

Quantity systems and the count/mass distinction

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Goals

- Investigation of the count/mass distinction from the perspective of quantity systems, in particular for nouns
- A brief comparison between the nominal and the verbal domains with respect to the properties of quantity systems

1. Two interrelated perspectives on the count/mass distinction

First perspective : count versus mass ‘meanings’ of nouns

- What is the relation between the count/mass distinction and noun denotation?

- | | | | |
|-----|----|---------------------|--------|
| (1) | a. | John ate sandwiches | COUNT |
| | b. | #John ate sandwich | ?MASS |
| (2) | a. | John drank water | MASS |
| | b. | #John drank waters | ?COUNT |

- The noun *sandwich* normally has a count interpretation
- The noun *water* normally has a mass interpretation

(3) Questions

1. Is there a lexical distinction between mass and count nouns and if so, what is it? (e.g. kinds, sets of singular individuals, sets of singular and plural individuals...)
2. Are there languages with only mass nouns? And what does that mean?
3. Are there languages with only count nouns? And what does that mean?

Second perspective : count and mass environments

- How does the syntactic or lexical environment of a noun interfere with the count/mass distinction?

- | | | | |
|-----|----|---------------------------------|--------------|
| (4) | a. | John ate sandwiches/ a sandwich | COUNT SYNTAX |
| | b. | ?John ate sandwich | MASS SYNTAX |
| (5) | a. | John drank water | MASS SYNTAX |
| | b. | ?John drank waters/ a water | COUNT SYNTAX |

(6) Questions

1. What kind of contexts interfere with the count/mass distinction?
2. How do they interfere with count and mass interpretations of nouns?
3. What about linguistic variation in this domain?

The two perspectives are interrelated

- The discussion of questions such as the ones in (3) and (6) is based on the interaction between noun meaning and the syntax/morphology of languages

1. In numeral classifier languages the syntax of nouns with typical count meanings (pen, apple, dog etc.) resembles usually the syntax for mass nouns, and numeral classifiers resemble measure words in a language such as English

ONLY MASS NOUNS???

- (7) a. san *(ge) pingguo [Mandarin]
three CL^{gen} apple
b. san *(jin) mi
three CL^{kilo} rice

- (8) a. three apples [English]
b. three *(kilos of) rice

2. In Yudja all nouns combine directly with numerals, without number marking and without use of measure words or numeral classifiers (Lima, 2010)

ONLY COUNT NOUNS???

- (9) a. txabiü ali [Yudja]
three child
'three children'
b. txabiü y'a
three water
'three containers/drops/ puddles etc. of water'

Count and mass environments

- In the absence of plural morphology, bare 'singular' nouns have a different distribution depending on whether they are mass or count

- (10) a. John saw water
b. #John saw sandwich

- Some adjectives may interfere with the count/mass distinction, but in a rather limited way (cf. Bunt, 1985, McCawley, 1975, Schwarzschild, 2011)

- (11) a. a round/rectangular/square sandwich
b. #round/rectangular/square water

- (12) a. #a round/square/rectangular problem
b. #round/square/rectangular courage

- (13) a. #small/#large water
b. small/large furniture (slightly deviant according to experimental data from Bunt 1985)

- Most importantly, the distribution of **quantity expressions** (including plural morphology, numeral classifiers and measure words) is strongly connected to the count/mass distinction; actually one could say that the behaviour of bare nouns is also strongly connected to quantity and the distribution of plural markers

2. Quantity Systems

Quantity system:

A system of expressions in a given language that are used to indicate quantities

- (14) a. He saw sandwiches plural –s: COUNT NOUNS
 b. #He drank waters
 c. #He bought furnitures
- (15) a. *a few/three book/soup a few/three: PLURAL NOUNS
 b. a few/three books
 c. a lot of soup/books/#book a lot of: PLURAL AND MASS NOUNS
 d. a bit of soup/#books a bit of: MASS NOUNS
- (16) PLURAL MORPHOLOGY
 a. apfel – äpfel [German]
 ‘apple – apples’
 b. libro – libros [Brazilian Portuguese]
 ‘apple(s) – apples’
 c. pinguo [Mandarin]
 ‘apple(s)’
- (17) Questions:
 1. What types of restrictions can be found on the distribution of quantity words from a cross-linguistic point of view?
 2. Are there language universals in quantity systems?
 3. What do general properties of quantity systems tell us about the count/ mass distinction?

