

On the Existential Force of Bare Plurals Across Languages

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1. Introduction

Bare plurals across languages can be associated with existential quantificational force. In the neo-Carlsonian account of Chierchia (1998), there are two distinct sources for this. One is the low ranked \exists -type shift of Partee (1986), which comes into play when the higher ranked *nom* and *iota* are unavailable. The other is the basic kind level meaning for bare plurals, where \exists force comes into existence as a result of sort-adjustment by the rule of Derived Kind Predication (DKP), in the spirit of Carlson (1977). Noun phrases shifted by \exists are marked by the ability to take scope over other operators. Noun phrases that tap into DKP are characterized by obligatory narrow scope with respect to other operators. This paper re-examines both sources of existential force and presents a new perspective on them.

Canonically, bare plurals allow reference to kinds but there are some that do not. \exists -type shift is posited by Chierchia for bare plurals that are not kind denoting. In this paper, a hitherto overlooked distinction among such bare plurals is noted. It is shown that while one set indeed shows scopal flexibility, as expected under Chierchia's analysis, the other set does not. It is argued that allowing \exists -type shift for even the first set is not viable when a larger set of facts is taken into account. Alternative ways of achieving the same effects are proposed, to compensate for eliminating \exists -type shift from the set of covert options available to bare plurals.

The paper then turns to the more familiar class of bare plurals, those for which Chierchia maintains a kind-based approach and uses DKP to obtain existential readings. New diagnostics are presented to show that the narrow scope existential readings imputed to bare plurals are not sufficient to capture the full range of their behavior. In order to accommodate these new facts, \exists quantification is eliminated from DKP. Bare plurals in episodic contexts are argued to refer to a

unique maximal entity, defined over a widened domain. The so-called \exists readings are claimed to be “representative group readings” of such maximal entities.

The end result of the investigation, then, is to do away with both sources of \exists force for bare plurals. Doing away with \exists -type shift pushes Chierchia’s original formulation of the hierarchy of covert type shifts to its logical limits, where only the two operations that he classifies as meaning preserving are available in natural language. Doing away with \exists quantification in DKP further delinks the alignment between bare plurals and indefinites in favor of aligning bare plurals with definites, pushing further a view proposed in Dayal 2004. Treating bare plurals as involving no quantification of any kind, as de facto definites, appears quite radical. But I build up to this conclusion incrementally, inviting the reader to go along with me as far as they can. The hope is that even if no part of the new proposal proves persuasive, the empirical motivations behind it will re-energize the bearers of the standard view to look at an old problem from a new angle.

I introduce in section 2 the theoretical framework of Chierchia (1998), within which I develop my account of bare plurals. In section 3, I draw attention to a distinction among bare plurals that do not denote kinds, and show why they are problematic for current accounts. In section 4, I capture the distinction by modifying the presuppositions associated with kind formation and by eliminating \exists -type shift from the grammar. In section 5, I look at kind denoting bare plurals and, on the basis of new data, argue against incorporating \exists in DKP and in favor of treating bare plurals as definites over a widened domain. In section 6, I consider some issues raised by the shift in perspective argued for and suggest lines for further inquiry.

2. Bare plurals in Chierchia’s Neo-Carlsonian approach

Chierchia (1998) put on the research agenda the goal of developing a theory of cross-linguistic variation in the domain of noun phrases. The impact of this paper has been phenomenal and the response to it has transformed the empirical landscape, informing and deepening our understanding of the interpretive possibilities available across languages. In this section I will

present the key ingredients of his theory, making explicit the background against which I will undertake the reanalysis of bare plurals.

The basic premise of the neo-Carlsonian position is that bare plurals refer to kinds, not only in the case of kind-level predication but also in the case of object-level predication, as originally proposed in Carlson (1977). Their quantificational force, however, is governed by the same principles that Lewis (1975), Kamp (1981) and Heim (1982) demonstrated govern the quantificational force of regular indefinites.¹ In a generic statement, for example, a bare plural can have either (quasi) \forall force or \exists force, depending on whether it is interpreted in the restrictor or the nuclear scope. In an episodic statement, which does not have a tripartite logical structure, bare plurals are necessarily mapped into the nuclear scope and so have \exists force.

Chierchia takes this general approach a step further and proposes a cross-linguistic theory of noun phrase variation. Within the general perspective of flexible types (Partee 1986), he admits three basic operations for turning an NP with a predicative meaning (type $\langle e, t \rangle$) into an argument (type $\langle e \rangle$ or $\langle \langle e, t \rangle t \rangle$), *nom*, *iota* and \exists :

¹ Proponents of the ambiguity approach (Wilkinson 1991, Gerstner-Link and Krifka 1993, Kratzer 1995 and Diesing 1992, among others) take bare plurals to refer to kinds when they serve as arguments of kind-level predicates and to ordinary individuals when they serve as arguments of object-level predicates. The ambiguity approach and the neo-Carlsonian approach converge, however, on the need for a flexible mapping of noun phrases into the logical structure. For a comparison of the two approaches, see Krifka *et al.* (1995) and Dayal (2011a), in addition to the references mentioned here.

- (1) a. **iota**: $\lambda P \iota P_s$, if there exists a unique maximal entity in P , undefined otherwise.
 (Chierchia 1998: 346)
- b. **nom**: For any property P and world/situation s ,
 $\circ P = \lambda s \iota P_s$, if $\lambda s \iota P_s$ is in K , undefined otherwise
 where P_s is the extension of P in s and K is the set of kinds.
 (Chierchia 1998: 350-351)
- c. \exists : $\lambda P \lambda Q \exists x [P(x) \wedge Q(x)]$
 (Chierchia 1998: 359)

Of these, Chierchia considers the first two meaning preserving, in the sense that they map a predicate into an entity without introducing quantificational complexity. The first is *iota* which picks out the unique maximal entity in the extension of the predicate at the relevant situation, if there is one, and is undefined otherwise (Sharvy 1980). In English, this shift has a lexical exponent *the*, but in many languages it is a covert type shift. *Nom*, the kind forming operator of Chierchia (1984), is a function from indices to the maximal entity that is in the extension of the predicate at that index – that is, it yields the unique maximal entity that instantiates the kind at the index. *Nom* is defined to yield falsity rather than presupposition failure at indices where the extension of the predicate is empty. It is, however, a partial function because it is undefined for predicates that do not fit the concept of a kind: “not all individual concepts are going to be kinds. Only those that identify classes of objects with a sufficiently regular function and/or behavior will qualify. Moreover, kinds...will generally have a plurality of instances (even though sometimes they may have just one or none). But something that is necessarily instantiated by just one individual (e.g., the individual concept or transworld line associated with Gennaro Chierchia) would *not* qualify as a kind” (Chierchia 1998: 350). The third type-shift \exists , from Partee (1986), not only turns a predicative expression into an argument, it also introduces \exists quantificational force. Since this yields an expression of the generalized quantifier type, it can interact scopally with other scopal expressions. Unlike the first two operations, \exists is a total function.

In Chierchia's system these possibilities are constrained by two principles specific to type shifts (2a,b) and a third general constraint of economy in grammar (2c).²

(2) a. **Ranking**: $\text{nom} > \{\text{iota}, \exists\}$ *to be revised (cf. 13)*

b. **Blocking Principle**: ('Type Shifting as Last Resort'):

For any type shifting operation π and any X:

* $\tau(X)$

if there is a determiner D such that for any set X in its domain,

$D(X) = \tau(X)$. (Chierchia 1998: 360)

c. **Avoid structure**: Apply SHIFT at the earliest possible level. (Chierchia 1998: 393)

Finally, there is the rule of DKP which mediates between a kind denoting term and a predicate of objects, a repair operation of sorts (3). It first takes the extension of the kind at an index defined as in (4), converts it into a predicate of objects, and \exists binds into this predicate (3). Since this \exists is introduced at the point where the sort adjustment is required, it ensures obligatory narrow scope for its operand:

² Chierchia's stance on the ranking of covert type shifts has to be gleaned from two separate discussions. The distinction between languages with and without determiners leads him to rank *iota* and \exists at par (Chierchia 1998: 360-61). The distinction between English kind denoting and non-kind denoting bare plurals leads him to rank *nom* above \exists (Chierchia 1998: 374). The two positions are actually inconsistent, as pointed out in Dayal (1999, 2004). Some of the arguments from there are used to motivate the revision of (2a) in (13).

(3) **Derived Kind Predication Rule (DKP):**

If P applies to objects and k denotes a kind,

then $P(k) = \exists x [\cup k(x) \wedge P(x)]$

(Chierchia 1998: 364)

(4) **PRED (\cup):**

$\cup k = \{\lambda x [x \leq k_s] \text{ if } k_s \text{ is defined, } \lambda x[\text{FALSE}] \text{ otherwise}\},$

where d_s is the plural individual that comprises all of the atomic members of the kind k.

(Chierchia 1998: 350)

With this much background, we can demonstrate how the theory captures the core facts related to bare plurals in two languages, English and Hindi. These two languages share the property of encoding number sensitivity in the nominal system while differing on the existence of determiners.³ Let us start with English, and consider bare plurals that are conceptually kinds:

- (5) a. Dogs have evolved from wolves.
b. Typhoons arise in this part of the pacific.
c. Dogs are barking.

³ I am leaving out of this discussion an important aspect of Chierchia's proposal, the *Nominal Mapping Parameter*. Hindi and English have the same parameter setting [+arg, +pred], unlike Chinese which has the [+arg, -pred] setting and French which has [-arg, +pred] setting. These distinctions do not directly bear on the issues this paper focuses on.

