

# BRAZILIAN BARE PHRASES AND REFERENTIALITY: EVIDENCES FROM AN EXPERIMENT

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## *Sintagmas nominais nus e referencialidade: evidências experimentais*

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### ABSTRACT

This paper experimentally investigates the denotation of the bare singulars (BS) and bare plural noun phrases (BP) in Brazilian Portuguese (BrP). The first section reviews two theories concerning the semantics of the bare nouns in BrP: the count theory according to which bare nouns are countable (plural sums); and the mass theory, which proposes that there is a difference between these bare nouns, since only the BP is a count noun. The second section presents the experiment. It explores the relation between the semantics of BSs and BPs in a mass context. 64 participants were asked to perform quantity judgments (on number, volume, both number and volume or

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none) in a comprehension task. The task relied on visual and hearing information. The results show that BSs allow preferentially comparison by volume scales, though they accept the count reading. The presence of the plural morpheme ([s]) only allows quantity judgments based on number. Thus, the experiment failed to support the count hypothesis that BSs are number neutral (SCHMITT; MUNN, 1999; MUNN; SCHMITT, 2005; MÜLLER, 2002), and corroborates Pires de Oliveira & Rothstein's (2011) mass hypothesis. Relying on Rothstein & Pires de Oliveira (in press), we propose that the morpho-syntactic plural mark imposes counting and that the cardinal reading of the BS is derived from measuring.

Keywords: *bare singular; bare plural; count/mass.*

## RESUMO

Neste trabalho, discutimos, a partir de um experimento, a denotação do chamado singular nu (SNu) e dos sintagmas plurais nus (PLNu) no Português Brasileiro (PB). Na primeira seção, discutimos as teorias propostas para os sintagmas nominais nus no PB: a teoria contável, para a qual nomes nus são contáveis (somas plurais); e a teoria massiva, que propõe uma diferença entre o singular nu e o plural, segundo a qual apenas esse é contável. Na segunda seção, apresentamos o experimento, o qual explora a relação entre o singular nu e o plural nu em contextos massivos. 64 participantes realizaram um teste de julgamento de quantidades baseando-se em cardinalidade, volume, cardinalidade e volume ou nenhum. O teste baseou-se em informações visuais e auditivas. Os resultados mostraram que o singular nu permite preferencialmente comparação por escalas não cardinais enquanto, por outro lado, a presença do morfema de plural ([s]) só permite julgamentos baseados em cardinalidade. Dessa forma, o experimento falhou em confirmar a hipótese de número neutro (SCHMITT; MUNN, 1999; MUNN; SCHMITT, 2005; MÜLLER, 2002), porém corroborou a hipótese de Pires de Oliveira e Rothstein's (2011). Na esteira de Rothstein e Pires de Oliveira (no prelo), propomos que a marca morfossintática do plural é condição suficiente para a contagem, enquanto a interpretação cardinal do singular nu é derivada de uma operação de “measuring”.

Palavras-chave: *singular nu; plural nu; contável-massivo.*

## 1. INTRODUCTION

This paper empirically investigates the denotations of Brazilian Bare Singulars (BS) and Bare Plurals (BP) in comparative contexts. It presents the results of a quantity judgment task, performed by 64 native speakers. The results support Pires de Oliveira & Rothstein's (2011, among others) claim that there is a semantic distinction between the BS and the BP which is related to the mass and count domains: the BS is mass like. Theoretically, we rely on Rothstein & Pires de Oliveira (in press), and claim that counting is different from measuring. The plural morpheme restricts the domain to count individuals, whereas the absence of plural mark is open to different measure functions, including the cardinal one.

In the next section, we review two different approaches to the bare noun phrases in BrP: the count view according to which the BS is a number neutral count noun denoting both atoms and pluralities but unrelated to mass nouns (SCHMITT; MUNN, 1999, 2002; MUNN; SCHMITT, 2005; MÜLLER, 2002A, 2002B; PARAGUASSU; MÜLLER, 2008); and the mass view which treats the BS as a mass noun, and also predicts that it does not have the same interpretation as the BP (PIRES DE OLIVEIRA; ROTHSTEIN, 2011; ROTHSTEIN; PIRES DE OLIVEIRA (in press)).

We explore the predictions of these theories by examining the behavior of native speakers when asked to perform a comprehension task, which verifies intuitive (linguistic) judgments of quantity, i.e. participants were asked to choose the best answer to quantity questions involving BS and BP phrases. The count theory predicts that the BS and the BP are count nouns, so they should show the same behavior: participants should not be sensitive to the BS and the BP: they should reject both in a mass context. The mass view predicts that the BS should allow for volume interpretations, and predicts that speakers behave differently depending on the input (bare singular or bare plural). Both theories predict that in a count context the BP is interpreted as indicating the number of individuals.

The results are presented in the end of the third section. They show that the behavior of the BS in BrP strongly parallels that of mass nouns. BPs are always compared by the number of individuals while the BS allows quantity judgments based preferentially on volume. This behavior is not predicted by the count view. This experiment gives support to the hypothesis that bare singulars are “mass” nouns.

Bale & Barner's (2009) distinguish between two types of mass nouns: those that have atoms in their denotation (as *furniture*) – sometimes called “fake mass nouns” (CHIERCHIA, 2010) – and those that do not have atoms, the substances (*water*). Moreover, according to them, mass nouns

should not be confused with flexible nouns as *stone* and *stones* in English. Flexible nouns are specialized in English: the non-plural form *stone* can only give rise to volume interpretation, whereas the plural form is specialized for counting. Now, we may ask: are there flexible nouns in BrP? How do they behave? The task aimed at investigating these factors in BrP. Thus, it compares “pure” bare singulars – as *bola* (ball) –, which do not exist in English; bare plurals – *bola-S* (balls); the furniture type noun – *mobília* (furniture); and translations of flexible nouns – *pedra* (stone) and *pedras* (stones). Substance bare mass – as in *suco* (juice), and BPs in a count context were control sentences. We discuss these issues in the fourth section. The experiment shows that in BrP “pure” bare singular, flexible nouns and fake mass nouns all accept volume and count readings.

