
Reference to Kinds in Brazilian Portuguese: Definite Singulars vs. Bare Singulars*

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Abstract

The paper explains the contrast between the generic readings of bare singulars (BSs) and definite singulars (DSs) in Brazilian Portuguese (BrP), which have so far gone unnoticed. BSs in BrP behave like kind-denoting bare plurals (BPs) in English: they may refer to non-well-established kinds, whereas DSs cannot, unless in a comparison context; conversely, DSs can occur in the object position of predicates such as *inventar* ‘to invent’, whereas BSs cannot. Although both DSs and BSs denote kinds in BrP (Schmitt & Munn 1999 among others, *contra* Müller 2002), they do so through different semantic mechanisms. Kind-referring DSs (in BrP as well as in English) are built by applying the *iota* operator to a property of kinds (Dayal 2004). Kind-referring BSs (in BrP) rely on Chierchia’s (1998) down operator, which can apply both to pluralities and to number-neutral expressions, yielding intensional maximal sets.

1 Introduction

The paper analyzes and explains the distribution of the generic readings of count bare singulars (BSs) and definite singulars (DSs) in Brazilian Portuguese (BrP), accounting *inter alia* for the following contrast:

- (1) # O pedreiro é preguiçoso
the bricklayer is lazy
‘The bricklayer is lazy’

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- (2) Pedreiro é preguiçoso
bricklayer is lazy
'Bricklayers are lazy'

In section 2, we provide some evidence that BSs in BrP may refer to kinds (in line with Munn & Schmitt (1999, 2005), Schmitt & Munn (2002), among others, and *contra* Müller (2002)). Section 3 presents the contrasting distribution of generic BSs and generic DSs; it is shown that generic BSs in BrP behave on a par with generic Bare Plurals (BPs) in English. In section 4, we adopt Chierchia's (1998) analysis of BPs and Dayal's (2004) analysis of DSs, which respectively rely on the Down operator and on an *iota* operator that applies to a property of kinds. In section 5 it is shown that the generic readings of BSs in BrP can be analyzed as relying on the Down operator. Section 6 is dedicated to the explanation of the examples introduced in section 3. In so doing, we are led to dispense with the notion of 'well-established' kind.

2 Bare Singulars in Brazilian Portuguese are names of kinds

Based on examples such as (3)-(5), Munn & Schmitt (1999), among others¹, proposed that generic BSs in BrP are names of kinds:

- (3) Baleia está em extinção
whale is in extinction
'Whales are on the verge of extinction.'
- (4) Computador foi inventado por Babbage
computer was invented by Babbage
'Computers were invented by Babbage.'
- (5) Rato foi introduzido na Austrália em 1770
rat was introduced In-the Australia in 1770
'Rats were introduced in Australia in 1770.'

These examples respectively show that BSs may combine with kind-predicates (see (3)), allow generic readings when appearing in the subject position of the passive form of *invent*-type verbs (see (4)), and allow generic readings in episodic contexts such as (5). All these contexts constitute reliable tests for names of kinds, which correlates with the fact that singular indefinites are either ungrammatical or else yield taxonomic readings.²

Further evidence for the kind analysis of generic BSs in BrP is related to the 'nomicity' constraint (Lawler (1973), among others). The examples below show that the generic

¹For instance Pires de Oliveira *et al.* (2006).

²For the relevant examples, see Dobrovie-Sorin & Pires de Oliveira (2007).

reading of an indefinite, which crucially relies on generic quantification, is allowed if the predicate expresses an essential/nomic property of the subject (sentence (6)), but blocked with non-essential properties, (sentence (7)):

(6) ? Um samba é polifônico
 a samba is polyphonic
 ‘A samba is polyphonic.’

(7) # Um samba é popular
 a samba is popular
 ‘A samba is popular.’

Example (9) shows that this constraint does not affect BSs in BrP, which indicates that their generic reading does not depend on generic quantification, but instead might be related to kind-reference:³

(8) Samba é polifônico
 samba is polyphonic
 ‘Sambas are polyphonic.’

(9) Samba é popular
 samba is popular
 ‘Sambas are popular.’

3 BSs and DSs: two ways of referring to kinds

This section shows that although in BrP both BSs and definite singulars (DSs) denote kinds, they do not behave in exactly the same way. Moreover, the contrast between BSs and DSs in BrP is parallel to the contrast between bare plurals (BP) and DSs in English.

