The velar glide in Axininca Campa*

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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. 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.

The segment inventory of Axininca Campa includes a voiced velar glide, represented as /y/, 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
   3m-burn-PERF-NF-3f
   no-kay-ak-i
   1-bring water-PERF-NF
   ir-o-warnay-ak-a
   3m-kill-PERF-NF
   [itaakiro] ‘he has burned it’
   [nokaaki] ‘I have brought water’
   [howarnaaka] ‘he has killed himself’
   [irayaan] ‘to cry for self’
   [oyaayaane] ‘to insert’
   [hoyaayakiro] ‘he has inserted it’
   [imitayi] ‘they jumped’

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) Delete a velar glide.

(4) demonstrates Velar glide as vowels are moraic (see syllabification proceeds pheme to build the Axinica). The derivation in (4) demonstrates that syllabification and the severe restriction on consonants are either pos direction of syllabification equivalent results. See structure.) In (4a) the because it is vowel-initia Following Itô’s proposes consonants on edges of m in (4b) as an onset (recall While Itô proposes that extra prosodic until an a lexical level), (4) shows cons on consonants syllabify aor Spring 1990 and § 12, the environment for Ve resyllabification provide

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

The velar glide surf adjoined on both sides followed by a suffix be glide takes its place for palatal glide, [y], as she
posed of at least one onset syllable is a CV sequence. Infixed in a nasal coda; thus the is a CVVN sequence. As its nuclei consist of a single or one of the diphthongs in

syllextless syllable, realised as a nasal coda. This paper syllable template requires aspect extrametrical at lexical ill-formed at the lexical level. Velar Glide Deletion. A includes a voiced velar under a narrow range of lextes when a single vowel when a well-formed syllable in a single vowel. Because Axininca lable and onsets are required, sult would be an illicit vowel (the appendix).

- 'he has burned it'
- 'I have brought water'
- 'he has killed himself'
- 'to cry for self'
- 'to insert'
- 'he has inserted it'
- 'they jumped'

ification 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 Itō (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 Itō'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 Itō'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 nasol). While Itō 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):

(4) a. \[(\sigma) \sigma \sigma\]
   \[
   \mu \mu \mu
   i-mi-ta-\gamma
   \]

   'he has burned it'

b. \[(\sigma) \sigma \sigma\]
   \[
   \mu \mu \mu
   i-mi-ta-\gamma
   \]

   'I have brought water'

c. \[(\sigma) \sigma \sigma \sigma\]
   \[
   \mu \mu \mu \mu
   i-mi-ta-\gamma-i
   \]

   'he has killed himself'

d. \[(\sigma) \sigma \sigma\]
   \[
   \mu \mu \mu \mu
   i-mi-ta-i-\gamma
   \]

   'they jumped'

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, [γ], as shown by forms in (5):

(5) a. iray-iro
   \[
   3m-mourn-NF-3f
   i-tay-iro
   3m-burn-NF-3f
   no-a-γ-i
   1-take-FUT
   \]
   \[
   [hirayiro]
   \]
   'he mourned it'

b. itayiro
   \[
   3m-mourn-NF-3f
   no-a-γ-i
   \]
   \[
   [nayi]
   \]
   'I will take'
A peculiar aspect of the behavior of the velar glide is illustrated in (5a). Velar Glide Deletion fails—even though a well-formed syllable rhyme, [ai], would result if Deletion applied (see Black 1991). In (5b) Velar Glide Deletion fails because a three-vowel sequence would result. More examples where Velar Glide Deletion unexpectedly fails are given in (6). Note that the last two forms show that it is not the fact that the velar glide becomes a palatal glide which blocks Velar Glide Deletion, since Deletion fails even if the glide remains a velar at surface level:

(6) ir-ay-i-ro 3m-take-NF-3f
   [hayiro] 'he took it'
ir-ay-i-ro 3m-burn-NF-3f
   [itayiro] 'he burned it'
ir-iray-i-ro 3m-mourn-NF-3f
   [hirayiro] 'he mourned it'
no-ay-i-ri 1-take-FUT-REL
   [nayiri] 'that I will take'
ir-tay-a 3m-burn-NFR
   [itaya] 'he burned himself'
ir-iray-a 3m-cry-NFR
   [hiraya] 'he cried for himself'

