The Denotation(s) of English Bare Plurals: Chierchia’s (1998) Theory

1. The Overarching Question: Are Bare Plurals Ambiguous?

(1) Major Question:
Does the bare plural *dogs* have the same denotation in each of these sentences?

a. **Kind Predication:** Dogs are not extinct.
   
   b. **Generic (Characterizing Sentence):** Dogs bark.
   
   c. **Episodic Sentence:** Dogs are barking.

(2) One Answer (Carlson 1977, Chierchia 1998)

- The bare plural in English has the same denotation in each of these sentences.
  - It denotes a *kind* (*i.e.*, the kind ‘DOG’)

- In sentences like (1b) and (1c), other mechanisms / operators act upon this denotation to produce the existential (1c) or ‘quasi-universal’ (1b) quantification over dogs.

(3) Some Initial Cause for Concern, Part 1

Indefinite singulars cannot denote kinds (3a). However, they can appear as the subject of generics (characterizing sentences), yielding a ‘quasi-universal’ reading like (1b).

a. *A dog is extinct.*
   
   b. A dog barks. \(\approx\) *Dogs bark*
   
   c. A dog is barking.

(4) Some Initial Cause for Concern, Part 2

Definite singulars can denote kinds (4a), and they can appear as the subject of a generic, yielding a ‘quasi-universal’ reading like (1b) and (3b).

- **However, when they appear with an episodic predicate, they do not produce existential quantification over dogs like (1c) and (3c).**

a. The dodo is extinct.
   
   b. The dog barks. \(\approx\) *Dogs bark*
   
   c. The dog is barking. \(\neq\) *Dogs are barking*


Bare plurals in English are *systematically ambiguous*. They can be interpreted as kinds or as plural indefinites.

- Under their ‘kind’-interpretation, they can appear with kind-level predicates (1a) or as the subject of a generic (characterizing sentence) (1b).

- Under their indefinite interpretation, they can appear as the subject of a generic (characterizing sentence) (1b) or in an episodic context (1c).
2. Evidence For Univocality in English Bare Plurals

(6) Cross-Sentential Anaphora Between ‘Indefinite’ Bare Plurals and Kinds
   a. John couldn’t buy dodos\textsubscript{1} because they\textsubscript{1} are extinct.

   • In this sentence, dodos seems intuitively to be the antecedent of they.

   • Importantly, dodos seems to be getting an ‘indefinite’ construal, while they denotes the kind.

   • This best fits the ‘univocal’ analysis in (2)…
      o Even under an ‘indefinite construal’, dodos denotes the kind DODO, and so a pronoun taking it as antecedent can also denote a kind…

(7) A Problem For this Argument
   a. John couldn’t buy a dodo\textsubscript{1} because they\textsubscript{1} are extinct.

   • In this sentence, a dodo seems intuitively to be the antecedent of they.

   • Again, they is understood to denote the kind DODO, even though we know the indefinite a dodo cannot itself denote that kind…

   General Lesson:
   Cross-sentential anaphora is complicated and ‘antecedents’ can be more than they appear…

(8) An Improved Argument: Binding Between ‘Indefinite’ Bare Plurals and Kinds
   a. At the meeting, Martians\textsubscript{1} presented themselves\textsubscript{1} as almost extinct.

   b. ?? At the meeting, some Martians\textsubscript{1} presented themselves\textsubscript{1} as almost extinct.

   c. ?? At the meeting, a Martian\textsubscript{1} presented themselves\textsubscript{1} as almost extinct.

   • In sentence (8a), developed by Rooth (1985), the bare plural Martians binds the anaphor themselves.

   • Importantly, Martians receives an ‘indefinite’ construal, while themselves denotes the kind MARTIAN.

   • Even more importantly, this isn’t as felicitous with an overt indefinite (8b,c)

   • Again, this array of facts best fits the ‘univocal’ analysis in (2)…
Another Argument: Conjunction of Episodic and Kind-Selecting Predicates

a. (??) Pandas are nearly extinct, but are being sold downtown.
   • In this sentence, which some speakers accept, a kind-selecting VP is conjoined with an episodic VP, and a single bare plural is the subject.
   • For those who accept the sentence, the bare plural yields a kind-level predication with the first VP and an ‘indefinite construal’ with the second VP.
     o Again, this best fits the ‘univocal’ analysis in (2).
   • However, not all speakers accept sentences like (9a).
   • On the other hand, everyone agrees that they get even better if you use an appositive relative…

b. (??) Pandas, which are nearly extinct, are being sold downtown.

As noted by Krikfa (2004), the most convincing evidence against the ‘ambiguity view’ in (5) is the special scopal behavior of bare plurals…

Bare Plurals Always Take Narrowest Scope

a. (i) **Dogs** were not in the yard.
   1. OK: \( \neg \exists x. \text{dogs}(x) \& x \text{ is in the yard} \).
   2. NOT: \( \exists x. \text{dogs}(x) \& \neg (x \text{ is in the yard}) \).

   (ii) **Some dogs** were not in the yard.
   1. NOT: \( \neg \exists x. \text{dog}(x) \& x \text{ is in the yard} \).
   2. OK: \( \exists x. \text{dog}(x) \& \neg (x \text{ is in the yard}) \).

b. (i) **Dogs** were everywhere
   1. OK: \( \forall y. \text{place}(y) \rightarrow \exists x. \text{dogs}(x) \& x \text{ was in } y \).

