The interpretation of Brazilian Portuguese Bare Singulars in neutral contexts*

A interpretação dos nomes singulares nus em contextos neutros

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ABSTRACT

The interpretation of Bare Singular count nouns (henceforth BS nouns) has been at the center of much debate in the literature on countability in Brazilian Portuguese. In this paper, we address the question whether BS nouns may only be interpreted as mass nouns or as names of kinds, or whether they may also be interpreted as object denoting nouns. It is generally agreed that BS nouns can be interpreted as names of kinds. Furthermore, Beviláqua and Pires de Oliveira (2014) show that BS nouns are interpreted as mass nouns in contexts that favor a mass interpretation. However, the preferred interpretation of BS nouns in neutral contexts (i.e. contexts that favor neither a count nor a mass interpretation) has never been investigated experimentally. We present the results of two experiments, which show that speakers tend to interpret BS nouns as count nouns in neutral contexts.

Keywords: *bare singulars; count/mass; Brazilian Portuguese.*

RESUMO

A interpretação dos nomes contáveis na forma de Nus Singula-res (NSs) tem ocupado o centro do debate sobre a contabilidade em Português Brasileiro. Este artigo aborda a questão de como são interpretados os NSs, se apenas como nomes de massa ou como nomes de espécie, ou, ainda, se denotando objetos. É consenso que NSs podem ser interpretados como nomes de espécie. Beviláqua e Pires de Oliveira (2014) já demonstraram que NSs são interpretados como nomes de massa em contextos que favorecem uma interpretação massiva. Não obstante, a interpretação preferida para NSs em contextos neutros (i.e., em contextos que não fazem prevalecer nem a leitura massiva nem a contável) ainda não tinha sido investigada experimen-talmente. Apresentamos os resultados de dois experimentos, mostrando que os falantes tendem a interpretar NSs como nomes contáveis em contextos neutros.

Palavras-chave: *nomes singulares nus; distinção contável--massivo; Português Brasileiro.*

1. Brazilian Portuguese: count/mass distinction

In Chierchia's (2010) typology, Brazilian Portuguese is a number-marking language. In this class of languages, count nouns can be plural-ized and can be combined with numerals, which sets them apart from mass nouns. To illustrate, while we can pluralize a count noun such as *cachorro* 'dog' (*cachorros* 'dogs'), we cannot do the same with a mass noun like *sangue* 'blood' (**sangues*)[1]. Likewise, while we can combine a count noun directly with a numeral (*três cachorros* 'three dogs'), we cannot do the same with a mass noun (**três carnes* *'three meat'). More precisely, a container or measure phrase is required in order to combine a numeral with a mass noun (*três quilos de carne* 'three kilos of meat').

A peculiar feature of Brazilian Portuguese is the distribution of bare singular count nouns (henceforth "BS nouns"), which are nominal arguments that occur without determiners or number morphology and can be interpreted as semantically singular or plural. Bare singulars have received much attention in formal semantics (cf. Schmitt and Munn, 1999, Müller, 2002, Munn and Schmitt, 2005, Paraguassu and Müller, 2008, Pires

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1   The pluralization of mass nouns is usually associated with coerced scenarios, which are very restricted (cf. Doetjes, 1997, Frisson and Frazier, 2005, Lima, 2012b, Lima, 2014).

de Oliveira and Rothstein, 2011, among many others). Some authors argue that Brazilian Portuguese is one of the few romance languages where BS nouns can occur in an argument position both in generic (1) and episodic (2) constructions[2]:

(1)   Cachorro   late
         Dog   barks
         'A/the/some dog(s) bark(s)'   (*episodic*)
         'Dogs bark'   (*generic*)

(2)   João   leu   livro
         João   read   book
         João read (a/the/some) book(s)' (*episodic*)

(Pires de Oliveira and Mendes de Souza, 2013: 34 – examples 6a and 6b)

Pires de Oliveira and Rothstein (2011) and Beviláqua and Pires de Oliveira (2014) have shown that BS nouns are not equivalent to bare plural nouns (henceforth "BPl nouns"). Most importantly, while BPl nouns always have a count interpretation in episodic contexts[3], BS nouns may have either a count or a mass interpretation. This difference is illustrated in examples (3) and (4). The comparative sentence (3) can only be interpreted as a comparison of numbers of cars. In particular, it cannot be interpreted as a comparison between the volume of cars that João owns and the volume of cars that Pedro owns. We call the attested interpretation of **carros** in (3) *a cardinality interpretation*, while the unattested interpretation is a *volume interpretation*. Examples (4a) and (4b) show that the BS noun **livro** may have either a cardinality interpretation in (4a) or a volume interpretation in (4b).