Examples in (7) show roots which require Velar Glide Deletion—even though these roots are followed by the same suffixes as are present in forms in (6) (the third form in (7) undergoes a regular rule of word-final vowel shortening):

(7) ir-mitayı-i 3m-jump-NF
   [imitai] 'he jumped'
ir-eʰinay-i-ros 3m-raise-NFR-3f
   [ieʰinairo] 'he raised it'
ir-eʰinay-a 3m-raise-NFR
   [ieʰina] 'he lifted his body part'

The final set of preliminary data bearing on the analysis of the velar glide is given in (8); the same roots which disallow Velar Glide Deletion in (5a) and (6) require Deletion in other contexts:

(8) ir-ay-ak-i-ros 3m-take-PERF-NF-3f
   [haakiro] 'he has taken it'

1.2 Tense subcategory

This section shows that composed of a prosodic word is a mini sensitive foot is a bim (σσ). Velar Glide Deletion foot composed on the Glide Deletion relies or morphology are first di Prosodic Morphology,

Axininca has an alternates of Axininca stress in the Payne et al. 1982). As syllable starting from i stressed. A heavy syllable regardless of position, pattern resumes after th and heavy syllable the s vowels count in determin by (9c) (and initial long the vowel-initial syllable where stress occurs.5

(9) a. čʰorita
   b. kimitaka
c. očɒtomóko
d. máinawo
e. nəmaašaityi
f. kanečižki

The quantity-sensitive (10), the footing algorithm the left edge: feet are syllables. Stress applies
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ir-tay-ak-i-ro [itaakiro] ‘he has burned it’
3m-burn-PERF-NF-3f
ir-tay-ant-a-ro-ri [itaantawori] ‘(reason) that he burned it’
3m-burn-RSN-NFR-3f-REL
ir-iray-ant-a-ro-ri [hiraantaawori] ‘(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 (σσ) or a disyllabic foot (σσσ). 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, Aixincha stress and prosodic morphology are first discussed, then the analysis is given (on the theory of Prosodic Morphology, see McCarthy & Prince 1986, 1990, 1991).

Aixincha has an alternating, quantity-sensitive stress pattern (discussion of Aixincha 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 (9c). 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.∗

(9) a. ṣihrina ‘palm species’
b. kimisaka ‘maybe’
c. ocčtomoko ‘monkey’
d. mašawo ‘senorita’
e. noWaWataiyan ‘we have continued eating’
f. kāńčiri ‘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:

inserted it'

a will insert it'

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

it'

ed it'

ned ed it’

ill take’

sed himself’

l for himself’

Velar Glide Deletion – even the suffixes as are present in a regular rule of word-final npec’d'

sed it’

ed his body part’

on the analysis of the velar swallow Velar Glide Deletion nexts:

‘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. Looking back on forms in (2)-(6) 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 [i] are the non-moraic counterparts of [o], [i] and [a] respectively.

(11) a. \( \mu \) b. \( \mu \mu \) c. \( \mu \mu \)

\( t\alpha y \quad i\alpha y \quad m\alpha t\alpha y \)

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 syllabifies to prosyllabifies as an onset.

(12) a.

\( (\sigma) \)

\( \mu \)

\( i\alpha y \)

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

(13) a.

\( F \)

\( (\sigma) \)

\( \mu \mu \)

\( i\alpha y \alpha \)

This prosodic condition suffixes in Axininca. V find that a tense marker – immediately tense are that (i) ten obligatory suffix of inflect pattern as a set with suffixes; affixes on inf modal-directional-aspe Payne 1981; Payne et Deletion applies even t extrametrical syllable, not a tense marker, rat a modal (reason) and et al. 1982: 300–301).

These data show that
The velar glide in Axinica Campa

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(6) is that the root is in other words, when 
root fails to provide a 
the root-final glide 
unity-sensitive foot, as 
syllabified and marked

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):

(12) a. b. c. d.

