Distributive numerals

Georgian and Tagalog (Gil 1992; chapters 6 and 7)
Karitiana (Muller and Negrão 2009; Muller 2011)

1. Tagalog

1.1 Some properties of Tagalog

- Verb initial language
- Voice and case marking morphology: ng direct case; sa locative; para sa benefactive
- Case morphology suggest definiteness (ang definite; ng indefinite)
- thematic relations are marked as a verbal affix: nag- actor topic; -in- patient topic; pinag- locative topic; -an benefactive topic

1 Nagpatay ang lalaki ng manok sa bahay para sa bata
   Killed-AT TOP man DIR chicken OBL house for OBL boy
   ‘The man killed a chicken in a/the house for a/the boy’
   (Gil 1992; 157 – example 1a)

- Nouns can be bare and plural morphology is optional:

2a Binasa ko ang libro
   Read-PT dir-1SG TOP book
   ‘I read the book(s)’

2b Binasa ko ang mga libro
   Read-PT dir-1SG TOP PL book
   ‘I read the books’

2c Binasa ko ang tatlong libro
   Read-PT dir-1SG TOP three-LIG book
   ‘I read three books’
   (Gil 1992; 161 – examples 4a – 4c)

- There are syntactic similarities between constructions with numerals and adjectives
  (same position in the sentence and the enclitic –ng is affixed on numerals and adjectives):
3a Binasa ko ang tatlong libro
read-PT DIR-1SG TOP three-LIG book
'I read three books'

3b Binasa ko ang bagong libro
read-PT DIR-1SG TOP new-LIG book
'I read the new book(s)'
(Gil 1992; 162 – examples 5a – 5b)

• Syntactic similarities between nominal phrases and verbal phrases (predicate + ang + topic):

4a Yumaman ang artista
got:rich-AT TOP actress
'The actress got rich'

4b Nagluto ng pagkain ang artista
cooked-AT DIR food TOP actress
'The actress cooked food'
(Gil 1992; 163 – examples 6a – 7a)

1.2 Distributive numerals

1.2.1 Adnominal distributive numerals

• Four different morphological series of adnominal distributive numerals:

Table 1. Adnominal Distributive Numerals (Tagalog)

<table>
<thead>
<tr>
<th>Numerals</th>
<th>Series 1 Prefix: tig-</th>
<th>Series 2 Prefix: tig- + numeral reduplication (first syllable)</th>
<th>Series 3 Prefix: tig- and reduplication (first two syllables)</th>
<th>Series 4 Prefix: man-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>isa</td>
<td>tig-isa</td>
<td>Tig-tigisa</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Dalawa</td>
<td>Tig-idadalawa</td>
<td>Tiga-tigalawa</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Tatlo</td>
<td>Tig-tatlo</td>
<td>Tiga-tigatlo</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Apat</td>
<td>Tig-aapat</td>
<td>Tiga-tigapat</td>
<td>—</td>
</tr>
<tr>
<td>10</td>
<td>Sampu</td>
<td>Tig-sampu</td>
<td>—</td>
<td>mamulo</td>
</tr>
</tbody>
</table>

Notes: Most productive series Restricted to numerals 1 to 4 Powers of ten

(Gil 1992; 164–165 – example 8)

NB: despite their morphological differences, Gil does not report semantic differences between the four series of adnominal distributive numerals; the author argues that the four classes of distributive numerals occur in the same scenarios.

• Distributive numerals can also be formed from Spanish numerals:
Table 2. Adnominal distributive numerals (derived from Spanish)

<table>
<thead>
<tr>
<th>Cardinal numerals</th>
<th>Adnominal Distributive Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uno</td>
<td>Tigo dos</td>
</tr>
<tr>
<td>Dos</td>
<td>Tigtres</td>
</tr>
<tr>
<td>Tres</td>
<td>Tigtres</td>
</tr>
<tr>
<td>Cuatro</td>
<td>Tiktrokwatro</td>
</tr>
</tbody>
</table>

(Gil 1992; 166 – example 9)

1.2.2 Adverbial distributive numerals

• Reduplication of the two first syllables of the cardinal numeral (as series 3 for adnominal distributive numerals):

