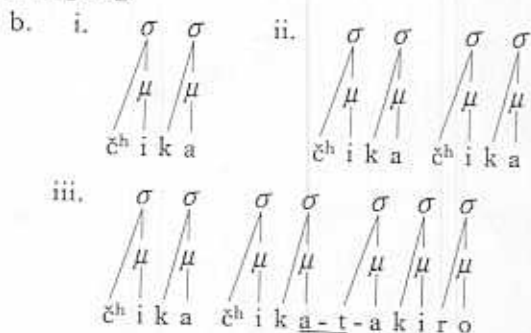
Evidence from epenthe
 in favour of the subc
 monomoraic, as is each
 Velar Glide Deletion th
 subcategorisation frame
 i.e. the fact that each te
 Glide Deletion.

In Axininca verb r
 between a consonant-fi
 1981). As shown in (15
 suffix-initial consonant
 between the two consor
 final velar glide and
 epenthesis is a part of th
 the final consonant is a
 morpheme-final consor
 syllabified as onsets).

- (15) a. ir-N-č^hik-pir
 3m-FUT-cut-v
 b. ir-oyaay-wai-
 3m-insert-co

In reduplication, vo
 before the syllabicity of
 demonstrated by the fac
 'double' epenthesis wi
 given in (16a) and a sar
 root is epenthised in
 When a vowel-initial s
 epenthesis occurs in (r
 verbal processes; see P
 segments (underlined i

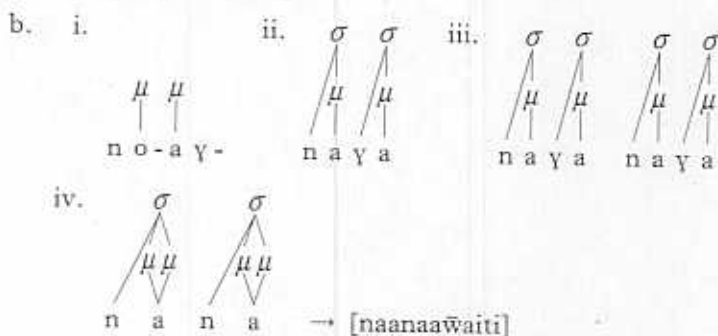
- (16) a. ir-č^hik-REDU
 3m-cut-exco
 'He has cut
 ir-koŋ-REDU
 3m-search-e
 'He has sear



(16) shows that vowel epenthesis applies to reduplicated forms *before* further suffixation occurs – as demonstrated by the application of double epenthesis – i.e. syllabification is cyclic, with epenthesis actually applying at the lexical level. Note that these data provide evidence that the edge consonant must syllabify before suffixation: epenthesis in (16a) applies to the right half of the reduplicated output, i.e. to the consonant-final verb, even though a vowel-initial suffix directly follows. If the edge consonant were extraprosodic until the suffix syllabifies, as proposed by Itô (1986), then the output forms of (16a) should not contain any epenthetic segments on the righthand member of the reduplicated form. For example, /č^hik/ should surface as *[ič^hikač^hikaki] rather than as the correct [ič^hika-č^hikakaki]. Thus the syllabification algorithm which the subcategorisation analysis presupposes is independently motivated in Axininca.

The point of interest to the subcategorisation analysis is the behaviour of monomoraic, velar glide-final verb roots in reduplication: the root undergoes epenthesis and then Velar Glide Deletion. An example is given in (17a) and derived in (17b). In (17b.ii), the person marker and verb root syllabify (the vowel of the person marker deletes by regular rule; see Payne 1981), and an epenthetic vowel is supplied to the final glide. Reduplication in (17b.iii) copies the verb (see §3.2 for further details of the formalisation of Axininca reduplication). Velar Glide Deletion applies in (17b.iv):

- (17) a. no-aγ-REDUP-w̄ai-i [naanaaw̄aiti]
1-take-excessive-CONT-FUT
'I will take and take'



(17) establishes that when an epenthetic vowel is inserted, the same phonological environment of which block Velar Glide Deletion applies as does tense suffixation. The shape of the tense suffixation is not affected by Velar Glide Deletion. Instead, Velar Glide Deletion blocks Deletion.

It cannot be argued that Velar Glide Deletion because [a]-[e] deletion in the derived environment of the velar glide only deletes the glide, it must create a derived environment, as attested by the double epenthesis in lexical, i.e. derived, forms. The epenthetic vowel is not aware of) epenthetic by the lexical rules of Affrication rule in (18), non-future tense mark affricates to [t], as derived in (17b.ii). The velar glide undergoes epenthesis, i.e. [a] → [e] (Affrication does not apply to [e] → [čokoriti] 'armadillo-suffixed: compare /no-

(18)

- a. no-kant-i
1-say-NF
no-ant-i
1-do-NF
b. no-misi-i
1-dream-NF

The facts of Velar Glide Deletion in final roots are predicted by the subcategorisation analysis. The final roots are predicted to subcategorise for a velar glide, and the material following the glide undergoes Velar Glide Deletion. The glide is each composed of a velar glide and a vowel. Velar Glide Deletion. Supporting evidence for the subcategorisation analysis comes from the fact that the root suffixation, was demonstrated by double epenthesis.

2.2 Tense subcategorisation

The comparative facts

(17) establishes that Velar Glide Deletion applies to the root-final glide when an epenthetic vowel follows, even though the epenthetic vowel has the same phonological shape as the tense suffixes in (5a) and (6), the latter of which block Velar Glide Deletion. Epenthesis occurs at the lexical level, as does tense suffixation. Thus, it cannot be the case that the phonological shape of the tense suffix contributes to the formalisation blocking Velar Glide Deletion. Instead, it is the subcategorisation frame of tense which blocks Deletion.

