

From roots to DPs, Brazilian Portuguese and English: a model theoretical approach to language variation.¹

Da raiz ao DP, Português Brasileiro e Inglês: Uma abordagem modelo teórica da variação linguística

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ABSTRACT

The paper develops Pires de Oliveira's (2020, in press) model theoretical account to Brazilian Portuguese (BrP) and English, both number marking languages, ie when n is first projected, little- n , $[n_0[X]]$, where X is a non-categorized root, it is as a predicate, $\langle e, t \rangle$. It revises Chierchia (2010, 2014) so it might account for the difference between these two languages: BSs in English are singular predicates, whereas in BrP, they can be arguments. The proposal assumes that n_0 denotes a part-whole non-atomic lattice (Rothstein 2010, 2017), ie. without grammatical atoms. In English, n_0 attracts atomicity, generating n_1 $[_{ATP} \text{SG-PL } [_{n_0} [X]]]$. Thus, it predicts no BSs in argument position, and coercion to mass if in such position. In BrP, $[n_0 [X]]$ surfaces in argument position, because the nominal phrase gravitates around the “specifier”. This is the bifurcation separating these two languages. The BS in BrP conveys no grammatical information about atomicity, because there is no specifier, so no atomicity is called for. It is sub-specified for mass and count. This move allows for an unitarist approach to the nominal phrase in BrP: where number gravitates around the specifier. The conclusion explores some consequences in the domain of language variation (Lima & Rothstein 2020), and in that of semantic processing.

Key words: *Semantic parameters; morpho-syntax; sub-specification; number.*

RESUMO

O artigo aprofunda a proposta modelo teórica de Autor (2020, in press) para o Português Brasileiro (BrP) e para o inglês. BrP e inglês são línguas que marcam o número, ie. quando n é projetado, eninho, $[n_0[X]]$, em que X é uma raiz não

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categorizada, ele é projetado como um predicado, $\langle e, t \rangle$ (Chierchia 2010, 2014, in press). A proposta distingue a denotação de n_0 da denotação de uma pluralidade de átomos (Rothstein 2010, 2017). Em inglês, a atomicidade é obrigatoriamente checada imediatamente após n_0 : n_1 é projetado, gerando $[n_1 [AtP [n_0 [X]]]]$. Isso prediz que não há Singular Nu em posição argumental em inglês e que a interpretação será massiva se isso ocorrer. Também prediz que a raiz nominal $[n_0 [X]]$ transparece em inglês quando AtP não é projetado, como é o caso de compostos. No BrP, $[n_0 [X]]$ ocorre em posição argumental, porque AtP não é mandatório após eninho. Esse é o ponto de bifurcação entre esses dois tipos de línguas. A ausência de atomicidade leva a uma subespecificação de massas e contável. Logo, o Singular Nu não é nem massa nem contável. A atomicidade é induzida pelos “determinantes”, em sentido amplo: o plural, o artigo definido e alguns quantificadores. O artigo explora uma alternativa unitarista para o sintagma nominal no BrP e explora uma derivação canônica. A conclusão explora a variação em línguas marcadas para número.

Palavras-chave: *parâmetros semânticos; morfossintaxe; subespecificação; número.*

Since the end of the 90's, language variation in the nominal domain has been fruitfully explored relying on the controversial idea of "Semantic" Parameters, introduced by Chierchia (1997, 1998). This research program has allowed a better understanding of language variation in the nominal domain; even languages that seem so close as English and Brazilian Portuguese (BrP, from now on) show variation. Schmitt & Munn (1999) were the first to show that the 98 model could not explain BrP nominal system, because it predicts that a language that has number morphology and determiners should only have bare plurals, and BrP has a Bare Singular (BS). Since then, there has been a lot of research on BrP BS (Ferreira, in press). Empirical results (Bevilaqua, 2019) show that the BS is neither mass (Pires de Oliveira & Rothstein, 2011) nor count (Schmitt & Munn 1999, 2002). It is sub-specified (Pires de Oliveira, 2020, in press).

