

## REMARKS ON THE INTERPRETATION OF THE BARE PLURAL\*

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### 0. INTRODUCTION

There have been many studies on generic noun phrases. Among others Carlson(1980) presents a detailed and elaborated analysis on this topic. He claims that the bare plural uniformly refers to a kind (a class of objects) and its ambiguous readings arise because of the properties of the predicates. As we will see below, his strategy requires many assumptions that give rise to the complexity of the system presented, and leaves unsolved the basic question of why the bare plural is interpreted as such. Focusing mainly on the ambiguous readings, I will claim that a kind is a nominalized property as assumed in Chierchia(1982) and that the ambiguous readings arise because of the time-reference in the sentence. Advantages of this approach will be argued in the sequel.

### 1. Problems in Carlson's Analysis

In this section, I will briefly examine Carlson's proposals that are relevant to the discussion here.

In the analysis of the bare plural, he introduces three types of entities in the domain: stages (time-space slices of individuals), objects (what is often referred to as individuals) and kinds. Objects and kinds are two sorts of individuals which stages realize or manifest. Further he assumes three types of predicates:

- (1) stage-level predicate: run, walk, available....  
object-level predicate: have a tail, intelligent....  
kind-level predicate: common, widespread....

Predicates of each level (basically) apply to stages, objects and kinds.<sup>1</sup> They are of type  $\langle e^s, t \rangle$ ,  $\langle e^o, t \rangle$ ,  $\langle e^k, t \rangle$ , respectively.

An important fact on the bare plural which any theory on this topic must explain is the ambiguous readings of a sentence such as below:

(2) Dogs ran.

One reading is that the kind dogs had the property of running, and the other is that there were some running dogs. For simplicity, I will call the former 'generic reading' and the latter 'existential reading'. Since the bare plural is assumed to refer to a kind, something other than the subject NP must be responsible for this ambiguity. For the logical representations of these readings, Carlson attributes the ambiguity to the different translations of the predicate. The kind reading arises when the predicate is translated as  $Gn'(\wedge run')$ , where  $Gn'$  is a (morphologically unrealized) VP operator that 'elevates' stage-level predicates to individual (object or kind)-level predicates. Notice that stage-level predicates such as run can not be applied directly to kind-level arguments, since the application would be sortally incorrect. On the other hand, the existential reading arises when the predicate is translated as  $\lambda y^i \exists x^s [R'(x^s, y^i) \& run'(x^s)]$ , where  $R'(x,y)$  means that  $x$  is a stage of  $y$ , and the superscripts stand for variables of each level. The resultant logical forms for the two readings of (2) are as follows:

(3) a.  $Gn'(\wedge run')(d)$

b.  $\exists x^s [R'(x, d) \& run'(x)]$ ,

where  $d$  stands for the kind dogs

(3a) says that the kind dogs is in the set of things that run. Note that  $Gn'(\wedge run)$  is an individual-level predicate, hence applicable to the kind-level argument, dogs. (3b) says that there are some running stages of the kind dogs.

Ambiguity of the same sort is observed even if a subject is a

proper name: the event reading and the habitual/characteristic reading. They are represented exactly in the same way as above: the former reading as in (3b) and the latter as in (3a). This is a strong piece of evidence for his analysis, since it suggests that the origin of the ambiguity in (2) is not the subject itself but the predicate.

In my view, there are a few problems in his proposals. The first and the biggest one is that the most interesting aspect of the very notion kind is left unsolved. As mentioned above, he claims that the bare plural should be treated as referring to a kind. For example, the bare plural dogs is translated as below:

$$\lambda P P \{ \iota x^k \square \forall y^o [ R ( y^o , x^k ) \leftrightarrow \text{dog}' ( y^o ) ] \}$$

- where  $R(x,y)$  means that  $x$  realizes  $y$

Though this translation seems to be sound as a representation of the kind dogs, we can not ask him why this should be the case, since it is a priori given. The second problem is, as Schubert & Pelletier(1987) rightly points out, the function R', which has no syntactic counterpart. It is needed for every predicates such as run which causes the existential reading. Such complexity should be avoided if possible. The third is the operator Gn', which elevates a stage-level predicate to an individual-level predicate (in other words, maps a temporary property to a characteristic property). For example, suppose that someone saw Nancy smoking several times and concluded that she was a habitual smoker. In other words, he observed her stages (temporary properties) and generalized her characteristic property. The operator Gn' reflects this mental process of generalization. Notice, however, that the formal characterization of this operator is, as Carlson(1979) himself argues, extremely difficult: how many similar stages are enough to jump to a generalization? The answer should be vague. Furthermore What Gn' formally does is to change the type of predicates (i.e. from  $\langle e^s , t \rangle$  to  $\langle e^i , t \rangle$ ). Therefore there must be

a systematic relationship between these completely distinct types. It seems to me that we can not assume such a relationship, since predicates of distinct types do not have any formal relationships. The same argument holds for another operator proposed by Carlson, Gn, which is just like Gn' except that it elevates object-level predicates to kind-level predicates.

