

Stress in Wichí (Mataguayan) and its interaction with the word formation processes

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1. Introduction

This paper analyzes the stress pattern in Wichí (Mataguayan) and its interaction with morphological information in the word formation processes. Stress is typically rhythmic. However, in some cases, morphological information (that is, the kind of elements – affixes or clitics – that are added to the host and some word formation processes, such as noun incorporation) takes priority over the phonological information modifying the lexical stress pattern.

Most of the studies dedicated to the description and documentation of the Wichí language, as well as of other Mataguayan languages (Gerzenstein for Chorote, Wichí and Maká, and Stell for Nivaklé), have focused on its phonology and morphosyntax as opposed to prosodic phenomena, particularly stress. Nevertheless, some observations were carried out on the behavior of stress in three different Wichí dialects by three different authors as part of the phonological description of this language. On studying the Noctén dialect of Wichí (spoken in Bolivia), Cleasson (1994: 6) argues that “Noctenes appears to have free, phonemic stress.” He notes that the suffixation of transitivizers or other role markers

results in “paroxytone and proparoxytone words”.¹ On the other hand, Gerzenstein (2004) holds that stress in the Bermejo dialect falls on the last syllable of the word, but notes that stress can sometimes fall on the penultimate or ante-penultimate syllable. She does not identify what triggers stress assignment in one case or another. Finally, for the Rivadavia variety (southeast of the province of Salta), Terraza (2009: 53) argues that Wichí has a hybrid type of stress because its position is quite variable. Even so, she maintains that stress also presents some regularity. On the one hand, nouns are stressed on the last syllable; on the other hand, the stress position is less predictable in verbs.

The data analyzed in this paper confirm the linguists’ impressions. This study contributes an examination of the stress pattern in the Bermejo dialect of Wichí in the metrical phonology theory (Hayes 1995). Thus, I suggest that primary stress in Wichí falls on the rightmost foot in the phonological word and that the resulting words stressed on the last syllable or on the penultimate one are a consequence of the interaction between morphological and phonological information that rules stress assignment.

The data examined in this study were collected and recorded by myself in different fieldworks in the Formosa province. It consists of recorded wordlists (with mono- and polysyllabic nouns and verbs) pronounced in isolation by three young speakers, one male and two females. Each participant in the study was bilingual, speaking both Wichí and Spanish. Phonetic transcriptions of the words were made following the native speakers’ impressions (with a prior discussion about the notion of stress) on the one hand, and my own stress perceptions, on the other hand. The recordings were submitted to acoustic analysis using Praat speech software. I mainly examined the duration of the vowels, and the intensity and pitch as complementary evidence of our impressionistic transcriptions. However, this paper does not analyze the acoustic features of stress, as this is still under study. Another set of data used for the study of the stress pattern was a corpus of Spanish loanwords. I analyzed their phonological adaptation to the phonemic inventory, syllabication and stress pattern of the recipient language, the Wichí (for further discussion, see Vidal & Nercesian 2009). The second type of data consists of recorded narrative texts produced by old Wichí people. The analysis of stress on words into the context of the phrase was very helpful too, as complementary

¹ The terms *paroxytone* and *proparoxytone* were used by the author meaning words stressed on the penultimate syllable, and words stressed on the ante-penultimate syllable respectively.

information. I examined the stress on the rightmost word of phrases, which is right-headed as foot.

The paper is organized as follows: Section §2 offers general information about the Wichí language, §2.1 focuses on general typological features, and §2.2 presents an overview of the syllable structure. Section §3 focuses on the stress pattern. I then introduce the relationship between stress and word formation processes into the analysis in Section §4. Section §4.1 describes stress in relation to affixation and cliticization, and to the extrametrical suffixes, §4.1.1; and Section §4.2 examines the interaction between stress and compounding processes. Section §5 presents the conclusion.

2. Wichí language and its speakers

The Wichí language belongs to the Mataguayan (also known as Matacoan) family spoken in the region of the Gran Chaco in South America. The other languages of the family are Maká, Chorote and Nivaklé.

The number of Wichí speakers in Argentina is estimated to be between 30,000 and 40,000.² They are distributed in three provinces: Formosa (from the centre to the west of the province through the National Road 81, and in the northwest in the District of Ramón Lista); Chaco (in the north of the province next to the margins of the Bermejo river); and Salta (in the southeast and northeast of the province). In Bolivia, Wichí is spoken in the Tarija County.

According to Gerzenstein (2003), the Wichí language exhibits three dialects: the Salteño – corresponding to both the *Guisnhay* and *Vejoz* dialects in Tovar's classification (1964) – (spoken in eastern Salta, Argentina); the Bermejo (also called *Teuco*) dialect (spoken in Formosa and Chaco, Argentina); and the Noctén (also called *Weenhayek*, in Tarija, Bolivia). Gerzenstein (2003) divides the Bermejo dialect into two dialect groups: *Arribeños* and *Abajeños*, depending on the course of the Bermejo River. The data analyzed in this study belong to the Bermejo dialect, *Abajeños* speakers.

² It was estimated at 30,649 Wichí speakers by INDEC (2004-2005) and 40,036 by UNICEF (2009).