Table 3. Adverbial distributive numerals

<table>
<thead>
<tr>
<th>Cardinal numerals</th>
<th>Adverbial Distributive Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isa</td>
<td>Isa-isla</td>
</tr>
<tr>
<td>Dalawa</td>
<td>Dalawa-dalawa</td>
</tr>
<tr>
<td>Tatlo</td>
<td>Tatlu-tatlo</td>
</tr>
<tr>
<td>Apat</td>
<td>Apat-apat</td>
</tr>
</tbody>
</table>

(Gil 1992; 167; example 10)

• Constructions involving beses ‘times’:

Table 4. Adverbial distributive numerals (‘beses’)

<table>
<thead>
<tr>
<th>Adverbial cardinal numeral</th>
<th>Maka-lima</th>
<th>Pref-five</th>
<th>Lima-ng beses</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Five-five’</td>
<td>‘Five times’</td>
<td>Five-ADV times</td>
<td></td>
</tr>
<tr>
<td>Adverbial distributive numeral</td>
<td>* tigmakalima, * makatiglima</td>
<td>Tig-lima-ng beses</td>
<td></td>
</tr>
</tbody>
</table>

(Gil 1992; 168; 11-12)

1.3 The Syntax of Tagalog Distributive Numerals

Gil (1992; 171): distributive numerals are more acceptable within NPs if they occur lower in the following hierarchy:

5  Ang A
   Ang P > Ang S > ngP > ng A
   Ang O Sa O

(Gil 1992; 171 – example 16)

Where:
A = actor of a transitive verb
P = patient of a transitive verb
S = actor of intransitive verb
O = oblique NP

Ang, ng and sa: case marking

• Exemplifying the hierarchy proposed by Gil (1992):

Example: ang A (case marking + actor of transitive verb) > ng P (case marking + patient of transitive verb):

6a Nakakita [ng tigdalawang babae] ang tatlong lalaki
saw-AT DIR DIST-two-LING woman TOP three-LIG man
sa Luneta
OBL Luneta
‘Three men saw [two women each] in the Luneta’

NB: the distributive numeral must occur within a patient NP marked with ng ‘forcing it to distribute over an actor NP marked with ang’ (Gil 1992; 173)

6b * Nakakita ng dalawang babae [ang tigtatlong lalaki]
    saw-AT DIR two-LIG woman TOP three-LIG man
    sa Luneta
    OBL Luneta
    ‘[Three men each] saw two women’
    (Gil 1992; 172 – examples 17a and 17b)

1.3.2 Patient topic verb

7a Nakita [ng tigtatlong lalaki] ang dalawang babae
saw-PT DIR DIS-three-LIG man TOP two-LIG woman
sa Luneta
OBL Luneta
‘[Three men each] saw two women in the Luneta’

7a * Nakita ng tatlong lalaki [ang tigdalawang babae]
    saw-PT DIR three-LIG man TOP DIST-two-LIG woman
    sa Luneta
    obl Luneta
    ‘Three men saw [two women each] in the Luneta’
    (Gil 1992; 173 – examples 20a and 20b)

In other words…

• In (6), the agent is the topic; in (7) the patient is the topic. The distributive numeral cannot occur inside the topic.

• The author discusses two sub-hierarchies that can be derived from the hierarchy presented in (5):
8a  Case Marking Subhierarchy  
Ang N > Sa N > Ng N  

8b  Thematic Relations Subhierarchy  
P > A > S  
O  

From the subhierarchy proposed by Gil (1992), it follows that:  

(i) Adnominal distributive numerals are more likely to occur within indefinite NPs than within definite NPs (remember from the introduction that ng is a case morpheme associated to indefiniteness) similarly to each in English.  
(ii) Also, according to the patient prominence hypothesis, adnominal distributive numerals are more likely to occur within actor NPs than within patient NPs (similarly ‘patient NPs are more likely to have wider scope than actor NPs’) (Gil 1992; 179)  

1.3.3.  Other syntactic considerations:  

• Distributive numerals may occur as a main verb:  

9  Papagtigisahin mo sila ng saging  
DIST-one-AT DIR-2SG TOP-3PL DIR banana  
‘Let each one take a banana’  
(Gil 1992; 182 – example 35)  