With these problems in mind, I will sketch a system which properly represents the two readings of the bare plural in the subsequent sections.

## 2. Generic Tense & Two Modes of Time-Reference

The basic concept of our analysis is the analogue of so-called 'generic tense' as in Dahl(1975). The assumption of the 'generic tense' was based on the observation that generic statements are often accompanied with the simple present tense. The generic tense, which is in simple present form, was assumed to indicate that the sentence is about characteristic properties, dispositions, habits and the like and induce the generic reading on a subject. Compare the sentence in (4a) with that in present progressive form: (4b).

- (4) a. Beavers build dams.  
b. Beavers are building a dam.

The subject beavers in (4a) is generically understood, for the sentence has the simple present tense. But the same bare plural can only be interpreted as existential in (4b). But the next example, which shows that the generic tense is not restricted to the simple present, exemplify that this simple assumption does not work.

- (5) Dinosaurs ate kelp.

Furthermore we have another counterexample to this assumption, in which an apparently tenseless construction exhibits the

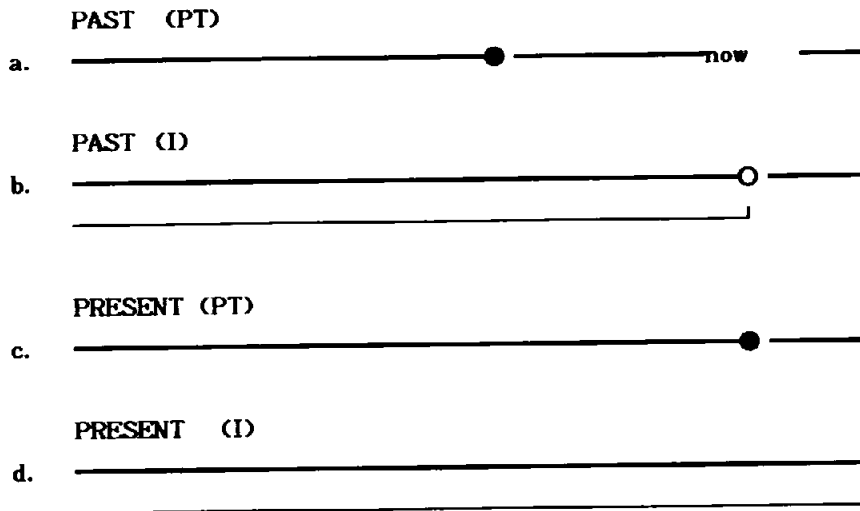
property which the generic tense was assumed to have:

(6) The doctor ordered Bill to jog.

According to Carlson(1980), this sentence is two-ways ambiguous: 'the doctor is either ordering Bill to engage temporarily in a happening, or else to be a habitual jogger'.

In Ohnishi(1987), I assumed, instead of the generic tense, the presence of two (abstract) modes of time-reference: PT(point of time)-mode and I(interval)-mode. They indicate a point of time or a stretch of time when the proposition is to be evaluated. Of course these modes are independent of tense operators. They jointly indicate the point of evaluation.

(7)



The tense operators and these two modes jointly indicate a) some point of time in the past, b) the maximally extended interval in the past, c) the present point of time (i.e., now), d) the maximally extended interval which covers the whole time-linear. As is clear from the above examples, a stretch of time indicated by the I-mode is maximal as long as it is compatible with the

tense operator. For example, as the present tense is compatible with adverbials like now, today, in this week, and so on, the only condition that the present tense imposes is that the speech time must be included. Since the I-mode indicates the maximal interval, the stretch of time indicated by the present tense and the I-mode is as in (7d). I assume here that when a VP is with the PT-mode, it refers to a temporary property (i.e., property at a point of time), and that it refers to a property in the interval when it is with the I-mode.

Now let us examine a few examples to see how these two modes work. In the following examples, the b-sentences represent intuitive truth-conditions of a-sentences.