3.1 BSs and DSs in Brazilian Portuguese: some differences

With respect to the tests used in section 2, DSs show the same behavior as BSs: they can combine with kind predicates; when appearing in an episodic context, they engender generic readings; and, finally, they allow a generic interpretation when combined with a non-essential property. However, as observed by Müller (2002), BSs and DSs contrast in certain other contexts:

(10) Garrafa de Coca-Cola tem gargalo estreito
 Bottle of Coca Cola has neck narrow
 ‘Coca Cola bottles have narrow neck.’

³Note the similar contrast between singular indefinites and bare plurals in English (see the translations).

- (11) A garrafa de Coca-Cola tem gargalo estreito
 the bottle of Coca Cola has narrow neck
 ‘The Coca Cola bottle has narrow neck.’
- (12) Garrafa azul tem gargalo estreito
 Bottle blue has neck narrow
 ‘Blue bottles have narrow neck.’
- (13) # A garrafa azul tem gargalo estreito
 the bottle blue has neck narrow
 ‘The blue bottle has narrow neck.’

Sentences (10) and (11) can be interpreted generically, because Coca-Cola is a ‘well established kind’ (Krifka *et al* 1995). Compare *garrafa azul* ‘blue bottle’, which does not refer to a well-established kind. The contrast between (12), which is interpreted generically, and (13), which does not have a generic reading when uttered out-of-the-blue,⁴ indicates that DSs can refer only to well-established kinds, whereas this constraint does not hold for BSs, which may refer to kinds regardless of the lexical properties of the NP (noun or noun + modifier) they are built with.

Another observation made by Müller (2002) is that the BS is not possible in the object position of a kind predicate such as *inventar* (‘to invent’), and *descobrir* (‘to discover’), whereas the DS is allowed:

- (14) a. * Graham Bell inventou telefone
 Graham Bell inventou telephone
 b. * Alexander Fleming descobriu penicilina
 Alexander Fleming discovered penicillin
- (15) a. Graham Bell inventou o telefone
 Graham Bell inventou the telephone
 b. Alexander Fleming descobriu a penicilina
 Alexander Fleming discovered penicillin

3.2 BSs in BrP are like BPs in English

The differences between BSs and DSs illustrated above parallel similar differences between BPs and DSs in English. As reported in Krifka *et al* (1995), “bare plural NPs like *green bottles* and bare [mass] singular NPs like *gold which is hammered flat* (which do not refer to well-established kinds) can take generic readings, whereas DSs like *the*

⁴In section 6 below, we show that (13) can be interpreted generically in a context of comparison.

green bottle can only take an object reading” (1995: 11). Moreover, BPs cannot occur in the object position of *invent*-predicate; examples from Krifka *et al* (1995: 70):

- (16) a. Shockely invented the transistor.
 b. ??Shocke invented transistors.

4 Intensional maximal sums of individuals and atomic kinds

In this section, we will adopt the currently assumed analysis, according to which English BPs involve Chierchia’s Down operator. Regarding the analysis of kind-referring DSs, we adopt Dayal’s (2004) proposal that kind-referring DSs rely on an *iota* operator that applies to a property of kinds. Given this differentiated analysis, generic DSs and generic BPs in English (and more generally ‘singular kinds’ and ‘plural kinds’) can be viewed as referring to ‘atomic kinds’ (modeled as groups) and intensional maximal sums, respectively.

4.1 The down operator

According to Chierchia’s analysis (1998: 351), kind-referring BPs are obtained via the Down operator, defined as an intensional iota operator that applies to a property of pluralities and yields the largest member of its extension (in a given world/situation):

- (17) For any property P, world/situation s [and set of kinds K]⁵
- $$\hat{\cap}P = \begin{cases} \lambda s \iota P_s, & \text{if } \lambda s \iota P_s \text{ is in } K \\ \text{Undefined} & \text{otherwise} \end{cases}$$

Where P_s is the extension of P in s.

Thus, a sentence such as (18a) has the logical form in (18b), where $\hat{\cap}$ Dogs denotes the sum of all the individual dogs in any possible world:

- (18) a. Dogs are intelligent.
 b. Intelligent ($\hat{\cap}$ Dogs)

Chierchia’s down operator cannot account for kind-referring definite singulars, because by definition, this operator cannot apply to singular properties: “if P is a singular property (i.e., a property true of just singularities), ιP_w will necessarily be a singular

⁵In Chierchia (1998:350), K designates the ontological domain of kinds: “for simplicity’s sake, let us assume that such individual concepts are members of the domain of individuals.” The necessity of assuming a domain of kinds seems inconsistent with Chierchia’s explicit rejection of an enriched ontology.

individual (when defined). Since kinds, as understood here, cannot have a singular instance in every world, “ \cap ” will not be defined for singular properties.” (1998: 351).