It cannot be argued that epenthetic [a] fails to prohibit Velar Glide Deletion because [a]-epenthesis, unlike tense affixation, does not create the derived environment required by Velar Glide Deletion. First, the velar glide only deletes in derived environments – thus epenthesis in (17) must create a derived environment. Second, epenthesis is cyclic – as attested by the double epenthesis in (16) – a result which is possible only in lexical, i.e. derived, contexts. Third, in several processes (in all that I am aware of) epenthetic segments create the derived environment required by the lexical rules of the language. An independent example is the Affrication rule in (18), which treats epenthetic [t] as derived. When the non-future tense marker, /-i/, is attached to a /t/-final root, the /t/ affricates to [ç], as demonstrated in (18a). In (18b), a vowel-final root undergoes epenthesis, and then the epenthetic [t] undergoes Affrication (Affrication does not apply in a non-derived environment, e.g. /çokori-ti/ → [çokoriti] 'armadillo-POSS', and applies only when the *non-future* /-i/ is suffixed: compare /no-N-kant-i/ → [noŋkanti] 'I will say' with (18a)):

(18)		<i>Epenthesis</i>	<i>Affrication</i>	
a.	no-kant-i 1-say-NF	—	[nokanç̣i]	'I said'
	no-ant-i 1-do-NF	—	[nanç̣i]	'I did'
b.	no-misi-i 1-dream-NF	no-misi-t-i	[nomisiç̣i]	'I dreamed'

The facts of Velar Glide Deletion in reduplicated, monomoraic, glide-final roots are predicted by the subcategorisation analysis: since tense subcategorises for a verb root = prosodic word, the prosodic properties of the material following the root have nothing to do with the prohibition on Velar Glide Deletion. Thus even though tense markers and epenthesis are each composed of a single mora, only tense prohibits Velar Glide Deletion. Supporting evidence for the syllabification algorithm which the subcategorisation analysis presupposes, where an edge consonant syllabifies along with the root rather than remaining extrametrical until further suffixation, was demonstrated by reduplicated forms which undergo double epenthesis.

2.2 Tense subcategorisation in Caquinte Campa

The comparative facts of the sister language of Axininca, Caquinte

σ
μ
k a

reduplicated forms *before* the application of double epenthesis actually applying the evidence that the edge epenthesis in (16a) applies to the consonant-final verb, ws. If the edge consonant is proposed by Itô (1986), in any epenthetic segments form. For example, /č^hik/ as the correct [ič^hika-] which the subcategorisation in Axininca.

analysis is the behaviour a reduplication: the root person marker and verb root etes by regular rule; see applied to the final glide. §3.2 for further details of lar Glide Deletion applies

[naanaawaiti]

σ σ σ σ
μ μ μ μ
n a γ a n a γ a

ti]

Campa, support the conclusion that tense in Axininca is a special category blocking Velar Glide Deletion. Though Velar Glide Deletion regularly occurs in Caquinte, tense markers exceptionally block its application in Caquinte. But in Caquinte, Deletion is blocked in all roots followed by tense, independently of the prosodic structure of the root. Caquinte therefore requires a subcategorisation analysis of the failure of Velar Glide Deletion, which formally relates the facts of Velar Glide Deletion in Caquinte to those in Axininca.

Velar Glide Deletion is a regular process in the language of Caquinte. The velar glide deletes when it is at the right edge of a root and is followed by a suffix (in Caquinte, the future (irrealis) marker is /-e/, and the non-future (realis) marker is /-i/; however after the perfective, both are realised as [-e]). Glosses are given in the appendix):⁸

(19)	i-ay-ak-e-ro	[yaakero]	'he has gotten it'
	3m-get-PERF-NF-3f		
	i-iray-ak-a	[iraaka]	'he has cried'
	3m-cry-PERF-NFR		
	i-pariy-ak-e	[ipariake]	'he has fallen'
	3m-fall-PERF-NF		
	siy-ayançi	[siayançi]	'to run'
	run-INF		
	pey-ayançi	[peayançi]	'to change state'
	disappear-INF		

As in Axininca, Velar Glide Deletion fails in Caquinte when the root-final glide is followed by a tense marker, as shown in (20a); however, in Caquinte, Velar Glide Deletion fails no matter how many morae are in the root, as exemplified in (20b):

(20) a.	i-ay-i-ro	[yayiro]	'he got it'
	3m-get-NF-3f		
	i-pey-a	[ipeya]	'he changed state'
	3m-change state-NFR		
	i-pariy-i	[ipariyi]	'he fell'
	3m-fall-NF		
	i-oniyay-i-Npi-ro	[yoniyayimpiro]	'he showed it to you'
	3m-show-NF-2-3f		

b.	<i>monomoraic root</i>		<i>multimoraic root</i>
	μ		μ μ μ
	a γ → [yayiro]		o n i γ a γ → [yoniyayimpiro]

In Caquinte, Velar Glide Deletion is prohibited on the final glide of the verb root when a tense marker follows, but the prosodic properties of the root are irrelevant to the failure of the rule. The blockage of Velar Glide Deletion is formalised by subcategorisation: tense suffixed to the verb root prohibits Velar Glide Deletion. Thus the subcategorisation analysis of

Velar Glide Deletion and of Caquinte: the rule of ' and the tense category e both languages by a lexicon in Axininca the prohibitions

In sum, this section has subcategorisation analysis section compares an alte

3 The disyllabic ian

Black (1991) insightfully linked to a prosodic foot analysis and argues against subcategorisation analysis is part of the morphological Deletion, and that a foot points of departure between part of the *prosodic domain* see proposed in Black's analysis, and a morphological analysis. After some evidence showing that the blocking Velar Glide Deletion foot constraining Deletion TYPOLICAL ANALYSIS, 1 of quantity-sensitive ian

3.1 The disyllabic ian

To account for the failure typological analysis argue constraint computed on special category, the DISY Deletion. Velar Glide results, and when, after syllables or bigger. Turn application would turn a a monosyllabic foot com

(21) exemplifies the failure initial syllable is extrametrical (see Itô 1986 and §1). In disyllabic foot, Velar Glide results. If Velar Glide Deletion be the monosyllabic foot

Velar Glide Deletion and its failure in Axininca is formally related to that of Caquinte: the rule of Velar Glide Deletion is shared by both languages and the tense category exceptionally prohibits Velar Glide Deletion – in both languages by a lexical subcategorisation frame. The difference is that in Axininca the prohibition is simultaneously prosodically conditioned.¹⁰

In sum, this section has shown two empirical arguments supporting the subcategorisation analysis of the failure of Velar Glide Deletion. The next section compares an alternative analysis by Black (1991).