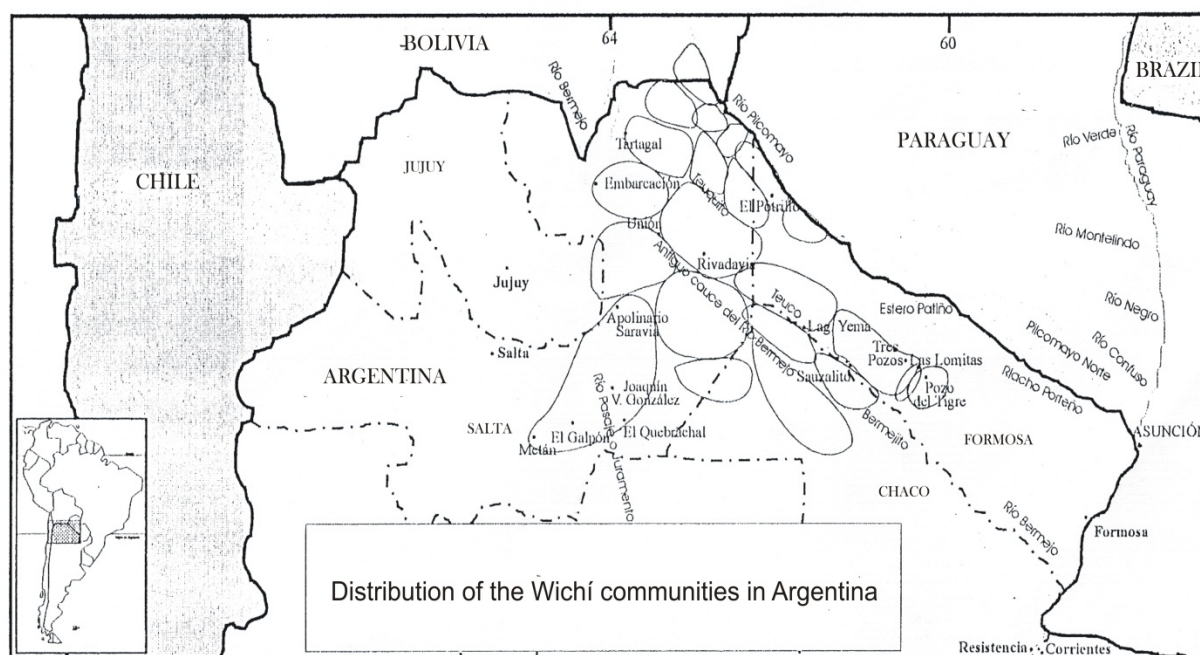


Figure 1. Geographical setting of Wichi in Argentina

2.1. A thumbnail typology

Wichi is head-marking, agglutinating and polysynthetic. The word order is relatively fixed, and it tends to be (S)V(O). The language has no adpositions or case/marking for nouns. An alienable/inalienable distinction exists, as in most Chaco languages. Nominal inflection includes number and possession, but not gender. Alienable nouns can be possessed but require a relational or genitive classifier between the possessor prefix and the root (Golluscio 1993, Vidal & Nercesian 2005). Possessive prefixes are formally similar to subject and object pronominal prefixes. Verbal categories are person, number, tense, mood, aspect negation, evidentiality, and directionality/location. Wichi has several affixes to increase or decrease the number of participants: causatives, applicatives, and reflexives/reciprocals.

The temporal system distinguishes future vs. non-future. There is a past tense clitic paradigm constituted by different markers for recent past, near past, further past and remote past. There are different affixes for negation that distinguish realis/irrealis. Irrealis negation constitutes a special single paradigm that conflates subject person, negation and evidentiality (Nercesian 2008).

As for word classes, (a) nouns and verbs share some affixes: past tense and iterative clitics can be combined with nouns; some alienable nouns can have pronominal prefixes to indicate the only argument of an existential predicate; negative affixes can be added to nominal possessive constructions (possessor-possessed); (b) property words and states belong to the verb class; (c) adverbials are an independent word class.

Wichí allows noun incorporation as a lexical compounding process, optionally bringing the possessor into the argument structure (possessor raising). It also has serial verb constructions as a syntactic mechanism to express different semantic categories: purpose, concomitant actions, cause-effect, manner, location/direction, trajectory/orientation, benefactive, instrument, comitative, causative and immediate future (Nercesian, 2009-2010).

The language has a large consonant inventory (34 phonemes) and an average vowel inventory (5 phonemes); following the *WALS* parameters (see Maddieson 2011a-b):

Plain: p, t, q, k^w, ʔ, ts, č, f^w, s, ł, χ, h, m, n, l, j, w

Ejective and glottalized: p', t', q', ts', č', 'l, 'm, 'n, 'j, 'w

Aspirated and voiceless: p^h, t^h, q^h, ts^h, ŋ, j̥, w̥

Oral vowels: i, e, a, o, u

Length, nasality and creaky voice are not distinctive features (Cleasson 1994, Gerzenstein 1992, Nercesian 2006, 2008.).

2.2. Syllable structure

Allowed syllable structures in Wichí are: CV, CVC, and CCV. The following sequences may occur inside a word: CV.CV(C), CVC.CV(C), CV.CCV(C), but others may not: *CVC.CCV(C), *CVCC.CV(C), *CV.V(C). There can be two consecutive consonants at most.

Any consonant of the inventory (plain, glottalized/ejective and aspirated) may occur in the onset position. There are no syllables without onset (Cleasson 1994). To avoid vowel hiatus and onsetless syllables, the palatal glide /j/ appears as an epenthetic segment that interrupts sequences of two vowels, thereby building a second syllable with an onset CV:

CVV(C) > CV.GV(C). Some clusters like /tʎ/, /pʎ/ and /kʎ/ are possible in the onset position, although they really are uncommon.³

The nucleus can be formed by a vowel or by an alveolar sonorant consonant ([ŋ] and [ʎ]). Both syllabic consonants are reduced pronominal prefixes. The former syllabic consonant refers to the first subject person or possessor in the Bermejo dialect. I hold that this prefix is derived from an old form: *no-*, which refers to the same person of the subject and possessor, documented by Pelleschi (1986) and Hunt (1913) in the Salteño dialect spoken in the province of Salta. The prefix /nõ-/ has actually been reduced to /ð:-/ in the Salteño variety, and to /ŋ-/ in the Bermejo variety. The other prefix, *la-* ‘third person possessor’, is often morphologically reduced to [ʎ] in spontaneous and faster speech (i.e., *la-w'u* ~ *ʎ-w'u* ‘his neck’). Syllabic nasal and lateral consonants are longer than non-syllabic ones because of compensatory lengthening. Since a segment of the syllable has been deleted, the adjacent syllabic becomes lengthened ‘in compensation’. As a result, the pronominal prefixes continue to be single syllables. Sequences like /aj/, /ej/, /oj/, /uj/ are very common in Wichí, and can occur in the middle or at the end of the word, but glides belong to the consonantal inventory of this language.⁴ Thus glides, like all other consonants, can occupy coda positions. The nucleus of syllables /ʔV/ and /CʔV/ is partially or totally laryngealized. The glottal onset causes the laryngealization of the vowel, which, in turn, produces longer vowels [ʔV:], [CʔV:]. Thus, two periods can be detected during the vowel production – a laryngealized one followed by an oral one: [ʔVV]. However, in fast speech, the vowel of syllables /ʔV/ and /CʔV/ may alternate between partially laryngealized vowel [VV] and totally laryngealized vowel [VV̥].

Plain and labialized consonants, as well as glides, can occur in coda position (although the /w/ is very rare). However, they can be neither a cluster nor an aspirated or ejective consonant (*CVCC; *CVCʔ; *CVCʰ).

³ Cleasson (1994: 3) says that if complex consonants and aspirated consonants are interpreted as phoneme sequences (rather than as a single consonant ejective or aspirated), then there also exist syllables CCV(C). In this paper, I interpret these cases as structural syllables CVC, where element C in the onset position may be plain, ejective or aspirated. In contrast, sequences [tʎ], [pʎ] and [kʎ], which only occur at the onset of the syllable, are considered clusters and the structure of the syllable in these cases is CCV.

