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SYNTACTIC AND SEMANTIC NATURES OF
JAPANESE COMMON NOUNS
presented by

Hisako Takano

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Ph. D. degree in Linguistics

Major professor

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SYNTACTIC AND SEMANTIC NATURES OF JAPANESE COMMON NOUNS

By

Hisako Takano

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Linguistics

1992

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ABSTRACT

SYNTACTIC AND SEMANTIC NATURES OF JAPANESE COMMON NOUNS

By

Hisako Takano

This study concerns the theory of parameters in general, the semantics of Japanese common nouns (CNs) in particular. It is an attempt to find a parametric account for the NP typology, and is also an attempt to provide a proper semantic theory which will encompass a variety of issues surrounding this universal lexical class: the mass/count distinction, genericity, and quantification. These issues, which have been scrutinized independently in the literature, will be raised and discussed in one perspective, i.e., a quest for some semantic universals of this lexical class.

The hypothesis which I examine and defend here is that a parametric schema in syntax is provided by semantic feature differences intrinsic to a universal lexical class. The parametric feature I propose is one which determines either a quantificational or a generic interpretation as the canonical one for a language. If the CN denotation consists of a predicate which is to define a sortal object (set) and a free variable which is to provide means to quantify over the entities (Gupta, 1980), a nominal domain can be built either by taking the predicate part primitive, or by taking the variable part primitive. The former choice will yield a

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language with a generic interpretation as the canonical one (Japanese), the latter, a language with a quantificational interpretation as the canonical one (English).

Adopting the type of nominal domain proposed by Link (1983), I propose a single, multi-sorted domain for the interpretation of Japanese CNs matched by multi-sorted variables which are selected for by verbal predicates and which determine the interpretation as mass, singular or plural. The analyses presented here have a number of relevant aspects with those theories recently developed in the formal semantics including Partee's type-shifting principles (1987), and Heim's quantifier-free interpretation of indefinites (1982). It will be argued that Japanese case-marking particles are determiners which perform some universal type-shifting functions. The quantification in Japanese will be characterized as NP-external quantification, which is a direct consequence of the parametric choice that a language makes for the nominal domain.

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me not only Japanese syntax, but also the fact that linguistics is a humane thing to do. I deeply appreciate his encouragement and guidance over the years. Finally, my deepest and foremost appreciation goes to Barbara Abbott, who introduced me to linguistics by her well-made LIN 401. She taught me all the exciting things in linguistics; from GB syntax to Montague semantics, and trained me tenaciously from an ignorant German major into a novice linguist. I learned from her that there are two things to do in scholarly life: to share the others' ideas by reading, and to write your own to be read and shared. I am very proud of being one of her students, and will try hard to live up to her standard.

I have a particular sentiment to the Department of Linguistics and Languages at MSU and the many wonderful people I met there. The department which generously supported me, granted me three degrees, and in which I shared time and space with those people, will receive my sincere gratitude. I would also like to express my gratitude to the Department of Foreign Languages at Central Michigan University, which allowed me to have a very flexible teaching schedule during the last years of my writing.

Many more contributed to my completing my thesis indirectly but significantly. First, I would like to thank my parents for being so healthy and happy that I can mind my own

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business most of the time with a comfort of being loved and supported. I am so grateful for their understanding, not so much of what I do, but of the fact that I do something I believe to be worthwhile. I am grateful to Bach and Joe Jackson for their great music, and to Mat Krogulecki not for his music, but for his being, which has been an encouragement in every possible way.

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Chapter I

Introduction

1. The general objective of the study

1.1 Parameters and language typology

Many questions that linguists have been trying to answer may be sufficiently put into a single question: how languages could be alike, and how they could be different at the same time. The first half of the question would lead us to language universals or the universal grammar (UG), and the last half would lead us to language typology. In the Government and Binding theory (GB), Chomsky (1981) introduced the theory of parameters precisely for the purpose of laying down a bridge between these two sides. According to his theory, UG includes a set of universal principles and parametric schemata with values for a language to choose from. Through a unique set of choices of those values, UG will then come to characterize a unique language.

In spite of the fact that no one would disagree that the theory of parameters could be bread-and-butter for language typology, Hudson (1990) is correct, when he points out in his review article for "Linguistics: The Cambridge Survey" (ed. Newmeyer, 1988) that very little interaction between the parameters of GB and the field of typology has been done.

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that he failed to point out, however, is the reason for this infertility. The reason seems clear when we hear Comrie (1988) say "this notion of parameter is of course, nothing other than a reformulation of linguistic typology" (P.459). It seems that linguists have so far tried to form a parametric schema directly in terms of the typological differences which are the most diversified surface structural differences among languages. Such a parametric schema would fail to show the intrinsic connection to UG which is supposed to provide those schemata in itself. The search for the parameters may start with a cluster of some related surface typological differences, but should go beyond looking for their common denominator in UG which has a priori insignificant parametric choices, but would yield significant surface structural differences. What Chomsky basically suggested in his theory was that UG and typology are not two different issues. In other words, the question raised above, although it may appear as two different ones, is truly a single question. What Chomsky did not suggest was what kind of things those common denominators are. Chomsky's general conjecture and some unsuccessful attempts to convert surface typological differences into parametric schemata have left linguists, typologists in particular, universalists in general, with one big unanswered question: what kind of things are parameters.

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1.2 The hypothesis

Elsewhere (1988), I proposed a theory of pro-drop parameter in which pro-drop phenomena can be viewed as a result of interaction between one universal principle, Avoid Pronoun, and a lexical category, pronouns, with two distinctive semantic features: [+/- referential] (whether or not a pronoun can pick up the reference in the discourse) and [+/- argumental] (whether or not a pronoun can carry a theta role). Whether or not a language is a pro-drop language will be determined by whether or not that language allows Avoid Pronoun Principle to interact with this lexical class to the extent that it will license the empty category (EC) for [-ref, -arg] pronouns. English is not a pro-drop language, but Italian and Japanese are. The distinction between Italian and Japanese will be also accounted for in this system. Italian does not allow [+ref, -arg] pro, while Japanese does. My present study extends and generalizes this particular proposal with an attempt to make a modest contribution to finding an answer for the question raised in the previous part: what kind of things parameters are. In order to do so, I would like to examine the following hypothesis:

- (1) A parametric schema in syntax can be provided in UG by semantic feature differences intrinsic to a universal lexical class.

This hypothesis is based on an assumption that UG has a lexical component which consists of universal lexical

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classes, each of which has an intrinsic set of semantic features associated with it. The hypothesis would include a strong claim for semantic universals. It is to say that there are some universal semantic features and that some kind of configuration of those features provide some a priori parametric choices. In other words, those features are indeed common denominators for a parametric system. It is beyond my intention to make any direct claim for this hypothesis in this study. Such a claim would require years of cross-linguistic research in the syntax and semantics of different lexical classes.

1.3 The goal

What I intend to do in this study is a case study, which concerns one lexical class of common nouns (CNs), in particular, those in Japanese with comparison to those in English. There is a cluster of typological differences surrounding this lexical class of words between Japanese and English. English has an obligatory system of pluralization, which Japanese does not have. English has lexical items which closely associate with this class, the definite and indefinite articles, which Japanese apparently does not have (to mention a few very obvious and well-observed differences). The most ambitious goal of this study would be to find some intrinsic semantic features which associate with

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CNs and identify them in a parametric system which makes these typological ramifications possible. This goal would not be attained before we complete a preliminary clarificatory study of this lexical class in which a variety of syntactic and semantic issues surrounding this class are cross-examined and framed into an all-inclusive general picture. I believe that such basic study will bring us fruitful findings and insights regarding more specific aspects in the study of CNs and NPs. The primary purpose of this study is to conduct such basic study rather than to present an elegantly formalized parametric system. However, it is also my belief that to complete the first task will lead us to a rather obvious path to reach the latter goal.

2. Specific objectives of the study

Since my general goal is to conduct a basic study to provide an all-inclusive general view of the domain of CNs, as I stated in the previous part, a variety of issues which belong to those major areas of the study of CNs and NPs will be discussed: the mass/count distinction, quantification, genericity, and definiteness. My study will be unique in the sense that those issues, which have been more or less independently scrutinized in the literature, will be raised and discussed in one perspective, i.e., a quest for some semantic universals of this lexical class.

2.1 Recent developments in formal semantics

A basic study of CNs of a language like Japanese would be not only a necessary step to take towards an adequate theory for the NP typology, but also an exciting exploration considering the climate created by recent developments in formal semantics. In particular, this study relies heavily on three innovative proposals: Link's logical analysis of plurals and mass terms (1983), Partee's type-shifting theory (1987), and Heim's quantifier-free interpretation of indefinites and definites (1982). I believe all of these shed a fresh light on the domain of Japanese CNs. I also believe that studying CNs in a language like Japanese would provide a tremendous insight for us to reach a better understanding of the nominal domain in general.

A breakthrough Link made is the right kind of structural analogy between the count and mass domain, by which the set-theoretic approach to the count domain could be conceptually extended to the mass domain. It will also provide a tool to deal with a unified domain, which Japanese seems to employ. Partee's type-shifting theory includes some universal type-shifting principles, which are crucial for understanding the functions which Japanese case-marking particles seem to perform. Her theory will shed new light on the study of case-marking particles as a lexical category which takes a CN

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phrase to yield an NP interpretation: determiners. Heim's quantifier-free interpretation of indefinites and definites not only provides a plausible account for the indefinite/definite distinctions made through the case-marking system in Japanese, but also reveals a basic fact about Japanese NPs in general: they are essentially unquantificational.

2.2 The goals

This study is an attempt to relate those recent developments in formal semantics to the study of the syntactic and semantic natures of Japanese CNs. Along with such efforts, this study is aimed at constructing a proper semantics of Japanese CNs, which will include accounts for the mass/count distinction, genericity, and the indefinite/definite distinction. In order to provide some accounts for these issues, we have to answer many questions. How does Japanese manage to provide the mass/count interpretations without any syntactic device? Where does genericity come from? What do the generic NPs denote? Why does the indefinite antecedent always occur in the non-topic position, and their anaphorically related definite NPs in the topic position? How does Japanese dispense with the indefinite and definite articles? Above all, however, the most fundamental question we have to answer is: what does the Japanese CN really

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2.3 The organization

This study consists of four major chapters and one concluding chapter. In Chapter II, I will discuss the structure of the nominal domain for Japanese CNs. I will adopt the basics of Link's system and propose a multi-sorted variable system. Chapter III & IV will focus on a particular nature of CNs which does not coincide with the quantification. Such unquantificational nature is prominent in those CNs which form the predicate nominal, and those in generic use. Finally, Chapter V will provide some account for the definite/indefinite marking in Japanese. In Chapter VI, I shall come back to the very general concern of this study: the theory of parameters. I shall gather all the findings and share some speculative thoughts on a parametric scheme which could explain many typological characteristics.

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Chapter II

Japanese Common Nouns and their Nominal Domain

0. Goals and organization

The most general perspective of this chapter is the nature of the domain of Japanese CNs. The domain serves as a storage of semantic values, or denotations, from which semantics assigns a semantic value to a syntactic form. This chapter concerns, in particular, how the domain copes with the mass/count distinction. The first part of this chapter will discuss the empirical facts about Japanese CNs concerning mass and count interpretations. In doing so, I will argue that Japanese employs a unified domain. Furthermore, it seems to be the case that the count domain is assimilated to the mass domain. In other words, the mass domain is unmarked and the count domain is marked. The second part of this chapter is aimed at searching for a basic theoretical ground on which we can build the semantics of Japanese CNs which will account for those facts. In doing so, the existing literature for English plurals and mass terms will be reviewed to point out some relevant problems. The primary goal of this part is to introduce Link's logical analysis for plurals and mass terms (1983). His system not only solves some of the persistent problems in the area of the study, but also provides a solid theoretical ground for the semantics of Japanese CNs.

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Finally, in the last part of this chapter, Link's system will be adopted to provide a semantic analysis of a fragment of Japanese CNs. The purpose of this part is to show the adaptability of Link's theory to the semantic study of Japanese CNs.

1. Empirical facts

1.0 Mass count distinction

Common nouns (CNs) are understood as names of things and beings which are or used to be fairly abundant in the world. CNs in this sense encompass both count and mass nouns. Compared to this general definition, there are more technical definitions. Chomsky (1965) presented a set of features in terms of which the class of nouns will be subcategorized. These subcategorization features can be made reference to in the selectional rules in which the right kind of nouns are to be selected for other syntactic elements. In his subcategorization schema, nouns are divided into [+common] and [-common], and [+common] will be divided into [+count] and [-count]. This view encompasses count and mass nouns. Another less traditional view (Maravcsik 1970) excludes mass nouns from the domain of CNs because of the fact that mass nouns do not exhibit the common vs. proper name dichotomy. As Geach (1962) pointed out, for every proper name, there is a corresponding CN: Thames, river; Henry VIII., king; Mary,

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girl. In other words, proper names denote entities which are in the denotation ranges of individuating terms, count nouns. Mass nouns, on the other hand, as Quine (1960) pointed out, do not individuate the reference. Whichever view we take, it seems obvious that there are two kinds of nouns besides proper names: one is count nouns, the other is mass nouns.

Count nouns, which refer to "countables" in Jespersen's definition (1933, p.206), are those to "call up the idea of something possessing a certain shape or precise limits", material or immaterial: girls, apples, horses, desks, days, sonatas, ideas, etc. Mass nouns do not call up a certain shape or precise limits, but "denote something in itself independent of form", material or immaterial: silver, water, leisure, knowledge, etc. Quine, in his "Word and Object" defines count nouns (full-fledged general terms) as those which "possess built-in modes, however arbitrary, of dividing reference". Mass nouns, on the other hand, do not divide their reference, and "have the semantic property of referring cumulatively: any sum of parts which are water is water" (p.91).

However, this semantic distinction is not directly carried over to the lexicon. In other words, it is not the case that one and the same word associates with one and the same domain. It is a well-known fact that most CNs can be used as

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1.1 Syntax

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either count or mass. Although the references of count nouns all share the atomicity, i.e., a property of having a further unanalysable atomic shape, there are no atoms which do not have atomic mass. Count nouns can be used to refer to atomic mass. Mass nouns can be also used as count to yield a "conventional portion of" or "kind of" interpretation.

- (1)a. I put some onion into my salad.
- b. An onion fell out of the kitchen counter.
- (2)a. I drank some French red wine.
- b. I tasted several French red wines.

In (1a) a CN, "onion" is used as a mass noun, while in (1b) it is used as a count noun. In (2a), "wine" is a mass noun, but it is a count noun in (2b).

1.1 Syntax of CNs

1.1.1 Pluralization

The semantic distinction discussed in the previous section is often realized at the level of syntax in many languages. English, for example, imposes pluralization on count nouns and the indefinite article will obligatorily mark a CN as either count or mass. Accordingly, English has three distinct syntactic forms: plural, singular, mass as in "apples", "an apple" and "apple". A language like Japanese, on the other hand, does not seem to be so explicit in syntax. Japanese does not impose pluralization. In other words, it does not have an obligatory plural marking on count nouns. It does not

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have the indefinite article. So, there is only one syntactic form available which corresponds to those three forms: "ringo" (apple, an apple, apples).

The notion of plurality, however, is not unique to the domain of CNs. A conjunct of proper names like "John and Mary" requires the plural agreement in the verb. All the deictic pronouns are lexically marked as either singular or plural besides the gender. If we understand the pluralization as a grammatical process by which a syntactic form is generated to refer to more than one object, the obligatory plural marking on count CNs such as English pluralization is not the only kind of pluralization. As I just mentioned, the conjunction of proper names is among those processes. A language like English introduces plural forms for personal pronouns in its lexicon, while a language like Japanese applies a general rule to create those plural pronominal forms.

When I say that Japanese does not impose the pluralization on count CNs, it simply means that there is no systematic obligatory syntactic process to mark on a CN the atomicity of the object which that CN refers to. It does not mean, however, that there is no syntactic process to generate a form which refers to more than one object. In fact, Japanese does have more than one morphological processes of

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pluralization: one is reduplication, the other is suffixation of a plural morpheme.

The question here is what the grammatical nature of these morphological processes is. Are they equivalents to English pluralization on count CNs? In what follows, I will argue that Japanese morphological processes of pluralization should not be regarded as part of the general characterization of Japanese CNs. In other words, English pluralization and those Japanese morphological processes are by no means equivalent. Rather, the lack of the syntactic system equivalent to English pluralization is the fact which should be accounted for. The grammatical function carried out by English pluralization seems to be a universal function which is related to the intrinsic natures of CNs.

1.1.1.1 Japanese morphological processes of pluralization

In this section, I will examine two kinds of plural forms in Japanese: those which are created by reduplication, and those which are created by suffixation of a plural morpheme "tachi". "Tachi", which is the most widely used plural suffix, can be combined with any animate noun to form a plural.¹ In this sense, tachi-plurals are quite productive.

(3)a. doobutsu (ANIMAL)
 kodomo (CHILD)
 gakusei (STUDENT)

b. doobutsutachi
 kodomotachi
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Reduplication, on the other hand, seems less productive, although it can apply to both animate and inanimate nouns.

(4)a. hito (PERSON)	b. hitobito
ie (HOUSE)	ieie
yama (MOUNTAIN)	yamayama
ki (TREE)	kigi
hana (FLOWER)	hanabana
inu (DOG)	*inuinu
mado (WINDOW)	*madomado
tani (VALLEY)	*tanidani

Those words which have more than two syllables, or a foreign origin are very unlikely to undergo this process.

(5)a. tamago (EGG)	b. *tamagotamago
ringo (APPLE)	*ringoringo
pan (BREAD)	*panpan
pen (PEN)	*penpen

It follows that the CNs which are not animate, and not compatible for the reduplication will not have a plural form. In fact, there are a large number of CNs which fall into this category. Another important fact concerning the productivity is that the suffix "tachi" can be also combined with a definite noun like "ani" (MY OLDER BROTHER) or even a proper name like "Yamada-san" (MR. YAMADA) to refer to a group represented by the person referred to by that definite noun. "Anitachi" does not necessarily mean "my brothers", but it can also mean "my brother and his friends/group". "Yamada-san-tachi" does not refer to more than two individuals who happen to share the name, Yamada, but rather Mr. Yamada's group.

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that Japanese morphological processes are by no means equivalent to English pluralization, which is completely productive. Furthermore, English pluralization is strictly for CNs. Even those cases in which proper names have a plural form like in (6) can be best explained as those proper names which have ceased to be proper names.²

(6) Ann and Andy are little Einsteins.

The English plural marker "-s" will never have such semantic content as Japanese "-tachi" seems to have. "My brothers" will never refer to those other than my brothers. In other words, English plural marker only indicates the number of the objects which fall into the CN denotation, while the Japanese plural suffix, "-tachi" seems to have some lexical content besides the function of number marking.

1.1.1.2 Syntactic distribution of lexical plurals

Let us now call those plural forms created by either of the morphological processes mentioned above lexical plurals, and observe their syntactic distribution. Lexical plurals have a quite different distribution from English plurals. First, lexical plurals do not occur in nominal predicates.

(7)a. Taroo to Hanako-wa kodomo da.
 AND -TOP CHILD BE-NON-PAST
 (Taroo and Hanako are kids.)

b.*Taroo to Hanako-wa kodomotachi da.
 AND -TOP CHILDREN BE-NON-PAST

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- c. Sakura to Kiku-wa hana da.
 CHERRY BLOSSOMS AND CHRYSANTHEMUM-TOP FLOWER BE-
 NONPAST
 (Cherry blossoms and chrysanthemums are flowers.)
- d.*Sakura to Kiku-wa hanabana da.
 CHERRY BLOSSOMS AND CHRYSANTHEMUM-TOP FLOWERS BE-
 NON-PAST

Second, lexical plurals do not occur with numerals in existential sentences.

- (8)a. Kodomo-ga sannin iru.
 CHILD-NOM THREE PERSONS EXIST-NON-PAST
 (There are three kids.)
- b.*Kodomotachi-ga sannin iru.
 CHILD-NOM THREE PERSONS EXIST-NON-PAST
- c. Ki-ga sanbon aru.
 TREE-NOM THREE PIECES EXIST-NON-PAST
 (There are three trees.)
- d.*Kigi-ga sanbon aru.
 TREES-NOM THREE PIECES EXIST-NON-PAST

Third, lexical plurals do not occur in generic sentences.

- (9)a. Ningen-wa honyuudoobutsu da.
 HUMAN BEING-TOP MAMMAL BE-NON-PAST
 (Human beings are mammals.)
- b.*Ningentachi-wa honyuudoobutsu da.
 HUMAN BEING-TOP MAMMAL BE-NON-PAST
- c. Hito-wa shinu mono da.
 PERSON-TOP DIE BEING BE-NON-PAST
 (A person is a being who dies./Man is mortal.)
- d.*Hitobito-wa shinu mono da.
 PEOPLE-TOP DIE BEING BE-NON-PAST

Fourth, lexical plurals can be often extended by demonstratives:

- (10)a. Gakuseitachi-ga kita.
 STUDENTS-NOM COME-PAST
- b. Sono gakuseitachi-ga kita.
 THAT STUDENTS-NOM COME-PAST

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- c. Sorerano gakuseitachi-ga kita.
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All these three sentences mean that a particular group of students came. On the other hand, the following sentences have all different interpretations.

- (11)a. Gakusei-ga kita.
 STUDENT-NOM COME-PAST
 (A student/Some students came.)
- b. Sono gakusei-ga kita.
 THAT STUDENT-NOM COME-PAST
 (That student came.)
- c. Sorerano gakusei-ga kita.
 THOSE STUDENTS-NOM COME-PAST
 (Those students came.)

It seems that lexical plurals are definite NPs in that they are implicitly associated with deictic pronouns.

- (12)a. Nihongo-o totteiru gakuseitachi-ga kita.
 JAPANESE-ACC BE TAKING STUDENTS-NOM COME-PAST
 (Those/My students who are taking Japanese came.)
- b. Ninongo-o totteiru gakusei-ga kita.
 JAPANESE-ACC BE TAKING STUDENT-NOM COME-PAST
 (A/Some student/students who is/are taking Japanese came.)

The nominative NP in (12a) refers to a particular group of students whom the speaker knows, while that in (12b) can refer to a student or some students whom the speaker had never met before. As the English translations clearly show, lexical plurals have a familiar referent, while a bare CN can be indefinite in either singular or plural. This is why a parent who has just come home and wonders how his/her children have been doing is likely to say "kodomotachi, doo

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1.1.1.3 Conclusion

We have seen some semantic and syntactic natures of Japanese lexical plurals which are quite distinct from those of English plural forms of CNs. In the former, the pluralization process is not productive, while it is completely productive in the latter. Consequently, Japanese has a large number of CNs which do not have their plural correlates. The lexical plurals seem to require a familiar referent and as such, they cannot be indefinite plural, while English plural forms of CNs as well as Japanese bare CNs are free from such a presupposition.³ Lexical plurals never occur in the most prominent uses of CNs, i.e., generic sentences, the nominal predicates, and existential sentences with numeral classifiers. If the lexical plurals are implicitly associated with deictic pronouns as I suggested in the previous section, all the syntactic and semantic differences mentioned here would be accounted for. I have no intention of further arguing for this point here. My present purpose is to show that the suffixation of "tachi" and the process of reduplication have a different function from the one which is carried out by the pluralization in English. I believe that lexical plurals can be independent from the general

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characteristics of CNs in Japanese. Therefore I will exclude them in the rest of my discussion. This will bring us back to the starting point that Japanese does not have a grammatical system of pluralization for CNs.

1.1.2 Quantification

CNs are called "general terms" opposed to "singular terms" since they do not refer to a unique individual, but rather a set of things or quantities. Consequently, when we make some assertion about an object referred to by a CN, we have to define the amount of the object which the predicate is going to be true of, unless we refer to the whole set in general. In other words, the quantification over the entities of a set referred by a CN is called into play. This intrinsic semantic function of the domain of CNs, quantification over entities, is implemented at the level of syntax in various ways.

