Count/mass distinction in Kuikuro: on individuation and counting

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Abstract

This paper analyses the processes of individuation and counting in Kuikuro (Southern Carib, Brazil). Kuikuro is a number-neutral language characterized by the absence of numeral classifiers. The central aspect we discuss in this paper is the fact that individuation is a context-dependent operation (cf. Rothstein (2010)) that may be optionally manifested by the standard container *ingü*.

Resumo

Neste artigo analisamos o processo de atomização e contagem em Kuikuro (Carib, Brasil). Kuikuro é uma língua de número-neutro caracterizada pela ausência de classificadores numerais. Hipotetizamos neste artigo que o processo de atomização em Kuikuro é realizado através de uma função dependente do contexto (cf. Rothstein (2010)) a qual é opcionalmente manifestada através do container estandardizado *ingü*.

Keywords: Kuikuro; count/mass distinction; individuation; numerals; counting.

 Palavras-chave: Kuikuro; distinção contável-massivo; individuação; numerais; contagem.

1.   Introduction

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[1]   The authors are listed in alphabetic order.

[2]   There is an extensive literature on the count-mass distinction in Brazilian Portuguese. Consult

Linguists and philosophers have extensively discussed how languages encode the distinction between so-called 'count nouns' (e.g. dog) and so-called 'mass nouns' (e.g. blood) (see Quine 1960, Burge 1972, 1975, Pelletier 1975, 2009, 2012, Bunt 1979, 1985, Link 1983, Gillon 1992, Krifka 1995, Chierchia 1998a, 1998b, 2010, Nicolas 2002, Borer 2005, Schwarzschild 2006, Rothstein 2010, Bale and Barner 2009, among many others).

Across many languages, these classes of nouns have distinct morphological and syntactic properties. The exact properties that distinguish 'mass' from 'count' nouns can vary from language to language. Chierchia (1998a, 1998b, 2010) has established three different categories of languages: number-marking languages, classifier languages and number-neutral languages.

In the so-called number-marking languages, only count nouns can be pluralized:

1a   This dog/girl is happy

1b   These dogs/girls are happy

2a   That blood is RH Positive

2b   ?? Those bloods are RH Positive   (Chierchia 2010; 109 – examples (19a) and (19b))

3a   That gold weighs two ounces

3b   ?? Those golds weigh two ounces (Chierchia 2010; 109 - examples (19c) and (19d))

In the examples above, *dog* and *girl*, but not *blood* and *gold* can be pluralized because the former but not the latter have clearly individuated entities in their extensions. In addition, the determiner system is sensitive to the mass/count distinction in English:

4.   the/some boy   4'. the/some boys   4''. the/some water

5.   a/every boy   5'. * a/every boys   5''. * a/every water

6.   *most/all boy   6'. most/ all boys   6''. most/ all water

(Chierchia 2010 - examples (21a), (21b) and (21c))

The determiners *the* and *some* can combine with any noun, either count (4 and 4') or mass (4''). Determiners such as *a* and *every* are restricted to singular count nouns (5). Finally, determiners such as *most* and *all* are restricted to plural and mass nouns (6' and 6'', respectively).

Not only English but other number-marking languages, such as the Romance languages[2], use these two morphosyntactic criteria - pluralization of count nouns and distribution of quantifiers – to distinguish these two classes of nouns. Finally, a measure phrase is required for a mass noun to be combined with a numeral ('three quarts of blood'; * 'three blood(s)'). Without such a measure phrase, the sentence is either ungrammatical, or else reinterpreted so that the mass noun shifts its interpretation ('we drank three beers', meaning 'three bottles of beer'; cf. Gleason 1965, Pelletier 1975, Frisson and Frazier 2005, Wiese and Maling 2005).

The second type of language described in the literature on the semantics of nouns uses classifier systems. Classifier languages are characterized by (i) generalized bare arguments, that is, nouns that are not associated with any functional material, occurring without articles, number inflection, case, etc.; (ii) the absence of pluralization and (iii) the requirement of a classifier. A classifier is understood here as "a word that denotes something like a measure, a container, or shape based words that express something like 'unit'" (Chierchia 2010; 107):

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[2]   There is an extensive literature on the count-mass distinction in Brazilian Portuguese. Consult Paraguassu-Martins and Müller (2007) and references therein.

Mandarin Chinese

7a	San	*(ge)	nanhai		7b	Yi	*(ben)	shu
	three	CL	boy			one	CL	book
	'Three boys'					'One book'		

(Chierchia 2010; 107 – examples 15a and 15b)

Examples 7a and 7b show that nouns in Chinese require a classifier, including nouns that have well-individuated atoms in their extensions, such as *nanhai* 'boy' and *shu* 'book'. Note, however, that the distribution of classifiers is not unrestricted in this language. Cheng and Sybesma (1999) argue in favor of count-classifiers and mass-classifiers (henceforth massifiers) in Chinese. For instance, the classifier *ge* does not combine with mass nouns or, if it does, it forces a count interpretation[3]:

Mandarin Chinese

8	?? San	ge	xue
	three	CL	blood
	'Three portions of blood'		

(Chierchia 2010; 107 – example 14)

Cheng and Sybesma (1999) show that some modifiers and adjectives can occur with one class of classifiers but not with the other. For instance, a modifier marker *de* can intervene between [massifier+N], but not between [count-classifier+N]:

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3   There is a debate about whether some classifiers are associated only to count nouns and others only to mass nouns in Chinese. See Li (2010).