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:

(13) a. b. c.

This prosodic condition on the verb root occurs only with a small set of suffixes in Axinica. 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-absolute-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
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 Aixininca 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 Aixininca which applies if a well-formed syllable will result after its application. However, this rule fails when a tense marker follows a glide-final monomoronic 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 Aixininca is a minimal quantity-sensitive foot, realised as a bimoraic monosyllabic or a disyllabic foot.

The innovation of the SUBCATEROGISATION 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 foot, 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 Itō (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 categorisation analysis: (i) reduplication, and (ii) Caquinte Campa.

2.1 Epenthesis and V
Evidence from epenthesis in favour of the submonomoronic, as in each Velar Glide Deletion the subcategorisation frame i.e. the fact that each to Glide Deletion.

In Aixininca verb t between a consonant-ñ 1981. As shown in (15) suffix-initial consonant between the two consonant final velar glide and epenthesis is a part of if the final consonant is a morpheme-final consonant syllabified as onsets).

(15) a. ir-N-ñik-pir
   3m-cut-cut-
   b. ir-oyaqay-wai-
   3m-insert-co

In reduplication, vo before the syllabicity of demonstrated by the fact ‘double’ epenthesis w given in (16a) and a sarr root is epenthised in When a vowel-initial t epenthesis occurs in (verbal processes; see P segments (underlined i)

(16) a. ir-ñik-redít
   3m-cut-exci
   ‘He has cut
   ir-kow-redít
   3m-search-t
   ‘He has search
2 Evidence for the subcategorisation analysis

This section presents two empirical arguments in favour of the subcategorisation analysis: (i) data from epenthised, glide-final verb roots in reduplication, and (ii) comparative data from the related language, Caquinte Campa.

2.1 Epenthesis and Velar Glide Deletion

Evidence from epenthesis of glide-final verb roots in reduplication argues in favour of the subcategorisation analysis. The epenthetic vowel is monomoraic, as is each of the tense markers; however, while tense blocks Velar Glide Deletion the epenthetic vowel does not, showing that it is the subcategorisation frame of tense – rather than any phonological property, i.e. the fact that each tense marker is a single vowel – which blocks Velar Glide Deletion.

In Axininca verb morphology, vowel epenthesis regularly occurs between a consonant-final root and a consonant-initial suffix (cf. Payne 1981). As shown in (15a), when a root-final consonant is adjoined with a suffix-initial consonant the epenthetic vowel, [a] (underlined), is inserted between the two consonants. In (15b) epenthesis applies between a root-final velar glide and a consonant-initial suffix. (15) establishes that epenthesis is a part of the syllabification algorithm of Axininca, even when the final consonant is a velar glide (epenthesis is motivated by the fact that morpheme-final consonants – other than the nasal codas – can only be syllabified as onsets).

(15) a. ir-N-chik-piro-i [in̪i̯chikapiroti]  he will really cut it
             3m-FUT-CUF-VER-FUT

     b. ir-oyna-wai-ak-i  [hoyaayawaitaki]  he has continued to insert
             3m-insert-CONT-PERF-NP

In reduplication, vowel epenthesis applies to consonant-final roots before the syllabicity of the initial segment of the suffix is determined, as demonstrated by the fact that reduplicated, consonant-final roots undergo ‘double’ epenthesis when a vowel-initial suffix follows. Examples are given in (16a) and a sample derivation is given in (16b). A consonant-final root is epenthised in (16b.i), and the root is reduplicated in (16b.ii). When a vowel-initial suffix is conjoined to the reduplicated root, [t]-epenthesis occurs in (16b.iii) ([t] is regularly epenthetic in Axininca verbal processes; see Payne 1981). The output form has two epenthetic segments (underlined in (16a)/(16b.iii)).

(16) a. ir-chik-redup-ak-i-ro [iči̯ikači̯ikatakiro]
             3m-cut-excessive-PERF-NP-3f
             ‘He has cut and cut it’

     ir-kow-redup-ak-i-ro  [kowakowataki]
             3m-search-excessive-PERF-NP-3f
             ‘He has searched and searched for it’
(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 Ito (1986), then the output forms of (16a) should not contain any epenthetic segments on the right-hand member of the reduplicated form. For example, /čʰik/ should surface as *[čʰikačʰikaki] rather than as the correct [čʰikačʰikataki]. Thus the syllabification algorithm which the subcategorisation analysis presumes is independently motivated in Axinina.