1.1.2.1 Numeral quantification vs. classifier quantification

One important syntactic characteristic for those languages which impose pluralization on count nouns is that they allow numerals to form quantified expressions by a direct adjunction to count nouns.

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- (13) a. two apples
 b. three desks
 c. four books
 d.*two knowledge
 e.*three salt

It is easy to imagine that a system of pluralization feeds this type of numeral quantification and vice versa. In other words, the domain of count CNs is such that it can be unambiguously quantified over by cardinality words. Mass nouns, on the other hand, need the help of mediation by classifiers or abstract measure terms in order to form a quantified expression. The domain of mass nouns does not provide a basis for the cardinality alone to yield the unambiguous quantification.

- (14) four glasses of beer
 three gallons of water
 three teaspoons of salt
 two grams of salt

However, this kind of formation of a quantified expression is not unique to mass domain as we see in (15):

- (15) two bushels of apples
 three truckloads of desks
 four cases of books

This shows that the type of quantification as in (13) in which a numeral directly modifies a CN is a marked case. It has a smaller range of application than the classifier quantification as in (14) and (15) has. If we assume that quantification is an intrinsic function of the domain of CNs, this will make a couple of non-trivial predictions: one is that a language which does not divide the nominal domain in

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syntax (lack of pluralization, and numeral quantification) will have only classifier quantification, the other is that there won't be a language which will employ only the numeral quantification, in other words, a language which has only count nouns in syntax. Japanese provides evidence which supports directly and indirectly these predictions. In Japanese only the classifier quantification is available.

- (16)a. niko-no ringo
TWO PIECE-GEN APPLE
(two apples)
- b. sansatsu-no hon
THREE VOLUMES-GEN BOOK
(three books)
- c. yonhai-no biiru
FOUR GLASSES-GEN BEER
(four glasses of beer)

It has been a common claim in typology that Japanese is one of the classifier languages which have an extensive lexical class of classifiers, and English is not. Such claim will fail to see the common nature existing in the aspect of quantification in both languages. In my opinion, there are no linguistically significant differences between Japanese and English as far as classifier quantification is concerned. A significant difference lies in the fact that English allows NP-internal quantification, but Japanese doesn't. It seems that this fact is due to the system in which the nominal domain is sufficiently divided for the numerals to quantify over entities.

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1.2 Japanese CNs: their semantic interpretations

It seems to be the case that Japanese CNs behave syntactically exactly as English mass nouns: they are not subject to pluralization, do not take the indefinite article, and undergo classifier quantification. Then, are they all mass nouns? The answer seems to be affirmative at the level of syntax, but not at the level of semantics. Certainly, it is not the case that there is no CN in Japanese which calls up the idea of something which possesses a certain shape. In the following examples, the CNs "ringo" (APPLE) and "ki" (TREE) seem to only call up something which has a unique atomic form. They are used with count noun meaning.

(17)a. Hisako-wa ringo-o moida
 -TOP APPLE-ACC PICK OFF-PAST
 (Hisako picked off an apple/some apples.)

 b. Hisako-wa ki-o ueta
 -TOP TREE-ACC PLANT-PAST
 (Hisako planted a tree/some trees.)

In fact, Japanese semantics clearly distinguishes three different kinds of interpretations: singular, plural and mass, for each of which English provides a different syntactic form. The following sections are aimed in presenting three different semantic interpretations which I intend to search for a semantic theory to account for. In doing so, I will show that mass and plural interpretations are unmarked, and the singular interpretation is a marked interpretation.

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1.2.1 Mass interpretation

One kind of interpretation which all the CNs seem to share is the mass interpretation. The CNs in (17ab) will have a mass interpretation in (18ab).

- (18)a. Hisako-wa ringo-o tabeta.
 -TOP APPLE-ACC EAT-PAST
 (Hisako ate some apple/an apple/some apples.)
- b. Hisako-wa ki-o moyashita.
 -TOP TREE-ACC BURN-PAST
 (Hisako burned some wood/a tree/some trees.)

In order for (18ab) to be true, there must have been at least some mass part of an apple, or a tree, whereas for (17ab) to be true, there must have been at least an apple and a tree. As we can see from the English translations, however, this minimal truth condition would not invalidate singular and plural interpretations. The important difference between the interpretations of CNs in (17) and (18) is that the one in (17) wouldn't have mass interpretation, while the one in (18) will have such an interpretation. Let us now call the kind of interpretation which we have in (17) singular interpretation, and that in (18) mass interpretation. Are all the CNs to have both singular and mass interpretation? The answer seems to be negative. In other words, there is a class of CNs which will not have a singular interpretation; they are basically mass nouns.

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mass and count entities: "sukoshi" (A LITTLE or A FEW). Those CNs which are not basically mass nouns will interact with this quantifier to yield either mass or count interpretation as we see in (19ab) and (21ab).

- (19)a. Hon-o sukoshi utta.
BOOK-ACC SMALL AMOUNT SELL-PAST
(I sold a few books.)
- b. Hon-o sukoshi yonda.
BOOK-ACC SMALL AMOUNT READ-PAST
(I read a small portion of a book.)
- (20)a. Gyuunyuu-o sukoshi utta.
MILK-ACC SMALL AMOUNT SELL-PAST
(I sold a little milk.)
- b. Gyuunyuu-o sukoshi nonda.
MILK-ACC SMALL AMOUNT DRINK-PAST
(I drank a little milk.)
- (21)a. Ringo-o sukoshi katta.
APPLE-ACC SMALL AMOUNT BUY-PAST
(I bought a few apples.)
- b. Ringo-o sukoshi tabeta.
APPLE-ACC SMALL AMOUNT EAT-PAST
(I ate a little amount of apple.)
- (22)a. Satoo-o sukoshi katta.
SUGAR-ACC SMALL AMOUNT BUY-PAST
(I bought a little amount of sugar.)
- b. Satoo-o sukoshi koboshita.
SUGAR-ACC SMALL AMOUNT SPILL-PAST
(I spilled a little amount of sugar.)

Those which are basically mass nouns, however, do not exhibit this phenomenon as we see in (20ab) and (22ab). What we have seen here is the distinction between two semantic domains: mass and count. Unlike English in which it is clearly marked in the level of syntax, Japanese distinguishes only in the

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semantic level. All the CNs share mass interpretation, but only a part of those have singular interpretation. Those which can be assigned only mass interpretation are basically mass nouns, whereas those which can be assigned either mass or singular interpretation roughly correspond to those which are called count nouns in English.

1.2.2 Plural interpretation

We might have to say that Japanese count CNs are ambiguous between singular and plural interpretations.

- (23) Niwa-ni inu-ga iru.
 YARD-LOC DOG-NOM EXIST-NON-PAST
 (There is a dog/are some dogs in the yard.)

In (23), "inu" (DOG) can be interpreted either as singular or as plural. However, we should keep it in mind that this sentence is no more unspecified than the following English sentence.

- (24) There is water on the floor.

(24) would not tell us how many puddles of water there are on the floor. A question to be raised here is whether or not they are always as unspecified as those English mass nouns seem to be.

There are clear cases in which CNs are always interpreted as plurals.

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- (25)a. Hon-o narabeta.
BOOK-ACC PLACE IN ORDER-PAST
(I arranged some books in order.)
- b. Hon-o utta.
BOOK-ACC SELL-PAST
(I sold a book/some books.)
- (26)a. Kaado-o kubatta.
CARD-ACC DISTRIBUTE-PAST
(I dealt cards to them.)
- b. Kaado-o otoshita.
CARD-ACC DROP-PAST
(I dropped a card/some cards.)
- (27)a. Shashin-o hikakushita.
PHOTO-ACC COMPARE-PAST
(I compared some photos.)
- b. Shashin-o totta.
PHOTO-ACC TAKE-PAST
(I took a picture/some pictures.)

In a. sentences, the CN is interpreted only as plural, while in b. sentences it is unspecified between singular and plural. In order for those a. sentences to be true, there must have been more than one book, one card, and one picture. In order for those b. sentences to be true, it will only take one book, one card and one picture.

As I mentioned before, plural interpretation is not unique to the count domain. Even those nouns which do not seem to call up the objects which have the atomicity, i.e., mass nouns, can be used as plural with the "conventional portions of" interpretation.

- (28)a. Mizu-o shokutaku-ni narabeta.
WATER-ACC DINING TABLE-LOC PLACE IN ORDER-PAST
(I arranged water on the dining table.)

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- b. Suupu-o kubatta.
SOUP-ACC DISTRIBUTE-PAST
(I served out soup.)
- c. Wain-o kurabeta.
WINE-ACC COMPARE-PAST
(I compared some wines.)

In order for the sentences in (28) to be true, there must have been more than one discrete amount of water, soup, and wine. Although mass nouns are usually regarded as irrelevant to it, the plurality is not just for the count domain, but also for the mass domain. In other words, what is unique to the count domain is not the plurality but the singularity.

1.2.3. Singular interpretation

CNs will have a singular interpretation when the truth conditions of a sentence which contains that CN makes a reference to the atomicity of the object that CN denotes. For example, the CNs in the following sentences will get such interpretation.

- (29)a. Hanako-wa kabin-o kowashita.
-TOP VASE-ACC BREAK-PAST
(Hisako broke a vase/some vases.)
- b. Taroo-wa ie-o tateta.
-TOP HOUSE-ACC BUILD-PAST
(Taroo built a house/some houses.)
- c. Hisako-wa hako-o aketa.
-TOP BOX-ACC OPEN-PAST
(Hisako opened a box/some boxes.)
- d. Taroo-wa to-o shimeta.
-TOP DOOR-ACC CLOSE-PAST
(Taroo closed a door/some doors.)

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In order for these sentences to be true, there must have been at least one vase, one house, one box and one door. Verbs like those in (29) are not likely to take mass nouns as their direct object. It seems to be the case that in order for these actions to hold, we need an object which has a certain form, not a mass part of a thing, but an atomic part of a thing.

(30)a.*Hanako-wa gyūnyū-o kowashita.
-TOP MILK-ACC BREAK-PAST

b.*Taroo-wa chokoreeto-o tateta.
-TOP CHOCOLATE-ACC BUILD-PAST

c.*Hisako-wa iwa-o aketa.
-TOP ROCK-ACC OPEN-PAST

d.*Taroo-wa satoo-o shimeta.
-TOP SUGAR-ACC CLOSE-PAST

Although the CNs which occur with these verbs are usually interpreted as singular, those CNs in (30) will not have a singular interpretation. Hence, the sentences will yield the semantic anomaly.

1.3 Summary - Problem statement

To summarize, Japanese CNs behave as mass nouns in syntax. Semantically, however, Japanese clearly makes a distinction between count and mass uses of CNs. The fact is that the distinction is drawn by singularity: whether or not the object referred to by a CN has atomicity, the property of having a unique atomic form. What all the CNs share are mass

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A question which naturally arises here is: how a language assigns those different kinds of interpretations without any syntactic devices. In other words, it is to ask what the semantics of Japanese CNs should look like. If we understand semantics as a sub-system of the grammar which assigns a denotation (or semantic value) to a syntactic form from the denotation range which is called its domain, in order to construct a semantics for Japanese CNs, there are basically two tasks to be done: one is to characterize the domain which can provide those various interpretations discussed in the previous section, and the other is to characterize the systematic assignment of a denotation to the syntactic form. To do the first task is to answer a fundamental question: what those Japanese CNs denote.

Unlike English, which has three distinct morpho-syntactic forms of mass, singular and plural interpretations, Japanese doesn't seem to motivate a divided domain in semantics. If Japanese employs a unified single domain, the count domain must be assimilated to the mass domain since, as we have seen in the previous sections, count (or singular) interpretation is a marked case. The theory proposed by Link (1983)

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introduces a new structured domain which is aimed in solving formal problems of plurals and mass terms in English. This theory not only predicts that the mass domain is more general one, but also presents a basic structure for the domain for semantics of a language like Japanese. I believe that Link's theory provides a solid theoretical ground for the semantics of Japanese CNs. In the following section I will briefly introduce his theory with some general problems in the relevant area of the study.

2. Semantics of plurals and mass terms

The purpose of this section is to search for a proper theoretical ground for a semantics of Japanese CNs in general. In particular, it is to introduce Link's semantic system for plurals and mass terms, and to examine the adaptability of his theory to Japanese CNs. Before introducing his system a brief background discussion should be in order. The first half of this section will review some basic issues, which Link attempts to address or chooses not to address in his system. First, I would like to draw attention to the tradition of Montague grammar and how it treats plurals in its set-theoretic quantificational theory. Second, I will briefly summarize the literature on mass term semantics, which has been developed more or less independently. The last half of this section will then

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2.1 The background

2.1.1 Plurals in Montague grammar

The enterprise to approach natural language semantics by using the techniques and concepts in logic and mathematics, took a rigorous shape in its development when Montague (1970, 1973) proposed his grammar about twenty years ago. Since then, Montague grammar has been successfully extended and adopted by linguists as the most productive and influential theoretical framework in formal semantics.

One of the significant characteristics of Montague's grammar is that the syntax and the semantics are closely tied together. Each syntactic rule is accompanied by a semantic rule which is typically a rule of a functional application. Montague also believes that the logical structure given in logical language to natural language syntax should be close to the basic structure of natural language. Then, it would be desirable to have a regular relationship between a syntactic category and a type of meaning which can be assigned to that category. Because of this reason, Montague chose to employ a rigid type system in which a certain semantic type is assigned to a certain syntactic category.

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It is in this type theory that he succeeded in assigning a single type of meaning to an indisputable syntactic category, NPs⁴. Besides this type theory and a set of denotation functions, Montague's grammar has a simple unstructured domain of entities, a non-empty set. Furthermore, he carefully excluded plurals and mass terms from his original model.

Bennett (1974) tried to implement plurals in Montague grammar. He did so while keeping two premises of Montague's: an unstructured domain of entities, and his type-theory. The central idea on which Bennett builds his grammar for plurals is that plurals denote sets, while singulars denote entities. For example, CNs are analyzed in Montague's system as one-place predicates just as any other intransitive verb, a function from entity (e) to truth value (t), type $\langle e, t \rangle$, in set-theoretic terms, a set of entities. In Bennett's system CNs are of two kinds: one is SCNs (singular CNs) which denote a set of entities, and the other is PCNs (plural CNs) which denote a set of sets of entities⁵. In other words, Bennett added to Montague's model some new basic categories like PCNs, and assigned a higher type of meaning to them - a function from sets of entities to truth value (type $\langle \langle e, t \rangle, t \rangle$). Consequently, whenever this new basic category is combined with another element to form a complex expression, that element has to match up with this higher

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type in order to keep the rigid type system he inherited from Montague. A determiner which is combined with a CN to form a term phrase, for example, has to have a higher type to be combined with a PCN. Such a term phrase will again require a higher type of meaning of its predicate. Bennett's treatment of plurals revealed an essential problem of Montague's type theory: a potential of type inflation. Besides this technical problem, whether or not his analysis of plurals' denoting an abstract object like a set is intuitive and plausible would be another fundamental question.

2.1.2 Mass term semantics

2.1.2.1 The essential problem

The literature on mass term semantics starts with Quine's informal discussion in "Word and Object" (1960), where he pointed out the peculiar property of mass terms' being cumulative in reference. Quine further pointed out that a mass term before the copula as in (31a) is a singular term which refers to a single object like "Mary" in (32a), and a mass term after the copula as one in (31b) is a general term which is a predicate, just like "red" in (32b).

- (31)a. Water is widespread.
- b. This puddle is water.

- (32)a. Mary is crying.
- b. This apple is red.

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This analysis poses an essential question whether a mass term, "m" refers to a single, although scattered object, or it denotes a class of all portions of whatever is m. A priori, there are at least three ways to answer this question: to try to reduce all the occurrences of mass terms to either a singular term (proper name) or a general term (predicate) or else, to have both.

2.1.2.2 Various approaches

Parsons' approach (1970) could be classified as one of those with the first option. He thinks that mass terms refer to single entities which he called substances "in the chemist's sense to stand for any material" (P.365). With this basic premise Parsons has a rather complicated ontological system which has three levels: physical objects, bits of matter, and substances. In order to commute among these levels he also introduces two primitive predicates: C (consists of) which relates a physical object to a substance, and Q (is a quantity of) which relates a bit of matter to a substance. According to this system, the mass term, "gold" in the following sentences will get three different interpretations.

- (33)a. My ring is gold. $r C g$
 b. The particular bit of matter which makes up my
 ring is gold. $m Q g$
 c. The element with atomic number 79 is gold.
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1974) claimed, Parsons' theory requires that substances be abstract entities. The existential meaning of mass terms as in (33ab) where they seem to be used to refer to a concrete entity, are derived through the primitive predicates in his theory.

Moravcsik (1973) also treats mass terms as referring to a single individual, i.e. the mereological whole⁶, but not an abstract entity. He analyses mass terms in subject position as referring to the mereological whole. For mass terms in predicate position, he imposes the structural restriction in the part-whole relation such that no parts contain those parts which are too small to be called by those terms. This restriction comes from the minimal parts hypothesis: the idea that lower limits should be acknowledged in mass noun extensions (Bunt 1985, P.24). This was the main concern which restrained Quine from reducing all occurrences of mass terms to the mereological whole. The way Moravcsik chose to implement this restriction in the part-whole relation, however, was to introduce a new restricted relation for each mass term. For example, he introduces a restricted relation $\subseteq_{\text{sp}}\langle \text{water} \rangle$ (which reads "is a part of that part which has a structural property of water") for "water", and another relation $\subseteq_{\text{sp}}\langle \text{liquid} \rangle$ for "liquid". As Bunt (1985) correctly points out, a simple inference like the following would run into a problem in this system.

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- (34)a. This puddle is water. P $\subseteq_{\text{sp}\langle\text{water}\rangle}$ W
 b. Water is liquid. W $\subseteq_{\text{sp}\langle\text{liquid}\rangle}$ L
 c. This puddle is liquid. P $\subseteq_{\text{sp}\langle\text{liquid}\rangle}$ L

Mass terms have been a problem for any set-based quantificational theory simply because it is not clear what we quantify over. In fact there are many semanticists who think that we are not able to provide a satisfactory mass term denotation within a set-theoretic framework, including Bunt (1979/1985) and Blau (1979). They give up or extend the underlying set-theory and define new kinds of objects⁷. There are also many semanticists who think that we can retain the usual set-theory and still provide a mass term denotation in a satisfactory manner, including Cartwright (1965), Grandy (1974), Pelletier (1974), and ter Meulen (1980/1981). In the set-based approaches, mass terms are usually viewed as predicates, denoting sets. If a mass term denotes a set, what is in that set? These people tend to give a simple answer to this question by saying that a mass term "m" denotes a set of all objects which are "m". When they say so, they all seem to assume a new ontological category, "quantities", which are the objects which fall into the mass denotation. Then, "quantities" are used for the denotation of a mass noun just as individuals are used for the denotation for a count noun.

It seems, however, that even those authors who agree with the basic idea of mass terms denoting sets of quantities would

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not go so far as to reduce the following kind of occurrence of mass terms into "predicate".

(35) Gold is an element.

Ter Meulen calls a mass term like in (35) as one in "nominal" use. She distinguishes the "nominal" use from the "predicative" use of a mass term like one in (36)⁸.

(36) My tooth is filled with gold.

She analyses a nominal mass term as a proper name of an abstract entity, a substance, which denotes a property (in the technical sense of the possible-worlds semantics), and a predicative mass term as a predicate which is true of those entities that are quantities which have that property in the actual world. In other words, the nominal mass term denotes the intension of the predicative mass term⁹.

2.1.3 Problems

Following Montague tradition, Bennett had a simple unstructured domain and a rigid type system. He extended Montague's model by analyzing plurals as denoting sets, a higher type of meaning than the one assigned to singulars. Consequently, the system revealed an essential problem of a rigid type system: a potential of type inflation. This would bring us to the position where we question his system including his basic analysis of plurals as denoting sets.

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As far as the mass terms are concerned, there seem to be at least three different occurrences which should be accounted for.

- (37)a. Gold has the atomic number 79.
- b. Gold is rare.
- c. This ring is gold.

As Parsons and ter Meulen did, "gold" in (37a) could be analyzed as a name of an abstract entity. Parsons introduced two primitive predicates to derive the existential meaning in (37bc) from the denotation of this abstract entity. Ter Meulen called "gold" in (37a) a nominal mass noun and assigned it an intensional function. The consideration of the minimal part hypothesis lead Quine to analyze "gold" in (37b) as referring to a single scattered object, i.e., the mereological whole, and "gold" in (37c) as a predicate. The same concern lead Moravcsik to impose some structural restriction on the mereological whole for "gold" in (37c). By doing so, Moravcsik reduced the mass term denotation to the mereological whole. Those who attempt the reduction in the other direction, i.e., to analyze all mass terms as predicates tend to do so by set-based approaches, where mass term "m" denotes a set of all quantities which are "m". Then, the quantities are used just like individuals for the denotation of a count noun. Here we have several problems to be addressed in any adequate semantic theory which is aimed in dealing with mass terms. The first is whether or not mass nouns refer to abstract entities. The second is how we deal

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When we review the literature on English plurals and mass nouns, as we have just done, it doesn't seem that the two have much in common¹⁰. Mass term semantics has its own issues which have been in general developed independently from the realm of count nouns which have been so successfully explored by set-based approaches. The plurals are of course regarded as rightly belonging to that realm of count nouns. Any set-based approach to plurals has not been successfully extended to the domain of mass nouns, and vice versa. This presents a serious concern to those who deeply realize that the fundamental characteristics of mass nouns such as cumulative reference is shared by plurals as we can easily see in the following examples. The examples are from Link (1983).

(38)a. If a is water and b is water, then the sum of a and b is water.

b. If the animals in this camp are horses, and the animals in that camp are horses, then the animals in both camps are horses.

The lack of conceptual analogy between plurals and mass terms is also a problem when we deal with languages like Japanese which does not distinguish count and mass in syntax, and seems to employ a unified domain for both. The essential question raised by Quine for English mass terms would rightly

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apply for count nouns in Japanese.

(39)a. Kujira-wa honyuudoobutsu da.
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 (Whales are mammals.)

 b. Kore-wa kujira da.
 THIS ONE-TOP WHALE BE-NON-PAST
 (This is a whale/a part of a whale.)

Does the term "kujira" (WHALE) refer to a single scattered object of whales, or a set of whales?

2.2 Link's logical analysis of plurals and mass terms

2.2.1 Assumptions

First of all, Link argues against the analysis of plurals' denoting sets. "Kids" in the sentence "my kids made a mess in the living room" does not seem to denote an abstract object, a set. Rather he thinks that there must be a concrete object for him to blame. If, for example, "Jim, John and Karen" denotes a set then it should be true to say "Jim, John and Karen have three elements", which, however, sounds strange. He also argues that the denotation of singulars and plurals should be treated on a par, because a question like (40a) can be answered by either a singular or a plural, and yet it is not ambiguous between (40b) and (40c) in its interpretation.¹¹

- (40)a. Who made a mess in the kitchen? - Mary/The girls
- b. Which individual made a mess in the kitchen?
- c. Which individuals made a mess in the kitchen?

Link analyzes plurals not as denoting sets, which are

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Secondly, Link retains the usual set-theoretic metalanguage, i.e. Montague framework, and simply enriches the domain of entities so that it can not only hold the plural entities, but also we can account for their cumulative reference property.

(41) On my view, such properties are also not secured by defining some plural or mass term denotations out of others through set-theoretic manipulation; they all should be recognized as simply being there. What we rather should try to discover, then, is the network of the various relations which they enter and through which they are tied together. (P.303)

From this view he is naturally led to the notion of lattice structure¹², which is inherent in mereological predicate logic. He imposes this lattice structure on the domain of entities, which, in Montague grammar, has been defined simply as an arbitrary non-empty set. This lattice structure employed by Link can be viewed as a more general application of Moravcsik's structural restriction on the part-whole relation. Although Moravcsik was led to impose that restriction by the direct concern of the minimal part hypothesis, Link's system is not going to address this issue at all.

