

# Number stacking and the semantics of associative plurals in Bamileke Medumba

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**Abstract:** Associative plurals (APL) also known as ‘group plurals’ refer to expressions whose meaning can be paraphrased as “X and X’s associated group” (Corbett 2000; Moravcsik 2003). This paper investigates the semantics of associative plurals (APL) in Medumba. I propose that the syntax of DP in Medumba exhibits number stacking: the first one NumP<sub>1</sub> serves as a regular number in the language and is divided into singular and plural whereas the second, NumP<sub>2</sub> is restricted only to the associative plural reading. As far as the semantic analysis is concerned, I adopt a set-based approach, which provides a unified analysis of the denotation of plurals and associative plurals in Medumba. I argue that the regular plural denotes non-singleton sets whereas the APL *bà* is a function that picks out the sum of the sets formed by the union of the set of the focal referent and the sets of the associates.

**Key words:** Associative plurals, number stacking, denotation, set

## 1 Introduction

This paper investigates the semantics of associative plurals (APL) in Medumba<sup>1</sup>, a Grassfields’ Bamileke Bantu language spoken in the Western Region of Cameroon, Central Africa. I address the following questions: (i) how is the Medumba Associative Plural integrated into the number system? (ii) What is the denotation of Regular Plural in Medumba? (iii) What is the denotation of Associative Plurals in Medumba? (iv) How does the Medumba Associative Plurals compare to Associative Plurals in other languages? I propose an analysis in which the syntactic distribution of number markers highlights their semantics. As far as the semantics of pluralities is concerned, I opt for a unified analysis of plurals and associative plurals in the language and adopt a set-based analysis, which provides interesting insights on the denotation of pluralities and the distribution of associative plurals in Medumba. The discussion is organized as follows: Section 2 focuses on number marking and the noun class system in Medumba, section 3 is devoted to the associative *bà* plurals in Medumba, section 4 on the basic DP syntax in Medumba, section 5 on the denotation of pluralities in Medumba and section 6 on the cross-linguistic distribution of associative plurals.

## 2 Number marking and the noun class system in Medumba

This section is devoted to the description of number marking and the noun class system in Medumba. Traditionally, noun classes are defined in Bantu languages in three ways: (i) by nominal prefixes, (ii) by concordial nominal and pronominal prefixes, and (iii) by a system of pairings between singular and plural prefixes (Voorhoeve 1968). According to Hyman (1970), in

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<sup>1</sup> Abbreviations and conventions: 1 = class 1; 2 = class 2; 3 = class 3; 4 = class 4; 5 = class 5; 6 = class 6; APL = associative plurals; CIP = Classifier Phrase; CN = common noun; D = determiner; DEM = Demonstrative; DP = Determiner Phrase; Num = number; NumP = Number Phrase; Nral = numeral; PL = plural; POSS = possessive; PN = proper name; 1PROX = proximate demonstrative near to speaker; 2PROX = proximate demonstrative near to addressee; SG = singular. Tonal convention: unmarked tone = high.

the Bamileke cluster of languages spoken in Cameroon, classified as Semi-Bantu or Bantoid languages, much of the noun classes they once shared with Bantu have been eroded. This section shows that relics of these noun class prefixes persist.

## 2.1 The noun class system in Medumba

In the description below, I adopt Hyman’s (1970) presentation of noun classes in another Bamileke (Fe’fe’) language by using the letters A, B, C, etc. The concord on the possessive determiner is used to organized nouns into classes in Medumba (Voorhoeve 1968). Note that some of the nouns that possibly belonged to different classes in Proto-Bantu are now organized into one single class in Medumba according to their possessive agreement concord. The table below summarizes the noun class system in Medumba.

**Table 1:** The noun class system in Medumba<sup>2</sup>

| Class |    |                 | 1SG Possessive concord |            | Class prefix residue | Gloss         |
|-------|----|-----------------|------------------------|------------|----------------------|---------------|
|       |    |                 | Noun                   | Possessive |                      |               |
| A     | A1 | SG <sub>1</sub> | m-ɛn                   | ∅-àm       | m-/ma-               | ‘my child’    |
|       |    | PL <sub>6</sub> | b-un                   | tʃ-am      | b-/ba-               | ‘my children’ |
|       | A2 | SG <sub>1</sub> | ∅-ʃùm                  | ∅-àm       | ∅-                   | ‘my son’      |
|       |    | PL <sub>6</sub> | ʃùúm~ʃùm               | tʃ-am      | Copy-                | ‘my sons’     |
|       | A3 | SG <sub>1</sub> | ∅-mb <sup>h</sup> u    | ∅-àm       | ∅-                   | ‘my dog’      |
|       |    | PL <sub>6</sub> | ∅- mb <sup>h</sup> u   | tʃ-am      | ∅-                   | ‘my dogs’     |
| B     | B1 | SG <sub>3</sub> | ∅-b <sup>h</sup> u     | ∅-am       | ∅-                   | ‘my hand’     |
|       |    | PL <sub>4</sub> | m-b <sup>h</sup> u     | m-am       | N-                   | ‘my hands’    |
|       | B2 | SG <sub>5</sub> | ∅-sō                   | s-am       | ∅-                   | ‘my tooth’    |
|       |    | PL <sub>4</sub> | n-sō                   | m-am       | N-                   | ‘my teeth’    |