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 Axinina reduplication). Velar Glide Deletion applies in (17b.iv):

(17) a. no-ay-REDUP-WAI-i
   1-take-excessive-CONT-FUT
   ‘I will take and take’

   b. i.  ii.  iii.  iv.
   μ  μ  μ  μ  μ
   μ
   μ  μ  μ  μ

   n o - a y - n a y a
   n a y a n a y a

(17) establishes that when an epenthetic vowel is the same phonological block Velar G as does tense suffixation, shape of the tense suffix Glide Deletion. Instead blocks Deletion.

It cannot be argued Deletion because [a]-e the derived environme velar glide only deletes must create a derived attested by the double- in lexical, i.e. derived, am aware of) epenthetic by the lexical rules of Affrication rule in (18), non-future tense mark affixes to [e], as der undergoes epenthesis, i (Affrication does not ap [kəkəkə] armadillo-suffixed: compare /no-

(18) a. no-kanji
   1-say-NF
   no-ant-i
   1-do-NF

b. no-misi-i
   1-dream-NF

The facts of Velar Gl final roots are predicte subcategorises for a ver the material following ti Velar Glide Deletion. T each composed of a b Deletion. Supporting ev subcategorisation analy: fies along with the root suffixation, was demor double epenthesis.

2.2 Tense subcategor

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 [g], 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. /čokori-ti/ → [čokori] ‘armadillo-POS’, and applies only when the non-future /-i/ is suffixed: compare /no-N-kant-i/ → [nonkanti] ‘I will say’ with (18a)).

$$\begin{array}{c|c|c}
\text{Epenthesis} & \text{Affrication} \\
\hline
\text{a. no-kant-i} & [nokangi] & \text{‘I said’} \\
\text{1-say-NF} & [nangi] & \text{‘I did’} \\
\text{no-ant-i} & & \\
\text{1-do-NF} & & \\
\text{b. no-misi-i} & \text{no-misi-ti} & \text{[nomsisigi] ‘I dreamed’} \\
\text{1-dream-NF} & & \\
\end{array}$$

The facts of Velar Glide Deletion in reduplicated, monomoramic, 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 Caquinute Campa

The comparative facts of the sister language of Axininca, Caquinute
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 \( \mathbf{-c} \), and the non-future (realis) marker is \( \mathbf{-i} \); however after the periphrastic, both are realised as \( \mathbf{-e} \). Glosses are given in the appendix).

\[(19)\]
\[
\begin{align*}
\text{1-ay-ak-e-ro} & \quad \text{[yaakero]} \quad \text{'he has gotten it'} \\
3m\text{-get-PERF-NF-3f} & \quad \text{[iraaka]} \quad \text{'he has cried'} \\
\text{i-ary-ak-a} & \quad \text{[piriak-e]} \quad \text{'he has fallen'} \\
3m\text{-cry-PERF-NFR} & \quad \text{[siyayanci]} \quad \text{'to run'} \\
\text{i-pariy-ak-e} & \quad \text{[peyayanci]} \quad \text{'to change state'} \\
3m\text{-fall-PERF-NF} & \quad \text{disappear-INF} \\
\text{siy-ayanci} & \quad \text{run-INF} \\
\text{pey-ayanci} & \quad \text{disappear-INF} \\
\end{align*}
\]

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):

\[(20)\]
\[
\begin{align*}
\text{1-ay-i-ro} & \quad \text{[yayiro]} \quad \text{'he got it'} \\
3m\text{-get-NF-3f} & \quad \text{[ipeya]} \quad \text{'he changed state'} \\
\text{i-pey-a} & \quad \text{[ipariyi]} \quad \text{'he fell'} \\
3m\text{-change state-NFR} & \quad \text{[yoniyayimpiro]} \quad \text{'he showed it to you'} \\
\text{i-party-i} & \quad \text{3m-fall-NF} \\
\text{1-onyiy-i-Npi-ro} & \quad \text{3m-show-NF-2-3f} \\
\end{align*}
\]

\[\text{b. monomoraic root} \quad \text{multimoraic root}\]

\[
\begin{align*}
\text{a} & \quad \text{[yayiro]} \\
\text{a} & \quad \text{[yoniyayimpiro]} \\
\end{align*}
\]

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 lex is in Axininca the prohib.