3 The disyllabic iamb and Velar Glide Deletion

Black (1991) insightfully shows that the failure of Velar Glide Deletion is linked to a prosodic footing constraint. This section reviews Black's analysis and argues against two of its specific conclusions. Basically, the subcategorisation analysis and Black's analysis both argue that the suffix is part of the morphological domain determining the failure of Velar Glide Deletion, and that a footing constraint blocks Velar Glide Deletion. The points of departure between the two analyses are (i) whether the suffix is part of the *prosodic* domain prohibiting Velar Glide Deletion – as we shall see proposed in Black's analysis – and (ii) what the specific characteristics of the foot constraining Velar Glide Deletion are: a disyllabic iamb in Black's analysis, and a minimal quantity-sensitive foot in the subcategorisation analysis. After showing Black's analysis, this section presents evidence showing that the suffix cannot be part of the prosodic domain blocking Velar Glide Deletion, and that the disyllabic iamb is not the foot constraining Deletion. Hereafter, Black's analysis is dubbed the **TYPOLICAL ANALYSIS**, because it relies on a refinement of the typology of quantity-sensitive iamb.

3.1 The disyllabic iamb

To account for the failure of Velar Glide Deletion in (6), Black's typological analysis argues that Velar Glide Deletion is subject to a footing constraint computed on the root and suffix together; it proposes that a special category, the **DISYLLABIC IAMB**, is the foot prohibiting Velar Glide Deletion. Velar Glide Deletion applies when a well-formed syllable results, and when, after its application, the root+suffix would be two syllables or bigger. Turned around, Velar Glide Deletion fails when its application would turn a disyllabic foot composed on the root+suffix into a monosyllabic foot composed on the root+suffix.

(21) exemplifies the typological analysis. Black assumes that a vowel-initial syllable is extrametrical; he follows Itô's syllabification algorithm (see Itô 1986 and §1). In (21a.i) the output of syllabification provides a disyllabic foot. Velar Glide Deletion does not apply and the correct output results. If Velar Glide Deletion were to apply, (21b.ii), the output would be the monosyllabic foot *[iraa], from the disyllabic input in (21b.i):

axininca is a special category
ir Glide Deletion regularly
ally block its application in
ted in all roots followed by
ure of the root. Caquinte
of the failure of Velar Glide
of Velar Glide Deletion in

in the language of Caquinte.
edge of a root and is followed
marker is /-e/, and the non-
er the perfective, both are
endix):⁹

e has gotten it'

e has cried'

e has fallen'

o run'

o change state'

Caquinte when the root-final
own in (20a); however, in
r how many morae are in the

'he got it'

'he changed state'

'he fell'

piro] 'he showed it to you'

oraic root

μ
|
' a v → [yoniyayimpiro]

bited on the final glide of the
re prosodic properties of the
The blockage of Velar Glide
tense suffixed to the verb root
subcategorisation analysis of

roots should provide exactly the context to block Velar Glide Deletion. The final glide of the prefixed verb in (17), /nay-/, after epenthesis [naya-], should not undergo Velar Glide Deletion since the input to Velar Glide Deletion is a disyllabic foot, and the output is a monosyllabic foot. Yet Deletion applies: [naya-] → [naa-].

Second, the typological analysis cannot relate Velar Glide Deletion in Axininca to that in Caquinte. While the typological analysis would require a subcategorisation analysis of the Caquinte facts – since tense in Caquinte clearly prohibits Velar Glide Deletion independently of prosodic considerations – it claims a purely prosodic analysis of Axininca. Therefore, Velar Glide Deletion in the sister languages is formally distinct in the typological analysis, even though descriptively, each language has the same rule of Velar Glide Deletion, and very similar rules blocking Velar Glide Deletion.

The remainder of this section shows two further empirical arguments against the specific conclusions of the typological analysis.

3.2 The minimal word in Axininca verbal morphology

Black argues that a minimal quantity-sensitive foot, realised as one heavy or two light syllables, is the minimal word foot of Axininca nominal morphology, and proposes that the verbal morphology is sensitive to the disyllabic iamb in (22b). He cites evidence from the augmentation facts found in Axininca reduplication in support of this conclusion. Below, I sketch the argument and then provide data showing that the augmentation facts indicate that a minimal quantity-sensitive foot, monosyllabic or disyllabic, is actually active in augmentation in reduplication.

In Axininca reduplication the reduplicant must be a minimal word or bigger. As shown in (23), a foot or more must reduplicate. In (23a) the verb root supplies one or more feet and the verb reduplicates without the prefix. In (23b), where the verb root is monomoraic and monosyllabic, the prefix reduplicates along with the verb in order to fill out the minimal word foot required by reduplication. Formally, the reduplicant is a prosodic word, a constituent minimally satisfied by a foot but potentially larger (note that this constituent is equivalent to that constraining Velar Glide Deletion, i.e. the prosodic word, argued in the subcategorisation analysis in §1).

