



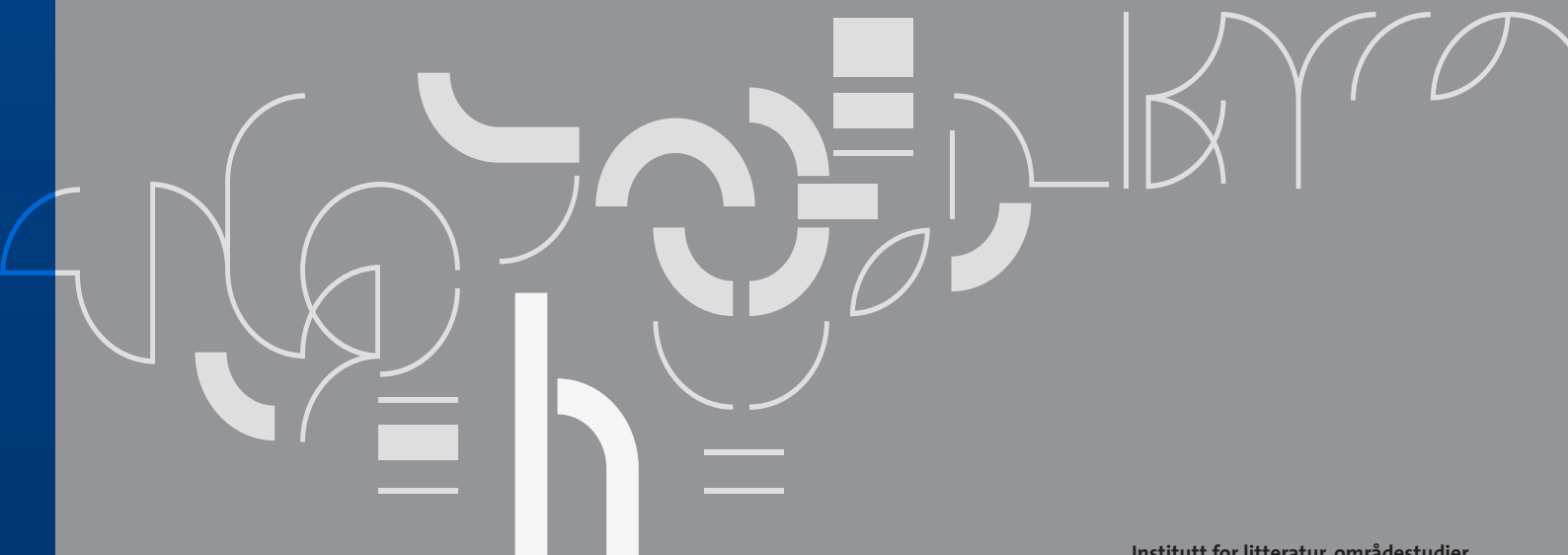
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Pluractionality in Karitiana

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Abstract

This paper focuses on the expression of number in Karitiana. It claims that both its noun and its verb have cumulative denotations, and argues that pluractional affixes perform a plural operation on verb denotations that subtracts its singular events. The paper provides evidence for a difference between lexical and phrasal cumulativity as proposed in Kratzer 2001, 2005.

1 Introduction

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 & Velden 2005).

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 clauses are (mostly) verb-second, whereas embedded clauses are always verb-final. Storto 1999, 2003 assumes that movement of the verb in matrix clauses is related to the presence of agreement and tense, which are totally absent in dependent clauses. 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.

The language has a process of reduplication that operates on verbs, which apparently encodes a number of meanings, such as multiplicity of participants and/or of events. We will claim that reduplication affixes are pluractional markers (cf. Sanchez-Mendes

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2006). According to Lasersohn 1995, these markers are verbal affixes that indicate the occurrence of a multiplicity of events.

Noun phrases, on the other hand, are not marked for number in the language. They are totally devoid of functional material, such as articles, quantifiers, classifiers, or morphological markers of number or gender (cf. Müller *et al.* 2006).