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

3 The disyllabic ia

Black (1991) insightfully linked to a prosodic fo analysis and argues against subcategorisation analysis: is part of the morphologi Deletion, and that a foot points of departure betw part of the prosodic doma see proposed in Black's a of the foot constraining Black's analysis, and a m sation analysis. After s evidence showing that t blocking Velar Glide D foot constraining Deleti TYPOLOGICAL ANALYSIS, l of quantity-sensitive ia

3.1 The disyllabic iarr

To account for the tai 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 ty initial syllable is extrane (see Itô 1986 and §1). It disyllabic foot. Velar Glic results. If Velar Glide D be the monosyllabic foot
Vowel Glide Deletion and its failure in Aixinca is formally related to that of Caquinte: the rule of Vowel Glide Deletion is shared by both languages and the tense category exceptionally prohibits Vowel Glide Deletion—in both languages by a lexical subcategorisation frame. The difference is that in Aixinca the prohibition is simultaneously prosodically conditioned. In sum, this section has shown two empirical arguments supporting the subcategorisation analysis of the failure of Vowel Glide Deletion. The next section compares an alternative analysis by Black (1991).

3 The disyllabic iamb and Vowel Glide Deletion

Black (1991) insightfully shows that the failure of Vowel 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 Vowel Glide Deletion, and that a footing constraint blocks Vowel Glide Deletion. The points of departure between the two analyses are (i) whether the suffix is part of the prosodic domain prohibiting Vowel Glide Deletion—as we shall see proposed in Black's analysis—and (ii) what the specific characteristics of the foot constraining Vowel 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 Vowel Glide Deletion, and that the disyllabic iamb is not the foot constraining Deletion. Hereafter, Black's analysis is dubbed the TYPOLOGICAL 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 Vowel Glide Deletion in (6), Black's typological analysis argues that Vowel 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 Vowel Glide Deletion. Vowel 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, Vowel 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 Löf's syllabification algorithm (see Löf 1986 and §1). In (21a.i) the output of syllabification provides a disyllabic foot. Vowel Glide Deletion does not apply and the correct output results. If Vowel Glide Deletion were to apply, (21b.ii), the output would be the monosyllabic foot *[ɪraː] from the disyllabic input in (21b.i):
Forms in (7), e.g. /ir-mitay-i/ → [imitai], where Velar Glide Deletion does not change a disyllabic iamb into a monosyllabic iamb, undergo Velar Glide Deletion.

Prince (1992) proposes that a canonical iamb is better than a disyllabic/monosyllabic iamb by virtue of an algorithm assigning a higher value to the former and a lower value to the latter, resulting in the typology in (22a) (Prince elaborates the hierarchy to include other feet, but the feet shown in (22a) are sufficient to the points in this paper). Black proposes the refinement of Prince's typology shown in (22b), where a bimoraic disyllabic iamb is higher in the typology than the bimoraic monosyllabic iamb (this refinement is argued on the basis of Axinica Velar Glide Deletion, rather than being derived from Prince's algorithm).

Black argues that Velar Glide Deletion fails when its application would create an iambic foot which is inferior to the one which occurs before Velar Glide Deletion applies.

\[
\begin{align*}
\sigma_\mu & \sigma_\mu > \sigma_f \sigma_f / \sigma_\mu \\
\sigma_\mu & \sigma_\mu > \sigma_f \sigma_f > \sigma_\mu
\end{align*}
\]

Summing up the difference between the two analyses seen in this paper, in the typological analysis (i) the root and suffix form the prosodic domain prohibiting Velar Glide Deletion, and (ii) the disyllabic iamb is the foot restricting Velar Glide Deletion. The subcategorisation analysis proposes that tense subcategorises for a verb root composed of a foot, and that (i) the verb root alone is the prosodic domain on which this foot is constructed, and (ii) the foot restricting Velar Glide Deletion is a minimal quantity-sensitive foot, realised as either a monosyllabic or a disyllabic foot.