Numerals

- Numerals typically count units and as such create a count environment (note that these units may be either individualized entities or measures)

- (18) ‘COUNT’
 a. two apple*(s) [English]
 b. liang *(ge) pingguo [Mandarin]
 two CL apple
 c. dalawa-ng mansánas [Tagalog]
 two-LINKER apple

- (19) ‘MASS’
- | | | |
|----|--|------------|
| a. | two kilos of rice | [English] |
| b. | liang jin mi
two kilo rice | [Mandarin] |
| c. | dalawang salop na bigas
two-LINKER ganta LINKER rice
‘two gantas (three liters) of rice’
(but see also the Yudja example in (9b)) | [Tagalog] |

Languages have different strategies with respect to numerals (cf. among others, Chierchia, 2010, Doetjes, 2012):

1. The noun has to be marked in some way or another
 - a) obligatory number marking on the noun (e.g. English, Italian)
 - b) obligatory classifier insertion, e.g. Chinese (Cheng and Sybesma, 2005), Kana (Ikoro, 1994)
2. Direct combination of a numeral and a non-marked noun, e.g. Tagalog (Gill, 2005, Schachter and Otones, 1972), Yudja (Lima, 2011), Denë Sɔliné (Wilhelm, 2008)
3. Mixed & optional systems, e.g. Armenian (Bale and Khanjian, 2008), Hausa (Zimmermann, 2008), Ejaham (Watters, 1981)

The generalizations of Sanches and Greenberg

THE GENERALIZATIONS OF SANCHES AND GREENBERG

1. ‘If a language includes in its basic mode of forming quantitative expressions numeral classifiers, then [...] it will not have obligatory marking of the plural on nouns’ (S)
2. ‘The classified noun itself is normally [...] not marked for number’ (G’s interpretation of claim by S/ S: classified noun is singular)
(Sanches 1971, Greenberg 1977: 286)

Historical development from number marking to a classifier system

- According to Greenberg, the development of numeral classifiers is possible due to the existence of structures of the type
- (19a) (with a mass noun) and of the type in (20); so he proposes that the *cattle* or *furniture* strategy takes over the count lexicon of a language after the loss of number marking

(20) two head of cattle, two pieces of furniture COUNT MASS NOUNS

- In Mandarin and in Kana, the disappearance of the plural suffix has preceded the appearance of a generalized use of numeral classifiers (Peyraube 1998 for Mandarin, Ikoro 1994 for Kana)

Number and number neutrality

1. Languages with obligatory plural marking and obligatory classifiers exist (WALS), but in these languages plural marking is not expressed as morphology on the noun (in accordance with the generalization in 1, and suggesting that the nouns in these languages are number neutral) (Doetjes, 2012)

- (21) a. mwumw jilu-**w**/ jil-**men** [Mokilese]
 fish three-cl^{general} three-cl^{animate}
 ‘three fish’
- b. jeri roah-**men**
 child two-cl^{animate}
 ‘two children’
- c. suhkoa rah-**pas**
 tree two-cl^{long object}
 ‘two trees’
- (22) a. woal-le woal-kai [Mokilese]
 man-this man-these
- b. woal-lo woal-lok
 man-that man-those

2. Languages in which classifiers combine with plural nouns are rare (but seem to exist) ; however, in these languages they **also** seem to combine with number neutral nouns

Hausa (Zimmermann, 2008)

- (23) kàtiifaa huɗu [Hausa]
 mattress.sg four
 ‘four mattresses’
 (also possible with plural nouns, Kateřina Součková p.c.)