- (6) a. $evolve\text{-}from(\textit{dogs}, \textit{wolves})$
- b. $GEN\ s\ x\ [\textit{typhoons}(s)(x) \wedge C(s)]\ [\textit{arise}(s)(x) \wedge (\textit{in}\text{-}\textit{this}\text{-}\textit{part}\text{-}\textit{of}\text{-}\textit{the}\text{-}\textit{P})(s)(x)]$
- b'. $GEN\ s\ x\ [\textit{this}\text{-}\textit{part}\text{-}\textit{of}\text{-}\textit{the}\text{-}\textit{P}(s)(x) \wedge C(s)]\ [\textit{arise}\text{-}\textit{in}\text{-}\textit{x}(s)(\textit{typhoons})]$
- = *DKP* \Rightarrow
- $GEN\ s\ x\ [\textit{this}\text{-}\textit{part}\text{-}\textit{of}\text{-}\textit{the}\text{-}\textit{P}(s)(x) \wedge C(s)]\ \exists y\ [\textit{typhoons}(s)(y) \wedge \textit{arise}\text{-}\textit{in}\text{-}\textit{x}(s)(y)]$
- c. $\exists [\textit{are}\text{-}\textit{barking}(s)(\textit{dogs})] = \textit{DKP} \Rightarrow \exists x\ [\textit{dogs}(s)(x) \wedge \textit{are}\text{-}\textit{barking}(s)(x)]^4$

Since *evolve* is a kind level predicate, and the predicates *dogs* and *wolves* have the requisite intensionality, *nom* turns them into arguments which can be fed into the verb meaning directly. In the case of *arise*, which is an object-level predicate in a characterizing sentence, we have a tripartite structure and depending on what goes into the restrictor of the GEN operator, we get distinct truth conditions for the bare plural. (6b) uses PRED to shift the type of the bare plural from kind to predicate and generically bind it. It says of typhoons in general that they arise in this part of the Pacific. In (6b') the bare plural is mapped into the nuclear scope and serves as the argument of the verb *arise*. Since *arise* cannot hold of the kind, only of instantiations of the kind, DKP comes into play. (6b') says that it is generally true of all contextually relevant situations involving this part of the Pacific, situations in which the climactic conditions are conducive, that there are typhoons that arise. Similarly, in the case of the episodic statement in (5c), DKP negotiates the relationship between an object-level predicate and a kind level argument, as shown in (6c).

Since we will be focusing on episodic contexts in this paper, it is worth noting that the truth conditions associated with (6c) are the same as those of a corresponding statement with an overt indefinite. However, a difference shows up in scopal contexts. Take, for example, the negative statements in (7), under the LF where the bare plural/indefinite outscopes negation:

⁴ I assume that the situation variable in episodic statements is indexical, rather than existentially bound, though nothing of relevance to the issues discussed here rides on this.

(7) a. Dogs are not barking.

b. Some dogs are not barking.

(8) a. [dogs_i [not [t_i are barking]]]

b. λx_i [[not [t_i are barking]]] ([\wedge dogs])

$\Rightarrow \neg$ are-barking (s) (\wedge dogs)

= *DKP* $\Rightarrow \neg \exists x$ [\cup \wedge dogs(s)(x) \wedge are-barking(s)(x)]

(9) a. [Some dogs_i [not [t_i are barking]]]

b. [[some dogs]] (λx_i [[not[t_i are barking]]]]

$\Rightarrow \lambda Q \exists x$ [dogs(s)(x) \wedge Q(x)] (λx_i [\neg are-barking(s)(x_i)])

$\Rightarrow \exists x$ [dogs(s)(x) \wedge \neg are-barking(s)(x)]

Since the bare plural is individual denoting (type $\langle s, e \rangle$), it gets lowered into the argument position of the negative predicate. When *DKP* adjusts the mismatch between *barking* and \wedge dogs,

\exists enters into the derivation, necessarily below negation. The regular indefinite, on the other hand, is a generalized quantifier, which means that it enters into an operator-variable relation with its trace and therefore has scope over negation. Appealing to reference to kinds for bare plurals and to a generalized quantifier meaning for indefinites thus yields the radically different truth conditions observed in such cases.

We see, then, that Chierchia's basic system preserves the original insights of Carlson's account, accommodating for advances in our understanding of external sources of quantificational force for indefinites (see also Carlson 1989 on this). Briefly put, the key insight is that the semantic *type* of the bare plural ensures that it will always be interpreted closest to the verb, but its *sort* forces \exists to be introduced at the level of the mismatch, ie at V, below any other operator.

We now turn to those aspects of interpretation that are specific to Chierchia’s system: namely the *blocking principle*, *ranking* and *economy* (cf. 2). We start with the fact that bare plurals in English do not admit definite readings (10a), while those in Hindi do (10b):

- (10) a. Some children_i came in. Children*_i sat down.
 b. kuch bacce_i andar aaye. bacce_i baiTh gaye.⁵
 Some children inside came children sit went
 ‘Some children came in. The children sat down.’

The explanation for this difference follows straightforwardly from *blocking*. Since *iota* is lexicalized in English, the definite plural must be used in this context and covert type shift for the bare plural via *iota* is ruled out. Since Hindi does not have a lexical determiner, the bare plural is free to shift via *iota*. This seems to be generally representative of languages with and without determiners and thus seems to be a welcome prediction of the theory (but see Dayal *in prep*).

The ranking of type shifts becomes important when we turn to English bare plurals that do not denote kinds. They differ from kind terms in allowing wide scope over negation:

- (11) a. Parts of this machine are not new.
 b. $\exists x$ [parts-of-this-machine(s)(x) \wedge \neg new(s)(x)]

Of such NPs, Carlson (1977) notes that they refer “to a FINITE set of things, things that must exist at a certain time in a given world” (*emphasis his* – pg. 196). As such, they do not display the kind of intensionality associated with kind terms. For Chierchia, this means that such bare plurals are not in the domain of *nom*. Since *iota* is lexically blocked by *the*, the bare plural now

⁵ *T* is a retroflex voiceless stop, *d* is a dental stop, *h* following a stop indicates aspiration.

shifts via the low-ranked \exists type shift and predictably displays the same scopal flexibility that characterizes regular indefinites.⁶

As pointed out in Dayal (1999, 2004), the ranking proposed by Chierchia requires revision since it does not capture the facts that he wants to capture. For example, it is predicted by the ranking in (2a) that the definite reading of bare plurals in languages like Hindi would not be available because of the availability of the higher ranked *nom*. But the ground reality is that *nom* and *iota* do not compete – Hindi bare plurals are acceptable with kind level predicates, in addition to having definite readings.⁷ There is a further problem noted there with respect to the indefinite readings of bare plurals in languages without determiners. The scopal properties of such bare plurals are precisely those of English bare plurals – they obligatorily take narrowest scope. In other words, bare plurals can have definite readings or DKP-based narrow scope \exists readings, but they do not have the wide scope readings associated with \exists type shift:⁸

⁶ Chierchia argues that *some* is not a lexical exponent of \exists , unlike *a*, which is. Thus it does not block the application of \exists here. Bare singulars are ruled out because they are not in the domain of *nom* and *iota* and \exists are lexically blocked. Crucial to the distinction between *some* and *a* is that only the latter lends itself to binding by a generic operator.

⁷ The idea that Hindi bare nominals are ambiguous between kind terms and definites, not true indefinites, was first proposed in a joint paper (Porterfield and Srivastav 1988). The facts generalize beyond Hindi to other typologically unrelated languages such as Russian and Chinese. On the latter, see also Yang (2001).

⁸ The two available readings may have different intonational contours and might need different contexts to make them salient. Neither intonation nor context can make available a wide scope \exists reading, a reading in which the predication only applies to some of the relevant individuals. An overt indefinite *kuch bacce* ‘some kids’ or *ek baccaa* ‘one kid’ would have to be used to convey the intended meaning.

- (12) vahaaN bacce nahiiN haiN⁹
 There children not be
 ‘There are no children there.’ or ‘The children are not there.’
 NOT ‘Some children are not there.’

This point is worth emphasizing. The popular view that bare plurals in languages without determiners can be definite or indefinite is simply not supported empirically. What this means for the theory is that we do not want bare plurals in such languages to be able to access \exists type shift. This is accomplished by revising the ranking in the following way:

- (13) $\{nom, iota\} > \exists$ (Dayal 2004: 419)

I consider this a friendly amendment to Chierchia’s system and will adopt it as part of the baseline theory in the rest of this paper.

In this section I have presented the details of Chierchia’s system at work, in preparation for the discussion to follow. I now turn to the task of establishing that \exists type shift is not required in some cases and leads to incorrect predictions in others. This will be followed by arguments for dispensing with the \exists force built into DKP. While I motivate the revisions on empirical grounds, the revisions themselves bear on the specifics of the theory presented above.

3. Indexical bare plurals

In this section I will take a closer look at non kind denoting terms, which had received little attention since Carlson’s original discussion. They remain under-examined even in the literature that has emerged in response to Chierchia’s proposal regarding cross-linguistic variation in the interpretation of noun phrases. I would like to begin though by introducing a terminological change. I will refer to such bare plurals from here on as indexical bare plurals since they

⁹ *N* indicates nasalization of the immediately preceding vowel.

typically include some indexical expression. I will continue to refer to standard bare plurals as kind denoting, reminding the reader that Carlson included in the set not only natural/well-established kinds such as *dogs* and *wolves*, but also novel kinds such as *houses with red roofs and yellow windows* or *dogs with three legs*.