   (ii) (??) **Some dogs** were everywhere.
   1. NOT: \( \forall y. \text{place}(y) \rightarrow \exists x. \text{dogs}(x) \& x \text{ was in } y \).

c. (i) Mary **wanted** to meet doctors.
   1. OK: \( \forall w \in W(Mary,w): \exists x. \text{doctors}(x,w') \& \text{Mary meets } x \text{ in } w' \)
   2. NOT: \( \exists x. \text{doctors}(x,w) \& \forall w' \in W(Mary,w): \text{Mary meets } x \text{ in } w' \)

   (ii) Mary **wanted** to meet some doctors.
   1. OK: \( \forall w' \in W(Mary,w): \exists x. \text{doctors}(x,w') \& \text{Mary meets } x \text{ in } w' \)
   2. NOT: \( \exists x. \text{doctors}(x,w) \& \forall w' \in W(Mary,w): \text{Mary meets } x \text{ in } w' \)
The special restricted scope of ‘indefinitely construed’ bare plurals follows from the ‘univocality account’ we already have on the table, if we add just one more assumption (12)…

(11) **Derived Kind Predication, Redux (Chierchia 1998)**

If \([[[XP]]^w \in D_K\) while \([[YP]]^w \in D_{<ct>}\) then \([[XP YP]]^w = T \iff \exists x . x \leq [[[XP]]^w(w) \& [[[YP]]^w(x) = T\)

(12) **Kind-Denoting Expressions Leave Traces of Kind-Level Type (Chierchia 1998)**

If \([[XP]]^{w,g} \in D_K\) and \(t_i\) is a trace left by movement of XP, then \([[t_i]]^{w,g} \in D_K\)

(13) **Result: Movement of Kind-Denoting Expressions Never Affects Scope**

a. Sentence: Dogs were not in the hard.

b. LF: \([\text{Dogs} [\text{1 NEG}[\text{VP} t_i [\text{in the yard}] \ldots]\]

b. Truth-Conditional Derivation:

\[(i) [[[\text{Dogs} [\text{1 NEG}[\text{VP} t_i [\text{in the yard}] \ldots]]]^{w,g} = T \iff

(ii) [\lambda y : y \in D_K . \neg(\exists x . x \leq y(w) \& x \text{ is in the yard})]([[[\text{dogs}]]^w(y)) = T \iff

(iii) \neg(\exists x . x \leq [[[\text{dogs}]]^w(w) \& x \text{ is in the yard}) \iff

(iv) \neg(\exists x . x \leq \text{MAX}(*[[[\text{dog}]]^{w,g}) \& x \text{ is in the yard}) \iff

(v) \neg(\exists x . *\text{dog}(x) \& x \text{ is in the yard})

(14) **Side-Note:**

This account of the narrow-scope behavior of bare plurals rests on various unstated ancillary assumptions about the syntax/semantics of the other logical operators.

- For example, this account only works if we assume (as we typically do) that negation only has a \(<t,t>\) reading, and necessarily sits above the base-position of the subject…

(13) **Some Well-Known Counterexamples to (10)**

Carlson himself noted that some bare plurals can seem to get wide-scope readings.

a. Dave didn’t see parts of this machine.

   OK: \(\exists x . \text{parts-of-this-machine}(x) \& \neg(\text{Dave see } x)\).

b. Dave doesn’t know people in this room.

   OK: \(\exists x . \text{people-in-this-room}(x) \& \neg(\text{Dave see } x)\).
A Possible View on those Counterexamples (Chierchia 1998)

For the bare plurals in these sentences, there is no corresponding kind they can denote

- The properties these NPs denote – ‘part of this machine’ and ‘person in this room’ are too ‘spatio-temporally bound’ – to function as ‘kinds’… (?)

- Since these bare plurals don’t denote kinds, our account in (11)-(13) simply wouldn’t apply to them…

Obvious Question

OK, but if the bare plurals in (13) don’t denote kinds… what do they denote? (Stay tuned!)

Interim Summary

- From the arguments in (8)-(10), it seems that we want to treat all the bare plurals in (1a,b,c) as denoting kinds after all…

- But how do bare plural NPs end up denoting kinds?...
  - In our semantics for plural NPs, they denote cumulated properties: *[[dog]]
  - How/why can such a thing be used in English on its own to refer to the kind?
    - What is the grammar / system behind that?
    - And, can the account alleviate our causes for concern in (3)-(4)?

Chierchia’s (1998) Theory of Kind-Denoting Expressions Across Language

Note: There is much in Chierchia’s (1998) paper that we aren’t going to discuss here (e.g., his analysis of Mandarin, his theory of mass nouns)

Architectural Note:

- Chierchia’s (1998) analysis is couched within a purely intensional semantics, one where intensions are computed and composed together… (LING 620)

- Thus, the semantic value of an NP like dog will be its intension

  \[
  [[[\text{dog}]]] = [\lambda w : \lambda x : x \text{ is a dog in } w]
  \]

- This is done (I believe) because it makes things look cleaner with his special type shifting operators…
Brief Review of Chierchia’s (1998) Ontology for Kinds

a. Kinds are members of a special domain, $D_K$

b. Kinds are complex intensional objects of type $<s,e>$. They map a world to a ‘maximal plural individual’.
   - The kind ‘DOG’ maps a world $w$ to the plurality of all the dogs in $w$
     \[
     \text{DOG} = \left[ \lambda w : \text{MAX}(*[[\text{dog}]](w)) \right]
     \]

c. Not all $<s,e>$ functions of this nature are members of $D_K$
   - Some properties simply do not have corresponding kinds…
     \[
     \left[ \lambda w : \text{MAX}(*[[\text{part of this machine}]](w)) \right] \notin D_K
     \]