⁴ Glides may undergo an aspiration process when they are followed by a laryngeal consonant [h]. Aspiration only occurs in consonants, never in vowels.

3. Stress pattern

Stress in Wichí is rhythmic, derived by parsing the word into binary iambic feet from left to right. The language has a quantity-insensitive stress system; syllable weight does not influence stress placement. The primary stress is applied to the head of the rightmost foot in the phonological word. Examples of monomorphemic words (called ‘base’) are presented below, (1a-f) and (2a-e), organized by the number of syllables. There are no ‘base’ words with more than three syllables.

(1) <i>Two-syllable words</i>					
a.	(x)	b.	(x)	c.	(x)
	ten. té		ʔi. nóʔ		ʔa. lé
	stone		water		iguana
d.	(x)	e.	(x)	f.	(x)
	mi. tsí		pe. láχ		ʔa. lú
	cat		he/she is white		field

(2) <i>Three-syllable words</i>					
a.	(x)(x)	b.	(x)(x)	c.	(x)(x)
	ʔa. tsi. ná		po. tsè. káj		ʔa. fʷèn. čé
	woman		Pleiades		bird
d.	(x)(x)	e.	(x)(x)		
	si. wà. nás		ʔis. ti. wín		
	ant		eagle		

Note that, since feet construction is made iteratively, words with an odd number of syllables have a monosyllabic foot word finally. Secondary stress appears to fall on alternating syllables counting from left to right. Thus, stress clash is perceived to occur at the end of most words with an odd number of syllables, as shown (2a-e) in three syllable base words, and the following (3a-d) in polymorphemic words with an odd number of syllables too.

(3) <i>Polymorphemic words with an odd number of syllables</i>			
a.	(x)(x)	b.	(x)(x)
	la. pò. lé		yi. sèt. ’nú
	<i>la-pole</i>		<i>yiset-n’u</i>
	2SUB-be.bald		(he/she)cuts-1OBJ
c.	(x)(x)(x)	d.	(x)(x)(x)
	ŋ. yis. tʰi. là. ʔám		la. qà. tʰ. jèn. ’nú
	<i>n’-yiset-hila-’am</i>		<i>la-katin-yen-n’u</i>
	1SUB-cut-FUT-2OBJ		2SUB-jump-CAUS-1OBJ

Stressing alternating syllables favors the prominence of mono- and disyllabic morphemes within the same word.

I also noted that in most of the cases, the vowel in head position of the foot lengthens, especially when the syllables are open. Note that lengthening is not a contrastive feature in Wichí's vowel inventory (*cf.* §2.1). The examples below (4a-j) show the metrical structure of the words and the duration of the vowels.

(4)		
a. (ča. 'lá:)	69.110	lizard
c. (mi. tsí:)	65.99	cat
b. (si. wà:)(ŋá:s)	70.130.110	ant
c. (ʔi. nà:)(tʰá:χ)	80.110.90	the morning
d. (ʔa. fʷè:n)(čé:)	32.55.61	bird
e. (ʔa. fʷè:n)(če. 'lé:)	30.53.36.67	that bird
f. (qa. tí:n)	98.139	jump!
g. (ta. qà:)(tí:n)	70.101.108	he/she jumps
h. (la. qà:)(tiʰ. jè:n)('nú:)	78.90.70.88.126	you make me jump
i. (ŋ. tà:h)(jen. là:)(ʔá)<ma>	225.123.93.151.180.55	I will make you pay something
j. (ŋ. tà:h)(jen. là:)(ʔá)(ma. pé:x)	235.121.87.118.128.61.148	I will always make you pay something

Examples (4a-d and f) are base words, while the others are polymorphemic. In (4i) the verb has an extrametrical suffix *-a* 'LOC.near' that has been syllabified forming a CV syllable with the consonant in the coda of the prior suffix *-am*. This extrametrical material is marked by "<>". Example (4j) is the same word that (4i) plus a clitic *=pej* 'ITERATIVE' that was attached after the extrametrical suffix. This extrametrical suffix has been incorporated to the new phonological word forming a foot with the clitic (I will discuss this phenomenon in section §5.1.1).

My hypothesis is that the lengthening of the vowels occurs to enforce the optimal iambic foot structure, and that vowels are lengthened by rhythmic patterns. Rhythmic lengthening was observed in many other languages with an iambic type stress pattern, as noted Gordon (2003: 3) for Chickasaw, but also for Yupik (Jacobson 1985, Miyaoka 1985, Woodbury 1987), Kashaya (Buckley 1994), and Choctaw (Munro & Ulrich 1984). Since the rhythmic stress pattern creates unstressed-stressed sequences, it might be related with the iambic lengthening. For the Noctén dialect of Wichí (*cf.* §2), Cleasson (1994: 8-11) holds that the lengthening of vowels must be considered a suprasegmental feature of prominence, comparable to stress. He argues that vowel lengthening is not generally predictable and that it could play a role

within the inflectional morphology of the language (i.e. the vowel of the second syllable of a disyllabic pronominal prefix is long, while that of a monosyllabic prefix is not; pronominal object morphemes have a long vowel when placed before the verbal stem: 'aa- 'you' and 'inaa- 'us INCLUSIVE'; the first-person possessive prefix has a long vowel: 'oo-; and adjectives have a long vowel in their second-person prefix: 'aa-). However, most of the pronominal cases that he mentioned are either disyllabic morphemes that form a single iambic foot attached before the root, or prefixes that in Bermejo dialect correspond to CVC: 'aa- ~ -'am, and C̣: 'oo- ~ n'-. The forms 'am and n'o- were attested by Pelleschi (1986) and Hunt (1913) in the 20th century, which means that the long vowel could have resulted from a compensatory lengthening. In addition, vowel laryngealization may also cause a phonetic lengthening of the vowels, as it was explained in §2.2. In sum, vowel lengthening appears to be related with stress, diachronic phenomena, the phonetic context of the vowels, and maybe the contact with some special dialects of the Spanish. Therefore, these last cases require specific attention to determining what causes vowel lengthening.

The minimal word in Wichí consists of one syllable that is a degenerate foot /ɔ/ and stressed, as the examples in (5) show.

- (5) /'la/ fruit
 /'lup/ winter
 /'lel/ white snail
 /'t'on/ He/she screams.
 /'t'en/ He/she is hard.

Loanwords integrated into the stress pattern of the recipient language illustrate the canonical Wichí stress pattern well. Wichí has few Spanish phonologically adapted loanwords, and the same stress pattern that is applied to native words is applied to loanwords (Vidal & Nercesian 2009).