3.1. Two types of indexical bare plurals

As mentioned in connection with (11), Carlson (1977) notes that some bare plurals, typically those modified by relative clauses or PP's with an indexical expression, behave differently from standard bare plurals. The following are some canonical examples of indexical bare plurals:

- (14) a. Parts of that machine
b. People in the next room
c. Books that John lost yesterday
d. Bears that are eating now

Indexical bare plurals do not lend themselves to kind level predication (15a) or to binding by adverbs of quantification. They are also not very good with individual level predicates (15b).

- (15) a. ?Parts of that machine are widespread.
b. ?Dogs in the next cage are (usually) intelligent.

He notes that such bare plurals can be ambiguous between opaque and transparent readings. The following can be read in a way that the content of the description is not included in Bill's belief worlds or in Sue's search:¹⁰

¹⁰ Carlson notes certain respects in which these bare plurals align with kind denoting bare plurals (see section 4.3).

- (16) a. Bill believes that people in the next room are about to leave.
b. Sue is looking for books Bill lost yesterday.

Recall that Chierchia's account, as summarized in section 2, is that such bare plurals are \exists generalized quantifiers because they are shifted to argument type by the low ranked \exists type shift. It therefore predicts full convergence between indexical bare plurals and indefinites, but this has been challenged by Van Geenhoven (1999). One point of difference between the two positions is empirical. While Chierchia argues that such NPs can take wide scope with respect to negation, Van Geenhoven claims wide scope readings to be unavailable. The source of this disagreement, I believe, is due to a distinction in the class of indexical bare plurals that has so far escaped notice.

The examples in (17) show that indexical bare plurals are not a homogeneous class. Some of them, those in partitive constructions, indeed allow wide scope over negation, and this can be made explicit. This scopal flexibility, however, does not hold generally:

- (17) a. Parts of this machine are not new, but parts of it definitely are.
b. # Light bulbs for this lamp I sell but light bulbs for this lamp I don't sell.

While (17a) behaves as predicted by Chierchia, (17b) from Van Geenhoven (1999), is contradictory. This buttresses Van Geenhoven's arguments against Chierchia. Of course, the acceptability of (17a) does not support Van Geenhoven's view that these bare plurals are semantically incorporated indefinites.¹¹

¹¹ Van Geenhoven (1998) posits a rule of semantic incorporation where bare plurals are predicative expressions bound by an \exists introduced by the lexical rule. Hers is, in effect, a translation of Carlson's account of the scope properties of bare plurals, minus reference to kinds.

We can abstract away from scope interactions, and note that there remains a distinction between the two types when we try to use them in statements with incompatible predicates.¹² In (18a)-(18c) there are no other operators, so distinctions having to do with kind terms vs. semantically incorporated indefinites are irrelevant. However, there is a contrast between (18a) and (18b)-(18c). We understand the first clause in (18a) to apply to some parts and the second clause to apply to other parts. The same option is clearly not available to (18b) and (18c), where we apparently interpret all the people/light bulbs to have the first property so that applying the second property leads to contradiction:

- (18) a. Parts of this machine are old but parts of it are new.
b. #People in the next room are tired but people in the next room are full of energy.
c. #Light bulbs for this lamp were bought at Home Depot but light bulbs for this lamp were bought at Lowe's.

Given that scopal effects are at the heart of the distinction between type shift by *nom* and type shift by \exists , this distinction clearly merits further attention. I should note in closing that these facts are equally problematic for both approaches to bare plurals, the neo-Carlsonian approaches that treat such bare plurals as kinds and the ambiguity approaches that treat them as object-level indefinites.

3.2 Infelicitous indexical bare plurals

There is a further problem with taking indexical bare plurals to tap into \exists type shift. Not all bare plurals that are conceptually incompatible with kinds are, in fact, acceptable. The crucial data rests on contrasts in contextually anchored bare plurals of the kind discussed by Condoravdi (1997), those she terms “functional” bare plurals. In addition to her example (19a), I include two others:

¹² This is an important new diagnostic that I use in this paper. I elaborate on it in section 5.

- (19) a. There was a ghost on campus. Students/The students were afraid.
b. My garden is in shambles. Groundhogs/ The groundhogs eat up whatever I plant.
c. The bus stopped. Passengers/The passengers quickly got off the bus.

I will not be concerned with the particulars of Condoravdi's approach but rather with what her data implies for Chierchia's theory.¹³ The bare plurals in (19) pose a challenge because they seem to suggest the operation of *iota*, rather than \exists . The real problem, however, is that there are structurally parallel sentences such as the ones in (20) where the bare plural appears infelicitous. That this is not an effect restricted to bridging contexts but is more generally true of indexical bare plurals can be seen in (21), where the contextual grounding is lexically encoded in the modifiers inside the noun phrase:¹⁴

- (20) a. I bought a car. The wheels/ *Wheels need to be replaced.
b. John has a rope. The fibers/ *Fibers are made of nylon.
c. Sue visited the ancient monument. She found the stones/ *stones impressive.

¹³ According to Condoravdi, bare plurals are indefinites that are ambiguous between being weakly and strongly novel. She defines a weakly novel NP as requiring its index to be novel, while presupposing its descriptive content. A strongly novel NP places a requirement that the index be novel, but imposes no conditions on its descriptive content. Her claim is that the novelty condition on the index of bare plurals rules out anaphoric readings for them in contexts such as those in (19), but because they have only a requirement of weak novelty, the descriptive content can be entailed by the context. This results in the observed functional readings. For more details, the reader is referred to Condoravdi's work.

¹⁴ I owe (21b) to Ayesha Kidwai (p.c.).

- (21) a. The wheels/ *Wheels of my car need to be replaced.
 b. The fibers/ *Fibers of this rope are made of nylon.
 c. Sue found the stones/ *stones of the monument impressive.

One might, of course, appeal to *the blocking principle* to explain this effect, but we would then have a problem showing why the same does not apply to (19). In addition, it would not explain why the \exists type shift, which does not have any presuppositions associated with it, does not become available once *iota* is lexically blocked. Once again, it bears emphasizing that the data in (19) to (21) pose a challenge not only for Chierchia's theory but for all current theories of bare plurals.

4. A proposal: *nom* and \exists in a system of ranked type shifts

In this section I will lay out my solution to the problems regarding indexical bare plurals discussed in section 3. The solution turns on two changes that I propose to Chierchia's theory: one, I extend the scope of Chierchia's kind forming operator *nom* to include some indexical bare plurals; two, I do away with \exists as a covert type shift.

4.1. Extending the Scope of *Nom*

I will take as my starting point the surprising infelicity of certain bare plurals discussed above. The obvious conclusion to draw from the facts is that there are only two covert type shifts in natural language, *nom* and *iota*. In languages with definite determiners *iota* is indeed lexically blocked, as claimed by Chierchia. This entails that if for any reason a bare plural cannot undergo *nom*, it will simply be unacceptable. We now have to figure out the reason why some indexical bare plurals in English undergo *nom*, while others do not and are therefore infelicitous.

I start by delinking *nom* from kind terms. Instead, I build partiality into the function in a somewhat different way. That is, instead of an appeal to the concept of kinds in Chierchia's (1a), repeated here as (22a), I appeal to a notion of proper variation in size, as shown in (22b):

(22) a. **nom** (Chierchia 1998: 350-351):

For any property P and world/situation s,

$\ulcorner P = \lambda s \iota P_s$, if $\lambda s \iota P_s$ is in K, undefined otherwise

where P_s is the extension of P in s and K is the set of kinds.

b. **nom** (revised):

For any property P and world/situation s,

$\ulcorner P = \lambda s \iota P_s$, if $\exists s' \exists s'' |P_s| \neq |P_{s'}|$, undefined otherwise

where P_s & $P_{s'}$ are the extensions of P in s and s'.

Let us see how this helps us deal with indexical terms. Recall that Chierchia takes kinds to be individual concepts that live in the domain of quantification U, if and only if, they “identify classes of objects with a sufficiently regular function and/or behavior” and “generally have a plurality of instances (even though sometimes they may have just one or none)” (Chierchia 1998: 350). As we can see, there is both an appeal to intensionality and an appeal to variation in size in defining the notion of kinds here.

My revision of *nom* in (22b) preserves the notion of variation in size as integral to *nom* but it lets in a certain amount of extensionality. Let us consider the requirement of variation in size first.

The idea that number morphology plays a role in licensing kind formation goes back to differences I noted in Dayal (1992) between bare plurals/mass terms and definite singular generics in English and between bare plurals/mass terms and bare singulars in Hindi. There were two conclusions I drew from these comparisons. I located number morphology, rather than definiteness marking, as the locus of the differences since they were maintained across languages with and without determiners. A second conclusion I drew there was that singular morphology would constrain the resulting kind term to singleton instantiation sets. I argued that there were fundamentally two types of operations involved in kind formation: a “plural” kind formation and a “singular” kind formation. The former is what we have been discussing here: *nom* is defined on predicates whose extensions vary in size from index to index; it is undefined for singular terms

“because the number feature clashes with the presuppositions associated with a kind term” (Dayal 1992: 48).¹⁵ This point is highlighted by Chierchia. His definition of *nom* in (1b) builds in the uniqueness associated with *iota* and effectively rules out *nom(dog)*, as clashing with the notion of kind. The semantics of plural morphology allows *nom(dogs)* because now plural individuals of different sizes can be denoted at different indices. The proposed revision in (22b) takes things a bit further. It not only prevents *nom* from applying to singular terms, it also blocks it from applying to plural predicates if their extension remains constant in size across indices. Let us see what this buys us.

