THE MEANING OF PLURACTIONALITY IN KARITIANA*

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1. Introduction

This paper focuses on the meaning of pluractional affixes in Karitiana. Karitiana is the sole surviving language of the Arikén family, Tupi stock. It is spoken by about 350 people that live in a reservation located to the south of Porto Velho in the northwest of Brazil in the state of Rondônia (cf. Storto 1999). The paper deals with the following questions: (i) what is the meaning of pluralization in Karitiana?; (iii) how does the array of readings available for Karitiana sentences arise?

Karitiana is a pluractional language - it makes use of pluractional markers. These markers are verbal affixes that indicate that a multiplicity of events has occurred (cf. Lasersohn 1995). The language has no Determiner Quantifiers, that is, it has no quantifiers that belong in the nominal phrase. Quantifiers in Karitiana are adverbial in that they either take scope over the predicate or the whole sentence (cf. Müller et al 2006).

Our account will assume as background The Cumulativity Universal, as proposed in Kratzer 2005. This universal claims that the denotations of all simple predicates in natural languages are cumulative (cf. Krifka 1986, Landmann 1996, Kratzer 2001). The account will be laid out within an event semantics - VPs are assumed to have an event

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argument (cf. Davidson 1967, Parsons 1990, Schein 1993, Lasersohn 1995, among others).

The paper claims that pluractional affixes are PLural operators on cumulative verb denotations in Karitiana and that the multiplicity of participants readings for both pluractional and quantified sentences is a result of cumulativity plus entailments and/or implicatures.

2. Noun Phrases and Quantification in Karitiana

Karitiana is a verb final language. There is a complementary distribution between embedded and matrix clauses with respect to the position of the verb. Matrix sentences are verb-initial (VOS, VSO) or verb-second (SVO, OVS), whereas embedded clauses are always verb-final (OSV, SOV). Movement of the verb in matrix clauses is related to the presence of agreement and tense, which are totally absent in dependent clauses (cf. Storto 1999, 2003). In spite of the fact that noun phrases are not marked for case in Karitiana, its Case pattern is ergative-absolutive, in that intransitive verbs agree with their subjects, and transitive verbs agree with their direct objects. This pattern is characteristic of Tupi languages in general.

In Karitiana, noun phrases are not marked for (in)definiteness, nor for singular/plural, as illustrated by the many possible interpretations of sentence (1). There is no morphosyntactic marker for number within the NP. In sentence (2) below, the phrase *myhint pikom* ('one monkey') is semantically singular, while in sentence (3) the phrase *sypomp pikom* ('two monkeys') is semantically plural. However, both noun phrases

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(NPs) remain uninflected for number in the two contexts. These two sentences also show that Karitiana makes no use of numeral classifiers.

(1) Taso naka'yt boroja [1]
taso naka-'yt boroja
man DECL-eat-NFUT snake
'(The/a/some) man/men ate (the/a/some) snake(s)'

(2) Yn naka'yt myhint pikom
yn Ø-naka-'y-t myhin-t pikom
1S 3-DECL-eat-NFUT one-OBL monkey
'I ate a/some monkey(s)'

(3) Yn naka'yt s ypomp pikom
yn Ø-naka-'y-t sypom-t pikom
1S 3-DECL-eat-NFUT two-OBL monkey
'I ate two monkeys'

Universal quantification and demonstrative functions are not expressed by determiners but by subordinate clauses as shown in sentences (4) and (5). In sentence (4) the quantified interpretation is achieved by a subordinate clause composed by the verb to

[1] Glosses are as follows: 1st line: orthographic transcription, 2nd line: morphological segmentation. Symbols used: NFUT= non future, AUX = auxiliar, PART = participle, REDUPL = reduplication, DECL = declarative, CAUS = causative, SG = singular, PL = plural, NEG = negation, 3 = 3rd person, 1S = 1st person singular, FUT = future, EXIST = existencial, 3ANAPH = 3rd person anaphoric prefix, SUB = subordinator, ASSERT = assertative, POS = posposition, PASS = passive, OBL = oblique sufix, VERB = verbalizer.

be and a subordinator. And the demonstrative meaning is achieved by a constituent made of a locative the noun and the verb to be, as can be seen in sentence (5).