This paper focuses on the expression of number in Karitiana. Our goal is to explain the semantics of pluractional markers in the language.

2 Background

The account will be laid out within an event semantics - VPs are assumed to have an event argument (cf. Davidson 1967, Parsons 1990, Schein 1993, Lasersohn 1995, among others). More specifically, we will assume the framework of Kratzer 2001. In this framework, subjects are not considered arguments of the verb, whereas objects are. Verb phrase denotations are taken to be minimal in that they denote an event in which nothing apart from what is encompassed by the lexical meaning of the verb happens.

We will also assume the Cumulativity Universal, which claims that the denotations of simple predicates in natural languages are cumulative (cf. Krifka 1992, Landmann 1996, Kratzer 2001, 2005). 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 (1) and illustrated in (2) for the noun stem $\sqrt{student}$. The definition of cumulativity for verbal predicates is presented in (3) and illustrated in (4) for the verb stem \sqrt{fall} (cf. Kratzer 2001). Note that Kratzer assumes a neo-davidsonian semantics for verbs, in that the external argument is not an argument of the verb. In the case of (4), \sqrt{fall} is analyzed as an ergative verb.

- (1) Cumulativity (properties of individuals):
 $\lambda P_{\langle et \rangle} \forall x \forall y [[P(x) \ \& \ P(y)] \rightarrow P(x+y)]]$
- (2) $[[\sqrt{student}']] = \{ \text{Mary, John, \dots, Mary+John, \dots, Mary+John+Carlos+Andrea} \}$
- (3) Cumulativity (properties of events):
 $\lambda P_{\langle st \rangle} \forall e \forall e' [[P(e) \ \& \ P(e')] \rightarrow P(e+e')]]$
- (4) $[[\sqrt{fall}']] = \{ \langle \text{Mary, fall}_1 \rangle, \langle \text{John, fall}_2 \rangle, \dots, \langle \text{Mary+John, fall}_1 + \text{fall}_2 \rangle, \dots \}$

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 Noun Phrases (NPs) or Verb Phrases (VPs) (cf. Kratzer 2005). Theoretically, the composition of an ergative verbal stem like $\sqrt{\text{fall}}$ and a nominal stem like $\sqrt{\text{student}}$, should result in an array of possible interpretations due to the cumulative denotations of its constituents. The possible readings are listed in (5).

- (5) $[[\text{fall}']]([\text{student}'])$ 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.

The next two sections show that the null hypothesis to assume for Karitiana nouns and verbs is that their denotations are cumulative.

3 Noun Phrases in Karitiana

Noun phrases are not marked for number in Karitiana. There is no morphosyntactic marker for number within the noun phrase. In sentence (6) below, the phrase *myhint pikom* ('one monkey') is semantically singular, whereas in sentence (7) the phrase *sypomp pikom* ('two monkeys') is semantically plural. However, both NPs remain uninflected for number in the two contexts. These two sentences also show that Karitiana makes no use of numeral classifiers. Third person pronouns are also neutral as far as number is concerned. The subject of sentence (8) may refer to both singular and plural entities.

- (6) Yn naka'yt myhint pikom²
 yn naka-'y-t myhin-t pikom
 1S DECL-eat-NFUT one-OBL monkey
 'I ate one monkey/'I ate monkey once'

- (7) Yn naka'yt sypomp pikom
 yn naka-'y-t sypom-t pikom
 I DECL-eat-NFUT two-OBL monkey
 'I ate two monkeys/'I ate monkey twice'

²Glosses 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, NEG = negation, 3 = 3rd person, 1S = 1st person singular possessive, FUT = future, EXIST = existential, 3ANAPH = 3rd person anaphoric prefix, SUB = subordinator, ASSERT = assertative, POS = posposition, PASS = passive, OBL = oblique suffix, VERB = verbalizer.

The translations given are the ones volunteered by the native speaker. Other readings of the same sentence might very well be possible.