- (23) a. no-koma-REDUP-*wai-i* [nokomakomawaiti]
 1-paddle-excessive-CONT-FUT
 'I will continue to paddle and paddle'
 no-kaa^wosi-REDUP-*wai-i* [nokaawosikaa^wosiwaiti]
 1-bathe-excessive-CONT-FUT
 'I will continue to bathe and bathe'
- b. no-na-REDUP-*wai-i* [nonanona^waiti]
 1-carry-excessive-CONT-FUT
 'I will continue to carry and carry'

→ (i)raya



→ *(i)raa

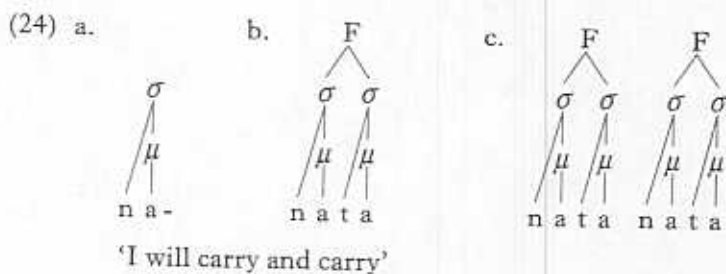
re Velar Glide Deletion does
 llabic iamb, undergo Velar

ib is better than a disyllabic/
 assigning a higher value to
 lting in the typology in (22a)
 ther feet, but the feet shown
 paper). Black proposes the
 (22b), where a bimoraic
 ypology than the bimoraic
 ed on the basis of Axininca
 ed from Prince's algorithm).
 when its application would
 ne one which occurs before

o analyses seen in this paper,
 ix form the prosodic domain
 e *disyllabic* iamb is the foot
 gorisation analysis proposes
 posed of a foot, and that (i)
 ain on which this foot is
 Glide Deletion is a minimal
 monosyllabic or a disyllabic

for the typological analysis.
 he root is part of the domain
 l in the typological analysis,
 glide-final monomoraic verb

When a verb root is too small to supply a foot, and a prefix is not overtly specified in the morphological string, a process of augmentation provides phonological material to fill out the foot required by reduplication. An example is given in (24) (see Spring 1989a, 1990, to appear, on Axininca reduplication). Taking the typological analysis of Velar Glide Deletion along with the augmentation facts in (24), Black argues that because augmentation supplies a syllable, [ta] (in (24b)), rather than a single mora, [a], when the verb root is monomoraic (as in (24a)), the disyllabic iamb is the minimal word required in Axininca verbal morphology. The reduplicated output of the verb stem is shown in (24c):



Black considers augmentation data from Payne (1981) in support of the conclusion that augmentation supplies a syllable to roots smaller than a foot. However, Payne's (1981) reduplication data do not include evidence from non-moraic roots, i.e. roots consisting of a single consonant, even though such roots exist in the language. If the conclusion that the verbal morphology is sensitive to a disyllabic iamb is correct, the expected reduplicated form of a single C root is [C-ata = C-ata-], where C- is the verb root and -ata- is the epenthetic sequence required to fill out the disyllabic iamb ([a] and [t] are regularly epenthetic in the language; cf. arguments throughout this paper and Payne 1981).

Fieldwork from Payne & Spring (1989) corrects the gap in the data. Reduplicated bare consonant roots are given in (25). The language consultant was adamant about these forms. As shown in the third form of (25), he explicitly rejected the possibility of reduplicating such verb roots as disyllabic:

(25) root	augmentation	reduplication	
\tilde{n} -	$\tilde{n}aa$	$\tilde{n}aa = \tilde{n}aa$	'see'
\check{c} -	$\check{c}aa$	$\check{c}aa = \check{c}aa$	'enter'
p-	$paa/*pata$	$paa = paa/*pata = pata$	'feed'

Augmentation of non-moraic verb roots results in a monosyllabic, bi-moraic output form, not a disyllabic one, as exemplified in (26). In (26b), augmentation supplies two morae to the root in (26a), and reduplication in (26c) results in a copied monosyllabic foot:

(26) a. b.



Data in (24) and (25) : mora(e) to satisfy a augmentation of a syllable is a compilation of pr monomoraic root (to sa regular epenthesis rule for arguments). The r supplies the minimal c syllabic or a disyllabic Thus the augmentator morphology is, in gen

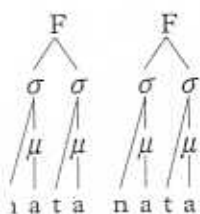
3.3 Velar Glide Dele

The typological analys syllabic suffix will pro morpheme is monomor be a foot lower in the The fact that Velar (regressive marker, a ve problem for this analys sive morpheme, /-ay-/ the tense marker, yet morpheme:

- (27) a. a-N-pok-ay
 linc-FUT-co
 b. a-ay-an-ay-
 linc-take-D

The typological analys morpheme should not creates a monosyllabic underlined sequence in Deletion it is monosylli we might assume tha regressive morpheme p preceding morphemes.

t, and a prefix is not overtly
s of augmentation provides
ired by reduplication. An
990, to appear, on Axininca
is of Velar Glide Deletion
Black argues that because
, rather than a single mora,
(24a)), the disyllabic iamb is
l morphology. The redupli-
lc):

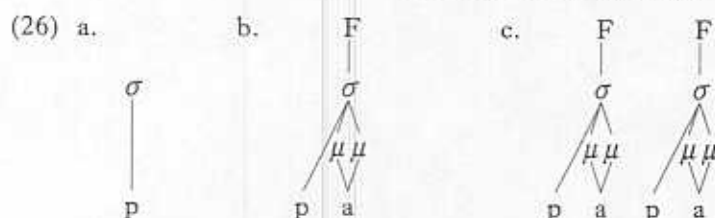


ne (1981) in support of the
ble to roots smaller than a
lata do not include evidence
of a single consonant, even
e conclusion that the verbal
b is correct, the expected
= C-ata-], where C- is the
ce required to fill out the
nthetic in the language; cf.
1981).

