Segmental Alternations in Yaminahua

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1 Introduction[1]

Deletion and epenthesis serve metrical purposes in some languages. Typologically, deletion reduces weak and unstressed syllables, and epenthesis strengthens strong and stressed syllables (González 2003). It would be unexpected to find a language where deletion targets strong syllables and epenthesis weak syllables.

Yaminahua (Peru: Panoan) seems to be such a language. A number of its morphophonological alternations appear to go against the typological generalization stated above. This paper presents the main alternation patterns and shows that these seemingly typologically odd alternations arise through the interaction of metrical, syllabic and gradient alignment constraints.

The organization of this paper is as follows. Section 2 provides a brief background on Yaminahua and its phonology. Sections 3 and 4 focus on vocalic and consonantal alternations respectively. Section 5 considers syllabic alternations and section 6 is the conclusion.

2 Background

Yaminahua is a South–Central Panoan language with around 1,700 speakers, mostly in Peru but also in Bolivia and Brazil (Grimes 2000). The main sources for this paper include Eakin 1991 and Faust and Loos 2002 (henceforth F&L).[2] The data in this paper is given in IPA.

Yaminahua has 14 consonants /p, t, k, f, s, ʃ, ʂ, h, ts, tʃ, m, n, ɾ, j/ and 8 vowels /a, e, i, ɯ, ã, ẽ, ĩ, ɯ̃/ (F&L 17–8). Two contiguous vowels generally belong to different syllables, as in [pi.a] 'arrow', [te.o.ti] 'necklace', and [ma.i.ti] 'crown' (Eakin 38). However, diphthongs are possible, as in /fain/ 'daily', and vowel merging occurs word–finally with certain morphemes (1).

(1) Word final vowel merging (from Eakin 43, F&L 96–7)

(a)	/oĩ–i/	[oĩ]	to see–infinitive	'To see'
(b)	/pi–a–a/	[(ˈpi.a)]	eat–participle–past	'Eaten'

The preferred pattern for verbal and noun roots is disyllables of the form CV(C)(C)V (F&L 114). All consonants delete in coda except for /s, ʃ, ʂ/; thus, [mi.tsis̲] 'nail', [kaʃ.ta] 'armadillo', [paʂ.ta] 'dog', but /ik̲–tiro/ [i.ti.ro] *aux–potential* '(He) can sing' (Eakin 17, 42, 172; F&L 23–4).

Coda nasals are realized as nasalization of the preceding vowels (F&L 99) (2). Nasalization can be marked on the last or the first vowel of the word; it is sometimes better perceived on the first vowel, it can be variably realized depending on the speaker, and it might be obvious only if a suffix is added to the word (F&L 99, 115). The consonants /m, n, f, j/ are pronounced as [m, n, w̃, ɲ] before nasal vowels and as [b, ᵐb], [d, ⁿd], [f, j] elsewhere (F&L 17–8).

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[2] A Yaminahua–Spanish dictionary currently in preparation by Norma Faust and Eugene E. Loos.

 Proceedings of the 24th West Coast Conference on Formal Linguistics, ed. John Alderete et al., 155-163. Somerville, MA: Cascadilla Proceedings Project.

(2) Nasalization (from F&L 108, 135)

(a)	/a–ʂon–fe/	[a.ʂõ.fe]	do–benefactive–imp.	‘Do it (for me)’
(b)	/nika–ʃin–jamea/	[ni.ka.ʃĩ.ja.me.a]	listen–nightly–past	‘Listened all night’
(c)	/tene–fain–naka/	[te.ne.faĩ.na.ka]	rest–daily–future progr.	‘Will rest all day’

Verbal roots have stress and high tone in the first syllable, and roots of transitive verbs are also stressed and have high tone on the second syllable. The first syllable of the noun phrase is tonic (F&L 18). There are no secondary stresses reported. Based on this, I consider Yaminahua a syllabic trochaic language with only one stress per word and exhaustive footing from left to right (3). Evidence for persistent footing in the absence of secondary stress is provided by many vocalic, consonantal and syllabic alternations that occur in the language and that will be discussed next.

(3) Yaminahua foot structure

1 2	3 4	5 6	7
(ˈσ σ)	(σ σ)	(σ σ)	σ
S W	S W	S W	U

Notation:
σ: Syllable
S: Strong W: Weak U: Unfooted

3 Vocalic alternations

Yaminahua has two types of foot sensitive vocalic alternations that target specific morphemes (Table 1). A vowel might alternate with zero, or both vowels in a morpheme might alternate.