## 2. BARE SINGULARS AND BARE PLURALS IN BrP

BrP is certainly an interesting case study since it is a singular/plural and a mass/count language with both definite and indefinite phrases, as well as all sorts of bare noun phrases. As in English, and differently from other Romance languages, BrP has a productive BP; but, differently from English, BrP also has a productive BS, the existence of which led Schmitt & Munn (1999) to claim that BrP jeopardizes Chierchia’s (1998) semantic parameters. The sentences in (1) and (2) are both acceptable in BrP:

- (1) Professor fala muito.  
Teacher talk-PRG.3SG much  
‘Teachers talk too much’
- (2) Professores falam muito.  
Teacher-PL talk-PRS.3PL much  
‘Teachers talk too much’

Munn & Schmitt (2005), Müller (2002), among others, have argued that BSs are number neutral count nouns, whereas Pires de Oliveira & Rothstein (2011) and Rothstein & Pires de Oliveira (in press) argue that the BS behaves massively.

The count view relies on the fact that BSs and mass nouns do not show the same behavior with respect to reciprocals, reflexives, and distributive predicates, as illustrated by the following examples from Schmitt & Munn (1999):

- (3) \*Ouro pes-a duas grama-s.  
gold weigh-PRS.3SG two gram-PL.  
'Pieces of gold weigh two grams'.
- (4) Criança (nessa idade) pes-a 20 kg.  
child (at.this age) weigh-PRS.3SG 20 kg.  
'Children (at this age) weigh 20 kg.'

According to the authors, distributive predicates distribute over a set of atoms; since mass nouns are not generated by sets of atoms, they are not compatible with this type of predicate; thus, the ungrammaticality of (3). In contrast, the sentence in (4) is grammatical because *criança* (child) is generated from a set of atoms, allowing the predicate *pesa 20kg* to be distributed over the individuals denoted by the BS. Thus, *ouro* (gold) is mass, and *criança* (child) is count. The same contrast shows up with reciprocals:

- (5) \*Ouro realça um ao outro.  
gold enhance-PRS.3SG one to the other.  
'Pieces of gold enhance each other'
- (6) Criança briga uma com a outra.  
child fight-PRS.3SG one with the other.  
'Children fight with one and another.'
- (7) Criança sabe se lavar sozinha.  
child know-PRES.3SGREFLwash-INF alone.  
'Children know to wash themselves alone.'

They conclude that is unlikely that BSs are mass nouns. They are count number neutral nouns, i.e. they denote atoms and their sums. This is sustained by the fact that the BS can be properly recovered by singular or by plural anaphora, as shown below:

- (8) Tem criança na sala. Ela/Elas está/estão assistindo TV.  
 Have3SG child-SG in + the room. She/They is/are watching TV.  
 ‘There are children in the room. They’re watching TV.’

However, Schmitt & Munn (1999) also show that the BS and the BP do not have the same distribution: only the BS is marked when in the subject position of episodic predicates, while BPs are more natural in such a position:

- (9) Mulheres estavam comendo bolo.  
 Women is- PAST.PERF.3PL eat-GER cake  
 ‘Women were eating cakes’
- (10) ?Mulher estava comendo bolo<sup>2</sup>.  
 Woman is- PAST.PERF.3PL eat-GER cake  
 ‘Women were eating cakes’

The authors cannot explain the contrast between them: “Although we do not have an account for this distinction, it is consistent with bare singulars being unspecified for semantic number [...] the subtle differences between the behaviour of bare plurals and bare singulars may, in fact, hinge on this distinction.” (p.13). Thus, they argue that the BP is derived from a number projection, and the BS has no number projection, so they are “unspecified for semantic number.” This suggests that the BS is derived from a count root noun, which denotes atoms and pluralities. From a different perspective, Müller (2002a, 2002b) proposes that the BP denotes set of sums of individuals without the atoms – an exclusive plurality. The BS denotes an inclusive sum, atoms and sums. Both theories claim that the BS is not a mass noun. Thus, BSs are open to be interpreted as singulars and plural but never massively.

Pires de Oliveira & Rothstein (2011) argue that the data from (3) to (7) do not show that the BS is a count noun. The examples are prototypical

<sup>2</sup> For more discussion about the acceptability of this sentence, see Pires de Oliveira & Mariano. (2011).

mass and count nouns. Mass nouns that have natural atoms, the so-called fake mass nouns as *mobília* (furniture), behave as the BS:

- (11) a. *Mobília* (dessa marca) pes-a 20 kilos.  
 furniture (this brand) weigh-PRS.3SG 20 kg  
 'Pieces of furniture (of this brand) fit into each other.'
- b. *Mobília* (dessa marca) encaix-a uma na outra  
 furniture this brand) fit one in another  
 'Pieces of furniture (of this brand) fit into each other'

The authors compare the BS, the bare mass and the BP to show that the BS patterns with the bare mass. For instance, the BS and the bare mass are generic, whereas the BP also has an existential reading in the subject and in object positions of generic predicates, as exemplified below (examples from the original paper):

- (12) a. *Bombeiros* estão a disposição. (generic OR existential readings)  
 fireman-PL be.PRS.3PL at available.  
 'Firemen in general are available.' OR 'Some firemen are available.'
- b. *Bombeiro* está a disposição. (ONLY generic reading)  
 fireman be.PRS.3SG at available.  
 'Firemen in general are available.'
- c. *Petróleo* está a disposição. (ONLY generic reading)  
 oil be.PRS.3SG at available.  
 Oil is available.'
- (13) a. *João* gosta de cachorros. (kind OR subkind readings)  
 João like-PRS.3SG of dog-PL.  
 'João likes dogs in general.' OR 'João likes some sub kinds of dogs.'
- b. *João* gosta de cachorro (kind/\*subkind)  
 João like-PRS.3SG of dog.  
 'João likes dogs in general.'

