1 Introduction

1.1 Goals & Hypotheses

This paper attempts to provide an account for the phenomenon of the dependent plural reading of bare plurals in English (Chomsky 1975, de Mey 1981). Consider the paradigm below.

(1) a. (The) unicycles have wheels.
    = It's true of each unicycle that it has one wheel.
b. (The) unicycles have a wheel.
    = It's true of each unicycle that it has one wheel.

(2) a. #A unicycle has wheels.
    ≠ It's true of one unicycle that it has one wheel.
b. A unicycle has a wheel.
    = It's true of one unicycle that is has one wheel.

The paradigm is interesting for the fact that the bare plural wheels seems to lose its plurality in (1a.) while in the scope of another plural. The same is not true of wheel in (2a.), where it is in the scope of a singular.

Descriptive accounts of the phenomenon have noted that dependent plurals are necessarily within the semantic scope of a plural quantifier or a frequency adverb. I intend to spell out a different story in which the dependent plural is not a special kind of bare plural, but is instead an available reading of bare plurals generally.

In what follows, I would like to claim:

- Bare plurals with a dependent plural interpretation are not plural indefinites and are not morphologically mismatched singular indefinites.
- Bare plurals with a dependent plural interpretation are not a unique kind of bare plural. Instead, they have the same semantics and live in the same LF as existentially interpreted bare plurals.
- The dependent plural reading of a bare plural in cases such as (1) can be captured in a Carlsonian system of existential bare plurals. I will propose a new type-shifting operator that takes an object bare plural and turns it into a quantificational statement over spatio-temporal realizations of a kind.

1.2 Roadmap

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2 What dependent plurals aren’t (and what they might be)

2.1 Dependent plurals aren’t the singular indefinite

- One might suggest that the bare plural is the indefinite singular in disguise. That is, the plural feature is there only at PF, but at LF the semantic representation of wheels would be singular. However, consider the following data.

(3) a. The cars have wheels and the unicycles do, too.
   b. #The cars have wheels and the unicycle does, too.

This example suggests that the semantic parallelism constraint on ellipsis is sensitive to the plural feature on DPs. It also suggests that the bare plural cannot be identical semantically to a wheel or we should predict (7b.) to be good since the PF mismatch would disappear.

We can provide other examples that similarly illustrate this observation.

(4) a. The boys have mothers and the girls do, too.
   b. #The boys have mothers and Kim does, too.

- This idea that the dependent plural is not purely singular matches one’s intuitions when we take into consideration the fact that each unicycle having one wheel will ultimately culminate in the presence of multiple wheels. Furthermore, coreference to the dependent plural in donkey anaphora constructions requires a plural pronoun.

(5) a. The men who wear ties iron *it/them.
   b. The men who wear a tie iron it/*them.

This example is meant to show that even when syntactic agreement is not possible, referring to the dependent plural requires a plural pronominal form whereas coreference with the singular indefinite form requires a singular pronominal form.

- Additionally, bare plurals that receive a dependent plural reading pattern in their scope behavior with bare plurals as opposed to indefinite singulars. Carlson (1977b) noted that bare plurals in a non-subject position can’t take wide-scope.

(6) Indefinite singular
   The man didn’t read a book. (NEG > 3, 3 > NEG)

(7) Bare plural
   The man didn’t read books. (NEG > books, *books > NEG)

Bare plurals behave the same way as shown in the example below. So, again, books may not have wider scope than negation.

(8) Dependent plural
   The men didn’t read books. (NEG > books, *books > NEG)

- These facts suggest that dependent plurals are not the plural form of an indefinite singular DP and that they don’t have the semantics of singular.

2.2 Dependent plurals aren’t different from bare plurals

If a bare plural that receives a dependent plural interpretation is not the singular indefinite, doesn’t have singular meaning, and patterns in scope behavior with bare plurals, then it begins to make sense to say that dependent plurals are simply bare plurals.