Table 1 Vocalic alternations

V~Ø			V_1~V_2
[–ã] ~ [–˜] ‘To somebody’s harm’	[–anã] ~ [–nã]	*Reciprocal*	[–toʃi] ~ [–tiʃo] ‘On arriving’

The suffix ‘to somebody’s harm’ is realized as nasalization [˜] after verbs with an even number of syllables (4a) and as [–ã] after verbs with an odd number of syllables (4b) (Eakin 99, F&L 109–10). While Eakin 100 reports the reciprocal to have the same distribution, F&L 22, 105 mention that [–anã] occurs after monosyllabic stems and [–nã] when the verb has more than one syllable (4c, d).[3]

(4) V~Ø alternations (from Eakin 99, F&L 105, 10)

(a)	/rete–˜ –ita/	[(re.tẽ.) (i.ta)]	kill–harm–past	‘Killed (to my harm)’
(b)	/fi–˜ –i/	[(fi.ã.) i]	take–harm–progr.	‘Is taking away (to my harm)’
(c)	/fi–nã–i/	[(ˈfi.a.) (nã.i.)]	receive–reciprocal–progr.	‘(They) ate each other’
(d)	/joi–nã–i/	[(jo.i.) (nã.i.)]	say–reciprocal–progr.	‘(They) are talking’

My proposal is that these alternations arise through root augmentation and alignment of the suffix to the edge of a foot. Root augmentation requires the stem to be aligned to the right edge of a foot. The reciprocal suffix is aligned to the left edge of a foot, while [˜] ~ [–ã] is aligned to the right edge of a foot. The vowel [a] is epenthesized when these suffixes are in danger of being misaligned.

These are not isolated cases. The future indefinite /ʂi–i/ triggers vowel reduplication in monosyllabic stems (F&L 122–3; cf. (5a, b) with (5c)). Since reduplication takes place even if the plural /–kan/ intervenes (5d), this means that /–ʂi/ is aligned to the left edge of the foot.[4] Another example involves the suffix /–tai/ ‘always’. Reportedly, [ti] is epenthesized in front of the suffix if the syllable before /–tai/ is odd numbered (cf. 6a, b with 6c). F&L 137 mention that the reason to add this epenthetic syllable has not been discovered.

[3] Neither Eakin nor F&L provide examples where these suffixes are added to verbs with three syllables.

[4] An alternative analysis is that /a/ is epenthesized and vowel harmony makes it the same as the preceding vowel. This is supported by a tendency to vowel harmony in the first two syllables of a word, especially for /i/ or /e/ (Eakin 123, F&L 83).

(5) Future indefinite (from Eakin 77, F&L 122–3)

(a)	/o–ʂi–i–mẽ/	[(o.o.) (ʂi.i.) mẽ]	come–future–progr–inter.	'(When) will come?'
(b)	/ka–ʂi–i/	[(ka.a.) (ʂi.i)]	go–future–progr.	'(She) will go'
(c)	/inã–ʂi–i/	[(i.nã.) (ʂi.i)]	give–future–progr.	'(We) will sell'
(d)	/fe–ʂi–kan–i–mẽ/	[(fe.e.) (ʂi.ka.) (ni.mẽ)]	come–fut.–pl.–progr.–inter.	'Will (they) come?'

(6) /–tai/ 'always' (from F&L 137–8)

(a)	/oia–tai–a–pao–ni/ cry–always–aux–prog–rem past	[(o.i.) (a.ti.) (tai.a.) (pa.o.) ni]		'Always cried'
(b)	/pi–tai–fa–i/	[(pi.ti) (tai.fa.) i]	eat–always–aux.–prog.	'Always eats'
(c)	/joi–tai–fa–i/	[(jo.i.) (tai.fa.) i]	speak–always–trans–prog.	'Always tells'

[ti] is epenthesized after a monosyllabic stem (6b) but also when no monosyllabic stems are involved (6a). I propose that this alternation is related to the interaction of alignment and sonority. The suffix /–tai/ is aligned to the left of a foot; [ti] is epenthesized in a weak footed syllable to avoid a violation of alignment. At the same time, sonorous /–tai/ occupies a strong, prominent foot position, while epenthetic, non sonorous [ti] occupies a weak, non prominent position.[5]