Many empirical objections were raised to show that the 98 Nominal Parameter was not adequate. The notions of mass and count, of plurality, the idea that Bare Nouns in Mandarin are mass were revised and led to the Parameter of Number, developed in Chierchia (2010, 2015), according to which languages vary at a very low level of the derivation. In the first bifurcation of an uncategorized root, little- n or n_0 in this paper, splits into

kind languages, Mandarin, and number marking languages, English. In this paper, we assume that English is a number marking language, that is, it starts as a predicate, $\langle e, t \rangle$. Here the aim is to derive English and BrP, both number marking languages. The last few years also have witnessed a growing understanding of the mass and count distinction across languages (Kiss et al 2021, Rothstein & Lima 2020), and its relation to counting and measuring (Rothstein, 2010, 2017). In this paper we distinguish grammatical atomicity from natural atomicity. Grammar may redraw the boundaries of reality (to a certain extent!)

This is the background against which this paper develops Pires de Oliveira's (2020, in press) proposal that English and BrP are number marking languages (Chierchia 2010, 2015), $\langle e, t \rangle$ languages. The aim is to present a step by step derivation of the nominal phrase in both languages. The first section shows that BrP and English are number marking languages that differ with respect to the possibility of the Bare Singular in argument position. The second section presents some aspects of Chierchia's model theoretic account of English (2010, 2014), and shows that it cannot generate BrP nominal system. Section three presents a model theoretic account of number marking languages that have Bare Singulars and Bare Plurals. It proposes that in English the noun phrase revolves around the noun, n_0 , whereas in BrP it is around the specifier. It presents an unitarian account of the nominal phrase in BrP. In the conclusion, language variation is briefly discussed.

1 Brazilian Portuguese and English: mapping languages

Chierchia (2010, 2014, 2021) argues that language variation in the nominal domain can be explained by a choice between argument or predicate at a very early stage in the derivation, when n is projected in a neutral root, what is sometimes called little n , represented here as $[n_0X]$, where X is a no-categorized root. This paper deepens this idea. Semantically, \sqrt{X} denotes anything that can be related to this root, events, individuals, parts of individuals. The author argues that when this root is categorized as a little n , n_0 from now on, there is a choice between being a predicate, type $\langle e, t \rangle$, or being a kind, type $\langle s, e \rangle$. If English, then take the $\langle e, t \rangle$ route; if Mandarin, take the $\langle s, e \rangle$ route.²

Given this typology, BrP patterns with English, since in both languages there is plural morphology which does not attach to mass nouns; moreover, numerals combine directly with count nouns, but measure phrases are needed with mass nouns. BrP grammatically distinguishes between *livro* (book) and

² Chierchia is not explicit about what happens in Number neutral languages, but one may think that in those languages both options are available, ie. there is no bifurcation.

lama (mud): 3 *livro* but *3 *lama*; *livro-s* but **lama-s*. Mass nouns are counted via a measure phrase: 3 *balde de lama* (3 buckets of mud). Moreover, the definite phrase in both languages distinguish between singular and plural, as exemplified in (1). Descriptively, the difference in both languages is that (1a) and (1b) are about a singular individual, whereas (1c) and (1d) are about a plural individual:

- (1) a. O cachorro latiu a noite inteira.
- b. The dog barked all night long.
- c. Os cachorro(s) latiram a noite inteira.
- d. The dogs barked all night long.

Traditionally,³ for both English and BrP, the differentiation of singular and pluralized nominal phrases is described as the absence of phonological realization corresponds to a null morpheme that conveys singularity, whereas plural inflection is interpreted as one and more than one.⁴ We come back to this representation in the next section. Both languages have Bare Plurals (BP) and Bare Mass nouns, as exemplified in (2):

- (2) a. Dogs bark.
- b. Cachorros latem.
- c. Milk is healthy.
- d. Leite é saudável.

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The puzzle in BrP is that the association between the absence of inflection and the Singular (SG), on the one hand, and the presence of plural inflection and plurality, on the other, vanishes away in contexts such as (3):

- (3) a. Tem cachorro na rua.
- has dog in the street.
- b. * There is dog in the street.
- c. Tem cachorro-s na rua.
- Has dog-PL in the street.
- “There are dogs in the street.”

In English, the Bare Singular is ungrammatical in argument position, as shown in (3b).

³ See Mattoso Camara (1970) for BrP. The next section shows that this is the proposal for English in Chierchia.

