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ON DEFINITE KINDS[•]

1. Introduction

A central topic in the literature on genericity is how different types of languages refer to kinds. In this respect, a well-established assumption, since Carlson (1977/1980), is that bare plurals (BPs) in English (E) allow for a generic use, a reading that arises because BPs are taken to denote a particular type of entity: names of kinds of things. This view reflects the fact that BPs in E may occur as arguments of generic sentences (with kind-level and individual-level predicates).

However, a still unresolved and poorly understood phenomenon is the question why E also allows the use of definite generics, as pointed out by Carlson (1977/1980:274-280) and Chierchia (1998:379-383):

(1) a. *The owl* is common/widespread/fast disappearing/often intelligent.
         (Carlson 1977/1980:276, (32a))
     b. *Owls* are common/widespread/fast disappearing/often intelligent.
         (Carlson 1977/1980:276, (32b))

In this paper we will challenge the standard assumption that the generic or kind reading for NPs is basically modeled over pluralities (Chierchia 1998), and we will focus on so-called 'singular' definite generics as in (1a).

We will defend the following hypotheses:

H1. All languages that have Determiners (null or overt) have **definite kinds**, a possibility which does not prevent languages from using other means to refer to kinds (e.g. bare plurals in E).

H2. **Kinds are referred to by definite DPs with no Number involved**. We will provide empirical support for this hypothesis based on a contrastive analysis of two languages that show opposite strategies for marking definiteness: Spanish (S), a Romance language with articles, which does not allow for generic BPs (Laca 1990; Dobrovie-Sorin and Laca 1996, 2003), and Russian (R), a Slavic language with no article.

H3. In these languages the **subkind interpretation is built on Number,** the idea being that in combination with i(ndividual)-level predicates and k(ind)-level predicates argument selected DPs type-shift its reading from $<e^o>$ to $<e^{sk}>$, otherwise the interpretation crashes.

The prediction we make in this paper is that languages that have (null or overt) Determiners do not differ with respect to definite generics: they all have them. However, we think that languages differ a lot in the domain of pluralities (cf. Farkas and de Swart 2007).

2. The kind interpretation
2.1. The definite generic *The N* according to Carlson

Carlson distinguishes between two classes of individuals: objects and kinds. Objects can occupy one place at a time. Kinds may function in such a way as to be in many places at a given time. Kinds also serve to tie objects as well as stages together to make them manifestations of the same type of thing. Objects only serve to tie stages together, and never other objects. Unlike kinds, objects cannot have stages that appear at various distinct places at a given instant.

We interpret this view as corresponding to an extensional view of kinds, which can be represented in a semi-lattice structure (2), where the kind corresponds to the highest node in the lattice.

(2)
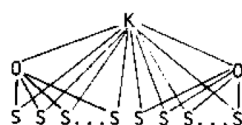

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K = kind
O = object
S = stage
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(Carlson 1980:69)

According to Carlson, semantically, there is a great deal of similarity between the definite generic and the bare plural. Indeed, he claims that *the owl* and *owls* behave entirely in parallel.

(3) a. *The owl* has two eyes in the front of its skull.
     b. *Owls* have two eyes in the front of their skull.
         (Carlson 1980:276, exs. (31))

Let us consider in more detail the definite generic vis-à-vis the bare plural. Carlson takes both to be NPs that denote the property set of a kind. He claims that the definite generic appears to share most (but not all, apparently) of the individual-level properties of the bare plural that corresponds to it. The definite

generic is much more limited in the sorts of NP's it may productively occur in than the bare plural, the latter being virtually unbounded [in E]. Referring to E, he claims that the former is subject to such constraints because the species cannot be 'too general'. He also regards the definite generic as a proper name of a kind: in the light of the fact that it takes the definite article, this makes it seem to be much closer syntactically to proper names, as many proper names have as a part of the name the definite article as well (*The Hague, The Mississipi, The Bronx,* etc.). According to this view the definite generic appears to be more name-like than the bare plural in several respects, but Carlson attributes to both definite generics and bare plurals a name-like status.

Our reservations to Carlson's analysis are the following. First of all, even if we consider the intensional counterpart of *owls* as denoting the intension of a set (i.e., a function that picks out all existent owls in any possible world at any given time), it seems to us that *the owl* cannot denote in the same way the intension of a set. The denotation of plural nominal expressions appears to be quite different from the denotation of definite kinds.

Secondly, Carlson highlights a number of similarities between bare plural kinds and definite kinds, but never addresses the question of what the relevant differences between them might be. We argue that these expressions have different denotations relying on the presence or absence of number.

In the account that we are going to propose in this paper, we rather follow Jespersen (1927), who characterizes the definite generic as denoting the species itself. Plurals, on the other hand, denote all members of the species.

We will also rely on the hypothesis that there is no ambiguous Determiner. Romance languages may show overt Determiners preceding proper names. The syntactic form and semantics of this definite Determiner is the same as for definite kinds, where an overt Determiner precedes a common noun. We will come back to this hypothesis in Section 3.

2.2. Singular generic *The* according to Chierchia

In Cherchia's proposal, kinds are "individual concepts of a certain sort: functions from worlds (or situations) into pluralities, the sum of all instances of the kind" (Chierchia 1998:349). Kinds are derived from properties by the down operator $^\cap$, which is defined as follows (Chierchia 1988:351):

(4) For any property P and world/situation s,

$$^\cap P = \begin{cases} \lambda s \; \iota \; P_s, \text{ if } \lambda s \; \iota \; P_s \text{ is in K (set of kinds);} \\ \text{undefined, otherwise} \end{cases}$$

(i.e., the down operator maps each world to the greatest element in the extension of P in this world).