• Gil (1992) did not find adnominal distributive numerals occurring in adverbial position, but he did find adverbial distributive numerals in adnominal positions:  

tatlu-tatlo ‘three (adverbial)’ in adverbial position:  
10a  Pumanta sa parti ang mga lalaki nang tatlu-tatlo  
went-AT OBL party TOP PL man ADV DIST-three  
‘The men went to the party in threes’  

tatlu-tatlo ‘three (adverbial)’ in adnominal position:  
10b  ?? Pumanta sa parti ang mga tatlu-tatlo-ng lalaki (topic position)  
went-AT OBL party TOP PL DIST-three-LIG man  
‘The men went to the party in threes’  

tatlu-tatlo ‘three (adverbial)’ in adnominal position:  
10c  Tatlu-tatlo-ng lalaki ang pumanta sa parti (predicate position)  
DIST-three-LIG man TOP went-AT OBL party  
‘The men went to the party in threes’  
(Gil 1992; 181 – examples 30a to 30c)  

NB: Gil (1992; 181) argues that sentences (10a) to (10c) can all be translate as ‘The men went to the party in threes’ (‘…but with different pragmatic structures’)
1.4. The semantics of distributive numerals

- In order to discuss the possible semantic interpretations of sentences with adnominal distributive numerals, Gil (1992; 184) contrasted a sentence in Tagalog and in English:

11a Nagdala ng tigtatlong maleta ang dalawang lalaki
carried-AT DIR DIST-three-LIG suitcase TOP two-LIG man

11b Two men carried three suitcases each
(Gil 1992; 184 – examples 36a and 36b)

Classes of interpretation (Gil 1992; 184 and 216):

*Class A:* clausal distributivity over subject NP (two men carried some/the suitcases; the suitcases carried by each man were (individually or collectively) heavy)

*Class B:* clausal distributivity over verbal phrase (two men carried some/the suitcases; the suitcases carried each time were (individually or collectively) heavy)

*Class C:* phrasal distributivity over head (two men carried some/the suitcases; each suitcase was heavy)

*NB:* whether the suitcases were disjoint and carried collectively or distributively is not determined by A, B, or C. To investigate the possible different interpretations for the sentences in (11), Gil propose five state of affairs:

Five state of affairs:

State of affairs 1
M1 carried {s1, s2, s3}
M2 carried {s4, s5, s6}

State of affairs 2
M1 carried {s1, s2, s3}
M2 carried {s3, s4, s5}

State of affairs 3
M1 carried s1
M1 carried s2
M1 carried s3
M2 carried s4
M2 carried s5
M2 carried s6

State of affairs 4
M1 carried s1
M1 carried s2
M1 carried s3
M2 carried s3
M2 carried s4
M2 carried s5

State of affairs 5
M1 carried s1
M1 carried s2
\{m1, m2\} carried s3
m2 carried s4
m2 carried s5

- Gil (1992; 187) consulted two Tagalog speakers and one English speaker for each state of affairs described above:

Table 5. Tagalog and English speakers evaluate the sentences in (11) according to five possible state of affairs

<table>
<thead>
<tr>
<th>State of affairs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributivity</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Disjointness</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Collectivity</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tagalog S1</td>
<td>T</td>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Tagalog S2</td>
<td>T</td>
<td>F</td>
<td>?</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>English</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>

(Gil 1992; 187 – table 1)

NB: according to the author, the consultants’ responses indicate that Tagalog tigtatlo ‘is more restricted than that of the corresponding English expression three… each’ (Gil 1992; 188). Besides, tig- and each force the patient to distribute over the actor NP given the unacceptability of state of affairs 5 by all the consultants.

1.5 Other considerations

1.5.1 Double Distributive Constructions

12a Dinala \[[ng tigdalawang lalaki] [ang tigtatlong maleta]\]
carried-PT DIR DIST-two-LIG man TOP DIST-three-LIG suitcase

12b Nagdala \[[ng tigtalong maleta] [ang tigdalawang lalaki]\]
carried-AT DIR DIST-three-LIG suitcase TOP DIST-two-LIG man

‘Sets of two men carried (the same) three suitcases’

In Gil’s representation:

12c \[[[2-DIST \Rightarrow UNITS] MAN] CARRIED [[[3-DIST UNITS] SUITCASE]]

(Gil 1992; 189; examples 39a and 39b)
NB: for those sentences, Tagalog speakers rejected interpretations ‘involving distributivity within both NPs’ and favored an interpretation within the actor NP. Gil’s hypothesis (1992) is that this reading is due to patient prominence in Tagalog. Besides, he argues in favor of the ‘criterion of referential strength-uniqueness’ according to which an NP referring to a single set is preferred to a NP referring to multiple sets. In these examples, there is a referential strength-uniqueness preference of patients over actors.