⁴ Mattoso Camara (1970) understands that the plural is exclusive, that is it must be about more than one. Chierchia (2010) following the literature on the semantics of plurality argues that it is an inclusive plurality, that is it is about one and more than one. We come back to this issue in the next section.

The contrast between English Bare Singular and BrP Bare Singular pops up in other contexts as well. Experimental data shows that the Bare Singular is not interpreted in the same way in these two languages (Bevilaqua & Pires de Oliveira, 2021). In Quantity judgment tasks speakers of English interpret (4a) as a question about the volume, they systematically choose the picture with more volume, even when confronted with an alternative picture with more units. As a result, there is no cardinal interpretation with the bare count noun in English. Brazilians, in the same context, when confronted with the question in (4b), oscillate between counting and measuring.⁵

- (4) a. Who has more table? volume
 b. Quem tem mais mesa? cardinal and volume

There is no cardinal interpretation with the bare count noun in English. The famous universal grinder context (Pelletier, 1984) is another place where there is a contrast between the languages. The only way to interpret (5a) in English is to grind the cat or to tear it into parts. This is compatible with the results for (4a), because both show that the bare singular in English cannot refer to units:

- (5) a. #There is cat all over the place. Smashed cat
 b. Tem gato em tudo quanto é lugar. Cats and smashed cat

In BrP, (5b) may be interpreted as about cats and as about smashed cats in parallel with the results for (4a). It is worthy noticing that BrP is not like Mandarin, since in Mandarin we only get cat units readings (Rothstein 2017).

A last contrast is in the domain of quantifiers. The contrast in English between *many* and *much*, exemplified in *many books* and *much water*, is neutralized in BrP: *muito livro* and *muito leite* is in contrast with *muitos livro(s)*. Thus, (6a) has two translations to English:

- (6) a. Tem muita revista nessa caixa.
 Has much/many magazine in the box
 There is too much magazine in the box and *There are many magazines in the box*
 b. Tem muitas revistas nessa caixa.
 Has many magazines in this box
 There are many magazines in this box

Thus, although English and BrP can be described as number marking languages, there is a mismatching: English grammar does not have Bare

5 See Bevilaqua (2019) for a review of the experimental literature on the Bare Singular in BrP.

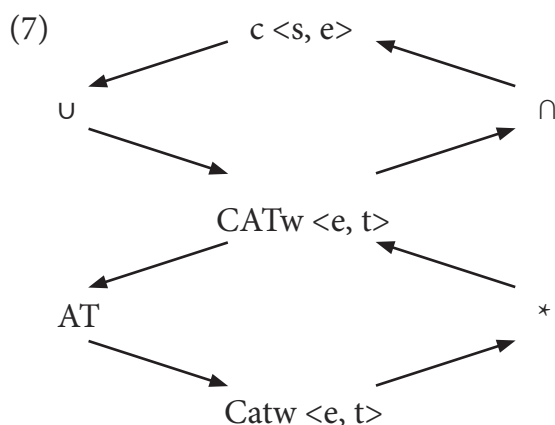
Singulars in argument position, whereas Brazilian grammar does. This is the puzzle we hope to solve. Next section introduces the relevant points in Chierchia's model.

2 Chierchia's model theoretic approach (2010, 2014, 2021)

Chierchia's (2010, 2014, 2021) model theoretical approach reformulates aspects of his 98 semantic parameters. The distinction between mass and count, the notion of plurality, and the semantic parameters are revised. The new approach draws an epistemic distinction between mass and count, both atomic. Relying on studies about cognition, the idea is that, as many other species (Soja *et al* 1991), we all know the difference between things and substances. The distinction is cognitive; it reflects the fact that speakers know that things like tables, books, and walls are atomically stable, whereas things like water, juice, honey, mud are unstable, that is, speakers know that there are alternative ways of carving up that substance into units. The clay over may be divisible into different units which are clay. Whereas the table over there if partitioned is no longer a table. Count nouns denote stable units as chairs and cups, whereas mass nouns denote vague partitions, that is, we know that the denotation of mass nouns is homogenous, thus different ways of partitioning are possible. We know that the same portion of clay might count as a unity in one situation, or as two units in a different situation. The denotation of mass nouns is, perhaps, one of the hottest topics, since there is no consensus (see Chierchia 2021). Assume that we know what a thing and a substance are. This knowledge is mapped into grammatical properties: in English, count and mass nouns. Count nouns combine with plural inflection, and are counted directly; mass nouns are ungrammatical with plural inflection, and need classifiers to combine with numerals: *dogs* versus **muds*; *3 dogs* versus **3 muds*.⁶