In most of the examples discussed so far root augmentation plays a role in causing vowel epenthesis and reduplication. There is further evidence for the preference for disyllabic roots in Yaminahua. First, there is a strong tendency to reduce morphemes to even syllable forms. For example, the word /kapeta/ 'lizard' is frequently pronounced as [kape] (F&L 75). Second, in prefixation vowel reduction applies to keep the stem disyllabic. Which vowel deletes depends on the second consonant of the root. If the second consonant is non continuant the first root vowel deletes, leaving a proper sibilant/non continuant cluster (7a). If the second consonant in the root is a sibilant and the syllable is open the second vowel deletes (7b). If the root has more than two syllables no deletion applies (7c) (F&L 114–7).[6]

(7) Prefixation (from F&L 114–5)

(a)	/me–ʂate/	[ˈmeʂ.te]	hand–cut	'Cut the hand'
(b)	/ma–moʃa/	[ˈma.moʃ]	head–hit	'Hit the head'
(c)	/me–ʂate–me/	[ˈme.ʂa.te.me]	hand–cut–refl.	'To cut the hand to oneself'

The second type of vocalic alternation in Table 1 concerns the suffix /–toʃi/ 'on arriving'. This suffix is reportedly pronounced as [–toʃi] when preceded by even numbered syllables (8a), and [–tiʃo] when preceded by odd numbered syllables (8b) (F&L 134).

(8) V_1~V_2 alternations (from F&L 134)

(a)	/fitʃi–toʃi–a–fo/	[(ˈfi.tʃi).(to.ʃi.)(a.fo)]	find–arrive–past–plural	'Found on arriving'
(b)	/fa–toʃi–ita/	[(ˈfa.ti.) (ʃo.i).ta]	say–arrive–yesterday	'Said on arriving'

I propose that the alternation [–toʃi]~[–tiʃo] is related to the alignment of vocalic sonority with foot prominence. The relatively sonorous vowel /o/ is aligned with a strong footed syllable, while the relatively non–sonorous /i/ is aligned with the weak syllable. For reasons of space I will not discuss this alternation further; the reader is referred to the analysis proposed for the Shipibo suffix [ɾiβi]~[ɾiβa] 'again' in González 2003 and Elías–Ulloa 2005, which can be applied to this case.

In conclusion, various vocalic and syllabic alternations target specific suffixes in Yaminahua. All of them involve the alignment of a specific suffix (or a suffix vowel) to the right or the left edge of a foot, implying that foot structure applies even in the absence of secondary stress. Suffix alignment

[5] Fetiye Karabay suggests that [ti] insertion might be a case of reduplication. This is a plausible option that deserves more investigation.

[6] Nasalization blocks prefix shortening (F&L 116).

might interact with the preference for disyllabic roots, which can be captured through stem alignment to the right edge of the foot. This interaction might trigger vocalic epenthesis and reduplication.

4 Consonantal alternations

Consonantal alternations in Yaminahua might be phonological or target specific morphemes; these are previewed in Table 2 and are discussed in separate sections.

Table 2 Consonant alternations

C_1~C_2			C~Ø	
[k ~ ʔ]	[–ʃin] ~ [–ʃi]	'Nightly'	[–fain] ~ [–fai]	'Daily'
	[–ʂon] ~ [–ʂo]	*Benefactive*	[–mad] ~ [–ma]	*Causative*

4.1 Glottal alternations

[k] and [ʔ] are allophones. [k] occurs word–initially, as in [kape] 'lizard'; after a consonant, as in [foʂki finapa] 'type of wasp; and in loanwords regardless of its position, as [kiɾika] 'book' (borrowed from Quechua). [ʔ] occurs intervocalically, as in /tʃaka/ [tʃaʔa] 'bad'. When the sequence /VkVkV/ occurs, the first /k/ is pronounced as [ʔ] and the second one as [k] (9) (Eakin 16).