3.1 The Universal Type-Shifters and Their Blocking Relations

The centerpiece of Chierchia’s (1998) theory is a system of type shifting operators, which are posited to be universal across languages…
   - As noted by Krifka (2004), these type-shifters can be thought of as unpronounced operators that adjoin to NP…

The Universal Type Shifting Operators of Chierchia (1998)

a. $\cap$ (‘Down’): Maps a cumulative property to its corresponding kind, if such a kind exists.
   \[
   \left[ [\cap \ X P] \right] = \left[ \lambda w : \text{MAX}([XP](w)) \right],
   \text{if } \left[ \lambda w : \text{MAX}([XP](w)) \right] \in D_K
   \text{ and } [XP](w) \text{ is cumulative…}
   \text{undefined otherwise.}
   \]

b. $\cup$ (‘Up’): Maps a kind to its corresponding property
   \[
   \left[ [\cup \ X P] \right] = \left[ \lambda w : \lambda x : x \leq [XP](w) \right]
   \]

Chierchia also makes use of some of the ‘classic’ type shifters of Partee & Rooth…
   - Again, in his system they can be treated as unpronounced adjuncts to NP

Additional ‘Classic’ Type-Shifters Used by Chierchia

a. $\exists$ (‘Exists’): Maps a property to a generalized quantifier
   \[
   \left[ [\exists \ X P] \right] = \left[ \lambda w : \lambda P_{<\text{sec}>} : \exists x . [XP](w)(x) \land P(w)(x) = T \right]
   \]

b. $\iota$ (‘Iota’): Maps a property to an individual concept
   \[
   \left[ [\iota \ X P] \right] = \left[ \lambda w : \text{MAX}([XP](w)) \right]
   \]
Important Note:
Iota (in a sense) has a weaker meaning than Down.
- Down is restricted to cumulative properties that have corresponding kinds.
- Iota is not restricted in that way…
- But for the arguments they’re defined for, they have the same effect

Another crucial ingredient in Chierchia’s (1998) account is the notion that use/insertion of these type-shifting operators can get blocked under certain conditions…

(21) Overt Determiners Block Type Shifters (Type Shifting as Last Resort)

For any of the type shifting operators $T$ in (20)-(21), $[T \text{NP}]$ is ill-formed / ungrammatical in a language $L$ if there exists in $L$ an overtly pronounced determiner $D$ such that for all $XP$, $[[D \text{XP}]] = [[T \text{XP}]]$

(22) Key Consequence: Bare NPs as Definites

- In a language that has a definite determiner, like English, Iota cannot be used to turn a bare NP into a definite description…
- If a language lacks a definite determiner, like Russian, then Iota can be used to turn a bare NP into a definite description!

(23) Key Consequence: Bare NPs as Indefinites

- In a language that has an indefinite determiner, like English, Exists cannot be used to turn a bare NP into a (regular, GQ) indefinite…
- If a language lacks an indefinite determiner, like Russian and Modern Hebrew, then Exists can be used to turn a bare NP into a (regular, GQ) indefinite!

Note: Dayal (2004) argues that bare NP indefinites in languages like Russian and Hindi have scope restrictions that suggest they are not created with ‘Exists’

(24) Important Note: The ‘Ineffability’ of Down and Up

- As noted above, Down does not have the same meaning as Iota or “the”
- Indeed, no language seems to have Ds expressing the meaning of Down or Up
- Thus, modulo other independent constraints, every language should permit NPs to surface bare with either Down or Up modifying them!
(25) **Restriction of ‘Down’ to Cumulative Predicates**

a. **Question:** Why is Down restricted only to cumulative predicates?

b. **Empirical Answer:**
Chierchia (1998) assumes that no language uses bare singular count nouns (e.g. ‘dog’) to denote kinds.

c. **Conceptual Answer:**
Chierchia also claims that this restriction is conceptually motivated, because:

- If XP is non-cumulative, then \([ [ \cap \text{XP} ] ] = [ \lambda w : \text{MAX}([[\text{XP}]][w])] \) would only be defined for w’ if there’s exactly one x such that [[XP]](w’)(x)

- Thus, the set of worlds that \([ [ \cap \text{XP} ] ] \) would be defined for is simply ‘too narrow’ to be useful as a member of \(D_{K}\)

(26) **Krifka’s (2004) Criticism of This Restriction**

a. **Empirical Criticism:**
Contrary to the assumption in (25b), some languages do use bare singular count nouns to denote kinds (Dayal 2004).

b. **Conceptual Criticism:**
As it stands, \([ [ \cap \text{XP} ] ] \) is only defined for worlds that have some x’s in them such that [[XP]](w’)(x).

- It’s unclear (to Krifka (2004)) why that limitation is okay, but not one where \([ [ \cap \text{XP} ] ] \) is defined only for worlds that have exactly one such x in them…

(27) **Important Assumption: The Non-Equivalence of Some and Exists**

As we will see later, Chierchia (1998) crucially assumes that – although ‘a’ in English has the same meaning as Exists (and so blocks Exist (21)) – ‘some’ does not.

- Thus, the ability for ‘some’ to appear with plural NPs in English does not block the ability for Exists to modify a plural NP.