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Another important point is that the lattice structure only governs the behavior of predicative mass terms and plural expressions. Link takes the position that ter Meulen's nominal mass nouns, such as "gold" in "gold has the atomic number 79" refer to abstract entities, substances, which cannot be defined in terms of their concrete manifestations. He thinks that the relation between substances and their quantities is not a logical one. Therefore, substances can be completely independent of the lattice structure. Link, however, treats "water" in "water is widespread" as denoting a scattered, concrete object, hence Quine's mereological whole. He interprets this sentence as synonymous to "the water on earth is widespread".

2.2.2 A sketch of Link's system

In what follows, I will briefly introduce Link's system. His central idea, as I already mentioned in the previous section, is to analyze plurals as denoting entities, (i.e., to have plural entities in the domain) rather than denoting sets as Bennett did. Those plural entities have their internal structure based on an individual part-whole relation. On the bottom of this structure of these plural entities, we have atoms, which can not be further broken down to their parts. We can also view these plural entities as being created by an individual join operation of these atoms. Link introduces

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an operator, "*" specifically for this purpose. This operator works on one-place predicate P , and generates all the individual sums of members of the extension of P . Then, $*P$ has the same cumulative reference property as a mass predicate such that any sum of parts which are $*P$ is $*P$.

As Link correctly pointed out, the reason why the set approach to plurals was not carried over to the case of mass terms successfully was the lack of structural analogy between the two cases. Once we allow for the domain of entities to be structured based on part-whole relation, it is not difficult to see a proper analogy between the two cases. Mass term denotation can have exactly the same kind of structure except for the atoms, because any portion can be a sum of other portions.

This structural analogy enables us to grasp the domain of individuals materially. Now suppose we call the set of all atoms A , then A has a subset which consists of all the portions of matter which are making up the individuals in A . Let us call this set D , D has its own material join operation and material part-whole relation. If P is a mass noun, the extension of P is a set of portions of matter, which is in D . Link also provides us with a couple of useful tools with which we can relate this set D to the set A and eventually to the super set which is built on A by $*$ operation. One is

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a homomorphism h , which is the identity function from A on D , in other words, from individuals to the stuff which they are made of. Then, h preserves the (individual) part-whole relation among individuals in the (material) part-whole relation among the portions of matter making them up. The other is the notion of supremum¹³, what is at the top of the structure, the whole or the largest plural individual. Using these tools, we can define the extension of the mass term correspondent of a count noun as a set of all x such that x is material part of the supremum of $h(|P|)$ ($|P|$ is the extension of P).

So much is a brief sketch of the outline of Link's system. It will leave most of the details, but it will probably suffice for the present purpose to evaluate some general virtues of his approach.

2.3 Summary

The purpose of the second part of this chapter was to search for some theoretical basis on which we can build a semantics of Japanese CNs. Such theory must have a proper analogy between mass and count domains, because in Japanese, as I stated in 1.3, seems to employ a unified domain. The most significant general contribution of Link's approach is that it provides a proper structural analogy between mass and

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count domains, which is certainly a promising perspective for a language like Japanese which does not distinguish mass and count syntactically. Furthermore, the theory predicts that when a language has a single nominal domain, the count domain must be assimilated to the mass domain. According to his theory, the latter is unmarked, and the former is marked case. More precisely, mass terms and plurals share a common logical structure, a lattice structure, and the only difference between them is that the latter is an atomic one, while the former isn't.

I believe that Link's model provides a solid theoretical ground for the semantics of Japanese CNs. However, there are some details which seem hard to apply directly to Japanese. For example, Link takes syntax, the morphological change in pluralization, seriously, and assigns three different descriptive predicates for three syntactic forms, mass, plural and singular as we can see in (42).

- (42)a. There are some apples. $\exists x[*APPLE'(x)]$
 b. There is an apple. $\exists x[APPLE'(x)]$
 c. There is apple. $\exists x[\{x \in D \mid x \leq_m \sup h[*APPLE']\}]$

If we take the syntax of Japanese CNs seriously, it is not well motivated to have three different predicates in the logical forms. Japanese has only one syntactic form for the three different syntactic forms in (42abc):

- (43) Ringo-ga aru.
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However, we have seen that "ringo" (APPLE) in (43) can be interpreted in three different ways: mass, plural, and singular. One way in which we can keep a single descriptive predicate and still provide three different interpretations is to have a multi-sorted variable system. If we use different variables for different ranges: mx which ranges over mass entities, px which ranges over plural entities, and ax which ranges over atomic entities, (43) will have the following three interpretations.

- (44) a. $\exists mx [\text{RINGO}'(mx)]$
 b. $\exists px [\text{RINGO}'(px)]$
 c. $\exists ax [\text{RINGO}'(ax)]$

In the rest of this chapter, I will adopt Link's basic analysis of plurals and mass terms to provide the logical forms for the Japanese CNs which occur in the direct object position of a transitive verb. In doing so, I will use a multi-sorted variable system, and revisit the issue of the subcategorization of verbs.

3. Semantic analysis of Japanese CNs - Part I

3.0 The purpose

The general purpose of this section is to demonstrate the suitability and adaptability of Link's theory, in particular his enriched structured domain of entities, for the semantic analysis of Japanese CNs. In other words, it is to show how

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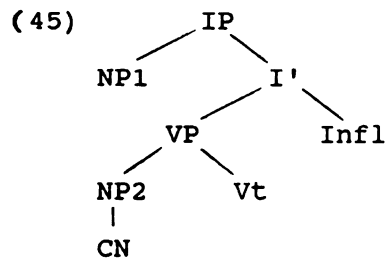
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a unified domain which is secured by his proper structural analogy between mass and count domains can provide desired semantic interpretations for Japanese CNs. For this purpose, it is beyond my intention to present a comprehensive analysis of Japanese CNs, or a complete semantics of them. Instead, a semantic analysis of a small fragment of Japanese will be presented in the rest of this chapter. The specific purpose of this analysis is to answer the question raised in 1.3: how Japanese dispenses with pluralization on CNs and still provides the mass/count distinction in the semantic interpretation.

3.1 Preliminaries

3.1.1 Empirical coverage

The CNs which I wish to discuss here are those which refer to concrete objects. So-called collective nouns will not be included in the discussion. Furthermore the CNs for which I intend to provide logical forms are those which occur in a particular syntactic configuration such as follows.



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In this construction, we have an extensional verb, which takes an agent NP as its external argument (NP1) and a goal NP as its internal argument (NP2). I concentrate in the cases where NP2 is headed by a CN and does not include any other modifying element such as demonstratives, nominal modifiers, or relative clauses (henceforth bare CNs). The NPs in this position in Japanese are to be followed by the particle "o", the so-called object marker. In the following discussion, I will ignore the internal structure of Japanese NP including the syntactic and semantic status of the particle (which will be discussed in the next chapter). In order to keep my discussion away from the temporal and aspectual issues, I will use the simple non-habitual past tense. The actual sentences which will be discussed in what follows are those like (46) and (47).

- (46)a. Hisako-ga hon-o otoshita.
 -NOM BOOK-ACC DROP-PAST
 (Hisako dropped a book/some books.)
- b. Hisako-ga hon-o atsumeta.
 -NOM BOOK-ACC COLLECT-PAST
 (Hisako collected some books.)
- c. Hisako-ga hon-o yonda.
 -NOM BOOK-ACC READ-PAST
 (Hisako read some part of a book/books.)
- (47)a. Hisako-ga gyuunyuu-o koboshita.
 -NOM MILK-ACC SPILL-PAST
 (Hisako spilled milk.)
- b. Hisako-ga gyuunyuu-o kubatta.
 -NOM MILK-ACC DISTRIBUTE-PAST
 (Hisako handed out milk.)

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- c. Hisako-ga gyuunyuu-o nonda
 -NOM MILK-ACC DRINK-PAST
 (Hisako drank some milk.)

Why this particular occurrence of CNs are of interest should require some explanation. Bare CNs in the object position of an extensional verb have some characteristics. The most important characteristic is that they can be subject to the mass/count distinction. They can be interpreted as either mass or count. They are also subject to quantification. Quantificational adverbs or modifiers can co-occur with those CNs.

- (46) 'a. Hisako-ga hon-o issatsu otoshita.
 -NOM BOOK-ACC ONE VOLUME DROP-PAST
 (Hisako dropped a book.)
- b. Hisako-ga hon-o *issatsu/gosatsu atsumeta.
 -NOM BOOK-ACC FIVE VOLUMES COLLECT-PAST
 (Hisako collected five books.)
- c. Hisako-ga hon-o nijuppeiji yonda.
 -NOM BOOK-ACC TWENTY PAGES READ-PAST
 (Hisako read some twenty pages of a book.)
- (47) 'a. Hisako-ga gyuunyuu-o sukoshi koboshita.
 -NOM MILK-ACC A LITTLE SPILL-PAST
 (Hisako spilled milk a little.)
- b. Hisako-ga gyuunyuu-o ippaizutsu kubatta.
 -NOM MILK-ACC ONE GLASS EACH DISTRIBUTE-
 PAST
 (Hisako handed out a glass of milk each.)
- c. Hisako-ga gyuunyuu-o takusan nonda
 -NOM MILK-ACC A LOT DRINK-PAST
 (Hisako drank milk a lot.)

However, they are not subject to the generic interpretation. **Another** characteristic is that they are always indefinite.¹⁴ **Having** said this, I will not speculate further how these

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characteristics are or are not related to each other until later chapters (see Chapter IV for generics, and Chapter V for indefinites).

3.1.2 Assumptions

For the underlying syntactic characterization of this analysis, I will adopt the basic insights of Government and Binding theory in general. For the semantic characterization, I adopt the general framework of Montague grammar. Following Link's proposal, the domain of entities will be enriched by the lattice/algebraic structure. A CN denotes a set of entities, individuals or quantities. That set, however, contains plural entities as well as singular ones. Those entities are holding a part-whole relationship to each other in that set.

In Montague grammar, CNs are just like any other one-place predicate. I believe this to be true in the sense that both denote a set. However, As Gupta (1980, p.8-16) correctly points out: CNs behave quite differently from other one-place predicates. Only CNs are combined with variables and quantifiers, while the other predicates aren't. Furthermore, he claims that "variables make sense only if a certain type of information is supplied, and this information is carried distinctively by CNs". It was also hypothesized that

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"whenever there is variable binding in the syntax of a language, there is also a CN binding the variable." (p.9)
 Following his basic claim, it will be assumed that the basic architecture of the logical form of a CN consists of a descriptive predicate and a free variable.

3.2 A semantic analysis of Japanese bare CNs in the object position

3.2.1 Hypotheses

In English there are three different syntactic forms for the same predicate "apple": apple (mass), an apple (singular), and apples (plural). It seems rather appropriate to have three different predicates for their logical forms and to let them choose the right kind of domain for their variable to range over. Once the right kind of domain is properly chosen by the predicate, a variable introduced by that predicate will be able to range over the proper domain. Unlike English, Japanese does not have a system in which this distinction is marked on the syntactic form of a CN as we have seen in the first part of this chapter. The lack of syntactic device to make a mass/count distinction suggests that predicate parts of Japanese CNs will just choose a single domain which contains different kinds of objects, or different phases of objects. In other words, it is not well motivated in Japanese to divide the nominal domain into two different subdomains,

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mass and count. Then, how can we account for the fact that mass/count distinction seems to be made in the semantic level in Japanese? As an answer to this question, I will propose a multi-sorted variable system in which the same predicate can introduce different kinds of variables. I will argue that in Japanese, not the predicate parts of CNs, but the variable parts of CNs do the task of choosing the right kind of objects to range over. For example, a CN like "ringo" (APPLE) can introduce three different kinds of variables: *mx*, which ranges over mass individuals, *x*, which ranges over atomic individuals, *X*, which ranges over plural individuals. The first hypothesis which I propose here is as follows.

(48) Hypothesis I

Japanese CNs which refer to concrete objects introduce various kinds of variables ranging over various kinds of phases of objects.

ex. *mx* = ranging over mass-part individuals
 x = ranging over atomic-part individuals
 X = ranging over plural individuals

Carlson (1977) once also employed a multi-sorted variable system to enrich the domain of entities. He reidentified a spacio-temporal slice of an object as a stage of an object. What I meant by the word "phases" in (48) are not spacio-temporal slices of an object, rather ontological phases of existence of an object. I hope the following discussion will clarify this point further.

If a CN can introduce various kinds of variables, how does

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the semantics manage to assign the right kind of denotation to the expression? In other words, if the word "ringo" (APPLE) can introduce any one of the mass, singular, and plural variables, how is each of the sentences like those in (46), which I repeat as (49), to have one and only one interpretation?

- (49)a. Hisako-ga hon-o otoshita.
 -NOM BOOK-ACC DROP-PAST
 (Hisako dropped a book/some books.)
- b. Hisako-ga hon-o atsumeta.
 -NOM BOOK-ACC COLLECT-PAST
 (Hisako collected some books.)
- c. Hisako-ga hon-o yonda.
 -NOM BOOK-ACC READ-PAST
 (Hisako read some part of a book/books.)

My answer to this question is the second hypothesis, which **I** wish to examine.

(50) Hypothesis II

Extensional verbs have enough information to determine what kind of phase of an object will be involved in the action as their internal argument.

(50) is to say that the subcategorization of a verb will **include** the information about the ontological nature of the **object** which is involved in the action.

3.2.2 Analyses

Before I start to present the analyses based on the **hypotheses** formed in the previous section, some **terminological** clarification should be in order. Objects in

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the world can be perceived in various phases. A gold ring can be individualized as a massive golden object. The same object can be also individualized as a complete architecture, the totality of which is only worth referring to as "a replica of Cleopatra's ring". Language doesn't seem to distinguish these two different phases of an object in syntax.

(51)a. This ring is gold.

b. This ring is a replica of Cleopatra's ring.

"This ring" in (51a) refers to the mass phase of the object, while "this ring" in (51b) refers to the atomic phase of the object. If an object has atomic parts, English is likely to refer to that object by a plural like "those trees".

(52)a. Those trees are conifers.

b. Those trees cover two acres of my land.

c. Those trees are standing along a street.

d. Those trees were partially burned.

"Those trees" in (52a) refers to the atomic phase of the object, while "those trees" in (52bc) refer to the plural phase of the object. The plural phase referred to by the subject NP in (50b), however, is a special kind, the largest plural individual. On the other hand, the subject NP in (52c) refers to any plural individual. (52d) shows that the same NP can also refer to the mass phase of the object. What I called "ontological phases" of objects are the intrinsic internal architecture of the existence, which repeatedly appears in the continuum of the world of substance. Those ontological phases are cleverly imported into the lattice structure in Link's system.

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Having said this, I am ready to examine the two hypotheses, (49) and (50), i.e., CNs introduce various kinds of variables each of which ranges over a different phase of things, in particular, mass phase, atomic phase and plural phase. Mass nouns cannot introduce a variable which ranges over atomic-part individual because objects referred to by those mass nouns do not have the atomic phase (non-atomic lattice structure). This semantic system will become fully functional when it is accompanied with syntax which includes the lexical insertion rules with an appropriate subcategorization of the verb. The hypothesis (50) says that transitive verbs which take bare CNs as their internal argument have a constraint on the kinds of variables that can be combined with.

3 - 2.2.1 The informal discussion

There seems to be a class of verbs which take an object NP which denotes a plural-individual. In other words, in the actions referred to by these verbs, the plural phase of objects are involved.

- (51) atsumeru (COLLECT)
 kubaru (DISTRIBUTE)
 naraberu (PLACE IN ORDER)
 kasaneru (PILE)

The actions referred to by the verbs in (51) are such actions which can be completed by accumulation of the same kind of

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events in each of which the atomic phase or the mass phase of an object is involved.

- (52)a. Hisako-ga kitte-o atsumeta.
 -NOM STAMP-ACC COLLECT-PAST
 (Hisako collected some stamps.)
- b. Hisako-ga okane-o atsumeta.
 -NOM MONEY-ACC COLLECT-PAST
 (Hisako collected money.)
- (53)a. Hisako-ga tegami-o kubatta.
 -NOM LETTER-ACC DISTRIBUTE-PAST
 (Hisako distributed some letters.)
- b. Hisako-ga suupu-o kubatta.
 -NOM SOUP-ACC DISTRIBUTE-PAST
 (Hisako distributed some soup.)
- (54)a. Hisako-ga osara-o narabeta.
 -NOM DISH-ACC PLACE IN ORDER-PAST
 (Hisako placed some dishes in order.)
- b. Hisako-ga mizu-o narabeta.
 -NOM WATER-ACC PLACE IN ORDER-PAST
 (Hisako placed water in order.)
- (55)a. Hisako-ga hon-o kasaneta.
 -NOM BOOK-ACC PILE-PAST
 (Hisako piled some books.)
- b. Hisako-ga chocoreeto-o kasaneta.
 -NOM CHOCOLATE-ACC PILE-PAST
 (Hisako piled up some chocolate.)

In these sentences, the CNs are assigned the following **logical** forms:

CN'(X) X = a free variable ranging over
 plural-individuals

This interpretation is assigned due to the lexical **information** of the verb such as:

VERB: [CN'(X)___]

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The subcategorization of a verb includes which kind of variable to be selected: in this case, X. The a. sentences in (52) through (55) will fail to be interpreted with a numeral quantifier which indicates singularity.

- (52) 'a.*Hisako-ga kitte-o ichimai atsumeta.
-NOM STAMP-ACC ONE PIECE COLLECT-PAST
- (53) 'a.*Hisako-ga tegami-o ittssuu kubatta.
-NOM LETTER-ACC ONE LETTER DISTRIBUTE-PAST
- (54) 'a.*Hisako-ga osara-o ichimai narabeta.
-NOM DISH-ACC ONE PIECE PLACE IN ORDER-PAST
- (55) 'a.*Hisako-ga hon-o issatsu kasaneta.
-NOM BOOK-ACC ONE VOLUME PILE-PAST

The b. sentences, on the other hand, can be interpreted with a numeral quantifier which indicates singularity. It is because any single amount can contain many amounts in the mass phase of an object.

- (52) 'b. Hisako-ga okane-o hitohukuro atsumeta.
-NOM MONEY-ACC ONE BAGFUL COLLECT-PAST
(Hisako collected a bagful of money.)
- (53) 'b. Hisako-ga suupu-o hitonabe kubatta.
-NOM SOUP-ACC ONE POTFUL DISTRIBUTE-PAST
(Hisako distributed a potful of soup.)
- (54) 'b. Hisako-ga mizu-o hitohako narabeta.
-NOM WATER-ACC ONE CASE PLACE IN ORDER-PAST
(Hisako placed one case of water in order.)
- (55) 'b. Hisako-ga chokoreeto-o hitohako kasaneta.
-NOM CHOCOLATE-ACC ONE BOXFUL PILE-PAST
(Hisako piled up a boxful of chocolate.)

There is also a class of verbs which take mass-part individuals as their object NP.

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- (56) taberu (EAT)
 nomu (DRINK)
 yomu (READ)
 moyasu (BURN)
 kizamu (CHOP)

These verbs refer to the actions which constantly and cumulatively interact with the mass-phase of an object. This type of verb imposes a mass-reading for the object NP even if it is a count noun. This kind of action does not hold without an interaction with the atomic mass of an object.

- (57)a. Hisako-ga tamanegi-o kizamda.
 -NOM ONION-ACC CHOP-PAST
 (Hisako chopped some onion.)
- b. Hisako-ga hon-o yonda.
 -NOM BOOK-ACC READ-PAST
 (Hisako read a part of a book/books.)

The CNs will be analyzed in these sentences as:

CN'(mx) mx: a free variable ranging over
 mass-part individuals

This kind of interpretation is imposed by the lexical information of the verb.

VERB: [CN'(mx) _]

We can also find a class of verbs which presuppose a certain architecture or a unique form of an object, i.e. the atomicity.

- (58) akeru (OPEN)
 shimeru (CLOSE)
 tateru (BUILD)
 kowasu (BREAK)
 otosu (DROP)

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Those verbs are to associate with atomic individuals, and they are not likely to take mass nouns as their object NPs.

- (59)a. Hisako-ga hako-o aketa.
 -NOM BOX-ACC OPEN-PAST
 (Hisako opened a box.)
- b.*Hisako-ga iwa-o aketa.
 -NOM ROCK-ACC OPEN-PAST
- (60)a. Hisako-ga mado-o shimeta.
 -NOM WINDOW-ACC CLOSE-PAST
 (Hisako closed a window.)
- b.*Hisako-ga koori-o shimeta.
 -NOM ICE-ACC CLOSE-PAST
- (61)a. Hisako-ga kabin-o kowashita.
 -NOM VASE-ACC BREAK-PAST
 (Hisako broke a vase.)
- b.*Hisako-ga iwa-o kowashita.
 -NOM ROCK-ACC BREAK-PAST

The CNs in a. sentences will be analysed as;

CN'(x) x: a free variable ranging over
 atomic individuals

The CNs in b. sentences will not be interpreted because those CNs are not able to introduce the kind of variable required by the verbs. These verbs have the following subcategorization.

VERB: [CN'(x) ___]

3.2.2.2 The logical form

In this section, I will provide briefly the logical forms for the following three sentences, which are previously (54a),

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- (62)a. Hisako-ga osara-o narabeta.
 -NOM DISH-ACC PLACE IN ORDER-PAST
 (Hisako placed some dishes in order.)
- b. Hisako-ga tamanegi-o kizanda.
 -NOM ONION-ACC CHOP-PAST
 (Hisako chopped some onion.)
- c. Hisako-ga kabin-o kowashita.
 -NOM VASE-ACC BREAK-PAST
 (Hisako broke a vase.)

In order to generate these three sentences, we will have a small lexicon which include basic expressions.

(63) Lexicon

- | | |
|--|---|
| 1. Hisako: h | |
| 2. Osara: OSARA'(mx/x/X) | |
| 3. Tamanegi: TAMANEGI'(mx/x/X) | |
| 4. Kabin: KABIN'(mx/x/X) | |
| 5. narabeta: NARABETA'(y ² , x ¹) | NP ₂ [vp CNP ₁ (X)___] |
| 6. kizanda: KIZANDA'(y ² , mx ¹) | NP ₂ [vp CNP ₁ (mx)___] |
| 7. kowashita: KOWASHITA'(y ² , x ¹) | NP ₂ [vp CNP ₁ (x)___] |

On the left side of the colon, the lexicon lists syntactic forms. On the right side of the colon, it lists the semantic values. The items 2. through 4. are CNs which can introduce any one of the three variables: mx: for ranging over the mass-phase of objects, x: for ranging over the atomic-phase of objects, and X: for ranging the plural-phase of objects. The items 5. through 7. are transitive verbs which are two-place predicates. In syntax, they have one internal argument (1), and one external argument (2). Here we only expect CNP with a certain kind of variable to be in the internal argument position.

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(62abc) will have the following logical forms.¹⁵

(62a) OSARA'(X) & NARABETA'(h, X)

(62b) TAMANEKI'(mx) & KIZANDA'(h,mx)

(62c) KABIN'(x) & KOWASHITA'(h,x)

The logical forms provided here all contain a free variable which is yet to be bound. In order for these sentences, (62abc), to be true, however, there must be a variable assignment to satisfy these logical forms. In other words, for (62a) to be true, there must be a plural object which satisfies the formula. Here, I tentatively propose the rule of existential closure to yield the truth conditions for these sentences. (62abc) are true if and only if:

(64)a. for (62a) $\exists X$ [OSARA'(X) & NARABETA'(h, X)]

b. for (62b) $\exists mx$ [TAMANEKI'(mx) & KIZANDA'(h,mx)]

c. for (62c) $\exists x$ [KABIN'(x) & KOWASHITA'(h,x)]

3.2.3 Arguments and implications

Here I intend to summarize some arguments for the analysis presented in the previous section and the two hypotheses from which that analysis has been drawn. I will also discuss some specific consequences of this analysis.