Under this view, the representation of the BP kind-denoting NP *owls* is as in (5):

(5) $^\cap OWL = o$

By contrast, singular generic NPs with the definite article *the* (like *the owl*) pick out a group individual which do not allow any reference to its members. This accounts for the fact that these nominal expressions cannot combine with predicates that require a count interpretation (cf. (6a) and (7a)). In this respect, definite kinds show a contrast with 'regular' bare plural kind NPs, as shown in (6):

(6) a. *The owl is numerous.
     b. Owls are numerous.
(7) a. *The Jones family is numerous.
     b. The members of the Jones family are numerous.

According to Chierchia, the semantic derivation of singular generic NPs is complex and proceeds with the following two steps, as illustrated in (8):

(8) a. Step1: a MASS operator applies to the denotation of a singular count noun like *owl* to produce MASS(owl). It has a mass reference, i.e. it applies both to atomic owls and pluralities of owls.
     b. Step2: the iota-operator applies, but its semantics is different for count and mass noun denotations (Chierchia 1998:380):

$$THE \; P = \begin{cases} \iota P, \text{ if } P \text{ is a count noun denotation} \\ g(\iota P), \text{ if } P \text{ is a mass noun denotation} \\ \text{(where } g \text{ is a function from pluralities into groups)} \end{cases}$$

The resulting representation of the definite kind NP *the owl* is given in (9):

(9) the owl $\Rightarrow$ THE(MASS(owl)) = g(ι MASS(owl))

It should be noted that, according to the analysis of Chierchia, both "the sums of all instances of the kind" (bare plural kinds) and groups (definite singular kinds) are atomic, although they have different internal structures. But we think that this, in fact, poses a conceptual problem, since kinds denoted by BPs seem to have a dual nature: on the one hand, they are assumed to represent "the sums of all instances" or "the largest plurality" and, on the other hand, kinds constitute a subset of atomic entities in the semi-lattice structure.

Apart from this, we have an empirical objection to Chierchia's analysis. It should be observed that we do not normally find generic *the*-NPs in episodic sentences (as noted by Chierchia himself, but also Krifka 2004).[1] Given that the definite article in his analysis is basically assumed to be ambiguous (cf. (8b)), it is unclear how to rule out the kind reading in (10):

(10) The owl hunted/was hunting a rat this morning.

In the account that we are going to develop in this paper, we assume that BNs do not have to be shifted into a mass reading to derive a kind interpretation and we argue that definite kinds do not rely on the notion of plurality at all. Furthermore, we treat the definite D uniformly as the iota operator without encoding any sort of ambiguity. With regard to the empirical problem posed in (10), we rely on the hypothesis that definite kinds do not combine with stage level predicates, as will be explained in the next section.

3. The denotation of nominal expressions and definite kinds

Let us start with the assumption that the canonical syntactic structure (Chierchia 1998, Longobardi 2001, Zamparelli 1995) for nominal expressions in languages with number morphology and determiners is that given in (11):

(11) [$_{DP}$ D [$_{NumP}$ Num [$_{NP}$ N]]]

This tripartite syntactic organization schema is not, however, the only possible one, since nominal structures may lack a Number specification (12b), a Determiner (12c), or both (12a).

(12) a. [$_{NP}$ N]
     b. [$_{DP}$ D [$_{NP}$ N]]
     c. [$_{NumP}$ Num [$_{NP}$ N]]

Therefore, we have to consider three additional syntactic structures in 12(a-c) that emerge from this schema and which have been postulated respectively for (i) bare count nominals (BNs) in object position in several Creole and Romance languages (Déprez 2005, Dobrovie-Sorin et al. 2006); (ii) singular expressions occurring in subject position in languages such as Brazilian Portuguese (Munn and Schmitt 2005); and (iii) existential BPs in object position in languages such as Catalan, Romanian and S (Dobrovie-Sorin and Laca 1996, 2003; Dobrovie-Sorin et al. 2006). The fact that these different syntactic possibilities exist does not imply that languages necessarily have predicates that select for these different types of nominal expressions (see below in this section). We think that semantic arguments are basically of two types: individual objects or kinds, but the four structures in (11) and (12) offer more possibilities and, therefore, additional mechanisms are needed in natural languages to match the requirements of the predicate with the meaning of the nominal expression it combines with.

Let us focus on the semantics of (12a) in contrast to (12b). We start from the assumption that of the four nominal structures in (11) and (12), the 'least marked' one (see Swart and Zwarts 2009) is the representation in (12a), which corresponds to BNs when occurring as objects of verbs and as objects of prepositions, the situation illustrated for S in (13).

(13) a. Este profesor   tiene *libro*.
        this professor has   book
        'This professor has a book/ has published.' (It could be one book, or more than one)
     b. Estuvieron en *prisión*.
        were   in prison
        'They spent time in prison.' (It may have been more than one prison)

Note that these BNs, in object position of Vs and Ps, have a number neutral interpretation, as suggested by the glosses (see Espinal 2010, Espinal and McNally 2011), and hence do not have inherent number. Therefore, we follow the hypothesis that they are morphologically unmarked for Number, and do not require a Num projection in syntax (see Munn and Schmitt 2005 for a similar claim with respect to Brazilian Portuguese).

Besides Num, BNs in S also lack a Determiner. Several arguments support this claim: (i) BNs can occur neither in subject position (which is possible in BrP; Munn and Schmitt 2005, Müller 2002) nor as indirect objects, and (ii) cannot be assumed to move to a strong D° position (as postulated for canonical arguments in Italian by Longobardi 1994, 2001) because BNs are not associated with a marker of determined atomic reference.

We assume that the denotation of bare common count nouns, corresponding to structure (12a), is a property. More specifically, we assume that the BNs in (13) denote properties of kinds of individuals that share the property denoted by the Noun (Espinal and McNally 2007, 2011; Dobrovie-Sorin and Pires de Oliveira 2007).

Definite nominals may have either the structure in (11) or the one in (12b). We postulate that the latter is the one that corresponds to definite kinds, while the former corresponds to definite singular or plural individual objects.

Let us start with by considering the minimal pair in (14a-b), as discussed in Espinal (2010).