English starts as a predicate, type $\langle e, t \rangle$. The aim is to develop the semantic system in parallel with the morpho-syntax, an aspect we will explore in depth. Little- n , the first level of the nominal phrase, represented as $[n_0 \sqrt{X}]$, and that we called n_0 , is a predicate. Not only that, in Chierchia n_0 corresponds to $CAT_w \langle e, t \rangle$, the center of the semantic constellation in (7), taken from Chierchia (2010: 116). It denotes the sum of cats in the domain, including the atoms, i.e., the stable units of cats. \cap shifts the number neutral predicate $CAT_w \langle e, t \rangle$, into the kind $\langle s, e \rangle$, represented by c . \cup shifts the kind cat, c , into the number neutral predicate, CAT_w . AT turns the number neutral predicate into an atomic predicate, $Cat_w \langle e, t \rangle$, and the star $*$ turns the atomic predicate back into a number neutral denotation.

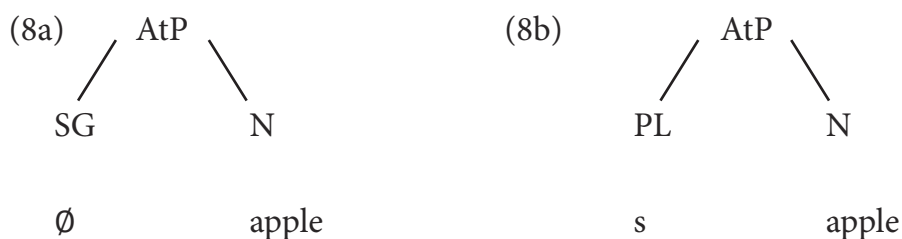
⁶ There are mechanisms of coercion that shift count nouns into mass - *there is apple in the salad* - and mass nouns into count ones - *three coffees*. Coercion is a last resort mechanism, heavily restricted. See Frisson & Frazier (2005).



AtP, AtomPhrase, is the semantic counterpart of number projection. It is a check point:

“A natural way of understanding it is as an atomicity check point. Number morphology lets a property go through if it is atomic. There are two ways of qualifying as atomic, both based on the function AT; the first consist in being composed solely of stable individuals not closed under (and is coded in the singular morpheme); the second consists of being generated by a set of stable individuals via U-closure (and is coded in the plural morpheme).”
 Chierchia (2010: 133).

In his examples for *apple* and *apples*, presented below, the singular morpheme is phonologically null. It corresponds to SG; it applies to N, our n_0 , and returns the set of stable individuals. The plural, coded by \-s\ in English, denotes the U-closure, i.e., the set of sums of stable individuals, including the stable individuals which are sums of themselves:



In this description, the plural morpheme is the identity function: plural morphology lets N goes through, since $APPLE_w$ is already the sum of stable atoms.

Nonetheless, when the author presents the derivation for the definite singular and plural, this time, PL, the English plural inflection, /-s/, applies to the atomic predicate and generates the plural predicate which is then closed by the ι operator, that maps to the definite article, *the*. Below his derivation for *the boy* e *the boys*, on page 134:

- (9) a. [DP[SG]the [SG boy]] \rightarrow ι AT(BOY) defined only when boy is a singleton
 b. [DP[PL] the [PL boy]] \rightarrow ι^* AT(BOY) defined only when boys is non empty

The definite article externalizes the ι operator. SG corresponds to AT and PL is the $*$ applied to an atomic predicate generated by AT applied to the noun.