orrects the gap in the data.
en in (25). The language
s shown in the third form of
duplicating such verb roots

'see'
'enter'
a = pata 'feed'

ults in a monosyllabic, bi-
emplified in (26). In (26b),
in (26a), and reduplication
:



Data in (24) and (25) show that the augmentation process supplies only mora(e) to satisfy a minimal, quantity-sensitive foot. The apparent augmentation of a syllable to monomoraic verb roots, exemplified in (24), is a compilation of processes: a single mora, [a], is augmented to the monomoraic root (to satisfy a minimal word foot), and [t] is inserted by the regular epenthesis rule applying to this context (see Spring 1990, to appear for arguments). The reduplication facts, then, show that augmentation supplies the minimal quantity-sensitive foot, which surfaces as a monosyllabic or a disyllabic foot, depending upon the phonological context. Thus the augmentation data do not support the conclusion that the verbal morphology is, in general, sensitive to a disyllabic iamb.

3.3 Velar Glide Deletion and the regressive suffix

The typological analysis of Velar Glide Deletion proposes that a monosyllabic suffix will prohibit Velar Glide Deletion when the preceding morpheme is monomoraic, since the result of Velar Glide Deletion would be a foot lower in the iambic typology than that provided by the input. The fact that Velar Glide Deletion applies to the final glide of the regressive marker, a verbal suffix of the 'directional' suffix category, is a problem for this analysis. As shown in (27), the final glide of the regressive morpheme, /-ay-/, a suffix composed of a single mora, is followed by the tense marker, yet Velar Glide Deletion applies to the regressive morpheme:

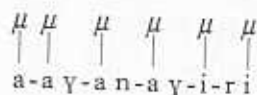
- (27) a. a-N-pok-ay-i [ampokai] 'we'll come back'
 Iinc-FUT-come-REG-FUT
 b. a-ay-an-ay-i-ri [aanairi] 'let's take it back'
 Iinc-take-DEPT-REG-FUT-3m

The typological analysis predicts that the final glide of the regressive morpheme should not delete in either of (27a) or (27b), since its deletion creates a monosyllabic foot out of a disyllabic one. For example, the underlined sequence in /a-N-pok-ay-i/ is disyllabic; yet after Velar Glide Deletion it is monosyllabic, [ampokai]. To counter this problem in (27a), we might assume that the footing requirement is computed on the regressive morpheme plus the phonological material included in all the preceding morphemes. Thus, the velar glide deletes because the phono-

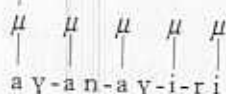
logical material included in the verb+regressive morpheme remains disyllabic after Velar Glide Deletion: /a-N-pok-ay-i/ → [ampokai].

This alternative, however, cannot account for (27b). The problem is that since a vowel-initial syllable is extrametrical (as argued by both the subcategorisation analysis and the typological analysis), the verb+regressive sequence preceding the velar glide in (27b) is effectively monomoraic and monosyllabic – yet Velar Glide Deletion applies. A derivation of the problem is shown in (28). The prefixed root /a-ay/ deletes the prefix by regular rule (see Payne 1981) in (28b); the initial vowel is syllabified and marked extrametrical, as expected at this lexical level. The remainder of the verb root and the directional marker, /-an/, syllabify in (28c). The root is velar glide-final, and in the surface form, this glide deletes (cf. output in (27b)). Velar Glide Deletion of the root-final glide is shown in (28d). Let us assume that Deletion applies to the root-final glide because (i) the initial vowel is extrametrical, so (ii) the root-final glide is effectively in word-initial position. Since a velar glide is illicit in word-initial position (cf. Payne 1981), the glide deletes. In (28e), resyllabification of the second vowel of the string with the initial vowel occurs (these vowels coalesce as per the OCP; cf. McCarthy 1986); this vowel-initial syllable is extrametrical. In (28f), the regressive morpheme syllabifies and a disyllabic sequence results. Syllabification of the tense marker in (28g) fills in the mora of the velar glide-initial syllable (note that in the typological analysis, tense syllabifies into the same syllable as the velar glide, as shown in (28g), then the resulting structure is scanned to see if Velar Glide Deletion can apply). The typological analysis predicts that Velar Glide Deletion could not apply to the final glide of the regressive marker since a monosyllabic foot will result from the disyllabic foot present in (28g). Nonetheless, Velar Glide Deletion applies, as shown in (28h), and after affixation of the object marker in (28i), the correct output results:¹¹

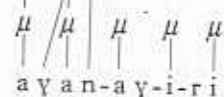
(28) a.



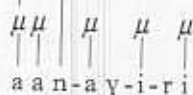
b. (σ)



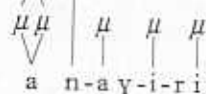
c. (σ) σ σ



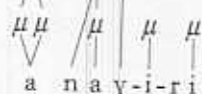
d. (σ) σ



e. (σ) σ



f. (σ) σ σ



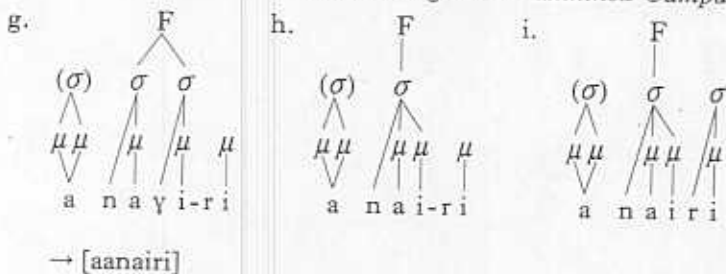
The typological analysis of regressive morpheme Deletion is a verb = disyllabic foot. In contrast to the fact that the final glide of the tense suffix is not in the regressive suffix interval, the prosodic subcategorisation applies. The subcategorisation of application of Velar Glide Deletion (27b)/(28d): a suffix with a glide, so the glide deletes.