- (8) I naokoot õwã
 i Ø-na-okoot-Ø õwã
 he/they 3-DECL-bite-NFUT kid
 ‘He/They bit the/a/some kid(s)’

In Karitiana, noun phrases are bare in that they do not project for determiners or quantifiers or are marked for (in)definiteness. The many possible translations of sentence (9) show that definite and indefinite interpretations – if they exist – do not arise from morphology or lexical meaning. They also show that nouns and Noun Phrases are number neutral in that their interpretations encompass both singularities and pluralities.

- (9) Taso naka'yt boroja
 taso Ø-naka-'yt boroja
 man 3-DECL-eat-NFUT snake
 ‘The/a/some man/men ate the/a/some snake(s)’

Numerals are best analyzed as adjuncts in the language, not as quantifiers, since they are not Determiner-Quantifiers, and may take scope over NPs and VPs as illustrated by sentences (6) and (7) above.³ Sentence (10) shows that numerals are not tied to the NP constituent.

- (10) Sypomp nakaponpon João sojxaty kyn
 sypom-t Ø-naka-pon-pon-Ø João sojxaty kyn
 two- OBL 3-DECL-shot-REDUPL-NFUT João boar POS
 ‘João shot twice at the/a/some boar(s) / ‘João shot at two boars’

Universal quantification and demonstrative functions are not expressed by determiners but by subordinate clauses as shown in sentences (11) and (12). In sentence (11) the universal interpretation is achieved by a subordinate clause composed by the verb *to be* and a subordinator. And the demonstrative meaning is achieved by a constituent made out of a locative, the noun and the verb *to be*, as can be seen in sentence (12).

- (11) 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 monkeys that be’

³See Bach *et al.* for the D(eterminer)- vs. A(dverbial)-Quantifier distinction.

- (12) Ony sojxaty aka kyn nakapon João
 ony sojxaty aka kyn Ø-naka-pon-Ø João
 there boar be POS 3-DECL-shoot- NFUT João
 ‘João shot at that boar’
 Literally: ‘João shot at boar (that) be there’

Karitiana does not have determiner quantifiers in the same way as English and other Germanic and Romance languages do. Quantifying expressions are adverbials. The informant uses the word *si'irimat* indistinctly to translate either *nobody* or *never*, as in sentences (13) and (14) below. And in sentences (15) and (16), the word *kandat* ('a lot') is used to translate both quantification over entities (10) and quantification over events ('work a lot') (11).

- (13) Isemboko padni si'irimat eremby
 i-semboko padni si'irimat eremby
 3-get.wet NEG ever hammock
 ‘Hammocks never get wet’ (≡ No hammocks ever get wet)
- (14) Iaokooto padni si'irimat y'it
 i-a-okooto padni si'irimat y-'it
 3-PASS-bite NEG ever 1S-son
 ‘My son was never bit’ (≡ Nobody bit my son)
- (15) Kandat nakahori dibm taso
 kandat Ø-naka-hot-i dibm taso
 a.lot 3-DECL-leave-FUT tomorrow man
 ‘Many men will leave tomorrow’ (≈ ‘Men will leave tomorrow many times’)
- (16) Pyrykiidn taso pytim'adn kandat tyym
 pyry-kiit-n taso pytim'adn kandat tyym
 ASSERT-EXIST-NFUT man work a.lot SUB
 ‘There are men 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.

Based on the Cumulative Universal, the null hypothesis to assume for Karitiana is that its nouns have cumulative denotations. The facts 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. In the next section, we will argue for cumulativity in the verbal domain.

4 Verb Phrases in Karitiana

A prediction of the ‘cumulativity from the start’ hypothesis is that cumulative interpretations should be available at no cost (Kratzer 2001). We have already seen that this is so for noun phrases. In this section, we will see that this should also be the null hypothesis for verbs in Karitiana. A sentence with bare arguments like (17) is made true by any number of entities of the appropriate kind and by any number of events.