- c. João gosta de suco. (kind/\*subkind)  
 João like-PRS.3SG of juice.  
 'João likes juice in general.'

They argue that the interpretation of the BS in comparison structures is not the same as that of the BP, and parallels the bare mass. If this is so, then the BS behaves massively. This is supported by the fact that only the BS may have volume readings. Here is an example taken from Pires de Oliveira & Rothstein (2011) – example (53):

- (14) a. Essa lata tem mais minhoca do que aquela.  
 this can have.PRS.3SG more earthworm-SG of.the that that.  
 'This can contains a bigger quantity of earthworm than that one.'
- b. Não, esse tem 10 e aquele tem 12 minhocas.  
 no, this have.PRS.3SG 10 and that have.PRS.3SG 12 earthworm-PL.  
 'No, this can has 10, and the other one has 12 earthworms.'
- c. Mas esse pesa mais.  
 But this weigh-PRS.3SG more  
 'But this one weighs more.'

The BS allows both a cardinal and a volume reading. (14b) is an answer where the number of individuals is invoked; and (14c) answers measuring the volume. The same is true in (15):

- (15) João tem mais livro que a Maria. (cardinal<sup>ok</sup>, volume<sup>ok</sup>)<sup>3</sup>  
 João has.PRS.3SG more book-SG than the Maria  
 '\*John has more book than Maria has'

<sup>3</sup> See Mendes de Souza & Pires de Oliveira (2012) for the semantics of comparatives with BS and BP



The sentence in (15) can be used in a situation where João has a greater number of individual books than Mary, or if he has a greater volume of book(s) than she has (though fewer books). On the other hand, the BP only compares the cardinalities and we cannot use (16) to convey that João has a greater volume of book(s) than Maria has:

- (16) João tem mais livros que a Maria. (cardinal<sup>ok</sup>, volume\*)  
 João has.PRS.3SG more book-PL than the Maria  
 ‘\*John has more books than Maria has’

So, for the authors, BSs and mass nouns generally have the same distribution and interpretation, which contrast with the BP. Based on these facts, Pires de Oliveira & Rothstein (2011) generalize that the BSs are best analyzed as kinds, while proposing that BPs are generated as plural predicates.

The data from (12) to (16) is unexpected according to the count view. The count view argues that BSs are count nouns unspecified for semantic number; they should not give rise to volume readings, and should not contrast with the BP. The mass view understands that the BS is massive, and the BPs is a plural predicate. The theories disagree with respect to the semantics of the BS, and share the view that the BP is a plural predicate. The experiment we present in the next section aims at verifying which view best describes the behavior of native speakers when they are asked to compare massively.

### 3. THE EXPERIMENT<sup>4</sup>

Since the difference between the two accounts can be detected in comparative constructions, we propose a task which asks participants to compare quantities. The task explores the method of quantity judgments developed by Barner & Snedeker (2005): speakers chose the best situation to be the answer for the question: ‘*who has more X?*’, where ‘X’ was replaced by the noun: ‘who has more toothpaste?’, for instance. In our experiment, the aim is to verify whether the BS is a count or a mass predicate, so the quantity question was preceded by a context that favored volume answers, as exemplified in the next section.

<sup>4</sup> The experiment is approved by the UFPR – Ethics Committee, CAAE 31107114.6.0000.0102.

The prediction, according to the count view, is that native speakers should show the same behavior in interpreting the BS and the BP independently of the context: they should rely on the number of individuals, and not the overall mass or volume. On the other hand, if the mass approach is right, participants should treat the BS as mass, and choose the larger mass or volume of stuff, despite the existence of major number of discrete individuals. For both theories, the BP is always compared by the number of individuals. Moreover, both theories have the same predictions concerning substance mass nouns.

The BP in a count context is our control, because we wanted to compare its behavior in the mass context. The fact that the BP shows the same behavior in both contexts shows that the interpretations are not due exclusively to the mass context.

The hypotheses to be verified are:

- (i) BSs allow for mass and count quantity judgments.
- (ii) Flexible nouns and Fake mass nouns behave as BSs.
- (iii) BPs only allow for count quantity judgments.

### 3.1 DESIGN AND METHODS

The participants were shown photos of two persons while they listened to a short “story”, the context of interpretation. Then, they were asked to choose the best answer for the quantity question. Both the context and the question were recorded in audio samples to diminish the influence from the written variety. The visual context could lead to mass or count interpretations. In a count context, we expect that the only possibility is a comparison by number. In a mass context, the aim is to investigate whether there is any difference between the BS and the BP. One character always had two or three larger objects, while the other had three or four small objects of the same kind. The objects that out-numbered were smaller in volume and in surface area, allowing judgments based on number to be distinguished from those based on volume, as proposed by Barner & Snedeker's (2005) methodology. The picture below was introduced while the participants heard the following context:

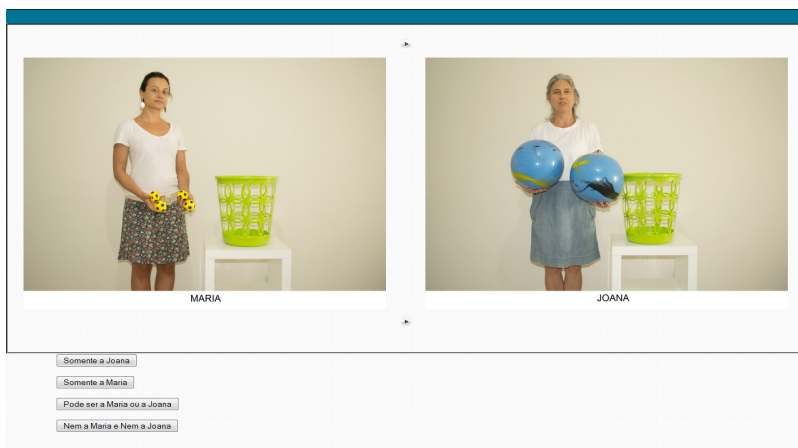


Fig. 1. Stimuli from the experiment

Context: “Joana e Maria querem encher o cesto” (Joana e Maria want to fill the basket); Question: “Quem tem mais bola para encher o cesto?” (Who has more ball to fill the basket?).

The participant could choose between one of the persons, both, and none of them. Participants had four possible answers. In the above example, if the participant made the judgment based only on number, she should choose person (A), named *Maria*. If the participants made the judgment based only on volume, they could choose person (B), *Joana*. However, if the participants thought that the noun could be evaluated by either number or volume, they should choose “both”, as answer (A and B). The answer “both” is important because it captures the double possibilities of comparison. If the participant thought that the comparison did not take place, she should choose “neither A or B”. The participants were instructed before they started.

The task was presented in a computer, using *php* language, and it can be accessed at [www.roberta.neg.cce.ufsc.br](http://www.roberta.neg.cce.ufsc.br)<sup>5</sup>. For statistical analysis, we used the software SPSS (Statistical Package for the Social Sciences) for Windows, Version 17.0 (Chicago: SPSS Inc). The scores were analyzed using the statistical tests of “chi-square goodness-of-fit” to verify whether the

<sup>5</sup> For this research, we have used only the test results that were made off-line (in person).

proportion of cases expected in each group of the categorical variable is equal or unequal; the “independent-samples t-test” was conducted to compare the means of an specific variable in different groups.

### 3.2 PARTICIPANTS

The sample comprises 64 undergraduate students from Universidade Federal do Paraná, from different major degrees. Their participation was volunteer, and they all signed an informed consent. The data were collected in person, in the UFPR post-graduating’s room.

### 3.3 MATERIALS AND PROCEDURES

The experiment was constructed with 12 target sentences – 4 BSs in a mass context (BSM), 4 BPs in a mass context (BPM), and 4 fake mass nouns (FK). There were 8 control sentences – 4 BPs in a count context (BPC), and 4 substance mass nouns. Fillers were also included in a proportion of 2:1. Due to the high number of sentences for participants, the sentences were pseudo-randomly distributed in the 4 different lists. Each list got an example of each target sentence and of each control group. Each participant evaluated only one list. The speakers heard the context while looking at the picture, and then the question command: *Quem tem mais X para Y?* (Who has more X for Y?).

Four bare singular items – *bola* (ball), *livro* (book), *corda* (string) and *pedra* (stone) – these last two are flexible nouns in English –, and their plural forms – e.g. *bolas* (balls), *livros* (books), *cordas* (strings) and *pedras* (stones) – were tested. We postpone the discussion about fake mass nouns to the next section.

Control sentences allow researchers to check whether speakers are behaving as expected in contexts where both theories agree. In a count context, BPs should only allow comparison of the number of individuals. Substance mass nouns, as *farinha* (flour), *suco* (juice), *mostarda* (mustard) and *milho* (corn), only compare by volume. These were our control sentences.

The order in which BSs and BPs appeared was selected randomly. Each participant evaluated 3 target sentences: the BS in a mass context, the BP in a mass context, a fake mass noun in a mass context; two control sentences, a BP in a count context, and a substance mass noun. The same participant did not judge the same items, that is, if the BS was *bola* (ball), the BP was not *bolas* (balls).

Since we had 4 lists (each list was evaluated by 16 speakers) and each one had an example of the target sentences, we got the total amount of 64 quantity judgments for BSs in a mass context, 64 quantity judgments for BPs in the same context, and 64 quantity judgments for fake mass nouns also in a mass context: 64 quantity judgments for mass control group and 64 for count control group. Now, let's take a look at the results.

### 3.4 RESULTS AND ANALYSIS

For BSs, participants based their quantity judgments on volume significantly more, despite the number of individuals being greater (60,94% vs 20,31%). We conducted a “chi-square goodness-of-fit” test to verify whether the proportion of cases expected in each group of the categorical variable is equal or unequal. The result was statistically significant:  $\chi^2(2) = 21.96$ ,  $p = 0.000$  ( $p < .005$ ). Therefore, we can reject the null hypothesis and conclude that there are statistically significant differences in the preference of the quantity judgments for BS regarding the “volume” judgments: participants tend towards the volume interpretation. The following bars chart shows the percentages of quantity judgments for BS.