- (8) a. Bill I( is intelligent)  
 b. Bill has the property of being intelligent in the interval(at each and every point of time in the interval).
- (9) a. Bill I( runs in the park)  
 b. Bill has the property of running in the park in the interval.
- (10) a. Bill PT( jogged)  
 b. Bill had the property of jogging at some point of time in the past.

A few words may be in order about the truth-condition in (9b). It might sound curious that Bill has the property of running at each and every point of time in the interval. For he may be sitting on a chair at a point of time in the interval. I do not mean that he is actually running all through the interval by the above condition. Rather I mean that he has that property all through that period. Though the condition (8b) seems to be sound, it is clear that Bill need not exhibit intelligence all through the interval. We may say that he is intelligent even at the time he is sleeping like a log. This means that one has a property even if the property is implicit

(not being actualized). Therefore we can safely maintain that Bill has the property of running in the park all through the interval.

The advantage of assuming these two modes is the following: we can explain without the generic tense why sentences are habitually/characteristically interpreted. The I-mode is at work here.

Basically these two modes are freely selected.<sup>2</sup> For example the sentence below is two-ways ambiguous: the event reading and the habitual reading.

(11) Bill ran.

The event reading and the habitual reading arise when we select the PT-mode and the I-mode, respectively.

Though I mentioned both the PT-and I-modes to simplify the discussion, I will eliminate the PT-mode and adopt only the I-mode as a VP operator for technical reasons that will be explicated in section 4. Therefore VPs that select the PT-mode will be represented with no VP operator.<sup>3</sup> In other words, I will assume that all VPs denote temporary properties, and that when a VP is with the operator I (i.e., when the VP selects the I-mode), the property that the VP denotes is 'elevated' to the property in the interval.

### 3. Kinds as Nominalized Properties

In this section, I will derive the notion kind from the denotation of the category CN (i.e., common noun). If this attempt is successful, there is no need to use a a priori translation rule as in Carlson(1980). Though I will analyze the bare plural as denoting a nominalized property, this analysis is not new. Chierchia(1982) has already proposed the same analysis. Here I will try a different formulation based on the PTQ system.

To treat kinds as properties is to interpret the sentence in (12a) as asserting something like (12b):

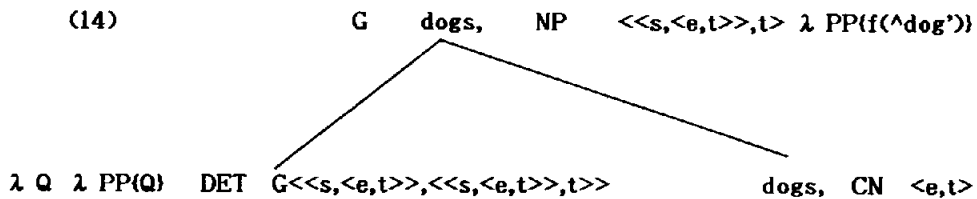
- (12) a. Dogs have four legs.  
 b. The set of individuals (the property of being dogs) has the property of having four legs.

An intension of a CN is formally equivalent to Carlson's notion kind if it is regarded as an individual. I will modify the PTQ system so that it can entertain this fact.

A problem in treating the bare plural as CN (of type  $\langle e,t \rangle$ ) is that it breaks the type system proposed in PTQ, where NPs, such as John and every man, are assigned the logical type  $\langle \langle s, \langle e,t \rangle \rangle, t \rangle$  (a property set of an individual). Hence we need a semantic operation that converts the type  $\langle e,t \rangle$  to  $\langle \langle s, \langle e,t \rangle \rangle, t \rangle$ . For bare plurals are clearly NPs. To accomplish this, I assume a null determiner G of this type. Further I assume the following function, which recast intensions of CNs into individuals:

- (13) Individualizing Function  $f$   
 for all  $\hat{P} \in ME \langle s, \langle e,t \rangle \rangle, f(\hat{P}) \in A$   
 ME : meaningful expression  
 A : domain of individuals

Equipped with these assumptions, we can treat the bare plural as a property set of an individual just like ordinary NPs (e.g., John). The following is a sample derivation of dogs (translations added):

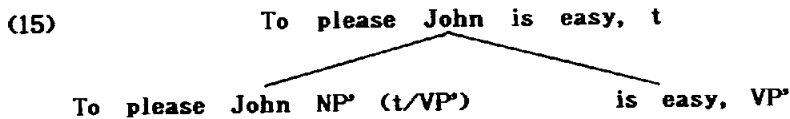


The resultant translation,  $\lambda PP\{f(\hat{A}dog')\}$  is formally equivalent



to Carlson's kind as mentioned above. Note that such nominalizing devices as these are far from ad hoc. To exemplify this point, I briefly survey Ohnishi(1988), where similar devices are proposed in the analysis of nominalized constructions as an alternative to Partee (1977).