(6)	Wichí		Spanish	English
	me.'sa	<	'me.sa	table
	si.'ja	<	'si.ʃa	chair
	a. ,sej. 'taχ	<	a. 'sej.te	oil
	a. ,su. 'k ^w i	<	a. 'su.kar	sugar
	pu. ,lu. 'tu	<	po. 'ro.to	bean
	qas. ,lu. 'la	<	ka.se. 'ro.la	pan
	a. ,sej.tu. 'na	<	a.sej. 'tu.na	olive

Examples in (6) show that when the loanword stresses the penultimate syllable, the accent moves to the last syllable in phonological adaptation.

4. Stress and word formation processes

The same stress pattern explained above is applied after the processes of affixation, cliticization and composition take place. However, in some cases it may be conditioned by morphological information. A group of locative/directional suffixes (which presumably developed from old verbal roots) are extrametrical, they do not count in metrical parsing, and are therefore stressless (*cf.* §5.1). In addition, when a noun incorporation process leads to a new word, a specific and fixed stress structure is applied to the compound word favoring the visibility of the internal lexical edges of the word (*cf.* §5.2). These types of phenomena in Wichí call for an analysis of stress in connection with morphological information, that is, the type of elements of the word and the type of word formation processes.⁵

The phonological word (PWord) is the domain within which lexical stress in Wichí is assigned (and also, within which phonological processes such as reduction or deletion of phonological segments and syllables, palatalization, aspiration, epenthesis, and syllabification occur). In fact, primary stress always falls on the last foot of the PWord, which makes its right edge easy to perceive. What counts as a phonological word (PWord) has been largely debated in the literature. However, there is general consensus that the PWord is an indispensable prosodic constituent (Hall 1999: 19). As Selkirk (1980), Booij (1983), Nespor & Vogel (1986) and others have sustained, the phonological word is arranged in a prosodic hierarchy of inclusive units: the PWord is the domain where feet are organized, and the phonological phrase is the domain where PWords are organized.

Phonological Utterance (U) > Intonational Phrase (IP) > Phonological Phrase (Φ) > Prosodic Word (ω) > Foot (F) > Syllable (σ)

At the same time, a phonological word may correspond to one lexical word (LexWord) or more (this is assumed by most linguists: Lyons 1968, Matthews 2000[1974], Booij 1983, Spencer 1991, Mithun 1998, Gussenhoven & Jacobs 1998, Hall 1999, Dixon & Aikhenvald 2002, Aikhenvald 2007, among others). In addition, a PWord may have morphological relationships within it, since it is associated to one or more lexical words and the LexWord may be formed by a stem+affixes:

⁵ In this paper, 'word formation' covers both derivation and inflection. The last one is obligatory in verbs and in inalienable nouns. In consequence, a verb and an inalienable noun without the inflectional affixes are not considered a 'word' by the speakers. I follow Mithun (1998) and Dixon & Aikhenvald (2002) for the notion of 'word'.

(LexWord)PWord

Inversely, a lexical word may not correspond to one phonological word. That would be the case of clitics, for example (Anderson 2005: 12). Thus, two lexical words that constitute a recursive PWord (a PWord that contains a PWord), may be combined for two reasons: *a*) because one of the LexWord does not correspond to a PWord and needs a phonological host:

$$((\text{PWord})+\text{clitics})=\text{recursive PWord}$$

and, *b*) motivated by morpho-semantic factors, that is, compounds that create a new concept:

$$((\text{PWord})+(\text{PWord}))=\text{recursive (complex) PWord}$$

Regarding clitics and their phonological host, I agree with the point of view of Woodbury (2002). He holds that it is reasonable to reserve the term *phonological word* for the maximal domain of the lexical phonology; and that the grammatical word plus any enclitics should make the phonological word; where the grammatical word is a clearly demarcated subdomain within that. This result, as he said, is rather unremarkable, since it amounts to the classic treatment of enclitics as phonologically bound, but grammatically independent (*op. cit.*: 96). From this perspective, the concept of recursive phonological word is really useful and illuminating because the same morpho-phonological changes that may occur within a PWord aligned with a lexical word, as well as within a PWord plus clitics, do not occur between two PWords linked to form a phrase. In addition, the idea that a PWord can contain another PWord may also explain compounds. According to Hall (1999: 12-13), the recursive PWord is accepted by different linguists for representing enclitics in Serbo-Croatian (Zec & Inkelas 1991), English (McCarthy 1993), the Cologne dialect of German (Kleinhenz 1997), and the Neapolitan dialect of Italian (Peperkamp 1997).

In sum, these possible correlations between LexWord and PWord show that a phonological word may have morphological relationships within it. And, since morphological information may be taken into account by the stress rule in Wichí, I will distinguish between lexical word and phonological word in order to analyze the interaction between main stress assignment and word formation.

4.1. Stress and affixation / cliticization processes

The same stress pattern in Wichí is applied to a PWord with affixes and clitics.⁶ They share a phonological dependency, they are unstressed, and need a phonological host. However, they differ in several other morphosyntactic-functional features.

Affixes in Wichí have a slot within the morphological structure of the word. They usually choose only one lexical word class (noun, verb or adverb), they can derive the word, and they have scope over the local domain (the word). Nominal and verbal affixes are: pronominals (subject, object and possessor), noun classifiers, demonstratives, reflexive/reciprocal, nominal and verbal derivatives, future tense, negation, durative aspect, nominal number and locatives/directionals Type I.

POSS+CL+**Root**+Derivatives+DIM/AUG+N+DEM

Figure 2. Morphological Structure of the Noun

NEG+SUB+RFL/REC+**Root**+CAUS+NEG+FUT+OBJ+APPL +NMZ+ASP I+DIR/LOC

Figure 3. Morphological Structure of the Verb

Affixes are attached to the host to form a lexical word (they contribute to the word formation process) which, in turn, corresponds to a PWord. Stress is assigned on the resulting (LexWord)PWord in the same way as it is assigned when the single word has no affixes (*cf.* §4).

⁶ Apart from the clitics analyzed in this study, there is another group of clitics that has not been considered here. This group is composed of clitics that have their own stress and lack phonological dependency. Some of these clitics are: *toj* 'LINKER.realis', *che* 'LINKER.irrealis', *p'ante* 'REMOTE_PAST', *p'iya* 'DUBITATIVE'. They may be attached to the preceding or following word in the phrase, and they may also combine with some other clitics: *toj=tsu* 'that'; *toj=na* 'this'; and in some cases, they may occur independently by themselves.