Traditionally, based on work of Voorhoeve (1968), Medumba is assumed to have 5 noun classes organized according to the concord on the possessive determiner. The above table shows that nouns are organized in two big crossed-classes in Medumba that I refer to as class A and class B. Class A nouns are organized according to their possessive concord but are divided into 3 sub-classes according to their singular/plural pairing (members of the A1 class share the *m-/ma-* singular prefix and *b-/ba-* plural prefix; the A2 class has a zero singular prefix and is totally reduplicated in the plural; class A3 is characterized by a zero prefix both in singular and plural). In contrast, class B nouns are organized according to their singular/plural pairing by virtue of sharing a zero prefix in the singular and the homorganic nasal in the plural, but are divided into 2 sub-classes according to their possessive concord (class B1 has a zero possessive singular prefix and the nasal *m-* in plural whereas class B2 has the possessive singular prefix *s-* in the singular and the nasal *m-* in the plural). With regard to the traditional notation, the singular of class A nouns in the above table is known as class 1 and their plurals as class 6 (1/6); the singular of class B1 nouns is known as class 3 and their plural class 4 (3/4); as for B2 nouns, their singular is known as class 5 and they also form their plural with class 4 (5/4). This pairing (1/6, 3/4, 5/4) is consistent with Maho’s (1999) typological survey of noun classes in Bantu. I opt for the above presentation because it presents richer information about nouns namely their singular/plural

<sup>2</sup> The subscript on SG/PL indicates the figures representing the pairing of classes in Medumba

pairing and their possessive agreement concord; it also highlights some relics of the class prefixes and classes that possibly merged into one single class in Medumba. For instance, with regard to singular/plural pairing, class A1, A2, and A3 pattern differently and seem to have belonged to different classes but are nowadays sharing the same possessive agreement concord.

### 3 The Medumba associative *bà* plural

Associative plurals (APL) also known as ‘group plurals’ according to Moravcsik (2003) and Corbett (2000) refer to expressions whose meaning can be paraphrased as “X and X’s associated group”. These expressions are formed in Medumba by combining the associative plural marker, the low tone *bà*, with proper names (PN) or with common nouns (CN).

#### 3.1 The distribution of the associative plural *bà* in Medumba

The examples in the table below show that proper nouns (1), definite singular (2) and plural nominals (3) can combine with the associative plural marker both in subject and object position<sup>3</sup>. They also show that it is illicit to combine the associative plural marker with indefinite singular nouns (marked by *tà?* which behaves as an indefinite determiner) in Medumba (4).

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<sup>3</sup> The main text examples illustrate associative *bà* plural in object position. It also occurs in subject position, where it is governed by the same distributional constraints. With singular terms, associative *bà* occurs with proper names (i), definite singulars (ii), but not with indefinite singulars (iii). And with plural terms, associative *bà* is compatible with both indefinite and definite construals (iv).

- (i) **(bà)** Sēmí tʃàʔdǎ Numi  
**APL** Sami greet Numi  
 ‘Sami (**and his associates**) greeted Numi.’
- (ii) **(bà)** má-dzùm tʃàʔdǎ Numi  
**APL** SG-boy greet Numi  
 ‘The boy (**and his associates**) greeted Numi.’
- (iii) *tà?* **(\*bà)** ma-dzùm tʃàʔdǎ Numi  
**INDEF APL** SG-boy greet Numi  
 ‘A boy (**and his associates**) greeted Numi’
- (iv) **(bà)** bá-dzùm tʃàʔdǎ Numi  
**APL** PL-boy greet Numi  
 ‘The/some boys (**and their associates**) greeted Numi.’

**Table 2** Distribution of the associative plural *bà* in Medumba

|                     | <b>Singular</b>   | <b>Plural</b>  |
|---------------------|---|--|
| <b>Proper Names</b> | (1) Numi tʃàʔdǎ ( <b>bà</b> ) Sěmí<br>Numi greet <b>APL</b> Sami<br>'Numi greeted Sami ( <b>and his associates</b> )'                   |  |
| <b>Definite</b>     | (2) Numi tʃàʔdǎ ( <b>bà</b> ) má-dzùm<br>Numi greet <b>APL</b> SG-boy<br>'Numi greeted the boy ( <b>and his associates</b> )'           | (3) &Numi tʃàʔdǎ ( <b>bà</b> ) bá-dzùm<br>Numi greet <b>APL</b> PL-boy<br><br>= (i) 'Numi greeted the boys ( <b>and their associates</b> )'<br><br>= (ii) 'Numi greeted some boys ( <b>and their associates</b> )' |
| <b>Indefinite</b>   | (4) Numi tʃàʔdǎ tàʔ ( <b>*bà</b> ) ma-dzùm<br>Numi greet <b>INDEF APL</b> SG-boy<br>'Numi greeted a boy ( <b>*and his associates</b> )' |  |

The table also highlights the definiteness contrast in Medumba: Singular nominals exhibit a split between definite and indefinite construals in that bare singulars are definite or denote kind whereas their indefinite counterparts are marked by *tàʔ*. With plural nominals, this contrast is neutralized giving rise to the ambiguity of bare plurals. After showing that the Medumba associative *bà* plural combines with singular and plural nominals (Table 2), I will show that, it is illicit<sup>4</sup> to combine it with numerals (5). But unlike indefinite singulars, whenever there is a demonstrative determiner in the construction<sup>5</sup> the case of numerals becomes grammatical (6).

(5) Numi tʃàʔdǎ (**\*bà**) bá-dzùm tad  
Numi greet **APL** PL-boy three  
'Numi greeted three boys (**and their associates**)'

(6) Numi tʃàʔdǎ (**bà**) bá-dzùm tad (tʃùn)<sup>6</sup> n-i  
Numi greet **APL** PL-boy three DEM-1PRX  
'Numi greeted these three boys and their associates'

### 3.2 The associative L-tone *bà* plural and the regular H-tone *bá* plural in Medumba

*bà* is nearly homophonous with the A1 plural prefix (*bá*) in Medumba although the latter carries a high tone. The question one may ask is whether this is an accident. It seems that the low tone *bà* is the class A1 plural marker that is recycled as the associative plural marker in Medumba. Another way of looking at the *ba*s could be to say that those forms are actually bimorphemic and

<sup>4</sup> It is also illicit to combine the APL with pronouns

<sup>5</sup> This paper will not address issues related to APL + Numerals. For the analysis of APL + Numerals, see Keupdjio (in progress).