3.2.3.1 Some arguments

The first and most informal argument for this kind of multi-

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sorted variable system is the native speaker intuition. It seems to me, as a native speaker of Japanese, that a Japanese CN, like "ringo" (APPLE) represents all three kinds of phases of apples. We can only decide which phase of the object is represented by its surrounding linguistic environment. We may say that Japanese CNs are unspecified to the same extent that English mass nouns are.

My second argument comes from the syntax of Japanese. As I stated repeatedly, Japanese does not employ any syntactic device which requires some divided domain in the semantic component. In other words, Japanese syntax does not provide any evidence for the divided domain like English. More specifically, English has syntactic evidence for the semantics having three distinctive descriptive predicates, and the corresponding divided domain. Japanese syntax, on the other hand, rather suggests that it employs one descriptive predicate which specifies the single domain, and lets variables to choose the right kind of objects in that unified domain.

My third argument is that a unified domain is independently supported by Link's semantic theory. His theory predicts that a language could have a unified domain by assimilating the count domain to the mass domain. In other words, the mass domain has the unmarked structure, while the count domain has

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My fourth argument is that although my multi-sorted variable system with a unified domain appears to be quite different from Link's system, logically speaking, it is exactly the same, as many readers might have already noticed. This may serve as a counter-argument. If that is the case, why do we need two different systems? Can't we apply Link's system as it is to Japanese? I believe that the answer to this question is "yes". However, whether or not we want to do it is another question, which is also an empirical one. The empirical facts seem to suggest otherwise.

Many authors who attempt to integrate mass nouns into the domain of count nouns, especially in the study of English bare plurals, tend to introduce some primitive predicates to mediate between the objects and their different phases. For example, Chierchia (1982) advanced Carlson's bare plural analysis, and proposed three kinds of one-place predicate constants in his logical language, MQ, th, and kd (matter, things, kinds respectively) which go with a two-place predicate constant Re (realize) so that objects can be realized in three different phases to give a right interpretation. Link uses a homomorphism, an identity function between two domains. Compared to these approaches, the multi-sorted system proposed here is considerably simpler. This forms my fifth argument.

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If a language chooses to employ this multi-sorted variable system with a unified domain, that language has to have some means to fix the kind of variable to yield the desired interpretations. Then, some evidence for the verbs' containing enough information to perform this task would be a strong argument for this kind of system. In other words, to argue for my second hypothesis will directly result in a strong argument for my first hypothesis.

Ter Meulen, in her paper, "Events, Quantities and Individuals" (1984) thinks that "to eat apple" is a homogeneously referred expression, while "to eat an apple" makes a heterogeneously referred expression. In other words, parts of the action of eating apple are properly contained within an action of eating apple (hence homogeneous), whereas parts of the action of eating an apple are never properly contained within an action of eating an apple (hence heterogeneous). This argument is not quite convincing to a Japanese speaker who could sufficiently translate both into a single expression, "ringo-o taberu" (EAT APPLE/AN APPLE/SOME APPLES). The action of eating an apple consists of an accumulation of numerous acts of eating apple. Whenever the act of eating apple has consumed an apple, it happens to be called "an act of eating an apple. Regardless of the amount consumed in the action of eating, the fundamental

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nature of the action of eating remains as homogeneous. On the other hand, an act like "moving the door" and another like "open the door" are different, although both can refer to the identical action: the former is a homogeneously referred expression, and the latter is a heterogeneously referred expression in ter Meulen's terminology. In my terminology, the former is an action which associates with the mass-phase of the object, and the latter is one which associates with the atomic-phase of the object, in this case, "the door". I believe that even in English, the verbs and only the verbs determine the nature of the action, homogeneous or heterogeneous. The fundamental nature of the act referred by the verb "eat" should not be affected by the syntactic form of the object NP, "apple" (mass) or "an apple" (count). This is to say that the denotation of transitive verbs includes the information about what kind of phase of the object will be involved in the action referred by that verb. If this is true, it would make the multi-sorted variable system feasible.

3.2.3.2 The implications

The analysis presented here has a couple of non-trivial implications. One concerns specifically the semantic nature of the accusative NP formed by a bare CN and the case-marker. The other concerns so-called "Aktionsarten" in general.

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The accusative NP formed by a bare CN and the case-marker "o" was interpreted in the present analysis as a descriptive predicate introducing a free variable, the kind of which is yet to be determined by the head of the VP, a transitive verb. As such, it does not look like a quantified expression. This will certainly pose a problem for Montague's analysis of NPs as generalized quantifiers. On the other hand, it will also provide some evidence for an analysis such as Heim's quantifier-free analysis of indefinites (1982). As I already pointed out in 3.1.1, this particular position is always subject to the quantification. It is expected because the quantification over entities will be obscured without mass count interpretation. Does this mean that these NPs can be quantified, but have not yet quantified? I postpone answering this question until the later chapter, Chapter V, where I intend to discuss indefinites. It would suffice for the purpose of the present chapter to say that the quantificational nature of the accusative bare CNs ought be further examined.

The discussion we had in this part has drawn our attention to the fact that there are intrinsic relations between actions and the phases of objects which are involved in those actions. As I argued above, if the lexical information of a verb contains the reference to the kind of phase which will

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be necessarily involved in the action, it could dispense with the syntactic system which marks the atomicity or the lack of it directly on the CNs. The analysis presented here would lead us to a broad area of the study of so-called Aktionsarten. It would certainly provide a new aspect to the verbal domain. It might even be true that the sort of actions can be determined by what kind of phase of objects is involved. If we could draw some principles from the study of the ontological phases of the objects, those principles would be able to give some criteria of individuation. It is beyond my intention to further pursue this issue here, or in any other part of my study. It would suffice for the present purpose if I have shown that the analysis presented here has some non-trivial implications which would bring us to more general and broader issues in linguistics and philosophy.

3.3 Conclusion

The specific purpose of this part was to answer the question raised in the earlier part of this chapter: how Japanese dispenses with the pluralization of CNs and still provides the mass count distinction in the semantic interpretation. I answered this question by saying that Japanese could dispense the pluralization of CNs by making a multi-sorted variable system with a unified structured domain of entities, which is basically the same as the one Link proposed,

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cooperate with the lexical information of the verb, which has been always available, yet never been utilized with a proper presentation of the reference to the semantic nature of the argument NP.

This solution presupposes that the mass domain and the count domain can be unified. This unification had never been possible, and wouldn't be possible without a proper structural analogy between the two domains. Link's theory of plurals and mass nouns does provide this significant conceptual basis, hence marks a major breakthrough in all the relevant areas of semantic studies. It was demonstrated in the previous sections that his theory and the basic concepts about the structure of the domain of entities can also serve as a sufficient theoretical basis of the semantics of Japanese CNs.

I should conclude this part and this whole chapter by summarizing what has been done and what is yet to be done in my study of Japanese CNs. In this chapter, I focused on the domain of CNs. I questioned what kind of domain of entities can bear the accounts of the empirical fact of Japanese CNs, especially their mass and count interpretations. I reviewed the empirical facts about Japanese CNs in the first part of this chapter. In the second part, I conducted a research of the semantic theories of English plurals and mass term.

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Finally, I argued that Link's system suitably fits the theoretical demands for the semantics of Japanese CNs. In the last part of this chapter, I presented an analysis of the accusative bare CNs to show how Link's system could be actually implemented in the study of Japanese CNs.

Since the syntactic positions where the mass/count distinction matters are also subject to quantification, the discussion in this chapter has drawn our attention to the quantificational nature of the NPs formed by a bare CN and the case-marker. As I stated before, this will be discussed in conjunction with the issues of (in)definiteness in Chapter V. The present analysis was limited to the object position of extensional transitive verbs, and also the focus of this chapter was largely on the mass/count distinction. The major areas of investigation of CNs, such as generics, or the CNs which occur in the nominal predicate position with the copula verb have been left out. These will exactly be the focus of the following two chapters.

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Notes for Chapter II

1. It was pointed out by Mutsuko Endo that tachi-plurals with animate nouns such as "doobutsutachi" (ANIMALS) are cases of personification. It seems to be the case, however, that tachi-plurals are fairly productively used to refer not to those which have some person-like quality (hence, personification) but to those ordinary but somehow familiar animals without presupposing any person-like quality. There is a clear difference between the following two examples: the first does not imply that the referent of the tachi-plural has any person-like quality, while the latter does imply that the referent of the tachi-plural has some person-like qualities.

- (i) Inutachi-wa ima hirune-o shiteiru.
DOGS-TOP NOW NAP-ACC DOING-EXIST-NONPAST
(My/Those dogs are taking naps now.)
- (ii) Isutachi-wa ima hirune-o shiteiru.
CHAIRS-TOP NOW NAP-ACC DOING-EXIST-NONPAST
(My/Those chairs are taking naps now.)

For this reason, I use the word "animate" rather than "personal" here.

2. An obvious exception can be found in such a case of "the Smiths". For related discussion, see Geach (1962).

3. See Song (1988) for a relevant discussion in Korean plurals.

4. Proper names and quantified NPs had been assigned completely different logical forms in Russellian notation: the former is a constant, and the latter is not even analyzed as a constituent. Montague, who believes that logical form assigned to the natural language syntax should be close to the basic structure of syntax, finds this a fundamental problem. He solved this problem by assigning the same type of meaning to both proper names and quantified NPs, a generalized quantifier, a property set ($\langle\langle e, t \rangle, t \rangle$). See for a further discussion on this matter Ch. III, 3.1.

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5. Not only CNs but also those verbs which will have plurals in their extensions such as "meet", "gather" are also treated as a different higher type.

6. Mereology is a theory of the part-whole relation originally developed by Lesniewski (1929) and further reformulated by Leonard and Goodman (1940) as "calculus of individuals". This theory formalizes the notions of sum and fusion of parts.

7. Bunt (1985) thinks the following examples present a fundamental problem for set-based approaches to mass terms.

- (i)a. The gold on the table is from Egypt.
- b. The gold on the table weighs 7 ounces.

The definite descriptions involving mass nouns can be analyzed in a set-based approach either as a singular count noun or as plural count noun as in (ii).

- (ii)a. The gold on the table
 = The golden object on the table
- b. The gold on the table
 = The golden objects on the table

(iia) will lead us to a difficulty. When there is some gold on the table, it will be incorrect to say that there is one quantity of gold on the table because any quantity generally contains many other quantities. (iib) will also be a problem, when we analyzed a sentence like (ib). If we treat "the gold on the table" as the gold quantities on the table", it will lead us to an analysis that the sum of the weights of the gold quantities on the table is 7 ounces. This is wrong, since the set $\{x \mid x \in Q_{\text{gold}} \ \& \ \text{ON-TABLE}(x)\}$ contains many overlapping quantities. In order to analyze the sentence correctly we need first perform a summation of the gold quantities involved, which Bunt says "is an operation that cannot be carried out within a purely set-theoretic framework (P.42)."

8. Ter Meulen (1981) provides two syntactic arguments for this distinction. One is that nominal mass nouns exhibit anaphoric behavior similar to that of proper names in allowing for backwards pronominalization.

- (i)a. The man she_i loves betrays Sarah $_i$.

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b. Its_i chemical formula defines water_i.

- (ii)a.*The men they_i love are betrayed by some women_i.
 b.*The person who finds it_i sells some gold_i.

The other argument is that nominal mass nouns bind only pronouns that denote the substance, whereas predicative mass terms bind only pronouns which are interpreted to denote a set of quantities.

- (iii)a.*Water is H₂O and it is muddy.
 b.*Some water₂ is muddy and it is H₂O.

9. Furthermore, ter Meulen concludes that a formal semantics of mass terms can only be given within an intensional framework because the phenomenon of nominal and predicative use is specific to mass terms, and nominal mass terms have intensional denotations. The first half of her premise of this conclusion might be questioned because the same kind of phenomenon can be easily found in the count domain.

- (i)a. Diamonds are hard carbonates.
 b. The ring is ornamented with diamonds. (Bunt, P.38)

10. One exceptional area of study is generics. Plurals, especially bare plurals and mass terms are always on the same table of discussion of generic sentences.

11. For further arguments and the criticism to those, see Landman (1989).

12. Keenan/Faltz (1978) and Keenan (1981) advanced similar techniques in their "Boolean approach".

13. This notion of supremum will be useful when we have to provide a proper summation of some quantities for the definite descriptions headed by a mass term as in the example Bunt raised.

- (i) The gold on the table weighs ten ounces.

14. Example sentences are supposed to be in the discourse initial position unless specified otherwise. In other words, those object CNs in (46) and (47) do not have any antecedent. They are not being used anaphorically.

15. In Montague grammar, all the NPs are analyzed as a generalized quantifier, a property set. The sentences in (62) will be translated first into those forms like the following ignoring the intensions.

- (i) $\text{NARABETA}'(h, \lambda P \exists X [P(X) \ \& \ \text{OSARA}'(X)])$
 $\text{KIZANDA}'(h, \lambda P \exists mx [P(mx) \ \& \ \text{TAMANEGI}'(mx)])$
 $\text{KOWASHITA}'(h, \lambda P \exists x [P(x) \ \& \ \text{KABIN}'(x)])$

Then, Montague provides the following meaning postulate for extensional verbs.

- (ii) $\forall x \forall Q [P(x, Q) \leftrightarrow Q (\lambda y P(x y))]$

Suppose Q is a variable over sublimation-concepts, i.e., a variable of type $\langle e, \langle e, t \rangle \rangle$, this meaning postulate will give us simpler forms for those in (i)

- (iii) $\lambda P \exists X [P(X) \ \& \ \text{OSARA}'(X)] (\lambda y [\text{NARABETA}'(h, y)])$
 $= \exists X [\text{NARABETA}'(h, X) \ \& \ \text{OSARA}'(X)]$
 $\lambda P \exists mx [P(mx) \ \& \ \text{TAMANEGI}'(mx)] (\lambda y [\text{KIZANDA}'(h, y)])$
 $= \exists mx [\text{KIZANDA}'(h, mx) \ \& \ \text{TAMANEGI}'(mx)]$
 $\lambda P \exists x [P(x) \ \& \ \text{KABIN}'(x)] (\lambda y [\text{KOWASHITA}'(h, y)])$
 $= \exists x [\text{KOWASHITA}'(h, x) \ \& \ \text{KABIN}'(x)]$

Chapter III

Japanese CNs and Genericity - Part I: Predicate Nominals

1. Introduction

1.1 Two different uses of CNs

A CN can be viewed as a name given to a set of things or beings which share certain characteristics in general. It is natural to talk about those general characteristics. When we do so, we refer to the set as a whole, no matter how many members that set has in it, by the common name, CN. Then we have so-called generic sentences. A CN can be also viewed as a shared name by every member of that set. It is also natural to use a CN when we identify some object's membership of the set that CN refers to. When we do so, we will have a CN in the nominal predicate. In the following examples, "gakusei" (STUDENT) is being used in these two different ways.

(1)a. Gakusei-wa ate-ni naranai.
STUDENT-TOP RELIANCE-DAT BECOME-NEG-NONPAST
(Students are not reliable.)

b. Hisako-wa gakusei da
-TOP STUDENT BE-NONPAST
(Hisako is a student.)

(1a) is an typical example of a generic sentence in which the CN will be interpreted as referring to the set of students in general. (1b) is a typical example of a predicative use of a CN. It roughly means that Hisako is a member of the set of students.

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As far as English count nouns which occur in these kinds of context are concerned, they appear to be quite distinct from each other in their syntactic forms: in the generic sentences, they are usually bare plurals; for the predicative use, they are indefinites. This is probably why these two kinds of uses of count nouns have never been treated together in the literature. Both are integrated in a broader area of studies of NPs. There is an extensive literature on generics in which bare plurals are the main focus. Although there are some disagreements on the formal representation of generic NPs (Carlson, 1977, 1982; Chierchia, 1982; Schubert & Pelletier, 1987), the consensus is to treat the generic NPs as denoting a kind, or some generic entity, something like a proper name. As such, quantification over entities is inconsequential for the generic NPs.

Those indefinites which occur as the nominal part of the nominal predicates are analyzed as full NPs as well. Montague treated them as accusative NPs, and the copula verb as a transitive verb. While opinions may vary among linguists regarding whether or not to label them explicitly as accusative NPs as Montague did, there will be certainly very few who would assign them any less than NP interpretation, since there are many reasons not to do so¹. As far as English count CNs are concerned, the issue of two kinds of uses thereof belongs to the NP semantics, in which they have been

scrutinized independently in spite of the fact that both seem to share a fair amount of characteristics.

On the contrary, two uses of mass nouns have been treated together, and in that unified treatment, they are supposed to present an essential problem in mass term semantics as I mentioned in 2.1.2.1.

- (2)a. Water is a liquid.
- b. This puddle is water.

Quine (1960) poses a question whether a mass noun like "water" in (2) refers to a single, although scattered object, or it denotes a class of all portions of material. In Japanese, however, the same question is legitimate not only for mass nouns, but also for all the CNs. The examples in (1) raise the same question as the one Quine did for English mass nouns: does a Japanese CN denote a set of objects, atomic or non-atomic, or a single object such as a generic entity?

1.2 General perspectives

The present and following chapters will deal with two particular occurrences of Japanese CNs which do not seem to be subject to quantification: one is those which are interpreted as generics, and the other is those which form the nominal predicate with the copula verb. The latter case will be discussed first in this chapter, and the first case

will be discussed in the following chapter, Chapter IV. Although these two occurrences of CNs should be kept in the same perspective because of their unquantificational nature, each seems to represent a quite distinctive use of CNs mentioned above: the predicative use, and the nominal use. The most general perspective of the following two chapters is, therefore, two-fold: one concerns the unquantificational nature of CNs, and the other concerns the alleged distinction between the predicative use and the nominal use of CNs.

The present and following chapters will encompass two uses of CNs, generic and predicative, under the title "genericity". The reason why I intend to structure these two chapters in such a manner will require some explanation. First, this is based on my belief that these two different uses are characteristic of CNs, but not NPs in Japanese, as I mentioned in the previous section. Secondly, it is syntactically motivated to keep CNs in both uses within the same perspective, because both share not only the internal syntactic structure, but also some of the external syntactic structures. It seems to be the case that CNs in both uses are irrelevant to quantification over entities. Assuming that CNs in both uses share some syntactic and semantic characteristics, the next question to be answered is: why should we unify them under "genericity"? I do so because I presume that a CN as a nominal element would preserve its

intrinsic nominal nature, if any, in a nominal position rather than in a verbal position. Here I have a hypothesis related to the general hypothesis stated in Chapter 1: genericity is one of two intrinsic semantic features of CNs, and is in complementary distribution with quantification. In other words, genericity starts to matter where quantification ceases to matter. Again, I do not intend to make any direct claim about this general hypothesis, but I would like to come back to this point at the very end of this study.

1.3 Specific goals

This chapter has two specific goals: one concerns the internal structure of Japanese NPs, i.e., the syntax of an NP formed by a CN and a case-marking particle. The other is to introduce the theory of NP type-shifting and type-shifting functors proposed by Partee (1987).

I will argue that a Japanese CN in a nominal predicate does not have an NP projection, based on the fact that those CNs which are combined with the copula verb to form a nominal predicate are not case-marked. This is to say that in order to be an NP, a CN must be combined with a case-marking particle. This hypothesis will have some significant theoretical implications. The first specific goal includes

the presentation of the non-NP analysis for the nominal part of the nominal predicate and some arguments for this hypothesis, and the discussion of its theoretical implications.

The second part of this chapter will be mainly used to introduce a new approach for the NP interpretation proposed by Partee. Her theory includes some universal claims about the type-shifting functions. In the later chapters I will argue that those universal functions are being carried out by case-marking particles in Japanese. In this chapter, I will briefly summarize her system, and show that some of her universal type-shifting functors will have the same effect as my non-NP analysis of CNs in the nominal predicate.

Finally, this chapter will be concluded with a semantic analysis of a small fragment of Japanese: those sentences which contain CNs in the nominal predicate position.

2. The internal structure of Japanese NPs

2.1 Non-NP analysis for CNs in the nominal predicate

3.1.1 Hypothesis

In the previous chapter, I presented an analysis of a small fragment of Japanese in which a CN occurs with a case marking particle, "o", but no other modifying elements. I called them

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accusative bare CNs, and assumed that those bare CNs are NPs. I did so from a simple reason: they are all case-marked. Here, case is understood as intrinsic to NPs, as tense to VPs. The Case filter (Chomsky 1981) tells us that all NPs should be case-marked. If we assume that bare CNs can have an NP projection if, and only if they are case marked, it will have an interesting consequence: CNs in the nominal predicate are not NPs, because they are never case-marked. Here I propose a hypothesis: Japanese CNs do not have the NP projection when they are not case-marked. Based on this general assumption, the more specific hypothesis which will be examined in what follows is:

CNs in the nominal predicate in Japanese do not have an NP projection.

2.1.2 Syntactic characteristics of the CNs in the nominal predicate

A CN as well as any kind of noun is caseless in the position immediately followed by the copula in Japanese.

- (3)a. Taroo to Hanako-wa kodomo da.
 AND -TOP CHILD BE-NON-PAST
 (Taroo and Hanako are kids.)
- b. Kore-wa hon da.
 THIS ONE-TOP BOOK BE-NON-PAST.
 (This is a book.)
- c. Kore-wa mizu da.
 THIS ONE-TOP WATER BE-NON-PAST
 (This is water.)

- d. Ano hito-wa Yamada-san da.
 THAT PERSON-TOP MR. YAMADA BE-NON-PAST
 (That person is Mr. Yamada.)
- e. Tabeta no-wa watashi da
 ATE ONE-TOP I BE-NON-PAST
 (The one who ate it is me.)

Before I proceed my discussion, a terminological clarification should be in order. Here I call nominal predicates only those which will not yield equative sentences. In other words, my discussion will not include those sentences which have a proper name (3d), a pronoun (3e), or a CN with a definite description in the position which immediately precedes the copula verb. I believe that equative sentences are of a different nature. Geach (1968, P.22-46) pointed out that a CN in a nominal predicate is not used in an act of naming. In other words, it is not used referentially, but predicatively. He further pointed out that a CN used predicatively can not be the subject of a proposition, i.e., a logical subject. I believe that two definite nouns which occur in both sides of the copula in an equative sentence are used in an act of naming, referentially. This is why either one of them can be the logical subject and in fact they are interchangeable like in "John is my brother" and "My brother is John".

One important characteristic for those CNs in the nominal predicate is that they cannot be relativized. There is no

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syntactic equivalent to the following English sentence in Japanese.²

(4)a. John is a doctor, which his father was.

The closest translation would be like the following.

(5) John-wa isha da. Otoosan-mo soo datta.
 -TOP DOCTOR BE-NON-PAST HIS FATHER-ALSO SO BE-
 PAST

(John is a doctor. So was his father.)

This can be easily accounted for, if we assume that CNs in the nominal predicate do not have the NP projection, whether you assume WH-movement or pro strategy for Japanese relative clause formation.

Japanese has some lexical particles: "mo" (ALSO); and "shika" (ONLY), which is followed by a negative form of a verb. These particles override the grammatical case-marking particles as we can see in the following examples.

(6) Kyooshitsu-ni gakusei-mo ita.
 CLASSROOM-LOC STUDENT-ALSO EXIST-PAST
 (There were also some students in the classroom.)

(7) Kyooshitsu-ni gakusei-shika inakatta.
 CLASSROOM-LOC STUDENT-NOTHING BUT EXIST-NEG-PAST
 (There were only students in the classroom.)

These particles never occur with a CN in the nominal predicate. In other words, there is no syntactic equivalent to the following English sentences in Japanese.

(8) John is also a student
 (as well as he is a teacher).
 John is only a student.

In order to say these, Japanese requires a different kind of copular verb which contains a gerundive form of the copula

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and a verb of existence: "dearu".

- (9) John-wa gakusei de-mo aru.
JOHN-TOP STUDENT BE-ALSO EXIST
(John is also a student.)

*John-wa gakusei-mo da.
JOHN-TOP STUDENT-ALSO BE-NON-PAST

John-wa gakusei de-shika nai.
JOHN-TOP STUDENT BE-NOTHING BUT NONEXISTENT
(John is only a student.)