(3)   João   tem   mais   **carros** que   Pedro
         João   has   more   car-pl   than   Pedro
         'João has more cars than Pedro.'
         Context 1: João has a higher number of cars than Pedro.
         Context 2: # João has two big cars and Pedro has 4 tiny ones

(4a)   João comprou muito   livro   hoje
         João bought   many.much   book   today

'João bought many books today.'

(4b)   Context: João is travelling and has thick/heavy books on his hands:

Quanto	livro	você	acha que pode carregar!?
how-much-SG	book-SG	you	think that can to carry

'What quantity of books can you carry?!'

É	muito	livro	pra	você	levar!
is	much-SG	book-SG	for	you	to carry.

'That quantity of books is too much for you to carry.'

(Pires de Oliveira e Rothstein, 2011, p. 2172)

While it is generally agreed that BPls denote pluralities of individuals, the denotation of BS nouns is still debated. The fact that BS nouns may have either a cardinality or a volume interpretation raises an important question about their basic denotation. We will review recent proposals in the next section.

2. Bare singulars in Brazilian Portuguese: literature

Many recent studies have discussed the denotation of BS nouns (Munn and Schmitt, 2005, Schmitt and Munn, 1999, Müller, 2002 and Paraguassu and Müller, 2008, Dobrovie-Sorin and Pires de Oliveira, 2008, Pires de Oliveira and Rothstein, 2011, among others).

Schmitt and Munn were among the first scholars to devise a formal analysis of the distribution and interpretation of BSs in Brazilian Portuguese (Schmitt and Munn, 1999 and Munn and Schmitt, 2005). Their analyses focus on syntactic properties of BS nouns. The authors argue that "interpretable number can be selectively missing in Romance but not in English," (Schmitt and Munn, 1999, p.14) which they take to mean that Agree and/or Number functional heads are optional in the extended projections of nouns in Romance languages. In the absence of a Number head, a bare noun will not receive plural morphology, although it will not necessarily be interpreted as singular. Brazilian BS nouns are analyzed as kind-denoting precisely because they lack number. The authors distinguish BS nouns such as *criança* 'child' from mass nouns like *ouro* 'gold' and point out that these nouns have different properties when they are used as arguments of distributive predicates:

(5a)   Criança 'child'
        Criança   pesa   20 quilos nesta idade.
        Child   weighs 20 kilos   at-this age
        'Children weigh 20 kilos   at this age.'

(5b)   Ouro   'gold'
        * Ouro   pesa   2 gramas
        Gold   weigh 2 grams.
        'Gold   weighs 2 grams.'

(Schmitt and Munn, 1999, p. 10, examples 32 and 33)

Schmitt and Munn (1999) analyze the distribution of BS nouns as arguments of distributive predicates, as antecedents of reciprocals and reflexives, and conclude that BS nouns such as *criança* 'child/children' have atomic individuals in their denotation, while mass nouns like *ouro* 'gold' do not. In other words, they recognize two different classes of bare nouns, i.e. nouns without plural morphology and determiners: while mass nouns are atomless, BS nouns have atomic individuals in their extension. More precisely, Schmitt and Munn argue that BS nouns are better analyzed as number neutral. That is to say, they argue that BS nouns have both atomic individuals and sums thereof in their extension.

Other recent studies of BS nouns in Brazilian Portuguese focus on their semantic properties. Following Schmitt and Munn (1999), Paraguassu-Martins and Müller (2007) also analyze BS nouns as number-neutral predicates:

(6) João comprou maçã.
    John bought   apple
    'John has bought apples.'

(7) $[[maçã]] = \{apple1, apple2, apple3,..., apple1+apple2,..., apple1+apple2+apple3, ...\}$

(Martins and Müller, 2007, p. 171 - examples 18 and 19)

Martins and Müller (2007) observe that singular count nouns can be determined by numerals in colloquial Brazilian Portuguese (*Eu vi três menino correndo* 'I saw three boy(s) running'), unlike mass nouns. Building on this observation, they argue that count singular nouns and BS nouns have atoms in their extension, unlike mass nouns. Paraguassu-Martins and

Müller (2007) acknowledge that the grammaticality of combinations of mass determiners like *muito* with singular nouns like *maçã* supports an analysis of these singular nouns as mass nouns. Nevertheless, they claim that other morphosyntactic features distinguish singular nouns like *maçã* 'apple' from mass nouns. Following Link (1983), they argue that count nouns and mass nouns take their denotation in different domains: while mass nouns denote sets of non-individuated portions of matter, count nouns denote sets of individuals.