Mandarin Chinese

9a   San   bang   (de)   rou

three CL.pound   DE   meat

'Three pounds of meat'

(Cheng and Sybesma 1999; 515 – example 12a)

9b   Ba   tou   (*de) niu

eight CL.head   DE   cow

'eight cows'

(Cheng and Sybesma 1999; 516 – example 13a)

Another aspect of the distribution of classifiers in Chinese is the fact that some adjectives modify massifiers but not count-classifiers:

Mandarin Chinese

10a yi   da   zhang   zhi   10b *yi da   zhi gou

one big   CL.sheet   paper   one big CL   dog

'One large sheet of paper'

(Cheng and Sybesma 1999; 516 – examples 14a and 15a)

This set of examples show that even though pluralization and distribution of determiners are not criteria for the distinction between count and mass nouns in Chinese, other criteria can be used to establish this distinction.

The third type of language described in the literature, the number-neutral languages, share some properties with classifier languages. To start with, these languages, like classifier languages, are characterized by generalized bare arguments:

Dëne Suliné

11a   k'ásba   nághilnígh   11b li   dëneyuaze theál

      chicken   PERF-1SG-buy O   dog   boy-DIM   PERF-bit/chew O

      'I bought a chicken'   'The dog bit the little boy'

(Wilhelm 2008; 45 - examples 4a (11a) and 4e (11b))

In these examples, the nouns in argument position (subject or object) are bare. That is, *k'ásba* 'chicken' (in 11a) *li* 'dog' and *dëneyuaze* 'boy' (in 11b) do not bear definiteness, case nor number inflection. The second characteristic that number-neutral languages share with classifier languages is the absence of plural morphology:

Dëne Suliné

12a   Larry   lághe   ejëre   nághélnígh

      Larry   one   bovine   PERF-buy O

      "Larry bought one cow'

12b   Larry   ejëre   nádághélnígh

      Larry   bovine   DIST-PERF-buy O

      'Larry bought several cows/ cattle'

(Wilhelm 2008; 45 - examples 5a and 5b)

In the examples above, *ejëre* has the same morphological form for singular ('cow' (12a)) and plural ('cows' (12b)), where, crucially, no morphology is added. What distinguishes count and mass nouns in these languages is the fact that nouns count nouns can directly combine with numerals while mass nouns cannot. That is the first property that distinguishes classifier languages from number-neutral languages. Differently from classifier languages, number-neutral languages do not require a classifier system. But, as in number-marking languages, measure phrases are required to mediate the relation between numerals and mass nouns in Dëne Suliné (13c):

Dëne Suliné

13a Solághe   dzol

     five   ball

     'five balls'

(Wilhelm 2008; 46 - example (8c))

13b * Solághe   ber   13c Solághe   nedádhi   bër

      five   meat   five   pound   meat

                                                'Five pounds of meat'

(Wilhelm 2008; 47 - example (9b))   (Wilhelm 2008; 47 - example (10a))

Scholars challenged this typology based on the documentation of languages that on the surface seem to lack a count/mass distinction. Some examples include Algonquian languages such as Innu-aimun. Gillon (2010) argues that in spite of the apparent absence of a count/mass distinction in Innu-aimun, the distribution of the plural morpheme in constructions with quantifiers provides evidence for grammatical differences between count

and mass nouns. In Innu-aimun (Gillon 2010; 22), all nouns can occur with any class of quantifier, but only count nouns and some mass nouns can be pluralized in constructions with the quantifier *mîtshet* 'many/much':

Innu-aimum

14a   Mîtshet   utenâu   14b   mîtshet   utenâu-a

lots/many   town   lots/many   town- INAN.PL

'Many towns'   'Many towns'

15a   pimî   4b   pimî-a   16a   mîtshet pimî 16b   * mîtshet   pimî-a

oil   oil-INAN.PL   lots/many oil   lots/many   oil-INAN.PL

'Oil'   'Oil(s)'   'Lots of oil'   (intended: lots of bottles

of oil)

(Gillon 2010; 12/21/22; examples: 1c/d; 30b, 31d, 32c, 33c)

In Ojibwe, scholars (Rhodes 1990:153 *apud* Mathieu 2012) suggested that there is no grammatical distinction between count and mass nouns because any noun can be pluralized in this language, even mass nouns, as in Halkomelem Salish (Mithun 1988) and St'at'imcets (Davis and Matthewson 1999; 60-61). Contrary to this view, Mathieu shows that plural morphology in this language can be used as a measure word, as illustrated below:

Objibwe

17a   n-gii-waabam-aa-g   mikom-iig   17b   n-gii-waaband-aa-nan manoomin-an

1SG-PAST-see-3-PL.AN ice-PL.AN   1SG-PAST-see-3-PL.IN rice-PL.IN

'I saw pieces of ice'   'I saw portions of rice'

(Mathieu to appear; 2; examples 4a and 4b)

In Yudja (Tupi, Brazil), a number-neutral language, any noun can be interpreted as count. Two facts from the language support this hypothesis: first, all nouns can be directly combined with numerals, even when coercion (universal packager) is not possible (cf. Lima 2010, 2012, 2013 for details):

Yudja

Ba'ï 'paca'

18a   Txabïu ba'ï   wãnã

        three   paca   ran

        'Three pacas ran'

Ali 'child'

18b   Txabïu ali   wãnã

        three   child   ran

        'Three children ran'

Pïkaha 'chair'

18c   Txabïu Maria   pïkaha   ĩwã

        three   Maria   chair   buy.PL

        'Maria bought three chairs'

Yukïdï 'salt'

18d   Maria   txabïu   yukïdï   apa

        Maria   three   salt   drop/fall

'Maria dropped three (containers of) salt'

lit.: 'Maria dropped three salt'

Apeta 'blood'

18e   Txabïu   uda   apeta wï

three   someone   blood bring

'Someone brought three (containers of) blood'

lit.: 'Someone brought three blood'

Y'a 'water'

18f   Maria yauda y'a   dju wï

Maria two   water bring

'Maria brought two (containers of) water'

lit: 'Maria brought two water'

Second, Yudja has a pair of 'count' quantifiers (*itxïbï* 'many'/ *kïnana hinaku* 'few') that are compatible with all nouns:

iidja 'woman' (human)

19a   itxïbï   iidja   19b   kïnana hinaku   iidja

many   iidja   few   woman

'Many women'   'Few women'

y'a 'water' (substance)

19a   itxïbï   y'a   19b   kïnana hinaku   y'a

many	water	few	water

'(There are) many containers of water'   '(There are) few containers of water'

A key fact of this paper is that the Kuikuro language do not obviously fit in the general picture described by Chierchia (1998a, 1998b, 2010), similarly to Blackfoot (Wiltschko 2010), Dene Suliné (Wilhelm 2008), Inuu-aimun (Gillon 2010), Ojibwe (Mathieu 2012), St'at'imcets (Davis and Matthewson 1999) and Yudja (Lima 2010, 2012, 2013, in prep.). Kuikuro (Southern Carib, Brazil) is characterized by its bare arguments, optional plural morphology and the absence of numeral classifiers (Franchetto, Santos and Mehinaku 2007). The central aspect we discuss in this paper is the fact that individuation is a context-dependent operation (cf. Rothstein (2010)) that may be optionally manifested by the standardized container *ingü*. This paper is structured as follows. In Section 2 we present some general properties of the Kuikuro language. In Section 3 we present a description of the constructions with numerals. In Section 4 we present an analysis for individuation in Kuikuro based on Rothstein's (2010) contextual parameter analysis and Lima's (2010, 2012) analysis for Yudja.

2.   Kuikuro: general properties

Kuikuro is a dialect of the Upper Xingu Carib Language (LKAX), the Xinguan Southern Branch of the Carib family (Meira and Franchetto 2005) and it is spoken by 600 Amerindians in Southern Amazonia, living in five villages in the Southeastern part of the Xingu Indigenous Land, north of the State of Mato Grosso.

LKAX is an agglutinative, head final and ergative language. The External Argument (Cause/Source/Agent of a transitive verb) is marked by *heke*, a locative postposition. Internal

Argument (Pacient/Experiencer of a transitive verb and Actor/Experiencer of an intransitive verb) is not marked (Absolutive). The Absolutive Case is mandatory and the Internal Argument constitutes with a phonological unit. All intransitive verbs are inaccusative.

20a   kangamuke agu-ki-jü   is-ügünu   heke

    child   thin-VBLZ-PNCT   3-sick. PNCT   ERG

    'his sickness made (the) child thin'

20b   kangamuke   agu-ti-lü

    child   thin- VBLZ-PNCT

    '(the/a) child/children got thin'

20c   kangamuke   atsaku-lü

    child   run-PNCT

    '(the/a) child/children run(s)/ran'

Bare arguments Kuikuro is characterized by generalized bare arguments. That is, nouns are unmarked for number and for definiteness:

21   kanga enge-tagü   kangamuke   heke

    fish   eat-CONT   child   ERG

    '(The/a/some) child/children is/are eating fish/es'

Plurals As in other number neutral languages, the plural morpheme *–ko* is optional as any noun can be interpreted as singular or plural. Three properties characterize the distribution of

this morpheme. First, the morpheme *–ko* can only occur suffixed to [+animate] nouns; therefore, the plural morpheme is not a fundamental feature in order to distinguish count from mass nouns, as there are some count nouns that cannot be pluralized (such as *tehu* 'stone'):