<sup>6</sup> This morpheme is optional and marks agreement between the noun and the demonstrative determiner as in the Yoruba type system (see Ajiboye 2005)

the CV form *ba* carries just an abstract plural feature. The high tone (´) specifies the regular plural reading while the low tone (˘) conveys the associative or group reading. Some of the nouns with the A1 plural prefix are illustrated in the table below.

**Table 3** Associative L-tone *bà* plural and the regular H-tone *bá* plural

|       | SG-N                   | Tone | PL-N                         | Tone |
|-------|------------------------|------|------------------------------|------|
| Boy   | má-dzùm                | HL   | bá-dzùm                      | HL   |
| Woman | m-èn-zwí               | LH   | b-ún-zwí                     | HH   |
| Child | m-óŋ-kú?               | HH   | b-óŋ-kú?                     | HH   |
|       | ‘The N’                |      | ‘The/some N’                 |      |
|       |                        |      |                              |      |
|       | APL SG-N               |      | APL PL-N                     |      |
| Boy   | bà má-dzùm             | LHL  | bà bá-dzùm                   | LHL  |
| Woman | bà m-èn-zwí            | LLH  | bà b-ún-zwí                  | LHH  |
| Child | bà m-óŋ-kú?            | LHH  | bà b-óŋ-kú?                  | LHH  |
|       | ‘The N and associates’ |      | ‘The /some N and associates’ |      |

The above examples show two things. First, the Medumba associative *bà* plural involves number stacking, as seen by the fact it combines with an overtly number-marked noun. (Note that except proper nouns, both singular and plural are overtly marked in Medumba.) Second, the Medumba associative Low-tone *bà* may be an allomorph of the regular High-tone *bá* plural. Neither of these features is specific to Medumba. Number stacking is attested in many Bantu languages in the context of evaluative marking, where a number-marked evaluative N-class prefix combines with an already number-marked noun, as for example in Shona (Déchaine et al., 2014):

- (7) a. mù-kómáná (singular)                      b. vâ-kómáná (plural)  
       C1-boy    C2-boy  
       ‘boy’    ‘boys’
- (8) vâ-mù-kómáná  
       C2<sub>HON</sub>-C1-boy  
       ‘Mr boy’

As for the fact that *bà* is singled out to be the associative plural, this likely reflects that in Bantu languages with a full set of N-class prefixes, the cognate for Medumba *bà/bá* is the class 2, which is the plural of human nouns. This is illustrated in (9) for Nata<sup>7</sup>, which similarly recruits this N-class prefix for collective plurals on proper names, as in (10).

- (9) a. o-mu-kári (singular)                      b. a-βa-kári (plural)  
       PPF-C1-woman                              PPF-C2-woman  
       ‘woman’                                      ‘women’

<sup>7</sup> Nata is a lacustrine Bantu language spoken in North-eastern Tanzania

- (10) βa-Másato (Associative Plural)  
 C2-Masato  
 ‘Masato and his associates’

I think the recruitment of the class 2 N-class prefix as the associative plural likely reflects the fact its "human, plural" denotation is compatible with the kind of group denotation that is typical of collective plurals, which tend to denote human entities even though Medumba extends this denotation to non-human entities.

- (11) b̂a n-séŋ sě nà  
 APL PL-bird destroy field  
 ‘The birds (**and their associates**) destroyed the seeds.’

- (12) Nùmí z̄yn b̂a n-dzú?  
 Numi buy APL PL-spoon  
 ‘Numi bought a bunch of spoons/spoons (**and other utensils**).’

### 3.3 The meaning of associative plurals in Medumba

The most obvious semantic property of associative plurals is their plurality. According to Moravcsik (2003), associative plurals are characterized as follows: (i) they denote a non-singleton set of individuals; (ii) the members of the plural set are a spatially and conceptually coherent group; (iii) the named individual is the focal referent and so is the most prominent member of the set. The author illustrates what she means by coherent group by arguing that in Hungarian example below (13), the expression *Péter-ék* could not ordinarily refer to Peter and his enemies.

- (13) Peter-ek  
 Peter-APL  
 ‘Peter and his family or friends or associates’

In Medumba, it is possible to imagine a context in which the focal referent does not need to form a ‘coherent group’ with his associates or does not necessarily refer to the focal referent and his family or friends. For instance, consider a context in which Numi is his tribe’s warrior and is sent to fight his tribe’s enemies at the border. Imagine the tribe’s leader while briefing the community about the situation says:

- (14) (b̂a) Numi t̄fwěd ndú? nt̄fù á ndzũ lá?  
 APL Numi PRS fight war Foc border town  
 ‘Numi (**and the tribe’s enemies**) are fighting at the border’

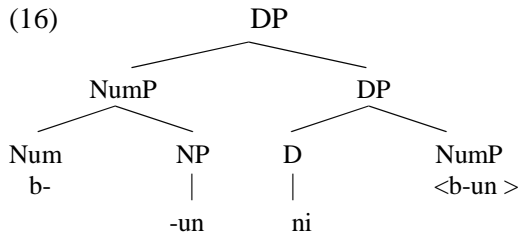
Then, it is clear in the above context that the expression *b̂a Numi* does not refer to Numi and his friends or family but to Numi and his tribe’s enemies.