I repeat the crucial contrasts from section 3:

- (23) a. There was a ghost on campus. Students (on campus) were afraid.
b. My garden is in shambles. Groundhogs (in my garden) eat up whatever I plant.
c. The bus stopped. Passengers (on the bus) quickly got off the bus.
- (24) a. I bought a car. *Wheels (of my car) need to be replaced.
b. This rope is very strong. *Fibers (of this rope) are made of nylon.
c. Sue visited the monument. She found *stones (of the monument) impressive.

A crucial difference between (23) and (24) is in the relationship of the bare plural with the noun it is associated with. Take a given campus. While it is readily possible to accommodate a set of students by the mention of a campus, it is not strictly speaking necessary that there be students for a campus to be considered a campus. Similar considerations apply to buses and passengers or gardens and groundhogs. In each case, if we define a function from a given campus/bus/garden

¹⁵ Singular terms, of course, can be interpreted as taxonomic kind terms. Crucially, taxonomic kinds do not allow access to individual members in the way that DKP does for kind terms formed by *nom*. Since we are focusing on bare plurals in this paper, I will not go into details of singular kind formation, referring the reader to Dayal (1992) and the development of those ideas in Dayal (2004).

to students/groundhogs/passengers in it, we are likely to end up with different sets at different times, and most likely these sets will be of different sizes.

Turning to (24), we see that the connection between the two nouns is much tighter. A car cannot be considered a (complete) car if it does not have wheels. Similarly, while monuments do not, in and of themselves, entail the existence of stones, a given monument made of stone does: the monument cannot exist if the stones are removed. It is the same with a rope, which cannot exist without its fibers. Another way to express this is to say that the noun which provides the functional pivot (e.g., *car*, *rope*, *monument*) and the bare plural it is functionally related to (e.g., *wheels*, *fibers*, *stones*) are co-extensional. If the function is restricted to indices in which the pivot exists, the cardinality of the predicate denoted by the bare plural will remain constant across all of them.

I am suggesting that the infelicity of the bare plurals in (24) is due to this requirement of variation in size but I am aware that this particular implementation of the intuition may not be precise enough. Ivano Caponigro (p.c.) correctly points out that one can conceive of a given rope as having fewer fibers in one world than in another. If the two ropes count as the “same” rope, (22b) fails in its job (see Heller and Wolter 2011 for relevant discussion). There is, of course, a simple way to take care of this problem. We can tap into the intuition that there is a minimum limit on size. There is no world in which we can conceive of the rope without any fibers, so the presupposition on *nom* could conceivably be stated as: $\exists s P_s = \emptyset$. I do not pursue this line here since it does not rule out unacceptable bare singulars, such as the ones in (25a). There are many situations in which the same country does not have a president/monarch so the requirement that there be an index at which the extension of the nominal is empty would be insufficient. It would have to be combined with the requirement of variation in size:

- (25) a. The country is flourishing. #President/#Monarch is very popular.
b. The platoon is under attack. Soldiers are being killed.

Another alternative to (22b), suggested by an anonymous reviewer, is to have variation in the instantiation set itself instead of in its size: $\exists s \exists s' P_s \neq P_{s'}$. This would work as well for the contrast we are interested in, since it would rule out the set in (24) where the bare plurals are co-extensional with the pivot of the function. It would also explain cases like (25b) where one might imagine a context in which a platoon is defined in terms of a fixed number of soldiers, but the actual soldiers in a given platoon could change from time to time. The reason I have not adopted this suggestion is that it is not clear to me that the same reasoning would not apply to cars and wheels. After all, the wheels on a typical car get changed several times and yet (24a) is clearly unacceptable, unlike (25b). Furthermore, eliminating reference to size would require a separate explanation for cases like (25a). The function from a given country to its president/monarch yields different (atomic) individuals at different times, but bare singulars are unacceptable. The fact that bare singulars do not seem to undergo *nom* suggests that rigidity in size is critical.

For the moment, then, I will continue to take (22b) as the appropriate way of constraining *nom*, though I will return to this question briefly in section 6 (see Dayal *in prep* for further discussion of the alternatives considered here). To sum up, (22b) allows *nom* to apply to predicates that do not include a deictic term, i.e. standard kind denoting bare plurals, as in Chierchia's original formulation. It privileges bare plurals over bare singulars which are restricted by number morphology to invariably denote an atomic individual. In the case of indexical bare plurals, it makes a crucial distinction. The deictic expression restricts variation to situations with the contextually salient entity in it, in the actual world or in worlds with counterparts of it. The presupposition of variation makes *nom* undefined for predicative terms where co-extensionality with the deictic term leads to invariance in size. With *iota* being lexically blocked, such terms are correctly predicted to be infelicitous if \exists type shift is not in the set of covert shifts. It should be obvious that even if some variant of (22b), such as the ones we have considered above, were to be adopted instead of (22b), the conclusion would remain valid that the infelicity of indexical bare plurals can only be explained if \exists type shift is removed from the equation.

4.2. Partition-inducing bare plurals

In the last section I argued for expanding the domain of *nom* to include those indexical bare plurals that meet a reduced bar for intensionality. The fact that such bare plurals show the same scopal behavior as canonical kind denoting bare plurals is no longer surprising. We expect DKP to apply equally to both and yield narrow scope \exists readings. The question we must now address is the behavior of those indexical bare plurals for which Chierchia's \exists type shift seemed to capture the scope facts correctly: *parts/slices/pieces of NP*. Given that \exists type shift is no longer among the set of covert options, we need an alternative account of the ability of such bare plurals to take scope over other operators.

Drawing on the discussion of *part-of* in Chierchia (2010), we can take it to be a function from an entity to sets of entities. Extending the account of *part* to include *pieces*, *slices* etc, we can treat all of them as subdividing the entity denoted by the inner NP into non-overlapping i-parts. Their role, roughly speaking, is akin to that of classifiers, in that they create properties that have the appropriate structure for counting. Phrases headed by such partition inducing nouns can therefore serve as arguments for cardinal expressions or determiners, as shown in (26a):

- (26) a. Every part /Three parts /The (three) parts/ No part of the machine
b. Parts of this machine are not new, but parts are.

The question that concerns us here is how to interpret such phrases when there is no cardinal or determiner in the structure. As we know from examples like (26b) they display the scopal properties that \exists generalized quantifiers have.

In order to address this question, let us consider cardinal phrases which show a similar pattern of behavior. They can be arguments of determiners (27a) or function by themselves as \exists generalized quantifiers (27b):

- (27) a. The three students are standing.
b. Three students are not standing but three are.

A standard view of cardinal expressions in work stemming from Link (1983) is that they are predicate modifiers. This allows them to serve as arguments of determiners. When there is no determiner they are taken to shift to a generalized quantifier meaning by a default \exists type shift (Landman 2004, Ionin and Matushansky 2006, Chierchia 2010, among others). We have argued in the previous section, however, against the possibility of such an option, in order to explain the infelicity of some indexical bare plurals. A further argument for an alternative explanation comes from cross-linguistic considerations. We know that in languages without definite determiners, such as Hindi, Russian or Chinese, bare plurals cannot interact scopally with other operators. We have captured this fact by allowing them to shift to argumental meaning via *iota* as well as *nom*. Interestingly, cardinal expressions in these languages behave like cardinal expressions in English in allowing scope interaction with other operators. That is, they behave like regular indefinites, rather than definites. If we were to allow phrases headed by cardinal expressions to be covertly type-shifted into argumental meaning, we would predict incorrectly that in these languages they would make use of *iota*, just like bare plurals.¹⁶ An alternative in which covert type shifts do not come into play for cardinal expressions is clearly preferable.

I suggest that cardinal expressions, universally, are ambiguous between predicative and \exists generalized quantifier meanings. Thus there are two options for their interpretation. (28a) involves a predicative meaning for the cardinal. (28b) involves the existential generalized

¹⁶ By and large cardinal phrases allow wide scope indefinite readings and disallow definite readings. Trinh (2011) notes that Vietnamese cardinal phrases also have definite readings. I focus here on the indefinite readings which seem to be universally available, leaving discussion of definite readings which are possible in some languages to Dayal (*in prep*).

quantifier meaning. What is ruled out is the derivation in (28c), where the cardinal has a predicative meaning and undergoes \exists type shift covertly.¹⁷

- (28) a. $[\text{DP the}_{\langle\langle\text{et}\rangle\rangle\text{e}} [\text{CardP three}_{\langle\text{et}\rangle} [\text{NP boys}_{\langle\text{et}\rangle}]]] = \iota x [3(x) \wedge \text{boys}(x)]$
- b. $[\text{DP three}_{\langle\langle\text{et}\rangle\rangle\langle\langle\text{et}\rangle\text{t}\rangle} [\text{NP boys}_{\langle\text{et}\rangle}]] = \lambda P \exists x [3(x) \wedge \text{boys}(x) \wedge P(x)]$
- c. $[\text{CardP three}_{\langle\text{et}\rangle} [\text{NP boys}_{\langle\text{et}\rangle}]] = \lambda x [3(x) \wedge \text{boys}(x)]$
- $= * \exists \Rightarrow \lambda P \exists x [3(x) \wedge \text{boys}(x) \wedge P(x)]$

There remains one final issue to settle. Assuming that cardinal phrases are not in the domain of *nom*, a derivation like (29a) will be ruled out in languages with determiners due to *blocking* by the lexical definite. In languages without determiners, however, they are predicted, incorrectly, to be possible under a definite reading due to a covert application of *iota*, as shown for Hindi in (29b):

¹⁷ Ionin and Matushansky (2006) argue against a generalized quantifier meaning for cardinal expressions. The semantics they give for complex cardinals like *twenty-two N* or *two hundred and three N* requires a predicate modifier meaning for the lower cardinal. Note that their argument is not inconsistent with an ambiguity analysis of the kind I am positing. Well-formed cardinal phrases will all require the lower cardinals to be predicate modifiers in order to avoid a type-clash. The option of utilizing a generalized quantifier meaning will only meet type matching requirements for the cardinal which is the highest expression in the phrase. I have not followed the specifics of Ionin and Matushansky's account of numerals though I consider it correct, since the precise choice of a predicate modifier semantics for cardinals is orthogonal to the point under discussion. The reader is referred to the original article for details.