4.2 The *iota* combined with a property of kinds

For kind-denoting definite singulars, we follow Dayal’s (2004) proposal, in which these expressions rely on the standard *iota* operator. The difference between kind-referring and particular definite descriptions is due to the type of nominal predicate to which the *iota* operator applies: when applied to properties of objects, it returns a particular individual, and when applied to properties of kinds, it yields a kind. This analysis relies on an enriched ontology that contains kinds,⁶ in addition to particular individuals, among the primitive entities of the domain.

According to Dayal, an important difference between particular individuals and kinds is that the domain of particulars is an unordered set, whereas kinds belong to a taxonomic hierarchy, ordered by the part-whole relation ‘ \leq ’. Thus, the singular noun *whale* refers either to particular individuals that are whales, assembled in an unordered set, or to the atomic kind WHALE, which is part of a taxonomic semi-lattice.

The *iota* operator has a uniqueness requirement that is satisfied if the set denoted by the nominal predicate is a singleton. For kinds, this requirement is that the domain of quantification does not include sub-kinds of the relevant type. The super kind is unique: it denotes the only taxonomic entity in the domain that has the whale property. Thus, the sentence *The whale is on the verge of extinction* is interpreted as (19a); the domain of quantification is the set of taxonomic entities, (19b), and the extension of the predicate *whale* is (19c):

- (19) a. Be-on-the-verge-of-extinction (ιX [(whale (X))])
 b. $D = \{\text{DOG, LION, WHALE, MAN}\}$
 c. $[[\text{whale}]] = \{\text{WHALE}\}$

5 Back to Brazilian Portuguese: Number neutrality and the Down operator

No doubt, DSs in BrP behave exactly like DSs in English, and Dayal’s proposal may cover both languages. But generic bare singulars cannot receive the same analysis for at least two reasons: (i) in all the languages that have an overt definite article, the *iota* must be overtly realized as a definite article; (ii) kind-referring bare singulars in BrP consistently behave unlike DSs and on a par with English BPs. The latter observation

⁶Because Chierchia refrained from enriching the ontology, he attempted to construct atomic kinds not as primitive entities in the domain, but rather as groups derived from mass-entities. For convincing criticism of Chierchia’s analysis see Dobrovie-Sorin & Pires de Oliveira (2007).

strongly suggests that BSs in BrP should be analyzed as relying on the down operator. The problem is that Chierchia's down operator cannot, in principle, apply to BSs in BrP, because, at least superficially, BSs are singular, and by definition, the down operator cannot apply to singular properties. This problem is solved as soon as we recall that on their existential readings, BSs are number-neutral (Munn & Schmitt (1999)): since by Chierchia's (1998) own definition, the down operator can apply to any kind of predicate other than a predicate of singularities, nothing prevents it from applying to predicates that hold of both singularities and pluralities.

5.1 BSs in BrP are number neutral

For lack of space, we cannot review the evidence showing that existential BSs in BrP are number-neutral.⁷ Let us merely illustrate this generalization by one example:

- (20) a. Eu vi criança na sala
I saw child in-the room
b. E ela/elas estava/estavam ouvindo
and she/they was/were listening
'I saw a child/children in the room. And she was/they were listening.'

Sentence (20a) can be true in a situation in which there is one or more than one child in the room, which shows that the bare singular is unspecified for number. As pointed out by Munn & Schmitt (2005: 825), number neutrality is better indicated by the fact that the bare singular may be resumed with both a singular and a plural pronoun, as shown in (20b). Compare the bare plural, which can only be resumed with a plural pronoun.

It can also be shown that reference to mass entities has to be distinguished from number-neutral reference (contra Chierchia (1995, 1998)). In particular, bare mass nouns in BrP behave differently from count BSs (Munn & Schmitt (1999) and Müller & Paraguaçu (2007)). The difference between the two types of bare singulars can be characterized in terms of their respective denotational domains: the domain of mass nouns differs from that of count nouns insofar as it does not contain minimal parts (Bunt (1985), Landman (1989, 1991), Link (1989)); number-neutral count nouns, on the other hand, can be defined as denoting sets that contain both atoms and pluralities. This means that the count vs. mass distinction is a lexical distinction (which exists even in Chinese, as argued by Doetjes (1997) and Cheng & Sybesma (1999), contra Chierchia (1995, 1998)).⁸ As to the morphosyntactic analysis, the 'null hypothesis' is that in the Lexicon, nouns (regardless of whether they are mass and count) are 'bare', i.e., they lack functional

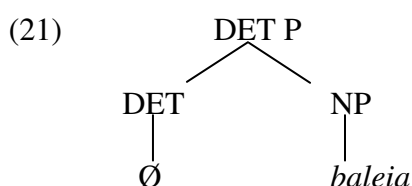
⁷See for instance Schmitt & Munn (2002), Müller & Paraguaçu (2007), among others.