**Nominal Structures of English:**

| (i)      | [D a [\text{NP} \text{dog}]] |
| (ii)     | * [\text{NP} \exists \text{dog}] | (blocked by (i), (21))
| (iii)    | [D some [\text{NP} \text{dogs}]] |
| (iv)     | [\text{NP} \exists \text{dogs}] | (*not* blocked by (iii)) |
(28) **The Difference Between Some and A / Exists**

- Chierchia (1998) assumes that while an indefinite like *a dog* truly is an existential generalized quantifier (and so is equivalent to [NP ∃ dog]...)

- The DP *some dogs* is (always) a so-called ‘choice-functional indefinite’. That is, *some* introduces a variable over ‘choice-functions’ that takes *dogs* as argument...

  \[
  [[ \text{some}_1 \text{dogs} ]] = [ \lambda w : f_1 ( \{ y : [[\text{dogs}]](w)(y) = \text{T} \} ) ]
  \]

- If you’re not familiar with ‘choice functional indefinites’, it doesn’t matter...

- All that matters is that Chierchia semantically distinguishes *some* from *a/Exists* so that *some* won’t block *Exists*...

(29) **Important Assumption: Down (∩) Blocks Exists (∃)**

- Notice that if Down is defined for an XP (*i.e.*, it’s cumulative and has a corresponding kind), then – because of the rule of DKP – the following structures will be equivalent.

  a. \[
  [[ [ \text{∩} \text{XP}_{<\text{set}>} ] \text{YP}_{<\text{set}>} ]] = \quad \text{(via DKP)} \]

  \[
  [ \lambda w : \exists x . x \leq [[ \text{∩} \text{XP} ]]^w(w) & [[\text{YP}]](w)(x) ] = \quad \text{(def. of ‘∩’)}
  \]

  \[
  [ \lambda w : \exists x . x \leq \text{MAX}([[\text{XP}](w))] & [[\text{YP}]](w)(x) ]
  \]

  b. \[
  [[ [ \exists \text{XP}_{<\text{set}>} ] \text{YP}_{<\text{set}>} ]] = \quad \text{(def. of ‘∃’)}
  \]

  \[
  [ \lambda w : \exists x . [[\text{XP}])(w)(x) & [[\text{YP}]](w)(x) ]
  \]

- Chierchia (1998) assumes that no language makes free use of either of these LFs. That is, if the LF in (29a) is well-formed in L, then the LF in (29b) is *not*.

- In other words, Down (∩) Blocks Exists (∃)

  c. **Motivation for the Blocking Relation:**

    (i) *Empirical Motivation:* (We’ll discuss that later)

    (ii) *Conceptual Motivation:*

    - It’s not entirely clear (Krifka 2004, Dayal 2004)
    - Chierchia seems to think that the ‘existential import’ of ‘∃’ means that it has a more radical effect on the meaning of the NP, and so is dispreferred...
(30) **Summary of the Blocking Relations for English:**

a. ‘the’ blocks Iota (ι)
   • So bare NPs cannot be used as regular definite descriptions…

b. ‘a’ blocks Exists (∃)
   • So bare singular count nouns cannot be used as indefinites…

c. ‘some’ does not block Exists (∃)
   • So bare plural count nouns can sometimes be formed with ‘∃’

d. Down (∩) blocks Exists (∃)
   • So bare pl. count Ns are formed with ‘∃’ only if ‘∩’ is not defined for them

e. Nothing blocks Down (∩)
   • The only reason ‘[∩ NP]’ would be ill-formed in English is if
     o (i) NP is not cumulative (i.e., singular count noun), or
     o (ii) NP does not have a corresponding kind…

(31) **An Initial Remark About Romance Languages**

- Although no Ds or type-shifters ever ‘block’ Down, some languages – like the Romance languages – simply have a (morpho)syntactic ban on using NPs bare as arguments…

- Thus, ‘[NP ∩ NP]’ is just independently syntactically ruled out in (e.g.) Italian.

- **Consequently, the only way to denote the kind DOG in Italian would be to use a definite article…**

a. *(I) cani sono diffusi.
the dogs are widespread
*Dogs are widespread* (Dayal 2004)

b. Some Question We’ll Come Back To:

   (i) Wait… then why can’t we use definite plurals to denote kinds in English?
   (After all, it’s not as if ‘∩’ blocks use of ‘the’…)

   (ii) Wait… bare plurals are okay in Italian under certain circumstances
   (We’ll see the data later, but they are sometimes okay…)
3.2 The Analysis of English Bare Plurals in Chierchia’s (1998) System

Let’s now use the ingredients we just laid out to understand the use of bare plural NPs in English...

3.2.1 Bare Plurals with Kind-Selecting Predicates

Thanks to the Down operator, any NP that is cumulative and has a corresponding kind can be used to refer to that kind!

(32) a. **Sentence:** Dodos are extinct.

   b. **LF:** \([S \ [NP \ \cap [dodo \ PL]] \ [VP \ \text{are \ extinct}]]\)

   c. **Denotation:** [\(\lambda w : DODO \ \text{is \ extinct \ in} \ w\)] = [\(\lambda w : [\lambda w' : \text{MAX}(*[[dodo]](w'))] \ \text{is \ extinct \ in} \ w\)]

3.2.2 Bare Plurals with Episodic (Entity-Selecting) Predicates

If a plural NP has a corresponding kind, then a sentence like (33a) – where it combines with an episodic, entity selecting predicate – will have the LF in (33b).