- (29) a. $[\text{CardP three}_{\langle\langle\text{et}\rangle\langle\text{et}\rangle\rangle} [\text{NP boys}_{\langle\text{et}\rangle}]] = \lambda x [3(x) \wedge \text{boys}(x)]$
 $= \text{blocked by 'the'} \Rightarrow \iota x [3(x) \wedge \text{boys}(x)]$
- b. $[\text{CardP tiin}_{\langle\langle\text{et}\rangle\langle\text{et}\rangle\rangle} [\text{NP laRke}_{\langle\text{et}\rangle}]] = \lambda x [3(x) \wedge \text{boys}(x)] = *iota \Rightarrow \iota x [3(x) \wedge \text{boys}(x)]$
three boys

In order to rule out the derivation in (29b), we may consider the primary meaning of cardinals to be that of a generalized quantifier. However, in structures where a predicative meaning is required they shift by a covert application of BE (Partee 1986).¹⁸ Assuming that such shifts are repair operations, there is no motivation for a predicative meaning for the cardinal expression in a structure like (29b). Without a determiner above, it is predicted that phrases headed by cardinal expressions will necessarily denote generalized quantifiers and show scope interaction with negation and other operators cross-linguistically. Back to indexical bare plurals, I suggest the same holds for partition-inducing expressions like *part-of/slices-of*, etc.

4.3. Some predictions for indexical bare plurals

The proposal I am advancing makes an essential distinction within the class of indexical bare plurals. The first type, those that shift via *nom*, are predicted to undergo DKP in episodic contexts and display obligatory narrow scope, just like kind denoting bare plurals. The second type, those with partition-inducing head nouns, are predicted to behave like regular indefinites in being able to take scope over other operators. However, there are two properties noted by Carlson that apply equally to both types of indexical bare plurals. One is the ability to take narrowest scope in contexts where indefinites cannot take such scope, the other is the ability to have *de re* readings of the sort that kind denoting bare plurals do not have. Since I am aligning one kind of bare plural with kind terms and another with indefinites, these shared properties call for some further discussion.

Carlson (1977) notes that the following have differentiated scope readings. That is, they allow different books/puzzles to participate in different sub-events of destruction/discovery. Overt

¹⁸ BE is defined as: $\lambda P_{\langle\langle\text{e},\text{t}\rangle,\text{t}\rangle} \lambda x [P(\lambda y [y=x])]$ in Partee (1986).

indefinites do not display similar effects. These data are particularly important because they show that the \exists readings of bare plurals are not a subset of the \exists readings of indefinites:

- (30) a. Fred repeatedly destroyed books I lost yesterday.
b. Max discovered pieces from that puzzle for three hours.
- (31) a. #Fred repeatedly destroyed some books I lost yesterday.
b. #Max discovered some pieces from that puzzle for three hours.

Under the present account, (30a) is unproblematic since the bare plural denotes a kind and is subject to DKP. The challenge is to explain (30b). If these bare plurals are like indefinites, (30b) should pattern with the examples in (31), where the generalized existential quantifier takes scope over the adverb and leads to the implausible readings in which the same set of entities is destroyed/discovered multiple times.

So far I have argued that *pieces of that puzzle* or *parts of this machine* can have the same semantics as regular indefinites. However, this does not preclude the possibility that they can also be analyzed as simple predicative terms. If so, they would be able to undergo *nom* as long as they satisfy the presupposition of variation in size.¹⁹ It seems to me that they do. It is possible for there to be different partitions of the same entity at different indices: a puzzle can be made into a 50 piece puzzle in one world and into a 100-piece puzzle in another; a cake can be cut into 6 slices in some world and into 8 slices in another. If so, then it should come as no surprise that they would have the option of aligning with other kind terms in taking lower scope than indefinites that function unambiguously in argument position as generalized quantifiers.

¹⁹ Zucchi and White (2001), in fact, admit to the possibility of treating such noun phrases as kind denoting but do not elaborate on it. See also Lasersohn (1995), Van Geenhoven (2004), and more recently, Dayal (2011b) where this phenomenon is discussed at more length.

The second property that the two types of indexical bare plurals have in common is the potential for *de re* readings. Carlson (1977) notes, albeit somewhat tentatively, that (32a) seems to be ambiguous in the relevant way, while (32b) clearly is not:²⁰

- (32)a. Bill believes that people in the next room are about to leave.
 b. Bill believes that people are about to leave.

(32a), under the present account, is predicted to have the interpretation in (33a), after the application of DKP. This can be compared to (33b), the representation of (32b):

- (33) a. believes (s) (b, $\lambda s' \exists x [\text{people-in-room-next-to-}y_i(s')(x) \ \& \ \text{about-to-leave} (s')(x)]$)
 b. believes (s) (b, $\lambda s' \exists x [\text{people}(s')(x) \ \& \ \text{about-to-leave} (s')(x)]$)

I assume that the situation index on a bare plural, shifted via *nom*, must be identified with the situation index at the lowest point in the tree where one becomes available. In an intensional context, this necessarily yields an opaque reading. An indexical expression inside the bare plural (e.g., *next* and its logical translation ‘next-to- y_i ’), however, anchors the interpretation of the bare plural to a set of finite entities of whom the attitude holder could potentially have direct

²⁰ An anonymous reviewer asks what the facts would be if *in the next room* were changed to *on Mars* in (32a). The judgments are subtle, but briefly put, they turn on whether the extension of the term varies from index to index within a given world (the familiar kind denoting bare plural) or whether the extension of the term is fixed in a given world to a finite set of entities though allowing for variation across worlds. For present purposes, if it is possible to think of *people on Mars* in the first sense, it would behave like (32b) in resisting *de re* readings; if it is possible to think of it in the second sense, it would behave like (32a) in allowing it. I refer the reader to an illuminating discussion of the distinction between kind denoting and indexical readings of *alligators in the New York sewer system* (Carlson 1977: 197), and to Dayal (*in prep*).

knowledge. This is what I claim is the source of the *de re* feel of these examples. In other words, the apparent *de re* reading is a piggy-back effect based on the contextual anchoring provided by the deictic expression. When the bare plural is unmodified or when the modification does not contextually anchor the interpretation, the effect cannot arise. The effect is also unlikely to arise if the anchoring is to a set that is potentially too large for an attitude holder to have direct knowledge of its members. I think the following would not be characterized as allowing a *de re* construal:²¹

- (34) a. Bill believes that people on this earth are about to perish.
b. Bill believes that victims of the earthquake in Turkey will be adequately compensated.

No doubt this issue needs further thought, both in terms of the generalizations as well as implementation (see Dayal *in prep*), but I hope that the remarks here suggest a way of reconciling the fact that interpreting such indexical bare plurals via *nom* still leaves room for distinctions between indexical bare plurals and canonical kind terms.

Before ending this section, I would like to acknowledge that the issue of scope interaction with negation for *nom* shifted indexical bare plurals remains somewhat debatable. Gennaro Chierchia (p.c.) points out that (35a)-(35b) are accepted by speakers in situations where only some of the books were bought or read. The point I would like to emphasize, though, is that this cannot be made explicit, as shown in (36a)-(36b):

- (35) a. I didn't buy books I wanted to buy.
b. I didn't read books suggested by you.

²¹ Thanks to Matt Barros for confirming these judgments.

- (36) a. #I didn't buy books I wanted to buy but I bought books I wanted to buy.
b. #I didn't read books suggested by you but I read books suggested by you.

The data seems a bit puzzling at first glance but I suggest that the wide scope effect we get for (35a) and (35b) is due to the possibility of a contrastive reading. Take a context in which I bought almost all the things I had intended to buy, including perhaps some books that I wanted to buy. I can utter (35a) to convey that among the things that got left out were books I wanted to buy. Similarly, if I read almost everything I was supposed to read including some books suggested by you, I can say (35b) to convey that among the things I didn't read were books suggested by you. This is not exactly a wide scope reading of an \exists bare plural. It is only bare plurals that can plausibly be analyzed as having partition inducing head nouns that allow for true wide scope, where conjunctions with affirmative and negative counterparts do not result in contradiction. The case of indexical bare plurals that do not countenance conjunction of incompatible predicates but nevertheless seem to allow a $\exists\neg$ reading no doubt merits further attention. But I would like to suggest that the locus of this inquiry should be the role of modification, not the possibility of the \exists type-shift.

5. A More radical proposal: DKP modified

In section 4 I made two modifications to Chierchia's system that only affected indexical bare plurals but left untouched his account of kind denoting bare plurals. In this section, I would like to make two further modifications that are somewhat more significant in that they impact on our general understanding of bare plurals. I claim that in episodic statements, the extension of the kind is accessed, i.e. that reference is made to the maximal entity that instantiates the kind at that index. I also argue that the interpretation involves a widened domain, in the sense of Kadmon and Landman (1993). The so-called \exists force typically associated with bare plurals in such contexts is re-analyzed as a representative group reading of the maximal entity in the widened domain.