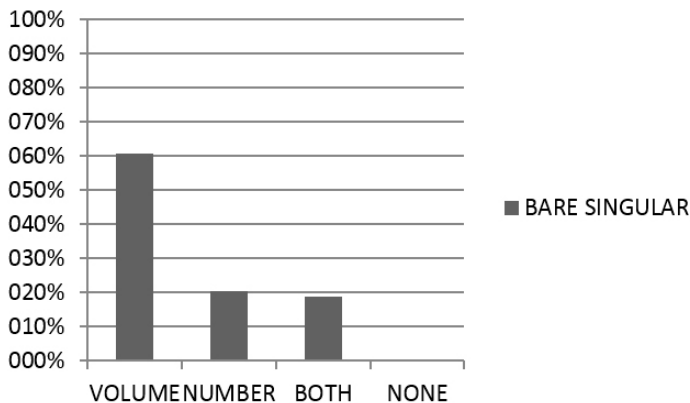


Fig. 2. Quantity judgments for bare singulars

On the other hand, the results for BPs in the mass context show a different pattern: participants based their quantity judgments on the num-

ber of individuals significantly more (72,31%). We conducted a “chi-square goodness-of-fit” test to know whether the proportion of cases expected in each group of the categorical variable is equal or unequal. The test was statistically significant:  $\chi^2(2) = 42.21$ ,  $p = 0.000$  ( $p < .005$ ). Therefore, we can reject the null hypothesis and conclude that there are statistically significant differences in the preference of the quantity judgments for BP regarding the “cardinal” judgments.

Thus, participants tend to interpret BPs comparing the number of individuals, i.e. they relied on a cardinal scale, even in a biased context. The following bars chart shows the percentages of quantity judgments for BPs.

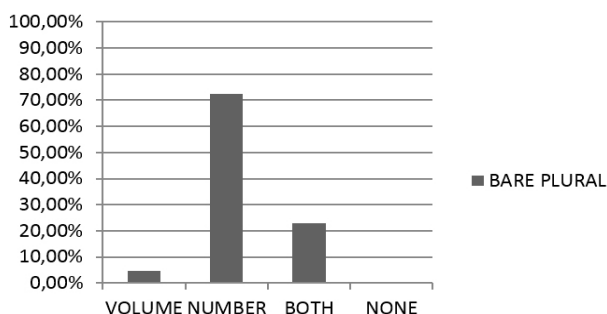


Fig. 3. Quantity judgments for bare plurals in a mass context

When in a count context, BPs also allowed quantity judgments on the number of individuals significantly more (93,75%), as expected. If we compare the behavior of the participants with respect to the bare plural when it appears in mass and in count contexts, we see that there are no great differences.

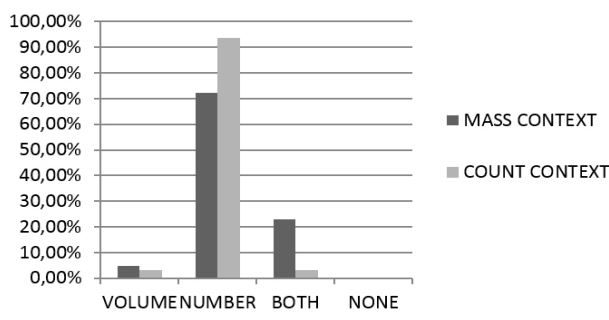


Fig. 4. Quantity judgments for bare plurals (mass vs. count context)

A chi-square “independence test” was performed to verify whether random samples of BPs in a mass context and in a count context are associated or not. The test was statistically significant:  $\chi^2(2) = 12.751$ ,  $p = 0.002$  ( $p < .005$ ). In other words, there is association between the BPs regarding their quantity judgments even if they appear in contrastive contexts. These results are important because they indicate that the context is not sufficient to impose mass quantity judgments on the nouns and rule out the possibility that participants performed their judgments based exclusively on the context, since with BPs we have judgments based almost exclusively on number in both count and mass contexts.

So far, we can conclude that only the BS may have mass interpretation. The BP shows much lower volume readings (4,68% in the mass context and 3,13% in the count context). Let us have a closer look at the behavior of these noun phrases. These percentages are accurate within the margin of error. The 23% “both” reading for BP in a mass context is explained by the contextual bias; i.e the mass context forces a volume interpretation of the bare plural. This becomes clear when we look at the “both” reading for BPs in count context – only 3,13%.

The important point concerns the fact that accordingly to the count view we expect that the BP and the BS show the same quantity judgments, since the BS denotes singularities and pluralities but not volume. Both forms should only allow comparison by number. The results do not indicate that. The following chart compares the scores for BPs and BSs in the mass context:

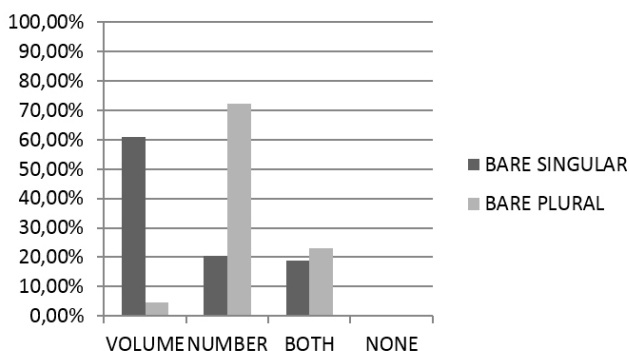


Fig. 5. Quantity judgments for bare plurals vs. bare singulars

However, if we take in consideration the mass view, it predicts that the quantity judgments for the BP and the BS contrast: only the BS allows comparison by volume; the BP always compares the number of individuals.

A chi-square “independence test” was performed on the data displayed in figure 7:  $\chi^2(2) = 46.477$ ,  $p = 0.000$  ( $p < .005$ ). Thus, we can reject the null hypothesis and indicate that there is difference between the BP and the BS. Moreover, descriptive statistics shows that while BSs allow quantity judgments over mass – almost 61% of quantity judgment based on volume –, BPs only allow quantity judgments over number of individuals. These results cannot be explained by the count view of the BS.