- **Thanks to the rule of DKP, the resulting LF will get the interpretation in (33c)!**

(33) **Bare Plurals (with Corresponding Kinds) in Episodic Sentences, Part 1**

   a. **Sentence:** Dogs are barking

   b. **LF:** \([S \ [NP \ \cap [dog \ PL]] \ [VP \ \text{are \ barking}]]\)

   c. **Denotation (Thanks to DKP):** [\(\lambda w : \exists x . x \leq \text{MAX}(*[[dog]](w)) \ \& \ x \ \text{is \ barking \ in} \ w\)]

Furthermore, due to the fact that Down blocks Exist ((29), (30d)), a sentence like (33a) cannot have the LF in (34a), even though that LF would end up getting an equivalent meaning (34b).

(34) **Bare Plurals (with Corresponding Kinds) in Episodic Sentences, Part 2**

   a. **Not a Possible LF for (33a):** \([S \ [NP \ \exists [dog \ PL]] \ [VP \ \text{are \ barking}]]\)

   b. **Denotation of (34a):** [\(\lambda w : \exists x . *[[dog]](w)(x) \ \& \ x \ \text{is \ barking \ in} \ w\)]

Thus, for reasons we’ve seen (13), a negated sentence like (35a) will only end up getting the ‘narrow scope’ reading in (35b, c).
(35) **Bare Plurals (with Corresponding Kinds) in Episodic Sentences, Part 3**

a. **Sentence:** Dogs are not barking.

b. **LF:** 
\[ S [ NP \cap [dog PL] ] [ 1 [ NEG [ t_1 [ VP are barking ] ] ] ] \]

c. **Denotation (Thanks to DKP (13)):**
\[ \lambda w : \neg \exists x . x \leq \text{MAX}(*[[dog]](w)) \& x \text{ is barking in } w \]

(36) **Crucial Prediction: Scopal Behavior of Bare NPs Without Corresponding Kinds!**

- By the logic of ‘blocking’, if Down is ever *undefined* for a (plural) NP, then Exists should be able to apply to it (30c,d)…

- Therefore, if a plural NP ever fails to have a corresponding kind, then it should be possible to form a bare plural with it via Exists

- Chierchia (1998) claims that such NPs would include cases like ‘*parts of this machine*’ (14)!

- Consequently, the negated sentence in (36a) *can* have the LF in (36b), and so will (correctly) end up getting the ‘wide scope’ reading in (36c).

a. **Sentence:** Parts of this machine are not here.

b. **LF:** 
\[ [ NP \exists [parts of this machine] ] [ 1 [ NEG [ t_1 [ VP are here ] ] ] ] \]

c. **Denotation:** 
\[ \lambda w : \exists x . *[[part-of-this-machine]](w)(x) \& \neg (x \text{ is here in } w) \]

3.2.3 **Bare Plurals with Habitual Predicates: Characterizing Sentences / Generics**

(37) **Minor Background Assumption Regarding GEN**

- Our discussions of *GEN* thus far have treated it as an (unselective) quantifier over *situations*, like a kind of unspoken adverb…

- As we’ll see (and as mentioned by Krifka *et al* 1995), it’s also common to view *GEN* as a modal, and thus an (unselective) quantifier over *worlds*…

- Chierchia (1998) basically assumes this second view… though again we’re going to put off giving an exact formulation of the *quantificational force* of *GEN*
(38) **Provisional (Unselective) Lexical Semantics for GEN**

a. \[ [[ \text{GEN}_{\text{set<st,se>}} ]]^{w,g} = [\lambda p_{\text{set}>} : [\lambda q_{\text{se}>} : [\lambda w' : \text{GEN} w . p(w) = T : q(w) = T ] ] ] \]
   ‘p-worlds are generally q-worlds’

b. \[ [[ \text{GEN}_{\text{set<st,se>}} ]]^{w,g} = [\lambda p_{\text{set}>} : [\lambda q_{\text{se}>} : [\lambda w : \text{GEN} w, x . p(w)(x) = T : q(w)(x) = T ] ] \]

*With this in place, our system predicts that sentence (39a) can have the LF in (39b)…*

- In this LF, the bare plural NP *dogs* is combines first with Down, and then with Up…

(39) **The Syntax of Bare Plurals in ‘Characterizing Sentences’ / ‘Generics’**

a. **Sentence:** Dogs bark.

b. **LF:**
   \[ [ [ \text{GEN}_{\text{set<st,se>}} ] S [NP \cup [NP \cap [\text{dog PL}]]] ] [[VP bark ]] \]

*Given the meaning of Up (19b), the NP in (39a,b) ends up denoting a property… the property of realizing the kind DOG…*

- Since both NP and VP in (39b) denote properties, their meanings can combine via PM…
- Thus, the prejacent sentence in (39b) will have the denotation in (40a)
- Given our method for determining C, it follows that C will have the value in (40b).
- **Thus the entire sentence has the meaning in (40c)…**