The plural inflection in English is sometimes the identity function, in example (8), and sometimes the $*$ operator applied to the atomic predicate, as in (9). Thus, *cats* corresponds sometimes to $CATw\langle e, t \rangle$, and sometimes to $*Catw\langle e, t \rangle$. This must be so, if we stick to the constellation in (7). Thus, theoretically, there are two ways of arriving at the Bare Plural, as *dogs* in (10a): one directly from the noun as an identity, (10c), the other via atomization of the noun, indirectly, in (10d). Both lead to sums of atoms which are then shifted to the kind:

- (10) a. Dogs bark
 b. $[_{DP} [_{NumP} -s [_{NP} dog]]]$
 c. $[_e \wedge [_{\langle e, t \rangle} PL [\langle e, t \rangle DOGw]]]$
 d. $[_e \wedge [_{\langle e, t \rangle} PL [_{\langle e, t \rangle} AT [\langle e, t \rangle DOGw]]]]]$

The system is over-generating. Moreover, as it stands, it is unclear what blocks the Bare Singular in argument position. Why is plural inflection mandatory if the nominal is cumulative, since there are cases where the Bare Singular surfaces in English? This happens in compounds as *stardust*, but $*stardsdust$, and *cat food*, but $*catsfood$. Finally, as it stands, Chierchia's model predicts incorrectly that the Bare Singular in BrP is ungrammatical. The next section introduces the changes that are needed in order to explain the differences between BrP and English. It follows Pires de Oliveira (2020, in press) who argues that in English number is mandatory immediately after n_0 . In other words, in English the derivation is (10d).

3 Modeling a number marking language that has Bare Singulars and Bare Plurals

The proposal relies on Chierchia (2010, 2015, 2021) and Rothstein (2010, 2017). It further develops the perspective from the last section, where meaning of a linguistic structure is the result of the way it is composed. Assume that although our cognition knows that there are objects and substances, grammar starts from a homogenous domain that is organized

by part-whole relations without grammatical atoms. Atomization is, then, a grammatical operation. Assume that immediately after n is projected, called n_0 , the denotation is the set of all possible partitions of a noun, according to Rothstein's ontology (2010). The denotation of the noun projection, n_0 , delimitates a space in the domain organized by parts-wholes (Rothstein 2010, 2017). In that particular sense, the noun is neither singular nor plural, because it does not restrict the denotation to stable atoms; it is neither count, nor mass. It is unspecified for these grammatical features. Thus, n_0 denotes the set of all cat-things-stuff. We might represent this as the set that realizes the property cat, following Carlson (1977). Thus, $[[n_0]] = \{x: x \text{ realizes } P\}$, where P is a region in the domain of the realization of that property. It might include natural atoms.

In English, the noun projection, n_0 , attracts Atomicity. Atomicity opens two possibilities: either the atomic predicate or the \cup -closure under sum. This immediately explains why the Bare Singular is ungrammatical, as shown in (11b). Atomicity is projected, either it is a sum or an atomic predicate. If it is an atomic predicate, the down operator cannot rescue the derivation, because the denotation is not cumulative, thus the derivation crashes:

- (11) a. * Dog barks
b. * [\cap [$\langle e,t \rangle$ AT [$\langle e,t \rangle$ dog]]]

Thus, there is number projection in the bare phrase in English. Moreover, plural inflection is always significative, it returns sums of atoms. Finally, we drew a distinction between the denotation of n_0 and that of n_1 ($=^*n_0$) which does not exist in Chierchia.

The proposal explains the bare singulars in (12). If they are in argument position, then atomicity blocks \cap , and the atomic predicate must be coerced into the parts. Thus, both in (12a) and (12b) from Link (1982), the Bare Singular is smashed, crushed, partitioned:

- (12) a. # There was dog everywhere.
b. There is apple in the salad.

In (12b), *apple* is an atomic predicate that is coerced to mass. It cannot denote the kind because the nominal phrase in English requires the noun to project atomicity. Thus, *apple* is either a sum of atomic individuals or the set of atomic individuals. The noun attracts atomicity: the absence of inflection leads the interpretation to atomic individuals, which are then coerced into mass as a last resort operation. In cumulative contexts, as in (13), the only alternative to the bare singular is to be coerced into a mass denotation or to be partitioned. The prediction finds empirical support (Scontras *et al*, 2017;

Bevilaqua & Pires de Oliveira, 2021): in quantity judgment, English bare singulars are always interpreted as mass:

(13) #Who has more table? (volume)

Speakers judge the quantity question in (13) by choosing a non-cardinal scale, even in a context that contrasts a picture which outnumbers the cardinality. Grammar blocks counting, so they measure the object. This is explained, if *table* is an atomic predicate that is coerced into mass. If it were kind denoting, it would give rise to counting interpretation.