1.5.2. **Bawat: distributive numeral formative**

- *Bawat, as each*, is a universal quantifier that marks distributivity:

  13a Each of two men carried three suitcases

  13b Two men carried three suitcases each
  (Gil 1992; 193; examples 46a and 46b)

- English: examples (13a) and (13b) are synonymous

  14a Dinala **ng bawat isa sa dalawang lalaki ang tatlong maleta**
  carried-PT DIR each one OBL two-LIG man TOP three-LIG suitcase

  14b Dinala ng dalawang lalaki ang **bawat** tatlong maleta
  Carried-PT DIR two-LIG man TOP each three-LIG suitcase
  (Gil 1992; 193; examples 47a and 47b)

- Tagalog: examples (14a) and (14b) are not equivalent; (14a) is synonymous to (13a) and (13b). (14b) is synonymous to adnominal distributive numeral sentences, i.e., numerals preceded by *bawat* are similar in syntax and semantic distribution to numerals preceded by *tig-.*

- Gil suggests that a diachronic explanation for the derivation of adnominal distributive numerals may be that the mechanism is derived from universal quantifiers that mark distributivity (distributive numeral formative Gil 1992; 194):

  15 Two men [$_S$ each carried 3 suitcases]

  Two men [$_VP$ each carried 3 suitcases]

  Two men carried [$_NUM$ each 3] suitcases
  (Gil 1992; 194 – examples 48)

2. **Georgian**
2.1 Some properties of Georgian

- Word order is free (SOV, most basic)
- Split ergative case (case morphology depends on the lexical category of the verb (16c) and aspect of the verb (16a and 16b)). Examples:

16a k’abeci merian
men-NOM sing-3PL
‘The men are singing’
(Gil 1992; 203 – example 1a)

16b k’aebma imeres
men-ERG sang-3PL
‘The men sang’
(Gil 1992; 203 – example 1b)

16c k’acebma cantebi c’aies
men-ERG suitcases-NOM carried-3PL
‘The men carried the suitcases’
(Gil 1992; 204 – example 2a)

- No morphological distinction between NPs and DPs:

17 Bavavi mirboda
boy-NOM ran-3SG
‘A/the boy ran’
(Gil 1992; 205 – example 4a)

- As in Tagalog, reduplicated numerals form a subclass of adjectives:

<table>
<thead>
<tr>
<th>Table 6. Georgian Case Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominative</td>
</tr>
<tr>
<td>Ergative</td>
</tr>
<tr>
<td>Vocative</td>
</tr>
<tr>
<td>Genitive</td>
</tr>
<tr>
<td>Instrumental</td>
</tr>
<tr>
<td>Dative</td>
</tr>
<tr>
<td>Adverbial</td>
</tr>
</tbody>
</table>

‘three’ ‘pretty’ ‘boy’

Where:
These three suffixes occur on numerals, adjectives, and nouns:
Nominative = -i; Ergative = -ma; Vocative = -o

Affixes that only occur with nouns:
Genitive = -is; Instrumental = -it; Dative = -s; Adverbial = -at
• Numerals are basically adjectival, but they can also occur as adverbs or nouns:

Adnominal numerals:
18 Sami bavsvi mirboda
   three-NOM boy-NOM ran-3SG
   '(The) three boys ran'

Adverbial numerals (−at adverbial case marking):
19 Bavsvebi samat mirboda
   boys-NOM three-ADV ran-3SG
   'Some/the boys ran threely'

20 bavsvebi sameulat mirboda
   boys-NOM three-NML-ADV ran-3SG
   'Some/the boys ran threesomely'
   (Gil 1992; 207–208; examples: 6a–6d)

Nominalization of numerals (−eul nominalization suffix):
21 Bavsvebis sameuli mirboda
   boys-GEN three-NML-NOM ran-3SG
   'A/the threesome of boys ran'

2.2 Reduplication and distributivity

• Distributive numerals can be formed by reduplication:

Table 7. Formation of adnominal distributive numerals by reduplication

<table>
<thead>
<tr>
<th></th>
<th>Cardinal numerals</th>
<th>Adnominal Distributive Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>erti</td>
<td>erti-erti</td>
</tr>
<tr>
<td>2</td>
<td>or</td>
<td>or-ori</td>
</tr>
<tr>
<td>3</td>
<td>sami</td>
<td>sam-sami</td>
</tr>
<tr>
<td>4</td>
<td>otxi</td>
<td>otx-oxi</td>
</tr>
<tr>
<td>5</td>
<td>xuti</td>
<td>xut-xuti</td>
</tr>
<tr>
<td>11</td>
<td>tertmet’i</td>
<td>tertmet’-tertmet’i</td>
</tr>
</tbody>
</table>

   (Gil 1992; 211 – example 13)

• As numerals, adjectives also reduplicate:

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>22a ckari</td>
<td>at’let’ebi</td>
</tr>
<tr>
<td>fast-NOM</td>
<td>athletes- NOM</td>
</tr>
<tr>
<td>Comment: athletes may be fast individually or collectively</td>
<td>23a Sami</td>
</tr>
<tr>
<td>three-NOM</td>
<td>athletes- NOM</td>
</tr>
<tr>
<td>Comment: single set of three athletes</td>
<td>22b ckar-ckari</td>
</tr>
<tr>
<td>23b Sam-sami</td>
<td>at’let’ebi</td>
</tr>
</tbody>
</table>
Gil’s analysis is that reduplicated numerals and adjectives distribute over the classifier head:

22
[[FAST UNITS] ATHLETE]
Collectively fast (units of) athlete (for 22a only)

[[FAST ⇒ UNITS] ATHLETE]
Individually fast (units of) athlete (for 22a and 22b)

23
[[3 UNITS] ATHLETE]
Collectively fast (units of) athlete (for 23a)

[[3 ⇒ UNITS] ATHLETE]
Units numbering three each, of athlete (for 23b)

Reduplication may also apply for adverbs and also entails distributivity:

24a  Ckar-ckari at’let’ebi mirbodnen (Distributive adjective)
       fast-DIST-NOMathletes-NOM ran-3PL

24b  at’let’ebi ckar-ckara mirbodnen (Distributive adverb)
       athletes-NOM fast-DIST-ADV ran-3PL
Gil’s comment (1992; 218): ‘both sentences entail that each individual athlete was fast’
(Gil 1992; 218 – examples 27a and 27b)

Gil (1992; 219) emphasize that some sentences with distributive adverbials may be
ambiguous, as presented below:

25a  K’acebma amocanebi gamoicnes prtxil-prtxilat
       men-ERG problems-NOM solved-3PL care-DIST-ADV
Possible interpretations: each man acted carefully or each problem was solved carefully

25b  K’acebma amocanebi gamoicnes prtxil-prtxilat
       men-ERG problems-NOM solved-3PL care-DIST-ADV
Possible interpretations: the men acted in threes the problems were acted upon in threes
(Gil 1992; 219 – examples 31a and 31b)

A few verbs reduplicate in Georgian, and they also refer to distributivity:
26a Adamiani gamalda
man-NOM became: tall-3SG
‘The man became tall’

26b Adamiani gamald-gamalda (phrasal distributivity)
man-NOM became: tall-DIST-3SG
‘The man became tall in stages’

26c Adamianebi gamald-gamaldnen (clausal distributivity)
men-NOM became: tall-DIST-3PL
‘The men became tall in degrees’
‘The men each became tall’

• The kind of distributivity entailed by the verb may be phrasal or clausal distributivity if the object is singular:

27a Man vaslebi mic’ia
3sg-ERG apples-NOM moved-3SG
‘He moved the apples’

27b.i Man vaslebi mic’ – mic’ ia (phrasal distributivity)
3sg-ERG apples-NOM moved-PH:DIST-3SG
‘He moved the apples in stages’

27b.ii Man vasli mic’ – mic’ ia
3sg-ERG apple-NOM moved-PH:DIST-3SG
‘He moved the apple in stages’

In Gil’s terms: HE ["S UNITS"] APPLE ["S UNITS"] MOVED-DIST]