(14) a. Tener *gripe (porcina)*.
         have flu   swine
         'To have swine flu.'
     b. Tener *la   gripe (porcina)*.
         have the flu   swine
         'To have the swine flu.'
     c. *Tener las   gripes porcinas.
         have   the.PL flu.PL swine.PL

In (14a) 'have–flu' or 'have–swine flu' ('swine flu' being a subtype of 'flu') is a characterizing predicate of the external subject, in the sense that it adscribes a complex property of 'having (swine) flu' to it. In (14b) the definite D conveys a generalization and denotes the kind/class of viruses known as *la gripe porcina* 'the swine flu'; this definite D does not refer to the set of entities which belong to the kind, but rather names the kind itself, as proved by the fact that this nominal expression cannot occur in a definite plural form (14c). This example shows that definite kinds have no Number associated with them[2].

Furthermore, only the definite expression *la gripe (porcina)* (but not the BN) can occur in subject position of a kind–selecting predicate like *estar por todas partes* 'to be widespread', as shown in the minimal pair exemplified in (15).

(15) a. *La gripe porcina* está   por   todas   partes.
         the flu   swine   is   around every   parts
         'The swine flu is widespread.'
     b. *Gripe   porcina está por   todas partes.
         flu   swine   is   around   every parts

The meaning of bare count nouns, as denoting PROPERTIES OF KINDS OF INDIVIDUALS of type $<e^k,t>$ (Espinal and McNally 2007, Espinal 2010) is represented in (16b), where the superscript k indicates a kind–level individual x.

(16) a. [$_{NP}$ N]
     b. ⟦N⟧ = $\lambda P \lambda x^k [P(x^k)]$ b'. $<e^k,t>$ properties of kinds

The definite D is formally translated as the iota–operator (Partee 1987), which combines with a property to give an entity–denoting expression, the atomic KIND (x^k). It is crucial to note that the iota–operator in this analysis binds variables of kinds, which syntactically correspond to definite nominal expressions not marked for Number. Therefore, structure (12b), repeated here as (17a), corresponds to what we name *definite kinds*, not singular definite kinds or singular generics.

(17) a. [$_{DP}$ D [$_{NP}$ N]]
     b. ⟦D N⟧ = $\lambda P \iota x^k [P(x^k)]$ b'. $<e^k>$ kind denotation

Recall that we rely on the hypothesis that there is no ambiguous Determiner. Romance languages may show overt Determiners preceding proper names. The syntactic form and semantics of this definite Determiner is the same as for definite kinds, where an overt Determiner precedes a common noun.

An argument in support of the syntactic-semantic correlation just made relies on speakers judgements about possible discourse relationships. Properties of kinds cannot introduce discourse referents, while kind denoting expressions can. The examples in (18) illustrate the fact that kinds are referred to in discourse by means of token discourse anaphors (like the Catalan third person accusative clitic *el*), whereas BNs introduce properties, and reference to them in discourse is only possible by means of a type anaphor (like the Catalan property-type anaphoric clitic *en*).

(18) CATALAN
     a. Alguna cosa   va   exterminar *el dodo*, però què *el /*   #*en* va
         some   thing PAST   exterminate the dodo but what it.ACC / PROP PAST
         exterminar?
         exterminate
         'The dodo was exterminated by something, but what was it?'
         (Espinal 2010: note 19)
     b. Avui porta   *faldilla*. Li   *'n* vam   regalar   una l'any   passat.
         today wear.3SG skirt   to.her PROP PAST.1PL give.present   one the.year last
         'Today she is wearing a skirt. We gave her one as a present last year.'
         (Espinal and McNally 2011:ex.(17))

With these assumptions in mind, our main theoretical **claim** is that a definite determiner, standardly interpreted as the iota operator ι, is responsible for instantiating a kind-denoting expression if, and only if, it applies directly to a Noun. Crucially, **no Number** is involved in the composition of a **definite kind** interpretation.

Let us now consider what happens when a syntactic projection that encodes Number is present. If **Number** is available, we assume that it relates properties of kinds to properties of objects, singular or plural, of that kind. It correlates with Carlson's (1977) realization relation R (cf. Déprez 2005), although for him R is a two-place relationhip between stages and individuals.

(19) a. ⟦Num$_{[-PL]}$ N⟧ = $\lambda P \lambda x^k \lambda y^o [P(x^k) \wedge R(P(x^o), P(x^k))]$ $<e^o,t>$ properties of objects

b. $[\![\text{Num}_{[+\text{PL}]} \, \text{N}]\!] = \lambda P \lambda x^k \lambda y^o \, [P(x^k) \wedge R(*P(x^o), P(x^k))]$

In addition, the **iota operator** has a uniform semantics and applies either to properties of kinds (17b) or to properties of objects of this kind (20b). In the former case the output is a kind entity, in the latter case the output is an object entity.

(20) a. $[_{\text{DP}} \, \text{D} \, [_{\text{NumP}} \, \text{Num} \, [_{\text{NP}} \, \text{N} \,]]]$

b. $[\![\text{D Num N}]\!] = \lambda P \lambda x^k \iota x^o \, [P(x^k) \wedge R(P(x^o), P(x^k))]$ b'. $<e^o>$ object denotation

We therefore claim and postulate that the difference between two types of entities, kinds and objects, initially proposed by Carlson, is morphosyntactically encoded.

As for **predicates**, we assume the following typology: (i) kind-level predicates select for $<e^k>$ arguments, (ii) individual-level predicates may select for $<e^k>$ or $<e^o>$, and (iii) stage-level predicates only select for $<e^o>$. A model based on this predicate typology predicts the possibility to use a kind-referring definite NP with k-level and i-level predicates, as illustrated in (21).

(21) a.   The blue whale *is the largest mammal* in the world.

b.   The blue whale *lives* in all oceans, mainly in the Artic and the Antarctic.

However, a s-level predicate makes it impossible to interpret the subject DP as a kind. In order to make a generic statement with a s-level predicate the sentential operator GEN is required (Krifka et al. 1995). This type of abstract operator is what guarantees the appropriate interpretation for (22).