5.1. Arguments against \exists -force for kind denoting bare plurals

I start with two facts that argue against the \exists force associated with bare plurals. I give in each case the logical representation that would be derived under Chierchia's neo-Carlsonian approach as well as under the ambiguity approach. I do this to highlight the fact that the problems are not specific to the neo-Carlsonian position:

(37) a. Dogs, (#namely Spotty and Rover), are barking.

b. $\exists x [\text{dogs}(x) \wedge x = \text{Spotty} + \text{Rover} \wedge \text{barking}(x)]$

c. $\exists x [\text{dogs}(x) \wedge x = \text{Spotty} + \text{Rover} \wedge \text{barking}(x)]$

(38) a. #Dogs are barking and dogs are sleeping.

b. $\exists x [\text{dogs}(x) \wedge \text{barking}(x)] \wedge \exists x [\text{dogs}(x) \wedge \text{sleeping}(x)]$

c. $\exists x [\text{dogs}(x) \wedge \text{barking}(x)] \wedge \exists x [\text{dogs}(x) \wedge \text{sleeping}(x)]$

(39) Dogs are barking and dogs are running around.

(37a) shows that the referents of a bare plural cannot be listed. If all that is involved in interpreting bare plurals in episodic contexts is some form of existential quantification over (instances of) dogs, as shown in (37b)-(37c), there is no reason why they should resist specification via a list. The data in (38) is the problem of incompatible predicates we had encountered earlier in connection with indexical bare plurals. As shown in (38b) and (38c), standard approaches do not have a way of accounting for the oddness of (38a). Since there is no issue of scope interaction and each conjunct would normally be acceptable on its own, their conjunction should be as well. Note that switching to compatible predicates has an ameliorating

effect, as shown in (39). I should note that it is important in applying this diagnostic to keep the interpretation of both conjuncts fixed to a single spatio-temporal location.²²

These facts are replicated cross-linguistically. Consider the following Korean paradigm.²³ In the first case, we have a nominative marked bare nominal, in the second a nominative marked bare nominal with the overt plural morpheme. Both are judged unacceptable:

- (40) a. #ai-ka camtul-eiss-ko ai-ka wancenhi kkay-eiss-ta.
 child-NOM asleep-be.PROG-and child-NOM completely awake-be.PROG-DECL
 ('A child is asleep and a child is wide awake.')
- b. #ai-tul-i camtul-eiss-ko ai-tul-i wancenhi kkay-eiss-ta.
 child-PL-NOM asleep-be.PROG-and child-PL-NOM completely awake-be.PROG-DECL
 ('Children are asleep and children are wide awake.')

Switching to compatible predicates leads to improvement in the basic version and full acceptability in the plural-marked version.

- (41) a. ?ai-ka noraeha-ko iss-ko ai-ka chwumchwu-ko iss-ta.
 child-NOM sing-CONN be.PROG-and child-NOM dance-CONN be.PROG-DECL
 'A child is singing and a child is dancing.'
- b. ai-tul-i noraeha-ko iss-ko ai-tul-i chwumchwu-ko iss-ta.
 child-PL-NOM sing-CONN be.PROG-and child-PL-NOM dance-CONN be.PROG-DECL
 'Children are singing and children are dancing.'

To sum up, specification is resisted in languages with definite articles. In languages without definite articles, specification is possible under a definite reading of the bare plural, but not under an indefinite reading. Bare plurals seem to resist the conjunction of incompatible predicates universally. In addition to English and Korean, I have tested the data in Hindi and Japanese as

²² See Dayal (2004) for a similar diagnostic in the characterization of bare singulars.

²³ I thank Hyunjoo Kim for consulting a large number of Korean speakers in eliciting this data.

well. As already shown, these facts are as problematic for the neo-Carlsonian account which always refers to kinds in the interpretation of bare plurals, as they are for the alternative ambiguity based accounts that interpret them as object-level indefinites. Since my focus here is on Chierchia’s theory, I will pitch my solution to the problem posed by these facts in relation to the rule of DKP, which is responsible for deriving the existential readings of bare plurals in his theory. However, there are obvious implications for the ambiguity approach as well.

5.2. Bare plurals as definites over a widened domain

There are two modifications I will propose to DKP. The first is to remove existential quantification from it, and simply have the sort mismatch between the predicate and the kind term repaired by taking the extension of the kind, i.e. the maximal entity that instantiates the kind at the relevant index (see also Dayal 2011a for discussion of this way of deriving definiteness in Chierchia’s system). The second is to require the domain of quantification for a bare plural to be wider (cf. Kadmon and Landman 1993). Furthermore, I impose a requirement of proper widening where the instantiations of the kind in the widened domain must properly include the instantiations in the base situation:

(42) a. **DKP-Modification 1 (Maximality):**

If $P(s)$ applies to objects and k is a kind, then $P(s)(k) = P(s)(k_s)$,
where k_s is the extension of the kind at s .

b. **DKP-Modification 2 (Maximality + Proper Widening):**

If $P(s)$ applies to objects and k is a kind,
then $\llbracket P(s)(k) \rrbracket = 1/0$ if $\llbracket \exists s' s < s' \wedge P(s)(k_{s'}) \rrbracket = 1/0$,
where $\exists x[x \leq k_s \wedge \neg \text{in-}s(x)]$ and is undefined otherwise.

The claim of widening immediately accounts for the impossibility of specification, demonstrated in (37). If the instantiation set extends beyond the contextually salient set, it follows that it would not be possible to specify through a list the entities denoted by the bare plural. The explanation for the impossibility of conjoining incompatible predicates, demonstrated in (38), becomes

tractable under the claim of maximality. It is parallel to the explanation for the oddness of conjoining incompatible predicates with definites, shown in (43). The same individual cannot have two conflicting properties at the same time:

- (43) a. #The dogs are barking and the dogs are sleeping.
 b. $\text{barking}(s)(\iota x[\text{dogs}(s)(x)]) \wedge \text{sleeping}(s)(\iota x[\text{dogs}(s)(x)])$

This line of argumentation, however, begs the question of how to derive the intuition that bare plurals seem to have indefinite readings. In the next section I show that in accounting for the facts in (37) and (38) we haven't thrown away the baby with the bathwater. The solution rests on both aspects of the proposed modification: maximality and widening.

5.3. Representative group readings

The challenge, in brief, is to reconcile the maximality that clearly helps rule out the conjunction of incompatible predicates with the perception that bare plurals in episodic contexts allow predication to a subset of relevant entities. In order to show that maximality need not be anti-thetical to our intuitive understanding of bare plurals, I will begin with definite determiners which canonically are thought to encode maximality. An interesting fact about them is that although they refer to maximal entities, they can actually allow a weaker reading in which the predication, strictly speaking, only holds of a subset of the group. It is easy to see this when definites are contrasted with universal terms:

- (44) a. Every reporter asked questions at the press conference.
 b. The reporters asked questions at the press conference.
 c. $\forall x[\text{reporter}(s)(x) \rightarrow \text{ask-question}(s)(x)]$
 d. $\text{ask-question}(s)(\iota x[\text{reporters}(s)(x)])$

In a situation where 3 out of 10 reporters asked questions, (44a) would be false but (44b) may well be accepted. Note that this is independent of the domain restriction for which resource domain variables have been proposed. In both (44a) and (44b) the resource domain variable may restrict the evaluation to reporters at a press conference in the White House on a particular day. The difference between universals and definites remains unaffected even when the common noun has this restricted interpretation.

This phenomenon, known as representative group readings or pragmatically weakened readings, has been studied by Dowty (1987), Taub (1989), Brisson (1998) and Lasersohn (1999), among others. Lasersohn (1999) discusses these facts within a more general perspective on various items that countenance and regulate such effects.²⁴ His main point with regard to data such as (44b) is that statements with definites can be evaluated with respect to subsets of the full set of entities, *pragmatic halos* in his terms, as long as the gap between the halo and the actual denotation is irrelevant in the utterance situation.

Let us work through a concrete case to see how the account works. Consider a situation in which there are four reporters, a, b, c and d. Of these a, b and c ask questions at the news conference. In this scenario, the halos for the definite plural would be the set in (46a), with the halos ordered from tightest on the left to loosest on the right. Assuming the compositional semantics in Lasersohn, the halo of a complex expression is derived by applying normal semantic rules to all possible combinations of elements drawn from the halos of its immediate parts. Under this view a sentence like (46b) may be judged true in virtue of a proposition like (46c), where a particular halo of the definite functions as the argument. That is, a loose halo with only three of the four reporters suffices for truth, as long as the context supports treating them as representative of their group $\alpha[\textit{reporters}(s)(x)]$:

²⁴ Lasersohn discusses *all*, *exactly*, *precisely*, as expressions which regulate such weakened readings. See also Brisson (1998).