- (24) a. kujèeraa gùdaa huɗu [Hausa]
 chair.sg unit four
- b. kùjèeruu gùdaa huɗu
 chair.pl unit four
 ‘four chairs’

“Given that a classifier typically picks out a set of atomic individuals from a plurality of individuals, the co-occurrence of *gùdaa* and the singular count noun *kujèeraa* in [(24a)] is accounted for if the lexical denotation of *kujèeraa* contains plural individuals next to atomic individuals.”
 Zimmermann 2008, note 10

Yucatec (Allan, 1977)

- (25) oš tul maak(oob)
 three CL^{animate} person(s)
 ‘three persons’

REFORMULATED VERSION OF THE GENERALIZATIONS OF SANCHES AND GREENBERG

1. Classified nouns are (normally) not marked for number (number neutral nouns)
2. As a consequence of this, numeral classifiers are not expected to occur in languages with a true singular-plural opposition marked on the noun

So far: focus on the differences between quantity systems...

What do quantity systems have in common?

- Differences between systems in terms of number marking, classifiers and lack thereof obscure a very important fact about languages in general: languages seem to have quite similar types of expressions (cf. Rothstein, 2009a, Rothstein, 2009b):
 - a. Expressions that involve **counting** and that presuppose the availability of units to count
 - b. Expressions that involve **measuring** and that do *not* presuppose the availability of units to count
 - c. Expressions that presuppose the absence of units to count (**'anti-counting'**)

Counting quantity expressions

- (26) a. three/several/a few/many books
b. three/several/a few/many #(kilos of) sugar
- (27) *key property: atomicity* (cf. Krifka, 1992)
a. $\forall x, P[ATOM(x, P) \leftrightarrow P(x) \ \& \ \neg \exists y[y < x \ \& \ P(y)]]$
(*x* is a *P*-atom)
b. $\forall P[ATM(P) \leftrightarrow \forall x[P(x) \rightarrow \exists y[y \leq x \ \& \ ATOM(y, P)]]]$
(the predicate *P* has atomic reference)

Problematic issues

- the notion of atomicity (Nicolas, 2004, Rothstein, 2010) ; some count nouns are not atomic : *bunch, fence, thing...*
- linguistic variation: (some) count quantity expressions need plural markers and/or classifiers (see above)
- 'count mass nouns' (*furniture, silverware*) are atomic but do not combine with numerals (for arguments in favor of atomicity of these nouns, see Bale and Barner, 2009, Barner and Snedeker, 2005, Chierchia, 1998, Doetjes, 1997)

Measuring quantity expressions

- (28) a. more/less/a lot of books/soup PLURAL OR MASS NOUN
b. a pot of honey/marbles PLURAL OR MASS NOUN
- (29) a. #more/less/a lot of book SINGULAR:
b. More house for less money INTERPRETED DIFFERENTLY
- (30) *key property : strict cumulative reference* (cf. Krifka, 1992)
 $\forall P (CUM(P) \leftrightarrow \forall x, y[P(x) \ \& \ P(y) \rightarrow P(x \vee y)] \ \& \ \exists x, y[P(x) \ \& \ P(y) \ \& \ x \neq y])$

Non-counting quantity expressions

- (31) a. John drank a bit of water MASS NOUN
b. John drank #a bit of/a few coffees
c. (?) a bit of flowers (more than 100.000 Google hits)
d. Rick has quite a bit of books and a growing collection of DVDs
[http://rocwiki.org/Rick's Recycled Books](http://rocwiki.org/Rick's_Recycled_Books), 11-9 2013

(32) *key property: absence of atomicity (cf. (27) as well as the remarks on problematic aspects of atomicity above)*

Counting quantity expressions across languages

Core property:

- Count quantity expressions involve **counting** and presuppose the availability of units to count

Numerals etc.