(22) A blue whale *eats* an average of three tones of food a day.

This approach predicts that a distinction is to be made in natural languages between **definite kinds** (no Number projection in syntax, selected by k-level predicates and possibly also by i-level predicates), and **(in)definite generics** (Number projection in syntax, GEN operator, selected by s-level predicates). And, more important, this difference in meaning is morphosyntactically encoded.

4. Definite kinds in Spanish

The model we have just presented straightforwardly accounts for the S data in (23). Note that a kind-denoting subject is allowed with both k- and i-level predicates. If a *singular* definite DP subject is combined with either an i-level or a s-level predicate, then the existence of a unique individual object is to be inferred.[3]

(23) a.   *El dodó* se   extinguió   en el   siglo   XVII.   **k-level**; $[_{\text{DP}}\text{D} \, [_{\text{NP}}\text{N} \,]]$
        the dodo CL   extinguished in the   century   XVII
        'The dodo was extinct in the XVII century.'

b.   *El dodó* vivió en la   isla   Mauricio.   **i-level**; $[_{\text{DP}}\text{D}[_{\text{NP}}\text{N}]]$ or
        the dodo lived in   the isle   Mauritius $[_{\text{DP}}\text{D}[_{\text{NumP}}\text{Num}[_{\text{NP}}\text{N}]]]$
        'The dodo lived in Mauritius Island.'

c.   *El dodó* fue disecado en el   Museo   Ashmolean.   **s-level**;
        the dodo was dissected in the   museum Ashmolean $[_{\text{DP}}\text{D}[_{\text{NumP}}\text{Num}[_{\text{NP}}\text{N}]]]$
        'The dodo was dissected in the Ashmolean Museum.'

Our claim that there is no Number involved with the kind-referring DP subject is supported by the following piece of data:

(24) a.   *La nevera* se   inventó   en el   siglo   XVIII.
        the fridge   CL   invented.3SG   in   the century XVIII
        'The fridge was invented in the XVIII century.'

b.   **Las (dos) neveras* se inventaron…
        the   two   fridges   CL invented.3PL
        '*The (two) fridges were invented…'

The ungrammaticality of (24b) supports the correlation we make between definite kinds and absence of morphosyntactic Number. In other words, as already mentioned in the previous section, in the absence of any explicit evidence for semantic or morphosyntactic Number in subject DP position, we assume the minimal hypothesis that there is no Number projection. **Definite kinds are numberless.**

Now, if Number is assumed to relate properties of kinds to properties of objects of that kind (as presented in Section 3), the next question that we have to answer is how we can account for Number (singular and plural) in DP structures that refer to subkinds like the following? Note that the DPs in (25a,b) contain either a demonstrative or a numeral.

(25) a.   *Esta ballena* está   en peligro de extinción.   **subkind**
        this whale   is   on verge of extinction $[_{\text{DP}}\text{D}[_{\text{NumP}}\text{Num}_{[-\text{PL}]} \, [_{\text{NP}}\text{N}]]]$
        'This whale is on the verge of extinction.'

b.   *Dos ballenas* están   en peligro de   extinción.   **subkind**
        two whales   are   on verge of   extinction $[_{\text{DP}}\text{D}[_{\text{NumP}}\text{Num}_{[+\text{PL}]} \, [_{\text{NP}}\text{N}]]]$
        'Two whales are on the verge of extinction.'

c.   *La   ballena* está   en peligro de   extinción.   **kind**
        the whale   is   on verge   of   extinction $[_{\text{DP}}\text{D} \, [_{\text{NP}}\text{N}]]$
        'This whale is on the verge of extinction.'

One important difference between (25a-b) and (25c) is that in the former a lexical item such as *clase, tipo* 'kind', a kind-noun (Zamparelli 1995), can always be inserted.[4] With the definite kind DP this possibility is discarded.

(26) a. Esta *clase* de ballena está en peligro de   extinción.
          this kind of whale   is   on verge   of extinction
          'This kind of whale is on the verge of extinction.'

     b. Dos *tipos* de ballenas están en peligro de extinción.
          two kinds of whales   are   on verge   of extinction
          'This kind of whale is on the verge of extinction.'

     c. *La clase de ballena está en peligro de extinción.
          the kind of whale   is   on verge   of extinction

Going back to example (24b), it is interesting to note that it can only be turned into a grammatical sentence if a noun that names kinds of things is overtly specified. Example (27) necessarily conveys a taxonomic interpretation.

(27) Las dos *clases* de neveras se inventaron …
       the two   kinds of fridges CL invented.3PL
       'The two kinds of fridges were invented…"

The morphosyntactic DP structure corresponding to the examples in (26) and (27) is the maximal one, containing both Number and Determiner, as represented in (20b) and with the semantic type in (20b').

Let us now consider the problem posed by the data in (25a-b). It is obvious that an $<e^o>$-type object denotation cannot combine in a straightforward way with a k-level predicate like *estar en peligro de extinción* 'to be on the verge of extinction', unless a semantic operation of type shifting guarantees that the expression denoting individual entities (i.e. *esta ballena, dos ballenas*) is turned into a class-denoting expression, mainly a subkind. Provisionally, we propose the operation in (28)[5].

(28) *Type-shifting to subkinds*
      $<e^o> \rightarrow <e^{sk}>$

      Condition: when an individual object is the semantic argument corresponding to a selected k-argument of a k-level or an i-level predicate.

This type-shifting operation, conceived as a last resort process, guarantees an appropriate semantic composition for the sentences in (25a,b). It also predicts that an example such as (29) only allows a subkind interpretation, even in the case the speaker holds a specific iPod computer in his hand.[6]

(29) Steve Jobs inventó *este iPod*.
       Steve Jobs invented this   iPod
       'Steve jobs invented this iPod.'