(9) C_1~C_2 alternation (from Eakin 16)

(a)	/ʃaɾa–koĩ/	[ˈʃa.ɾa.ʔo.ĩ]	good–very	'Very good'
(b)	/tʃaka–koĩ/	[ˈtʃa.ʔa.ko.ĩ]	bad–very	'Very bad'

This is an intriguing case of intervocalic lenition that seems to interact with a prohibition against [ʔ…ʔ] sequences. This alternation is not foot sensitive; in [ˈtʃa.ʔa.ko.ĩ], both instances of /k/ are pronounced in different feet: [(ˈtʃa.ʔa.) (ko.ĩ)]. This alternation shares with Capanahua and Huariapano the fact that it is phonological and involves a glottal consonant, but unlike the alternations in these languages, it occurs in onsets and is not clearly foot sensitive (González 2003).

4.2 Nasal alternations

Yaminahua also has cases of morphophonological alternations involving nasals. Reportedly, deletion of /n/ occurs before a consonant (2), and prevocalically when /–ʂon/ *benefactive*, /–ʃin/ 'nightly', and /–fain/ 'nightly' are even numbered in the word (10a, c, e). No deletion applies if these suffixes are odd numbered (10b, d, f) (F&L 107, 135; cf. Eakin 98).

(10) /–ʃin/, /–ʂon/, /–fain/ (from F&L 108, 135)

(a)	$^{1\ 2\ 3}$/fe–ʂon–a/	[fe.ʂõ.a]	bring–benefactive–past	'Bring (for me)'
(b)	$^{1\ 2\ 3\ 4}$/kene–ʂon–a/	[ke.ne.ʂo.da]	write–benefactive–past	'Wrote (for me)'
(c)	$^{1\ 2\ 3}$/o–ʃin–a/	[ˈo.ʃĩ a]	come–nightly–past	'Came at night'
(d)	$^{1\ 2\ 3\ 4\ 5}$/oʂa–ʃin–a–ma/	[ˈo.ʂa.ʃi.na.ma]	sleep–nightly–past–neg.	'Did not sleep at night'
(e)	$^{1\ 2\ 3}$/o–fain–i/	[o.faĩ]	come–daily–progressive	'Is coming daily'[7]
(f)	$^{1\ 2\ 3\ 4}$/oʂa–fain–a/	[o.ʂa.fai.na]	sleep–daily–past	'Slept during the day'

[7] In this case vowel merging has applied word finally.

Epenthesis of [d] is reported to take place before a vowel if the causative /–ma/ is odd numbered (11a). No epenthesis occurs if /–ma/ is even numbered (11b) (F&L 108–9; cf. Eakin 97).

(11) Causative suffix (from F&L 109)

(a) /tapin–ma–i/ [(ˈta.pĩ) (ma.di)] learn–causative–progressive ‘Is causing to learn’

(b) /pi–ma–i/ [(ˈpi.mai)] eat–causative–progressive ‘Is causing to eat’

Epenthesis is proposed for /–ma/ because [d] is never nasal and does not trigger nasalization (F&L 109). However, the choice between [d~n] depends on the nasality of surrounding vowels (Eakin 16, F&L 17). Also, at least for /–ṣon/ nasalization is variable (Eakin 98). Thus, I will analyze these four suffixes similarly, since they all target prevocalic [n~d].

A syllable counting analysis is also problematic. Note that the odd/even count in Yaminahua targets suffixes underlyingly; the suffix is split into two syllables in the surface (12). If the syllable count analysis is maintained, this means that deletion of /n/ would occur in odd numbered syllables, which is unexpected since odd numbered syllables are strong in Yaminahua (12a). For the causative, this means that epenthesis of [d] takes place in even numbered syllables (12b), which is also unexpected since typically epenthesis occurs in strong syllables (González 2003).

(12) Problem

(a) /o–ʃin–a/ [ˈo.ʃĩ. a] ‘Came at night’

(b) /tapin–ma–i/ [ˈta.pĩ.ma.di] ‘Is causing to learn’

Another related point is that languages do not count segments or syllables. As the alternative, metrical feet can account for reduplication, minimal words, stress assignment and other phenomena. (McCarthy & Prince 1986, Kager 1996). And finally, other so called odd/even alternations in Panoan have been analyzed metrically, including coda /ʔ/ deletion in weak syllables in Capanahua and [h] epenthesis in strong syllables in Huariapano (González 2003 and references therein).