At this point, we can draw the following conclusions:

- (i) The BP is always compared by number.
- (ii) The BS raises quantity judgments based on volume.

Note that we cannot conclude that BS is always compared by volume. The BS also gives raise to number judgments: 20% of the participants interpreted it as comparing the number of individuals. This is the issue we discuss in the next section.

#### 4. BARE NOUN PHRASES

The current study described an experiment that used quantity judgments to assess BrP native speakers’ knowledge of the semantics of the BS and the BP. The experiment explored the two opposing approaches for the BS: either it is a plural count noun or a mass noun. The results indicated that the participants interpreted the quantity question when the noun was a BS noun phrase as mainly about the volume. When the noun in the quantity question was a BP noun phrase participants systematically interpreted as related to the number of individuals in both count and mass contexts.

Nonetheless we also tested noun phrases like *furniture*, the so called “fake mass nouns” or “count mass nouns” or “even atomic mass nouns”, to verify whether they behave as the BS. Moreover, flexible nouns as *string* and *stone* have a peculiar behavior: they appear in both mass and count syntax. In the next sections, we discuss more closely these cases guided by the following question: Is the BS a fake mass noun, a flexible noun, or neither?

##### 4.1 FLEXIBLE NOUNS

The experiment tested 4 items for bare singulars: 2 “pure” BSs: *bola* (ball), *livro* (book), and two nouns that might be considered flexible



– *corda* (string), *pedra* (stone) –, since their equivalents in English, *string* and *stone*, respectively, are flexible nouns. Flexible nouns have in English a peculiar behavior: not only they appear in both mass and count syntax, but their interpretation is dependent on the syntax. According to Bale & Barner's (2009) analysis of the examples below, (example (1) from the original paper), the English word *string* in a mass syntax, (17b) cannot have number interpretation; and the plural version is necessarily interpreted as about the number of individuals:

- (17) a. Seymour has more strings than Esme. (cardinal<sup>ok</sup>; volume\*)  
 b. Seymour has more string than Esme. (cardinal\*; volume<sup>ok</sup>)

In other words, (17a) is evaluated only in terms of number of individuals, and (17b) is evaluated only in terms of length, weight or volume, but crucially not the number of individuals. This led the authors to generalize that flexible nouns always denote individuals when used in count syntax but never when used in mass syntax.

According to our intuition, this generalization does not hold for BrP. As in English, sentence (18a) has only a number interpretation, but (18b) has both a number and a mass reading:

- (18) a. João tem                    mais cordas                    que Pedro. (cardinal<sup>ok</sup>; volume\*)  
          João have.PRS.3SG more string-PL than Pedro  
          'João has more strings than Pedro.'  
 b. João    tem                    mais corda                    que Pedro. (cardinal<sup>ok</sup>; volume<sup>ok</sup>)  
          João have.PRS.3SG more string-SG than Pedro  
          'João has more string/strings than Pedro.'

This intuition about the interpretation of *corda* (string) was experimentally confirmed. The candidates to be flexible nouns in BrP behave exactly like the "pure" BS: they allow for comparison in volume and number. The items *bola* (ball) / *livro* (book) and *corda* (string) / *pedra* (stone) have the same distribution related to their quantity judgments: they allow preferentially mass quantity judgments (because the test verified their behavior in a mass context), though they also allow number quantity judgments in

the same context. The percentages are close to the results found for BSs in the mass context, as we can see below<sup>6</sup>.

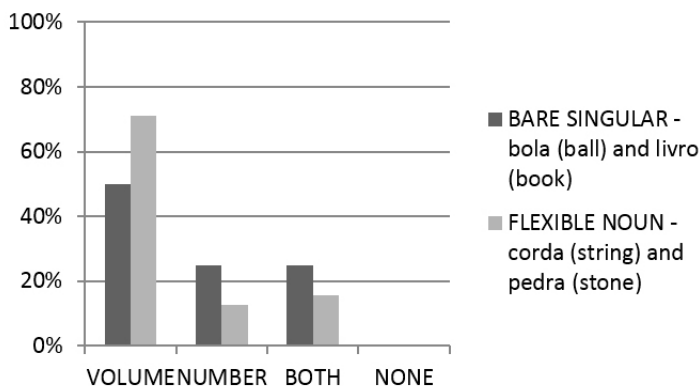


Fig. 6. Quantity judgments for bare singulars vs. flexible nouns

Given the test scores of two random samples of BS (*bola* (ball) and *livro* (book)) and Flexible nouns (*corda* (string) and *pedra* (stone)), does one group differ from the other? The null hypothesis ( $H_0$ ) at the outset of the experiment is that no association exists between the group 1 (Bare singulars) and group 2 (Flexible nouns) for the variable being compared (the comparison scale), assuming the significance level  $\alpha = 0.05$ . A chi-square “independence test” was statistically significant:  $\chi^2(2) = 41.158$ ,  $p = 0.000$  ( $p < .005$ ). Thus, we can reject the null hypothesis. In other words, there is association between BS and FN regarding the comparison scale. This result leads us to assume that nouns like *corda* (string) and *pedra* (stone), and nouns like *bola* (ball) and *livro* (book) do not belong to different mass groups in BrP. Empirically, there is no difference in behavior between what one could call “pure” BSs and flexible nouns: both allow for mass and count interpretations. Thus, one issue to be explained is crosslinguistic: why does the difference exist in English? In section 4.3, we suggest an explanation.

## 4.2 FAKE MASS NOUNS

Another type of noun to be discussed is the “count” mass noun, which is also called fake mass noun, since Chierchia (2010). Barner &

<sup>6</sup> Note that the volume bar for flexible nouns increases compared to the bar of bare singulars. We can explain that by the fact that *corda* (string) is commonly used and measured by non-cardinal measures, this biased the volume quantity judgments.