27c.i Man vaslebi mic’ – mic’ ia (clausal distributivity)
3sg-ERG apples-NOM moved-CL: DIST-3SG
‘He moved each of the apples separately’

27c.ii * Man vasli mic’ – mic’ ia
3sg-ERG apples-NOM moved-CL:DIST-3SG

In Gil’s terms: HE ["S UNITS"] APPLE ["S UNITS"] MOVED-DIST]

• clausal distributivity is not compatible with singular objects (vasli in 27.c.ii) (Gil 1992; 222); phrasal distributivity is compatible with singular objects (26.c.ii).
• If the subject is plural, the sentence that includes the verb form associated to clausal distributivity — ‘mic’-mic’ies’ — is going to be ambiguous (but not mic’i-mic’ies, ‘phrasal distributivity’ verb):

28a Ingenma vaslebi mic’ies
3PL-ERG apples-NOM moved-PL
'They moved the apples’

28b Ingenma vaslebi mic’i-mic’ies
3PL-ERG apples-NOM moved-PH:DIST-3PL
'They moved the apples in stages’

28c Ingenma vaslebi mic’-mic’ies
3pl-ERG apples-NOM moved-CL: DIST-3PL
'Each of them separately moved the apples’ (mic’-mic’ies distributes over the subject)
'They moved each of the apples separately’ (mic’-mic’ies distributes over the object)
'Each of them separately moved each of the apples separately’ (mic’-mic’ies distributes over both NPs)

• Reduplication of nouns is more restricted in comparison to distributive numerals, adjectives, adverbs. Noun reduplication is restricted to nominal numerals formed by suffixation of the morpheme –eul:

29a Bavsvebis sam-sameulebi mirboda
boys-GEN three-DIST-NML-NOM ran-3SG

29b Bavsvebi sam-sameulat mirbodnen
boys-NOM three-DIST-NML-ADV ran-3PL
'Some/the boys ran in threes’

Summary:
• Verbs, adjectives, adverbs but mostly numerals can undergo reduplication;
• Reduplication trigger a distributive reading;
• Gil argues in favor of a parallel between adjectives and adnominal numeral in Georgian;

2.3 A final note before we conclude the discussion on Georgian: “stack numerals”

English
30a Tall Albanian students
30b * Ten two students

Georgian
• Non-reduplicated numerals:

31a * Ati ori st’udent’i
ten-NOM two-NOM student-NOM
'Ten two students’
… if one of the numerals is reduplicated, then the sentence is acceptable:

31b  Ati   ori-ori  st’udent’i  
ten- NOM   two-DIST- NOM   student- NOM
Possible interpretations:  ‘Ten sets of two students’  
                          ‘Ten students in sets of twos’  
                          ‘Ten sets of several sets of two students’

31c  At-atì  or-ori   st’udent’ì  
ten-DIST- NOM   two-DIST- NOM   student- NOM
Possible interpretations:  ‘Several sets of ten students and several sets of two students’  
                          ‘Several sets of ten sets of several sets of two students’

32a  Őwä  nakam’at   gooj  
     Őwä   Ò-naka-m-’a-t   gooj  
    child 3-DECL-CAUS-build-NFT   canoe  
‘Children built canoes’

Paraphrase (Muller and Negrao 2009): there is a possibly plural event in which a possibly plural number of children built a possibly plural number of canoes.

32b  Őwä  nakam’ab’adn  gooj  
     Őwä   Ò-naka-m-’a-m-’a-t   gooj  
    child 3-DECL-CAUS-build-CAUS-RDPL-NFT   canoe  
‘Children built canoes’

Paraphrase (Muller and Negrao 2009): there is a necessarily plural event in which a possibly plural number of children built a possibly plural number of canoes.

(Muller and Negrao 2009; 12 – examples 25 and 26)
33a
Contexts:  
A boy broke two eggs at once (one event only).
A boy broke two eggs, one after the other (more than one event).

Ôwâ nakakot sypomp opokakosypi
ôwâ Ø-naka-kot-Ø sypom-t opok-ako-sypi
child 3-DECL-break-NFT two-OBL egg
‘Children broke two eggs’ / ‘Child broke eggs twice’

33b
Contexts:  
*A boy broke two eggs at the same time (one event only).
A boy broke two eggs, one after the other (more than one event).