- (17) Taso naka’yt boroja
 taso Ø-naka-’y-t boroja
 man 3-DECL-eat-NFUT snake
 ‘Men ate snakes’

Literally: ‘An unspecified number of men ate an unspecified number of snakes an unspecified number of times’

Sentence (18) has all the array of readings predicted by lexical cumulativity: collective action, iterated action and all sorts of cumulative actions. In the readings where the numerals take scope over the arguments, the same two students may have lifted the same two kids collectively, each student may have lifted one of the kids, one student may have lifted the two kids, and the other one only one of them, and so on. The only reading that is not allowed is the one that requires phrasal distributivity, that is, the one where two students lifted two (different) kids each.⁴

- (18) Sypomp aluno namangat sypomp õwã
 sypom-t aluno Ø-na-mangat-Ø sypom-t õwã
 two-OBL student 3-DECL-lift-NFUT two-OBL kid
 ‘Two students lifted two kids (together, or one each, or any of the possible cumulative combinations any number of times)’
 *‘Two students lifted two kids each’
 ‘Students lifted two kids twice’

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

5 Pluractionality in Karitiana

Karitiana makes use of pluractional markers. Pluractional markers in Karitiana are usually expressed by reduplication. The contrast between the verbal predicates in (19) and (20) illustrates the use of reduplication in Karitiana. In (19), the two eggs were broken at the same time, that is, there was only one breaking event, and no reduplication

⁴We have no data on phrasal distributivity over the subject, that is, of the same two kids being lifted by two different students each (i.e. there should be a total of four students in this scene).

occurs. In (20), the pluractional affix - reduplication - is used to express that more than one breaking event has taken place.

- (19) Õwã nakakot sypomp opokakosypi
 ãwã 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

- (20) Õwã nakokonat sypomp opokakosypi
 ãwã 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. Cusic 1981, 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 (21). The definition states that, when 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’.

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

that sentence (22) with no reduplication has the same readings as sentence (23) with reduplication in the context of a plural event.

- (22) João naakat ipon pikom kyn
 João Ø-na-aka-t i-pon-Ø pikom kyn
 João 3-DECL-AUX-NFUT PART-shoot-NFUT monkey POS
 ‘João shot at monkeys’
Context: more than one shooting

- (23) Pikom kyn naponpon João
 pikom kyn Ø-na-pon-pon-Ø João
 monkey POS 3-DECL-shoot-REDUPL-NFUT João
 ‘João shot at monkeys’
Context: more than one shooting

Sentences (24) and (25) with the adverbial *kandat* (a lot/a lot of times) make the same point. Sentence (24) is capable of expressing iteration of an action without the use of a pluractional affix, whereas sentence (25) shows that iteration may co-occur with a pluractional affix.

- (24) Kandat nakakop opokakosypi
 kandat Ø-na-kop-Ø opokakosypi
 a.lot 3-DECL-fall-NFUT egg
 ‘Many eggs fell’/ ‘Eggs fell many times’
Literally: ‘Eggs fell many times’

- (25) Kandat taso naponpon sojxaty kyn
 kandat taso Ø-na-pon-pon-Ø sojxaty kyn
 a.lot man 3-DECL-shoot-REDUPL-NFUT boar POS
 ‘Men shot at boars many times’
Literally: ‘An unspecified number of men shot at an unspecified number of boars many times’

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 the role of adverbials like *kandat* in such a language be?

We claim that pluractional affixes in Karitiana perform a pluralization operation on cumulative verb denotations – they exclude atomic events from the denotation of verbs (cf. Ferreira 2005 for nouns and verbs and Müller 2000 for nouns). The formalization of this proposal is laid out in (26) for both transitive (a) and intransitive (b) verbs, and illustrated for the predicate *fall* repeated in (27). The result of applying the pluralization operation to a predicate like *fall* is that all singular falling events are excluded from its denotation as illustrated in (28).