This position has been resisted in the past exactly for the reason that the bare plural doesn’t appear to be plural in the same way as bare plurals. But, with the contrast in (3) suggesting that these guys are plural, we might then try to show some evidence that they are semantically equivalent.
If it were the case that the simple bare plural and the dependent plural are different things, we wouldn’t predict the facts below.

(9) a. The cars have wheels and the unicycles do, too.
    b. The unicycles have wheels and the cars do, too.

(10) a. The colanders have holes and the funnels do, too.
     b. The funnels have holes and the colanders do, too.

Assuming that ellipsis is subject to a semantic parallelism constraint, then we would be hard pressed to claim that wheels in (3) and holes in (4) have different semantic representations in the antecedent clauses and in the ellipsis sites.

We can show similar facts using environments where dependent plural readings aren’t licensed.

(11) #Every unicycle has wheels.

(12) Every car has wheels and the unicycles do, too.

If there were a special form of wheels that provides a singular meaning, then it wouldn’t be licensed in the antecedent clause of (6). Thus, whatever does have this meaning in the ellipsis site, wouldn’t be able to have the semantics of some different kind of bare plural.

What’s more, we can also show that the bare plural may, in a sense, act as a dependent plural for one of the conjuncts of a conjoined subject, but not for the other.

(13) a. The cars and the unicycles have wheels.
     b. The unicycles and the cars have wheels.

(14) a. The colanders and the funnels have holes.
     b. The funnels and the colanders have holes.

We don’t predict the examples in (12) and (13) to be well-formed if we assume either that the c-commanding DP directly licenses a dependent plural reading or if we assume that the dependent plural reading is contributed by a special kind of bare plural.

These facts from ellipsis and coordination suggest that canonical bare plurals as well as bare plurals receiving a dependent plural interpretation are semantically identical and that the LF of the sentence for each interpretation must be identical.

2.3 What dependent plurals might be

In Section 2.1, we saw evidence that suggests that dependent plurals are not the plural version of a singular indefinite NP and that they are not semantically singular.

We also saw evidence from ellipsis and coordination that that the bare plural that receives a dependent plural interpretation is not distinct from other types of bare plurals.

Those same facts also suggested that the LF representation of the sentence that produces the existential interpretation an object bare plural, must also be able to produce the dependent plural interpretation.

So, it really looks like we should want to treat a dependent plural as being no different than other bare plurals. The analyses that will be examined in the following section as well as the analysis proposed in Section 4 will work on this assumption.

3 Two possible analyses for dependent plurals

3.1 Zweig (2008)

Zweig, building on Sauerland et al. (2005) and Spector (2007), analyzes dependent plurals, and bare plurals in general, as being number-neutral pluralized predicates. Thus, they contain both atoms and essentially “groups” (Landman 2000) in their denotation. This says that dependent plural interpretations are automatically provided by the semantics of the bare plural (it just takes the rest of the sentence’s cooperation to elicit this reading).

The plural meaning of a bare plural is supplied by a scalar plurality implicature. In this way he accounts for the data in (15) and (16). The claim rests on the observation that the plurality implicature may be cancelled in downward entailing environments.
(15)  a. Sam ate apples.  \( (\text{ate more than one}) \)
    b. Sam didn’t eat apples.  \( (# \neg \text{eat more than one}) \)

(16)  a. The boys ate apples.  \( (\text{ate one each} / \text{ate more than one each}) \)
    b. The boys didn’t eat apples.  \( (#\neg \text{eat even one} / #\neg \text{eat more than one}) \)

So, bare plurals are not ambiguous given that a not more than one reading is not available along with not even one. Instead an only one reading (dependent plural reading) is the default and a plurality implicature computed during the derivation of the sentence produces the more than one reading.

But, consider the conjoined subject cases we saw earlier. I repeat (13) as (17) here.

(17)  The cars and the unicycles have wheels.

It’s not clear to me that a scalar implicature account such as that offered by Zweig would be able to account for the acceptability of this sentence. Either a single conversational implicature says that wheels refers to a single wheel and multiple wheels simultaneously, or we have two scalar implicatures from the same scale being computed for the same part of the same sentence.