The typological analysis of only of verb roots, and the application of Velar Glide Deletion would essentially be a subcategory of Velar Glide Deletion!

3.4 Summary

Black (1991) proposes that the analysis of iambic contexts motivates an iambic foot rather than a monosyllabic iambic foot. Empirical findings from comparative data from English and other languages is important to note the fact that the root+suffix constitutes the iambic foot. It is argued by the typological analysis that Velar Glide Deletion fails when a monosyllabic foot is present. If the suffix is abandoned, the analysis of Velar Glide Deletion is a regular, minimal analysis.

ressive morpheme remains
 [k-ay-i] → [ampokai].
 for (27b). The problem is
 ical (as argued by both the
 cal analysis), the verb +
 de in (27b) is effectively
 glide Deletion applies. A
 The prefixed root /a-ay/
 1981) in (28b); the initial
 as expected at this lexical
 directional marker, /-an/
 nd in the surface form, this
 Deletion of the root-final
 deletion applies to the root-
 etrical, so (ii) the root-final
 ce a velar glide is illicit in
 deletes. In (28e), resyllabi-
 h the initial vowel occurs
 Carthy 1986); this vowel-
 regressive morpheme syllabi-
 tion of the tense marker in
 syllable (note that in the
 same syllable as the velar
 icture is scanned to see if
 ical analysis predicts that
 nal glide of the regressive
 from the disyllabic foot
 etion applies, as shown in
 n (28i), the correct output

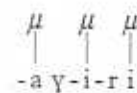
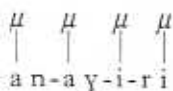


The typological analysis cannot explain the fact that the final glide of the regressive morpheme deletes even though the input to Velar Glide Deletion is a verb = disyllabic foot and the output is a verb = monosyllabic foot. In contrast, if the subcategorisation analysis is correct, the fact that the final glide of the regressive morpheme deletes is explained: the tense suffix is not immediately adjoined to the verb root; rather, the regressive suffix intervenes. The inflected verbal stem is not subject to the prosodic subcategorisation constraint on tense, so Velar Glide Deletion applies. The subcategorisation analysis also independently explains the application of Velar Glide Deletion to the verb root-final glide in (27b)/(28d): a suffix which is not a tense marker follows the root-final glide, so the glide deletes.

The typological analysis might argue that Velar Glide Deletion holds only of verb roots, and that in (27b), where the regressive suffix is adjoined to the monomoraic tense suffix, a verb root is not directly suffixed and thus Velar Glide Deletion applies. But such a stipulation would be ad hoc; it would essentially be a subcategorisation prohibition on the failure of Velar Glide Deletion!

3.4 Summary

Black (1991) proposes that the failure of Velar Glide Deletion in some contexts motivates an iambic typology in which a disyllabic iamb is better than a monosyllabic iamb. Velar Glide Deletion in Axininca fails when a demotion on the iambic scale would result from its application. However, empirical findings from epenthesis, the regressive marker, augmentation and comparative data from Caquinte Campa argue against this analysis. It is important to note the relationship between the assumption that the root + suffix constitutes the *prosodic* domain of Velar Glide Deletion, as argued by the typological analysis, and the conclusion that Velar Glide Deletion fails when a monosyllabic foot would result from a disyllabic one. If the suffix is abandoned as part of the prosodic domain for computing Velar Glide Deletion, the root alone is the prosodic domain prohibiting Velar Glide Deletion. In the latter case, the minimal word blocking Deletion is a regular, minimal quantity-sensitive foot.



4 Conclusions and future research

In Axininca, tense subcategorisation for a foot composed on the verb root supports the minimal quantity-sensitive foot as the minimal prosodic word operative in the prosodic morphology of the language. The regular syllabification rule of Velar Glide Deletion is blocked when a monomoraic, glide-final root precedes a tense marker, because in precisely this case the velar glide forms part of the minimal word required by the tense marker. This analysis is consistent with the stress, the syllabification and the prosodic morphology found elsewhere in the language. The single innovation of the analysis is that a syllable composed of a single onset glide and devoid of moraic content counts as a *bona fide* syllable in determining the prosodic template prohibiting Velar Glide Deletion. However, as argued, the syllabification algorithm giving rise to this foot is required elsewhere in the language. Thus the analysis is consistent with the facts of Axininca. The phonological properties of the suffix are immaterial to the analysis, thus explaining why a tense marker, but not an epenthetic vowel, prohibits Velar Glide Deletion. The fact that the final velar glide deletes in the regressive morpheme is explained, as are similarities and differences between Velar Glide Deletion in Axininca and the related language of Caquinte. This paper argued against an alternative analysis proposed by Black (1991), on the grounds that it is inconsistent with several facts of Axininca morphophonology, and it cannot formally relate the facts of Velar Glide Deletion in the language of Caquinte Campa with those of Axininca.

Further data to formulate the failure of Velar Glide Deletion might come from the future reflexive marker in Axininca. The future reflexive is a tense suffix, not discussed above, because its phonetic realisation is quite variable, and so far, its underlying structure is not analysed. (Though Payne 1981 assumes that the correct underlying representation of the future reflexive marker is the monomorphemic form /-ia/, the claim is not supported with any formal arguments.) The realisation of the future reflexive varies between [iyaa] in (29a), [aa] in (29b) (with concomitant palatalisation of the root-final consonant) and [iiyaa] in (29c):

(29)	ROOT	FUTURE REFLEXIVE	
a.	kim	no-kim-iyaa-ma 1-hear-FR-DUB	'I will hear myself?'
	kiw̃	no-kiw̃-iyaa-ma 1-wash-FR-DUB	'I will wash myself?'
b.	kant	no-kanč-aa-ma 1-say-FR-DUB	'I will say (to)-myself?'
	č ^h ik	no-č ^h ič-aa-ma 1-cut-FR-DUB	'I will cut myself?'
c.	miç	no-miç-iiyaa-ma 1-peel-FR-DUB	'I will peel myself?'
d.	tay	no-taiyaa-ma 1-burn-FR-DUB	'I will burn myself?'