- (26) a. $PL = \lambda P \langle e \langle s, t \rangle \rangle \lambda X \lambda E [P(X)(E) \ \& \ \text{non-atomic}(E)]$
 b. $PL = \lambda P \langle s, t \rangle \lambda E [P(E) \ \& \ \text{non-atomic}(E)]$
 E: variable over cumulative events.
- (27) $[[\text{fall}']] = \{ \langle \text{Mary}, \text{fall}_1 \rangle, \langle \text{John}, \text{fall}_2 \rangle, \langle \text{Mary} + \text{Carlos}, \text{fall}_3 \rangle, \dots, \langle \text{Mary} + \text{John}, \text{fall}_1 + \text{fall}_2 \rangle, \dots, \langle \text{Mary} + \text{John} + \text{Carlos}, \text{fall}_1 + \text{fall}_2 + \text{fall}_3 \rangle, \dots \}$
- (28) $PL ([[\text{fall}']]) = \{ \langle \text{Mary} + \text{John}, \text{fall}_1 + \text{fall}_2 \rangle, \dots, \langle \text{Mary} + \text{John} + \text{Carlos}, \text{fall}_1 + \text{fall}_2 + \text{fall}_3 \rangle, \dots \}$

Our hypothesis makes sense of the apparent puzzle posed by the existence of pluractionality in a language in which cumulativity is available in the syntactic composition for both nominal and verbal constituents. 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* ('a lot') 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 of more than one event.

The claim that the pluractional operation is a plural operation on verb denotations 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 sentences denoting a significant number of events. That this is so, is shown by the use of reduplication in a sentence about two shooting events in (29).

- | | | | | | |
|------|----------------------------|--------------------------|------|---------|-----|
| (29) | Sypomp | nakaponpon | João | sojxaty | kyn |
| | sypom-t | Ø-naka-pon-pon-Ø | João | sojxaty | kyn |
| | two-OBL | 3-DECL-shoot-REDUPL-NFUT | João | boar | POS |
| | 'João shot twice at boars' | | | | |

The second prediction that follows from our claim is that sentences denoting a singular event should not reduplicate. Sentences (30) and (31) are about one single lifting event, and reduplication cannot be used (31). Sentence (32), without reduplication, may refer to singular or plural events, whereas sentence (33), with reduplication can only be used to express the occurrence of two or more events.

- | | | | | | |
|------|----------------------------------|------------------|---------|-------|-------|
| (30) | Inacio | namangat | myhint | Nadia | ka'it |
| | Inacio | Ø-na-mangat-Ø | myhin-t | Nadia | ka'it |
| | Inacio | 3-DECL-lift-NFUT | one-OBL | Nadia | today |
| | 'Inacio lifted Nadia once today' | | | | |
| | <i>singular event</i> | | | | |

- (31) *Inacio namangatmangadn myhint Nadia ka'it
 Inacio Ø-na-mangat-mangat-Ø myhin-t Nadia ka'it
 Inacio 3-DECL-lift-REDUPL-NFUT one-OBL Nadia today
 'Inacio lifted Nadia once today' *singular event*
- (32) Inacio namangat Nadia ka'it
 Inacio Ø-na-mangat-Ø Nadia ka'it
 Inacio 3-DECL-lift-NFUT Nadia today
 'Inacio lifted Nadia today (once or more)' *singular or plural event*
- (33) Inacio namangatmangadn Nadia ka'it
 Inacio Ø-na-mangat-mangat-Ø Nadia ka'it
 Inacio 3-DECL-lift-REDUPL-NFUT Nadia today
 'Inacio lifted Nadia today (more than once)' *plural event*

Sentences (34) and (35) make the same point. Sentence (34) describes the occurrence of a single collective event of giving a single canoe to João, and no reduplication is used. The same sentence, if reduplicated, may not be used to describe the same situation (35).