(40) **The Semantics of Bare Plurals in ‘Characterizing Sentences’ / ‘Generics’**

a. Denotation of Prejacent S in (39b):
   \[ [ \lambda w : \lambda x : x \leq \text{MAX}(*[[\text{dog}]](w)) \& x \text{ is barking in } w ] \]

b. Denotation of C in (39b):
   \[ [ \lambda w : \lambda x : x \leq \text{MAX}(*[[\text{dog}]](w)) ] \]

c. Denotation of LF (39b):
   \[ [ \lambda w' : \text{GEN} w, x . x \leq \text{MAX}(*[[\text{dog}]](w)) : x \leq \text{MAX}(*[[\text{dog}]](w)) \& x \text{ is barking in } w ] \]

d. Equivalent Meaning to (40c):
   \[ [ \lambda w' : \text{GEN} w, x . x \leq \text{MAX}(*[[\text{dog}]](w)) : x \text{ is barking in } w ] \]
   ‘Generally, if w is a world and x is a group of dogs in w, x is barking in w…’
An Immediate Criticism (Krifka 2004)

- Krifka (2004) notes that Chierchia’s (1998) system would also seem to simply allow the following LF for sentence (39)…

  a. Possible LF for (39a):
     \[
     [ \text{GEN} \langle \text{set}^{<\text{set},\text{st}^{>}} \rangle C ] [S [\text{NP} \text{dog PL}] [\text{VP bark}]]
     \]

     In this LF, we simply allow the pure plural predicate *dogs* be the subject… **after all, it’s logically equivalent to** ‘[\text{NP} \cup [\text{NP} \cap [\text{dog PL}]]]’

     As the reader can confirm, such an LF would end up getting the meaning in (41b), which is equivalent to that in (40d):

  b. Interpretation of (41a):
     \[
     [ \lambda w' : \text{GEN} w, x . \ast[[\text{dog}]](w)(x) : x \text{ is barking in } w ]
     \]
     ‘Generally, if \(w\) is a world and \(x\) is a group of dogs in \(w\), \(x\) is barking in \(w\)...’

- **Furthermore, if there are no means for blocking the LF in (41a), there are also no means for blocking the LF in (41c) either, where the NP is singular**

  c. Possible LF:
     \[
     [ \text{GEN} \langle \text{set}^{<\text{set},\text{st}^{>}} \rangle C ] [S [\text{NP} \text{dog}] [\text{VP bark}]]
     \]

     The LF in (41c) would be interpretable; it would get the interpretation below

  d. Interpretation of (41c):
     \[
     [ \lambda w' : \text{GEN} w, x . x \text{ is a dog in } w : x \text{ is barking in } w ]
     \]
     ‘Generally, if \(w\) is a world and \(x\) is a dog in \(w\), \(x\) is barking in \(w\)...’

  e. Thus, unless we can block LF (41a), Chierchia’s (1998) system wrongly predicts that the bare singular sentence in (41e) should also be possible.

  e. Sentence with LF (41c):
     \* Dog barks.
(42) **Scope and Bare Plurals, Redux**

- Let us assume that movement of a property-denoting expression will leave behind a property-typed trace (trace of type <s,et>)

- It will again follow that syntactically scoping the bare plural above GEN in (39a,b) will have no effect upon the predicted meaning…

a. LF of (39a) with Movement of Bare Plural:
   \[
   \{ [NP \cup [NP \cap [dog PL]]] [1_{\text{set}}] [[GEN_{\text{set,et}} \rangle C] [S t_1 [VP bark] \ldots ]
   \]

b. Predicted Meaning of (42a) (= (40d)):
   \[
   \lambda w : \text{GEN } w, x . x \leq \text{MAX}(\star[[\text{dog}]](w)) : x \text{ is barking in } w
   \]

- Thus, sentence (39a) will only get a generic / characterizing reading…
  It will not get a ‘wide-scope’ habitual reading (e.g. unlike ‘Some dogs bark’)

- **NEWS FLASH:**
  We finally have an answer to why bare plurals with habitual predicates only get ‘generic’ (‘quasi-universal) readings…

(43) **But… Suddenly Wide Scope Again!**

- As noted earlier (36), Exists can combine with an NP in English if that NP does not have a corresponding kind.

- Thus, the “parts of this machine” can have the structure [NP \exists [parts of this machine]]

- Thus, the sentence in (43a) can have the LF in (43b), where the bare plural subject undergoes non-vacuous movement above GEN.

- Thus, we correctly predict that (43a) can get the wide-scope habitual reading (43c) (like ‘Some parts of this machine break easily’)

  a. **Sentence:**  Parts of this machine break easily.

  b. **Possible LF:**  \[
  \{ [NP \exists [parts of this machine]] [1_{\text{et}} [GEN_{\text{set,et}} \rangle C]
  \]
  \[
  [S t_1 [VP \text{break easily} \ldots ]
  \]

  c. **Denotation of (43b):**
  \[
  \exists x . \star[[\text{part-of-this-machine}]][w](x) \& \text{GEN } w : x \text{ is in } w . x \text{ breaks easily in } w
  \]
  ‘There are some parts of this machine such that they generally break easily’
3.3 Chierchia’s (1998) Analysis of English Definite Singulars Denoting Kinds

So far, we have a picture of how bare plurals in English can end up denoting kinds…
But what about definite singulars like ‘the dodo’ (4a)? How do those work?...

(44) Caveat:
• Chierchia’s (1998) account of kind-denoting definite singulars is a bit sketchy on some details…
• I’m largely following Krifka’s (2004) exposition/reconstruction of it…

(45) Opening Observation: Definite Singular Kinds and ‘Collective Nouns’

• ‘Collective Nouns’ in English are nouns like ‘team’ or ‘committee’ that intuitively denote ‘groups’ or ‘collections’, but which:
  o (i) Are singular in number, and
  o (ii) Are incompatible with ‘cardinality predicates’ like be numerous.

a. (i) The committee members are numerous.
   (ii) ?? The committee is numerous.

b. (i) Dogs are numerous.
   (ii) ?? The dog is numerous.

c. Key Idea: Maybe ‘definite singular kinds’ are to ‘bare plural kinds’ what (regular) plural NPs are to collective nouns?