The model introduces the difference between n_0 and an atomic noun projection, n_1 . Plural predicates entail the non-atomic predicate, but not vice-versa. Plurality is significant, because it conveys that there is a unity. At last, it might give an explanation for compounds such as *dogfood*, where the absence of number projection within the compound allows for n_0 to surface. Thus, *dog* denotes the vague lattice structure because there is no AtP; thus, plural inflection is not allowed: **dogsfood*. Occam's razor might be invoked, since it seems that we are creating entities without any need. However, natural languages distinguish between sums and non-atomic sums. As we argued, even in English this seems to be the case for compounds. Moreover, we need to explain languages like BrP that have Bare Singulars and Bare Plurals.

3.1 Bare Singulars (BS) in BrP

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There is already a literature on Bare Singulars in BrP and it is not our aim to revise it here.⁷ In this section, we revise the relevant facts about bare nominals in this language. As we have already shown, only BrP has Bare Singulars. Schmitt & Munn (1999, 2002) were the first to argue that Chierchia's 98 parameter could not generate the BS in BrP. The authors claim that it denotes the kind; the nominal phrase is syntactically defective, and there is the projection of a null determiner that turns the predicate into the kind. Pires de Oliveira & Rothstein (2011) show that the BS cannot be an indefinite, as suggested by Müller (2002); it must denote the kind. They apply Carlson's tests to the Bare Nominals in BrP, and conclude that the BS denotes the kind. They compare, for instance, sentences as (14a) and (14b) show that the BS is not an indefinite:

(14)a. # Tem um cachorro em tudo quanto é lugar.

There is a dog all over the place.

b. Tem cachorro em tudo quanto é lugar.

There are dogs all over the place

⁷ Cf. Ferreira (in press)

(14a) is weird, because there seems to be a dog that is everywhere; (14b) says that for every place it is the case that there is at least one realization of the dog kind.

Schmidt and Munn (1999) and Pires de Oliveira and Rothstein (2011) agree that the BS in BrP denotes the kind, but they disagree about how this is possible. Schmidt and Munn argue that the Bare Singular is a count predicate; they suggest that it is an inclusive plurality and that the Bare Plural is an exclusive plurality. Moreover, they understand that the BS in BrP is defective syntactically, since there is no number projection. A null determiner turns the cumulative predicate into the kind. Pires de Oliveira and Rothstein (2011) argue that the BS is a mass noun that always denotes the kind. These approaches make different predictions concerning the BS in Quantity judgment tasks. If the BS is a count noun, only cardinal interpretation is expected, whereas if it is a mass noun, we expect that it has a non-cardinal interpretation (volume). Different experiments were developed in order to evaluate these predictions.⁸ The results do not support these theories, since it allows for both cardinal and non-cardinal interpretations.

A particularly relevant experiment Pires de Oliveira and Bevilaqua's (2020) replication of Scontras *et al's* (2017) methodology to BrP. They examined the reactions of Brazilian native speakers in quantity judgments tasks where the presence of the BS is compared to its absence:

- | | |
|------------------------------|-----------------------|
| (15) a. Quem tem mais livro? | (cardinal and volume) |
| Who has more book | |
| b. Quem tem mais? | (cardinal and volume) |
| Who has more? | |

There is no significative difference in the reaction of the speakers to the question with the Bare Singular (15a) and without any noun (15b): Brazilians oscillate between counting and measuring, even in a scenario where the number of individual books is greater than the volume. This is not the result Scontras *et al* found for English Bare Singulars. English speakers in the context where there is no noun, *Who has more?*, oscillate between cardinal and volume, but when they are asked to evaluate the question with the Bare Singular, *Who has more book?*, for instance, they do not oscillate, they massify or partition, as discussed before. The authors argue that English speakers oscillate in the absence of the noun, because there is no grammatical cue about atomicity. These results support the description in the last section: in English, the BS is interpreted by volume, because it is a singular predicate.