Müller and Oliveira (2004) take a slightly different path. For them, BSs are indefinites à la Heim (1982) and predicates, but BS nouns "denote unsorted mass" (Müller and Oliveira, 2004, p. 22). Chierchia (1998) defines a mass term as containing both atomic and plural entities in its denotation. Contra Chierchia, they claim that BSs may be used as arguments without denoting kinds. According to the authors' analysis, "bare singulars in BP are not only number-neutral but also presortal - they do not encompass only full-fledged individuals" (Müller and Oliveira, 2004, p. 22). Furthermore, they claim that "count nouns do not always have an atoms-only denotation" (Müller and Oliveira (2004, p. 28)). For them, mass nouns denote pre-sorted stuff in Link's (1983) sense. Still, a lexical difference between mass and count bare nouns may still subsist (although the authors do not explain what this difference might be).

Pires de Oliveira and Rothstein's (2011) analysis is opposed to what the authors call "the canonical view" of Schmitt and Munn (1999) and Paraguassu and Müller (2008). Pires de Oliveira and Rothstein (2011) argue that BS nouns are similar to fake mass nouns, i.e. mass nouns that have natural atoms in their extension, like *mobília* 'furniture'. Following Rothstein (2010), Pires de Oliveira and Rothstein (2011) argue that "there are mass nouns which denote sets of inherently individuable entities, such as *furniture* and *silverware* (…) and there are count nouns which denote sets of entities where the choice of atoms is contextually determined, such as *fence* or *line*". Building on this observation, they distinguish natural atomicity from semantic atomicity. Mass nouns like *mobília* 'furniture' are naturally atomic, denoting sets of inherently individuable entities, while nouns like *corda* 'string' are not. For the authors, differences between prototypical count nouns like *criança* 'children' and substance mass nouns such as *ouro* 'gold' are explained by the speaker's sensitivity to natural atomicity. They claim that all bare nouns denote kinds.

Beviláqua and Pires de Oliveira (2014) claim that the debate we introduced so far in the paper could be summarized in two main views that make opposite predictions:

''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."

Beviláqua and Pires de Oliveira (2014, p. 255)

What the authors call "the count view" includes the syntactic proposal of Schmitt and Munn, as well as analyses of BS Nouns as number neutral predicates, rather than kind-denoting nouns (Schmitt and Munn, 1999, 2002, 2005; Müller, 2002a, 2002b, Paraguassu and Müller, 2008). The "mass view" is represented by Pires de Oliveira and Rothstein 2011. Beviláqua and Oliveira (2014) summarize the predictions of these different theories as follows:

Bare Nouns		SYNTACTIC VIEW	LEXICAL APPROACH	
BASIC DENOTATION		kinds	kinds	Predicates / indefinites
Count	Flexible nouns *stone* 'pedra'	cardinal reading only ??? (unclear)	Both cardinal and volume readings	cardinal reading only
	Stretchable count nouns (without natural atoms) *corda* 'string'	cardinal reading only ??? (unclear)	Both cardinal and volume readings	cardinal reading only
	Regular count nouns (with natural atoms) *bola* 'ball'	cardinal reading only	Both cardinal and volume readings	Both cardinal and volume readings
Mass	Substance bare nouns *suco* 'juice'	non-cardinal reading only	non-cardinal reading only	non-cardinal reading only
	Fake mass nouns *mobília* 'furniture'	non-cardinal reading only ??? (unclear)	Both cardinal and volume readings	non-cardinal reading only

The question that matters to us in this paper is whether BSs are interpreted as number-neutral predicates or as names of kinds. Only theories according to which BS nouns are names of kinds predict that fake mass nouns may have a cardinality interpretation as well as a volume interpreta-

tion. Beviláqua and Pires de Oliveira (2014) investigated the interpretation of BS nouns and fake mass nouns in contexts that favor either a volume interpretation or a cardinality interpretation. Picture 1 illustrates a context that favors a volume interpretation of a BS noun:

Picture 1. Experimental item from the 'Volume' condition in Beviláqua and Pires de Oliveira (2014)
Context: "Joana e Maria querem encher o cesto" (Joana and Maria want to fill the basket); Question: "Quem tem mais bola para encher o cesto?" (Who has more ball to fill the basket?
(Beviláqua and Pires de Oliveira, 2014, p. 263)

Beviláqua and Pires de Oliveira (2014) found out that volume interpretations are available for BS count nouns, fake mass nouns and flexible nouns (such as *corda* 'string' and *pedra* 'stone'), provided the context favors a volume interpretation.