Even languages that have very restrictive numeral systems – e.g. Mundurucu (Pica et al., 2004) – seem to have quantity expressions that resemble numerals or expressions such as *several* in the sense that they presuppose the availability of units to count

- The conditions on the use of numerals are at least partly related to the distribution and function of numeral classifiers and number marking in a language
- Besides numerals, languages usually have other expressions that share the properties of numerals. This is not only true in number marking languages such as English, but also in numeral classifier languages (*ji* ‘how many, a few’ in Mandarin, cf. Li and Thompson (1981)) and even in languages such as Tagalog (*ilan* ‘a few’ in Tagalog Schachter and Otnes (1972))

	English (plural marking)	Mandarin (numeral classifier)	Tagalog (no marking)
only ‘count’ /further requirements depend on the type of language	numerals, <i>several, a few, many...</i>	numerals, <i>ji</i> ‘a few, how many’	numerals, <i>ilan, hindi ilan</i> ‘not only a few, quite a few’

- Number markers** and certain **classifiers** are themselves also count quantity expressions, as they presuppose a count interpretation of the noun as well

Count selecting classifiers

1. Sortal classifiers

- Sortal classifiers occur with expressions that are semantically count (Cheng and Sybesma, 1998, 1999, 2005, Doetjes, 1997, 2012, Grinevald, 2005, Li, Dunham and Carey, 2009, Zhang, 2013)

(33) a. liang **zhi** bi [Mandarin]
two CL^{branch} pen
‘two pens’

b. san **ge** ren
three CL^{general} person
‘three persons’

(34) a. Wo mai-le bi [Mandarin]
I buy-ASP bi
‘I bought a pen/pens’

b. hen duo bi
 a lot pen
 ‘a lot of pens’

(35) san ge hua-duo [Mandarin]
 three CL^{general} flower-CL^{flower}
 ‘three flowers’ Zhang (2013)

- Cross linguistic variation in the form and function of sortal classifiers
 - the size of the inventory of sortal classifiers (Grinevald 2005)
 - further grammatical properties (Cantonese classifiers are also used to mark definiteness; Cheng & Sybesma 2005)
 - obligatory vs. optional use
 - morphological status and position
 - ...

2. *Group or plural classifiers*

(36) a. yi da (*pi) bai-ma [Mandarin]
 a CL^{dozen} CL^{horse} white-horse
 b. yi qun (*pi) bai-ma
 a CL^{flock} CL^{horse} white-horse
 ‘a dozen/flock white horses’

- ‘plural’ classifiers combine typically with nouns that take sortal classifiers, but the sortal classifier is left out, even though the count interpretation is clearly there (Doetjes, 1997)

Count selecting measure words

1. *Unit terms (Greenberg, 1972)*

(37) two head of cattle, a piece of furniture

2. *Group/plural measures*

(38) a. a couple of books
 b. a dozen of eggs
 c. #a couple of furniture

Number

- number markers normally presuppose the presence of ‘units’ to count

(39) a. John ate sandwiches COUNT
 b. #John ate sandwich ?MASS

(40) a. John drank water MASS
 b. #John drank waters ?COUNT

- Cross linguistic variation in the form and function of number markers (see among many others Corbett, 2000, Dryer, 2005)
 - morphological/syntactic status of the number marker
 - obligatory vs. optional number marking
 - present with numerals or not
 - grammatical status (subject of debate)
 - in systems with number, mismatches may occur, resulting in count mass nouns (*furniture*) and mass count nouns (*oats*)

To sum up:

- Counting quantity expressions are commonly found across languages (in particular numerals and expressions such as *a few* or *several*)
- Languages differ in the number and types they make use of and the ways they interact

Measuring quantity expressions

Core property

- Measuring quantity expressions involve **measuring** and that do *not* presuppose the availability of units to count nor the absence thereof

Degree expressions

Many degree expressions do not presuppose the availability of units to count or the absence thereof

- The conditions on the use of degree expressions depend partly on the distribution and function of numeral classifiers and number marking in a language

(41) a lot of books/soup/furniture

	English (plural marking)	Mandarin (numeral classifier)	Tagalog (no marking)
combine with both mass and count nouns ; incompatible with 'real' singulars	<i>a lot</i> ; count nouns need plural marking or get a mass interpretation	<i>hen duo</i> 'a lot' ; depending on the dialect with optional classifier	<i>marami</i> 'a lot'