(4)	Pikom	akatyym	naponpon	João
	pikom	aka-tyym	Ø-na-pon-pon-Ø	João
	monkey	be-SUB	3-DECL-shoot-REDUPL-NFUT	João
	'João shot at all the monkeys'			

Literally: 'João shot at the monkeys that are'

(5)	Ony	sojxaty	aka	kyn	nakapon	João.
	ony	sojxaty	aka	kyn	Ø-naka-pon-Ø	João
	there	boar	be	at	3-DECL-shoot- NFUT	João
	'João shot at that boar'					

Literally: 'João shot at the boar (that) be there.'

In languages such as English, quantifiers such as *every*, *much* and *nobody* belong in the nominal constituent, as illustrated by the contrast between sentences (6) and (7). These quantifying expressions occupy functional positions in the determiner phrase (DP).

(6) John shot at [every wild boar]

(7) [Every wild boar] was shot

Karitiana does not seem to have determiner quantifiers in the same way as English and other languages do. Quantifying expressions have an adverbial behavior. The informant uses the word *si'irimat* indistinctly to signify either *nobody* or *never*, as can be seen in sentences (8) and (9) below. And in sentences (10) and (11), the word *kandat* ('much') is used to express both quantification over entities (10) and over events ('work a lot') (11).

(8) Isemboko padni si'irimat eremby
i-semboko padni si'irimat eremby
3-get.wet NEG ever hammock
'Hammocks never get wet'

(9) Iaokooto padni si'irimat y'it
i-a-okooto padni si'irimat y-'it
3-PASS-bite NEG ever 1S-son
'Nobody bit my son'

(10) Kandat nakahori dibm taso
kandat Ø-naka-hot-i dibm taso
a.lot 3-DECL-go-FUT tomorrow man
'Many men will go tomorrow'

(11) Pyrykiidn jonso pytim'and kandat tyym
pyry-kiit-n jonso pytim'and kandat tyym
ASSERT-EXIST-NFUT woman work a.lot SUB
'There are many women that work a lot'

Typologically Karitiana is closer to the Chinese-type languages, which are characterized by the free occurrence of bare nouns as arguments and by the absence of number inflection among other traits (cf. Chierchia 1998). Under Chierchia's proposal, in this type of language, lexical nouns denote kinds. Nevertheless, unlike the Chinese-type languages, Karitiana makes no uses of classifiers.

3. Cumulativity in Karitiana

Based on work by Krifka 1986 and Landmann 1996, Kratzer 2005 argues that all basic predicates are born cumulative. This means that verb stems, when intransitive, denote both singular and plural events. And, when transitive, verb stems denote relations between singular or plural events and singular or plural entities.

A predicate is cumulative if whenever it applies to two individuals in its denotation, it also applies to their sum. A classical example is plurals. If Mary and John are students and Carlos and Andrea are students, then Mary and John and Carlos and Andrea are students. That is, any sum of students also belongs in the denotation of *students*. The formal definition of cumulativity for nouns is presented in (12) and illustrated in (13) for the noun stem *student*. The definition of cumulativity for verbal predicates is presented in (14) and illustrated in (15) for the verb stem *fall* (cf. Kratzer 2001). Note that Kratzer assumes an neo-davidsonian semantics for verbs, in that the external argument is assumed not to be an argument of the verb. In the case of (15), *fall* is analyzed as an ergative verb.