When a velar glide-final glide does not appear representation. This is a and the typological ana monomorphemic it is ex subcategorisation analysi: Thus, (29d) might be ana the output of the future might be a suffixation ordering or lexical excep typological analysis, the fi Deletion of the root-fina bimoraic suffix, since this context to block Velar C typological analysis is th delete because an illicit t The future reflexive, ther Velar Glide Deletion.

Appendix

Axininca verbal morphi

prefix-ver
absolu

(N.B. affix classes are divi affixes than those listed bel

verbal prefixes

1st person
3rd person masculine
1st person inclusive
future

suffixes

modal
continuative
verity
excessive reduplication
reason
plural
directional
departative
aspect
perfective
regressive

When a velar glide-final root is suffixed with the future reflexive, (29d), the glide does not appear as either a velar or palatal glide in the surface representation. This is a problem for both the subcategorisation analysis and the typological analysis. If the future reflexive tense marker is monomorphemic it is expected to prohibit Velar Glide Deletion in the subcategorisation analysis – since the future reflexive is a tense suffix.¹² Thus, (29d) might be analysed with the underlying glide realised as [i] in the output of the future reflexive, or alternatively, the future reflexive might be a suffixation process demonstrably distinct – e.g. by level ordering or lexical exception – from the other tense categories. In the typological analysis, the future reflexive is expected to require Velar Glide Deletion of the root-final glide if the future reflexive is underlyingly a bimoraic suffix, since this tense category would not provide the prosodic context to block Velar Glide Deletion. However, the problem for the typological analysis is that the root-final glide is still predicted not to delete because an illicit trimoraic sequence would result from Deletion. The future reflexive, then, stands as a future test for the phenomenon of Velar Glide Deletion.

Appendix

Axininca verbal morphology

morphological order

prefix-verb-modal-directional-aspect-tense-
absolutive-plural-subordinate-mode

(N.B. affix classes are divided into subclasses, and Axininca has many more affixes than those listed below. See Payne *et al.* 1982: 300-301.)

	abbreviation	Axininca
<i>verbal prefixes</i>		
1st person	1	no-
3rd person masculine	3m	ir- (→ i/ — C, h/ — V)
1st person inclusive	1inc	a-
future	FUT	N-
<i>suffixes</i>		
modal		
continuative	CONT	-wai
verity	VER	-piro
excessive reduplication	REDUP	VERB = VERB
reason	RSN	-ant-
plural	PL	-aiy-
directional		
departative	DEPT	-an-
aspect		
perfective	PERF	-ak-
regressive	REG	-ay-

composed on the verb root
as the minimal prosodic
the language. The regular
locked when a monomoraic,
se in precisely this case the
quired by the tense marker.
the syllabification and the
language. The single inno-
d of a single onset glide and
syllable in determining the
letion. However, as argued,
; foot is required elsewhere
with the facts of Axininca.
immaterial to the analysis,
epenthetic vowel, prohibits
l velar glide deletes in the
imilarities and differences
nd the related language of
native analysis proposed by
sistent with several facts of
ormally relate the facts of
ainte Campa with those of

elar Glide Deletion might
inca. The future reflexive is
phonetic realisation is quite
is not analysed. (Though
ying representation of the
form /-ia/, the claim is not
e realisation of the future
n (29b) (with concomitant
[iiyaa] in (29c):

near myself?'

wash myself?'

say (to) myself?'

cut myself?'

peel myself?'

burn myself?'

tense		
non-future	NF	-i-
future	FUT	-i-
non-future reflexive	NFR	-a-
future reflexive	FR	?
absolute		
3rd feminine-object	3f	-ro
3rd masculine-object	3m	-ri
plural		
plural	PL	-ni
subordinate		
relativiser	REL	-ri
mode		
dubitive	DUB	-ma
<i>infinitive</i>	INF	-aanɛ ^{hi}

Caquinte verbal morphology

	<i>abbreviation</i>	<i>Caquinte</i>
<i>verbal prefixes</i>		
3rd person masculine	3m	i-/iri-
<i>suffixes</i>		
3rd feminine-object	3f	-ro
perfective	PERF	-ak-
2nd person	2	-Npi-
<i>infinitive</i>	INF	-ayanɛi
<i>tense suffixes</i>		
non-future	NF	-i-
future	FUT	-e-
non-future reflexive	NFR	-a-

NOTES

- * My appreciation goes to David Payne for discussion of Axininca phonology which contributed to this paper, and to Zhiming Bao, Andrew Black, Megan Crowhurst and an anonymous *Phonology* reviewer for comments on an earlier draft of this paper. Errors are my responsibility.

- [1] The symbols C, V and N and the terms ONSET, NUCLEUS and CODA are used as descriptive notations.
- [2] Spring (1990) argues on the basis of 'minimal word' facts and reduplication, both computed at the lexical level in Axininca, that (i) the vowel-initial sequence is extrametrical at the lexical level, and (ii) this extrametrical unit is actually a rhyme, not a syllable (because this paper is concerned with mora and syllable quantity in Axininca, in an attempt to provide maximally simple representations, subsyllabic structures like the rhyme and onset are not shown). Space constraints prohibit argumentation for lexical level initial extrametricality in this paper. The reader is referred to Spring (1990) for detailed information.
- [3] Velar Glide Deletion applies only in a derived environment. However, because all morpheme-internal velar glides are surrounded by more than two vowels, this rule could never apply morpheme-internally, i.e. in a non-derived environment. See Payne (1981), Black (1991) on the distribution of the velar glide.