Okay... but what do collective nouns denote, exactly?...

(46) The Theory of ‘Groups’ (vs. Plurals)

Given their incompatibility with cardinality predicates (45a), collective nouns like ‘committee’ denote atoms... but they are atoms that ‘correspond’ to plurals…

a. Introducing Groups:
   o For every plurality x, there is the group corresponding to x, g(x)
   o This group g(x) is an atom, so ∼∃y . y < g(x)

b. Illustration: (i) Seth+Dave+Bill the plurality made up of S, D, B
   (ii) g(Seth+Dave+Bill) the group corresponding to S, D, B
   (iii) Seth < Seth+Dave+Bill
   (iv) ∼ ( Seth < g(Seth+Dave+Bill) )
Membership in Groups

Even though groups don’t have parts the way pluralities do, they do have ‘members’. We can define ‘group membership’ ($\leq_m$) as follows:

$$x \leq_m y \iff y = g(z) \& x \leq z$$

Chierchia’s (1998) Analysis of Definite Singular Generics

- There is in English a version of ‘the’ which has the following denotation:

  a. $$[[\text{the}_{\text{kind}}]] = [\lambda P_{\Rightarrow} : [\lambda w : g(\text{MAX}(P(w)))]$$

- Thus, this version of ‘the’ takes a property as argument and does the following:
  - It applies the cumulative / pluralizing star operator ‘*’ to $P(w)$
  - It applies the operator MAX, yielding the largest entity in $w$ satisfying $*P$
  - It then applies the group-forming operator $g$, mapping $\text{MAX}(P(w))$ to its corresponding (atomic) group

  b. **Illustration:** $$[[\text{the}_{\text{kind}} \text{ dodo}]] = [\lambda w : g(\text{MAX}(P([\text{dodo}](w)))$$

  $$[[\cap \text{ dodos}]] = [\lambda w : \text{MAX}(P([\text{dodo}](w)))$$

- In this way, singular ‘dodo’ combines with this special version of ‘the’ to produce a meaning akin to bare plural ‘dodos’…
  - … Because this special version of ‘the’ has the plural ‘*’ operator baked into its meaning!

Kind-Denoting Definite Singulars and Kind-Level Predicates

- As shown in (48b), the denotations yielded by ‘the$_{\text{kind}}$’ are rather similar (but not identical) to those yielded by ‘$\cap$’…
  - Thus, we might assume that $D_K$ contains, along with every aforementioned kind, also it’s ‘group-kind’ correlate.
  - Consequently, it should be possible for the group-kinds produced by ‘the$_{\text{kind}}$’ to combine with kind-level predicates

  a. **Illustration:**
  
  (i) **Sentence:** The dodo is extinct.
  
  (ii) **Meaning:**

  $$[\lambda w : [\lambda w' : g(\text{DODO})] \text{ is extinct in } w]$$

  $$[\lambda w : [\lambda w' : g(\text{MAX}(P([\text{dodo}](w'))) \text{ is extinct in } w]$$
Kind-Denoting Definite Singulars and Cardinality Predicates

Let us suppose that a cardinality predicate like ‘be numerous’ has a denotation like in (50a), where it is restricted to individual concepts that yield non-atoms

\[ \lambda \omega : [ \lambda P_{\text{<atom>}} . |P(\omega)| > 1 : |P(\omega)| \text{ is big } ] \]

Consequently, we predict that ‘be numerous’ will be defined for bare plural kinds like ‘dogs’, since \( |\text{MAX}([\text{dog}](\omega))| > 1 \)

\[ [[ \text{Dogs are numerous } ]] = [ \lambda \omega : |\text{MAX}([\text{dog}](\omega))| \text{ is big } ] \]

We also predict that ‘be numerous’ will be undefined for ‘group’ kinds like ‘The dog’, since \( |\text{g(MAX}([\text{dog}](\omega))| = 1 \)

\[ [[ \text{The dog is numerous } ]] = \text{UNDEFINED} \text{ (and so (50c) is anomalous) } \]

Kind-Denoting Definite Singulars in Characterizing Sentences / Generics

Let us suppose that along with the regular ‘Up’ type-shifter (19b), there is a special version of ‘Up’ that applies to group-kinds

\[ [ \text{Group-Kind Version of ‘Up’} ] = [ \lambda \omega : \lambda x : x \leq m [\text{XP}](\omega) ] \]

We can thus suppose that a sentence like (51b) has the LF in (51c), and thus the truth-conditions in (51d), which are equivalent to those we had in (40d)

\[ \text{Sentence: The dog barks.} \]

\[ \text{LF: } [ [ \text{GEN}_{\text{set,set,>}} \text{ C} ] [ s \text{ [ } \text{Union} [ \text{the kind dog} ] ] [\text{vp bark} ] ] \]

\[ \text{Denotation of (51d):} \]

\[ [ \lambda \omega' : \text{GEN w, x} . x \leq m \text{ g(MAX}([\text{dog}](\omega)) : x \text{ is barking in w } ] \]

‘Generally, if w is a world and x is a member of the group of all dogs in w, then x is barking in w...’

News Flash!