*John-wa . gakusei-shika dewanai.
JOHN-TOP STUDENT-NOTHING BUT BE-NEG-NON-PAST

There are some cases which appear to be counterexamples which show that the copula can take a case-marked NP.

- (10) Tegami-wa chichi-kara datta.
LETTER-TOP MY FATHER-FROM BE-PAST
(The letter was from my father.)

"Kara" can be analyzed as ablative case in the following sentence.

- (11) Taroo-wa mado-kara tobiorita.
-TOP WINDOW-ABL JUMP DOWN-PAST
(Taroo jumped down out of a window.)

"Mado" in (11) can also be relativised.

- (12) Taroo-ga tobiorita mado
-NOM JUMP DOWN-PAST WINDOW
(the window that Taroo jumped down from)

However, it is also true that these phrases, whatever they are, seem to behave just like a noun when they modify another noun because they will be assigned a genitive case.

- (13)a. Chichi-kara-no tegami
MY FATHER-FROM-GEN LETTER
(a letter from my father)

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- b. Mado-kara-no tobiori
 WINDOW-FROM-GEN JUMP
 (a jump from a window)

I don't have an immediate answer to this problem³, but it doesn't seem to present any essential problem in postulating that the Japanese copula does not take a full NP as its complement. Considering the fact that all argument NPs in Japanese are case-marked, Japanese does not support an analysis like one that Montague had for the nominal predicate, i.e., the copula being a transitive verb taking an argument NP.

Another fact is that nominal predicates do not occur with numeral classifiers. As I stated before, lexical plurals cannot be the complement in the nominal predicate, either.

- (14) Taroo to Hanako-wa kodomo da.
 AND -TOP CHILD BE-NON-PAST
 (Taroo and Hanako are kids.)

- *Taroo to Hanako-wa kodomo futari da.
 AND -TOP CHILD TWO PEOPLE BE-NON-PAST

- *Taroo to Hanako-wa kodomotachi da.
 AND -TOP CHILD-PL BE-NON-PAST

The non-NP analysis of the nominal part of the nominal predicate, i.e., a CN, is not only supported by the basic syntactic facts, but also explains the general understanding in semantics that quantification is inconsequential in this position. That CN can not be a quantified NP, since it is not an NP at all.

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2.2 Theoretical implications

2.2.1 Japanese case-marking particles as determiners

The non-NP analysis of the nominal part of the nominal predicate has an important theoretical implication for the recent development of syntactic theory concerning phrase structure. Chomsky (1986) extended X' syntax to functional categories such as Infl and Comp. The very same idea has been applied to the domain of NPs. Abney (1986, 1987) argued that the determiner is a functional element which deserves a parallel structural treatment as Infl or Comp. Det (for determiner) heads a DP (for determiner phrase) which takes an NP as its complement, just as Infl heads an Infl phrase and takes a VP as its complement. He points out that Det and Infl have similar semantic functions. Det specifies the reference of a noun phrase. The noun provides a predicate, and the determiner picks out a particular member of that predicates extension. Infl plays a similar role, where the VP provides a predicate, a class of events, and Infl locates a particular event in time. In this account, what we have been calling an NP is a DP. In English phrase structure, the specifier is on the left of the head, and the complement is on the right of the head. Japanese, on the other hand, is consistently right headed: the head is in the rightmost position, and the specifier and the complement are on the left in that order. If (15a) is English DP, we expect (15b)

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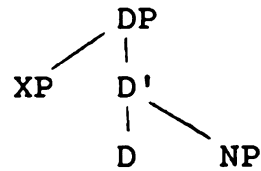
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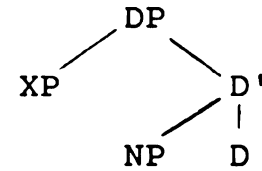
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The basic assumption from which I drew a non-NP analysis for the nominal part of the nominal predicate, was that only case-marked phrases are full NPs. Then, a natural candidate for Japanese Det would be the case marker. Although English articles seem to have lost their case-marking function a long time ago, it is quite common among natural languages that the determiner carries the function of case-marking.

2.2.2. Existence of a functional category, Det in Japanese

I suggested in the previous section the possibility to analyze case-marking particles as determiners in Japanese. Fukui and Speas (1986), however, seem to have been led to a different conclusion. They argued that Japanese does not have a projection of DP, because it does not have the functional category, Det. One of their arguments for this hypothesis is that Japanese allows iteration of nominal modifiers on the left of the head noun, while English does not allow iteration of nominal modifiers on the left of the determiner. It seems that they are simply forgetting the fact that Japanese is consistently right-headed. If it has Det at all, it must be

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on the rightmost position, where Det won't be in the way of modifiers' iteration.⁴

The existence of the functional category of determiners in Japanese has been also questioned in the study of (in)definiteness. Many linguists who take the stand that Japanese is not a configurational language tend to be led to assume lack of configurationality for the internal structure of NPs. Gil, who takes this position, claims (1987) that because Japanese does not have (in)definite articles, which he presumes have the function of raising an expression of category N^n to an expression of category N^{n+1} , Japanese does not have determiners, hence, no full N' projection. This conclusion, however, seems to be drawn too quickly. If we assume that Japanese case marking particles are in fact determiners, it is easy to find an example in which particles are actually performing a similar role as one English definite and indefinite articles do. Kuroda (1965) pointed out that Japanese particles, "wa" and "ga" function just like "the" and "a" in English as we can see in the example and its English translation.

- (16) Michi-ni otoko-ga tatteita.
 STREET-LOC MAN-NOM BE STANDING-PAST
 (There was a man standing in the street.)
- Otoko-wa kuroi kooto-o kiteita
 MAN-TOP BLACK COAT-ACC BE WEARING-PAST
 (The man was wearing a black coat.)

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It is not my intention here to further argue for this syntactic analysis. Rather, it will suffice if I have showed that my original non-NP analysis for CNs in the nominal predicate is arguably plausible, and would have non-trivial theoretical implications. In the later chapters, I will show that Japanese case-marking particles carry out some type-shifting functions which Partee claimed to be universal. It is not only that those case-marking particles can be syntactically analyzed as determiners, but also that they seem to perform semantic functions typically performed by determiners: taking a CNP denotation to yield an NP denotation. Particularly, the indefinite/definite marking through case-marking in Japanese will be discussed in Chapter V.

3. Partee's type-shifting theory

3.1 The background

One problem surrounding the predicate nominal is some apparent discrepancy between the syntactic status and the semantic nature. The predicate nominal in English shows every sign to be a full NP, while it seems to show some obstinacy to one of the semantic functions which are expected from this syntactic category: quantification. English predicate nominals have been always treated as a full NP as mentioned before. Jespersen (1933, CH. XIII) points out that it

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generally has either the indefinite or the definite article, which conforms to the widely accepted base rule;

(17) NP --> (Det) (AP) N (PP) (S)

although he didn't seem to include those clearly quantificational NPs.

Montague, as I mentioned before also, analyzed the copula as a transitive verb which takes a accusative NP. Montague did so as a part of one of his enterprises to solve a long-standing problem in semantics. In syntax, there is an undisputable category, which is called noun phrase. However, it was not the case that this syntactic category had been treated in a unified way in logical analyses. (18) has been analyzed as (18)' in the standard logical translation.

- (18)a. [John]_{NP} walks.
- b. [A man]_{NP} walks.
- c. [Every man]_{NP} walks.

- (18)'a. WALK(j) j:John, WALK:walks, MAN:man
- b. $\exists x[\text{MAN}(x) \ \& \ \text{WALK}(x)]$
- c. $\forall x[\text{MAN}(x) \ \text{-->} \ \text{WALK}(x)]$

"John" in (18a) is analyzed here as an individual constant. "A man" and "every man" involve existential and universal quantification respectively, and do not even have a corresponding constituent in the logical form. In order to meet the syntactic generalization that these three subjects in (18) all belong to the same syntactic category, Montague assigned them all the same type of meaning, i.e., a property set. "John" is analyzed as the set of properties John has.

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Likewise, "a man" and "every man" can be analyzed as the set of properties which a man/every man has. In this way, Montague succeeded in treating NPs in a unified way, i.e., they are all generalized quantifiers (Barwise & Cooper, 1981). This enables us to interpret certain conjunctions such as "John and every woman".

Williams (1983) argues that there is no difference between predicative NPs and referential NPs either in their internal structure or in their syntactic distribution, although he recognized, as Geach did, they are semantically different. Hence, he argued against Montague's rigid type-system, according to which a certain syntactic category will be associated with only one semantic type. His point is that NPs can be semantically different between predicative use and referential use, while the NP syntax does not distinguish these two uses. He cited examples which appear to be counterexamples to the general observation that a quantified NP in a nominal predicate will not yield a sensible predicative reading. The following example is among them.

(19) The hair of my girl friend has been every color.

The consensus is that the nominal part of the nominal predicate in English has a full NP projection. However, opinions seem to vary between those who expect a wide variety of NPs including quantified NPs in this position, and those

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who only expect a certain kind of NPs. Partee (1987) thinks that examples like (19) are a highly language specific phenomenon. She suggested that predicative NPs are either definite singular NPs or formed with weak determiners (Milserk's term, 1974) such as the indefinite article, numerals, and some for unspecified amount (see endnote 7). I find Jespersen's observation such that generally we don't have any quantificational determiners in the nominal predicate more accurate than the one by Partee. The weak/strong classification of determiners seems irrelevant for the predicative position simply because quantification is inconsequential for a sensible predicative reading, assuming that there will be an independent account for those cases like (19) as Partee suggested. If we limit our discussion to those cases that everyone agrees on, and also exclude the cases which will yield an equative sentence, then we will have the most obvious cases for predicative NPs in English.

- (20)a. John is a boy.
- b. John and Mary are kids.
- c. This is cotton.

- (20)'a. John-wa shoonen da.
 JOHN-TOP BOY BE-NONPAST
 (John is a boy.)
- b. John to Mary-wa kodomo da.
 JOHN AND MARY-TOP CHILD BE-NONPAST
 (John and Mary are kids.)
- c. Kore-wa momen da.
 THIS ONE-TOP COTTON BE-NONPAST
 (This is cotton.)

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(20)' is the Japanese equivalent to (20). In the previous section, I discussed the possibility of analyzing the CNs in the nominal predicate in Japanese as not having a full NP projection. Partee, who analyzes the predicate nominal as a full NP, proposes, however, some type-shifting functors which create the same kind of effect as my non-NP analysis.

3.2 A sketch of the theory

Partee's general aim in proposing the type-shifting theory is to resolve the conflict between two different approaches to NP interpretation: one is Montague's unified treatment, in which all NPs are generalized quantifiers, denoting sets of sets of entities (type $\langle\langle e, t \rangle, t \rangle$), and the other is one in which NPs are divided into referring, denoting entities (type e), predicative, denoting sets (type $\langle e, t \rangle^5$) and quantificational NPs ($\langle\langle e, t \rangle, t \rangle$). The latter approach is more or less a traditional view. Partee proposes to resolve this conflict by saying that all NPs can have meanings of type $\langle\langle e, t \rangle, t \rangle$, the most general and complex type of meaning, (hence, Montague is right), but NPs can have meanings of the other types as well (hence, the traditional view can be maintained). In order to show that this is in fact the case, Partee proposes some type-shifting principles which predict what possible e -type or $\langle e, t \rangle$ type interpretation a given NP will have besides $\langle\langle e, t \rangle, t \rangle$ type interpretation. In her

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systematic investigation of the type-shifting principles, Partee has reached a new perspective on the copula, and the (in)definite articles, "a" and "the". She claims that these are natural type-shifting functors. This particular claim, which is my primary interest here, will show some direction toward which we should look regarding NP interpretation in a language like Japanese which does not seem to encode these functions entirely by lexical elements. Her claim will invoke a question how these semantic functions are performed in Japanese. Finding a proper answer of this question would then validate her universal claim.

I would like to start with the general picture of her type-shifting system, but then to concentrate on those functors which were claimed to be most natural, BE, THE and A, in particular, the first and the third, which are directly relevant in my discussion. The whole system consists of three model-theoretic domains D_e , $D_{\langle e, t \rangle}$, and $D_{\langle \langle e, t \rangle, t \rangle}$, plus several type-shifting functions which map objects in one domain onto corresponding objects in another domain. These functions can not only map NP-meanings onto other meanings for those same NPs, but also relate expressions in different syntactic categories. For example, a predicate, which is an $\langle e, t \rangle$ -type object, can be mapped onto its e-type correlate by a nominalization functor, nom (BLUE' $\rightarrow$ b). Partee consider e-type and $\langle \langle e, t \rangle, t \rangle$ -type as unmarked for English full NPs, and

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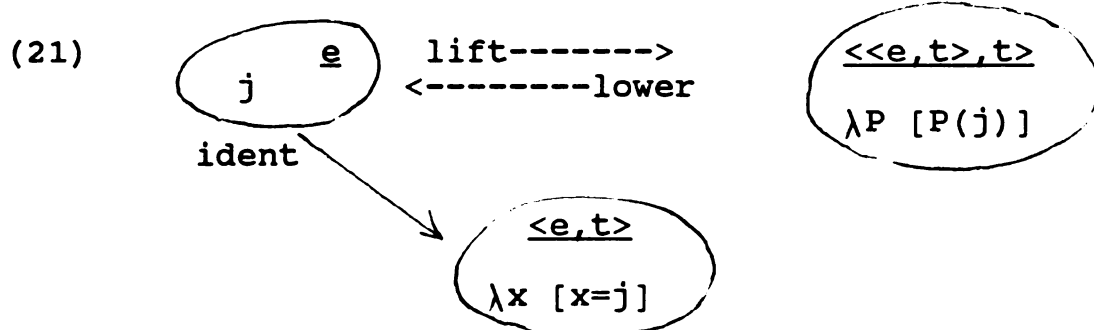
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$\langle e, t \rangle$ -type marked cases, whereas the last type is unmarked for common noun phrases and verb phrases. The following diagram is a simplified version of the one Partee proposed. It illustrates how an NP like "John" can have meanings in three different types.



The functor lift maps any entity like j onto its individual sublimation⁶, $\lambda P [P(j)]$ (the set of all the properties that j has). Lower is the inverse of lift, which maps any individual sublimation onto its generator. This function is a partial function, because not all the generalized quantifiers ($\langle \langle e, t \rangle, t \rangle$) are individual sublimations. Ident maps any entity onto its singleton set.

Although this brief sketch of her system will leave most of the detail with some other interesting operations, I believe this will suffice to get the essence of the type-shifting operations.

3.3 The natural type-shifting functors: BE, A

Now I would like to introduce those functors, BE, and A.

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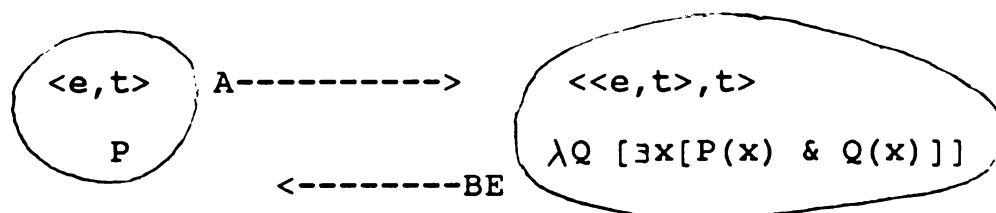
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A maps an $\langle e, t \rangle$ -type meaning onto an $\langle \langle e, t \rangle, t \rangle$ -type meaning. Those syntactic categories which Partee particularly assumed have $\langle e, t \rangle$ -type meanings as unmarked cases are CNPs, VPs, and some type of adjective phrases and prepositional phrases. Since I am not quite sure how this functor would work on those categories other than CNPs, I will consider here only CNs. A is to apply to a set, P and create the existential sublimation, i.e., a set of properties such that in each property, there is at least one thing which is in P . Suppose that BOY' denotes a set of boys, then $A(BOY')$ will denote a set of properties such that for each property, there is at least one boy in the extension of that property. BE is the inverse of A . BE maps any $\langle \langle e, t \rangle, t \rangle$ -type meaning onto an $\langle e, t \rangle$ -type meaning, by collecting singletons in that generalized quantifier into a set.⁷ Now suppose $A(BOY')$, which is a generalized quantifier, a set of all the properties such that in each property, there is at least one boy, undergoes this type-shifting operation of BE . It will go through all those properties and select such properties as there is a unique boy in the extension, i.e., singleton sets, and make a set out of those singletons. That will yield the set of boys, i.e., BOY' . Although Partee carefully did

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not identify these two functors with the meanings of English "a" and "be"⁸, it seems natural to assume these operations are involved in the following sentence.

(23) John is a boy. (= 20a)

The NP "a boy" is a generalized quantifier, $\langle\langle e,t\rangle,t\rangle$, after A having applied to a CN, boy, which is $\langle e,t\rangle$, but then this full NP undergoes another type-shifting operation by BE, which exactly cancels out the first operation to yield the original type of meaning of a CN, boy. The whole operation creates exactly the same effect as my non-NP analysis does.

Before I conclude this section, I would like to see how these operations would work in the cases like (20bc), now as (24ab).

- (24)a. John and Mary are kids.
b. This is cotton.

If we suppose that we have a structured domain of entities as Link proposed, which has plural entities, KIDS' would denote a set of all the plural entities in the extension of that predicate. A(KIDS') would be the set of properties such that in each property, there is at least one plural entity which is in the extension of KIDS'. BE will then cancel out the operation to yield the $\langle e,t\rangle$ -type meaning, a set of plural entities. Analogously, COTTON' would denote a set of all the quantities which are cotton. A(COTTON') will denote a set of properties such that in each property, there is at

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least one quantity which is in the extension of COTTON'. Again, BE will cancel this operation to yield the $\langle e, t \rangle$ meaning. These type-shifting operations seem very vacuous for these determinerless NPs. However, in English, as Williams argues, it is quite difficult to postulate something less than an NP in the nominal part of the nominal predicate. If we choose to do so, (20a) and (20b) have to be dealt with differently, unless we assume that the syntactic forms are purely the result of a syntactic rule of number agreement. In Japanese, on the other hand, as far as the nominal predicates are concerned, it seems that the syntactic fact which allows CNs not to be NPs in the complement position of the copula also allows us to dispense with these type-shifting operations performed by A and BE in this particular position. Despite the claim that BE is a natural, presumably universal functor made by Partee, Japanese does not seem to provide supporting evidence. As far as the functor A is concerned, we still have to look at interpretations of Japanese CNs in the NP position, which is the topic of the next two chapters.

4. A semantic analysis of Japanese CNs - Part II

4.0 The purpose.

The general purpose of this section is two-fold: one is to show how the analysis presented so far in this chapter can

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be implemented in the basic framework adopted in the previous chapter. In other words, this section is aimed in showing how this particular syntactic analysis of the nominal part of the nominal predicate can be implemented in a semantic system in which we have a single, unified, and structured nominal domain and the multi-sorted variable system. The other is to seek a suitable explanation for the non-quantificational nature of the nominal predicate. More specifically, this semantic analysis shows how the kind of CN denotation that I assumed in the chapter II will yield the proper predicative meaning for the nominal predicate by being combined with the copula verb. In doing so, I will also provide a new analysis of the copula verb.

4.1 Preliminaries

4.1.1 Empirical coverage

The nominal predicate which I wish to discuss here consists of a bare CN and the tensed copula verb and occurs in a simple sentence in which that predicate is preceded by a topic NP. The examples are those sentences in (20'), which are now repeated as (25).

- (25)a. John-wa shoonen da.
 JOHN-TOP BOY BE-NONPAST
 (John is a boy.)
- b. John to Mary-wa kodomo da.
 JOHN AND MARY-TOP CHILD BE-NONPAST
 (John and Mary are kids.)

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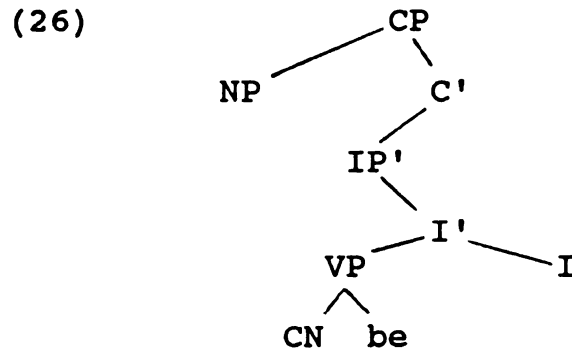
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 THIS ONE-TOP COTTON BE-NONPAST
 (This is cotton.)

The examples in (25) share a common syntactic structure as in (26).



In the topic NP position, these examples always have a definite noun such as a proper name or demonstrative pronoun followed by the topic marker "wa".

4.1.2 Assumptions

Besides the general assumptions in 3.1.2 of chapter II, I also assume all the consequences of the analysis of chapter II. A Japanese CN denotes a set of entities, individuals or quantities, which contains plural entities as well as singulars. A Japanese CN also introduces various kinds of variables ranging over various sorts of objects.

Japanese copula sentences take a topic NP as unmarked subject NP, while non-copula sentences which have an active verb as the main verb take either a topic NP or a nominative NP.

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(27)a. Taroo-wa byooki da.
 -TOP SICKNESS BE-NON-PAST
 (Taroo is sick.)

b. Taroo-ga byooki da.
 -NOM SICKNESS BE-NON-PAST
 (Taroo, but not the others, is sick.)

(27b), unlike (27a), will have an interpretation of obligatory focus. In other words, the subject NP in (27b) has an unusual case marking to label itself as marked case. This marked/unmarked difference cannot be observed in the non-copula sentences.

(28)a. Taroo-wa ashita gakkoo-e iku.
 -TOP TOMORROW SCHOOL-LOC GO-NON-PAST
 (Taroo will go to school tomorrow.)

b. Taroo-ga ashita gakkoo-e iku.
 -NOM TOMORROW SCHOOL-LOC GO-NON-PAST
 (Taroo will go to school tomorrow.)

I attribute this difference to the difference in the ability to assign a theta role between the copula verb and the ordinary active verb: the former does not assign any theta role, while the latter does. Since this distinction between topic NPs and nominative NPs is not a direct concern of the following analysis, I postpone further discussion on this matter to the next chapter, where we discuss CNs in generic use which present the same distinction that the proper names in (27) in topic and nominative position do.

In chapter II, I analyzed the proper names in the nominative NP position as denoting entity-type meaning, in other words,

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as individual constant. In the following analysis, I will assume that the topic NP will have $\langle\langle e, t \rangle, t \rangle$ type meaning, i.e., a generalized quantifier. "Hisako-wa" in "Hisako-wa gakusei da" (Hisako is a student) will denote a set of properties that Hisako has. I will do so here without any further justification, since in later chapters I plan to argue that Japanese topic NPs always denote a generalized quantifier.

4.2 A semantic analysis of Japanese nominal predicates

4.2.1 Hypotheses

Various syntactic facts (2.1.2) led us to hypothesize that the CN in the nominal predicate in Japanese does not have an NP projection. If there is no NP to be quantified, it seems to confirm the general understanding that a quantified NP would not occur in this position. However, it would certainly not explain why it is so. In other words, my non-NP analysis itself would not complete the explanation of why the quantification in this position is extrinsic. After all, it is not an NP but a CN that is to be combined with a so-called quantificational determiner to form a quantified NP. Furthermore, it is not the descriptive predicate of the CN denotation, but the variable that CN introduces that will be actually bound by a quantificational determiner to form an quantified NP. If we assume that a CN in this position

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denotes a set of entities/quantities with a free variable of any kind, the question still remains unanswered: why we don't have a quantification. The quantificational nature of a CN will, however, be totally sterilized if the copula verb absorbs the variable from its complement CN. Here I revise the hypothesis proposed in 2.1.1 with an additional hypothesis regarding the copula verb.

(29) I. CNs which occur in the complement position of the copula in Japanese do not have an NP projection.

II. The copula verb is to absorb the variable introduced by the complement CN.

After a variable being absorbed by the copular verb, a CN can only define a sortal object (a set), and will lose the ability to be bound by a quantificational determiner to perform a quantification over entities in that set.