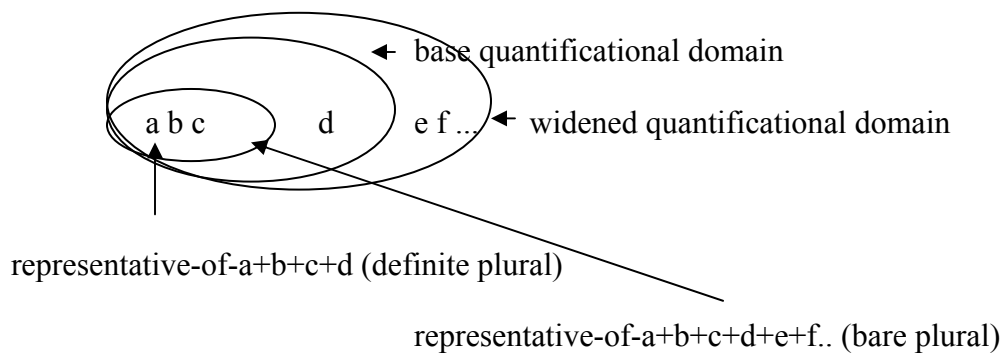
- (46) a. Halos for the definite plural: {a+b+c+d, a+b+c, a+b, a+c, b+c, a, b, c}
- b. The reporters asked questions at the press conference.
- c. $\llbracket \text{ask-questions}(s)(a+b+c) \rrbracket = 1$

My claim is that bare plurals present a parallel situation. In the same situation as above, the halos of the bare plural would include larger entities, as represented on the left in (47a). A statement like (47b) is verified on the basis of a loose halo such as the one we see in (47c), as long as the context supports treating them as representatives of their group. This is parallel to what we saw in (46), except that the group represented happens to include other possible reporters:

- (47) a. Halos for the bare plural: {a+b+c+d+e+f..., a+b+c+d, a+b+c, a+b, a+c, b+c, a, b, c }
- b. Reporters asked questions at the press conference.
- c. $\llbracket \text{ask-questions}(s)(a+b+c) \rrbracket = 1$

This is represented diagrammatically in (48):

(48)



With this in mind, let us take a closer look at the “indefinite” reading of bare plurals. A canonical context for such readings might be something like (49). You are looking out of the

window, you see dogs, none of them known to you, running around the garden. Your friend asks you the question in (49a). You might respond with (49b):

(49) a. What's happening outside?

b. Not much, dogs are running around.

c. $\llbracket \text{running}(s)(\cap \text{dogs}) \rrbracket = DKP \Rightarrow$

$\Rightarrow \llbracket \text{running}(s)(\cap \text{dogs}_s) \rrbracket = 1$ iff $\llbracket \exists s' [s < s' \wedge \text{running}(s)(\cap \text{dogs}_{s'})] \rrbracket = 1$

You know that the dogs you see could not possibly be all the dogs in the world, possibly not even in the neighborhood. You use the bare plural to refer to this larger entity, though the truth of the statement is based on the halo that refers only to the dogs in the base situation. The intuitive characterization of this reading may be that it is an indefinite because world knowledge tells us that only a subset of the dogs in the wider set are involved. The point I am making is that such a reading technically does not involve \exists quantification over dogs in the way that an actual indefinite like *some dogs* does. One way to think of this is to say that by choosing a kind term, the speaker signals that the truth of the statement will be verified with respect to a loose halo that refers to a group larger than the contextually salient one. This puts, if you will, empirical bite into the claim of reference to kinds in episodic contexts.

There is an interesting consequence of the account I am proposing. Consider what happens if you utter (49b) when there are no dogs outside. There will not be a halo for $\cap \text{dogs}_s$ that will make the sentence true, but the term itself will not be undefined because the presupposition of existence can be satisfied on the widened domain. In the case of a plural definite on the other hand, the term itself, $\iota x [\text{dogs}(s)(x)]$, is undefined. We can capture, without stipulation, a difference between definites and bare plurals by appealing to different domains of quantification for presupposition satisfaction.

Another welcome consequence is that it provides a straightforward account of the problem of incompatible predicates. Consider the following paradigm, due originally to Kroch (1974):

- (50) a. Some of the townspeople are awake.
b. The townspeople are asleep.
c. #Although the townspeople are asleep, some of them are awake.

Assume a context in which (50b) will be judged true under a pragmatically weakened reading. That is, a context in which *asleep(the townspeople)* is true only of a proper subset of the townspeople. The question is why in (50c) those members who are awake cannot make the second conjunct true. The reason, according to Lasersohn, is that the choice of a halo is context sensitive. If their being awake is relevant enough to justify the assertion in the second conjunct, a halo that leaves those people out cannot be supported to make the assertion in the first conjunct.

The same obviously applies to conjunctions with plural definites. Two conjuncts which have incompatible predicates cannot be remedied by applying the predicates to different halos since a subset that is deemed irrelevant to the truth of the first conjunct cannot then be resurrected as relevant in the next conjunct. In this respect, definites differ from indefinites, whose semantics has predication to subsets built into it and need not rely on halos for the relevant reading:

- (51) a. #The reporters asked questions while/but/and the reporters kept quiet.
b. Some reporters asked questions while/but/and some reporters kept quiet.

Under the view that a bare plural is a type of definite, the solution to the problem of incompatible predicates with bare plurals follows from our assumptions about maximality and representative group readings. To go back to our White House press conference scenario, whether the plural

individual $a+b+c$ represents the contextually salient set of reporters (for the definite) or reporters more generally (for the bare plural), we cannot predicate *kept quiet* or *did not ask questions* in the same context by referring to those that are set aside by the halo deemed appropriate for *asked questions*. Lasersohn’s account, though it incorporates the notion of halos into compositional semantics, leaves to pragmatics the choice of halo appropriate for an assertion. While the semantics proper allows for conjunction of incompatible predicates, the pragmatics of assertion, which regulates the choice of halos, militates against it.

6. Taking stock

In the previous sections I have presented arguments against having a covert \exists type shift as well as against the \exists force introduced by DKP. I have provided alternative explanations for the effects previously attributed to these sources. Instead of \exists type shift for partition inducing bare plurals, I have posited a lexical ambiguity where one of the meanings of these phrases is that of the \exists generalized quantifier. I have re-analyzed the indefinite feel of *nom*-shifted bare plurals as a representative group reading of a definite, interpreted over a widened domain. This new angle obviously raises a host of questions requiring revision of previously accepted explanations for the behavior of bare plurals. Considerations of space prevent me from addressing all the ones I am aware of but I will briefly touch upon a few, indicating the directions of research I hope to pursue in the future.

6.1. Scope matters

An important aspect of the semantics of bare plurals has always been the propensity for narrow scope. Let us see if the revisions I have proposed capture this aspect of their behavior, starting with negation:

(52) a. Dogs are not barking.

b. $\text{barking}(s)(\wedge \text{dogs}) = \text{DKP} \Rightarrow \text{barking}(s)(\wedge \text{dogs}_s)$

c. $\llbracket \text{barking}(s)(\wedge \text{dogs}_s) \rrbracket = 1$ iff $\llbracket \exists s' [s < s' \wedge \text{barking}(\wedge \text{dogs}_{s'})] \rrbracket = 1$

I believe the facts follow from what we have said so far. Since we are taking bare plurals to be definites, the presupposition of existence will project above negation. If there are no dogs in the base situation, it does not matter. The presupposition can be satisfied in a larger situation. With the presupposition satisfied, DKP comes into play in the computation of the sentence at the level of the predicate *bark*. If there are no barking dogs in the base situation, either because there are no dogs or because no dog is barking, there will be no halo of the extension of the kind to make it true. (52c) will be false, so (52a), the negative statement will be true, as desired. But now suppose there is one sole dog barking. In a particular context, that one dog may be enough to make (52c) true and, in that case, (52a) will be false, as desired. But now suppose that the one barking dog for some reason doesn't count as particularly relevant. In such a situation we can ignore that dog and choose a halo without it, making (52c) false and consequently (52a) true.

This last fact goes against the received wisdom about bare plurals and negation but I think it better captures the reality. Consider the White House press conference scenario and assume only one reporter got to ask a question. It may be possible to say in this context either (53a) or (53b), depending on how easy it is for us to treat the sole reporter that asked a question as an outlier:

- (53) a. The reporters did not get to ask questions.
- b. Reporters did not get to ask questions.

Finally, we might wonder about cases in which the presupposition of existence cannot be met, as shown in (54):

- (54) I didn't see dinosaurs, because there are no dinosaurs.

What seems to be going on is that the first sentence is uttered in a context where the presupposition that dinosaurs exist is entertained, but is subsequently abandoned (see Chierchia and McConnell-Ginet 2000: 384-386 for discussion of apparent cases of presupposition cancelation). But this is not how bare plurals under negation typically behave. Typically, the presupposition of existence is accommodated and the negative sentence evaluated as true either

because there are no relevant entities in the base situation, or it is evaluated as true/false depending on whether there is a halo that makes the embedded sentence true. I have suggested that the diagnostic of narrow scope be tweaked to allow for some pragmatic weakening but the rest follows from what we know about negation, definites and halos. Thus the present account maintains the results of the standard neo-Carlsonian account.

Let us now consider the fact that bare plurals show differentiated scope. These are sentences where they take scope below a temporal adverbial, at a point where indefinites cannot:

(55) a. Leaves kept falling all morning.

b. $\forall s[s < S \rightarrow \text{fall}(s)(\cap \text{leaves})] = \text{DKP} \Rightarrow \forall s[s < S \rightarrow \text{fall}(s)(\cap \text{leaves}_s)]$

There are many issues that come up in relation to such sentences but an intuitively adequate way of characterizing them is to take them as involving quantification over times within a temporal interval. Just to keep things simple, I have taken the quantification to be over sub-situations s of a contextually salient situation S . After the intervention of DKP, we look for a halo of leaves at each s to see if *fall* can be truthfully predicated of it. Since this is a once-only predicate, we take each sub-situation to license access to a distinct halo for the kind term. This seems reasonable enough but requires further thought when we consider definites in such structures. A variant of (55a) with a definite is also acceptable, as we might expect given the kinship we are claiming between bare plurals and definites. However, we need to be cautious in drawing parallels because the alignment is not perfect.