The data in §2 are immediately problematic for the typological analysis. First, if the phonological material following the root is part of the domain prohibiting Velar Glide Deletion, as claimed in the typological analysis, then the epenthetic vowel in reduplicated, glide-final monomoraic verb

roots should provide exa

The final glide of the [naya-], should not under

Glide Deletion is a dipyl

Yet Deletion applies: [ni

Second, the typological Axinica to that in Caqui

a subcategorisation analys

clearly prohibits Velar Gl

ations - it claims a purely

Glide Deletion in the sire

analysis, even though de

Velar Glide Deletion, Dele

tion.

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3.2 The minimal word

Black argues that a minim

or two light syllables, is m

orphology, and propose

disyllabic iamb in (22b).

found in Axinica redundan

the argument and t

facts indicate that a mit

disyllabic, is actually acti

In Axinica reduplicat

bigger. As shown in (23) v

verb root supplies one o

prefix. In (23b), the p

prefix reduplicates along w

word foot required by p

osodic word, a constituen
t larger (note that this con

Glide Deletion, i.e. the p

analysis in §1).

(23) a. no-koma-REDUF

1-paddle-excess

'I will continue

no-kawosi-RED

1-bathe-excessi

'I will continue

b. no-na-REDUP-W

1-carry-excessi

'I will continue
roots should provide exactly the context to block Velar Glide Deletion. The final glide of the prefixed verb in (17), /naya-/, after eponthesis [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 foot 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-kawosi-REDUP-Wai-i [nokawosikawosiiwaiti]
   1-bathe-excessive-CONT-FUT
   ‘I will continue to bathe and bathe’

b. no-na-REDUP-Wai-i [nonanonawaiti]
   1-carry-excessive-CONT-FUT
   ‘I will continue to carry and carry’
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):

(24) a. \( \sigma \) b. \( \mu \) c. \( \mu \)
\[
\begin{array}{ccc}
\sigma & \sigma & \sigma \\
\mu & \mu & \mu \\
n & a & - n & a & t & a & n & a & t & a
\end{array}
\]

'I will carry and carry'

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 epenhetic sequence required to fill out the disyllabic iamb ([a] and [ä] are regularly epenhetic 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
\[
\begin{array}{ccc}
\ddot{a} & - & \ddot{aa} \\
\ddot{e} & - & \ddot{ea} \\
p- & - & paa/*pata
\end{array}
\]

Augmentation of non-moraic verb roots results in a monosyllabic, bimoraic 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. \( \sigma \) b. \( p \)
\[
\begin{array}{ccc}
\sigma & \sigma & \sigma \\
\mu & \mu & \mu \\
n & a & a & t & a & n & a & t & a
\end{array}
\]

Data in (24) and (25) shows that a monomoraic root (to satisfy a regular epenhetic rule for arguments). The \( \sigma \) supplies the minimal epenhetic syllable or a disyllabic Thus the augmentation morphology is, in gen-

\[ (27) \text{a. } a-N-pok-ay \text{ b. } a-ay-an-ay- \]

3.3 Velar Glide Deletion
The typological analysis of velar glide suffix will put morpheme is monomoraic be a foot lower in the The fact that Velar (regressive marker, a ve problem for this analytic of morpheme, /-ay/- the tense marker, yet morpheme:

The typological analysis of morpheme should not results in a monosyllabic underlined sequence in Deletion it is monosyllable we might assume the regressive morpheme preceding morphemes.
and a prefix is not overtly augmented by reduplication. An aug-
mentation 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 typing 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’
    
    1inc-FUT-come-REG-FUT
    
    b. a-ay-an-ay-i-ri
    [sanairi] ‘let’s take it back’
    