In this paper, we investigate the preferred interpretation of these three classes of nouns in neutral contexts, i.e. contexts that are not biased in favor of either a volume or a cardinality interpretation.

3. Quantity judgment tasks

According to Chierchia (2010) mass nouns denote sets of vague or unstable atoms while count nouns denote sets of non-vague or stable atoms. The extension of the noun *chair* consists of objects that count as atomic chairs in any context: what counts as a chair in context A will also count as a chair in context B. On the contrary *water* has no stable atoms; that is, different

partitions of the kind "water" (puddles, bottles, drops, etc.) can count as units of water in different contexts. Fake mass nouns like *furniture* have a special status in Chierchia's system, since these nouns have stable atoms in their denotation but are nonetheless grammatically encoded as mass nouns.

Quantity judgment studies in English (Barner and Snedeker, 2005) demonstrate that speakers are sensitive to the distinction between atomic nouns (i.e. count nouns and fake mass nouns) and non-atomic nouns (i.e. real mass nouns). In this study, participants were shown two visual stimuli – one that shows a great number of objects with a small combined volume of matter, while the other shows a smaller number of objects with a greater combined volume. Participants were then asked "who has more x?" where x could be a plural count noun, a bare mass noun or a bare fake mass noun. The study shows that participants interpreted count nouns (such as *shoes*) and fake mass nouns (such as *furniture*) similarly for the purpose of this task. When participants were shown count nouns or fake mass nouns, they tended to choose the picture with a great number of objects, rather than the picture with a great volume of object. On the other hand, participants picked the picture that showed a great volume of objects when the question included a plain mass noun. This shows that speakers interpret fake mass nouns as denoting sets of atoms, despite the fact that fake mass nouns have the same grammatical distribution as that of plain mass nouns in English.

Barner and Snedeker (2005)'s study of *flexible* count nouns in English is critical to our analysis of BS nouns in Brazilian Portuguese. A small set of nouns in English can be freely interpreted as mass nouns or as count nouns in their singular form, although they must be interpreted as count nouns when they are pluralized (e.g. *stone/stones*, *paper/papers*). Barner and Snedeker observed that participants in quantity judgment studies preferred Volume answers with singular flexible nouns like *stone* and Number answers with plural flexible nouns. Note that while fake mass nouns suffer from a mismatch between semantic and grammatical encoding, flexible nouns appear to be ambiguous between a count interpretation and a mass interpretation. When interpreted as mass (bare), they trigger a Volume response in quantity judgment studies. When interpreted as count, they trigger a Number response.

One of the results of Barner and Snedeker's experiment that is relevant to our study of Brazilian Portuguese is that singular flexible nouns in English tend to be interpreted as mass nouns in quantity judgment tasks. That is to say, if a noun like *stone* may be interpreted as a mass noun at all, it will tend to be interpreted as such in a quantity judgment task. As we will see, this tendency is not observed with BS nouns in Brazilian Portuguese.

Finally, differently from English, the class of count nouns that can

be used as BS nouns is not restricted in Brazilian Portuguese. Virtually any count noun can be used as a BS noun.

4. Experimental studies

We conducted two off-line studies[4]. 22 participants from the Federal University of Rio de Janeiro participated in Study 1. 114 participants took part to Study 2, which was realized on an online platform (Google forms).

Study 1

In Study 1, participants were shown two characters each standing next to some objects (see pictures in Table 1). The two characters were always associated with the same kind of objects (e.g. cars) but one character was associated with a small number of objects that together had a large combined volume (Volume situation), while the other was associated with a greater number of objects that together had a smaller combined volume (Number situation). This situation was described by a sentence of the form "A has more x than B" where x was a noun referring to the objects possessed by the characters A and B. This noun could be a BS noun, a fake mass noun or a bare mass noun. The task of the participants was to decide whether the description was true or false.
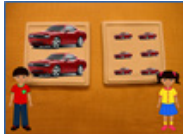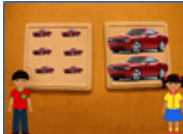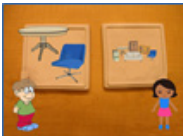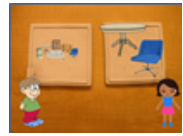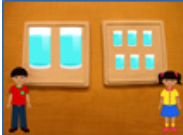
Materials and methods