Ôwâ nakakokonat sypomp
Ôwâ Ø-naka-kot-kot-a-t sypom-t
boy 3-DECL-break-RDPL-TV-NFT two-OBL
‘Children broke two eggs (two or more events)’ / ‘Children broke eggs twice’
(Muller and Negrao 2009; examples 27)

3.2. Distributive numerals

- Distributive numerals in Karitiana are formed by numeral reduplication:

34 Sypomp.sypomp nakam’t gooj ôwâ
sypom-t.sypom-t Ø-naka-m’a-t
two-OBL.two-OBL 3-DECL-CAUS-build-NFT canoe child
‘Each child built two canoes’
‘Children built two canoes at a time’

- Distributive numerals in English and in Karitiana, according to Muller (2011), do not share the same interpretations:

Karitiana:
For each kid[^1], there is an event of kid[^1] breaking two eggs
For each occasion, there is an event of kids breaking two eggs

English:
For each occasion, there is an event of two kids breaking two eggs
For each occasion, there is an event of kids breaking two eggs

- Muller reports the existence of distributive numerals being interpreted as adverbial distributivity operators:

Paraphrase for sentence 34:
‘There was an event of children building canoes and this event is divided into subevents of children building two canoes; and these subevents are individuated on the basis of the agent (children) or on the basis of ‘times’”
• NPs and VPs are claimed to have cumulative denotations in Karitiana:

35a Ōwā nakam’t gooj
∅-naka-m-‘a-t
child 3-DECL-CAUS-build-NFT canoe

35b ∃e∃x∃y [build (y) (e) & agent (x) (e) & child (x) & canoe (y)]
‘There is a possibly plural event in which an indefinite number of children build an indefinite number of canoes’

Possible interpretations:
✔ cumulative reading (some children are building canoes individually, some are building canoes in group…)
✔ collective reading (children are building canoes together)
✔ distributive reading (each canoe is being built separately)

36 myhīmt-myhīmt Ōwā nakam’at gooj
myhīm-t-myhīm-t Ōwā ∅-naka-m-‘a-t gooj
one.OBL-one.OBL child 3-DECL-CAUS-build-NFT canoe
‘Every child built one canoe’
‘Children built canoes one at time’

✖ cumulative reading
✖ collective reading
✔ distributive reading

Analysis for reduplicated numerals:

37 Myhīmt-myhīmt

P is true in eventuality E iff E has smaller eventualities e1, e2, ..., en, en+1, ... as parts, in which P is true, and en is atomic.

[[myhīmt myhīmt]] = λP<_,t> λE [P(E) ∃e₁...eₙ [e₁... eₙ < E & atomic (eₙ) & P(eₙ)]]
(Muller and Negrão 2009; 18 – example 38 and 39)

3.2. Properties of distributive numerals

Property 1: a distributive numeral break an event into subevents of the same type:

38a Ombaky naka’yt pikom
jaguar eat monkey
‘Jaguars ate monkeys’

38b ∃e∃x∃y [jaguar (x) & agent (x) (e) & monkey (y) & eat (y) (e)]
myhint myhint  ombaky  naka’yt  pikom
myhim-t-myhim-t  jaguar  eat  monkey
one.OBL-one.OBL

‘For each jaguar, there is an event of eating one monkey’
‘For each occasion, there is an event of jaguars eating one monkey’

∃e ∃x ∃y [jaguar (x) & agent (x) (e) & monkey (y) & eat (y) (e)] & e is made of eating jaguars…

39b

Property 2: the subevents are distributed over the subject or occasions (in the example above, ‘for each subject/occasion, there is a subevent of eating monkeys’)

Property 3: distributive numerals impose a restriction on the cardinality of one of the sentence arguments:

Transitive verbs with direct objects:

40  Õwã  nakakot  sypomp.sypomp  opokakosypi
    õwã  Ø-naka-kot-Ø  sypom-t-sypom-t  opok ako sypi
    kid  3-DECL-break-NFT  two-OBL-two-OBL  egg
‘For each kid, there was an event of his breaking two eggs’
‘For each occasion, there was an event of kids breaking two eggs’

Transitive verbs with oblique objects:

41  Inácio  Cizino Renato naakat  kamyt  sympop sympop
    Inácio Cizino Renato  Ø-na-aka-t  i-amyt-t  sypom t sypom t
    3-DECL-COP-NFT  NMZ-buy CONC ABS  two-OBL-two-OBL
carrotty
carro-ty
car-POS
‘Inácio, Cizino and Renato bought two cars each’
‘On each occasion, Inácio, Cizino and Renato bought two cars’

Intransitive verbs:

42  Sypomp.sypomp  naotãm  taso
    sypom t sypom t  Ø-na-otãm-Ø  taso
    two-OBL-two-OBL  DECL-arrive-NFT  man
‘Men arrived two by two’
‘On each occasion, two men arrived’
3.3.  *On the absence of adnominal distributive numerals*

- Muller argues that distributive numerals can only be adverbial quantifiers, never adnominal quantifiers

**Evidence 1:** distributive numerals may occur in different sentence positions:

43a Myhimt.myhimt nakam’at gooj õwã
   one-OBL one-OBL 3-DECL-CAUS-build-NFT canoe child

43b nakam’at myhimt.myhimt gooj õwã
   3-DECL-CAUS-build-NFT one-OBL one-OBL canoe child

43c õwã nakam’at gooj myhimt.myhimt
   child 3-DECL-CAUS-build-NFT canoe one-OBL one-OBL

‘Each child built one canoe’

‘On each occasion, children built one canoe’

**Evidence 2:** distributive numerals have the same distribution as adverbial quantifiers (e.g., *kandat* ‘many times’)

- Matrix sentences: adverbs may be left or right adjoined to the clause or left adjoined to VP:

*Adverbs – matrix sentences*

44a Kandat jonso nakaot ese Adv S V O
   kandat jonso Ø-naka-ot-Ø ese
   many times woman 3P-DECL-get-NFUT water

44b * jonso kandat nakaot ese * S Adv VO
   jonso kandat Ø-naka-ot-Ø ese
   woman many times 3P-DECL-get-NFUT water

44c jonso nakaot kandat ese S V Adv O
   jonso Ø-naka-ot-Ø kandat ese
   woman 3P-DECL-get-NFUT many times water

44d jonso nakaot ese kandat S V O Adv
   jonso Ø-naka-ot-Ø ese kandat
   woman 3P-DECL-get-NFUT water many times

‘Women brought water many times’
Distributive numerals - matrix sentences

45a  Myhint-myhint   nakam’at       gooj  ðwâ
myhim-t-myhim-t  Ø-naka-m’a-t        gooj  ðwâ
one.OBL-one. OBL  3DECL-CAUS-build-NFT canoe  child

45b  * ðwâ  Myhint-myhint   nakam’at       gooj
child  myhim-t-myhim-t  Ø-naka-m’a-t        gooj
one.OBL-one. OBL  3DECL-CAUS-build-NFT canoe

45c  ðwâ  nakam’at       myhint-myhint  gooj
child  Ø-naka-m’a-t        myhim-t-myhim-t  gooj
3DECL-CAUS-build-NFT one.OBL-one. OBL canoe

‘Children built canoes distributively (in ones)’

• Embedded sentences: adverbs must adjoint to the left periphery of the sentence:

46a  myhint-myhint  jonso  ðwâ  mangataty  y-ta-pyting  yn
     one.OBL-one. OBL   woman  child  lift- OBL  1P-DEC-want-NFUT  1P

46b  *jonso  myhint-myhint  ðwâ  mangataty  y-ta-pyting  yn
     woman  one.OBL-one. OBL   child  lift-OBL  1P-DEC-want-NFUT  1P

46c  *jonso  ðwâ  myhint-myhint  mangataty  y-ta-pyting  yn
     woman  child  one.OBL-one. OBL  lift-OBL  1P-DEC-want-NFUT  1P

46d  *jonso  ðwâ  mangataty  myhint-myhint  y-ta-pyting  yn
     woman  child  lift-OBL  one.OBL-one. OBL  1P-DEC-want-NFUT  1P

‘I want women to lift children distributively’

Muller’s proposal: distributive numerals are not ambiguous between determiner and adverbial quantifiers (despite the fact that distributive numerals may distribute over subjects and over occasions)

But…

• The author does not present the rules that regulate that in a scenario $x$ the distributive numeral is going to distribute over subjects and in a scenario $y$ it is going to distribute over contextually given occasions.