- In the presence of this type of quantity expressions, the presence or absence of 'counting' comes from the meaning of the noun (see in particular Barner and Snedeker, 2005)

Mensural classifiers and measure terms (default)

(42) yat¹ di¹ jan⁴ / seoi² [Cantonese]
 one di person /water
 'some people/ some water' (Cheng et al., 2012)

(43) a kilo of clay/apples

To sum up:

- Measuring quantity expressions seem to be very common across languages, in particular in the domain of degree related quantity expressions (*more, less, a lot*) and the domain of measure terms/mensural classifiers

Non-counting quantity expressions

Degree expressions

- (44) a. John drank a bit of water MASS NOUN = (31)
 b. John drank #a bit of/a few coffees
 c. (?) a bit of flowers (more than 100.000 Google hits)
 d. Rick has quite a bit of books and a growing collection of DVDs
[http://rocwiki.org/Rick's Recycled Books](http://rocwiki.org/Rick's_Recycled_Books), 11-9 2013

- Not restricted to languages with number marking
- These expressions often come in pairs with a counting quantity expression
- If we assume that their existence is due to some kind of blocking mechanism, this may explain the fact that the requirement is not as strong as the 'count' requirement on counting quantity expressions, cf. (31c,d) vs. *(quite) a few soup

	English (plural marking)	Mandarin (numeral classifier)	Tagalog (no marking)
counting	<i>a few</i> (plural noun)	<i>jǐ</i> 'a few' (classifier)	<i>ilan</i> 'a few'
Non-counting	<i>a little</i>	<i>yī diǎnr</i> 'a little'	<i>kainti</i> 'a little'

Certain mensural classifiers or measure words

- (45) a drop of milk

- Measure terms can impose many very detailed lexical restrictions, that may impose the use of mass nouns (e.g. 'liquid'); this goes beyond mass vs. count

To sum up:

- This type seems to be a subtype of the measuring quantity expressions where the combination with count nouns is blocked by the presence of a counting quantity expression

3. Count and mass from the perspective of quantity Systems

Two main types

- Expressions that involve **counting** and that presuppose the availability of units to count
- Expressions that involve **measuring** and that do *not* presuppose the availability of units to count

Third type reducible to the second type and blocked by an expression of the first type

Linguistic variation and arbitrariness in the count/mass status of nouns

- (48) a. advice (English) vs. un conseil ‘a piece of advice’ (French)
b. success vs. failure

(Gillon, 2012, Pelletier and Schubert, 1989, Rothstein, Treves and Kulkarni, 2012)

- differences may be due to the fact that the grammatical environment of nouns forces them to choose; this choice may turn out to be arbitrary because there is not a unique way in which language can be mapped onto the ‘real world’
- Cf. *rougir* (accomplishment in French) vs. *blozen/ to blush* (activity in Dutch, English)

Shifts

- Ongoing debate: do shifts exist? (Borer, 2005, Pelletier, 2012)
→ I think they do exist

(49) *Typical mass-to-count shift*

- a. glass (mass, material)
b. glass (drinking container made of glass)
c. the glass of a bottle, the glass of the stained glass windows of Reims Cathedral
d. no relation between b and c except for the ‘material’

(50) *Typical count-to-mass shift*

- a. chicken (count, bird)
b. chicken (mass, meat)
c. chicken meat has been part of a chicken

- (51) a. Johnny is very choosy about his food. He will eat book, but he won’t touch shelf.
b. Johnny is very choosy about his food. He will eat paper, but he won’t touch wood.
c. mass book has been part of a book, mass shelf has been part of a shelf

(cf. Gleason, 1965)

Mismatches

- The source of mismatches (count mass nouns such as *furniture* and mass count nouns such as *oats*) seems to be a rigid number marking system on the noun (Chierchia, 2010, Doetjes, 2010)
- They also occur in ‘looser’ systems such as French (Anne Zribi-Hertz, p.c.) and Brazilian Portuguese (Pires de Oliveira and Rothstein, 2011)
- Many questions remain with respect to the mapping between number systems and semantic atomicity

4. Quantity systems in the verbal domain

Bach (1986), Krifka (1986): similarity of nominal and verbal domains

- activities : similar to mass nouns (cumulative reference)
- accomplishments/ achievements : similar to count singulars or plurals (singular : no cumulative reference; plural : cumulative reference)

Question:

- Do we find the same types of quantity expressions in the nominal and in the verbal domains?