If this is so, Pires de Oliveira and Bevilaqua (2020) argue, then there is no grammatical cue for atomicity with the BS in BrP, since there is

⁸ See Bevilaqua (2019) for a review of the experimental literature.

no significative difference between the absence of the noun and the Bare Singular. This shows that the Bare Singular is neither mass nor count, the main idea in Pires de Oliveira (2020, in press). As we have already said, the author claims that English and BrP are number marking languages, but argues that they differ with respect to the direct accessibility of n_0 . In the last section, we summarized the approach. It relies on Rothstein (2010), where atomicity is a grammatical operation. Thus, the noun first projection, n_0 , delimitates a region in a non-atomic part-whole structure. It does not carry grammatical information about atomicity; it just gives information about a region in the part-whole domain. She suggests that in English atomicity is mandatory immediately after n_0 . In English, n_0 attracts atomicity. In BrP, the specifier attracts atomicity. The result is that, syntactically, there is no number projection in the BS phrase.⁹ The DP denotes the individual kind directly from n_0 , so it carries no grammatical information about atomicity, it carries only gender. The semantic derivation of the DP in (15a), for instance, is directly from the nominal projection to the individual:

$$(16) [[_{\text{DPe}} \cap [n_0 \text{livr}]]] = b_k$$

If there is no grammatical information about atomicity, one is free to understand (15a) as about units of books or about volume or pieces of books. These interpretations are “sub-specified”. In BrP, n_0 surfaces in argument position because atomicity is attracted by the specifier.

This proposal explains the contrast between the Bare Singular in BrP and in English when in Quantity tasks. In (17a), *table* is an atomic predicate and the only alternative is to be partitioned or to be compared the volume or the area. Crucially, it will not be counted, because grammar tells you this is an atomic predicate, as in (17b). In BrP, *mesa* is the name of a kind; there is no AtP, and the semantics gives you the part-whole relations in the region delimited by the noun, as represented in (17d). The grammar does not instruct whether one should count or measure these individuals. When interpreting (17c), the speaker is free to choose the unity of the comparison:

- (17) a. #Who has more table? (measuring)
 b. [n_1 AtP-SG [n_0 [\sqrt{N}]]]
 c. Quem tem mais mesa? (counting and measuring)
 d. [$_{\text{DPe}} \cap [n_0 [\sqrt{N}]]]$]

9 Schmitt & Munn (1999, 2002) assume that the BS is defective, and that there is number projection in the nominal phrase in BrP. Taveira da Cruz (2008) and Cyrino & Espinal (2011) assume the ambiguity view: the BS in BrP sometimes denotes the kind, and has no number projection, sometimes it is a singular predicate, projects number. This is a different theoretical account from the one proposed in this paper.

In the next section we explore the consequences of this proposal in contexts where the two languages behave alike, exploring a unitarian approach to the nominal phrase in BrP.

3.2 An unitarian approach

A straightforward account for BrP nominal system, which includes Bare Singulars, Bare Plurals, and the contrast between singular and plural definite article exemplified in (1) in the first section, is ambiguity. Rothstein & Pires de Oliveira (2020), for instance, argue that nouns in BrP are ambiguous as flexible nouns in English are. In English, *rope* is mass and *ropes* is count. Following this reasoning, *mesa* sometimes denotes little- n_0 ; sometimes the atomic predicate, $[n_1 \text{ AtP } [n_0 \text{ X}]]$. The singular/plural predicates would be generated as the singular/plural predicates in English. This ambiguity view is explored by Schmitt & Munn (2002), Taveira da Cruz (2008), Cyrino and Espinal (2011), among others. However, one might imagine that it is the “specifier” that carries the information about atomicity. In English the noun attracts the Atomic Phrase; in BrP, the specifier does that. Thus, although English Bare Plural and BrP Bare Plural, in (18a) and (18b), respectively, denote the set of closure of atomic sums, their derivational history is not the same. In BrP, the plural inflection attracts the nominal, n_0 . Crucially, there is no number projection above n_0 . This is represented below by starting the derivation from the inflection. In English, the noun attracts the AtP, thus it is always projected in the nominal phrase in English:

- (18)a. Quem tem mais mesa-s?
 b. $[n_1 [n_0 \text{ Noun } [\text{AtP } \text{-s PL}]]]$
 c. Who has more table-s?
 d. $[n_1 \text{-s PL } [\text{AtP } [n_0 \text{ Noun}]]]$

In English, n_0 projects atomicity, the plural inflection applies to it, as represented in (18d). In BrP, the plural inflection projects atomicity that has n_0 as its domain as in (18b). The system spins one way or the other. This very small change allows for Bare Singulars or not.