⁸Doetjes (1997) showed that Chinese count nouns and mass nouns do not allow the same type of classifiers. Cheng & Sybesma (1999) were thus led to conclude, against Chierchia (1998), that the difference between Chinese and other languages cannot be stated as a semantic parameter regarding the type of noun, but rather as a morphosyntactic parameter regarding presence or lack of number morphology on nouns.

information such as Number or Determiner. In other words, all count nouns are number-neutral in the Lexicon, before the morphosyntactic category of Number is added to them (Munn & Schmitt (1999, 2005 among others). Singular and plural Number signal semantic operations over number neutral denotations: Singular Number suppresses all the pluralities in the set, maintaining only the atomic individuals, while Plural Number selects all the pluralities (Müller (2002), Müller & Paraguaçu (2007)). The presence of Number is not always visible to the naked eye: while in BrP, the suffix *-s* can be safely assumed to correspond to Plural Number, its absence does not necessarily correspond to Singular Number, but may also correspond to absence of the category of Number (interpretable as number neutrality). In BrP, and more generally in Romance languages, Singular Number is unambiguously signaled only on (indefinite or definite) articles and demonstratives.

5.2 The syntactic structure of BSs in BrP

Strictly speaking, a count ‘bare singular’ taken out of the Lexicon is not singular, but rather a ‘bare NP’, i.e., a nominal constituent that lacks Number. The parameter that separates BrP from the other Romance languages is that it allows a null Det to govern a bare NP, thus allowing BSs to occur in argument positions.⁹ More concretely, we will follow Munn & Schmitt (1999) in assuming that in BrP, bare singulars are DPs headed by a null Det, with no NumP projection:¹⁰



A very similar proposal is found in Cheng & Sybesma (1999), who analyze Chinese bare nouns as Cl(assifer) Phrases headed by a null Cl that governs an NP. Given Munn & Schmitt’s (1999, 2005) analysis, BrP and Chinese BSs share the option of not projecting the functional category of Number, but they differ insofar as in BrP, Number may be projected when Det is null (this is the case with BPs) and must be projected when Det is overtly realized as a definite article.

5.3 Number-neutral existential readings and the Down operator

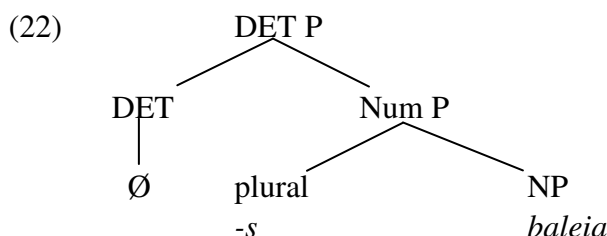
In the configuration in (21), the count NP is not governed by Num, and as such it denotes a number-neutral property, to which the null Det applies. The function denoted by a null

⁹In the other Romance languages, e.g., Spanish, Romanian and possibly also Italian, BSs show a highly restricted distribution, which arguably indicates that in these languages BSs are not DPs, as in Br P, but rather pseudo-incorporated bare NPs (Dobrovie-Sorin & alii (2005, 2006)).

¹⁰Since Agr(eement) is not relevant here and because we want to stay neutral as to whether it heads its own syntactic projection or not, this functional head does not appear in (21).