Partee (1977) proposes a system, where sentences with an infinitival subject is derived as below:



She treats the subject basically as an VP phrase. Then the predicate must not be an ordinary VP to avoid the Russell's Paradox. So she adds the new category, VP' (of type  $\langle\langle e,t \rangle, t \rangle$ ) of which is easy is a member. In the PTQ system NPs are of the category t/VP (of type  $\langle\langle s, \langle e,t \rangle \rangle, t \rangle$ ). But in this case the NP to please John must be of another category, because the predicate is easy is not a VP but VP': NP' (of type  $\langle\langle s, \langle\langle e,t \rangle, t \rangle \rangle \rangle$ ). One of the serious problems are from Chierchia (1982): if we take into consideration that the bar-level categories, such as is easy in (15), themselves can be nominalized (i.e. to be easy), there must be a higher-level category: NP'' (for this and other problems, see Ohnishi (1988)). To solve the problems I proposed a new category, COMP(NP/t) of type  $\langle\langle s, t \rangle, \langle\langle s, \langle e,t \rangle \rangle, t \rangle \rangle$ , which takes propositions and yields property sets of individuals, and a function (i.e., Individualizing Function), which recasts all propositions into individuals. Therefore the property sets which COMP yields are those of the individuals. By virtue of these improvements we can easily analyze not only to-infinitives but also all the nominalized constructions in (16) without introducing problematic categories. Note that to-infinitives are regarded as subjectless sentences.

(16) a. To go to the beach is enjoyable.

- b. That I went to the beach was surprising to Bill.
- c. For John to go to the beach is difficult.

As exemplified above, these or similar nominalizing devices are necessary not only for the present analysis but also for every analysis of nominalized constructions. Furthermore, unless we do not have such devices, how can we analyze property-denoting nouns such as redness and distruction?

I do not restrict the application of G to the bare plural but assume it in every NP that does not have a determiner. <sup>4</sup> Therefore G is applied to mass terms such as water and snow.

- (17) a. Water is wet.
- b. Snow melts.
- c. Petroleum is various in origin.
- d. Cork is lighter than water.

Similarities between kind-denoting expressions and mass terms have been recognized. Some of the similarities can be accounted for if we assume the G in the vacant DET position. That is, G introduces the property set of a unique individual (e.g.,  $\lambda PP\{f(\wedge\text{'water'})\}$ ).

#### 4. Ambiguity of the Interpretation of the Bare Plural

In section 2, I proposed two modes of time-reference, which made it possible to account for the event reading and the habitual reading:

- (18) a. John (ran in the park) (event reading)
- b. John I (ran in the park) (habitual reading)

In section 3, we derived the notion kind from the denotation of CN by use of G. I assume here that this determiner G is also translated as an existential quantifier  $\exists$  under a certain condition that will be discussed later in this section.

Thus we can, in principle, represent the two readings of the bare plural: the generic reading and the existential reading. Notice, however, that this analysis predicts undesirable readings. Since we assumed two translations of  $\underline{G}$  and two modes of time-reference, there must be four possible readings in (19).

(19) Dogs barked.

But we can not find the reading in which there were some dogs that habitually barked, and the reading in which kind dogs barked in an event. To exclude such undesirable readings, we have to relate the translations of  $\underline{G}$  to the two modes of time-reference (i.e.,  $\lambda Q \lambda PP(Q)$  to the I-mode, and  $\exists$  to the PT-mode). This is accomplished by assuming that the translation of  $\underline{G}$  varies according to the modes of time-reference. Suppose that a subject NP is co-indexed with the operator of the VP in the following way:

(20) a. (Dogs) ' I(barked) (generic reading)  
b. (Dogs) (barked) (existential reading)

And the translations of  $\underline{G}$  are as follows:

(21) a. (G) ' :  $\lambda Q \lambda PP(Q)$   
b. (G) :  $\lambda Q \lambda P \exists x(P(x) \ \& \ Q(x))$