My proposal is that the same process accounts for the allomorphy of /–ʃin/, /–ṣon/, /–fain/ and the causative /–man/. Whether /n/ is realized as [d~n] depends on the nasality of the surrounding vowels. It can be argued whether deletion or epenthesis best account for these alternations; consonantal deletion generally occurs in coda position (see section 2), but glides can be epenthesized, as in /ak–i–o–i/ *do–inf.–come–progressive* [a.ki.ɟo.i] ‘came to do it’ (Eakin 43).

However, a purely metrical account of these data runs into the same problem as the syllable counting analysis (12). While [(ˈta.pĩ.) (ma.di)], [ˈ(o.ṣa.) (ʃi.na.) ma], [n~d] do not surface in unparsed syllables [(fe.ṣõ.) a] or even in strong footed syllables: [(fo.ṣõ.) (i.ka.) (nõ.ki)] ‘Will take it to you’ (Eakin 98). This apparently goes against the typological generalization that deletion takes place in weak syllables and epenthesis in strong syllables (González 2003). I propose that these alternations arise through the interaction of several factors. First, there is a requirement for right edge alignment for these four suffixes. At the same time, there is a tendency to avoid final unparsed syllables. Final /n/ is not pronounced if it causes a final syllable to be unparsed (13a); cf. with (13c). An important assumption is that when /n/ does not surface, the suffix vowel diphthongizes with the final vowel in the word, thus avoiding a final onsetless syllable (13b).

(13) Schema

(a) Avoidance of unparsed syllables [(ˈo.ʃĩ a)] > *[(ˈo.ʃĩ) na]

(b) Diphthongization avoids final onsetless syllables [(ˈo.ʃĩ a)] > *[(ˈo.ʃĩ) a]

(c) /n/ surfaces if all syllables parsed [(ˈta.pĩ) (ma.di)] > *[(ˈta.pĩ) (ma.i)]

The constraints that account for this alternation are given in (14). I assume that lexical entries are sets of allomorphic alternates (Hudson 1974, Hooper 1976). These suffixes have two forms each: {ʃin~ʃi}, {fain~fai}, {ʂon~ʂo}, and {man~ma}. This is essential since other suffixes in Yaminahua have a final /n/, including /fera ~ feran/ 'do on coming' and /ta ~ tan/ 'distance'; in these cases final /n/ is pronounced before vowels and not pronounced before consonants (Eakin 39, F&L 134, 136).

(14) Constraints

FTBIN σ	Feet are binary under a syllabic analysis (Prince 1980, Kager 1989, Prince & Smolensky 1993)
PARSE σ	Syllables are parsed by feet (Prince & Smolensky 1993)
ONSET	Syllables must have onsets (Itô 1989, Prince & Smolensky 1993)
DEP–IO	Output segments must have input correspondents (McCarthy & Prince 1995)
MAX–IO	Input segments must have output correspondents (McCarthy & Prince 1995)
ALIGN–*man*–R	Align the right edge of {ʃin ~ ʃi}, {fain ~ fai},{ʂon ~ ʂo}, {man ~ ma}, {pake ~ pa} with the right edge of a foot (based on McCarthy & Prince 1993) [8]

ALIGN–man–R is a gradient constraint, and violations are counted by segment. For example, *[(ˈo.ʃĩ) a] incurs no ALIGN–man–R violations, but *[(ˈo.ʃĩ) na] has one, since /n/ is misaligned with the right edge of the preceding foot. *[(ˈo.ʂa) (ʃia.ma)] violates ALIGN–man–R three times, since the segments /a, m, a/ intervene between the suffix and the right edge of the foot.

The ranking DEP–IO, MAX–IO>> ONSET accounts for the occurrence of onsetless syllables in Yaminahua (Tableau 1). The ranking FTBIN σ>> PARSE captures binary footing and allows for final unparsed syllables when these cannot be parsed in a disyllabic foot (Tableau 2).

Tableau 1 Onsetless syllables allowed

/ika/ 'he has come'	DEP–IO	MAX–IO	ONSET
☞ a. ˈi.ka			*
b. ˈti.ka	*!		
c. ˈka		*!	

Tableau 2 Binary feet; final σ might be left unparsed

/akiki/ 'towards her'	FTBIN σ	DEP–IO	MAX–IO	PARSE
☞ a. (ˈa.ki) ki				*
b. (ˈa.ki.) (ki)	*!			
c. (ˈki.ki)			*!	
d. (ˈa.ki) (ki.a)		*!		