It might also be interesting to find out if implicatures are subject to the semantic parallelism constraint on ellipsis. We would then potentially have another testing ground.

### 3.2 Diesing (1992) and cumulativity

Carlson (1977b) identified two primary interpretations of bare plurals noting that the position of the bare plural affects the available interpretations.

(18)  Bears are ruining my garden
    a. Generic
        It’s a property of bears in general that are ruining my garden.
    b. Existential
        There are some bears that are ruining my garden

(19)  Sam saw bears in the woods.
    a. Generic
        #It’s a property of bears that Sam saw them in the woods.
    b. Existential
        Sam saw some number of bears in the woods.

\[ \text{Building on Heim’s (1982) restrictive-quantifier analysis and LF-mapping, Diesing takes the observation that object bare plurals can’t take high scope and relates the generic interpretation of bare plurals to a high position in the LF representation of a sentence.} \]

\[ \text{To simplify the situation to near unrecognizability, a bare plural in Spec,IP at LF may act as the restrictor to either an overt operator or a GEN operator which takes scope over the rest of the sentence. Existential readings of bare plurals are what we get either when a subject bare plural remains in the VP at LF or when we have an object bare plural, which of course will be trapped inside the VP.} \]

\[ \text{So, assuming at the same time a ‘∗’-operator analysis (Link 1998, Krifka 1999), then we can produce a semantic representation which will capture the dependent plural reading of Unicycles have wheels and which is essentially a cumulative reading.} \]

(20)  a.  \[ \text{GEN}_s [\exists x. \ast \text{unicycle}(x,s)] [\exists y. \ast \text{wheel}(y,s) \& \ast \text{has}(x,y,s)] \]
    b.  In a general situation s where there is a group of unicycles x in s, then there is some group of wheels y in s such that \(<x,y,s>\) is a tuple that can be formed from the closure of the tuples in [[has]] under the ‘∗’-operator.

The truth conditions in (20b.) would hold in the situation below, which is the dependent plural reading.

(21)  a.  Unicycle\(_1\) has wheel\(_1\).  Unicycle\(_2\) has wheel\(_2\).
    b.  \([\text{has}]=\{<\text{unicycle}\(_1\),\text{wheel}\(_1\),s>,<\text{unicycle}\(_2\),\text{wheel}\(_2\),s>\}\]
    c.  \[\ast [[\text{has}]=\{\ldots,\text{unicycle}\(_1\)+\text{unicycle}\(_2\),\text{wheel}\(_1\)+\text{wheel}\(_2\),s>\}]\]
Unfortunately, however, dependent plural readings and cumulative readings have different distributions.

(22) a. The TAs graded thirty exams.
   = Each TA (with some squish) graded some number of exams and the total number of exams graded was 30.

b. The TAs graded exams.
   = Each TA graded a single exam.

(23) a. Most TAs graded thirty exams.
    # For most TAs, it’s true that he or she graded some number of exams and in total 30 exams were graded.

b. Most TAs graded exams.
   = For most TAs, it’s true that he or she graded a single exam.

Of real interest is the contrast between (23a.) and (23b.). We’re able to get a dependent plural reading in (23b.), but we can’t get a cumulative reading in the same environment in (23a.).

Notice, too, that Diesing’s analysis will not capture the dependent plural reading in the scope of most.

(24) a. \textsc{Most}_x [\lambda x. \textsc{TA}(x)] [\textsc{Gen}_y. \textsc{exam}(y,s) & \textsc{grade}(x,y,s)]

b. For most x such that x is a TA, there is a general situation s where there is a group of exams y in s such that <x,y,s> is a tuple that can be formed from the closure of the tuples in [[[\textsc{grade}]]] under the ‘+’-operator.

c. “For most TAs there is typically a group of exams that he or she graded.”