18 nouns were used to form experimental items: 3 BS count nouns, 3 bare mass nouns, 3 bare fake mass nouns and two controls with bare plurals. Each noun (e.g. *carro*, 'car') was used to prepare two visual displays: one of these associated the Volume situation to character A and the Number the situation to character B, and the other reversed this association. One description was associated to each noun (e.g. *Pedro tem mais carro que Júlia*, 'Pedro has more car(s) than Júlia'), in such a way that this description would receive a Volume interpretation or a Number interpretation depending on the visual display that it was associated with. The choice of Volume or Number interpretation for a given item as well as the order of presentation

of experimental items was randomized in two lists.

Table 1.   Sample of experimental items (Experiment 1)

	List A	List B	Target question:
BS count noun			*Pedro tem mais carro que Júlia.* 'Pedro has more car(s) than Júlia.'
BS fake mass noun			*Lucas tem mais mobília que Carol.* 'Lucas has more furniture than Carol.'
Bare mass noun			*Pedro tem mais água que Júlia* 'Pedro has more water than Júlia.'

RESULTS

The results for Study 1 are presented in Picture 1:

Picture 1. Percentage of 'Number' responses across conditions.
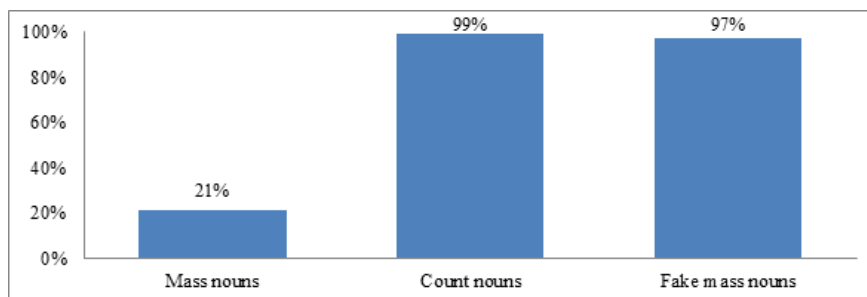
These results suggest that in unbiased comparative contexts, plain mass nouns have a Volume interpretation by default, while BS nouns and fake mass nouns have a default Cardinality/Number interpretation. These support the findings of Lima (2014, 2015), who did a quantity judgment study ('who has more x?') with 38 Brazilian Portuguese speakers (21% of Number answers for mass nouns, 86% of Number answers for count nouns and 97% of Number answers for fake mass nouns).
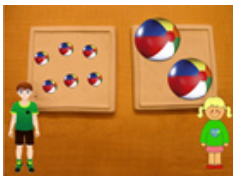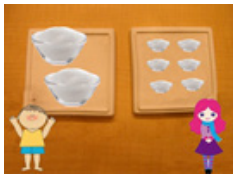
Study 2

Study 2 follows the logic of study 1, but instead of using comparative sentences (*Carlos tem mais bola que João*, 'Carlos has more ball(s) than João') we used absolute constructions (*João não tem muita bola, mas Carlos tem*, 'João does not have *muita* (much/many) balls but Carlos does.').

Materials and methods

8 items were randomized in a single list: 6 critical items and two control items (bare plurals). As in study 1, participants were shown a picture in which two characters were each associated with objects of the same kind. While one character was associated with a small number but great volume of objects, the other was associated with a great number but small volume of objects. Each kind of objects was associated with two different pictures and one sentence as in experiment 1. The choice of Volume or Number interpretation for a given item as well as the order of presentation of experimental items was randomized in two lists.

Table 2. Sample of experimental items (Study 2)

BS count noun		A) The sentence favors a Volume answer: *João não tem muita bola, mas Maria tem.* 'João does not have *muita* (much/many) balls, but Maria does.' B) The sentence favors a Cardinality/Number answer: *Maria não tem muita bola, mas João tem.* 'Maria does not have *muita* (much/many) balls, but João does.'
Bare mass noun		A) The sentence favors a Cardinality/ Number answer: *João não tem muito açúcar, mas Maria tem.* 'João does not have *muita* (much/many) sugar, but Maria does.' B) The sentence favors a Volume answer: *Maria não tem muito açúcar, mas João tem.* 'Maria does not have *muito* (much/many) sugar, but João does.'