Snedeker's (2005) experiment showed that although nouns like *furniture* behave as mass, since they cannot combine with numerals (\**three furnitures*), nor pluralized (\**furnitures*), native speakers interpreted comparison with respect to the number of individuals. Thus, they systematically pointed to the picture with more pieces of furniture, instead of choosing the picture of larger pieces of furniture, when they were asked who had more furniture. Their paper is not clear about the possibility of a mass reading with count mass nouns, but their theoretical approach suggests that this type of noun can only be compared by cardinality, since count mass nouns are derived from atomic roots. Be as it may, Grimm & Levin (2012) show that this type of noun can have mass readings. Suppose this is so. Fake mass nouns in English behave exactly as the BS in BrP: both allow for count and mass readings.

Our experiment shows that both fake mass nouns and the BS can have count and mass interpretations when in the mass context.

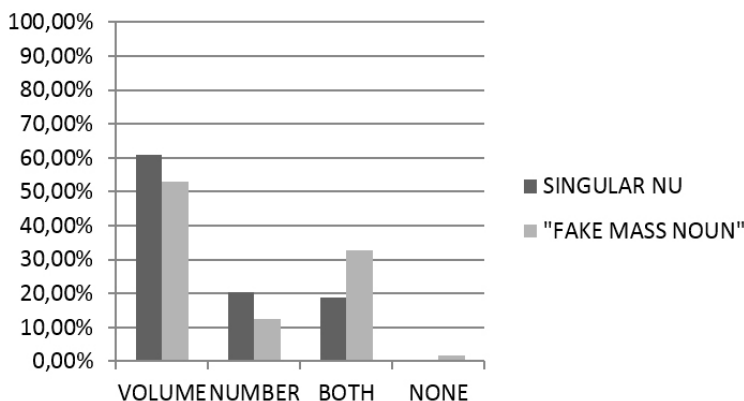


Fig. 7. Quantity judgments for fake mass nouns and bare singulars

A chi-square "independence test" was performed to verify whether random samples of BSs and Fake mass nouns are associated or not:  $\chi^2(3) = 4.407$ ,  $p = 0.221$ . In other words, there is no evidence to reject the null hypothesis, i.e. we cannot posit an association between the BSs and fake mass nouns regarding their quantity judgments.

In summary, our results show that speakers do not behave differently when the comparison involves "pure" BSs, flexible nouns and fake mass nouns. They all allow for both count and mass interpretations; in this respect, they all contrast with the BP, which disallows volume readings.

### 4.3 THE BS, WHAT IS IT THEN?

BSs allow preferentially quantity judgments based on volume scales, but it also allows a number interpretation, as shown in the graphics before. Around 20,31% of the answers for the BS were comparisons by number. However, the difference with respect to the BP is significant, since it allows almost exclusively quantity judgments based on number.

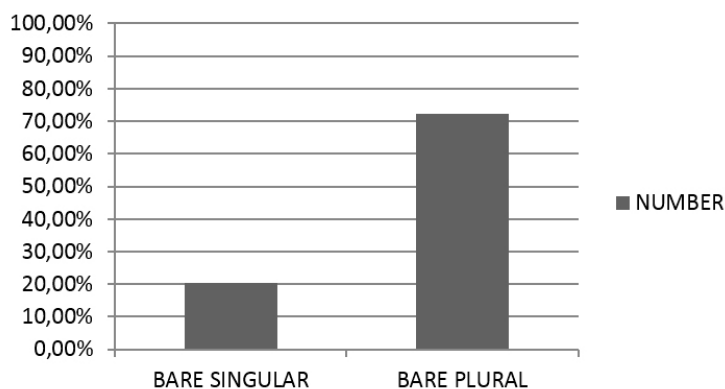


Fig. 8. Number quantity judgments for bare plurals and bare singulars

The same case, i.e. quantity judgments based on number, applies to the fake mass nouns. So we need to explain how we arrive at the number interpretation for these nouns, because it seems clear that substance mass bare nouns, like *água* (water), at least in BrP, do not behave like bare singular nouns since they do not accept number quantity judgments. The “mass” account for BSs solves the problem of volume quantity judgments raised. However, we need to offer an explanation that tells apart BSs from substance mass bare nouns.

Following Rothstein (2010), and Pires de Oliveira & Rothstein (2011), we rely on the distinction between “natural atomicity” and “semantic atomicity”. Basically, natural atomicity is a characteristic of predicates which denotes a set of entities where the minimal atomic units are not context dependent. Thus, *mobília* (furniture) has natural atoms. Semantic atomicity is a property of count nouns, which denotes sets of atoms indexed for the context in which they count as one unity. *Mobília* (furniture) does not have semantic atoms, since it cannot be counted or pluralized. Substance mass nouns do not have semantic nor natural atoms. Thus, substance mass nouns do not allow comparison by cardinality; this is possible only if the noun denotes a naturally atomic predicate. On the other hand, BSs, like *livro*, are

naturally atomic predicates, so they may be compared along different scales, including the cardinal one.

To explain the possibility of different measures for BSs and fake mass nouns, we rely on Rothstein & Pires de Oliveira (in press). In a nutshell, mass nouns (and the BS is a mass noun) are constructed from root predicates, which allow for different partitions, because the atoms are vague. Thus, nouns phrases as *livro* (book) and *mobília* (furniture) because they have natural atoms, may be compared by the number of individuals; *corda* (string) is a count noun that does not have natural atoms, thus it may be compared by the number of units in a context where a unity is available. Água (water) can be measured by different units, but they do not have natural atoms, so out of the blue they cannot be compared by the number of individuals. Rothstein & Pires de Oliveira (in press) propose the distinction between counting and measuring: “counting is putting entities in one-to-one correspondence with the natural numbers, whereas measuring is assigning an overall quantity a value on a scale”. Number judgments with the mass nouns involve measuring; one of the available scales is the cardinal one. BPs are derived from plural predicates which are built from atoms, thus can only be counted.