22a   kanga-ko

       fish-PL   'fishes'

22b   kuge-ko

       person- PL   'people'

22c   kangamuke-ko

       child- PL   'children'

22d   * tehu-ko

       stone- PL

22e   * ehu-ko

       canoe- PL

Second, as in classifier languages (cf. Nakanishi and Tomioka 2004), in Kuikuro, the plural morpheme *–ko* may be suffixed to individual-denoting expressions:

Japanese

23   Taro-tati-wa   moo   kaetta

Taro-tati-TOP   already   went home

'The group of people represented by Taro went home already'

(Nakanishi e Tomioka 2004; 124)

Kuikuro

24a   Jumu-ko

'Extended family of Jumu/the people of Jumu'

24b   Brazil-ko

'The Brazilian football team'

24c   Tabata-ko

'Extended Family of Tabata/ the people of Tabata'

Third, in Kuikuro pluralized nouns cannot co-occur with numerals:

25   *tilako kanga-ko

three   fish-ko

This property is also observed in classifier languages, such as Chinese. In Chinese the morpheme –*men* cannot co-occur with numerals (cf. Cheng and Sybesma 1999):

Chinese

26   * san-ge   haizi-men

      three-CL   child-men

      Cheng and Sybesma (1999; 537)

Fourth, the suffixation of the morpheme –*ko* to unpossessed nouns seems to be a recent process in the Kuikuro language. In interviews, elderly speakers, commenting the "new" language spoken by younger people, argue that -*ko* used to occur only suffixed to proper nouns (indicating an associative plural), possessed nouns and verbs in order to indicate plurality of possessors (27a-27b) and internal arguments (28a-28b, 29a-29b), respectively, when they are coded by the second and third person prefixes. Besides, this restricted use of –*ko* is documented in spontaneous speech and written texts produced by elderly speakers (above 40 years old)[4]:

Possesives

27a   i-tahaku-gu

       2-bow- REL

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[4] -*ko* is not agreement, as shown by the following examples:

i   kangamuke(-ko)   ünkgü-lü hagu-te nhatüi

       child sleep- PNCT-PL fishing.camp-LOC five

       'child/children slept five (nights) at the fishing camp'

ii   * kangamuke(-ko) ünkgü-lü-ko hagu-te nhatüi

       child sleep- PNCT-PL fishing.camp- LOC five

       'child/children slept five (nights) at the fishing camp'

'his bow(s)'

27b   i-tahaku-gu-ko

2-bow-REL-PL

'their bow(s)'

Verbs

28a   nhatüi is-ünkgü-lü   hagu-te

five   3-sleep-PNCT fishing.camp-LOC

'He slept five (nights) at the fishing camp'

28b   nhatüi is-ünkgü-lü-ko   hagu-te

five   3-sleep-PNCT-PL   fishing.camp-LOC

'They slept five (nights) at the fishing camp'

29a   e-ingi-lü iheke titá

2-see-PNCT 3-ERG there

'He saw you (sing) over there'

29b   e-ingi-lü-ko i-heke titá

2-see-PNCT-PL 3-ERG there

'He saw you (pl) over there'

Another morpheme that refers to quantities is *tuhugu*, which can be combined with [-animate] and mass nouns. As *–ko*, *tuhugu* cannot be combined with nouns in constructions with numerals:

30a   tilako   nhukau

          three   pequi oil

          'Three (portions of) pequi oil'

30b   *tilako   nhukau   tuhugu

          three   pequi.oil   quantity

          'Three quantities of pequi oil'

Note that *tuhugu* can co-occur with *–ko*, which may suggest that they do not have the same meaning in Kuikuro:

31   Kanga-ko   tuhugu

      fish-PL   quantity

      'Quantities of (alive) fishes'

Elderly speakers suggest that *tuhugu* could be combine with all nouns (count or mass) while *–ko*, as mentioned before, historically, was only suffixed to verbs. Since *tuhugu* can co-occur with *–ko* and since it can be suffixed to any noun, we may hypothesize that its meaning is similar to that of the expression *quantity of* in English (cf. Chierchia 2010), which can combine with count and mass nouns. This hypothesis, however, will be explored in future developments of this work (Franchetto, Santos and Lima prep.).