4.2.2 Analysis

4.2.2.1 The informal discussion

The crucial syntactic fact which led me to hypothesize the non-NP status of the predicate nominal in Japanese is the lack of a case-marking. A case can be either a thematic case or a non-thematic case. Elsewhere (1989) I argued that the topic case and the genitive case are the second kind, and the nominative and the accusative are the former kind in Japanese⁹. The nominative case is assigned to the NP in the specifier position of IP by Infl, and the accusative case is

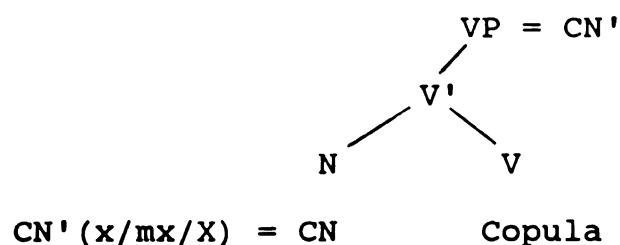
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assigned to the NP in the complement position of VP by Vt structurally. These two cases are thematic, because each NP will carry a different theta role which is projected by the lexical head of the VP. The theta criterion states that the theta roles will be projected throughout the syntactic levels. Not being case-marked can be inferred from two different syntactic sources: one is the potential of the lexical head of a VP, the copula verb, to assign a thematic case, and the other is the configurational property of the NP which licenses the case assigner to assign the case. The fact that Japanese predicate nominals are caseless could be explained in two ways. One way to look at this phenomenon is to postulate that Japanese copula verb, which is the lexical head of the VP in this construction simply does not assign any direct theta role to the predicate nominal, hence no case. The other way is to say that the predicate nominal will not satisfy the configurational requirement for a case to be assigned: it does not have an NP projection. If the copula does not assign any theta role and takes a CN, or CN phrase as its complement, the fact that the predicate nominal is never subject to the case assignment would be easily accounted for. (30) illustrates the internal structure of the nominal predicate, which the hypotheses in (29) exactly endorse.

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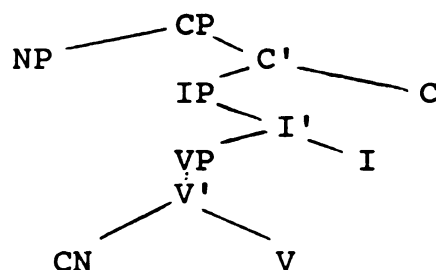
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A CN denotes a set of entities/quantities introducing a free variable of any kind. When it is taken by the copula verb, the variable will be absorbed to yield an ordinary predicate denotation such as a set of entities/quantities. If the Japanese copula verb does not project any theta role to its local NPs, we will have to have a term phrase in the non-local position, the topic position, in order to yield a sentence as we see in the following example.

(31)a. Hisako-wa gakusei da.

b.



Hisako-wa gakusei da
 (Hisako is a student.)

According to (30), the nominal predicate in (31), "gakusei da" will have the logical form such as GAKUSEI', which is the type $\langle e, t \rangle$. In order for this predicate to yield a truth value, it either takes e-type, or is taken by $\langle \langle e, t \rangle, t \rangle$. The latter will be our choice because I assume here the topic NP will have a generalized quantifier type meaning $\langle \langle e, t \rangle, t \rangle$. (31a) will have a logical form: $\lambda P[P\{h\}](\text{GAKUSEI}')$, which

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says that the set of the properties that Hisako has contains the property of being a student. After a proper λ -conversion, this will be logically equivalent to GAKUSEI'(h).

4.2.2.2 The logical form

The following three sentences share the same structures as those in (26).

- (32)a. Hisako-wa gakusei da.
 -TOP STUDENT BE-NONPAST
 (Hisako is a student.)
- b. Hisako to Shuuichi-wa kodomo da.
 AND -TOP CHILD BE-NONPAST
 (Hisako and Shuuichi are kids.)
- c. Kore-wa momen da.
 THIS ONE-TOP COTTON BE-NONPAST
 (This is cotton.)

In order to generate these three sentences, we will have a small lexicon which include the following basic expressions.

(33) Lexicon

1. Hisako: h
2. Shuuichi: s
3. kore: k
4. gakusei: GAKUSEI'(x/X)
5. kodomo: KODOMO'(x/X)
6. momen: MOMEN'(mx/X)
7. da: (mx/x/X) $\rightarrow \phi$ / [_{VP} CN ____ da]

The item 7 is the first lexical entry which lacks the lexical content. Instead of conveying some lexical content, it carries out a certain operation in a certain configuration. The lexicon lists that operation just as it lists the lexical content for any other lexical element. It also lists the

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subcategorization of this particular verb just as it does for any other verb. The former corresponds to the left of the slash in 7, and the latter the right. The item 7 roughly reads that "da" performs an operation to absorb the variable when it takes CN as its complement. While a transitive verb imposes a certain kind of variable in the logical form of the object NP, the copula verb deprives the variable from that of its complement. (32abc) will have the following logical forms.

- (34)a. (=32a) $\lambda P[P\{h\}](GAKUSEI')$
- b. (=32b) $\lambda P[P\{h\&s\}](KODOMO')$
- c. (=32c) $\lambda P[P\{k\}](MOMEN')$

What sort of variable the CN denotation carries will become completely irrelevant because whatever it is, it will be absorbed by the operation carried out by the copula verb. In order for (34a) to be true, the property of being a student must be in the set of all the properties Hisako has. That is to say that Hisako is in the set of students. The truth conditions for (32abc) will be like the following.

- (35)a. $GAKUSEI'(h)$
- b. $KODOMO'(h\&s)$
- c. $MOMEN'(k)$

4.2.3 Arguments

Here I summarize some arguments for the analysis presented

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in the previous section. First, I presented many syntactic facts that suggest that the predicate nominal in Japanese does not have an NP status, including the fact that the predicate nominal is never case-marked (2.1.2). Without repeating those, I simply argue that the non-NP analysis is syntactically motivated.

The copula verb has been traditionally treated as having no lexical content. In the nominal predicate, the lexical content always comes from the complement noun. Then, are the denotation of a CN like "ringo" (APPLE) and the denotation of a CN + BE like "ringo da" (BE AN APPLE/APPLES) the same? The answer seems to be negative. The former can be quantified by a quantificational adverb "futatsu" (TWO PIECES) in the NP position, but the latter cannot as we see in the following examples.

- (36)a. Ringo-o futatsu tsukatta.
 APPLE-ACC TWO PIECES USE-PAST
 (I used two apples.)
- b. *Korera-wa ringo futatsu da.
 THESE ONES-TOP APPLE TWO PIECES BE-NON-PAST
- c. Korera-wa ringo da.
 THESE ONES-TOP APPLE BE-NON-PAST
 (These are apples.)

Another important difference is that the former can be referential, but the latter is not. "ringo-o futatsu" in (36a) can license a discourse anaphor, but "ringo" in (36c) cannot. It is sensible to ask "which apples?" after (36a),

but it does not make sense to ask "which apples?" after (36c). In other words, predicate nominals are capable neither of being quantified, nor of fixing their reference. Theoretically it is much preferred to assume that a CN will have the same denotation in any syntactic position, rather than to postulate two different denotations: one is quantificational and referential, and the other is unquantificational and nonreferential. Then, we have to attribute this difference as being caused by the copula verb. In order for a CN to be quantified, its variable must be bound by a quantifier. In order for a CN to be referentially fixed, the variable must get some referential index. One easy way to achieve the unquantificational/non-referential nature is to deprive the CN of the variable. One advantage of this analysis is that it can differentiate the CN denotation and the denotation of the nominal predicate, which is not possible, for example in Partee's system.

Although the present analysis of the copula verb and Partee's universal functors A and BE have exactly the same effect, the latter seems to have a problem which the former doesn't. Partee's system cannot be quite extended to mass nouns. Suppose, a mass noun denotes a set of quantities, we are able to create an existential sublimation. Then, certainly we cannot apply BE because it cannot find any singleton set in that generalized quantifier. Any quantity would contain more

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than one quantity. Suppose A functor is not present in the nominal predicate with a mass noun, as syntax suggests, then we have to have another BE which does not perform the type-shifting, in fact does not carry out any function at all. In the present analysis, this problem does not arise.

My last argument, and the most important one, is that the present analysis provides an explanatory account for the quantificational nature of CNs and the lack thereof. It is explanatory, because it essentially explains the intrinsic semantic functions of CNs: defining a sortal object, and providing means to quantify over entities or to yield the referentiality. Furthermore, the analysis implies that these two functions are carried out by a distinct part of the CN denotation: the descriptive predicate and the variable.

5. Conclusion

In this chapter, a new analysis for Japanese nominal predicates has been presented. I argued that the Japanese copula verb takes a CN, rather than a full NP, as its complement. The unquantificational nature of the nominal predicate has been explained as a result of the copula verb's absorbing the free variable introduced by the complement CN.

I would like to conclude this chapter by pointing out the

implications of the present analysis. First, it has a non-trivial implication for the internal structure of Japanese NPs. It provides a possibility to analyze the case-marking particles as determiners. It also suggests that Japanese is a configurational language at least at the NP level.

If the present analysis is correct, it seems to be the case that of the logical form of the CN, what is mainly responsible for the quantification is the variable part, not the descriptive predicate part. We have witnessed that a CN can achieve a linguistic significance without quantification, i.e., without a variable being bound in the nominal predicate. In this position, because of the function of the copula verb, a CN will only define a sortal object, a set of entities/quantities by its descriptive predicate. There is one more case in which a CN can be significant without quantification: in a generic sentence. This is the topic of the following chapter.

Notes for Chapter III

1. Logicians and philosophers seem to be inclined to do so. In Russell's analysis, we do not see any evidence that he treated the nominal predicate as a full NP. Gupta (1980), who defended the non-standard view of CNs such that they are essentially different from other one-place predicates in that they are combined with variable and quantifiers, never provided any logical analysis for those CNs in the nominal predicate.

2. Japanese does not have a syntactic equivalent to those English free relatives in which the predicate nominal is relativised.

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3. One possible way to avoid this problem would be to postulate that "chichi-kara" (from my father) is an abbreviation of "chichi-kara-no tegami" (a letter from my father).

4. For detailed discussions concerning the phenomenal differences between Japanese and English, see Fukui (1986). He argues that some distinctions can be explained by postulating the lack of the functional categories such as Det and Comp.

5. $\langle e, t \rangle$ is a notational device for a semantic type which is derived from two primitive types, e (entity), t (truth value). An expression of this type $\langle e, t \rangle$ is such an expression which is combined with an expression of e type and to yield an expression of t (sentence).

6. This is the term of Dowty, Wall and Peters (1981).

7. Partee suggests that although BE is a total function, because it only collects singletons to form a set, some generalized quantifiers which do not contain any singleton such as "most men" end up with an empty set. She says that this is why some quantified NPs are not likely to occur in the nominal predicate position, because the operation only creates a degenerate case.

8. We have already seen that the function ident can be performed by "be" as in "he is John."

9. In 1989, I argued that all these four cases are structurally assigned in Japanese. Such a claim is highly non-standard in two accounts: one is that the genitive case is not treated as the inherent case as it is treated as such in Chomsky (1981), and the other is that the topic is regarded as an abstract case.

Chapter IV

Japanese CNs and genericity - Part II: CNs in Generic Use

0. Introduction

0.1 The general goal

The unquantificational nature of CNs in certain linguistic contexts still remains as the general perspective. A general question I intend to address in this chapter is what exactly the unquantificational nature of CNs comes from. There is a general understanding that in certain linguistic contexts, quantified NPs do not occur. We saw in the previous chapter one of those contexts, the nominal predicate. Another kind of context is generic NPs. If we assume that quantified NPs do not occur because the quantification over entities in the CN extension is inconsequential in those contexts, we certainly owe an explanation of why it is so. One way to seek the answer to this question is to find out the way a CN can achieve its linguistic significance without quantification. In the previous chapter, I suggested that a CN could do so without forming a term phrase. In other words, a CN can denote an ordinary one-place predicate by abandoning its ability to be bound, i.e., its free variable. This is to say that a CN in the nominal predicate is not a term phrase semantically, and not an NP syntactically. A CN in generic use, which occurs in the NP position, however, would require

some other explanation.

The primary purpose of this chapter and the preceding one is to show how a CN can be linguistically significant without being quantified. It is also aimed to show that the CN denotation itself consists of the potentials which enable a CN to be significant either with or without quantification. This would lead us to the ultimate question: what do CNs do, in other words, what are the intrinsic functions of CNs? One of my general hypotheses stated in the first chapter, and mentioned also at the beginning of Chapter III (1.2), was exactly meant to answer this question. I do not intend to discuss this issue comprehensively in this chapter, but to start the discussion to prepare for the further discussion in the concluding chapter. Another general issue which I intend to keep in perspective in this chapter, although I believe that it would be far beyond my capacity to bring about any kind of conclusive discussion, is the alleged contrast that CNs in generic use display to those in the nominal predicates: the former are in nominal use (especially for mass nouns), or referential use, and the latter are in predicative use. I hope that the discussion we had in the previous chapter for the nominal predicate and that we will have in this chapter for generics would bring us to a better understanding of some intrinsic functions of CNs which would shed some fresh lights on this old issue.

0.2 The specific goals

This chapter also has some more specific and attainable goals. The primary one is to provide a semantic analysis for Japanese generic sentences which contains CNs with the generic interpretation. In doing so, I will show how Link's theory for the nominal domain, which I discussed in chapter II, and Partee's universal type-shifting functions introduced in the previous chapter can provide a sufficient framework for the analysis. Secondly, I hope to review some issues in English generics and to discuss them from a Japanese perspective. It seems that some issues will turn out to be non-issues in Japanese generics, and some will remain.

0.3 The organization

The first part of this chapter will deal with the empirical facts about Japanese CNs in generic use, for which I attempt to provide a semantic analysis. The second part of this chapter will review some relevant issues in the literature on English generics, especially those to which Japanese counterparts present somewhat different aspects. In the third part, a semantic analysis for a fragment of Japanese, Japanese CNs in generic use, will be presented. Finally, in the last part of this chapter, I will discuss the consequences of the presented analysis from more general and

broader perspectives where I attempt to relate the specific facts to those issues mentioned above (0.1).

1. The empirical facts

1.1 The empirical coverage

The following discussion will not include all the occurrences of CNs in generic sentences, because some occurrences of CNs in generic sentences are clearly not in generic use. When a CN is used in the generic sense, it is interpreted as if being universally quantified with no exception, hence a universal reading, or with some exceptions, quasi-universal reading.

- (1)a. Apples are fruit.
- b. Apples are red.
- c. Hanako eats apples.

"Apples" in (1a) is in generic use and calls for a universal reading. In other words, (1a) means that all the apples are fruit. "Apples" in (1b) is also in generic use, but does not call for a universal reading. (1b) means that generally apples are red. On the other hand, "apples" in (1c) is not in generic use. It means neither that Hanako eats all the apples, nor that generally Hanako eats apples. It simply means that Hanako eats apples among other things. In other words, (1c) does not tell us any general characteristic of apples, whereas the other two, (1ab) do. Needless to say, the property of Hanako's occasionally eating apples is not a

general characteristic of apples, or a characteristic which is shared by most or all the apples. Usually, CNs in generic use invoke a universal implication, while CNs which are not in generic use invoke an existential implication. In order for (1c) to be true, there must be some apple or apples Hanako eats. The kind of generic sentences I would like to discuss in this chapter could be defined such as one expressing a general characteristic of objects of one sort referred by a CN.

Generic sentences, however, usually receive a broader definition in the literature. Carlson (1989, p.167) defines them notionally as ones "expressing a regularity as opposed to an instance from which one infers a regularity", and epistemologically as ones "expressing a truth or falsehood, the true value of which cannot be ascertained solely with reference to any particular localized time." Accordingly, it is a common practice to include habitual sentences within the study of generic sentences. Then, generic sentences do not necessarily contain a CN, or have a universal reading over the entities in the extension of that CN. For example, the following sentences do not contain any CN or do not seem to involve any quantification over the entities in the CN extension.

(2)a. Hanako-wa yofukashisuru.

-TOP SIT UP LATE AT NIGHT-NON-PAST

(Hanako sits up late at night.)

- b. Hanako-wa sugu naku.
 -TOP INSTANTLY CRY-NON-PAST
 (Hanako cries in no time.)

In these habitual sentences, we have a definite NP in the logical subject position, and an extensional verb in the present tense. This kind of habitual sentences can easily contain a CN in the object position.

- (3)a. Taroo-wa hamaki-o suu.
 -TOP CIGAR-ACC SMOKE-NON-PAST
 (Taroo smokes cigars.)
- b. Taroo-wa sakana-o taberu.
 -TOP FISH-ACC EAT-NON-PAST
 (Taroo eats fish.)

The CNs which occur in the object position of this kind of habitual sentences do not seem to be in generic use. CNs in the object position will have an existential implication, not a universal one. If someone smokes a cigar, there must be a cigar which he smokes. Verbs like "kegiraisuru" (DISLIKE), and "konomu" (PREFER), however, seem to impose a different implication on their object NPs.

- (4)a. Taroo-wa hamaki-o kegiraisuru.
 -TOP CIGAR-ACC DISLIKE-NON-PAST
 (Taroo hates cigars.)
- b. Taroo-wa sakana-o konomu.
 -TOP FISH-ACC PREFER-NON-PAST
 (Taroo prefers fish.)

These intensional verbs impose their intensionality on the object NP denotations. (4ab) do not have existential generalization of the referents of the object NPs. If someone dislikes cigars, he must dislike any cigar not only in this actual world, but also in any possible world. In order to fix

the truth condition for (4ab), we will have to consider alternative states of affairs, i.e., possible world. The reason why we tend to have a misconception that the object NPs in (4ab) involve some universal quantification is that they share some inferences with those sentences in (5ab),

- (5)a. Taroo-wa subete-no hamaki-o kegiraisuru.
 -TOP ALL-GEN CIGAR-ACC HATE
 (Taroo hates all the cigars.)
- b. Taroo-wa subete-no sakana-o konomu.
 -TOP ALL-GEN FISH-ACC PREFER
 (Taroo prefers all the fish.)

although they are by no means synonymous to (4ab). The object NPs in (5ab) have a modifier which is a lexical universal quantifier. The CNs themselves in (5ab) are not generically used. I will not regard those object NPs in (4ab) as in generic use. Furthermore, I will not regard (5ab) as generic sentences.¹

To summarize, the discussion which follows will only deal with those generic sentences which contain CNs in generic use, i.e. CNs which calls for either universal or quasi-universal reading. In other words, I will restrict my discussion to one kind of genericity which appears to be solely derived from the universal quantification over entities of CN extension². What this restriction will leave us as an empirical coverage are those which state a general proposition about a sortal object referred to by a CN.

1.2 Syntax of Japanese generic sentences

Here, we will examine the syntactic environment of some Japanese generic sentences which fall into the empirical coverage of this study discussed in the previous section.

- (6)a. Kujira-wa honyuudoobutsu da.
 WHALE-TOP MAMMAL BE-NON-PAST
 (Whales are mammals.)
- b. Mizu-wa ekitai da.
 WATER-TOP FLUID BE-NON-PAST
 (Water is a fluid.)
- c. Tamago-wa zeijaku da.
 EGG-TOP FRAGILE BE-NON-PAST
 (Eggs are fragile.)
- d. Satoo-wa amai.
 SUGAR-TOP SWEET-NON-PAST
 (Sugar is sweet.)
- e. Inu-wa hashiru.
 DOG-TOP RUN-NON-PAST
 (Dogs run.)
- f. Yuki-wa furu.
 SNOW-TOP FALL-NON-PAST
 (Snow falls.)

These examples all have in common a topic NP which consists of a CN followed by the topic marker "wa" and a predicate with present tense.

The first general question is what makes these sentence generic. Every part of this syntactic configuration seems to contribute to making these sentences generic. If we change the tense into past, they are no longer generic sentences.

- (7)a. Kujira-wa honyuudoobutsu datta.
 WHALE-TOP MAMMAL BE-PAST
 (The whale was a mammal.)
- b. Mizu-wa ekitai datta.
 WATER-TOP FLUID BE-PAST
 (The water was fluid.)
- c. Tamago-wa zeijaku datta.
 EGG-TOP FRAGILE BE-PAST
 (The egg was fragile.)
- d. Satoo-wa amakatta.
 SUGAR-TOP SWEET-PAST
 (The sugar was sweet.)
- e. Inu-wa hashitta.
 DOG-TOP RUN-PAST
 (The dog ran.)
- f. Yuki-wa futta.
 SNOW-TOP FALL-PAST
 (It snowed.)

Here the NPs are interpreted as the discourse topic. For (7ab), however, we might need some explanation. Some reader might find these examples somewhat odd. The difference between (6a) and (7a), for example, is that the latter can be uttered to express a contingent truth, while the first cannot. A person who first found out that a particular whale was a mammal was suited to utter (7a) just after the moment of his/her discovery³.

If we change the marker into "ga", (6ef) are no longer generic.

- (8)a. Kujira-ga honyuudoobutsu da.
 WHALE-E.TOP* MAMMAL BE-NON-PAST
 (WHALES are mammals.)
- *EMPHATIC TOPIC

- b. Mizu-ga ekitai da.
WATER-E.TOP FLUID BE-NON-PAST
(WATER is a fluid.)
- c. Tamago-ga zeijaku da.
EGG-E.TOP FRAGILE BE-NON-PAST
(EGGS are fragile.)
- d. Satoo-ga amai.
SUGAR-E.TOP SWEET-NON-PAST
(SUGAR is sweet.)
- e. Inu-ga hashiru.
DOG-NOM RUN-NON-PAST
(A dog will run.)
- f. Yuki-ga furu.
SNOW-NOM FALL-NON-PAST
(It will snow.)

In (8abcd) "ga" is only interpreted as unusual marking for underlying "wa", i.e., emphatic. This is probably because those stative⁴ verbs in Japanese do not seem to assign any thematic role. On the other hand, those active verbs in (8ef) do assign thematic roles to their external argument NPs. "Ga" is interpreted here as nominative case marker. (8abcd) share the same D-structure with (6abcd), but their S-structures are different, while (8ef) do not share the same D-structure with (6ef). Nominative as they are, the subject NPs in (7ef) are not discourse topic, hence indefinite.

It seems to be the case that in Japanese a certain syntactic configuration is needed to convey genericity. It is obvious that the genericity which the sentences in (6) seem to convey does not come just from the CNs in the topic position. In other words, according to the facts we just reviewed, it is

not well-motivated to call them "generic terms" as Carlson (1982) did for English bare plurals. They occur as anaphorically definite NPs in non-generic sentences as we have seen in (7). In English, the lack of the definite article makes it impossible for English bare plurals to be definite at least syntactically. Although Japanese bare CNs in the topic position may not deserve to be called "generic terms", it is also hard to imagine that they have no contribution at all to yield the genericity for those sentences in (6). After all, they invoke a universal or quasi-universal reading in (6), whereas in (7) they do not have such readings, but instead, denote some specific entities. It may be fair to say NPs which consist of a bare CN and the topic marker are unspecified between generic and anaphorically definite at least at the level of syntax.

1.3 Semantic nature of Japanese CNs in generic use

When Carlson called English bare plurals "generic terms", he meant them as names of kinds, i.e., proper names for new objects in the domain, kinds. He showed that bare plurals behave like proper names⁵. Although Japanese generic NPs, which consists of a bare CN and the topic case-marker, "wa", may not be syntactically as distinct as English bare plurals, they seem to share some semantic characteristics with English bare plurals. It is not difficult to notice that they in fact

behave like proper names. They stand all by themselves in the topic position without being promoted to the topic. It is only proper names and deictic pronouns that are allowed to be in the discourse initial topic position. This is so because they are intrinsically definite. Proper names refer to particular individuals, and deictic pronouns are always referentially bound by a permanent residence in the universal discourse such as speaker, addressee, things close by or things in the distance. If we assume that this semantic nature of definiteness which proper names and deictic pronouns share entitles them to appear as the discourse initial topic, then, not the generic NP, but rather the bare CN itself must have some comparable nature to form a generic NP in the topic position⁶. In other words, if a topic NP headed by a proper name or a deictic pronoun and a generic NP headed by a bare CN share some characteristic which seems to originate from some particular nature of proper names and deictic pronouns such as definiteness, then, we should expect the head noun of a generic NP would have some nature analogous to the definiteness of proper names and deictic pronouns.