    1inc-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-a-yi/ → [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), syllabification of the second vowel of the string with the initial vowel occurs (though vowels coalesce as per the OCP; cf. McCarthy 1988); 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:

\[
\begin{align*}
(28a) & \quad \text{(a)} \\
(28b) & \quad \text{(b)} \\
(28c) & \quad \text{(c)} \\
(28d) & \quad \text{(d)} \\
(28e) & \quad \text{(e)} \\
(28f) & \quad \text{(f)} \\
\end{align*}
\]

The typological analysis predicts that regressive morpheme Deletion is a verb = d syllabic foot. In contrast, fact that the final glide the tense suffix is not regressive suffix interve prosodic subcategorisation applies. The subcategorisation of Velar glide-final in (27b) is: a suffix with glide, so the glide deletes.

The typological analysis only of verb roots, and the to the monomoraic tense Velar Glide Deletion a suffix Glide Deletion.

3.4 Summary

Black (1991) proposes contexts motivates an than a monosyllabic iam. demotion on the iambic's empirical findings from e and comparative data for is important to note the root+suffix constitutes the argued by the typological Deletion fails when a mon. If the suffix is abandoned Velar Glide Deletion, the Velar Glide Deletion. In Deletion is a regular, min
gressive morpheme remains \[\text{a-sy-i} / \rightarrow [\text{ampokai}].\]
for (27b). The problem is
tal (as argued by both the
tal analysis), the verb+
d in (27b) is effectively
deletion applies. A
The prefixed root /a-sy/ 1981) in (28b); the initial
as expected at this lexical
directional marker, /-an/,
nd in the surface form, this
Deletion of the root-final
dition applies to the root-
eal, so (ii) the root-final
ice a velar glide is illicit in
dels. In (28c), resyllabi-
h the initial vowel occurs
athy 1986); this vowel-
gressive morpheme syllabi-
tion of the tense marker in
able (note that in the
n syllable as the velar
ecture is scanned to see if
al analysis predicts that
al glide of the regressive
om the disyllabic foot-
ion applies, as shown in
(28d), the correct output

\[
\begin{align*}
\text{g.} & \quad \text{F} \\
(\sigma) & \quad \sigma & \sigma & \sigma & \mu & \mu & \mu \\
\mu & \mu & \mu & \mu & \mu & \mu & \mu \\
\rightarrow [\text{aanairi}] \\
\text{h.} & \quad \text{F} \\
(\sigma) & \quad \sigma & \sigma & \sigma & \mu & \mu & \mu \\
\mu & \mu & \mu & \mu & \mu & \mu & \mu \\
\text{i.} & \quad \text{F} \\
(\sigma) & \quad \sigma & \sigma & \sigma & \mu & \mu & \mu \\
\mu & \mu & \mu & \mu & \mu & \mu & \mu \\
\end{align*}
\]

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 = mono-
syllabic 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 Axininea 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 Cauinte 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 monomorphic, 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 Campe 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 monomorphic form /-ia/, the claim is not supported with any formal arguments.) The realisation of the future reflexive varies between [ìyaa] in (29a), [ssã] in (29b) (with concomitant palatalisation of the root-final consonant) and [ìyìa] in (29c):

(29) **ROOT** | **FUTURE REFLEXIVE** |
--- | --- |
| a. kim | no-kìm-ìyìa-ma | ‘I will hear myself?’ |
| 1-hear-FR-DUB |  |
| b. kant | no-kìtì-ìyìa-ma | ‘I will wash myself?’ |
| 1-wash-FR-DUB |  |
| c. miš | no-mìtì-ìyìa-ma | ‘I will cut myself?’ |
| 1-cut-FR-DUB |  |
| d. tìì | no-tìì-ìyìa-ma | ‘I will peel myself?’ |
| 1-peel-FR-DUB |  |

When a velar glide-final the glide does not appear representation. This is a and the typological ana monomorphic it is ex subcategorisation analysis. Thus, (29d) might be ana the output of the future might be a suffixation ordering or lexical exct typological analysis, the fi Deletion of the root-fina bimorphic 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 morp

prefix-ver

absolu

(N.B. affixes classes are divi

affixes than those listed bel

verbal prefixes

1st person

3rd person masculine

1st person inclusive

future

suffixes

modal

continuative

verity

ecessive 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 monomorphic it is expected to prohibit Velar Glide Deletion in the subcategorisation analysis—since the future reflexive is a tense suffix. 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 trinomina 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.)