Then the translations of (20a-b) will be as follows, ignoring tense:

(22) a.  $I(\wedge \text{bark}')(\wedge \text{dog}')$   
b.  $\exists x(\text{dog}'(x) \ \& \ \text{bark}'(x))$

Recall that we assumed all predicates to denote properties at a point of time. In (22a)  $\underline{I}$  is of type  $\langle\langle s, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$  and maps

predicates which denote temporary properties to predicates that denote interval properties. In other words, as mentioned above, it 'elevate' temporary properties to interval properties. Therefore the translation in (22a) means that the kind dogs has the property of barking in the interval (in this case, the interval in the past). The translation in (22b) means, on the other hand, that there are some barking dogs. The translations clearly represent our intuition about (19). Notice that we can represent these two readings without assuming any of such problematic functions as R' and Gn', and that we do not have to complicate semantics by assuming three tiers in the domain since the distinction between stages and individuals (objects and kinds) was reduced to the two modes of time-reference.

One of the reasons that I regard all predicates as denoting properties at a point of time and assume only I as the VP operator is that an intensional context is created in a VP only when the VP refers to a habitual/characteristic property. Consider the following sentences:

- (23) a. John ate with a knife.  
 b. Athletes ate with a knife.

When habitually (or generically) construed, we can not conclude that there were some knife that John/athletes ate with. This is predicted by the presence of the VP operator I. For it creates an intensional context by functional application.<sup>5</sup> But if we admitted PT as a VP operator, we would predict undesirable intensional contexts in event (or existential) readings. By use of the VP operator I, we can explain most of the linguistic data which are accounted for by the presence of Gn' and Gn though I do not go into details here.

Our final task is to give an intuitive explanation for the formal procedure proposed above and thereby show the origin of the generic reading of the bare plural.

The motivation behind the co-indexing of the operator and a

subject NP (more specifically, the determiner G in the NP) is that a subject is required to have the property expressed by the predicate at a point of time (in an interval) when the mode of time-reference is PT (I). For example, consider the following example:

(24) Bill ran in the park.

As for the event reading of this sentence, all that is relevant is Bill at the point of time. In the habitual/characteristic reading, Bill in the interval is required to have the property of running in the park. The following translations may be helpful to understand the point:

(25) a.  $R(b)$

b.  $I(\wedge R)(b)$ , where  $R$  translates ran in the park

Then what is the meaning of the bare plural with the time-reference (e.g., dogs at a point of time and dogs in an interval in (20))? Following Farkas & Sugioka (1983), I regard the bare plural as a variable that ranges over a set of individuals denoted by the CN. Then the bare plural with each mode is regarded as  $x$  at a point of time ( $x=\text{dog}$ ) and  $x$  in an interval ( $x=\text{dog}$ ) (in (20)). The former requires that  $x$ 's that exist at the point of time have the property denoted by the VP. The number of such  $x$ 's is virtually very small. Thus even a very small number of  $x$ 's (e.g., dogs in (20)) suffice for making the statement true. This is the reason that the existential reading arises. On the other hand, the latter requires  $x$ 's that exist in the interval have that property. Thus all such  $x$ 's must have that property. This is the origin of the generic reading. In other words, the bare plural is a variable bound by the time-reference of the sentence. These considerations are reflected in the translations of G.

## 5. Conclusion

In the above sections, I proposed an analysis of the ambiguous readings of the bare plural, where the modes of time-reference played a central role: the time-reference in a sentence binds the interpretation of the bare plural, which is a variable in essence. The determiner G was assumed to formalize this idea in the framework of Montague Grammar.

## NOTES

\* I wish to thank Jun Abe for discussion and comments. Needless to say, all errors are entirely my own.

<sup>1</sup> The stage-level predicates denote temporary properties of the subjects and typically induce an existential reading on the bare plural subject. The object-level predicates denote characteristic properties of the subject and induce a generic reading of the bare plural subject. The kind-level predicates apply only to kind-referring subjects.

<sup>2</sup> But predicates, such as is available and is running, unambiguously select the PT-mode due to their lexical properties, the progressive operator and so on. Though I do not have much to say about the relationship between the modes and aspectual operators, the progressive operator is, at least, incompatible with the I-mode. Object-level predicates, on the other hand, select only the I-mode.

<sup>3</sup> I will continue to use the PT-mode for simplicity. Notice, however, that it is not an operator.

<sup>4</sup> I ignore proper names here.

<sup>5</sup> See Carlson (1979).

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