The operation stated in (28) predicts the possibility of obtaining a subkind reading when a Number projection, either singular or plural, is overt and a Determiner projection, either an (in)definite or a demonstrative, is also overt, but the semantics of the DP cannot combine with the selecting requirements of the VP predicate.

The conclusion to be drawn is that **both subkinds and kinds require a D** projection, a definite D in the case of kinds and an (in)definite D in the case of subkinds. But, in addition, **subkinds are built on Number,** either singular or plural.

The final contrast we would like to point out for a Romance language like S, as has already been claimed for French (Beyssade 2005), is that definite kinds must be distinguished from maximal sums or maximal sets. Let us consider (30).

(30) a. *La   ballena* está en peligro de extinción.   **kind**
          the whale   is   on verge   of extinction
          'All whales are on the verge of extinction.'

     b. *(Todas) las ballenas* están en peligro de extinción.   **maximal sum**
          all   the whales   are   on verge of extinction
          'All whales are on the verge of extinction.'

The definite DP in subject position in (30a) corresponds to a definite kind. It denotes neither an individual atomic reference nor a sum of atoms; it denotes the name of a kind, the name of the property denoted by the Noun *ballena* 'whale'. By contrast, the definite plural DP in subject position in (30b) is ambiguous: it may either refer to the **maximal sum of individuals** which instantiate the kind, or the **maximal sum of subkinds** of the kind *ballena* 'whale'. This last claim suggests a possible alternative to our account in (28) for subkind interpretation. In particular, it could be that Number is responsible for two possible outputs: either properties of objects, as represented in (19), or properties of subkinds, as represented in (31) (cf. Zamparelli 1995), thus suggesting that Number is ambiguous.

(31) a. $[\![Num_{[-PL]} N]\!] = \lambda P \lambda x^k \lambda y^{sk} [P(x^k) \wedge R(P(x^{sk}), P(x^k))]$ $<e^{sk}, t>$ properties of subkinds
     b. $[\![Num_{[+PL]} N]\!] = \lambda P \lambda x^k \lambda y^{sk} [P(x^k) \wedge R(*P(x^{sk}), P(x^k))]$

Disambiguation between (19) and (31) will come up at the time of meaning composition, when the requirements of the predicate will be attended.

5. Definite kinds in Russian

In this section, we show how our analysis extends to R. As we argue below, in the absence of an overt determiner, R has the same type of defnite kind-referring expressions as S, both from a syntactic and a semantic viewpoint.

Consider first the set of representative examples in (32). Just like in S, if what looks like a bare subject *dront* 'dodo' is selected by either a k-level (32a) or an i-level (32b) predicate, its interpretation corresponds to a kind denoting entity. But reference to an individual object is allowed with an i-level predicate, as shown in (32b), and required with an s-level predicate, as in (32c).

(32) a. *Dront*   ischez   s   lica   zemli   v XVII veke.   **k-level**;
  dodo   disappeared   from surface of.earth   in XVII century $[_{DP}D [_{NP}N]]$
  'The dodo was extinct in the XVII century.'

b. *Dront*   ne   umel   letat.'   **i-level**;
  dodo   not   know.pst   fly $[_{DP}D [_{NP}N]]$ or
  'The dodo could not fly.' $[_{DP}D[_{NumP}Num[_{NP}N]]$

c. *Dront*   byl raschlenen   v   muzee   Ashmola.   **s-level**;
  dodo   was dissected   in   museum   of.Ashmol $[_{DP}D[_{NumP}Num[_{NP}N]]$
  'The dodo was dissected in the Ashmolean museum.'

These two interpretations of the subject (i.e. $<e^k>$ and $<e^o>$) follow from our assumptions laid out in Section 3, especially from the syntax-semantics mappings of the nominal expressions in combination with the typology of predicates.

Next, we argue that kind-referring subjects in R involve a null Determiner, which encodes the ι operator in the examples in (32). In making this claim we rely on previous work by Pereltsvaig (2006, 2007) who provides convincing arguments in favour of the Universal DP hypothesis by showing that both DP structures and QP/NP structures are available in R and the difference between them is syntactically and semantically motivated. In this paper, we follow Pereltsvaig in assuming that the DP structure is available in R, even though no overt article is used to realize the D projection.

Among the diagnostics proposed by Pereltsvaig (2006, 2007) to distinguish between NP and DP structures in R are the following: (i) DPs, but not NPs, allow for the expression of specificity; (ii) DPs, but not NPs, allow for the expression of quantity; (iii) DPs, but not NPs, control PRO, anaphora and trigger agreement.

We use one of these diagnostics, namely, pronoun and anaphora control, to show that kind-referring subjects have a DP structure. As shown in (33) below, kind-referring subjects can be antecedents for personal and reflexive pronouns:

(33) a. *Panda*   nahodit'sja   na   grani ischeznovenija.
  panda   is.found   on   verge extinction.GEN
  Ona   javljaetsja   oficial'nym simvolom   vsemirnogo   fonda dikoj   prirody.
  she   appears   official   symbol   world   fund wild   nature
  'The panda is on the verge of extinction. It is the official symbol of WWF.'

b. *Slon*   skoro   budet   zanesen   v   Krasnuyu   Knigu esli
  elephant soon   will   listed   in   red   book   if
  na *nego* ne   perestanut ohotit'sja.
  on him   not   stop   hunt
  'The elephant will soon be listed in the IUCN Red List if people don't stop hunting it.'

c. *Dront*   ischez   s   lica   zemli   potomu chto   ne   mog
  dodo   disappeared from   surface   of.earth   because that   not   could
  zaschitit' *sebja*   ot   napadenija.
  protect   self   from attacks
  'The dodo was extinct because it could not protect itself from being attacked.'