## 4 Basic DP syntax and associative plurals in Medumba

This section gives an overview of the DP structure in Medumba and proposes how the associative plural *b̂a* can fit within this structure. The base line of my proposal follows Kouankem’s (2012) analysis of the syntax of DP in Medumba. Consider the example below:

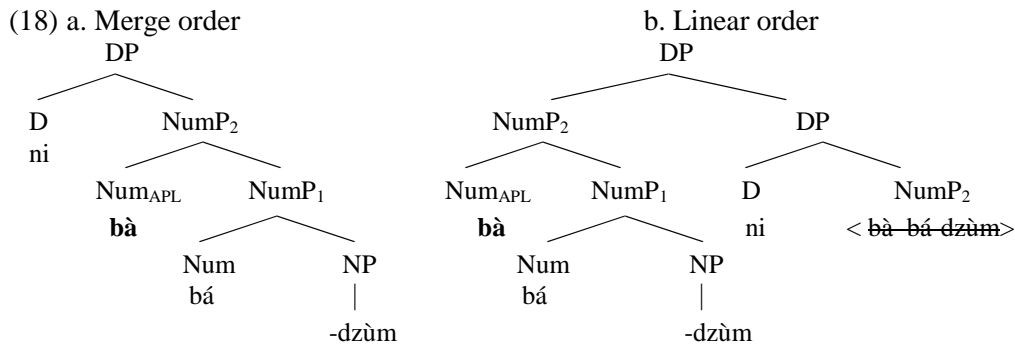
- (15) b-un (tʃun) n-i  
 PL-child DEM-1PROX  
 ‘these children, near the speaker’

I assume that (i) the demonstrative determiner occupies d in medumba and (ii) the class prefix indicating number occupies the head position of Num(ber) P(hrase) which selects NP as complement (Carstens 2010). I am trying to derive the linear order in Medumba, I follow Kouankem’s 2012 proposal about movement of NumP to Spec-DP as illustrated below.



With regard to APL, I assume that it heads another NumP (Number phrase) head in the structure. NumP<sub>1</sub> splits between singular and plural whereas NumP<sub>2</sub> is restricted only to plural, namely the associative plural.

- (17) bà bá-dzùm (tʃun) n-i  
 APL PL-boy DEM-1PROX  
 ‘these (near the speaker) boys and their associates’



In the above structure, NumP<sub>2</sub> headed by the APL moves to Spec-DP. That’s why the linear order shows the APL in initial position and D in final position. Given the linear order of the APL and other DP constituents, the question that can arise is why does the APL *bà* not merged above DP. The problem with this hypothesis is that it incorrectly predicts that in coordinated structures, the APL *bà* can scope over the coordinated DPs. Evidence from the language shows that in those structures, the associative plural reading is only applies to the first DP:

- (19) Numi tʃãʔdã bà bá-dzùm bu b-ún-zwí  
 Numi greet **APL** PL-boy and PL-child-female  
 ‘Numi greeted [**the/some boys and their associates**] and the/some girls’  
 ‘\*Numi greeted [the/some boys and their associates and the/some girls and their associates.]’

In order to get the associative plural reading with the two DPs, one needs two APL markers associated with each of them:

- (20) Numi tʃàʔdǎ **bà** bá-dzùm bu **bà** b-ún-zwí  
 Numi greet **APL** PL-boy and **APL** PL-child-female  
 ‘Numi greeted the/some boys **and their associates** and the/some girls **and their associates**’

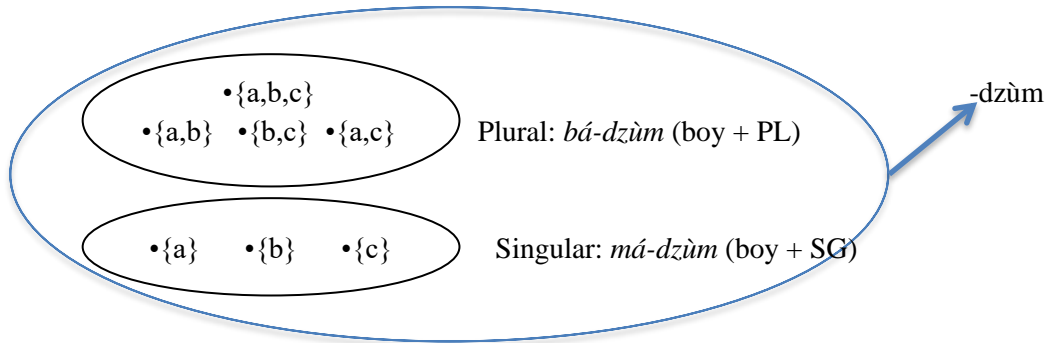
The fact that two *bà*’s are needed in coordinated structures suggests that they are deeply embedded within each DP and one cannot scope over both DPs.

## 5 Denotations of Pluralities in Medumba

### 5.1 Denotation of regular plurals

Several theories have been proposed as far as the semantic interpretation of plurality is concerned. Among these theories, most use either the set-theoretic approach, which interprets singulars as denoting individuals and plurals as denoting sets (Schwarzschild 1996; Chierchia 1998; Winter 2002; Rullmann and You 2003) or the lattice-theoretic approach, which interprets singulars as denoting atoms and plurals as denoting sums (Link 1983). As far as I know, either of these theories can be used to account for plurality in Medumba, but for concreteness, I assume the set-theoretic approach, which is consistent with the analysis I propose for the semantics of plurals and associative plurals in Medumba. In this analysis, I model atoms as singleton sets and pluralities as non-singleton sets and propose the following characterization: Singular count nouns denote a set of atoms whereas their corresponding plural forms denote the set of all pluralities that can be built out of the atoms.