2.   Count/mass distinction in Kuikuro: constructions with numerals

As in other number neutral languages such as Dene Suliné (Wilhelm 2008) and Yudja (Lima 2010, 2012, in prep) in Kuikuro count nouns can be directly combined with numerals without intervening classifiers or measure phrases:

32	Mutua	heke	leha	tahitse	ingi-pügü	tilako
	Mutua	ERG	CMPL	macaw	see-PERF	three

'Mutuá saw three macaws'

In constructions with mass nouns, container or measure constructions are optional as long as a salient unit of measurement is salient in the context (33b):

33a	tilako	nhukau	tingü	ata
	three	pequi.oil	bottle	in

'Three bottles of pequi oil'

33b	tilako	nhukau
	three	pequi.oil

lit: 'three bottles of pequi oil'

However, in production tasks, Kuikuro speakers prefer to include a container word in constructions with numerals and mass nouns. Thus, container nouns may be covert in the constructions with numerals (as in 33b), but speakers prefer if they are overt (as in 33a). Evidence for this claim comes from an elicitation session with one Kuikuro consultant. The

consultant was asked to create a sentence that included a noun that denotes a substance and a numeral. All the sentences produced included *ingü* 'recipient', which is a standard container for liquids and non-liquid substances:

34a tilako u-ngipi nhukau **ingü**

three 1-have pequi.oil recipient

'I have three bottles of pequi oil'

34b aetsingo **ingü**-pe nhukau-pe tu-nümingo leha u-heke

one recipient-EX pequi.oil-EX give-FUT CMPL 1-ERG

'I will give you one bottle of pequi oil'

34c ama heke nhatüi nhukau **ingün**-nde-pügü

mãe ERG five pequi.oil recipient-VBLZ-PERF

'My mother gave (to someone) five bottles of pequi oil'

34d aütü heke tilako agahü **ingü** tu-nügü apa-inha

Aweti ERG three salt recipient give-PNCT father-DAT

'Aweti gave three packages of salt to my father'

In the examples above, *ingü* 'recipient' stands for different container/measure units, such as bottles (34a-34c) and packages (34d), in different contexts. As mentioned in the introduction, cross-linguistically, either a classifier or a container/measure phrase is required in constructions with numerals and mass nouns. In Kuikuro the standard container *ingü* can refer to different types of packaging in different contexts. Crucially, *ingü* seems to be overt

manifestation of an individuation/atomization function, which is context-dependent as it can be interpreted as different individuation units in different scenarios, as illustrated in (34a) and (34d).

In this paper following previous work in other number-neutral languages and recent hypothesis on individuation and counting (Kratzer 2008, Rothstein 2010, Lima 2010, 2012, in prep.) we will claim that the basic denotation of nouns in Kuikuro is kinds (cf. Krifka 1995, Chierchia 1998) and properties of individuals are derived by a context-dependent semantic operation. Following much work in Distributed Morphology and previous analysis for word formation in Kuikuro (cf. Franchetto 2006, Santos 2007, 2008, Franchetto and Santos 2010), we argue that a root is categorized as a Noun by a functional head of category *n* in order to derive count interpretations via a context-dependent operation. Before motivating the context-dependent atomic function needed for counting in Kuikuro, we will motivate why the basic denotation of nouns is kinds in this analysis.

3.1 Motivating the analysis of bare nouns

Let us begin with the assumption that the basic denotation of a bare noun is a kind. A first piece of evidence in favor of this assumption is typological. It has been observed that in languages that license the use of bare nouns as arguments, bare nouns can be used to refer to kinds (Krifka 1995; 399; see also Chierchia 1998, Muller 2002, Pires de Oliveira and Rothstein 2011, among many others). In addition, in languages with generalized bare arguments and classifiers, the use of classifier is not required to refer to kinds (35a) but only to refer to objects and subkinds (35b-35c):

Kind

35a xiong jue   zhong le

    bear   vanish kind   ASP

    'The bear is extinct'

Subspecies

35b san   zhi   xiong

    three CL   bear

    'Three bears' (objects)

Specimens

35c san   zhong xiong

    three CL   bear

    'Three bears' (species)

    (Krifka 1995; 398-399 – examples 1a, 1d, 1e)

These two facts are expected if reference to kind is primitive and reference to objects and subkinds is derived. A second piece of evidence is conceptual in nature. One may argue that reference to kind is primitive for ontological reasons. According to Krifka (1995) "kinds seems to be ontologically prior to specimens; if we want to call some real object a bear we have to relate this object to the kind *Ursus*, whereas it is not necessary to have some real specimens in mind in order to talk about the kind *Ursus*" (Krifka 1995; 399). From this point of view, reference to kind is given for free, and additional semantic operations are required to get a noun to refer to objects and subkinds (cf. Krifka 1995, Kratzer 2008).

In the next section, we will go back to the issue of the context sensitivity of atomicity: why is it the case that units of counting are context sensitive with some NPs in Kuikuro, but not with others?

3.2   On a contextual parameter for counting in Kuikuro

The literature on countability relies on the assumption that counting is counting atoms. A first and central question to ask is how we define atoms. When I say 'There are three cats on the bed' the things that are counted are cat-atoms. Nouns like *cat* have natural atoms in their denotation. There is a family of easily identifiable properties that individual cats always have, in every context. If alive, they have a head, a body, four legs, a tail, etc. Because we know these properties, what counts as a cat and what counts as a body-part of a cat is stable across contexts. Other count nouns like *wall* have a less straightforward denotation.