In contrast, a property-type BN, even when morphologically specified for plural number, does not allow for pronominal reference:

(34)   Ja   budu   ballotirovat'sja v   *presidenty*. *Ih/*Ego   vybirajut raz   v   shest'   let.
  I   will   run   for presidents. *They/Him elect   once   in   six   years.
  'I wil run for president. The president is elected once in six years'

We take examples in (33) to support the DP status of kind-referring subjects. We therefore claim that the semantic representation of the kind-referring subjects in (32) and (33) involves the ι operator (i.e. a covert definite article) and its syntactic representation involves a DP projection, just like in the case of definite kinds in S (see (17) above, repeated in (35)):

(35) a. $[_{DP} D [_{NP} N]]$
b. $[\![D N]\!] = \lambda P \iota x^k[P(x^k)]$ b'. $<e^k>$ kind denotation

Having argued for the presence of D, we now turn to illustrate that there is no Number involved in kind-referring expressions. Supporting evidence for the absence of Number in the denotation of kinds is given in the following example, which illustrates that numerical expressions are incompatible with definite kinds:

(36) *Dva dronta   ischezli   v   XVII veke.
     two dodos   disappeared in XVII century
     '??Two dodos disappeared in the XVII century'

This example illustrates that if Number is imposed on nominal expressions that refer to species, the output is ill-formed, even when a taxonomic reading is intended. Hence, we conclude, that a kind-referring expression is incompatible with number, both syntactically and semantically.

Note, however, that in R it is possible to use an overt demonstrative pronoun to modify a kind-referring subject, as in (37a). Such an example only allows a taxonomic (subkind) interpretation, similar to (37b), which involves the lexical noun *vid* 'type':

(37) a. *Etot*   dront   ischez   v   XVII veke.
         this.SG   dodo   disappeared in   XVII century
         'This dodo disappeared in the XVII century.'
     b. *Etot*   *vid* dronta   ischez   v XVII veke.
         this.SG type   dodo.GEN.SG   disappeared   in XVII century
         'This type of dodo disappeared in the XVII century'

Unlike in S, this taxonomic interpretation is not available with numerals in R (cf. the ungrammatical example in (36)). Numerals in this language must pattern with lexical items such as *vid, tip, class* 'type, kind, class', which cannot directly combine with a kind-referring expression, as shown in (38c). For S, this last phenomenon was illustrated in example (26). However, the lexical items referring to classes in R occur freely with demonstrative pronouns and numerals, as shown in (38a) and (38b).

(38) a. Etot   vid   kita/kitov   ischez   s   lica   zemli
         this.SG   type. SG   whale.GEN. SG/GEN.PL   disappeared   from   surface   of.earth
         sovsem   nedavno.
         just   recently
         'This type of whale has become extinct only recently'
     b. Dva   vida   kitov   ischezli   s   lica   zemli
         two   type. GEN.PL whale. GEN.PL   disappear   from   surface   of.earth
         sovsem   nedavno.
         just   recently
         'Two types of whales has become extinct only recently'
     c. *Vid   kita   ischez   s   lica   zemli   sovsem   nedavno.
         type   whale   disappeared from   surface   of.earth   just   recently

In our analysis, a subkind interpretation is built on Number, either singular or plural, as the examples in (37) and (38a,b) properly illustrate for R. In these examples, we see the overt number agreement on the noun in Genitive case.

It is interesting to observe that in more traditional analyses of R nominals, demonstrative pronouns, as well as quantifiers and numerals, are taken to be 'actualizers', i.e. the elements that, in the absence of articles, actualize a common noun or, in other words, the elements that indicate a referential status of a common noun (Padučeva 1985).

We interpret these elements, actualizers, as functions that are 'parasitic' on number. According to our hypothesis, number corresponds to a semantic function that maps properties of kinds to properties of individuals. If actualizers are referential indicators, they can appear only in those configurations where number is involved, because they indicate the referential status of individual objects.

Crucial to our argumentation is the fact that definite kinds are incompatible with the presence of overt morpho-syntactic actualizers of any type. We interpret this fact as supporting our conclusion that all actualizers rely on the presence of Number in morphology, syntax and semantics.

Finally, we would like to consider the contrast in (39):

(39) a. *Kit*   nahoditsja   pod   ugrozoj ischeznovenija   **kind (ι)**
         whale   is.found   under   danger   of.extinction
         'The whale is in danger of extinction.'
     b. Vse   *kity*   nahodjatsja   pod   ugrozoj   ischeznovenija   **maximal sum**
         all   whale.pl   are.found   under   danger   of.extinction
         'All the whales are in danger of extinction.'
     c. *kity*   nahodjatsja   pod   ugrozoj   ischeznovenija   **kind ($\cap$)**
         whale.pl   are.found   under   danger   of.extinction
         'Whales are in danger of extinction.'

The subject in (39a) corresponds to what we have called a definite kind and is parallel to the S example in (30a). In the case of (39b), the plural subject shows the same type of ambiguity as in the corresponding S example in (30b). In particular, *vse kity* 'all whales' can either refer to a maximal sum of individuals instantiating the whale kind or the maximal sum of subkinds of whales (the blue whale, the white whale, etc.). Finally, (39c) contains a bare plural in subject position, which does not have any correspondence in S, but correlates with a mass-like interpretation of bare plural kind-referring expressions, like in E.

We take (39a) and (39c) to indicate that languages can have two ways to refer to kinds: either by means of definite kinds, which have been the object of our analysis in this paper, or by means of bare plurals, a discussion of which is outside the scope of this paper. It seems that R, like E, can employ both means, whereas in S, only definite kinds are possible. Note that, according to the nominal mapping parameter of Chierchia (1998), both E and R belong to the type of [+arg, +pred] languages, whereas S, as well all the other Romance languages, is of the type [-arg, +pred]. We think that Chierchia's typology, at least at first sight, correlates nicely with the possible ways of referring to kinds that a language allows for. Assuming that bare plurals are derived by Chierchia's $\cap$ operator, it follows that [-arg, +pred] languages cannot have bare plurals in argument positions unless a D is applied. Both R and E, however, have an option of referring to kinds by means of bare plurals. We find this observation very interesting but we will have to elaborate on this idea in future research.