First we should ask what is that compatible nature of CNs which allows them to behave like proper names. An obvious answer to that question would be the most pertinent nature of proper names such as being a singular term, i.e.,

referring to a unique individual. A rather straightforward account would be to postulate another kind of singular term which refers to a kind, some generic entity. This was exactly what Carlson did in his semantics of English generics. This approach is also syntactically well-motivated as far as count CNs are concerned. Bare plurals like [dogs]_{NP} denote a kind-level entity, the dog-kind, while an ordinary CN like [dog]_N denote a set of entities, which is yet to be quantified to form an NP. Semantically, the former is a singular term, the latter is a general term. However, if we go into the domain of mass nouns, this conceptualization is not syntactically well-motivated. A mass noun does not have such a distinct syntactic form which seems to refer to a mass-kind. It would bring us right back to the essential question Quine posed: whether a mass term refers to a single scattered object or a set of all portions. We have seen some different approaches to solve this problem in Chapter II (2.1.2).

What we seem to need in order to account for the facts we have reviewed for Japanese CNs in generic use is a single CN denotation for count and mass alike which can perform a double duty such that it denotes a singleton set for the cases where CNs are in generic use, and it also denotes a set of more than one entities for the cases where CNs are not in generic use. This may sound impossible, or at least controversial. In other words, we keep a single denotation

for CNs as general terms and at the same time try to derive a proper logical form for CNs as singular terms. This is exactly what I intend to do in the later section. In doing so, I will argue that the kind of nominal domain I adopted from Link in Chapter II and Partee's type-shifting principles are to provide a sufficient framework for such an analysis. I will propose to analyze the CN in generic use as denoting a set of the maximal plural entity, which is guaranteed to be a singleton set. According to Partee's type-shifting principles, we can generate either e-type NP denotation, or $\langle\langle e, t \rangle, t \rangle$ -type NP denotation from a singleton set ($\langle e, t \rangle$ -type). It will be shown that these two types of NP denotations are exactly what we need for the interpretation of Japanese generic NPs. A very similar analysis has been proposed by P. Jacobson (1988/forthcoming) for English free relatives in nominal use. I will discuss it in detail in section 3.

2. Problems with generics

Before I present a semantic analysis for Japanese generic sentences, a quick review of the issues in the literature of English generics might be useful. By doing so, I intend to sort out what is and what is not a relevant issue in Japanese generics. Schubert and Pelletier (1987, henceforth S&P) give an excellent review of the problems of generics, plurals, and

mass nouns. Among those problems, there are two problems to which Japanese seems to provide a different perspective. One is the problem which concerns the logical forms of those two kinds of sentences containing bare plurals and mass nouns: generic and episodic. This problem has been spotlighted in the literature on generics. Schubert and Pelletier themselves focus on this problem. The other is a problem which concerns those generic sentences which do not contain bare plurals, but rather, generic indefinites.

2.1 Generic vs. episodic bare plurals

English bare plurals occur not only in a generic sentence, but also in an episodic sentence. Relevant examples are (9ab) and (10ab).

- (9)a. Dogs bark.
 b. Dogs are barking.
 (c. Some dogs are barking.)
- (10)a. Snow falls.
 b. Snow is falling.
 (c. Some snow is falling.)

The consensus is that b. sentences in (9) and (10) somehow have existential import. So the issue is how we derive this existential import: directly from NPs or indirectly from predicates. If you take the first strategy, and treat b. sentences just like c. sentences, in other words, if you assign denotations to the NPs radically different from those of the NPs in a. sentences, then, you will have a problem in

interpreting a sentence like (11), which is (7) in S&P.

(11) Snow is white and is falling throughout Alberta.

This is why the latter strategy is more popular one. In the latter strategy, subject NPs in both a. and b. sentences uniformly refer to kinds, or generic entities. Then, semantics has to provide a mechanism which can realize this generic entity to be a special kind of entity (stages) which can match up with an episodic predicate (Carlson, Chierchia). S&P criticize existing approaches including Carlson's and Chierchia's, and make their own proposal. I will not go into these proposals in detail since these are not directly relevant to the point I plan to make.

Japanese seems to indicate that both strategies might be misleading. (12ab) are the Japanese equivalents of (9ab). As you see clearly, the subject NPs have different cases. The predicate of (12b) includes an existential verb "iru", which seems to make it easy to derive existential import.

- (12)a. Inu-wa hoeru.
DOG-TOP BARK-NON-PAST
(Dogs bark.)
- b. Inu-ga hoete iru.
DOG-NOM BARKING EXIST-NON-PAST
(Dogs are barking.)

Topic NPs are usually understood as definite, or old information in the discourse⁷. They are something which a speaker talks about. However, it is not the case that a speaker always talks about something when he utters a

sentence. (12b) is likely to be uttered when someone actually heard or saw some dogs or a dog barking and makes a remark of it, or when someone responds someone else's question: what is that noise? In either case, "inu" (DOG) must constitute a new information. In other words, a CN in (12b) is not being used anaphorically. Hence, it has an indefinite interpretation⁸. If it is used anaphorically, it will be marked so by being in the topic position as we see in (13).

- (13) Inu-wa hoete iru.
 DOG-TOP BARKING EXIST-NON-PAST
 (The dog/dogs is/are barking.)

It is not felicitous to utter (13) in discourse initial position.

Unlike English (9ab), the Japanese equivalents to those, (12ab), do not present any problem. They explicitly show that the two NPs are different kinds: one is a topic NP, and as such definite, and the other is a nominative NP, and indefinite. This is probably why I have a hard time translating (11) into Japanese. This kind of conjunction does not seem to be possible in Japanese. If that is the case, there is no reason that we should provide the same kind of interpretation for these two kinds of NPs, at least for Japanese. Japanese generic NPs consist of a CN and a topic marker, in other words, they are generated in the topic position with a lexical head, a CN. Those generic NPs will form generic sentences with a certain kind of predicate which

does not have the existential implication.

Japanese also indicates that the existential import comes from the predicate. The Japanese progressive is formed by a participial form of an active verb followed by the existential verb "iru". Although it is a well-known fact that the English copula occurs in existential sentences with locative phrases, no one, as far as I know, has directly attributed the existential import to "be" in English. It seems that the English copula has been discussed in philosophy and linguistics mainly with respect to its instances in the equative sentences. This might be the reason why the semantic content of the copula verb has been rarely acknowledged in the literature. Linguists may have been used to viewing the copula as semantically null, and lost the perspective of the copula as an existential verb.

From the Japanese point of view, the problem S&P have for English bare plurals and mass nouns in generic and episodic sentences is in fact essentially the old problem of mass nouns Quine had: how to cope with the distinction between generic use and predicative use of CNs (see Ch. II, 2.1.3). Although Quine identified the former use in those which occur on the left of the copula verb, the latter use, on the right, (10ab) shows that a mass noun in predicative use can occur not only on the right of the copula, but also on the left of

it. The mass noun in (10b) does not refer to a single scattered massive object, but to a portion of snow which falls into the extension of that mass noun. Those CNs in generic use somehow require a definite interpretation, while those in predicative use, an indefinite interpretation. Unlike the CNs in the predicate nominals, which are also regarded as predicative, they both seem to be referring to something. The NPs in (10ab) can license a discourse anaphor.

- (14)a. Snow is white. It has also a hexagonal shape.
 b. Snow is falling. It will paint my yard all white.

I will discuss this matter later, in the conclusion.

2.2 Problem of indefinite singular generics

English obligatory number marking on count CNs which allows syntactically simple quantification seems to make generic terms somewhat complicated. English allows count CNs to form NPs in a variety of forms in generic sentences, in particular those which call for a universal reading.

- (15)a. Whales are mammals.
 b. A whale is a mammal.
 c. The whale is a mammal.

In Japanese, because of the syntactic reasons mentioned before, all the generic sentences in (15) will be expressed by one sentence:

- (16) Kujira-wa honyuudoobutsu da
 WHALE-TOP MAMMAL BE-NON-PAST

(15) suggests that there are at least three ways to express

the universal reading such that all the whales are mammals. However, this variation is not always available in English.

- (17)a. Whales are rare.
- b.*A whale is rare.
- c.?The whale is rare.

S&P think that (15b) and (17b) present a problem. If indefinites can have a generic interpretation, and a generic term refers to a kind, why is (17b) ill-formed? Carlson's answer would be that indefinite subjects need an object/stage-level predicate, and "be rare" is a kind-level predicate. In other words, indefinites in generic sentences do not refer to kinds. Again, it is obvious that the genericity is not indicated solely by what we call "generic terms" (NPs). In fact, syntactic forms of generic NPs in English have little clue for us to construe genericity. The problem S&P are facing here seems to belong to a more general one. The property of being a mammal is true of any member of the set of whales, but the property of being rare could not be true of any whale. What we have in the sentence "whales are mammals" (15a) may be called distributive predication, while what we have in "whales are rare" (17a) may be called collective predication. Because in a distributive predication, the predicate is true of every member of the set or group, (15a) has (15b) as a valid inference, whereas (17b) is not a valid inference from (17a). The points that I would like to make here are twofold: one is that the problem of indefinite singular generics in English, probably more

correctly, the syntactic variation on generic terms, does not arise in Japanese for some obvious syntactic reasons. The second point is that this problem is not a unique problem in generics, rather it belongs to a general issue of the distributive and collective predication.⁹

2.3 Universal vs. quasi-universal reading

One important issue in generics concerns two existing readings of generic sentences: the universal reading and the quasi-universal reading. The former reading does not allow any exceptions as in (18a), while the latter reading allows some exceptions as in (18b).

- (18)a. Japanese are Asians.
- b. Japanese are diligent.

As far as this rather core issue in generics is concerned, it seems that Japanese would not provide any new perspective. The very same fact has yet to be accounted for also in Japanese. Here I speculate two possible directions to deal with this problem. One is toward a semantic solution, the other is toward a pragmatic one.

One difference between (18a) and (18b) is that the latter can be paraphrased with an explicit sentential adverb such as "generally", while the former cannot.

- (19)a.* Generally Japanese are Asians.
- b. Generally Japanese are diligent.

If we assume a sentential adverb quantifies over reference points in the temporal domain, or some other kind of entities in the domain of events, and not over the entities in the nominal domain, we might argue that (19b) shows that the regularity (18b) expresses is in fact not over the entities in the nominal domain, i.e., the extension of the CN "Japanese", but over those in a different domain. In other words, the source of the genericity of (18b) is different from that of (18a). In (18a) on the other hand, the regularity expressed is one over the entities of the CN extension. Therefore, (18a) has a valid inference such as (20a), but (18b) does imply (20b).

- (20)a. Every Japanese is an Asian.
- b. Every Japanese is diligent.

If we derive the interpretation for generic sentences with quasi-universal reading through postulating an implicit generic sentential operator, in other words, if we claim that (18b) and (19b) are semantically the same, we still have a question to be answered. How do we deal with the NP level denotation of the subject NP "Japanese" in (18ab)? Because we make the distinction of universal/quasi-universal reading at the sentence level, can we assign the same denotation in the NP level for the subject NPs in (18ab)? If we say yes to this question, we will incorrectly predict that (18b) has another synonymous sentence like (21).

- (21)* Generally every Japanese is diligent.

This seems to force us to make a distinction in the NP level denotation. It might be the case that the generic sentential operator will require a special kind of free variable to bind. The reason why (19a) is anomalous is because there is no variable for the operator to bind. On the other hand, if we analyze the subject NP in (18b) as an indefinite plural which introduces a free variable, that variable will be available to be bound by a sentential generic operator. I do not intend to go further in this matter. In the semantic analysis I present in the following section, I will only imply that the semantics I propose will be capable of applying this kind of semantic approach to the problem of two different readings in generic sentences.

I believe we can approach the same problem from a quite different direction, however. We could argue that the difference between (18a) and (18b) simply lies not in the NP denotation, but in the truth value of the proposition expressed. (18a) is true, while (18b) is not. If it is true that Japanese are diligent, it must imply that every Japanese is diligent. If it is not true that Japanese are diligent, there must be some Japanese who are not diligent, and it cannot be the case that every Japanese is diligent. (18b) can be either a statement of the speaker's false belief, or a false statement of the speaker's overgeneralization. In either case, the intended reading is the universal one. The

hearer who shares the speaker's false belief will have the universal reading, while the hearer who believes otherwise will understand that what has been said is a false statement, and conclude that what was asserted by the speaker was an overgeneralization, and as such the hearer renders a quasi-universal reading. In this approach, only the universal reading is part of the truth conditions of generic sentences. The quasi-universal reading simply arises as a conversational implicature. If such a pragmatic approach can be pursued to account for this persistent problem in generics, the burden of the semantics for generic sentences would be greatly lessened. The semantics will need to account only for the universal reading.

I am not in a position to further substantiate and evaluate these speculations or any other proposals made in the literature on this matter. I will focus on the universal reading of generic sentences in the following analysis, and be content if I could show that the analysis does not preclude the possibility to implement some semantic solution of this problem.

3. A semantic analysis of Japanese CNs - Part III

3.0 The purpose

The purpose of this section is two-fold. One is to show the

semantic system built so far in this study will also provide an adequate framework for analyzing Japanese CNs in generic use. The system contains an undivided unified, but structured nominal domain and a multi-sorted variable system. I will add some new ingredient to this system: some of Partee's universal type-shifting principles, which I introduced in the previous section. The other purpose is to seek an explanation for the non-quantificational nature of generic NPs. In other words, the analysis will show how a CN can become a term phrase without quantification.

3.1 Preliminaries

3.1.1 Empirical coverage

As I defined above (1.1), the empirical coverage of the present analysis are those generic sentences in (6abcdef) and (8abcd), from which I choose the following as (22) through (24).

- (22)a. Kujira-wa honyuudoobutsu da.
 WHALE-TOP MAMMAL BE-NON-PAST
 (Whales are mammals.)
- b. Kujira-ga honyuudoobutsu da.
 WHALE-NOM MAMMAL BE-NON-PAST
 (WHALES are mammals./It is whales that are mammals.)
- (23)a. Satoo-wa amai.
 SUGAR-TOP SWEET-NON-PAST
 (Sugar is sweet.)
- b. Satoo-ga amai.
 SUGAR-NOM SWEET-NON-PAST
 (SUGAR is sweet./It is sugar that is sweet.)

- (24)a. Yuki-wa furu.
 SNOW-TOP FALL-NON-PAST
 (Snow falls.)

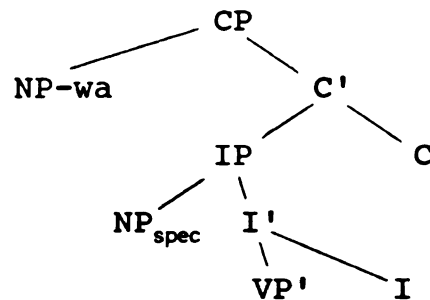
(22) and (23) show that an unmarked generic sentence (a.) has its marked version (b.), which yield the emphatic reading of the generic NP. The b. sentences could be translated into English with the cleft construction. (24a), on the other hand, does not have its emphatic version. If "yuki" (SNOW) is marked by "ga", nominative case marker, the NP will have no universal implication, instead, it will have an existential implication, hence, it will be interpreted as indefinite. (Indefinites will be discussed in the following chapter.) In what follows, I intend to provide a semantic analysis for a fragment of Japanese generic sentences such as those in (22) through (24). It will also account for the marked/unmarked distinction between a. sentences and b. sentences: how the marked version will be derived from the unmarked version.

3.1.2 Assumptions

Besides the general assumptions in 3.1.2 of chapter II, I also assume all the consequences of the analyses of chapters II and III. A Japanese CN denotes a set of entities, individuals or quantities, which contains plural entities as well as singulars, A Japanese CN also introduces various kinds of variables ranging over various sorts of objects. The

copula verb is to absorb a variable introduced by the complement CN. In syntax, I will assume that topic case (marked by "wa") and nominative case (marked by "ga") are structurally assigned by Comp and Infl respectively. Then, all the a. sentences in (22) through (24) have a common S-structure like (25).

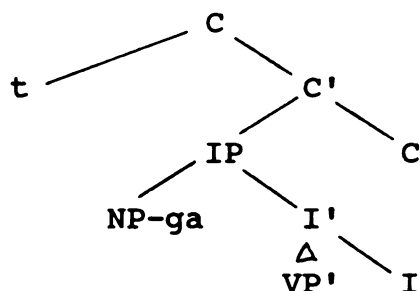
(25)



The fact that (24a) does not have its emphatic version, b. unlike (22a) and (23a) could be explained by the difference in the lexical nature of the heads of the VPs. The head of the VP in (24a) is an ordinary active verb, "furu" (FALL), which is unlike the stative verbs in (22) and (23) capable of assigning a thematic role to its external argument NP.¹⁰ We would expect that the spec position of IP in (25) is projected in the case of (24a). When a position is projected, that position has to be occupied. The IP of (24a) can be assumed to contain pro in its spec position, while the spec positions of IP of (22a) and (23a) are not projected, hence, may not have any element. This could explain why (24a) lacks its b. version, if we assume the b. sentences in (22) and (23) are derived from their a. versions through a syntactic movement. The topic NPs in (22a) and (23a) may move to the

spec of IP, which happens to be an A- position. The S-structure for (22b) and (23b) is like (26). The topic NP in (24), in the other hand, cannot move to the spec of IP because that position is occupied by pro which has an independent theta role.¹¹

(26)



There seems to be at least one instance in which this movement is obligatory. That is the case when this construction is headed by a nominal complementizer and constitutes a sentential argument. A generic sentence like (23), when it occurs inside a sentential argument, must be in the b. version.

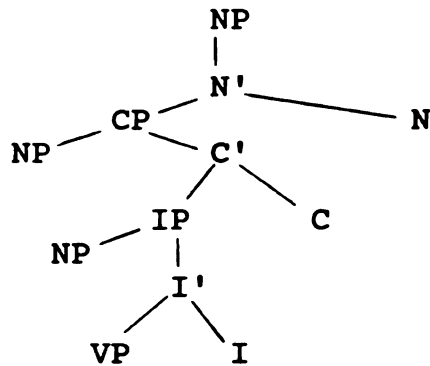
- (27)a. Hanako-wa satoo-ga amai no-o shiranai.
 -TOP SUGAR-NOM IS SWEET COMP-ACC KNOW-NEG-
 NONPAST
 (Hanako does not know that sugar is sweet.)

- b.*Hanako-wa satoo-wa amai no-o shiranai.
 -TOP SUGAR-TOP IS SWEET COMP-ACC KNOW-NEG-
 NONPAST

In the sentential argument, the nominal complementizer is to be case-marked. In order for the nominal element in the head of CP to receive a case, it has to move to the head of the immediately dominating NP. As a result, Comp will lose the

lexical element to assign the topic case to its spec NP, which then will be forced to move to the spec of IP to receive a case (nominative). (28) illustrates these movements.

(28)



Although the relevance of the abstract case theory to Japanese is still an open issue, I will assume the existence of structural case assignment in Japanese here without further justification. I will do so because I believe the following semantic analysis would not be undermined or in any way obliterated by the facts being proved otherwise.

Finally, I assume that there exist some universal type-shifting principles as claimed by Partee (Chapter III, 3): in particular, THE and iota. Since I did not include these principles in my previous discussion, I will briefly explain how these operations work. Both apply to a set/property $\langle e, t \rangle$ when and only when that set has a unique entity in it. THE generates an individual sublimation from that unique entity, which is the set of all the properties that unique entity has (a generalized quantifier, type $\langle \langle e, t \rangle, t \rangle$). The

operation called "iota" generates the individual which is that unique entity (e type).

3.2 A semantic analysis of Japanese bare CNs in generic use

3.2.1 The hypotheses

The present analysis has two major components: one concerns the level of CN denotation, and the other concerns the level of denotation of the generic NP. The first question to be raised here is: what does the CN in generic use, i.e., the CN which will eventually be combined with a case marker to form a generic NP in a generic sentence, denote? The second question is how we provide a proper type of NP denotation for the generic NP.

To answer the first question, I will argue that the denotation of generic NPs is associated with a particular entity in the extension of a CN. According to the structured domain adopted from Link's system in chapter II, a set a CN denotes will include always a special kind of plural entity, the maximal plural entity (the supremum), which is composed of all other entities in that set. By definition, a set of the maximal plural entity is guaranteed to be a singleton set. If a CN in generic use denotes such a singleton set, in which there is a unique entity, that CN will have a very same property as a proper name does: uniqueness. If it is the

case, quantification is inconsequential for the CN in generic use for the same reason why quantification is inconsequential for the proper name. If there is only one entity in the set, there must be a unique value assignment to the variable. In the previous chapter, we saw a CN in the nominal predicate position lose its variable and end up being a one-place predicate. If there is no variable to be bound, there won't be any quantification. For a CN in generic use, although it is equipped with a variable, because of the very nature of the set it denotes, i.e., a singleton set, the variable will not get a meaningful use.

A very similar approach was taken by P. Jacobson for English free relatives in their nominal use. English free relatives like the following are known to have both definite and universal reading.

(29) I ate what John cooked.

(29) can be paraphrased as either (30a), singular definite reading or (30b), universal reading.

- (30)a. I ate the thing John cooked.
- b. I ate everything John cooked.

Jacobson said that if the free relative in (29) denotes the maximal plural entity that John cooked, it will account for the fact that it sometimes seems to be a singular definite, and sometimes a universal. She argues that if there is only one atomic entity that John cooked then the NP will be

equivalent to a singular definite: if there is more than one then the NP will denote the single entity composed of all other entities that John cooked and so it will be like a universal. Here she claims that the universal force of the free relative in English comes from the fact that it denotes a complex individual composed of all atoms with the relevant property, rather than its denoting a set of sets of individuals (generalized quantifier). Furthermore, WH in a free relative, unlike WH in an ordinary relative clause, undergoes a category change from a predicate into an NP. In other words, "which John cooked" is a predicate denoting a property, while "what John cooked" shifts into an NP which denotes the maximal plural entity that John cooked through iota type shifting.

I believe that what is assumed to be happening in English free relatives by Jacobson is basically the same as what is happening in Japanese CNs in generic use. In the latter case, however, it seems that we can envision the type-shifting process in a more explicit manner. It is so perhaps because Japanese CNs in generic use are to form a generic NP with an overt syntactic element, a case marker, which seems to trigger the type-shifting operation. This will bring us to the second question I raised above: how we provide a proper type of NP denotation for the generic NP. My answer to this question assumes that in syntax, Japanese case-markers, in

particular "wa" (Topic case marker) and "ga" (Nominative case marker), constitute a distinct syntactic category which takes a CNP to form an NP. In semantics, I will argue that they impose a certain type of NP denotation: "wa" imposes the $\langle\langle e, t \rangle, t \rangle$ type meaning, and "ga", the e type. More specifically, the topic NP headed by a generically used CN denotes a generalized quantifier, a set of all the properties shared by the maximal plural entity denoted by that CN, while the nominative NP headed by a generically used CN denotes an individual which constitutes the maximal plural entity denoted by that CN. In the former the CN denotation ($\langle e, t \rangle$ type meaning) is shifted to a particular kind of NP denotation ($\langle\langle e, t \rangle, t \rangle$ type meaning) through a type-shifting operation, "THE". In the latter case, the CN denotation is shifted to another kind of NP denotation (e type meaning) through a type-shifting operation, "iota". In 2.2.1 of Chapter III, I have speculated a possibility of analyzing Japanese case markers as determiners. In this semantic analysis, I will not pursue further any syntactic generalization, instead, I will focus on the semantic functions these case markers seem to perform onto the given available CNP denotation.