Take as an example a medieval castle (based on Rothstein 2010; 374). There is a big building in the middle, which is surrounded by a thick wall in form of a square. Now, we might refer to this wall as 'the wall of the castle', in which case we count it as a wall-atom. Or we might refer to parts of this wall as walls themselves, as when we talk about the northern wall of the castle. Of course, we cannot mix these different ways of counting walls. That is, the 'northern wall' and the 'wall of the castle' cannot be counted as two walls in the same context. For instance, if someone asks the (funny) question 'How many walls are there in the castle?' we cannot answer 'there are two walls, the northern wall and the wall of the castle'. This example shows that wall-atoms are not natural atoms as they vary with the context.

Rothstein (2010) discusses the idea that we do not need natural atoms for counting. In the author's proposal, the basic denotation of a noun like *wall* (henceforth the root noun

meaning) is a set of wall-atoms of different kinds, possibly overlapping. For instance, the root noun meaning of *wall* in our example includes both the wall of the castle and the northern wall of the castle. We cannot count the members of the root noun meaning of *wall* because the set includes overlapping atoms of different kinds. As a consequence, before we can count walls, i.e. before we can combine a numeral with the noun *wall*, we need to select a type of wall-atoms to be counted.

How are atoms selected from a root meaning according to Rothstein (2010)? Rothstein introduces the notion of a context as a set of objects. A context k is a subset of the universe of discourse M. A context is a set of objects of all kinds (walls, fences...). Given any root noun meaning N_{root} and a context k, the intersection $N_{root} \cap k$ is a set of N-atoms of the same kind. This entails that for any x,y $\in$ $N_{root} \cap k$, if $x \neq y$ then x and y do not overlap. A function $COUNT_k$ is used to select atoms of a particular kind in a root noun meaning N_{root}.

For Rothstein, count nouns derived with $COUNT_k$ are not sets of individuals, but sets of pairs of an individual and the context k, i.e. the context in which the first member of the pairs count as atoms:

36    $COUNT_k (N_{root})=\{<d, k>: d \in N \cap k\}$ (Rothstein 2010; 364)

$COUNT_k (Wall_{root})=\{<d, k>: d \in Wall_{root} \cap k\}$

Note that k appears as a parameter of the function k, i.e. the value of k is chosen once and for all in a given context of utterance.

Our proposal is to exploit this difference between natural atoms and non-natural atoms to analyze the distinction between count and mass nouns in Kuikuro. We have seen that count nouns can be directly combined with numerals in Kuikuro, while mass nouns require a

container noun that may be interpreted as different instantiations of a kind depending on the context. We have also seen that container nouns may be elided in constructions with numerals. Nevertheless, in a production task the Kuikuro consultant included the standard container *ingü* in all sentences. For some nouns that denote masses such as *imbene* 'pequi mass', the overt manifestation of the atomic function is most likely covert, as illustrated below:

37a **kaküngi**   imbene   tuhugu   titá

quantifier   pequi.mass   QUANT   there

'There are a lot of pequi mass over there'

37b **aetsi** unkgu imbene   ingilü   uheke   titá

one   DIM   pequi.mass   see-PNCT   1-ERG   over there

'I saw only one (basket of) pequi mass over there'

In this analysis, all nouns in Kuikuro denote kinds and need a context-dependent atomic function in order to be count. While the minimal unit that constitutes an atom for a count noun such as *kanga* 'fish' or *itoto* 'man' is stable across contexts, the minimal unit that constitutes an atom for a mass noun like *nhukau* 'pequi oil' varies with the context and therefore a context-dependent atomic counting function is crucial.

When a noun such as *nhukau* 'pequi oil' is counted, we select a particular type of part of pequi oil in the set, which we treat as atoms. For instance we select bottles of pequi oil. Following Lima (2010), we will use a simplified Rothstein's analysis. As in Rothstein's analysis, root noun meanings are sets of atoms of different kinds. An atomic function f_c which is relative to a context c, is used to select one kind of atoms in a root noun meaning in

c. An atomic function F, which is relative to a context c, maps k to a set of k-individuals (i.e. individuals that are instances of the kind). More precisely, given a context c, F maps k to a set of individuals x such that x is a part of the kind k and x is k-atom in a context c:

38      $[[\text{ F oil }]]^c = \lambda x. \ x \leq \text{OIL} \ \& \ \text{AT(OIL)}(c)(x) = 1$

        $\text{AT}(k)(c)(x) = 1$ iff x is k-atom in c.

From this theoretical perspective, a NP can denote a set of individuals only if its root has been combined with a head denoting an atomic function F. The possibility of being count is not given *a priori* for any noun, but is always context dependent. Due to ontological reasons, we might expect that what constitutes as an atom for some nouns will be stable across contexts (such as for human nouns) and for other nouns will be unstable and vary across contexts (cf. Chierchia 2010).