Bare fake mass noun	A) The sentence favors a Volume answer: *Carol não tem muita mobília, mas Lucas tem.* 'Carol does not have *muita* (much/many) furniture, but Lucas does.' B) The sentence favors a Cardinality/ Number answer: *Lucas não tem muita mobília, mas Carol tem.* 'Lucas does not have *muita* (much/many) furniture, but Carol does.'

RESULTS

The results for Study 2 are presented in Picture 2:
Picture 2. Percentage of 'Number' responses across conditions.
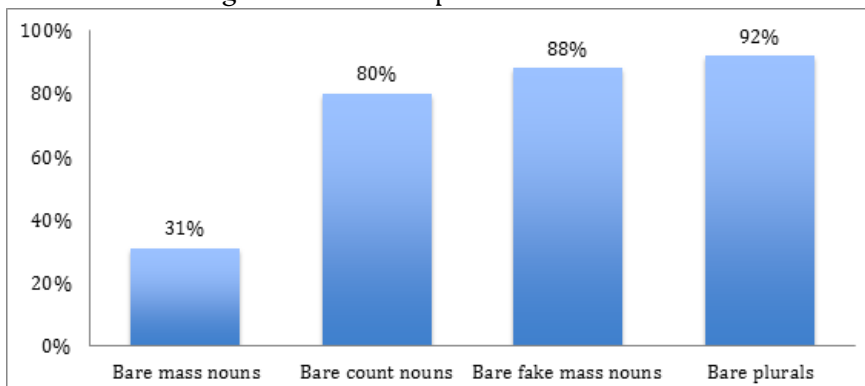
The results of study 2 confirm those of study 1. We observed a high percentage of acceptation of Number descriptions with BS count nouns, fake mass nouns and bare plural nouns (control items).

5. GENERAL DISCUSSION

In Brazilian Portuguese, count nouns can be productively used in the bare singular form. We have shown that these BS nouns are more likely to be interpreted as count nouns in neutral contexts, unlike bare mass nouns. These results should be compared to those of Beviláqua and Pires de Oliveira (2014), who showed that BS nouns can be interpreted as mass nouns in contexts that are biased towards this interpretation. Together, these studies suggest that BS nouns in Brazilian Portuguese may be interpreted either as count nouns or as mass nouns. We believe that theories of BS nouns as kind-denoting are best equipped to explain this situation, as Beviláqua and Oliveira make clear:

"Kinds are open to different measurements, because they denote lattice structures with vague atoms. This is not the case for the plural nouns, which denote atomic lattice structures; thus, they can only be counted. From an ontological perspective, the proposal requires the domain of individuals to be sorted: kinds have properties that are not those of plural predicates." (Beviláqua and Oliveira, 2014)

If the basic kind denotation of BS nouns can support either mass or count interpretations, it must be explained why speakers tend to interpret BS nouns as a count noun in neutral contexts. This preference could be due to at least two factors that are interconnected: 1) a natural atomicity bias (nouns that denote kinds whose canonical instances are individuals more likely to be grammaticalized as a count nous and to be interpreted as referring to cardinalities in Brazilian Portuguese) and 2) lexical statistics.

Regarding lexical statistics, it is tempting to assume that a BS noun like *livro* is more likely to be interpreted as a count noun due to the high frequency of count interpretations of other forms of the same lexeme (such as the plural form *livros*). A similar effect of frequency was observed by Samuelson and Schiffer (2011) in their studies of category extension. In these studies, young children were shown novel objects which were given a novel name. The children were then showed test objects that matched the previous ones either in shape or in substance. These authors showed that children who were taught a set of new names dominated by count nouns naming solid objects were more likely to recognize new instances by shape than by substance. count nouns when the determiner is compatible with either interpretation (*e.g. **the blicket***). Actually, the results of studies with 'neutral' determiners were robustly similar to the results of 'count determiners' (***a blicket, another blicket***) (Gathercole and Whitfield, 2001; Imai and Mazuka, 2003, 2007; Soja, 1992).

Finally, we also observed that a mass interpretation of fake mass nouns was strongly dispreferred in the tasks. Fake mass nouns in Brazilian Portuguese should be further investigated given that the literature on this topic (cf. Grimm, 2014, Grimm and Levin, 2012) has shown that functionality and heterogeneity – and not only cardinality - affect people's judgment on quantity when evaluating fake mass nouns.

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