6. Conclusions and predictions

Our proposal, based on the general assumption that the difference between object entities $<e^o>$ and kind entities $<e^k>$ relies on the presence or absence of Number in the structure of nominal expressions, has several consequences.

Our first prediction is that **definite kinds cannot combine with predicates that encode plurality**, like, for instance, *gather*, *be numerous*, etc. Chierchia (1998:381) make a similar observation, but his explanation of this phenomena is different from ours and relies on the presence of a MASS operator (see (8) above).

(40) a.	*The	tiger	gathered	in the jungle
b.	*El	tigre	se reunió	en la selva
	the	tiger	CL gather	in the jungle
c.	*Tigr	sobralsja	v dzungljah	
	tiger	gathered.REFL	in jungle.PL	

Our explanation of this fact relies on the absence of Number in the syntactic and semantic representation of definite kinds. In the absence of a projection that encodes Number, the subject cannot agree with a predicate that requires plurality. In contrast to numberless definite kinds, plural definite DPs, which, according to our proposal, denote maximal sums of individuals, are fine in this position:

(41) a.	The	tigers	gather	in the jungle.
b.	Los	tigres	se reúnen	en la selva.
	the.PL	tiger.PL	CL gather	in the jungle
c.	Vse	tigry	sobirajutsja	v dzungljah.
	All	tiger.PL	gather.REFL	in jungle.PL

The second consequence of our analysis is that **definite kinds cannot trigger a generic interpretation with s-level predicates**, because they are not selected by this type of predicates:

(42) a.	The	tiger	ate	in the jungle.
b.	El	tigre	comió	en la selva.
	the	tiger	ate	in the jungle
c.	Tigr	poel	v dzungljah.	
	tiger	ate.PERF	in jungle.PL	

The subject of the three examples in (42) can only have an individual reference. The contrast between (42) and (43) shows that a generic (or habitual) interpretation with a s-level predicate is independent of the definite DP in subject position, but is related to the presence of a generic operator instantiated by means of the present tense:

(43) a.	The	tiger	eats	in the jungle
b.	El	tigre	come	en la selva
	the	tiger	eats	in the jungle
c.	Tigr	est	v dzungljah	
	tiger	eat.IMPERF	in jungle.PL	

Our third prediction is that **definite kinds and definite plurals have different interpretations** in the languages that we have considered. Definite plurals are not to be interpreted as denoting kinds, but the maximal sum of individuals that satisfy the property denoted by the noun (Beyssade 2005).

The fourth consequence of our analysis is that we expect **all languages that have Determiners (null or overt) to have definite kinds**. However, as we noted at the end of the previous section, nothing prevents languages from using other means to refer to kinds, as, for instance, bare plurals in E (Carlson 1980, Chierchia 1998) and in R. Our hypothesis is that the availability of bare plurals depends on the semantic status of the nominal expressions in a language, in accordance with the Nominal Mapping Parameter (Chierchia 1998).

In particular, languages whose nominal expressions are [-arg, +pred], like S, always require a Determiner (null or overt) to realize a semantic argument, and definite kinds are one sort of semantic argument. On the other hand, languages whose nominal expressions are [+arg, +pred], like E and R, in

addition to definite kinds, also allow for bare plurals as kind arguments, because they can derive an argument interpretation by means of the $^\cap$ operator. This means that Germanic and Slavic languages show two means to express kinds in the nominal domain: the ι operator, that corresponds to D, and the $^\cap$ operator, that corresponds to Num$_{[+PL]}$, whereas Romance languages can only rely on the ι operator.

Finally, it should be noted that our proposal comes closer to the analysis of Dayal (2004) in treating the definite article uniformly as a ι operator and in assuming that there are two ways to refer to kinds, by means of ι or by means of $^\cap$. However, in Dayal's approach, definite kinds are singular, whereas we argue that they are numberless. Dayal takes definite kinds to be syntactically singular, although conceptually based on pluralities. In our approach, definite kinds are the basic entities derived by a direct application of the ι operator to the property of kind denoted by a common noun. There is no plurality involved in the denotation of definite kinds, neither conceptually nor grammatically.

Another crucial difference is that in order to derive a subkind (taxonomic) interpretation of nominal expressions, Dayal relies on the hypothesis that "common nouns […] systematically denote properties of ordinary individuals or properties of sub-kinds" (p.424). We do not derive the taxonomic reading by building an ambiguity into the denotation of the common noun or into the determiner: the presence or absence of Num does this work.

To match the syntax and semantics of nominal expressions, we commit to stricter mapping rules. In particular, if the interpretation requires the ι operator, we assume that it is reflected in syntax by the presence of D projection. Thus, unlike Dayal, we argue that definite kinds in R do involve a null determiner and that Number is independent of D.

As for crosslinguistic differences, Dayal attributes the difference between E and Romance languages to different lexicalization patterns. In particular, in E the $^\cap$ operator is not lexicalized, whereas in Romance languages the definite article is said to lexicalize both the ι and the $^\cap$ operators. In contrast, we attribute the difference between E and Romance languages to Chierchia's typology of nominal reference, which blocks the application of the $^\cap$ operator in Romance altogether. According to our analysis, in S kind nominal expressions corresponding to E bare plurals are absent, and definite plurals do not refer to kinds but to the maximal sum of individuals satisfying the property denoted by the noun. By contrast, in R neither $^\cap$ nor ι are lexicalized, but there is syntactic and semantic evidence of the existence of these operators.

References

AGUILAR-GUEVARA, Anna; ZWARTS, Joost (2010), Weak definites and reference to kinds. In: Li, N.; Lutz, D. (Eds.), Proceedings of SALT 20: p. 179-196.

BEYSSADE, Claire (2005), Les définis génériques en français: noms d'espèces ou sommes maximales. In: Dobrovie–Sorin, C. (ed.), *Noms nus et généricité* : p. 33–63. Paris: Presses Universitaires de Vincennes.