So, we can’t say that cumulativity alone is the source of dependent plural readings because we have an obvious situation where cumulativity is blocked, but we still get this dependent plural interpretation. Second, the \textsc{Gen} operator, being incompatible with overt quantifiers, will not allow the dependent plural reading that appears in the scope of most.

4 A Carlsonian (1977a) analysis

4.1 The mechanics

In the original formulation of existential bare plurals, Carlson (1977a) suggests that the type-shifting operator \textsc{Realize} picks out ‘stages’ (spatio-temporal realizations) of a ‘kind’ (the abstract representation of a concept). The extension of \textsc{Realize} is shown below.

(25) \text{\textsc{Realize}} = \lambda P \lambda x. \exists s. [s \in \text{STAGES & R}(s,x) & P(s) = 1]

So, Bears are eating my trash would have the following structure and meaning.

(26) a. [Bears [\textsc{Realize} [are eating my trash]]]

b. \exists s. [s \in \text{STAGES & R}(s,\text{BEAR}) & \text{eating-my-trash}(s) = 1]

c. There is some stage s such that s is a realization of BEAR and s is eating my trash.

The transitivity of the ontology of stages < objects < kinds makes any realization of a kind able to refer to a subset of the objects (bears) that make up that kind (BEAR). So, BEAR applied to \textsc{Realize} will pick out the plurality or group (Landman style perhaps) that is true of a predicate.

What’s less clear to me is why a single bear eating my trash couldn’t make (26a.) true. After all, Sam ate my trash would have the same semantic representation and would be true if there is only one spatio-temporal realization of the object Sam eating my trash.

As we saw above, bare plurals in object position cannot receive a generic reading, however, they may receive a dependent plural reading.

(27) The boys saw bears in the woods.

a. \textit{Dependent plural / Existential}
   The boys each saw a bear in the woods.

b. \textit{Generic}
   #It’s a property of bears that the boys saw them in the woods.
If we suppose the existence of different but similar type-shifting operator for object bare plurals that would work on the same principles as Carlson’s system above, then we will be able to generate (27a.).

\[(\text{REALIZE}') = \lambda x \exists s. [s \in \text{STAGES} \& R(s, x) \& P(s) = 1] \]

(28) \[a. \text{ [The boys [saw [REALIZE [bears]]]]} \]

b. \[\exists s. [s \in \text{STAGES} \& R(s, \text{BEAR}) \& \text{\^{*}see}(\text{MAX}[[\text{boy}]])(s) = 1] \]

c. There is some stage s such that s is a realization of BEAR and there is a maximal group of boys x such that <x,s> is a tuple that can be formed from the closure of the tuples in [[see]] under ‘+’.

Again, the realization of BEAR will pick out a group of bears that is a representative of the kind BEAR. We’ll still conceptualize this as consisting of a group (in the sense of Landman (2000)) of an unspecified size. Now, consider a situation where boy1 saw bear1 and boy2 saw bear2. The denotation of BEAR applied to REALIZE’ will be as follows.

\[(\text{REALIZE(\text{BEAR})]} = \{<\text{bear}_1, \text{bear}_2>\} \]

The extension of see and the extension of see closed under the star operator will be as follows.

\[[\text{see}] = \{<\text{boy}_1, \text{bear}_1>, <\text{boy}_2, \text{bear}_2>\} \]

\[[\text{\^{*}see}] = \{<\text{boy}_1, \text{boy}_2, \text{bear}_1, \text{bear}_2>\} \]

The same LF will also produce the non-dependent existential bare plural reading in which each boy saw more than one bear. BEAR applied to REALIZE will simply pick out the representative group of BEAR that contains, say, four objects. Altering the extension of [[see]] appropriately, it’s clear how the same truth conditions would be true in such a situation.

4.2 The application

First, what about the dependent plural reading under most that I claimed Diesing’s analysis failed to capture? The example below is the semantic representation of Most TAs graded exams.

\[(33) \quad a. \exists x. \{x : \text{TA}(x)\} \& \{z : z \leq x \& \text{AT}(z) \geq n \& \exists s. [s \in \text{STAGES} \& R(s, \text{EXAM}) \& <x,s> \in [[\text{grad}]]\} \]

b. There is some group of more than n TAs (where n is a contextually salient amount) and there is some stage s such that s is a realization of EXAM & <x,s> is a tuple that can be formed from the closure of the tuples in [[grad]] under ‘+’.