Answer:

- Measuring quantity expressions and non-counting quantity expressions (in particular degree modifiers) may occur in both domains
- Counting quantity expressions are predominantly **nominal**

Measuring quantity expressions

- Measuring quantity expressions may occur both with nouns and with verbs and seem to be sensitive to (strict) cumulative reference in both domains

(52) *plurality* → *counting*

- a. They met each other a lot → many encounters
- b. a lot of horses → large number

(53) *masses* → *evaluation of a global quantity*

- a. He spoke a lot → global quantity of speaking
- b. a lot of soup → global quantity of soup

- The source of counting is the semantics of the noun or the verb phrase: nouns and VPs introducing minimal parts trigger counting ; mass nouns or VPs yield a global quantity reading

Non-counting quantity expressions

- (54)
- a. He slept a bit → small global quantity of sleeping
 - b. a bit of soup → small global quantity of soup
 - c. He jumped a bit → several jumps
 - d. ?He visited him a bit → several visits? examples can be found...

- The non-count requirement does not seem to be very strict, but these modifiers do not seem to be restricted to the nominal system either

Counting quantity expressions

Verbal plurality

Součková (2011) on verbal plurality

“Terms like ‘singular’ and ‘plural’ are normally used in connection with the category of number in the nominal domain. It is intuitively very clear what the singular (a) dog means, as opposed to the plural dogs. On the other hand, the notion of ‘plural verbs’ seems to be much less transparent.”

“Most verbs are not naturally atomic, which means that it is not lexically specified for them what constitutes a single event unit. As a result, something else is needed to define the event units and these are what I call ‘anchors’.”

- (55) Nominal event anchors in Hausa (Součková, 2011: 143)
- a. Naa tat-tambayee **su**
1SG.PF RED-ask them
'I asked them'
N.B. one by one, or group by group
 - b. Yaa bib-bi shi **wuraaree daban-daban**
3SG.M.PF RED-follow him places different-different
'He followed him to various places'

→ Verbal plurality often mediated by nominal expressions

Numerals etc.

- (56) a. John went to the movies *three times* COUNT
b. John slept *three times* MASS
- (57) a. Jean est allé **trois fois** au cinéma COUNT [French]
b. Jean a **trois fois** dormi MASS

Hypothesis (to be rejected):

English (and many other languages) are, in as far as the verbal domain is concerned, numeral classifier languages: there is no opposition between singular and plural (only number agreement with the subject) and at the same time one has to always use a numeral classifier (*fois, times, keer*)

Prediction (false):

Nouns followed by a classifier are always followed by number neutral nouns, not by 'real' singulars/ expressions with a singular semantics (set of singularities)

→ we do not expect *three times* to modify a singular expression either

- (58) a. three pieces of cheese ?≈ sleep three times
b. three pieces of furniture ?≈ meet three times

1. *The modified VP does not need to have cumulative reference*

- (59) *cheese*: cumulative reference
furniture: cumulative reference

(60) *VPs modified by trois fois : cumulative reference??*

- a. Elle a dormi trois fois
'She slept three times'
- a'. Elle a beaucoup dormi
'She slept a lot'
- b. Elle l'a rencontré trois fois
'She met him three times'
- b'. Elle l'a beaucoup rencontré
'She met him a lot'

- (61) *non cumulative verbal predicate*: acheter deux kilos d'olives 'buy two kilos of olives'
 a. 2 kilos of olives + 2 kilos of olives = 4 kilos of olives
 b. buying 2 kilos of olives + buying 2 kilos of olives = buying 4 kilos of olives