#### (21) Denotation of plural count nouns in Medumba



To see how this works, consider the model with *D* (the domain) consisting of Numi, Sami and Kwimi (the set of ‘boys’) and Marie (the singleton set of girl).

- (22)
- |   |                               |
|---|-------------------------------|
| $\bullet\{n,s,k,m\}$  | ← Supremum (top element)      |
| $\bullet\{n,s,k\} \bullet\{n,s,m\} \bullet\{n,k,m\} \bullet\{s,k,m\}$                       |                               |
| $\bullet\{n,s\} \bullet\{n,k\} \bullet\{n,m\} \bullet\{s,k\} \bullet\{s,m\} \bullet\{k,m\}$ |                               |
| $\bullet\{n\} \bullet\{s\} \bullet\{k\} \bullet\{m\}$                                       | ← Atoms (At), bottom elements |

In this model, the noun root *-dzum* denotes the set of all singleton and non-singleton sets of boys.



$$(23) [[\text{-dzùm}]] = \{\{n\}, \{s\}, \{k\}, \{n,s\}, \{n,k\}, \{s,k\}, \{n,s,k\}\},$$

The star \*-operator (as used in Link 1983) is modeled using the closure under union in this analysis:

$$(24) \text{ A set of sets } S \text{ is closed under union if and only if for all sets } x \text{ and } y, \text{ if } x \in S \text{ and } y \in S \text{ then } x \cup y \in S.$$

$$(25) \text{PL}(x) = *x - \text{At}$$

The denotation of a plural noun *bá-dzùm* ‘boys’ is as follows:

$$(26) [[\text{bá-dzùm}]] = \text{PL}([\text{-dzùm}]) = *[\text{-dzùm}] - \text{At} = \{\{n,s\}, \{n,k\}, \{s,k\}, \{n,s,k\}\}, \text{ that is the set of all non singleton sets of boys.}$$

This framework assumes a unified analysis of definite singulars and plurals by letting them pick out the greatest or maximal member of the noun denotation. I use the sigma notation  $\sigma$  to mark definiteness:

$$(27) [[\sigma \mathbf{N}]] = \text{the unique set } x \text{ such that (a) } x \in [[\mathbf{N}]] \text{ and}$$

$$(b) \forall y (y \in [[\mathbf{N}]] \rightarrow y \subseteq x).$$

$$(28) [[\sigma]]([\text{bádzùm}]) = \{n,s,k\}$$

$$(29) [[\sigma]]([\text{mádzùm}]) = \text{undefined, since there is more than one boy.}$$

But in a model where there is exactly one boy,  $(\sigma)\text{mádzùm}$  ‘the boy’ would be defined. With regard to the set-theoretic framework adopted in this analysis, I treat expressions of type  $e$  (definite DPs) like proper names, definite singulars, definite plurals and conjunctions of these as sets. In other words, it means that in this model,  $D_e = D^* = \text{Pow}(D) - \{\emptyset\}$ . All types move one level up as well. For instance, functions of type  $\langle e,t \rangle$  will now be characteristic functions of sets of sets and functions of type  $\langle \langle e,t \rangle, t \rangle$  such as generalized quantifiers will be characteristic functions of sets of sets of sets. I assume that both common and proper nouns in Medumba are of type  $\langle e,t \rangle$ . Before getting to the structure, below is the denotation of the number marker (Num) and nouns in Medumba:

$$(30) \text{ a. } [[\text{Num}_{\text{SG}}]] = \lambda f \in D_{\langle e,t \rangle} . \lambda x \in D_e . [f(x) = 1 \wedge |x| = 1]$$

$$\text{ b. } [[\text{Num}_{\text{PL}}]] = \lambda f \in D_{\langle e,t \rangle} . \lambda x \in D_e . [f(x) = 1 \wedge |x| \geq 2]$$

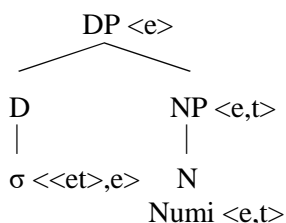
$$(31) [[\text{-dzùm}]] = \lambda x \in D_e . x \text{ is ‘boy’}$$

$$(32) [[\text{ma-dzùm}]] = \lambda x \in D_e . |x| = 1 \wedge x \text{ is boy}$$

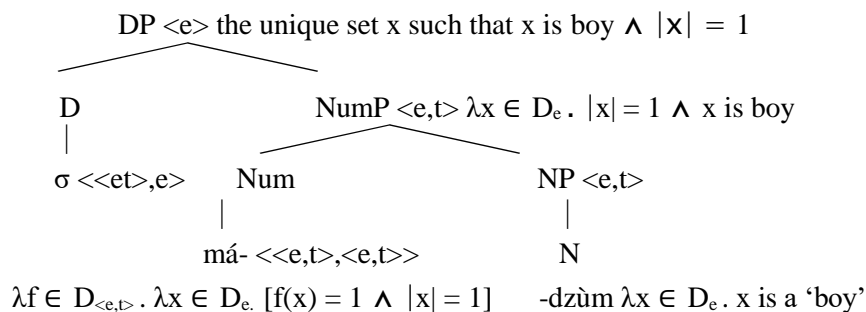
$$(33) [[\text{ba-dzùm}]] = \lambda x \in D_e . |x| \geq 2 \wedge x \text{ is boys}$$

The semantic type I am assuming for proper names is the same for singular common nouns, that is type  $\langle e, t \rangle$ . Likewise, they have the same derivation and proper names differ from singulars in that they don't project for NumP<sub>1</sub>.