(12) Cumulativity (properties of individuals):
$\lambda P_{<et>} \forall x \forall y [[P(x) \& P(y)] \rightarrow P(x+y)$

(13) [[√student']] = {Mary, John,…, Mary+John,…,
Mary+John+Carlos+Andrea}

(14) Cumulativity (properties of events):
$\lambda P_{<st>} "\forall e" \forall e' [[P(e) \& P(e')] \rightarrow P(e+e')]]$

(15) [[√fall']] = {<Mary, $fall_1$>, <John, $fall_2$>,…, <Mary+John, $fall_1$+ $fall_2$>, …}

A consequence of the Cumulativity Universal is that lexical cumulativity should be available in all natural languages at no cost. It should not depend on the particular make-up of its Determiner Phrases (DPs) or Verbal Phrases (VPs) (c.f. Kratzer 2005). Theoretically, the composition of an ergative verbal stem like *fall* and a nominal stem like *student*, should result in an array of possible interpretations due to the cumulative denotations of its constituents. The possible readings are listed in (16).

(16) [[fall']]([[student']]) is true for:

- "collective" falls: a group of students falling at the same time;
- cumulative falls: some falling first, then others,…;
- iterative falls: the same student(s) falling for a number of times.

Based on the Cumulative Universal, the null hypothesis to assume for Karitiana is that both nouns and verbs have cumulative denotations. The fact that the language has no number inflexion, no classifiers, nor determiners, and that bare nouns are number-neutral support that hypothesis as far as nouns are concerned.

The availability of iterative readings for any interpretation of future and non-future sentences argues for the cumulativity of verbs in the language. The many possible readings for sentence (17) illustrate the results of combining cumulative noun denotations to cumulative verb denotations.

(17) Taso naokyt boroja
taso ∅-na-oky-t boroja
man 3-DECL-kill-NFUT. snake
'Men killed snakes'
'A man killed many snakes'
'A/some/the man/men killed snakes many times'

Literally: 'An unspecified number of men killed an unspecified number of snakes an unspecified number of times'.

We will then begin our analysis of pluractionality in Karitiana by assuming that cumulativity is a property of both its nouns and its verbs.

4. Pluractionality in Karitiana

Somewhat suprisingly, Karitiana makes use of pluractional markers. Pluractional markers in Karitiana are usually expressed by reduplication, and eventually by supletion. The contrast between the verbal predicates in (18) and (19) illustrates the use of reduplication in Karitiana. In (18), the two eggs were broken at the same time, that is, there was only one breaking event, and no reduplication occurs. In (19), the pluractional affix - reduplication - is used to express that more than one breaking event has taken place.

(18) Õwã nakakot sypomp opokakosypi
õwã Ø-naka-kot- Ø sypom-t opokakosypi
kid 3-DECL-break-NFUT two-OBL egg
'The kid broke two eggs'

Context: the two eggs at the same time

(19) Õwã nakokonat sypomp opokakosypi

õwã Ø-na-kot-kot-a-t sypom-t opokakosypi

kid 3-DECL-break-REDUPL-VERB-NFUT two-OBL egg

'The kid broke two eggs'

Context: one at a time

According to the literature, pluractional markers are morphemes, usually verbal affixes that express a great variety of notions. They indicate that a multiplicity of events has occurred, which may involve multiple participants, times or places (cf. Lasersohn 1995).

> "These morphemes normally take the form of some sort of affix on the verb… , and expressing a broad range of notions typically including action by more than one individual, temporally iterated action, and specially scattered action" (Lasersohn 1995, p. 238).

Lasersohn 1995 defines the semantics of pluractional affixes as in (20). The definition states that, when the a verb with pluractional morpheme applies to a plural event, the singular predicate is true of every singular event that is part of that plural event. Pluractional affixes then imply the occurrence of a plurality of events. The cardinality of this plurality, according to Lasersohn, is to be determined by the context and is usually taken to be 'many'.

(20) $V\text{-}PA(E) \leftrightarrow \forall e \in E\ [V(e)\ \&\ card\ (E) \geq n]$

where:

V: verb;

PA: pluractional marker;

E: variable over sets of events;

e: variable over atomic events;

n: variable over the natural numbers.

We have claimed in the previous session that nouns and verbs in Karitiana have cumulative denotations. This implies that cumulative readings should be available with or without the occurrence of pluractional markers. That this is so is shown by sentences (21) and (22), which apparently have the same readings with or without reduplication.