The ranking FTBIN σ >> ALIGN–man–R, PARSE>> ONSET accounts for the alternations {ʃin ~ ʃi}, {fain ~ fai}, {ʂon ~ ʂo}, {man ~ ma}. The faithfulness constraints DEP–IO, MAX–IO are never violated by these alternating suffixes since their input includes two allomorphic forms; thus, DEP–IO, MAX–IO are not included in Tableaux 3–9.

Compare tableaux 3 and 4, which involve the suffix {ʃin ~ ʃi}. Tableau 3 shows that ALIGN–man–R and PARSE are crucially unranked. Candidates (b, c, e) violate FTBIN σ and are instantly eliminated from the evaluation. Candidate (f) fatally violates ALIGN–man–R three times. Candidates (a, d) tie on violations of ALIGN–man–R and PARSE; since candidate (d) violates ONSET twice, candidate (a) is selected as winner.

[8] The suffix {pake~pa} is considered in section 5.

Tableau 3 ALIGN–man–R, PARSE crucially unranked

/oʂa–{ʃin, ʃi}–a–ma/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
☞ a. (ˈo.ʃa.) (ʃi.na) ma		*	*	*
b. (ˈo.ʃa.) (ʃin.a) (ma)	*!	*		**
c. (ˈo.ʃa.) (ʃin.) (a.ma)	*!			**
d. (ˈo.ʃa.) (ʃi.a.) ma		*	*	**!
e. (ˈo.ʃa.) (ʃia) ma	*!	*	*	*
f. (ˈo.ʃa.) (ʃia.ma)		***!		*

In tableau 4, candidates (d, e) violate high–ranked FTBIN σ. Candidate (c) violates ALIGN–man–R and PARSE and is eliminated. At this point the tie between candidates (a, b) is decided by ONSET; since candidate (a) violates it twice, candidate (b) is selected as winner.

Tableau 4 [–ʃi] Selected to avoid onsetless, unparsed final syllable

/o– {ʃin, ʃi} –a/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
a. (ˈo.ʃĩ.) a			*	**!
☞ b. (ˈo.ʃĩa)		*		*
c. (ˈo.ʃĩ.) na		*	*!	*
d. (ˈo.ʃĩ.) (na)	*!	*		*
e. (ˈo.ʃĩ.na)	*!	*		*

Tableau 5 shows a crucial case involving the suffix {ʂon ~ ʂo}. The allomorph with /n/ deletion is selected in spite of a following strong, onsetless syllable. This tableau shows that ALIGN–man–R outranks ONSET. The optimal candidate (a) violates ONSET, while (b) violates ALIGN–man–R. Candidate (c) is excluded through violations of both ALIGN–man–R and PARSE.

Tableau 5 ALIGN–man–R>> ONSET

/fo–{ʂõn, ʂõ}–ika nõki/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
☞a.(fo.ʂõ.) (i.ka.) (nõ.ki)				*
b.(fo.ʂõ.) (ni.ka.) (nõ.ki)		*!		
c.(fo.ʂõi) (ka.nõ.) ki		*	*!	

The last two tableaux in this section show how the ranking captures the distribution of the causative {man, ma}. In Tableau 6, candidate (d) violates FTBIN σ and is eliminated. The rest of the candidates tie on ALIGN–man–R; candidate (a) wins since it does not violate any other constraint.

Tableau 6 [–mad] selected when no syllables risk being unparsed

/tapin–{man, ma}–i/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
☞a. (ˈta.pĩ) (ma.di)		*		
b. (ˈta.pĩ) (ma.i)		*		*!
c. (ˈta.pĩ) mai		*	*!	
d. (ˈta.pĩ) (mai)	*!	*		

Finally, (d) in Tableau 7 violates FTBIN σ and loses. Candidate (c) violates both ALIGN–man–R and PARSE and is eliminated. The tie between candidates (a, b) is decided once again by ONSET, which is violated by candidate (a). As a result, candidate (b) is selected as the winner.