- [4] Formally, the place of the suffixal vowel to the glide.
- [5] That stress occurs at the lexical level operations despite the complex nature with the possible exceptions morphemes, stress does the utterance. Rather, morphological string to sensitive pattern.
- [6] The nasal coda is mora Deletion, syllables with
- [7] Payne (1981) characterises moraic status of glides as onsets in the syllabification are syllabified as onsets rhyme.
- [8] This quantity-sensitive McCarthy & Prince 1991 representation since, when prosodic word will be ambiguity of footing occurs
- [9] Distribution of the velar glide occurs in all positions and finally. It occurs in can be adjoined by vowels of Caquinte, and Payne
- [10] Swift (1985) also shows directly followed by the
- [11] A *Phonology* reviewer explains the application. Note however that forms with [aanairi] ← /aanayiri/ Glide Deletion to the attributed to the direct [aanairi] ← /aanayiri/, the syllable, and is preceded the footing, whether it is the same in each case.
- [12] The future reflexive is almost certainly a port FUTURE + REFLEXIVE MORPH

REFERENCES

- Black, A. (1991). The phonology of Axininca. *Journal of Phonetics* 19, 183-217.
- Golston, C. (1991). The sonority theory of syllable structure. In Hayes, B. (1985). *Lambic and the syllable*. Cambridge, MA: MIT Press.
- Hyman, L. (1985). *A theory of the syllable*. Cambridge, MA: MIT Press.
- Inkelas, S. (1989). *Prosodic structure*. Cambridge, MA: MIT Press.
- Itô, J. (1986). *Syllable theory*. Cambridge, MA: MIT Press.
- McCarthy, J. (1986). OCP effects in Arabic. *Journal of Phonetics* 14, 1-46.

- [4] Formally, the place node, or the 'high' or 'front' feature, spreads from the suffixal vowel to the glide. See Black (1991) for one analysis.
- [5] That stress occurs at the word level, where the vowel-initial extrametricality of lexical level operations has been lost, is consistent with the facts of Axininca: despite the complex nominal, and especially verbal, morphology of Axininca, with the possible exception of some three word/phrase-final tone-bearing morphemes, stress does not interact with the morphophonological structure of the utterance. Rather, stress is computed on the output of the concatenated morphological string to produce the straightforward, left-to-right quantity-sensitive pattern.
- [6] The nasal coda is moraic, but since the nasal coda is irrelevant to Velar Glide Deletion, syllables with codas are not further discussed.
- [7] Payne (1981) characterises both glides and vowels as [-continuant] but the non-moraic status of glides accounts for the patterning of glides with true consonants as onsets in the syllabification system. Morae are syllabified as nuclei, non-morae are syllabified as onsets. The nasal coda is syllabified as a right branch of the rhyme.
- [8] This quantity-sensitive foot required by the prosodic word in (14) (cf. e.g. McCarthy & Prince 1986, 1990) can be constructed from either edge of the representation since, whether it is constructed from right to left or left to right, the prosodic word will be satisfied. Spring (1989a, 1990) argues that this same ambiguity of footing occurs in reduplication.
- [9] Distribution of the velar glide in Caquinte is different than in Axininca. The velar glide occurs in all positions in Caquinte - i.e. word-initially, as well as medially and finally. It occurs morpheme-internally between two vowels or more, and it can be adjoined by vowels of any quality. See Swift (1985) for data and discussion of Caquinte, and Payne (1981) for genetic classification of Campa languages.
- [10] Swift (1985) also shows sporadic deletion of suffix-final velar glides which are directly followed by tense markers.
- [11] A *Phonology* reviewer notes that the direction of footing may be important to explain the application of Velar Glide Deletion in forms like [aanairi] in (28). Note however that forms like [itayiro] <- /irtayiro/ 'he burned it' as compared with [aanairi] <- /aanayiri/ (intermediate stage) show that the application of Velar Glide Deletion to the latter and its failure to apply to the former cannot be attributed to the direction of footing: in each of these two cases, [itayiro] and [aanairi] <- /aanayiri/, the underlying velar glide is in the onset of the penultimate syllable, and is preceded by one extrametrical syllable and one visible syllable: i.e. the footing, whether it is assumed to be from left to right or from right to left, is the same in each case.
- [12] The future reflexive might be synchronically monomorphemic; if so, it is almost certainly a portmanteau morpheme arising from the protolanguage FUTURE + REFLEXIVE morphemes.

REFERENCES

- Black, A. (1991). The phonology of the velar glide in Axininca Campa. *Phonology* 8. 183-217.
- Golston, C. (1991). The so-called minimal word in Axininca Campa. Ms, UCLA.
- Hayes, B. (1985). Iambic and trochaic rhythm in stress rules. *BLS* 11. 429-446.
- Hyman, L. (1985). *A theory of phonological weight*. Dordrecht: Foris.
- Inkelas, S. (1989). *Prosodic constituency in the lexicon*. PhD dissertation, Stanford University.
- Itô, J. (1986). *Syllable theory in prosodic phonology*. PhD dissertation, University of Massachusetts, Amherst.
- McCarthy, J. (1986). OCP effects; gemination and antigemination. *LI* 17. 207-263.

ta
ane^{hi}
aquinte
/iri-
o
k-
spi-
yanci

discussion of Axininca phonology
ning Bao, Andrew Black, Megan
iewer for comments on an earlier
ity.

NT, NUCLEUS and CODA are used as

word' facts and reduplication, both
it (i) the vowel-initial sequence is
s extrametrical unit is actually a
concerned with mora and syllable
maximally simple representations,
t are not shown). Space constraints
extrametricality in this paper. The
d information.

environment. However, because all
ed by more than two vowels, this
i.e. in a non-derived environment.
ution of the velar glide.