(34) a. Proper name

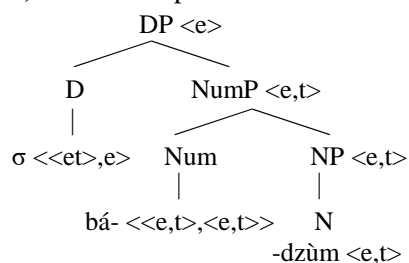


b. Singular common noun

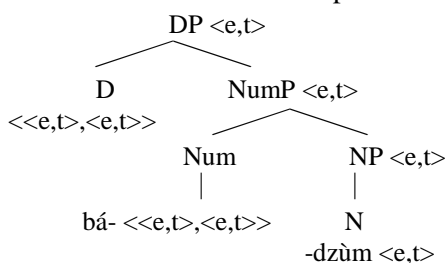


In the above structures, the  $\sigma$  operator is the definite D and is of type  $\langle \langle e, t \rangle, e \rangle$ . Plural nouns have the same structure:

(35) a. Definite plural



b. Indefinite plural



In the above representation, when the plural DP is indefinite, different ways of interpreting are possible depending on the theory one adopts: (i) either D is semantically empty (or the identity function), and bare plurals denote sets and the existential closure takes place at some higher level (Chung and Ladusaw 2004); or (ii) the determiner of bare plurals is an existential generalized quantifier (like the denotation of English "a" in Heim and Kratzer 1998); or (iii) D is a kind of 'choice function determiner which can yield either a definite or an indefinite DP (Reinhart 1997, Winter 1997, Matthewson 1999, Ferch 2013).

## 5.2 Denotation of the associative plural

I propose that in Medumba, the APL *bà* is a function that picks out the sum of the sets form by the union of the set of the focal referent and the set of the associates

$$(36) \text{ APL}(S) = * \{x \in D^* \mid \exists y, z [x = y \cup z \wedge y \in S \wedge z \notin S \wedge z \in \text{Assoc}(y)]\}$$

This formula makes sure that when the APL applies to a given set (S), it takes elements belonging to the set S (hence the focal referent) and element that do not belong to this set (the associates). The function Assoc adds the set denoting the associates to the set denoting the focal referent. For instance each set in the denotation of APL-boys will include some boys and some

non-boys. This is the key feature that makes the denotation of associative plural different from the denotation of regular plural. Consider for instance a model with three elements Numi, Sami, Kwimi where At (the set of atoms) =  $\{\{n\}, \{s\}, \{k\}\}$ . In the same model, suppose  $a$  and  $b$  are the associates of the boys as represented in the diagram below.

$$(37) \quad \begin{aligned} & \bullet\{n,s,k,a,b\} \\ & \bullet\{n,s,k,a\} \bullet\{n,s,k,b\} \bullet\{n,s,a,b\} \bullet\{n,k,a,b\} \bullet\{s,k,a,b\} \\ & \bullet\{n,s,k\} \bullet\{n,s,a\} \bullet\{n,s,b\} \bullet\{n,k,a\} \bullet\{n,k,b\} \bullet\{n,a,b\} \bullet\{s,k,a\} \bullet\{s,k,b\} \bullet\{s,a,b\} \bullet\{k,a,b\} \\ & \bullet\{n,s\} \bullet\{n,k\} \bullet\{n,a\} \bullet\{n,b\} \bullet\{s,k\} \bullet\{s,a\} \bullet\{s,b\} \bullet\{k,a\} \bullet\{k,b\} \bullet\{a,b\} \\ & \bullet\{n\} \bullet\{s\} \bullet\{k\} \bullet\{a\} \bullet\{b\} \end{aligned}$$

The APL  $b\grave{a}$  when it combines with any member of the singleton sets of boys denoting Numi, Sami and Kwimi, will pick out the sets formed by that proper name and at least one of his associates. In the diagram in (37), with regard to the denotation of ‘Numi and his associates’ (coded in red) for instance, the APL will pick out all the sets that contain Numi and at least one of his associates.

$$(38) \quad [[\mathbf{APL}(\mathbf{Numi})]] = \{\{n, a\}, \{n, b\}, \{n, a, b\}\}$$

In the denotation of  $\mathbf{APL}+badz\grave{u}m$  (boys and their associates, coded in blue), the APL searches within the set formed by the union of the set of boys and the set of the associates and picks out all the sets that contain at least two of the boys and at least one of their associates. This guarantees that each set contains some elements denoting the focal referent and some elements denoting the associates.

$$(39) \quad ([[ \mathbf{APL}(badz\grave{u}m) ]]) = \{\{n, s, a\}, \{n, s, b\}, \{n, k, a\}, \{s, k, b\}, \{s, k, a\}, \{s, k, b\}, \{n, s, k, a\}, \{n, s, k, b\}, \{n, s, a, b\}, \{n, k, a, b\}, \{s, k, a, b\}, \{n, s, k, a, b\}\}$$

With regard to the definite denotation of  $[[\sigma]]([[ \mathbf{APL}(badz\grave{u}m) ]])$  (the boys and their associates), the APL first applies to the set formed by the union of the sets denoting boys and the set denoting their associates; then the sigma operator ( $\sigma$ ) picks out the greatest member of the sets formed by the union of these sets:

$$(40) \quad \begin{aligned} [[\sigma]]([[ \mathbf{APL}(badz\grave{u}m) ]]) &= [[\sigma]]([[ \mathbf{APL}(b\acute{a}dz\grave{u}m) ]]) \\ &= [[\sigma_x.\mathbf{APL}(b\acute{a}dz\grave{u}m(x))]] = \{n,s,k,a,b\} \end{aligned}$$

After discussing how the APL functions with plural noun denotation including definite plurals, it is important to turn now on cases where the APL combines with singular indefinite and definite common nouns. Recall that it is not possible to combine the indefinite singular marker  $t\grave{a}?$  and the associative plural  $b\grave{a}$  in Medumba as illustrated by the ungrammaticality of the sentence below:

- (41) Numi tʃàʔdǎ tàʔ (\*bà) ma-dzùm  
 Numi greet INDEF APL SG-boy  
 ‘Numi greeted a boy (\*and his associates)’

The question that arises at this level is what blocks the indefinite singular reading of associative plurals. With regard to syntax, the indefinite singular *tàʔ* merges higher than the APL at D position. As far as the semantics of *tàʔ* is concerned, it can only be applied to a set of atoms by virtue of being singular. Since the APL *bá* creates a plural noun denotation (i.e., a set containing non atomic elements), one can conclude that the ungrammaticality of *tàʔ* plus the APL is due to the fact that *tàʔ* is incompatible with the plural denotation. Note that independently of the APL reading, *tàʔ* cannot combine with a plural-marked noun:

- (42) Numi tʃàʔdǎ tàʔ \*bá-dzùm  
 Numi greet INDEF PL-boy  
 \*Numi greeted a boys

With regard to APL and definite singular nouns, a contrast emerges: If the derivation proceeds following the internal syntax of DP in Medumba, it gives rise to a wrong interpretation.

- (43)  $[[\sigma]]([[APL(má-dzùm)])] = [[\sigma x. APL má-dzùm(x)]]$

The problem with the above example is that the sigma operator applies late after the APL already adds the associates to the singleton sets denoting boy, so when it picks the greatest member of those sets, instead of the atomic reading of the focal referent, it gives the non atomic reading. In order to get the right semantics, the sigma operator needs to apply first to the set denoting boy to single out the unique set denoting boy and then APL can add the associates to this unique set. Note that this derivation assumes that the APL should merge above DP. This hypothesis has already been ruled out as it gives false predictions about the language (as discussed in §4) and gives rise to a mismatch between syntax and semantics.

- (44)  $[[\sigma]]([[APL(má-dzùm)])] = APL [[\sigma x. má-dzùm(x)]]$

Further research is needed to give a unifying account of associative plurals with definite singulars and plurals in Medumba.

### 5.3 Associative plurals and anaphoric dependencies in Medumba

This goal of this section is to test whether in associative plurals, the focal referent and the associates can stand as independent nominals and can be interpreted independently. One of the tests I use for the matter concerns constructions involving split antecedents. Singular pronouns do not permit split antecedents. So in the example in (45), the 3<sup>rd</sup> person singular pronoun can take as antecedent either Numi or his friend but not both. In contrast, plural pronouns permit split antecedent. In the example in (46), the plural pronoun takes as antecedent Numi and his friend.

- (45) Numi<sub>i</sub> tʃúp ʃýn<sub>i</sub> ì mbù á bwò mbù à<sub>j*i*</sub> tʰúmé  
 Numi tell friend 3SG.POSS.C1 COMP 3SG.S good COMP 3SG.S go out  
 ‘Numi<sub>i</sub> told his friend<sub>i</sub> that he<sub>j*i*</sub> should get out’

- (46) Numi<sub>j</sub> tʃúp ʃýn<sub>i</sub> ì mbù á bwò mbù bú<sub>(j+i)</sub> tʰúmó  
 Numi tell friend 3SG.POSS.C1 COMP 3SG.S good COMP 3SG.S go out  
 ‘Numi<sub>j</sub> told his friend<sub>i</sub> that they<sub>(j+i)</sub> should get out’

In the case below where one of the antecedents is plural, the pronoun can take as antecedent Numi and his friends or only his friends.

- (47) Numi<sub>j</sub> tʃúp ʃýn<sub>i</sub> tsó mbù á bwò mbù bù<sub>(j+i)/i</sub> tʰúmó  
 Numi tell friend 3PL.POSS.C1 COMP 3SG.S good COMP 3PL.S go out  
 ‘Numi<sub>j</sub> told his friends<sub>i</sub> that they<sub>(j+i)/i</sub> should get out’

The ability of pronouns to take either or both of the antecedents is due to the fact that in constructions with split antecedents, the nominals are independent. This predicts that if the nominals in associative plurals are also independent, one would expect them to exhibit the same behaviour with regard to pronouns. In associative plural constructions, if the pronoun is singular, it takes as antecedent only the focal referent (in this case Numi) (48). If the pronoun is plural, it takes as antecedent the focal referent and the associates, but never the associates alone (49).

- (48) bà<sub>i</sub> Numi<sub>j</sub> tʃúp mbù á bwò mbù à<sub>j</sub> tʰúmó  
 APL Numi say COMP 3SG.S good COMP 3SG.S go out  
 ‘Numi<sub>j</sub> and his associates<sub>i</sub> said that he<sub>j</sub> should get out’

- (49) bà<sub>i</sub> Numi<sub>j</sub> tʃúp mbù á bwò mbù bù<sub>(j+i)/\*i</sub> tʰúmó  
 APL Numi say COMP 3SG.S good COMP 3PL.S go out  
 ‘Numi<sub>j</sub> and his associates<sub>i</sub> said that they<sub>(j+i)</sub> should get out’

What happens between constructions involving split antecedents and those involving associative plurals is that in constructions with split antecedents, the nominals are independent. Therefore a pronoun can refer to either of the antecedents or both. With associative plurals, the associates depend on the focal referent for their reference. Therefore, a pronoun can take as antecedent either the focal referent or to the focal referent together with the associates. Thus, the APL *bà* can be viewed as an operator that adds the associates to the focal referent.