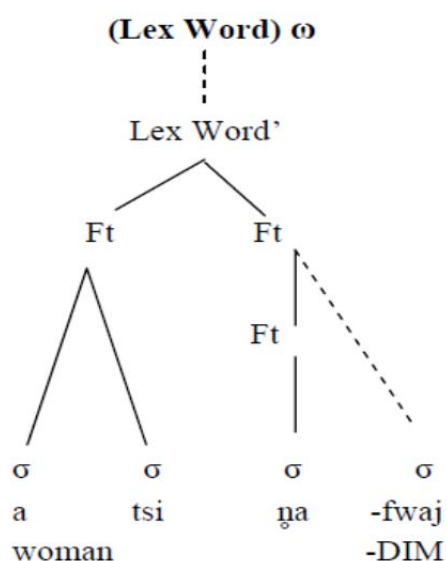


Figure 4a. Adding suffix

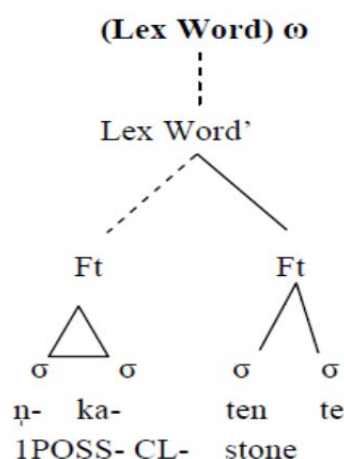


Figure 4b. Adding prefixes

As Figures 4a and 4b show, an affix may form a foot with a syllable of the host and two affixes can form a foot attached to the host. Examples (7)-(10) and (11)-(14) illustrate the stress rule assignment before and after affixation in verbal and nominal roots, respectively. Note that the main stress is always on the last foot of the PWord.

Verbs + Affixes	
(7) a. (x) t'is.čéj t'ischey (he/she)laughs	b. (x)(x) ʔa.t'is.če.jáχ a-t'ischey-yaj 2POSS-laugh-NMZ
(8) a. (x)(x) ʔi.čè.fʷén ichefwen (he/she)teachs	b. (x)(x)(x) n.čè.fʷen.jà.χáj n'-chefwen-yaj-ay 1POSS-teach-NMZ-PL
(9) a. (x) ʔi.čés iches (he/she)cures (intr)	b. (x)(x) ʔi.čè.sat.'nú iches-hat-n'u (he/she)cures-CAUS-1OBJ
(10) a. (x) ʔi.tsʰón itshon (he/she)pricks	b. (x)(x) ʔi.tsʰò.jén itshon-yen (he/she)pricks-CAUS

Nouns + Affixes	
(11)a. (x)(x) ʔa.tsì.ɲáj <i>atsinha-y</i> woman-PL	b. (x)(x) ʔa.tsì.ɲáj.tsú <i>atsinha-y-tsu</i> woman-PL-DEM
(12)a. (x) ten.té <i>tente</i> stone	b. (x)(x) ɲ.qà.ten.té <i>n'-ka-tente</i> 1POSS-CL-stone
(13)a. (x) ʔe.lé <i>ele</i> parrot	b. (x)(x) ɲ.lò.ʔe.lé <i>n'-lo-ele</i> 1POSS-CL-parrot
(14)a. (x)(x) ʔa.f ^w èn.čé <i>afwenche</i> bird	b. (x)(x) ʔa.f ^w èn.če.f ^w áχ <i>afwenche-fwaj</i> bird-DIM

On the other hand, clitics do not have a slot in the morphological structure of the word in Wichí. They are attached at the ends of the host, they may choose different lexical word classes, they do not derive the word, and they can have a larger scope than a lexical word. Clitics in Wichí are: past tense, verbal number, evidential, iterative aspect (that is, a ‘distributive’ number with nouns), and locatives/directionals Type II.

Clitics do not contribute to the formation of a lexical word but are adjoined to the host forming a recursive PWord structure. This is another strong difference with affixes. Clitics and affixes (both phonological dependent elements) are attached to different units (a PWord and a LexWord, respectively), and this difference is correlated with their morpho-syntactic functions. Thus, when clitics are attached to another lexical word which is associated with a prosodic structure (a PWord), a recursive PWord is formed containing more than one lexical word: ((lexword)PWord+clitics)=recursive PWord.

Figure 5 represents the cliticization process, where the clitic is attached to the lexical word associated with a PWord, thus resulting in a recursive PWord illustrated in the right tree.

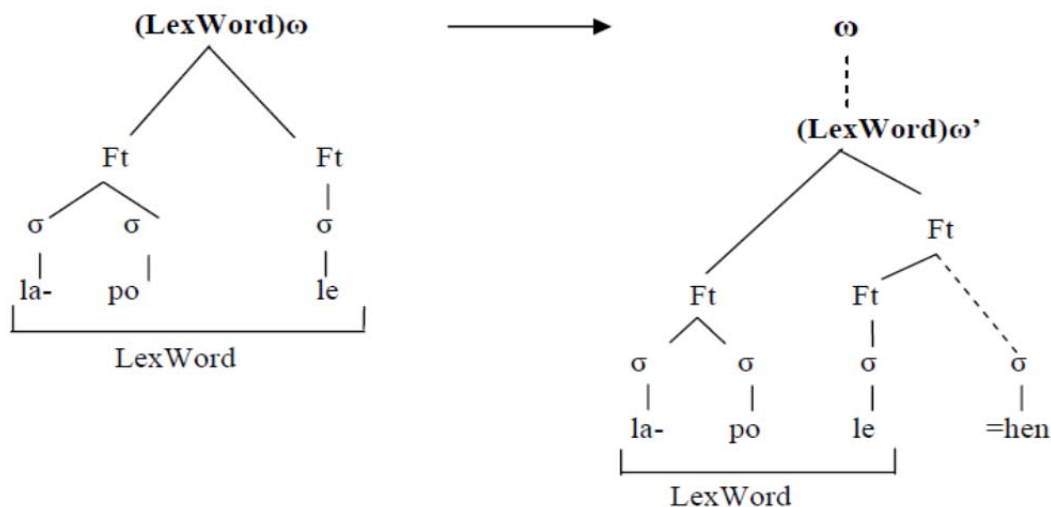


Figure 5. Cliticization process forming a recursive PWord

Examples (15)-(19) illustrate cliticization and the stress assignation involving noun and verb bases:

(LexWord) PWord + Clitics	
(15)a. (x)(x) la.pò.lé <i>la-pole</i> 2SUB-be.bald	b. (x)(x) la.pò.le.hén <i>la-pole=hen</i> 2SUB-be.bald=PL
(16)a. (x)(x) ta.qà.táj <i>takatay</i> (he/she)cooks	b. (x)(x) ta.qà.taj.péχ <i>takatay=pej</i> (he/she)cooks=ITER
(17)a. (x) ten.té <i>tente</i> stone	b. (x)(x) ten.tè.péχ <i>tente=pej</i> stone=DISTR
(18)a. (x) ha.'ló <i>hal'o</i> tree	b. (x)(x) ha.'lò.ma.t ^h í <i>hal'o=mathi</i> tree=DEM.PAST
(19)a. (x)(x) la.tà.w'e.lú <i>la-taw'elh-hu</i> 2SUB-climb-APPL	b. (x)(x)(x) la.tà.'we.lù.ma.t ^h í <i>la-taw'elh-hu=mathi</i> 2SUB-climb-APPL=DEM.PAST

Clitics that are attached to the host may form a foot with a syllable from the (host) PWord (see examples (15b) and (16b)). Note also that the

same iterative clitic has been attached to a verb, as in (16b), and to a noun, (17b). Furthermore, past tense clitics that were attached to verbs have been added to nouns in examples (18) and (19).

4.1.1. Extrametrical suffixes

Locatives and directionals are divided into two groups depending on whether they are extrametrical (Type I) or not (Type II). This grouping corresponds with other criteria. Only directionals and locatives Type II co-exist with their correspondent free forms, which are motion and position verbal roots, carry inflectional affixes (as any other verb) and function as a single predicate. They usually occur in asymmetrical serial verb constructions as verbs (Nercesian 2009-2010), whereas they function as applicatives attached to the verb, as bounded forms.

Locatives/Directionals (Type I) Extrametrical	Locatives/Directionals (Type II) Non-extrametrical
-a near	= <i>pe'</i> on
-e far	= <i>pho</i> up
-ey very far	= <i>cho'</i> down
-kwe allative	= <i>fwi</i> under
-che extending	= <i>hi</i> in (LOC)
-hu inside	
-ej instrument, comitative	

Table 1. Locatives/directionals and instrumental suffixes

The extrametrical group of suffixes is formed by locatives/directionals Type I. They add to the verbal base and form lexical words. Synchronically, they are neither free forms nor participate in serial verb constructions but may function as applicatives deriving verbal roots. In addition, unlike Type II forms, they never combine with nouns. Since they are similar to affixes, it would be expected that the word be parsed into feet and the stress be applied after they have been added to the base, as occurs after any affixation process. However, they are not counted in metrical parsing and they are never stressed, even when being in iambic position on the last right foot of the word. A hypothesis for their extrametricality could be that they have developed from free verbal roots, like metrical locatives/directionals (Type II). Also, the extrametricality of these suffixes could be a trace of their old status. The morphosyntactic and phonological differences between the two types of locatives/directionals could be explained as a consequence of their degree of grammaticalization. The grammaticalization of the extrametrical suffixes appears to be older

than the metrical group (Type II). Actually, this last group behaves as clitics rather than suffixes.

Examples in (21)-(24) show verbal roots derived by extrametrical suffixes and the stress assignment. Since these suffixes are extrametrical, they do not form a foot neither by themselves nor with another syllable of the (non-recursive) PWord, in spite of having an even or an odd number of syllables. Thus, they are unstressed.

Verbs derived by extrametrical locative/directional suffixes Type I	
(20)a. (x) t'ón <i>t'on</i> (he/she)shouts'	b. (x)<x> t'ó.nej <i>t'on-ey</i> (he/she)shouts-APPL.very.far
(21)a. (x)(x) la.nù.wáj <i>la-nuway</i> '2SUB-be.afraid'	b. (x)(x)<x> la.nù.wá.ja <i>la-nuway-a</i> 2SUB-be_afraid-APPL.near
(22)a. (x)<x> ŋ.t'é.k ^w e <i>n'-t'e-kwe</i> 1SUB-look-APPL.allative	b. (x)(x)<x> ŋ.t'è.ʔám.k ^w e <i>n'-t'e-'am-kwe</i> 1SUB-look-2OBJ-APPL.allative
(23)a. (x)<x> ŋ.t'é.je <i>n'-t'e-je</i> 1SUB-look-APPL.far	b. (x)(x)<x> ŋ.t'è.ʔá.me <i>n'-t'e-'am-e</i> 1SUB-look-2OBJ-APPL.far

Examples in (22) and (23) are roots co-lexicalized with the locative suffixes; even thus, they preserved the last place on the morphological structure and are extrametrical. Therefore, the pronominal object suffix has been attached to the verb between the verbal root and the co-lexicalized suffix breaking the base.

Compare examples (20)-(23) with the following (24)-(26) to see the extrametricality of the locatives/directionals Type I and the metricality of the locatives/directionals Type II.

Verbs derived by metrical locatives/directionals Type II		
(24)a. (x)(x) ŋ.tì.jóχ <i>n'-tiyoj</i> 1SUB-jump	b. (x)(x) ŋ.tì.joχ.péʔ <i>n'-tiyoj=pe'</i> 1SUB-jump=APPL.on	c. (x)(x) ŋ.tì.joχ.p ^h ó <i>n'-tiyoj=pho</i> 1SUB-jump=APPL.up

- | | |
|--|--|
| (25)a. (x)(x)
nt.qà.tín
<i>n'-tkatin</i>
1SUB-jump | b. (x)(x)
nt.qà.ti.ńí
<i>n'-tkatin=hi</i>
1SUB-jump=APPL.in |
| (26)a. (x)
'jaχ
<i>y'aj</i>
(he/she)hits' | b. (x)
'jaχ.čó?
<i>y'aj=cho'</i>
(he/she)hits=APPL.down |

The extrametrical suffixes may be adjoined to a foot in the recursive phonological word forming a foot with the clitic attached to the PWord. The incorporation of the extrametrical suffix allows the stressing of the recursive PWord. Similar phenomena of the adjoining of extrametrical material was attested in Latin (Kenstowics 1994: 574, Hayes 1995: 111), Hopi, Northern Uto-Aztecan (Hayes 1995: 111), Southern Paiute, Uto-Aztecan (Hayes 1995: 266) and Asheninca, Arawakan (Hayes 1995: 288), among others.

Examples in (27a and b) and (28 a and b) illustrate the adjoining of the extrametrical suffixes to the recursive PWord in Wichí.