- (62) a. #Elle a **beaucoup** acheté deux kilos d'olives (cumulative reference)
 b. Elle a acheté **trois fois** deux kilos d'olives (distributive reading)

- (63) Pierre et Marie ont acheté deux kilos d'olives
 a. collective reading: together/ 1 event
 b. distributive reading : each two kilos/ 2 events or two times one event

2. *The relation between fois and VP is not the same as the relation between piece and NP*

- (64) a. to give three times a different answer
 (different from each other or from another answer in the context)
 b. three pieces of different furniture/ furniture from a different period
 (different from other furniture in context, not from each other)

Alternative hypothesis for adverbial three times and trois fois:

Numeral structures with *fois* are fundamentally nominal; the numeral and the classifier *times* form together a distributive noun phrase that is adjoined to the verb phrase and that has scope over it, and resemble in that respect other noun phrases in the sentence (Doetjes, 1997, 2008)

- (65) *Nominal structures consisting of a classifier without a noun* (cf. Greenberg 1977 : 294)
 a. twee gulden, twee jaar (tijd), drie keer *Dutch*
 two guilder, two year (time) three time
 b. z̩̀̀ té fa *Kana/ Ikoro 1994*
 one CL boat
 c. z̩̀̀ zúá, z̩̀̀ s̩̀̀
 one year one time → currency, time units, *time...*

Cross-linguistic strategies for verbal counting ?

Hausa (Newman, 2000, Součková, 2011, Malàmi Buba, p.c.)

- (66) a. Taa zàagee shì zaagì ukù
 she insult him insulting three
 'She insulted him three times'
 b. *Taa zàagee shì zàzzagì ukù
 she insult him insulting-PL three
- (67) Sun ci/ *cicci jarràbâawaa sàu ukù
 they eat/eat-PL exams time three
 'They passed exams three times'

- Hausa: verbal noun and *N times* strategies

Frequentative affixes that derive frequentative numerals:

- (68) Tagalog *maka-* (Schachter & Otanes 1972: 214)
 Kari'nya (Carib): *-mboto* (Hoff 1968: 282)(Hoff, 1968)

- Issue for further research: not clear how these modifiers are interpreted

West Greenlandic (van Geenhoven 2005, Fortescue 1984)

- (69) a. nuka ullaa-p tunga-a tama-at sanioqqut-**tar**-puq
 Nuka.abs morning-erg direction-3sg.sg.abs all-3sg pass-**pl**-ind.[-tr].3sg
 'Nuka went by repeatedly for the whole morning' (trad. de Van Geenhoven)
- b. Marlu-riar -lu-ni quirsur-**tar**-puq
 two -do.times -inf-3sg.prox cough-**pl**-ind.[-tr].3sg
 'He coughed twice' or 'He repeatedly coughed, each time doing it twice'

- Incorporation of the numeral into a special type of auxiliary

Karitiana

- (70) 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'

- Karitiana seems to be an example of a languages where numerals combine directly with nouns that are (optionally or obligatorily??) marked for plurality; yet, in the verbal domain counting still seems to be often mediated by nominal structures

To sum up

- Direct modification of a VP by a numeral seems to be rare
- A VP modified by Num+*times* can be a singular from a semantic point of view (no cumulative reference!), while a noun modified by numeral classifiers needs to have cumulative reference
- In the verbal domain, counting often involves nominal structures

4. Conclusions

- Nominal quantity systems typically have three types of expressions
 1. Counting quantity expressions (numerals, number markers, sortal and plural classifiers, unit terms..)
 2. Measuring quantity expressions (degree expressions, mensural classifiers)
 3. Non-counting quantity expressions (*a bit* etc., usually in complementary distribution with expressions from the first category)

- Despite differences, the presence of counting quantity expressions correlates with the type of meanings we find for nouns: across languages we typically find nouns that can be counted and nouns that cannot, as well as shifting processes between the two types of meanings
- Despite parallels between nominal and verbal structures, counting seems to be much more closely associated to nouns and the nominal domain than to verbs and verbal counting often involves nominal structures (N *times*, anchors...)

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