We finally have an explanation why – unlike the bare plural sentence “Dogs bark” – the definite singular sentence in (51b) allows either a ‘generic’ or a ‘referential habitual’ interpretation!

In English, a definite singular – unlike a bare plural – is simply ambiguous between denoting a (group) kind and denoting a specific entity...
(52) **Kind-Denoting Definite Singulars in Episodic Sentences**

- Recall that unlike sentence (52a) with a bare plural, sentence (52b) with a definite singular does not get an ‘existential reading’…

  a. Dogs are barking.
  b. The dog is barking. (≠ (52a))

- Recall, too, that sentence (52a) receives its ‘existential reading’ by means of the rule DKP…

- **Let us then simply stipulate that DKP only applies to non-group kinds…**

  c. **Revised Rule of Derived Kind Predication:**
     
     If \([[[X]]] \in D_K\) and its not the case that for all worlds \(w\) \(|[[[X]]](w)| = 1\), while \( [[YP]] \in D_{\text{set}} \) then
     
     \([[[XP YP]]] = [\lambda w : \exists x . x \leq [[XP]](w) \& [[YP]](w)(x) = T ]\)

- Consequently, the LF in (52d) will not be interpretable; only the LF in (52e) will be.

d. **Uninterpretable LF:**  
   
   \([ [ \text{the kind dog} ] [ \text{is barking} ] ]\)

e. **Interpretable LF:**  
   
   \([ [ \text{the dog} ] [ \text{is barking} ] ]\)

**Note:** Chierchia (1998) does state that there is a principled reason why DKP should not apply to ‘group kinds’, but it is unclear to me (and Krifka (2004) concurs…)

4. **Reference to Kinds in Italian (and Romance)**

(53) **Question From Earlier**

- Why can’t we use plural definites in English to denote kinds like Italian does?
- That is, Chierchia’s (1998) system predicts that (53a) and (53b) both have the meaning in (53c)…

- **So why can’t (53d) have the same meaning as (53e)?**

  a. \([\text{DP the } [\text{NP dog }]]\)

  b. \([\text{NP } \cap [\text{NP dogs }]]\)

  c. \([\lambda w : \text{MAX}(*[[\text{dog}]](w)) ]\)

  d. Dogs bark.

  e. The dogs bark. (≠ (53d))
(54) **Chierchia’s (1998) Proposal: Avoid Structure!**
If the same truth-conditions can be obtained via either an NP or a DP, use the NP!

a. **Question 1:** Wait! Doesn’t this now mean that Iota should block use of ‘the’?
   **Answer:**
   Maybe this Avoid Structure constraint is ranked ‘below’ the blocking constraints. Thus, it will only come into play when blocking alone doesn’t decide between two structures…

b. **Question 2:** Wait! Doesn’t this now force use of *dogs* in all places where we would use ‘the dogs’ even in sentences like (54bi) below.
   - Come to think of it… why can’t (54bii) with the bare plural denoting a kind get the ‘referential use’ of the overt definite in (54bi)???

   (i) The dogs are hungry.
   (ii) Dogs are hungry.

(55) **Empirical Problem: Bare Plurals in Italian**

- Chierchia (1998) proposes that bare plurals cannot denote kinds in Italian because **Italian just doesn’t allow NPs to be bare in argument position at all** (31)
- But, as had been widely noted, Italian does allow bare plural NPs in certain positions:

  a. **Complement Position:**
     - Leo ha mangiato *patate*  
     - *Leo has eaten potatoes*

  b. **Left-Periphery:**
     - **Studenti ne ho molti.**
     - *Students of them I have many*

  c. **Heavy NPs:**
     - **Studenti e colleghi hanno telefonato.**
     - *Students and colleagues have called*

(56) **Solution: A Null Determiner in Italian**

Following prior work by Italian syntacticians, Chierchia assumes that (unlike bare plurals in English) there is actually a null determiner in sentences like those in (55)…

- Given that it’s null, this determiner is subject to the special licensing conditions we see in (55)

  **Obvious Question:** What is the meaning of this null Italian determiner?
Proposal: Null D in Italian Denotes ‘Down’!

a. \[ [ \emptyset \text{D} \text{NP} ] ] = [ [ \cap \text{NP} ] ]

b. (Allegedly Correct) Prediction: When bare NPs are possible in Italian, they should get all the same readings that they can get in English!

(i) **Kind-Level:** Ragazze in mingonna sono rare.
girls in miniskirts are rare.

(ii) **Existential:** (55c)

(iii) **Generic (‘Quasi-Universal’):**

(??) Bunteri di qui domano un cavallo
coyboys here tame a horse

in pochissimo tempo.
in little time

Note:
- The ‘generic’ use in (57biii) is reported to be somewhat degraded…
- But this could just be because in such uses, the subject must be deaccented, while null D in Italian is best licensed by focus…

c. **Prediction:** When bare NPs in Italian get ‘existential construals’, they cannot scope over other operators.

- Chierchia (1998) provides the key data here…
- Those data haven’t been disputed to my knowledge, and so I’ll forgo an illustration of them here.

One Final Question

- If Italian definite plurals simply denote regular, ‘non-group’ kinds, like bare plurals…
- … doesn’t this again entail that it should be possible for definite plurals to yield ‘existential construals’ when argument to episodic predicates?
- That is, don’t we predict that (58a) should have the same reading as (55c)?

a. **I studenti e colleghi hanno telefonato.**
the students and colleagues have called