In contrast to the periphrastic construction, a low pluractional adverbial such as *twice* yields a more nuanced comparison. With a small time interval like *this morning* the definite has the implausible reading but with a larger time interval like *last year* the differentiated scope reading re-emerges:

(56) a. Leaves/ #The leaves fell twice this morning.

b. Leaves/The leaves fell twice last year.

Descriptively, it is clear what is happening in (56). One can imagine one set of leaves falling and then a new set sprouting subsequently and falling later in the year, but not within a single morning.²⁵

We know that the reason indefinites do not show differentiated scope is because their type does not allow them to be interpreted low enough in the structure, but this does not hold true of definites. Carlson did not compare bare plurals with definites and the literature since then has also not done so systematically. The data discussed here argue for a systematic investigation into the differences between bare plurals and definites, both of which have the same type and can therefore occur as direct arguments of the verb. But clearly bare plurals have more flexibility than definites in allowing reference to distinct individuals within short intervals, thus allowing for distinct halos.

6.2. Bare plurals and discourse

Since I have extended the scope of *nom* and therefore of the modified DKP to indexical bare plurals, we need to see how proper widening plays out in these cases:

(57) a. In 1995, there was a ghost on campus. Students on the campus were afraid.

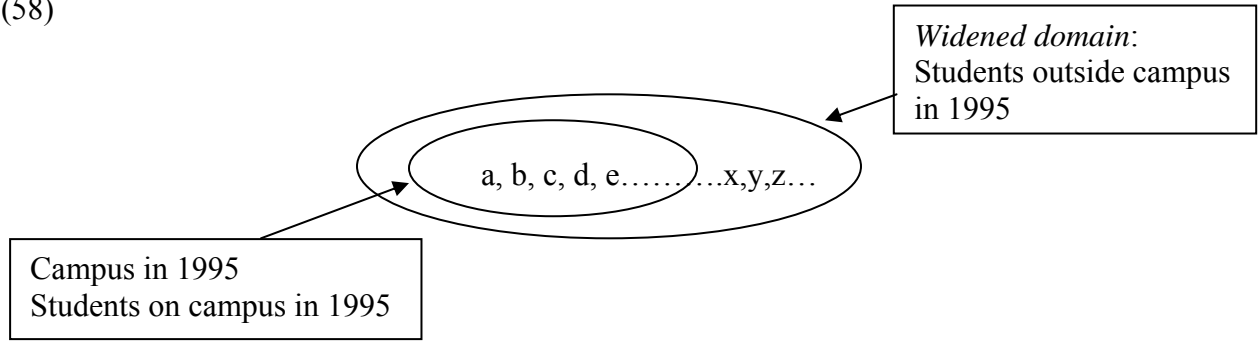
b. $\llbracket \text{afraid}(s)(\cap(\lambda s \lambda x (\text{students}(s)(x) \wedge \text{on-the-campus}(s)(x)))) \rrbracket = DKP \Rightarrow$

c. $\llbracket \exists s' [s < s' \wedge \text{afraid}(s)(\cap \text{students-on-the-campus}_{s'})] \rrbracket$

Given the restriction imposed by the modifier to a specific time and place, the requirement of proper widening cannot be satisfied if both properties are involved in the comparison. Because of the anchoring to a particular campus at a particular time, the set of students is fixed regardless of how much we widen the domain of quantification. However, because we are dealing with a complex noun phrase, I suggest that it is possible to satisfy widening with reference to the head noun alone. We can see this graphically:

²⁵ See references cited in footnote 19 for relevant discussion about the scope properties of bare nominals and such adverbs.

(58)



The bare plural is felicitous because even though $\neg \exists x [x \leq k(s') \wedge \neg \text{in-s}(x)]$, when $k = \lambda s \iota x [\text{students}(s)(x) \wedge \text{on-the-campus}(s)(x)]$, it is the case that $\exists x [x \leq k(s') \wedge \neg \text{in-s}(x)]$ iff $k = \lambda s \iota x [\text{students}(s)(x)]$. The head noun alone satisfies the presupposition of proper widening so widening can technically be satisfied. The implicit (or explicit) restriction by the indexical effectively blocks reference to a plurality beyond the base situation. The “indefinite” feel of the bare plural is predictably missing because the students on campus cannot represent a larger plurality of students on campus. We thus derive Condoravdi’s “functional” readings, which align bare plurals with definites rather than indefinites. Note that we needed to block *nom* from applying to *wheels on the car*, because if it were admitted as a kind term the same reasoning that we have applied to (57a) would apply to it and yield the unavailable reading.

Continuing further with the general issue of relation to discourse, let us move away from functional contexts to contexts in which there is an explicit antecedent. There are two possibilities to consider: an anaphoric link between the antecedent and the bare plural, and a partitive connection. I repeat English and Hindi (10) here to illustrate:

- (59) a. Some children_i came in. Children*_i sat down.
b. kuch bacce_i andar aaye. bacce_i baiTh gaye.
Some children inside came children sit went
'Some children came in. The children sat down.'

In a language like English the bare plural is unacceptable. In a language like Hindi it is acceptable, but only if anaphorically linked to the children in the first sentence. As far as I know, it is not possible for bare plurals to refer to a subset of a previously mentioned set in any language. This follows under the present account since bare plurals are never interpreted with \exists force, neither through \exists type shift, nor through DKP. The only possible reading is an anaphoric one, and that is dependent on whether the language has a lexical definite or not. This is, I believe, an important advantage of treating bare plurals as definites.

6.3. Proper widening and variation in size

Finally, I would like to consider whether we really need to constrain *nom* by requiring predicates to vary in size across indices and have a requirement of proper widening when bare plurals are used in object-level statements. In order to do so, I will first look at how predicate selection can affect the felicity of bare plurals. I start by noting some predictions of the view that the indefinite feel of bare plurals is due to representative group readings of a definite, interpreted over a widened domain.

It has been claimed that the choice of predicates can influence the availability of pragmatically weakened readings (see Dowty 1987, Taub 1989, Brisson 1998):

- (60) a. The senators are a large group.
b. The senators have elected a speaker.
c. The senators are meeting in the next room.
d. The senators have finished voting.

(60a)-(60b) can only be verified with respect to a tight halo. That is, the totality of senators must be taken into account. (60c)-(60d), on the other hand, admit loose halos. Not all senators need be involved in the relevant activity.

It is predicted that if a predicate requires a tight halo a bare plural will be inadmissible because it will run afoul of proper widening: if all the senators are already in the base situation, widening cannot add more senators. This prediction is borne out:

- (61) a. #Senators are a large group.
b. #Senators have elected a speaker.
c. Senators are meeting in the next room.
d. Senators have finished voting.

Crucially, what we get is infelicity of the otherwise acceptable bare plural *senators*. This is explained under the view that bare plurals have a presupposition of proper widening but not under a simple view of bare plurals as indefinite.

Coming now from the opposite angle, consider some potential counterexamples to the claim that bare plurals do not tolerate conjunction of incompatible predicates, a feature crucially explained by their being definites. (62a) is a context provided by an anonymous reviewer but other such examples are easy to construct:

- (62) a. *Context: live report from a disaster scene.*
“People are screaming, people are jumping out of windows, people are trying to force the doors open...”
b. *Context: teacher describing her classroom.*
“What a peaceful day it is. Children are playing happily, children are reading quietly, children are doing their homework. I wish everyday were like this.”

An interesting fact about such cases is that there is typically a framing sentence that describes the overall situation, after which follows an elaboration. (62a) most likely follows upon a statement like “There is complete chaos here. People are screaming...” The elaboration seems to pick out sub-situations from a partition of the overall situation. Under these circumstances, it appears possible to use different halos for each sub-situation. In the examples I had used to make the case for bare plurals being definites, the situation was held constant and the judgment was that conjoining incompatible predicates led to contradiction. The point was that holding the situation constant precludes a switch in halos for a bare plural. This would not be an obstacle if the bare plural were an indefinite because an \exists quantifier could still make reference to different subsets.

In a twist on the same theme, certain infelicitous bare plurals seem to improve when they are part of a list. (63b), due to Omer Preminger (p.c.), contrasts with our previous example, repeated here as (63a):

- (63) a. This is a very strong rope. #Fibers are made of nylon.
b. This rope needs to be replaced. Fibers are sticking out and the edges are frayed.

This is a bit of a puzzle but here is how one might try to make sense of it. Suppose, contrary to what we had assumed in section 3, that *fibers* even in the context of an indexical is a kind term. Suppose further that in interpreting the phrase *fibers are sticking out* in (63b), we focus only on a part of the rope, that part where we see some fibers sticking out. Then, we can satisfy proper widening by considering the whole rope which has fibers that are not sticking out. Not only do we get a felicitous bare plural, we also capture the intuition that only some of the fibers in the rope are sticking out. But if we are talking about what those fibers are made of, as in (63a), we look at the whole rope and now proper widening is not possible and the bare plural is ruled out.

The explanation I am giving for (63b) brings us back to the question we had started with: Can an appropriate understanding of how proper widening interacts with predicate selection make it possible to eliminate the constraint of variation in size on kind formation? I am clearly not in a position to answer this question in this paper though the theoretical appeal of such a streamlining is obvious.

7. Conclusion

I have taken a rather unorthodox view of the core data regarding bare plurals, and by extension, mass terms since the two generally align together. Although I believe I have motivated it on sound empirical grounds, I recognize that further buttressing may be needed to convince the skeptic of the need for such unorthodoxy. In the previous section I indicated some issues that remain open in my mind. It is quite possible that more sophisticated ways of treating discourse

and (in)definiteness may reveal a way to reconcile the facts which have formed the basis of my proposal with a treatment of bare plurals as encoding \exists force after all.

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