(21)	Õwã	naakat	ipon	pikom	kyn
	õwã	∅-na-aka-t	i-pon-∅	pikom	kyn
	kid	3-DECL-AUX-NFUT	PART-shoot-NFUT	monkey	POS

'The kid shot at the monkeys'

Context: more than one shooting

(22)	Pikom	kyn	naponpon	õwã
	pikom	kyn	∅-na-pon-pon-∅	õwã
	monkey	POS	3-DECL-shoot-REDUPL-∅	kid

'The kid shot at the monkeys'

Context: more than one shooting

Sentence (23) is capable of expressing iteration of an action without the use of a pluractional affix, whereas sentence (24) shows that iteration may co-occur with a pluractional affix.

(23) Kandat taso naokyt boroja
kandat taso ∅-na-oky-t boroja
a.lot man 3-DECL-kill-NFUT snake
'A/The man/Men killed snakes many times'

(24) Kandat nakahori dibm taso
kandat Ø-naka-hot-i dibm taso
a.lot 3-DECL-go:PL-FUT tomorrow man
'Many men will go tomorrow'
Literally: 'Men will go a lot tomorrow'

Since the language already has cumulativity the following questions come up: (i) Why would a language need pluractional affixes when it has cumulativity? (ii) What is the role of pluractional affixes in the language? (iii) What would be the role of quantifiers like many/many times in such a language?

We claim that pluractional affixes in Karitiana perform a pluralization operation on cumulative verb denotations – they exclude atomic events from the denotation of verbs (Ferreira 2005 for nouns and verbs, Müller 2000 for nouns). The formalization of this proposal is laid out in (25) and illustrated for the predicate *fall'* repeated in (26). The result of applying the pluralization operation to the predicate like *fall'* is that all singular falling events are excluded from its denotation as illustrated in (27).

(25) PL = λV [V(E) & non-atomic (E)]
E: variable over cumulative events.

(26) [fall']] = {<Mary, $fall_1$>, <John, $fall_2$>,<Mary+Carlos, $fall_3$, …, <Mary+John, $fall_1$+$fall_2$>, …, <Mary+John+Carlos, $fall_1$+$fall_2$+$fall_3$>, …}

(27) PL ([[fall']]) = {<Mary+John, $fall_1$+ $fall_2$>, …,
<Mary+John+Carlos, $fall_1$+ $fall_2$+$fall_3$>, …}

Our hypothesis makes sense of the apparent puzzle posed the existence of pluractionality in a language in which cumulativity is available in the syntactic composition for both nominal and verbal predicates. The pluractional affix means the same as the plural affix for nouns in many languages, that is, that atomic entities should be excluded from the denotation of the predicate.

The hypothesis also explains why quantifiers like *kandat* ('much') are not redundant with pluractional affixes. Contrary to traditional analyses of pluractional affixes, their combination with verbal predicates is not taken to express the occurrence of many events, but only more than one event.

The claim that the pluractional operation is a plural operation on events in Karitiana makes some predictions. The first one is that pluractionality should be possible for any sentence denoting two or more events and not only for a significant number of events. That this is so, is shown by the use of reduplication in a sentence about two shooting events.

(28)	Sympomp	nakaponpon	João	sojxaty	kyn
	sympom-t	∅-naka-pon-pon-∅	João	sojxaty	kyn
	two-OBL	3-DECL-shoot-REDUPL-NFUT	João	boar	POS

'João shot twice at the boar'

The second prediction that follows from our claim is that sentences denoting a singular event should not reduplicate or mark pluralization via suppletion. Sentence (29) is about one single leaving event, and no supletion is used, whereas supletion is used for the same verb to express a plural event of leaving on sentence (30).Sentences (31) and (32) also illustrate the prediction. Sentence (31) describes the occurrence of a single collective event, and no reduplication is used, whereas sentence (32) is about many events of giving fruit to João and accordingly the verb reduplicates. Sentence (33) is explicitly about only one shooting event and, as expected, no pluractional marker is used.