BSs differ from Fake mass nouns because fake mass nouns do not have a plural counterpart, whereas BSs do. In that particular respect, BSs resemble flexible nouns. The main difference with respect to flexible nouns is that in English they cannot be counted when in the mass syntax. How do we explain this difference? English does not have a productive BS, whereas BrP does. One may suppose that in English nouns are either mass or count, whereas in BrP some nouns are count, but all nouns have mass counterparts. The count interpretation of flexible nouns in English would then be blocked by a pragmatic principle: if a counting reading is needed, use the plural form. The principle does not apply to BrP. No doubt this is just the outline of an explanation which cannot be further pursued in this paper.

## 5. FINAL REMARKS

The aim of this paper was to verify the empirical predictions of two theories for the BSs in BrP. We conducted an experiment where native speakers were asked to evaluate quantity judgments with BSs and BPs (in mass and in count contexts). The results suggested that the count view according to which BSs are not mass cannot be maintained, since BSs allowed comparison by volume. BSs contrast with BPs because the former is never interpreted by volume, even when the context is massive. Thus, the proposal that BSs are mass seems to provide the best explanation for our results.

We then compared the behavior of the “pure” BS with other types of mass nouns, according to Barner & Snedeker (2005): flexible and fake mass nouns. The results show that the distinction does not apply to BrP: they all allow for both count and mass readings. We suggested that Rothstein & Pires de Oliveira’s (in press) proposal that mass nouns are constructed from root predicates is the best explanation. Root predicates allow for different measurements, including cardinality. BPs are plural predicates which denote sets of atoms and sums. Thus, they impose a number evaluation. Although a number of issues remain to be explained, we hope the paper contributes to a better understanding of bare nouns in BrP.

## REFERENCES

- BALE, Alan; BARNER, David. The interpretation of functional heads: using comparatives to explore mass/count. *Journal of Semantics*, 26, p. 217–252. 2009.
- BARNER, David; SNEDEKER, Jesse. Quantity judgments and individuation: evidence that mass nouns count. *Cognition*, 97, p. 41–66. 2005.
- CHIERCHIA, Gennaro. Reference to kinds across languages. *Natural Language Semantics*, 6 (4), p.339–405. 1998a.
- \_\_\_\_\_. Plurality of mass nouns and the notion of “semantic parameter.” *Events and Grammar*, 70, p. 53–103. 1998b.
- \_\_\_\_\_. Mass nouns, vagueness and semantic variation. *Synthese*, 174 p. 99-149. 2010. Disponível em: <<http://migre.me/n6qGE>>. Acesso em: 25 nov. 2014.
- GRIMM, Scott. LEVIN, Beth. Who has More Furniture? An Exploration of the Bases for Comparison. In: MASS/COUNT IN LINGUISTICS, PHILOSOPHY AND COGNITIVE SCIENCE CONFERENCE, dez. 2012, École Normale Supérieure, Paris, France. Disponível em: <<http://migre.me/n6qLu>>. Acesso em: 25 nov. 2014.
- MÜLLER, Ana Lúcia. Genericity and the denotation of common nouns in Brazilian Portuguese. *D.E.L.T.A.*, n.18, p.287-308, 2002a.
- \_\_\_\_\_. The semantics of generic quantification in Brazilian Portuguese. *PROBUS*, n.14, p.279-298. Berlin: Mouton der Gruyter. 2002b.
- MUNN, Alan; SCHMITT, Cristina. Number and indefinites. *Lingua*, 115, p. 821-855. 2005.

OLIVEIRA, Roberta Pires de; ROTHSTEIN, Susan. Bare Singular noun phrases are mass in Brazilian Portuguese. *Lingua*, 121. 2011.

OLIVEIRA, Roberta Pires de; MARIANO, Ruan de Souza. Mulher discutiu futebol: estrutura informacional e os nominais nus no PB. In: CONGRESSO INTERNACIONAL DA ABRALIN, 7., Curitiba. *Anais...*, v. 1. p. 3744-3757. 2011.

PARAGUASSU, N.; MÜLLER, A. A Distinção Contável-Massivo e a Expressão de Número no Sistema Nominal. DELTA. *Documentação de Estudos em Linguística Teórica e Aplicada*, 23, p.65-68. 2008.

ROTHSTEIN, Susan. Counting and the mass-count distinction. *Journal of Semantics*, 27. 2010.

ROTHSTEIN, Susan; OLIVEIRA, Roberta Pires de. *Brazilian bare phrases, comparatives and the semantics of counting versus measuring*. In press.

SCHMITT, C., MUNN, A. Against the nominal mapping parameter: bare nouns in Brazilian Portuguese. In: NELS, 29. *Proceedings...*, p. 339-353. 1999.

SCHMITT, Cristina; MUNN Allan. The syntax and semantics of bare arguments in Brazilian Portuguese. *Linguistic Variation Yearbook* 2, p. 253-269. 2002.

SOUZA, Luisandro Mendes de; OLIVEIRA, Roberta Pires de. Brazilian bare nouns and comparative clauses. In: WORKSHOP ON FORMAL LINGUISTICS, 9., 2012, Rio de Janeiro. *Proceedings...* Disponível em: <<http://migre.me/n6qSb>>. Acesso em: 25 nov. 2014.

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