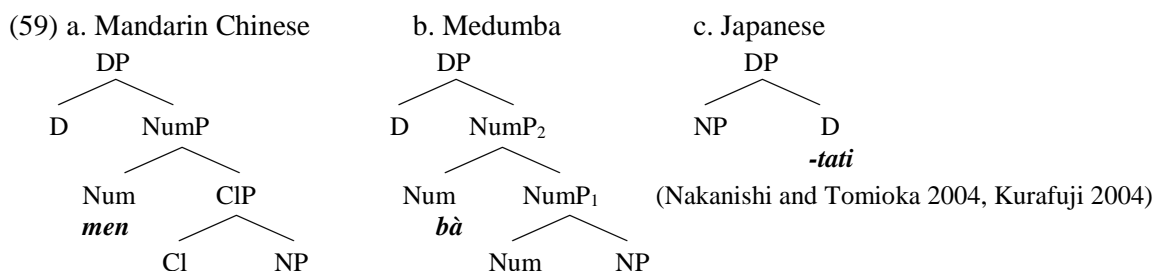
## 6 Cross-linguistic distribution of associative plurals

Japanese (Nakanishi and Tomioka 2004, Kurafuji 2004) and Mandarin Chinese (Li 1999) also exhibit associative plurals marked respectively by *tati/tachi* and *ta-men*. In Japanese, the *tati/tachi* suffix is used to convey regular plural as well as the associative plural readings (50). In Mandarin Chinese, the form *ta-men* is used. The morpheme *ta* represents the 3<sup>rd</sup> person plural ‘them’ and is mandatory in associative plural constructions whereas *men* is a plural marker (51). With regard to the distribution of APL, the three languages pattern the same in that they convey the APL reading with proper names, plural and singular nominals.

**Table 4** Cross-linguistic distribution of associative plurals

|                   | <b>Medumba</b>   | <b>Japanese</b>   | <b>Mandarin Chinese</b>   |
|-------------------|--|---|---|
| <b>APL – PN</b>   | (50) ( <b>bà</b> ) Numi<br>Numi (and his associates)                               | (51) Taro- <b>tachi</b><br>Taro and his associates  | (52) Xiao-( <b>ta</b> )-men<br>Xiao (and his associates)                                      |
| <b>APL – PL-N</b> | (53) ( <b>bà</b> ) bá-dzùm<br>APL PL-boy<br>‘the/some boys (and their associates)’ | (54) gakusei- <b>tachi</b><br>student- <b>tachi</b><br>= (i) the students<br>= (ii) the students and their associates | (55) haizi-( <b>ta</b> )-men<br>child- <b>3PL-PL</b><br>‘the children (and their associates)’ |
| <b>APL – SG-N</b> | (56) ( <b>bà</b> ) má-dzùm<br>APL PL-boy<br>‘the boy (and his associates)’         | (57) gakusei- <b>tachi</b><br>student-tachi<br>?’the student and his associates’                                      | (58) haizi-( <b>ta</b> )-men<br>child- <b>3PL-PL</b><br>‘the child (and his associates)’      |

With regard to syntax, the structure proposed by Li (1999) for Mandarin Chinese *men* (59a) is similar to the one I propose for Medumba APL (59b) in that both *men* and Medumba *bà* occupy the head of NumP. In Japanese, *-tati* occupies D (59c):



As for the semantics, the analysis propose for Japanese *tati* is a bit different from the one I propose for Medumba *bà* not in terms of meaning but in how they implement it. They propose two lexical entries that have exactly the same meaning for *tati*, namely type  $\langle e, \langle e, t \rangle \rangle$  when it combines with proper names (60) and type  $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$  when it combines with common nouns (61) as shown in the denotations below:

$$(60) [[\mathbf{tati}]] \in D_{\langle e, \langle e, t \rangle \rangle} = \lambda x_e. \lambda Y_e. x \leq Y \ \& \ |Y| \geq 2 \ \& \ x \text{ represents } Y$$

$$(61) [[\mathbf{tati}]] \in D_{\langle \langle e, t \rangle, \langle e, t \rangle \rangle} = \lambda P_{\langle e, t \rangle}. \lambda Y_e. |Y| \geq 2 \ \& \ P \text{ represents } Y$$

The table below summarizes the denotation of nouns and APL in Medumba and Japanese.

**Table 5** Nouns and APL denotations in Medumba and Japanese

|                 | <b>Medumba</b>          | <b>Japanese</b>            |
|-----------------|-------------------------|----------------------------|
| <b>PN</b>       | e                       | e                          |
| <b>CN</b>       |                         | <e,t>                      |
| <b>APL – PN</b> | <i>bà</i> <<e,t>,<e,t>> | <i>tachi</i> <e,<e,t>>     |
| <b>APL – CN</b> |                         | <i>tachi</i> <<e,t>,<e,t>> |

## 7 Conclusion

This paper was devoted to number stacking and the semantics of associative plurals in Medumba. I proposed that the syntax of DP in Medumba exhibits number stacking: the first one NumP<sub>1</sub> serves as a regular number in the language and is divided into singular and plural whereas the second, NumP<sub>2</sub> is restricted only to the associative plural reading. As far as the semantic analysis is concerned, the set-based approach provides a unified analysis of the denotation of plurals and associative plurals in Medumba. I argued that the regular plural denotes non-singleton sets whereas the associative *bà* plural is a function that picks out the set referred to by the focal referent plus the set of the associates and the sets formed by the union of these sets minus the atoms. As far as the cross-linguistic distribution of associative plurals is concerned, the structure I propose for Medumba is consistent with the one proposed by Li for Mandarin Chinese. Japanese differs from Medumba in that *tachi* occupies the D position whereas in Medumba it occupies NumP below DP. The semantics of the Medumba *bà* and the Japanese *tachi* differs depending on whether nouns are of type <e,t> (the Medumba case) or whether there is split between proper names being of type e and common nouns of type <e,t> (the Japanese case).

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