- | | |
|---|---|
| (27)a. (x)(x)<x>
ń.jò.ts ^h an.ʔá.ma
<i>n'-yotshan-'am-a</i>
1SUB-ask-2OBJ-APPL.near | b. (x)(x)(x)
ń.jò.ts ^h an.ʔà.ma.hén
<i>n'-yotshan-'am-a=hen</i>
1SUB-ask-2OBJ-APPL.near=PL |
| (28)a. (x)<x>
t'ó.nej
<i>t'on-ey</i>
(he/she)shouts-APPL.very.far | b. (x)(x)
t'ò.nej.péχ
<i>t'on-ey=pej</i>
(he/she)shouts-APPL.very.far=ITER |

In the parsing of a recursive PWord with an even number of syllables, the extrametrical suffix might be adjoined to the previous foot, but in this case, the construction results in a foot not accepted for an iambic structure: (- ∪). To avoid this 'illegal' iambic foot, the extrametrical suffix adjoins to the attached clitic forming a new foot with an optimal iambic structure. On forming a foot together, the extrametrical suffix and the clitic in the recursive PWord, the structure of the non-recursive PWord is preserved (see the vowel lengthening and the metrical parsing in a similar case in examples (4i) and (4j)). Actually, the preservation of the (non-recursive) PWord highlights the recursivity of the phonological word, since the (non-recursive) PWord is maintained as a subdomain of the recursive phonological word (in terms of Woodbury 2002). Figure 6 illustrates the morphological and phonological processes explained above in Wichí.

a.	→	b.
	(x)<x>(x)	(x)(x)
	/ŋ . t'ó . na . hen/	/ŋ . t'ò . na . hén/
	<i>n'-t'on -a=hen</i>	<i>n'-t'on -a=hen</i>
	1SUB-shout-LOC=PL	1SUB-shout-LOC=PL
	I shout for them (they are near)	I shout for them (they are near)

Figure 6. Morphological and phonological structures

Also, note that the metrical structure with an odd number of syllables resulting from the addition of a clitic to the verb plus an extrametrical suffix is different from the metrical structure of other words with an odd number of syllables, both base (see examples in (2)) and derived words (see (10b); (11a); (14a); (15a); (16a); (17b)). In the last case, the metrical structure is weak-strong-strong (. `x)(x'), but in cases like (28b), the metrical structure is strong-weak-strong (`x)(. x').

4.2. Stress and compounding processes

The rhythmic pattern also interacts with morphological information in compounding processes. The same stress rule – assigning the main stress to the last iambic foot to the right of the PWord – is applied to compound and non-compound words, whereas the noun incorporation process is associated with a specific prosodic structure.

Compounding and noun incorporation show differences and similarities in Wichí. Regarding semantic features, both processes create a new lexical item denoting a single concept (which can sometimes be deduced from the meaning of the elements). With respect to syntactic aspects, noun incorporation consists of a verb and its object, and may involve a possessor raising phenomenon (when the noun is incorporated with the possessor prefix). In contrast, the relationship between the two lexical items in the compounding process is semantic: part-whole, genitive and agent-event (Vidal 2008). Finally, regarding morphological features, the two processes are compounding mechanisms (unlike affixation and cliticization), but they differ because noun incorporation may change verbal valence or cause a rearrangement of the arguments, and the 'complex' word is always a verb (Mithun 1984). In addition, a special suffix, *-a*, is added to the verbal construction at the edge, derived by incorporation, whereas this suffix never occurs with compound words.

Regarding phonological features, both compounding and noun incorporation mechanisms combine two PWords to form a recursive PWord: ((PWord)+(PWord))=recursive (complex) PWord.

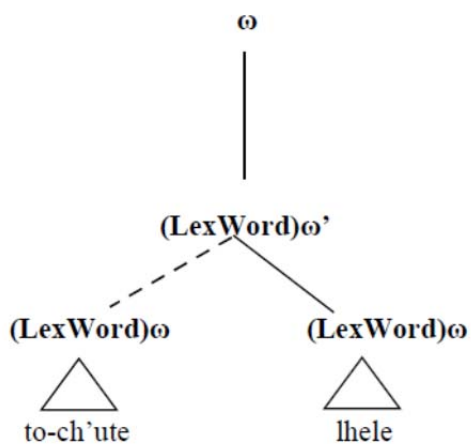


Figure 7. Compound word:
to-ch'ute 'ear' + lhele 'occupant' → 'earring'

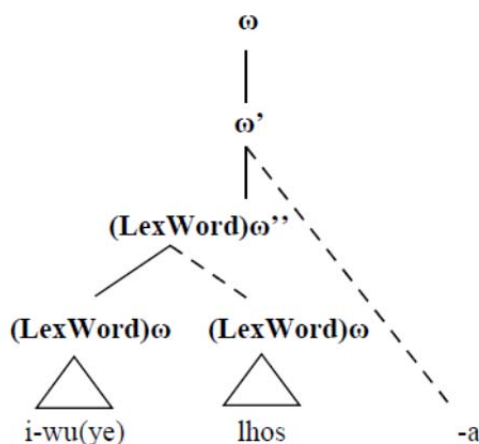


Figure 8. Noun Incorporation:
i-wuye 'he/she does' + lhos 'son/daughter' → 'she conceives'

The recursive (complex) PWord differs from the recursive PWord constituted by a PWord plus clitics in that its elements are phonologically independent. There is also a semantic motivation for compounding – to create a new single lexical concept – which causes the combination in a recursive PWord. The motivation is not phonological in this case (as it occurs with the PWord combined with clitics). However, recursive (complex) PWords resulting from compounding and noun incorporation are stressed differently.

The following examples (29)-(35) show compound words where the stress algorithm has been applied to the recursive PWord in the same way as a single PWord (*cf.* §4.).

(29) (x)(x)
to.fw'èfw.t'óχ
to-fwefw+t'oj
POSS.UNDEF-finger+leather
nail

(30) (x)(x)
to.fw'èfw.ɬu.kwé
to-fwefw+lhukwe
POSS.UNDEF-finger+father
thumb

(31) (x)(x)
tσα.λά.να.čá
tsalana+cha
canoe+tool
paddle

(32) (x)(x)
fwi.'jèt.čá
fwiy'et+cha
winter+tool
coat

- (33) (x)(x)
to.qòs. 'no.jíχ
to-kos+n'oyij
POSS.UNDEF-plant+way
furrow
- (34) (x)(x)
čos.ti.lóχ
chos+tilhoj
tail+to_carry
scorpion
- (35) (x)(x)
to.mò. 'wét
to-mo+w'et
POSS.UNDEF-to.sleep+place
bed

The recursive PWord resulting from noun incorporation is linked to a specific prosodic structure. It consists of two unbounded feet on which the stress is applied by a stress-stem type rule. Primary stress is applied to the first syllable of the incorporated noun root and secondary stress on the verbal root. That prosodic structure (examples (36)-(42)) highlights the morpho-syntactic edge of the two elements of the compound, i.e. the complex lexical word, V+N.