(29) Myjopá ∅-naka-tat-i dibm
Myjopá 3-DECL-go:SG-FUT tomorrow
'Myjopá will leave tomorrow' *singular event*

(30) Dibm nakahori sypomp õwã
dibm ∅-naka-tat-i sypom-t õwã
tomorrow 3-DECL-go:PL-FUT two-OBL kid
'Two kids will leave tomorrow' *plural event*

(31) Õwã nakahit goojoty João
õwã ∅-naka-hit-∅ goojo-ty João
kid 3-DECL-give-NFUT canoe-POS João
'The kids gave a canoe to João' *singular event*

(32) Õwã nakhithidn kinda'oty João
õwã ∅-naka-hit-hit-n kinda'o-ty João
kid 3-DECL-give-REDUPL-NFUT fruit-POS João
'The kids gave fruit to João' *plural event*

(33) Myhint tapon João napopit sympomp sojxaty
myhin-t tapon João Ø-na-popit-∅ sympom-t sojxaty
One-OBL shot João 3-DECL-kill-NFUT two boar
'With one shot, João killed two boars' *singular event*

Another prediction that is born out is that sentences with distributive readings of singular objects should not allow PL-affixes. This is so because one is distributing singular event predicates, and there are no singular events in the denotation of pluractional predicates. This prediction supported by the fact that the distributive operator *tamyry tamyry* ('each…each') never co-occurs with pluractional affixes. The use of the distributive operator in contexts that encompass singular objects is illustrated by sentences (34) and (35).

(34) Tamyry tamyry nakam'at py'ejip õwã
ta-myry ta-myry Ø-naka-m-'a-t py'ejip õwã
3ANAPH-POS 3ANAPH- POS 3-DECL-CAUS-do-NFUT homework kid
'Each child made his homework'

(35) Tamyry tamyry nakam'at gooj õwã
ta-myry ta-myry Ø-naka-m-'a-t gooj õwã
3ANAPH- POS 3ANAPH- POS 3-DECL-CAUS-do-NFUT canoe kid
'Each child built a canoe for himself'

In this section we have provided support to the claim that pluractional markers in Karitiana effect a PLural operation on verb cumulative denotations.

5. Conclusions

We have claimed that pluractional affixes in Karitiana are PLural operators on verbs: they subtract singular events from cumulative verb denotations. The occurrence of pluractional markers in the language indicates that the sentence is about two or more events. Consequently, quantifiers like *kandat* ('much') are not redundant with pluractional affixes.

The great array of readings that result from argument-predicate combinations in Karitiana as illustrated by sentence (36) is due to nominal and verbal cumulativity. In (37) we present the logical form for sentence (36) in order to illustrate how the multiplicity of readings is achieved. Since both noun and verb denotations are cumulative, the multiplicity of participants readings is a given possibility, and whether there are one or more participants/events involved is decided upon context.

(36) Kandat taso naokyt boroja
kandat taso ∅-na-oky-t boroja
a.lot man 3-DECL-kill-NFUT snake
Literally: 'An unspecified number of men killed an unspecified number of snakes an unspecified number of times'

(37) $\exists E \exists X \exists Y$ [killing' (X,E) & snakes' (X) & agent' (Y,E) &
men (Y) & $|E|$ = many]

where: E, X, Y are variables over cumulative verb and noun denotations respectively.

We conclude by stating that the Cumulative Universal is supported by the Karitiana data. The question of how Karitiana expresses phrasal cumulativity is left for further research. According to Kratzer 2005, phrasal distributive operators (*-operators) are tied to the presence of a plural trace on the DP. Since there are no plural markings on DPs in Karitiana, the question to be tackled is how phrasal distributivity is realized in the language.

An interesting typological question that remains to be pursued is the cross-linguistic availability of the Plural/Pluractional semantic operation for both verbs and nouns across languages.

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