Tableau 7 [–ma] selected to avoid onsetless, unparsed final syllable

/pi–{man, ma}–i/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
a. (ˈpi.ma.) i			*	*!
☞b. (ˈpi.mai)		*		
c. (ˈpi.ma.) di		*	*!	
d. (ˈpi.) (ma.di)	*!	*		

In conclusion, the alternations between {ʃin~ʃi}, {fain~fai}, {ʂon~ʂo}, and {man~ma} are compelled by conflicting metrical, syllabic and alignment factors, which are captured straightforwardly through constraint interaction in OT. ALIGN–man–R is gradient and accrues violations by misaligned segments (cf. McCarthy 2003); it is also crucially unranked with respect to PARSE. The following section presents additional alternations that can be analyzed in the same way.

5 Similar cases

Foot alignment is also relevant for /–pake/ 'going down' and /–ita/ 'yesterday'. /–pake/ reportedly reduces to [–pa] when the first syllable of the suffix is even numbered in the word (15a–c); otherwise it is pronounced as [–pake] (15d, e) (F&L 132).

(15)	Syllabic alternation: /–pake/ 'going down'		(from Eakin 140, F&L 133)	
(a)	/ka–pake–ni/	[(ka.pa.) ni]	go–down–rem. past	'Went down'
(b)	/ni–pake–naka/	[(ni.pa.) (na.ka)]	live–in series–fut.progr.	'Will live forever'
(c)	/ka–pake–i/	[(ka.pai)]	go–down–progressive	'On going down'
(d)	/kene–pake–ni/	[(ke.ne.) (pa.ke.) ni]	write–in order–rem. past	'Wrote in order'
(e)	/tsao–pake–kafa–ita/		[(tsa.o.) (pa.ke.) (ka.fa.) (i.ta)]	
	sit–down–lateral–yesterday		'(I) sat down'	

/–pake/ is aligned to the right edge of the foot. [–pa] is selected when the suffix is in danger of being split between two feet, even if an unparsed syllable results (Tableau 8); otherwise, [–pake] surfaces (Tableau 9). This case is further evidence for the interaction between ALIGN–man–R and metrical and syllabic constraints in Yaminahua, and it shows that no additional or binary alignment constraints are needed for syllabic cases.

Tableau 8 [–pa] selected

/ka – {pake, pa} – ni/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
a. (ka. pa.) (ke.ni)		**!		
☞ b. (ka.pa.) ni			*	

Tableau 9 [–pake] selected

/kene – {pake, pa} – ni/	FTBIN σ	ALIGN–man–R	PARSE	ONSET
☞ a. (ke.ne.) (pa.ke) ni			*	
b. (ke.ne.) (pa.ni)		**!		

Finally, /–ita/ 'yesterday' interacts with other alternating suffixes in seemingly exceptional ways. For instance, F&L 108 note that some speakers always pronounce the benefactive [–ʂõ] before /–ita/ 'yesterday', no matter its position in the word.[9] Thus, /jono–ʂon–ita/ 'worked for me' can be

[9] Some speakers use [–ʂõ] before /–ita/ and [–ʂon] before other suffixes starting with vowels (Eakin 98).

pronounced as [jo.no.ʂo.ni.ta] or [jo.no.ʂõ.i.ta].The second possibility suggests that /–ita/ requires alignment to the left edge of the foot. This suffix remains to be studied in more detail.

6 Conclusion

Even if Yaminahua has no secondary stress, it has foot sensitive morphophonemic alternations that strongly suggest exhaustive parsing of syllables into feet. These alternations might be vocalic, consonantal or syllabic, but in essence they share the same property: preferential alignment of certain suffixes to foot edges. These alternations are metrical. At first sight they go against the typological generalization that deletion targets weak syllables and epenthesis strong syllables, but it has been shown that they arise through the interaction of foot alignment and other metrical and syllabic factors, namely, foot binarity (especially important for stems), and the avoidance of final unparsed and onsetless syllables. For consonantal alternations, the analysis involves a gradient alignment constraint (cf. McCarthy 2003) that is crucially unranked with respect to a metrical constraint.

This paper has provided an overview of the various foot sensitive morphophonemic alternations in an understudied language, and has proposed an analysis of consonantal alternations (and the suffix /pake/) in Optimality Theoretic terms. It has also sketched an analysis along the same lines for the rest of the syllabic and vocalic alternations considered. Many aspects of Yaminahua remain to be investigated, including the intriguing [k]~[ʔ] alternation and the suffix /–ita/ 'yesterday'. Further study of these and related phenomena in other Panoan languages will undoubtedly increase our understanding of morphophonological alternations and their connection to the phonology.

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