Free Noun	Incorporated Noun
(36) (x) ło.mét <i>lhomet</i> word	(x)(x) i.wù.ló.me.ta <i>iwu+lhomet-a</i> (he/she)do+word-IC He/she preaches.
(37) (x) te.néq <i>tenek</i> singing	(x)(x) i.wù.té.ne.ča <i>iwu+tenek-a</i> (he/she)do+singing-IC He/she worships.
(38) (x) łós <i>lhos</i> son/daughter	(x)(x) i.wù.ló.sa <i>iwu+lhos-a</i> (he/she)do+son-IC She conceives.
(39) (x) 'wéj <i>w'ey</i> clothes	(x)(x) i.wù.'wé.ja <i>iwu+w'ey-a</i> (he/she)do+clothes-IC He/she dresses.
(40) (x) t'ál.jáχ <i>t'alh-yaj</i> to.request-NMZ request	(x)(x) i.wù.t'ál.ja.χa <i>iwu+t'alhyaj-a</i> (he/she)do+request-IC He/she prays.

- | | |
|--|---|
| <p>(41) (x)(x)
 ŋ.pò.sét
 <i>n'-poset</i>
 1POSS-beak/lip
 my beak/lip</p> | <p>(x)(x)
 i.wù.pó.se.ta
 <i>iwu+poset-a</i>
 (he/she)do+beak/lip-IC
 He/she whistles.</p> |
| <p>(42) (x)(x)
 la.čè.f^wá
 <i>la-chefwa</i>
 3POSS-partner
 his/her partner</p> | <p>(x)(x)
 i.wù.čé.f^wa.ja
 <i>iwu+chefwa-ya</i>
 (he/she)do+partner-IC
 He/she gets married.</p> |

Note that a stress clash is produced when the noun is incorporated without the possessive prefix and makes a morphological edge visible. Since the stress assignment follows the stress-stem type rule, stress falls on the left edge of the noun stem when nouns have been incorporated into the verb with the possessive prefix. See examples (43a-b) and (44a-b).

- | | |
|--|---|
| <p>(43)a. (x)(x)
 ŋ.wù.'wé.ja
 <i>n'-wu+w'ey-a</i>
 1SUB-do+clothes-IC
 I get dressed.</p> | <p>b. (x)(x)
 ŋ.wù.ʔa.'wé.ja
 <i>n'-wu+'a-w'ey-a</i>
 1SUB-do+2POSS-clothes-IC
 I dress you.</p> |
| <p>(44)a. (x)(x)
 ŋ.wù.lé.ja
 <i>n'-wu+lhey-a</i>
 1SUB-do+name-IC
 My name is (...)/ I am called (...).</p> | <p>b. (x)(x)
 i.wù.ŋ.lé.ja
 <i>iwu+n'-lhey-a</i>
 (he/she)does+1POSS-name-IC
 He/she calls me (gives me a name).</p> |

This prosodic structure is extremely predictable in noun incorporation. It even applies when the construction is further derived by the locative =*hi*, as in (45) and (44).

- | | |
|--|---|
| <p>(45) (x)(x)
 i.wù.ló.sa.hi
 <i>iwu+lhos-a=hi</i>
 (he/she)does+son-IC=LOC
 She became pregnant.</p> | <p>(46) (x)(x)
 i.wù.ʔé.la.hi
 <i>iwu+'elh-a=hi</i>
 (he/she)does+other-IC=LOC
 He/she changes.</p> |
|--|---|

This last phenomenon also shows that lexical word and phonological word are two relevant units to explain the interaction between stress assignment and morphological processes in word formation.

5. Conclusions

Stress in Wichí is rhythmic, derived by parsing the word into binary iambic feet from left to right. The language has a quantity-insensitive stress system; syllable weight does not influence stress placement. The primary stress is applied to the head of the rightmost foot in the phonological word. Secondary stress appears to fall on alternating syllables counting from left to right. Thus, stress clash is perceived to occur at the end of most words with an odd number of syllables. The minimal word in Wichí is monosyllabic and constitutes a stressed degenerate foot /ʊ/. Vowel lengthening rules enforce the optimal iambic foot structure.

The phonological word is the domain for applying lexical stress. A PWord may correspond with one or more lexical words. Also, a PWord may be recursive:

(LexWord)PWord
 ((PWord)+clitics= recursive PWord)
 ((PWord)+(PWord)=recursive complex PWord)

The same stress pattern is applied to a PWord resulting from the word-formation processes of affixation, cliticization and compounding. However, in some cases stress assignment is modified due to its interaction with morphological information that conditions the prosodic structure.

On the one hand, a group of extrametrical suffixes, the locatives and directionals Type I, are not counted in metrical parsing, and as a consequence, they are unstressed. This results in words with the primary stress in the penultimate syllable. The extrametricality could be due to their verbal origin (it is a hypothesis that they could have been verbs like locatives and directionals Type II) and their degree of grammaticalization. Even without strong proof of their verbal origin, it is a fact that stress assignment refers to morphological information, distinguishing between Type I locative and directional suffixes and the others.

On the other hand, the stress pattern may change depending on the type of word-formation process. The noun incorporation is associated with a specific prosodic structure consisting of two unbound feet and a stress-stem type rule. The primary stress is applied to the first syllable of the incorporated noun root and the secondary stress on the verbal root. This stress rule results in the visibility of the internal lexical edges of verbs with incorporated nouns.

This study did not intend to be an exhaustive account of stress in Wichí. It would be necessary to connect these findings with a thorough analysis of the phonetic correlates of stress. In this paper, I demonstrated what is gained by considering stress in relation to the word formation processes, and how this metrical analysis contributes to our understanding of the interaction between phonology/prosody and morphology in Wichí.

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Abbreviations

Phonological annotations were made with the SIL fonts. To annotate morphological analysis, I employed the Wichí orthographic alphabet that is accepted and employed by the Wichí speakers.

APPL=applicative; AUG=augmentative; ASP=aspect; CAUS=causative; CL=noun classifier; DEM=demonstrative; DIM=diminutive; DIR=directional; DISTR=distributive; FUT=future; IC=incorporation closer; ITER=iterative; LOC=locative; N=number; NEG=negation; NMZ=nominalizer; OBJ=object; PAST=past; PL=plural; POSS=possessor; POSS.UNDEF=undefined possessor; REC=reciprocal; REFL=reflexive; SUB=subject.

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