I think it’s right that these truth conditions hold in a situation where there are fifty TAs and forty of them graded one exam each while the others didn’t grade any.

Returning to coordinated subjects, I think the analysis proposed here will handle them as well.

\[(34) \quad \text{The unicycles and the cars have wheels.} \]

\[(35) \quad a. \exists s. [s \in \text{STAGES} \& R(s, \text{WHEEL}) \& \text{\^{*}have}(\text{MAX[[unicycle]]+MAX[[car]]})(s) = 1] \]

b. There is some stage s such that s is a realization of WHEEL and there is a plurality formed the maximal group of unicycles and the maximal group of cars x such that <x,s> is a tuple that can be formed from the closure of the tuples in [[see]] under ‘+’.
Next, consider the paradigm we started with.

(36) a. (The) unicycles have wheels.
   = It's true of each unicycle that it has one wheel.

   b. (The) unicycles have a wheel.
   = It's true of each unicycle that it has one wheel.

(37) a. #A unicycle has wheels.
    ≠ It's true of one unicycle that it has one wheel.

   b. A unicycle has a wheel.
   = It's true of one unicycle that it has one wheel.

In section 2, I argued that (1a.) and (1b.), as well as (2b.), are in fact not related and actually have different LFs. In 4.1, I provided a semantics that would treat the multiple readings available to a sentence like (1a.) as resulting from an underspecification of the cardinality of the group identified by the type-shifting operator REALIZE’.

We're left then with (2a.) A unicycle has wheels, which the theory I laid out in the previous section predicts to be true.

(38) a. ∃x. unicycle(x) & ∃s ∈ STAGES & R(s, WHEEL) & <x,s> ∈ ‘[[has]]’

   b. There is a unicycle x and there is a stage s such that s is a realization of WHEEL and <x,s> is a tuple that can be formed from the closure of the tuples in [[has]] under ‘+’.

This isn't a problem I don't think. There seem to be cases where we want something like (2a.) to be true. Consider the example below.

(39) A man wears ties.

This has a dependent plural reading, but the interpretation is that of many frequent events of tie wearing. We will probably be able to capture the acceptability of (39), then, in an event semantics. I will say of examples like (2a.) then, that they are simply ruled out based on our knowledge of the world and what it means to be a unicycle.

There are some other things that need to be sorted out or checked to make sure this system is able to capture them.

(40) Scope ambiguity of dependent plurals under opacity inducing operators
   The boys want to meet policemen.

(41) Intervention effects
   #dependent plural The boys gave a girl flowers
   #dependent plural Watering pales have a handle with wooden grips.

5 Conclusion

I started by claiming that bare plurals that receive a dependent plural reading are not singular indefinites in disguise, but are instead identical to object bare plurals in other cases. In section 2 I showed that bare plurals don’t show the same behavior as singular indefinites and I showed that ellipsis facts favor an analysis in which all bare plurals receive a unified analysis.

In section 3 I argued that an account based on scalar implicatures (Zweig 2008) is not able to account for all of the data. Specifically, it wasn’t clear to me that examples with coordinated subjects in dependent plural environments could straightforwardly be handled assuming that the interpretation of the bare plural varied depending on the context it was in.

I also argued that cumulativity alone will not capture dependent plural readings given that the two don’t have completely overlapping distributions. I showed that a restrictive-quantifier analysis of bare plurals (Diesing 1992) was undesirable because it was unable to capture dependent plural readings that appear in the scope of overt quantifiers.

In section 4 I proposed a unified analysis of object bare plurals that is able produce typical existential interpretations as well as dependent plural interpretations of the bare plural. I also returned to the problems identified for the previous analyses attempting to show that the system proposed should be able to handle them.
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