CARLSON, Greg (1977), *Reference to kinds in English.* PhD dissertation. University of Massachusetts at Amherst. Published in New York: Garland. 1980.

CHIERCHIA, Gennaro (1998), "Reference to kinds across languages", *Natural Language Semantics* 6, 339–405.

DAYAL, Veneeta (2004), "Number marking and (in)definiteness in kind terms", *Linguistics and Philosophy* 27-4, p. 393-450.

DÉPREZ, Vivian (2005), "Morphological number, semantic number and bare nouns", *Lingua* 115: p. 957–883.

DOBROVIE–SORIN, Carmen; BLEAM, Tonia; ESPINAL, M. Teresa (2006) "Bare nouns, number and types of incorporation". In: Vogeleer, S., Tasmowski, L. (Eds.), *Non–definiteness and plurality*: p. 51–79. Amsterdam: John Benjamins, Linguistics Today.

DOBROVIE-SORIN, Carmen; PIRES DE OLIVEIRA, Roberta (2007), "Reference to kinds in Brazilian Portuguese: bare singulars vs. definite singulars", Paper presented at *Sinn und Bedeutung*, Oslo.

ESPINAL, M.Teresa (2010), "Bare nominals in Catalan and Spanish. Their structure and meaning", *Lingua* 120: p. 984-1009.

ESPINAL, M.Teresa; MCNALLY, Louise (2007), "Bare singulars: Variation at the syntax-semantics interface", *Workshop on Bare nouns and nominalizations.* Stuttgart: University of Stuttgart.

ESPINAL, M.Teresa; MCNALLY, Louise (2011), "Bare nominals and incorporating verbs in Catalan and Spanish", *Journal of Linguistics* 47: p. 87-128.

FARKAS, Donca; DE SWART, Henriiëtte (2007), Article choice in plural generics. *Lingua* 117: p. 1657-1676.

JESPERSEN, Otto (1927), *A modern English grammar.* Heidelberg: Carl Winter'sUniversitätbuchhanlung.

KRIFKA, Manfred (2004), "Kinds of Kind Reference: Bare Plurals – Ambiguous or Not?", *Proceedings of Semantics and Linguistic Theory (SALT)* XIII: Seattle: University of Washington.

KRIFKA, Manfred; PELLETIER, Francis Jeffry; CARLSON, Greg; TER MEULEN, Alice; CHIERCHIA, Gennaro; LINK, Godehard (1995) "Introduction", In Carlson, G., Pelletier, J.F. (eds.). *The Generic Book*: p. 1-124. Chicago: The University of Chicago Press.

LANDMAN, Fred (1989), "Groups, I" *Linguistics and Philosophy* 12-5: p. 559–605.

LONGOBARDI, Giuseppe (1994), "Reference and proper names", *Linguistic Inquiry* 25: p. 609–665.

LONGOBARDI, Giuseppe (2001), "How Comparative is Semantics? A unified parametric theory of bare nouns and proper names", *Natural Language Semantics* 9: p. 335–369.

Munn, Alan; Schmitt, Cristina (2005), "Number and indefinites", *Lingua* 115: p. 821–855.
de Swart, Henriëtte; Zwarts, Joost (2009), "Less form – more meaning: why bare singular nouns are special", *Lingua* 119-2: p. 280–295.
Padučeva, Eleva Viktorovna (1985), *Vyskazyvanije i ego sootnesennost' s dejstvitel'nostju*. Moskva: Nauka.
Pereltsvaig, Asya (2006), "Small nominals", *Natural language and Linguistic Theory* 24-2: p. 433-500.
Pereltsvaig, Asya (2007), "On the Universality of DP: A View from Russian", *Studia Linguistica* 61-1: p. 5-38.
Zamparelli, Roberto (1995), *Layers in the determiner phrase*. PhD Dissertation. University of Rochester. Published in New York: Garland. 2000.

Notes

[1] Krifka actually notices that the group semantics might explain the use of definite generics in sentences like *The American customer bought 74.000 BMWs last year* or *The rat reached Australia in 1770*. In *The Generic book* these examples are analyzed as collective predications which attribute important properties of members of the group to the group, although we don't see how this interpretation would work for the first example (i.e., members of the group of American customers bought 74.000 BMWs????). Chierchia (1998:379) discusses a similar example (??*The tiger is roaring in the zoo*), where he comes up with a context to save the example.

[2] There is a nice parallel in Russian for this type of examples. Consider the contrast in (i):

    (i)   a.   U nih svinoj gripp
                at them swine.SG flue.SG
                'They have swine flue'
          b.   *U nih svinye grippy
                at them swine.PL flue.PL

The interpretation of (ia) is that for each individual referred to by the pronoun, the property of having swine flue applies. Normally, this distributive interpretation requires plural marking, as shown in (ii). However, since *svinoj gripp* denotes a property of kinds but not of individual objects, plural marking in (ib) is not possible.

    (ii)   a.   U nih novaja mashina
                at them new.SG car.SG
                'They have a new car.' (one for all, collective interpretation)
          b.   U nih novye mashiny
                at them new.PL car.PL
                'They have new cars.' (one car per person, i.e. distributive interpretation)

[3] Note that (23b) is ambiguous between the definite kind reading, associated with a DP structure that does not project Number, and a definite singular plus a taxonomic reading, the latter two associated with a DP structure that projects Number. We will come back to the taxonomic reading below.

[4] See also Carslon (1977/1980:26) for a specific reference to English names of kinds of things.

[5] See also Aguilar-Guevara and Zwarts (2010) for a kind lifting rule that shifts transitive verbs (or verb-preposition combinations) from an object-level meaning to a kind-level meaning, although we do not share with these authors the hypothesis that weak definites refer to kinds.

[6] It seems that there is an additional puzzle that appears to be related to the presence of a demonstrative. In examples like (29) an additional interpretation is available: the one that refers to representative instantiations of the subkind. This observation is also true for Russian demonstrative determiners, discussed in the next section.