verb prefixes

<table>
<thead>
<tr>
<th>abbreviation</th>
<th>Axininca</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st person</td>
<td>i-</td>
</tr>
<tr>
<td>3rd person masculine</td>
<td>-i/ — C, h/ — V</td>
</tr>
<tr>
<td>1st person inclusive</td>
<td>-a-</td>
</tr>
<tr>
<td>future</td>
<td>-N-</td>
</tr>
</tbody>
</table>

suffixes

<table>
<thead>
<tr>
<th>modal</th>
<th>CONT</th>
</tr>
</thead>
<tbody>
<tr>
<td>verb</td>
<td>VER</td>
</tr>
<tr>
<td>excessive reduplication</td>
<td>REDUP</td>
</tr>
<tr>
<td>reason</td>
<td>RSN</td>
</tr>
<tr>
<td>plural</td>
<td>PL</td>
</tr>
<tr>
<td>directional</td>
<td>DEPT</td>
</tr>
<tr>
<td>deparative</td>
<td>-an-</td>
</tr>
<tr>
<td>aspect</td>
<td>PERF</td>
</tr>
<tr>
<td>perfective</td>
<td>-sk-</td>
</tr>
<tr>
<td>regressive</td>
<td>REG</td>
</tr>
<tr>
<td></td>
<td>-vy-</td>
</tr>
</tbody>
</table>
tense
  non-future  NF  -i-
  future     FUT -i-
  non-future reflexive NFR -a-
  future reflexive FR -?

absolutive
  3rd feminine-object 3f -ro-
  3rd masculine-object 3m -ri-

plural
  plural  PL -ni-

subordinator
  relativiser  REL -ri-

mode
  dubitative  DUB -ma-

infinitive INF -aane'i-

Caquinte verbal morphology

verbal prefixes
  3rd person masculine 3m i-/iri-

suffixes
  3rd feminine-object 3f -ro-
  perfective PERF -ak-
  2nd person 2 -Npi-

infinitive
  INF -ayanei-

 NOTES
  * My appreciation goes to David Payne for discussion of Axinirca 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 Axinirca, 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 more and syllable
     quantity in Axinirca, in an attempt to propose maximally simple representations,
     subyllabic structures like the rhyme and onsets 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.

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  McCarthy, J. (1986). OCP e
The velar glide in Aixinne Campa 351

[4] Formally, the place node, or the 'high' or 'front' feature, spreads from the suffixed 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 Aixinne: despite the complex nominal, and especially verbal, morphology of Aixinne, 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-moramic status of glides accounts for the patterning of glides with true consonants as onsets in the syllabification system. Morae are syllabified as nuclei, non-moramic 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 1985, 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 Aixinne. The velar glide occurs in all positions in Caquinte - i.e. word-initially, as well as medially and finally, it occurs morpheme-externally 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 [anairi] in (28). Note however that forms like [itayiro] : /itarayiro/ 'he burned it' as compared with [anairi] : /aaniyiri/ (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 [anairi] : /aaniyiri/, 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 monomorphic; if so, it is almost certainly a portmanteau morpheme arising from the protolanguage future + reflexive morphemes.

REFERENCES


Andrew Carstairs-McC (Theory Guides). London:

Richard Sproat
AT&T Bell Laboratories

Near the beginning of my first reading of a well-known book and the lexicon in addition, I was not content with the response; at first, I thought that it was a job in itself. As a matter of fact, I have never been able to decide for myself on the accuracy of the discussion. I am sure that the discussion of the 'schools' is not sufficient; it is therefore noteworthy that discussion of the 'schools' is mentioned earlier but for C-M, the discussion breaks down the interaction between the one hand by lexical and semantic morphological variables of the intersentence relation or incoherence. Generative Morphology as an extension of the universals of Greenbergian univer-