Det that applies to number-neutral properties depends on the context: in existential contexts, the null Det denotes a choice function (Reinhart (1997), Winter (1997)) that yields a number-neutral entity; in generic contexts, it is interpreted as a Down operator. Although Chierchia does not extend the application of the Down operator to number neutral domains (nor to mass domains),¹¹ such an application comes for free, given his own definition of the down operator: since this operator picks up the maximal sum in a given domain, it is irrelevant whether the domain contains atoms, in addition to pluralities. Similarly, if the Down operator applies to domains that contain amounts of matter (as is the case for bare mass nouns), it yields the maximal intensional amount in the domain. Thus, mass, plural and number-neutral BNs show a three-way distinction for their existential readings, but are alike in generic contexts, where they yield names of kinds in exactly the same way, as the result of the application of the down operator. Although this analysis of kind-referring BSs in BrP seems straightforward, it was not proposed by Munn & Schmitt (2005). To the best of our knowledge, Cheng & Sybesma (1999) is the only place where the analysis proposed here was suggested *in passing*: unlike lexical CIs, which have an individualizing function, the null CI has – according to Cheng & Sybesma – only a ‘deictic’ function, i.e., it is a type-shifting operator that applies to a property and yields a non-individualized entity, e.g., a random amount of matter, a random number-neutral sum of individuals or an intensional maximal sum (i.e., a name of kind).

Our analysis directly explains why generic BSs in BrP behave on a par with generic BPs in English: just like BPs, they denote intensional maximal sums. Compare DSs which, in both English and BrP, denote atomic/taxonomic kinds obtained via an iota operator. English BPs differ from BSs in BrP insofar as Number is projected :



The difference in syntactic structure between BPs in English and BSs in BrP yields different readings in existential contexts: whereas BSs in BrP may refer either to a plurality or to an atom, BPs in English can refer only to pluralities. In a generic context, however, no difference in interpretation arises, because the Det-position is filled by the Down operator, yielding the maximal sum in the domain, regardless of whether the domain contains atoms or not.

¹¹Chierchia wrongly assimilates number-neutrality and mass denotation (for arguments against such an identification, see Doetjes (1997) and Cheng & Sybesma (1999) for Chinese and Munn & Schmitt (2005) and Müller & Paraguaçu (2007) for BrP) and proposes that mass/number-neutral BNs directly denote kinds, without recourse to the Down operator.

6 Explaining the differences between BSs and DSs in BrP

In this section, the restrictions on kind-referring DSs are shown to follow as consequences of the hypothesis that these expressions denote atomic kinds, which belong to a taxonomy of kinds. The notion of ‘well-established kind’ is dispensed with and its empirical coverage is explained in terms of atomic kinds. In order to account for the fact that BPs cannot occur in the object-position of *invent*-type verbs we distinguish kinds from prototypes: DSs can refer to both, whereas BPs in English and BSs in BrP can only refer to kinds (viewed as intensional maximal sums).

6.1 ‘Well-established’ kinds

As in English, kind-referring DSs in BrP seem to require reference to ‘well-established kinds’. Thus, sentence (24) is unacceptable as a generic statement about the kind, because there is no well-established bricklayer kind. (23) is fine, because *o homem* (‘the man’) belongs to the well established class that contains, *inter alia*, MAN, DOG, ... :

(23) O homem é inteligente
the man is intelligent
‘The man is intelligent.’

(24) * O pedreiro é inteligente
the bricklayer is intelligent
‘The bricklayer is intelligent.’

Since BSs refer to intensional maximal sums, which can be built from any kind of plural or number-neutral expression, there is no need for the existence of a ‘well-established’ kind. This explains why kind-referring BSs are not sensitive to the well-established-kind constraint:

(25) Pedreiro é preguiçoso
bricklayer is lazy
‘Bricklayers are lazy.’

6.2 Contrastive sets

Let us now observe that (24) becomes acceptable if the common noun bears contrastive focus, as in (26) (capital letters indicate that the expression is focalized), or if it is in an explicitly contrastive environment, as in example (27):

(26) O PEDREIRO é inteligente
the bricklayer is intelligent
‘The BRICKLAYER is intelligent.’

- (27) O pedreiro, e não o construtor, é inteligente
 the bricklayer, and not the builder is intelligent
 ‘The bricklayer, not the builder, is lazy.’

These examples are acceptable because contrastive focus and explicit contrast are means of contextually supplying a taxonomy of kinds: the bricklayer is contrasted with another ‘kind’, building a ‘taxonomy’. The facts observed here can be subsumed under Kay’s (1971) proposal that an entity qualifies as a sub-kind, if and only if it belongs to a contrast set. Since a contrast set can be contextually provided, any common noun is expected to denote an atomic kind, given an appropriate context.

Insofar as it has any empirical content, the restriction to ‘well-established kinds’ follows as a consequence of the necessity of a taxonomy: in the absence of context manipulation, the required taxonomy is part of the Lexicon of a given language.