- (34) Õwã nakahit myhint goojoty João
 õwã Ø-naka-hit-Ø myhin-t goojo-ty João
 kid 3-DECL-give-NFUT one-OBL canoe-POS João
 'The kids gave one canoe to João' *singular event*
- (35) *Õwã nakahithidn myhint goojoty João
 õwã Ø-naka-hit-hit-Ø myhin-t goojo-ty João
 kid 3-DECL-give-REDUPL-NFUT one-OBL canoe-POS João
 'The kids gave one canoe to João' *singular event*

Another prediction that is born out is that sentences with distributive readings of singular objects should not allow pluractional affixes. This is so because one is distributing singular event predicates, and there are no singular events in the denotation of pluractional predicates. The minimal singular event of giving one canoe, for example, contains only one canoe. Any event of giving more than one canoe is not a minimal event of 'giving one canoe'. That this is so is supported by the fact that the distributive operator *tamyry tamyry* ('each...each') cannot co-occur with a pluractional affix and a singular object, which is shown by the contrast in grammaticality between sentences (36) and (37).

- (36) Tamyry tamyry nakahit õwã myhint kinda'o
 ta-myry ta-myry Ø-naka-hit-Ø õwã myhin-t kinda'o
 3ANAPH-POS 3ANAPH-POS 3-DECL-give-NFUT kid one-OBL fruit
 'Each child gave one fruit'

- (37) *Tamyry tamyry nakahithidn
 ta-myry ta-myry Ø-naka-hit-hit-Ø
 3ANAPH-POS 3ANAPH-POS 3-DECL-give-REDUPL-NFUT
- õwã myhint kinda'o
 õwã myhin-t kinda'o
 kid one-OBL fruit
 'Each child gave one fruit'

Sentences (38) and (39) illustrate another point: that Karitiana pluractional affixes are lexical operators, not phrasal operators. The semantically plural subject of sentence (38) and (39) can only be interpreted as a collective agent. Since a collective action of building one canoe does not belong in the denotation of the reduplicated verb, sentence (39) is not interpretable.

- (38) Luciana Leticia nakam'at myhint gooj
 Luciana Leticia Ø-naka-m-'a-t(??) myhin-t gooj
 Luciana Letícia 3-DECL-CAUS-build-NFUT one-OBL canoe
 'Luciana and Leticia built one canoe'
 ✓ Collective reading
 × Distributive reading
- (39) *Luciana Leticia nakam'abyadn myhint gooj
 Luciana Letícia Ø-naka-m-'a-by-'a-t myhin-t gooj
 Luciana Leticia 3-DECL-CAUS-build-?-REDPL-NFUT one-obl canoe
 'Luciana and Leticia built one canoe'
 × Collective reading
 × Distributive reading

In this section, we have provided support for the claim that pluractional markers in Karitiana effect a plural operation on verb cumulative denotations. We have also provided support for Kratzer's 2001, 2005 claim that lexical cummulative differs from phrasal cummulative.

6 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 verb denotes two or more events.

The great array of readings that result from argument-predicate combinations in Karitiana, as illustrated by sentence (40), is due to nominal and verbal cummulative. In (41) we present the logical form for sentence (40) in order to illustrate how the

multiplicity of readings is achieved. Since both noun and verb denotations are cumulative, the multiplicity of participants and or events is a given possibility, and whether the sentence should be interpreted as being about one or more participants or events is decided upon context.

- (40) Taso naka'y-t boroja
 taso Ø-naka-'y-t boroja
 man 3-DECL-eat-NFUT snake
Literally: 'An unspecified number of men ate an unspecified number of snakes an unspecified number of times'

- (41) $\exists E \exists X \exists Y$ [killing' (X,E) & snakes' (X) & agent' (Y,E) & men (Y) & $|E| \geq 1$]
where: E, X, Y are variables over cumulative verb and noun denotations respectively.

The Katiana facts provide evidence for a distinction between phrasal and lexical cummulativity as proposed by Kratzer 2001, 2005. Pluractional affixes operate only on verb denotations, not on VP denotations as shown by the impossibility of getting readings that depend on phrasal distributivity with the mere use of the pluractional affix.

An interesting typological question that remains to be pursued is whether there is a cross-linguistic correlation between the unavailability of singular/plural distinctions for nouns and its availability for verbs.

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