The advantage of this adaptation of Rothstein is its simplicity: the denotation of any noun is a set of individuals, rather than a set of pairs of individuals and Rothsteinian-contexts. Of course, the denotation of nouns is still context sensitive. In the next section, we will provide support to the hypothesis that this atomic function is manifested by a functional head in Kuikuro.

3.3   The atomic function hypothesis and the Distributive morphology framework

We propose that bare nouns in Kuikuro are morphologically complex. Following much work in Distributed Morphology (Marantz 1995, Embick and Noyer 2005) and previous work on word formation in Kuikuro (cf. Franchetto 2006, Santos 2007, 2008 ,Franchetto and Santos 2010) we adopt the working hypothesis that all lexical items are

formed by combining category neutral roots with category-defining functional heads. In the distributive morphology framework, roots will surface in the syntax as lexical categories (nouns, verbs, adjectives, etc) only after being categorized. Therefore, lexical categories will always be syntactically complex. That is, nouns (and other lexical categories) are minimally formed by a root and an abstract morpheme as defined below:

"**Abstract Morphemes:** These are composed exclusively of non-phonetic features, such as [Past] or [pl], or features that make up the determiner node D of the English definite article eventuating as *the*.

Roots: These include items such as √CAT, √OX, or √SIT, which are sequences of complexes of phonological features, along with, in some cases, non-phonological diacritic features. As a working hypothesis, we assume that the Roots do not contain or possess grammatical (syntactic-semantic) features."
(Embick and Noyer 2005; 5)

In other words, the basic assumption of the distributive morphology is that roots never appear bare, without being combined with a functional head. This idea is formalized by Marantz (1995) as the 'categorization assumption':

Categorization assumption: roots cannot appear without being categorized; Roots are categorized by combining with category-defining functional heads (Marantz 1995)

Under this view, roots will be an open class of language-specific 'combinations of sound and meaning' (Embick and Noyer 2005; 5). Cross-linguistically the roots that will

become nouns in the syntax will vary but "the features that make up abstract morphemes are universal" (Embick and Noyer 2005; 5). Roots always will be categorized by functional heads, which are universal and are composed of non-phonetic features. Following this framework, in order to form the bare noun *nhukau* 'pequi oil', one needs to combine the root √*nhukau* with the nominal functional head *n*, as illustrated in (39):

39   [$_{nP}$ n √ *nhukau*]

One can make a cross-linguistic argument in favor of the morphological decomposition of bare nouns; in classifier languages, classifiers are overt manifestations of this functional head *n*. In some languages, such as English (Kratzer 2008) and Yudja (2013, in prep.) these are covert operations: in English, as suggested by Kratzer (2008), covert 'classifiers' (silent functional heads) will be combined with root noun meanings in order to derive nouns and its different interpretations (kinds, subkinds, objects)[5]:

40a [[√zebra]] = 'zebra'

40b [[CL$_{ind}$]] = λx λy [[kind(x) & individual (y) & y ≤ x]

40c [[CL$_{kind}$]] = λx λy [[kind(x) & kind (y) & y ≤ x]

(Kratzer 2008; 272 – examples 2a and 2b)

In this example, Kratzer is illustrating that a noun like *zebra* can denote a set of individual zebras (CL$_{ind}$) as in 'This zebra has not been fed' (40b, Kratzer 2008; 272) or a set of subspecies of the species 'zebra' (CL$_{kind}$) as in 'This zebra is almost extinct' (40c, Kratzer 2008; 272). Following Krifka (1995), for Kratzer nouns are semantically complex: they are

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[5]   For partially converging ideas, see Borer (2005) and Chierchia (2010).

formed by a root noun meaning and a functional head. The proposal presented in this paper make a similar claim; nouns in Kuikuro are complex: nouns are formed by combining a root noun meaning (kind-denoting) with a silent functional head that denotes a context-dependent atomic function.
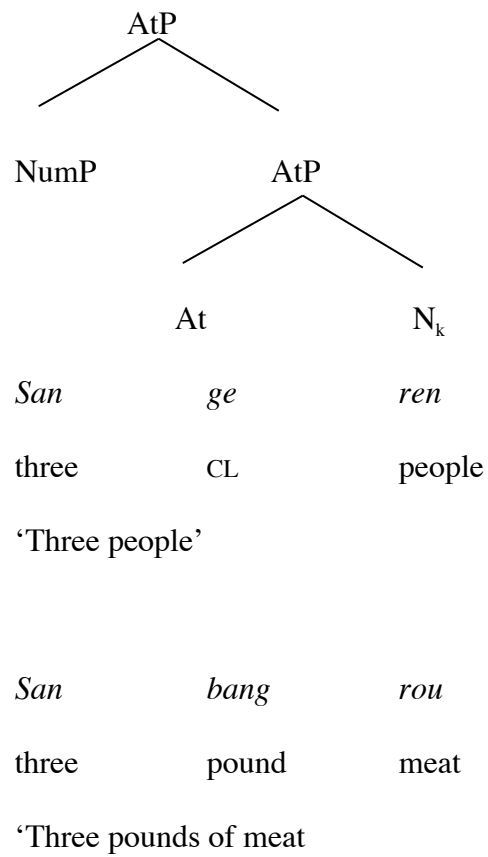
Similarly to Kratzer (2008)'s proposal for English, we proposed that category neutral roots like *nhukau* 'pequi oil' and *tahitse* 'macaw' denote kinds. Evidence from Kuikuro shows that bare nouns can be interpreted as kinds:

Kuikuro
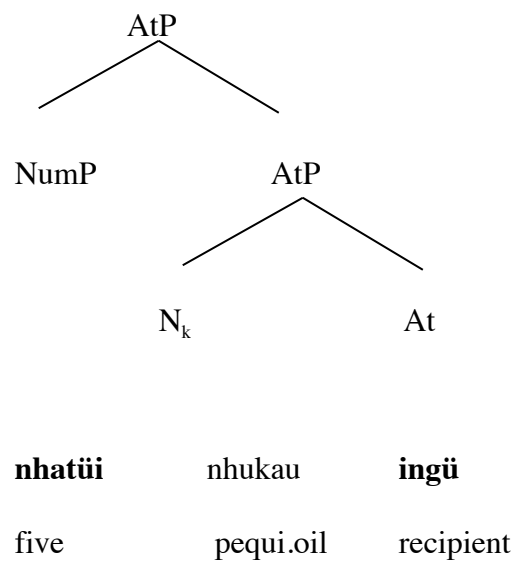
41   tahitse-pe   etü-nügü   leha

      macaw-EX   extinguish-PNCT   CMPL

      'Macaw is extinct'

The functional head *n*, in addition to introducing a categorical feature in the morpho-syntactic representation, may map the kind denoted by the root to a property of objects. In this sense, this analysis is also similar to Chierchia's analysis for classifier languages (Chierchia 1998, Chierchia 2010). In classifier languages nouns are uniformly mapped onto kinds. In this perspective, no automatic type adjustments are possible to turn kinds into properties in number-noun constituents. As a consequence, overt morphemes must intervene between numbers and their nominal arguments and that fact explains the emergence of classifiers in classifier languages. In Chierchia's perspective, classifiers are instantiations of AtP (42). In Kuikuro a standard container, not a classifier, may optionally be the overt manifestation of the atomic function (43):

42   *Chinese (Atomic function mapping)*

```
                    AtP
              ┌──────────┴──────────┐
           NumP                    AtP
                              ┌──────┴──────┐
                             At            N_k

           San            ge           ren
           three          CL           people
           'Three people'
```

```
           San            bang         rou
           three          pound        meat
           'Three pounds of meat
```

43   *Kuikuro (Atomic function mapping)*

```
                    AtP
              ┌──────────┴──────────┐
           NumP                    AtP
                              ┌──────┴──────┐
                             N_k            At

           nhatüi         nhukau       ingü
           five           pequi.oil    recipient
```

tilako	agahü	**ingü**
three	salt	recipient
tilako	kanga	∅
three	fish	

While in classifier languages there are overt classifiers for both count and mass nouns, in Kuikuro this operation is going to be denoted by a silent functional head for count nouns. For mass nouns, it will be optionally overt. To say that the same atomic function is needed for count and mass nouns is not to say that there is absolutely no linguistically relevant difference between mass and count nouns. One difference that was observed relates to the influence of context on the determination of units of counting (atoms) for a given noun. For notionally count nouns like fish, it appears that what counts as an atom is stable across contexts. However, for notionally mass nouns like pequi oil, what counts as an atom varies across contexts of utterance.

Final remarks

In this paper we discussed the processes of individuation and counting in Kuikuro (Southern Carib, Brazil). Kuikuro is a number-neutral language characterized by: 1) generalized bare arguments; 2) optional plural morphology restricted to animate nouns; 3) absence of numeral classifiers. We have argued that nouns in Kuikuro denote kinds. In order to interact with the count system (numerals, for example), a context-dependent individuation operation (cf. Rothstein (2010)) is required. For count nouns, this function is denoted by a silent functional head; for mass nouns, it is may be denoted by a silent functional head or by

the standard container *ingü* (or other container nouns). According to this view, nouns are morphologically complex: they are formed by combining a root noun meaning (kind-denoting) with a silent functional head that denotes the atomic function. What distinguishes count nouns from mass nouns is the fact that the atoms in the extension of count nouns are stable across contexts; while the atoms in the extension of mass nouns are unstable, i.e., vary across contexts.

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Interlinear glosses (Kuikuro)

1	first person
2	second person
3	third person
CMPL	completive (aspect)
DAT	dative
DIM	diminutive
ERG	ergative
EX	nominal suffix with past meaning, detached
FUT	future
LOC	locative
PERF	perfective
PL	plural
PNCT	punctual (aspect)
QUANT	quantity

REL   relational ('possession' suffixes)

VBLZ verbalizer