6.3 Intersective vs. Classifying Modifiers

The examples below, which contain DSs built with modified nouns, show that the existence of a contrast set is not sufficient for a DS to be able to refer to a kind: blue bottles contrast with non-blue bottles, just as Coca Cola bottles contrast with non-Coca Cola bottles:

- (28) A garrafa de Coca-Cola tem gargalo estreito
 the bottle of Coca Cola has neck narrow
 ‘The Coca Cola bottle has narrow neck.’
- (29) # A garrafa azul tem gargalo estreito
 the bottle blue has neck narrow
 ‘The blue bottle has narrow neck.’

There is, however, an important difference between the way in which the relevant contrast sets are built. The division between blue and non-blue bottles is obtained by putting together the objects that are both bottles and blue (i.e., the meaning of *blue bottle* is built of two intersective object-level properties). Compare the class of Coca Cola bottles: it includes all the objects that are Coca Cola bottles, but in this case the Coca Cola property cannot be viewed as an intersective property of objects: it does not mean ‘containing Coca Cola’, it does not even mean ‘object designed for containing Coca Cola’,¹² because it cannot apply to objects in general, but only to bottles. In other words, a modifier that belongs to a DP that refers to an atomic kind is a classifying rather than an intersective property.

¹²These observations were inspired by Beyssade’s (2006) following remark: well-established manufactured kinds refer to a class of objects defined by other properties than being a bottle and containing Coca Cola. Analyzing the same type of example in French, she argues that *bouteille de Coca-Cola* ‘Coca Cola bottle’ is not compositionally understood, precisely because it refers to a kind.

6.4 Kinds vs prototypes

As Beyssade (2005) suggests for the corresponding French example built with a definite plural, the unacceptability of (14a), **Graham Bell inventou telephone* ‘Graham Bell invented telephone’, is due to the fact that the BS *telefone* ‘telephone’ denotes the maximal sum of telephones, and it is not possible to invent a sum of individuals, but only the prototype (an atomic individual), hence the acceptability of DSs. The same reasoning accounts for the impossibility of English BPs to appear as objects of *invent*.

But why is it that the passive is fine (the same happens in English), as shown by example (4), *Computador foi inventado por Babbage* ‘Computer was invented by Babbage’? In the subject position of a passive sentence *computador* (‘computer’) is the topic of the generalization. This is a characterizing sentence that attributes the stable property of having-been-invented-by-Babbage to the kind/intensional maximal sum of computers and the sentence is acceptable because this property is relevant for the history of the kind. Compare the example in (14a): because the BS occupies the direct object position, it cannot function as a Theme, and therefore, this example cannot be analyzed as a characterizing sentence about the kind telephone, but only as an episodic sentence referring to the particular event of inventing a prototype.

7 Conclusion

Kind-referring DSs denote primitive entities in an enriched ontology. The label ‘taxonomic kind’ introduced by Dayal points to the fact that such primitive entities are classes that belong to a taxonomy of classes rather than classes built by putting together all the objects that have in common object-level properties (be they simple or complex properties, obtained by intersecting several object-level properties), which is the way in which kind-reference is obtained via the Down operator. It should be stressed that the ontological notion of ‘primitive/taxonomic kind’ is strictly correlated to a certain type of nominal expression: the *iota* operator applies to an NP that refers to a property of kinds and any modifier embedded inside the NP denotes a classifying rather than an intersective property. If the language is manipulated in such a way that a given NP or a given nominal modifier satisfies these conditions, reference to a primitive/taxonomic kind will be allowed. This means that the notion of ‘primitive/taxonomic kind’ should not be viewed as a language-independent ontological notion: primitive kinds are not given out-there, but are language-dependent. In other words, the language creates rather than reflects its ontology.

Kind-referring BSs denote intensional maximal sums, obtained by applying the down operator to a number-neutral domain, i.e., a domain that contains both atomic and plural objects. In this case, then, the common noun denotes a property of objects (rather than a property of kinds, as is the case with DSs, which refer to primitive kinds), which explains

why the generic use of bare singulars does not require a taxonomy of kinds. The fact that the Down operator can apply to a number-neutral property, which has gone unnoticed in the previous literature (with the notable exception of Cheng & Sybesma (1999)), follows from its very definition: since the down operator picks up the maximal sum in the lattice, it is irrelevant whether the lattice contains atoms in addition to pluralities/sums. In sum, the down operator is free to apply not only to plural properties (as in Chierchia (1995, 1998)), but also to mass properties (as in Dayal (2004)), and to number-neutral properties.

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