Following the same reasoning, atomization is carried by the definite article. Thus, the DP holds a place for the noun, whereas in English it combines with an AtP. The issue is the contrast in (1), repeated below for convenience:

- (19)a. O cachorro latiu a noite inteira.
 b. The dog barked all night long.
 c. Os cachorro(s) latiram a noite inteira.
 d. The dogs barked all night long.

Crucially, the sentences in (19a) and (19b) cannot be about sums, they are about singularities. As we have already said, one might postulate an ambiguity, but if we decide to assume the same design for the nominal phrases in BrP, then atomicity has to come from the determiner. Thus, *livro* denotes the non-atomic unspecified part-whole structure, n_0 . The suggestion is that the bifurcation between English and BrP is that in English, atomicity is projected immediately in the noun, whereas in BrP atomicity is a feature carried by specifiers. Here again the difference is on the derivational history, since the outcome is the same for the English definite phrase as in shown in (9) above, and for the definite phrase in BrP. Both denote the plural individual salient in the context. However, in BrP the noun is always sub-specified. Atomicity in BrP is a requirement of the definite article.

- (20) a. [_{DP} ι AtPSG] [n_0 root]
 b. [_{DP} ι AtPPL] [n_0 root]

Syntactically, it predicts that number is projected within the Determiner and then it is combined with the noun. Thus, it works like a presupposition, restricting the domain to atomic or plural sets of individuals. It is not our aim to discuss the semantics of the definite article, but the literature assumes that uniqueness is a presupposition of both the singular and the plural definite. The determiner attracts AtP, which adds another restriction to the singleton: it is the property of a singularity or the property of a plural individual. Here again the system spins around the specifier and the compound attracts the sub-specified noun.

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There is no doubt that a huge number of issues remain open. The system generates number marking languages that have Bare Singulars and Bare Plurals. In those languages, the noun, n_0 , is sub-specified, since atomicity is attracted by the specifier. In English, the noun, n_0 , is the attractor of atomicity. English gravitates around the noun, BrP around the specifier. The proposal explains the empirical facts that BrP and English are number marking languages, and that they differ with respect to the Bare Singular. Moreover, it argues for a unitarian approach for both languages.

4 Cross linguistic variation

The paper developed some consequences of assuming Pires de Oliveira (2020, in press) to explain the fact that BrP and English are number marking languages, since both have number inflection, distinguish mass and count nouns in the nominal domain, and singular and plural definite phrases. However, they contrast with respect to the Bare Singular. English does not accept it and BrP does. This contrast can be spotted in several places in these

languages. We argued for a modification of Chierchia's model theoretic account because it cannot explain a language like BrP: we distinguish between the denotation of the noun, n_0 , and the plural noun, in line with Rothstein (2010, 2017). Moreover, we argued that the bifurcation between English and BrP is that in English n_0 attracts atomicity, whereas in BrP the specifier does that. This movement allows number marking languages that have bare singulars and bare plurals, as Brazilian Portuguese. We have also argued that one may explain the nominal system in BrP without having to postulate an ambiguity between the bare singular and the singular atomic predicate. We presented steps in the direction of an unitarian approach.

The proposal needs to be further investigated. The notion of sub-specification, for instance, has been explored in the literature on semantic processing. The prediction is that the BS should impose no restrictions, whereas the BP should be penalized in mass contexts. Moreover, the investigation of other languages may give support to the approach. A number of indigenous languages in Brazil seem to be number marking languages with Bare Singulars and Bare Plurals (Lima & Rothstein 2020). This seems to be the case of Rikbaktsa (Macro-Jê), as described by Dellai *et al* (2021): a number marking language where atomicity is only in the determiner. This is a new field of investigation.

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