What has been hypothesized so far can be summarized as follows;

- (31)a. A CN in generic use denotes a set of the maximal plural entity, necessarily a singleton set.
- b. Wa triggers THE type-shifting: takes a set ($\langle e, t \rangle$ type) to generate the individual sublimation ($\langle \langle e, t \rangle, t \rangle$ type, generalized quantifier), if and only if that set is a singleton set.
- c. Ga triggers iota type-shifting: takes a set ($\langle e, t \rangle$ type) to generate an individual (e-type, referring expression), if and only if that set is a singleton set.

Here we notice that the above two kinds of type-shifting (b.&c.) presuppose that a set they apply is a singleton set. Furthermore, if we adopt Link's structured domain, it entails that a CN always denotes a set, in which there is a unique entity, the maximal plural entity. If a CN in generic use denotes a set of that maximal plural entity, necessarily a singleton set, it would suffice for THE and iota to apply to yield an NP denotation. (31a) will raise a technical question how the grammar actually makes it happen. Here I will propose a new variable, $x^{\max}$ which ranges over maximal plural entities. Then, a CN in Japanese will have the following logical form.

$$(32) \quad \text{CN}'(\text{mx}/x/X/x^{\max})$$

When the variable, $x^{\max}$ is chosen by some selectional restriction, just like a particular variable is chosen by the transitive verb for its accusative NP, $\text{CN}'(x^{\max})$ denotes a singleton set such as (33).

$$(33) \quad \bigwedge x[\text{CN}'(x) \ \& \ \forall y[\text{CN}'(y) \rightarrow y \leq x]]$$

(Y and X are variables over plural entities)

(31bc) says that "wa" and "ga" trigger the type-shifting, THE and iota respectively if and only if (33) is available. This could be viewed in a slightly different manner. Instead of these functors reacting passively to the given CN denotation, they could actively select a particular variable which guarantees the denotation to be a singleton set. Here I shall generalize (31bc), as (34ab), which lists some specific operations and their sectional restrictions.

- (34)a. Wa is a generalized type-shifting functor which takes a given CNP denotation to shift it into a generalized quantifier.

$wa(CNP'(X_{max})_{\langle e, t \rangle}) \rightarrow NP'_{\langle \langle e, t \rangle, t \rangle} \dots \text{THE}$
 $wa(CNP'(x/mx/X)_{\langle e, t \rangle}) \rightarrow NP'_{\langle \langle e, t \rangle, t \rangle} \dots \text{A}$
 $wa(E_{\langle e \rangle}) \rightarrow NP'_{\langle e \rangle} \dots \text{lift}$

- b. Ga is a generalized type-shifting functor which takes a given CNP denotation to shift it into a referring expression.
- $ga(CNP'(X_{max})_{\langle e, t \rangle}) \rightarrow NP_{\langle e \rangle} \dots \text{iota}$
 $ga(E_{\langle e \rangle}) \rightarrow NP_{\langle e \rangle}$
 ($E_{\langle e \rangle}$ stands for an expression of type e.)

If we generalize (31b) as (34a), "wa" triggers not only THE but also A, which also takes a set to generate a generalized quantifier. A, unlike THE, does not presuppose a singleton set, instead, it takes an ordinary set and generates an existential sublimation. If the given CNP is headed by a proper name which denotes an individual, "wa" would trigger the type-shifting lift, which will generate an individual sublimation. (34b) will guarantee that a singleton set denoted by a CNP will be shifted into an individual which constitutes of the unique entity in that singleton set

(iota). If the given CNP is already a referring expression, in other words, it is headed by a proper name, "ga" will guarantee that the given meaning remains to be a referring expression.¹² This will make some predictions. Only a CN in generic use, i.e., only when a CN is analyzed as $CN'(X^{\max})$ denoting a singleton set, will it have two different NP denotations: one is a generalized quantifier ($\langle\langle e, t \rangle, t \rangle$), and the other is a referring expression (e-type). This is exactly what we expect from a proper name. We can also predict that if a given CNP is analyzed as denoting an ordinary set by $\underline{A}$, it can only shift into a generalized quantifier (an existential sublimation), but it cannot be applied to by iota to become a referring expression (e-type). In other words, a topic NP which denotes an existential sublimation will lack its nominative NP version, unlike a topic NP headed by a CN in generic use. In what follows, I will present a semantic analysis of some Japanese generic sentences in which I intend not only to provide a semantics which will assign a proper logical forms for those sentences, but also to show that some predictions the present hypotheses in (34) make will in fact bear out.

3.2.2 Analysis

3.2.2.1 Informal discussion

3.2.2.1.1 Some parallelism between CNs in generic use and proper names

The primary fact which led us to those hypotheses discussed above was that a CN in generic use seems to possess a very similar semantic characteristic as one a proper name has. Both can occur discourse initially, without being promoted as a discourse topic. There is another interesting parallelism. Both sentences in (22), for example, are generic sentences. Both the topic NP and the nominative NP have a universal reading. This pair presents the same kind of difference between the two sentences in (35) where a proper name is heading the corresponding NP.

- (22)a. Kujira-wa honyuudoobutsu da.
 WHALE-TOP MAMMAL BE-NONPAST
 (Whales are mammals.)
- b. Kujira-ga honyuudoobutsu da.
 WHALE-NOM MAMMAL BE-NONPAST
 (WHALES are mammals./It is whales that are mammals.)
- (35)a. Taroo-wa byooki da.
 -TOP SICKNESS BE-NONPAST
 (Taroo is sick.)
- b. Taroo-ga byooki da.
 -NOM SICKNESS BE-NONPAST
 (TAROO is sick./It is Taroo that is sick.)

As we can see from the given English translations, the NPs in b. sentences will have an obligatory focus reading, which can be expressed in English either by placing a heavy stress

on the NP, or by using a cleft construction. English cleft sentences seem to prefer a particular kind of NPs as we see in the following examples.

- (36)a. It is John that I love.
 b.*It is everyone that I love.
 c.*It is no one that I love.
 d.*It is someone that I love.

(36) shows that non-referring quantificational NPs do not occur in the focused NP position in the cleft sentence. We might be able to say that the nominative NPs in b. sentences are referring expressions, i.e., e-type NPs. If it is the case, it would also explain the fact that only b. sentences are appropriate as an answer to a WH question which is supposed to ask for a listing of an individual.

- (37) Q: Nani-ga honyuudoobutsu desuka.
 WHAT-NOM MAMMAL BE-NONPAST-Q
 (What are mammals?)

A:*Kujira-wa honyuudoobutsu da. (= 22a)
 kujira-ga honyuudoobutsu da. (= 22b)

- (38) Q: Dare-ga byooki desuka.
 WHO-NOM SICKNESS BE-NONPAST-Q
 (Who is sick?)

A:*Taroo-wa byooki da. (= 35a)
 Taroo-ga byooki da. (= 35b)

These questions in (37) and (38) are asking which individual has the property denoted by the predicate. Roughly, (22b) and (35b) will have a logical form like (39).

- (39)a. (for 22b) MAMMAL'(w)
 b. (for 35b) SICK'(t)

The topic sentences, on the other hand, are good answers to a question which asks a listing of a property.

(40) Q: Kujira-wa nan desuka.
 WHALE-TOP WHAT BE-NONPAST-Q
 (What are whales?)

A: Kujira-wa honyuudoobutsu da. (= 22a)
 *Kujira-ga honyuudoobutsu da. (= 22b)

(41) Q: Taroo-wa doo desuka.
 -TOP HOW BE-NONPAST-Q
 (How is Taroo?)

A: Taroo-wa byooki da. (= 35a)
 *Taroo-ga byooki da. (= 35b)

The questions in (40) and (41) are asking what property is in the property set that a particular individual has. Roughly, (22a) and (35a) will have a logical form like (42).

(42)a. (for 22a) $\lambda P[P(w)](\text{MAMMAL}')$
 b. (for 35a) $\lambda P[P(t)](\text{SICK}')$

It seems plausible, or at least observationally correct, to assume that a topic NP denotes a property set (generalized quantifier, $\langle\langle e, t \rangle, t \rangle$), and that a nominative NP denotes an individual (entity, e)¹³. Then, we will face some problems. First, a CN like "kujira" (WHALES) is not to denote an individual like a proper name "Taroo" does. It is not appropriate to use an individual constant like "w" for its logical form as (39a) and (42a) did. Secondly, we know that (39b) and (42b) are logically equivalent. After a proper lambda conversion, (42b) becomes (39b). The second problem will raise a question: do we really need the $\langle\langle e, t \rangle, t \rangle$ type meaning for a topic NP?

I will argue that the difference between topic NPs and nominative NPs in Japanese which we can observe in the examples like (22) and (35) is not only a syntactic one but also a semantic one, in particular, a semantic type difference. I will show some independent evidence which shows that we need a $\langle\langle e, t \rangle, t \rangle$ type meaning for a topic NP. Once we establish the semantic type difference between the topic NP and the nominative NP in (22) and (35), then I shall show that the hypotheses discussed in the previous section will properly assign the right logical forms to (22), replacing (39a) and (42a). In other word, in what follows, I will demonstrate the fact that a CN in generic use has a proper-name-like semantic characteristic which enables it to form an NP in two different types: a generalized quantifier and a referring expression, just as a proper name does. By doing so, I will also demonstrate that the universal force which a generic NP appears to have comes from the internal structure of the entity in the set a CN in generic use denotes, rather than some intensionality of its being a set of sets. Such a claim will diametrically oppose the conjecture that Carlson (1989) held for generic sentences: "the meaning of a generic sentence stems fundamentally from a relation between intensional elements" (p.189).

3.2.2.1.2 Wa/ga distinction as a semantic type difference

Here I will briefly present two kinds of arguments that the semantic type of topic NPs marked by "wa" is different from that of nominative NPs marked by "ga": the former is $\langle\langle e, t \rangle, t \rangle$, the latter is e . The first kind of argument is that the distinction between two logical forms in (39b) and (42b) must be made at some level of semantic representation in order to explain the distributional difference of these two sentences which seem to share the truth condition. We have seen in (37), (38), (40) and (41) that a certain kind of wh question can be only answered by one, but the other. The following exchanges also show that only one, but the other can carry a certain conversational implicature.

- (43) A: I want Mr. Yamada to come to my office
right away.
- a. B: *Yamada-san-ga dekakemashita.
MR. YAMADA-NOM GO OUT-PAST
- b. Yamada-san-wa dekakemashita.
MR. YAMADA-TOP GO OUT-PAST
(Mr. Yamada has gone out.)

As a response to A in (43), only the topic sentence can carry a proper conversational implicature such that Mr. Yamada is not able to come to speaker A's office. If we suppose (43ab) have a different logical form like in (44ab), the fact would be accountable.

(44)a. (for 43a) WENT-OUT'(y)

b. (for 43b) $\lambda P[P(y)](WENT-OUT')$

What speaker A would be interested in was not who went out, in other words, whether or not Mr. Yamada is among those who went out, but whether or not Mr. Yamada has some property which might have a conflict with the property that the speaker wishes Mr. Yamada to have. (44b), not (44a) will have the expected kind of information in its argument position.

(45) A: I cannot find the dictionary on the shelf.

a. B: Yamada-san-ga tsukatteimasu.
MR. YAMADA-NOM BE USING-NONPAST
(Mr. Yamada is using it.)

b. *Yamada-san-wa tsukatteimasu.
MR. YAMADA-TOP BE USING-NONPAST

a.' USING-IT'(y)

b.' $\lambda P[P(y)](USING-IT')$

As a response to A in (45), a topic sentence does not seem to create a right kind of implicature. Speaker A's thought might not go so far to see if Mr. Yamada has some property which might solve the problem A faces. He would be quite satisfied with a mere fact that someone is in fact using the dictionary. In this case, that someone happens to be Mr. Yamada. That is exactly what (45a') tells us. Levinson (1983) discussed also the relation between the logical form and the conversational implicature. He said "while implicatures are derived from a level of semantic representation, they often cannot be calculated from the truth conditions

alone"(p.124).¹⁴ The distribution difference between Japanese topic sentences and nominative sentences could be accounted for by the difference in conversational implicature they can create based on their logical representations.

My second argument is that $\langle\langle e,t\rangle,t\rangle$ type meaning is independently needed for topic NPs such as in (46).

- (46) Nekutai-wa [Jiroo-ga akai-no-o katta.]_{IP}
 TIE-TOP -NOM RED-ONE-ACC BUY-PAST
 (Speaking of ties, Jiroo bought a red one.)

The logical form for the IP in (46) will be like (47), which will have $\langle e,t\rangle$ type meaning.

- (47) $\lambda x[\text{BOUGHT}'(j,x) \ \& \ \text{RED}'(x)]$

In order to yield a truth value, (47) has to be an argument of an expression of type $\langle\langle e,t\rangle,t\rangle$, or else take e type argument. The latter choice does not seem to be available. "Nekutai-wa" (TIE) is not referring to any particular tie. (46) does not have a marked/focused version with the nominative NP as (22a) and (35a) do. We can not form a wh question which asks regarding what Jiroo bought a red thing.

- (48)a. *Nekutai-ga [Jiroo-ga akai-no-o katta.]_{IP}
 TIE-NOM -NOM RED-ONE-ACC BUY-PAST
 b. *Nani-ga [Jiroo-ga akai-no-o katta.]_{IP} ka.
 WHAT-NOM -NOM RED-ONE-ACC BUY-PAST Q

For a sensible interpretation, the topic NP must have a denotation which contains the property of Jiroo's having bought a red thing, that is a set of properties.

Incidentally, the present hypothesis will also have an account of topic sentences like (46), and their lacking of a marked/focused version. (34a), which I repeat here,

- (34)a. *wa* is a generalized type-shifting functor
 which takes a given CNP denotation to shift
 it into a generalized quantifier.

$$\begin{array}{ll} \text{wa}(\text{CNP}'(X^{\text{max}})_{\langle e, t \rangle}) \rightarrow \text{NP}'_{\langle \langle e, t \rangle, t \rangle} & \dots \text{THE} \\ \text{wa}(\text{CNP}'(x/\text{mx}/X)_{\langle e, t \rangle}) \rightarrow \text{NP}'_{\langle \langle e, t \rangle, t \rangle} & \dots \text{A} \\ \text{wa}(E_{\langle e \rangle}) \rightarrow \text{NP}'_{\langle e \rangle} & \dots \text{lift} \end{array}$$

says that "*wa*" can also trigger A type-shifting to create an existential sublimation such that in each property set, there is at least one member of that set. (46) would be true if there is at least one tie in the set of all the red things that Jiroo bought. When a set is analyzed as other than singleton set, iota operation wouldn't apply, hence the lack of the focused version of (46).

The arguments presented here are by no means comprehensive, but I believe, there is enough evidence for us to maintain the hypothesis that two syntactic positions in Japanese, topic and nominative, are tied to two different semantic types: the former, to $\langle \langle e, t \rangle, t \rangle$, the latter, to e . The hypotheses in (34) state the same conjecture in terms of type-shifting theory proposed by Partee. In the following section, we will see how a CN, which does not denote an individual, but a set, can perform whatever a proper name does through some universal type-shifting principles. In other words, the present conjecture would in fact be born out

in the type-shifting theory. That would certainly form another strong argument.

3.2.2.2 The logical forms

Here I will provide some logical forms for some Japanese generic sentences, namely those in (22) through (24), which I will repeat here as (49) through (51).

(49)a. Kujira-wa honyuudoobutsu da.
 WHALE-TOP MAMMAL BE-NON-PAST
 (Whales are mammals.)

 b. Kujira-ga honyuudoobutsu da.
 WHALE-NOM MAMMAL BE-NON-PAST
 (WHALES are mammals.)

(50)a. Satoo-wa amai.
 SUGAR-TOP SWEET-NON-PAST
 (Sugar is sweet.)

 b. Satoo-ga amai.
 SUGAR-NOM SWEET-NON-PAST
 (SUGAR is sweet.)

(51)a. Yuki-wa furu.
 SNOW-TOP FALL-NON-PAST
 (Snow falls.)

In order to generate these sentences, we will have a small lexicon which include basic expressions.

(52) Lexicon

1. Kujira: KUJIRA' (mx/x/X/X^{max})
2. honyuudoobutsu: HONYUUDOOBUTSU' (mx/x/X/X^{max})
3. satoo: SATOO' (mx/X/X^{max})
4. yuki: YUKI' (mx/X/X^{max})
5. amai: AMAI'
6. furu: FURU' (y²) NP₂[____]
7. da: (mx/x/X/X^{max}) -> o / [CN' ____ da]
8. wa: THE : wa(CNP' (X^{max})_{<e,t>}) -> [NP]_{<<e,t>,t>}
A : wa(CNP' (x/mx/X)_{<e,t>}) -> [NP]_{<<e,t>,t>}
lift: wa(E_{<e>}) -> NP'_{<e>}
9. ga: iota: ga(CNP' (X^{max})_{<e,t>}) -> [NP]_{<e>}
ga(E_{<e>}) -> [NP]_{<e>}

The items 1. through 4. are CNS which denote a set and introduce various kinds of variables. We have a new variable $x^{\max}$ which ranges over the maximal plural entities. The item 5 is a stative verb, "amai" (BE SWEET), which is a one-place predicate. It does not disperse any theta role to its external argument NP, while the item 6, which is an intransitive verb, assigns a theta role to its external argument. The items 7 through 9 lack the lexical content, instead, they have some semantic functions to perform. The items 8. and 9. are newly introduced here as generalized type-shifting functors.

For the generic NPs in a. sentences of (49) through (51), the type-shifting functor, "wa" selects a certain kind of variable, $x^{\max}$ to perform THE. This operation generates an individual sublimation out of the unique entity in the given set, i.e., the maximal plural entity. The logical forms for these gneric NPs are those in (53).

- (53)a. (for (49a)) $\lambda P [KUJIRA'(X^{max}) \ \& \ P(X^{max})]$
 b. (for (50a)) $\lambda P [SATOO'(X^{max}) \ \& \ P(X^{max})]$
 c. (for (51a)) $\lambda P [YUKI'(X^{max}) \ \& \ P(X^{max})]$

(53abc) are equivalent to (54abc).

- (54)a. $\lambda P [\forall X [KUJIRA'(X) \ \& \ \forall Y [KUJIRA'(Y) \rightarrow Y \leq X]] \rightarrow P(X)]$
 b. $\lambda P [\forall X [SATOO'(X) \ \& \ \forall Y [SATOO'(Y) \rightarrow Y \leq X]] \rightarrow P(X)]$
 c. $\lambda P [\forall X [YUKI'(X) \ \& \ \forall Y [YUKI'(Y) \rightarrow Y \leq X]] \rightarrow P(X)]$

For the generic NPs in b. sentences of (49) and (50), "ga" selects also X^{max} to perform iota operation. This operation creates an individual from the unique entity in the given set. The logical forms for these generic NPs are those in (55).

- (55)a. (for (49b)) $iX^{max}[KUJIRA'(X^{max})]$
 b. (for (50b)) $iX^{max}[SATOO'(X^{max})]$

(55ab) are equivalent to (56ab).

- (56)a. $iX[KUJIRA'(X) \ \& \ \forall Y [KUJIRA'(Y) \rightarrow Y \leq X]]$
 b. $iX[SATOO'(X) \ \& \ \forall Y [SATOO'(Y) \rightarrow Y \leq X]]$

Finally, the logical forms of the example sentences of (49) through (51) are the following.

- (57)a. for (49a) $\lambda P [KUJIRA'(X^{max}) \ \& \ P(X^{max})] (HONYUUDOOBUTSU')$
 b. for (49b) $HONYUUDOOBUTSU' (iX^{max}[KUJIRA'(X^{max})])$
 (58)a. for (50a) $\lambda P [SATOO'(X^{max}) \ \& \ P(X^{max})] (AMAI')$
 b. for (50b) $AMAI' (iX^{max}[SATOO'(X^{max})])$
 (59)a. for (51a) $\lambda P [YUKI'(X^{max}) \ \& \ P(X^{max})] (\lambda Y [FURU'(Y)])$

(57) through (59) are equivalent to (60) through (62) respectively.

(60)a. $VX[KUJIRA'(X) \ \& \ VY[KUJIRA'(Y) \rightarrow Y \leq X]]$
 $\rightarrow HONYUUDOOBUTSU'(X)$

b. $HONYUUDOOBUTSU'(iX[KUJIRA'(X) \ \& \ VY[KUJIRA'(Y) \rightarrow Y \leq X]])$

(61)a. $VX[SATOO'(X) \ \& \ VY[SATOO'(Y) \rightarrow Y \leq X]]$
 $\rightarrow AMAI'(X)$

b. $AMAI'(iX[SATOO'(X) \ \& \ VY[SATOO'(Y) \rightarrow Y \leq X]])$

(62)a. $VX[YUKI'(X) \ \& \ VY[YUKI'(Y) \rightarrow Y \leq X]] \rightarrow FURU'(X)$

4. Conclusion

4.1 The CN denotation and two principles

Gupta (1980, p.2) pointed out that a CN should be distinguished from an ordinary one-place predicate in that it can provide not only a principle of application, but also a principle of identity. A one-place predicate like "white" provides a principle of application by which we can tell whether an object is white or not. However, we cannot identify an object by saying "this same white". On the other hand, a CN like "book" provides not only a principle of application which tells whether this is a book or not, but also a principle of identity. We can rightfully say "this same book". He further attributes this semantic difference to the absence and presence of a free variable in their denotation. One-place predicates are only descriptive

predicates which define a set of individuals sharing the relevant property, and do not introduce a free variable, while CNs are combinations of a free variable and a descriptive predicate. The descriptive predicate defines a sortal object, a set. Then it is obvious that the free variable is somehow responsible for providing a principle of identity. What Gupta did not explain, however, was why that is the case. In other words, why CNs provide a principle of identity. The reason seems to become clear when we think of another important difference between a CN and a one-place predicate. That is the nature of the sets they denote: the former denotes a homogeneous set, and the latter can denote a heterogeneous one. When a set is homogeneous, in other words, members of that set are a duplicate to one another, we would need some means to identify some particular member or members of that set. A free variable does indeed give us a means to do so. It can provide an absolute identification by obtaining a referential index, or it can also provide a relative identification by being bound by a quantifier.

In the last two chapters, we have investigated two cases in which a Japanese CN can achieve its linguistic significance without a variable, or with a minimum use of it: the former is when it is a predicate nominal, and the latter is when a CN is in generic use. In the nominal predicate position, a CN abandons its means of being a principle of identification,

i.e., a free variable, and becomes a one-place predicate, a principle of application. A CN in generic use denotes a singleton set, the set of the maximal plural entity, acquires the uniqueness, the ultimate identity, without the variable being used in any meaningful manner. These two instances of a CN exactly correspond to the two occurrences of a mass noun Quine talked about: one is on the right of the copula, the other is on the left of the copula. Quine questioned whether a mass noun refers to a set of quantities (general term) or a single scattered object (singular term). If we now ignore the philosophical issue of the minimal part hypothesis, then, it seems quite alright to answer that a CN has a potential to be either a singular term (in generic use) or a general term (predicate nominal). With Link's structured domain, we could keep a basic $\langle e, t \rangle$ type denotation for a CN, a set, and still derive a right kind of NP denotations through Partee's universal type-shifting principles for the generic NPs. For the predicate nominal, I suggested that the copula verb has some significant function to perform, while Quine completely ignored the semantic value of the copula. I presented some evidence that a CNP in the nominal predicate does not have a full NP projection. That fact could be accounted for if the copula is to absorb the free variable leaving a CNP incapable of being bound by a determiner.

4.2 Referentiality

Two instances of a CN we have discussed in the last two chapters would also correspond to those Geach discussed as referential vs. nonreferential use of a CN. A CN in generic use is referential, because it is intrinsically definite because of its uniqueness implication. In other words, if the descriptive predicate of a CN is sufficient to be referential, i.e., denotes a singleton set, the referentiality can be achieved without a variable obtaining some referential index. In the nominal predicate position, the descriptive predicate of a CN is not sufficient to be referential. It needs a variable to be referentially indexed to be referential. However, as we have seen, in this position, the variable is to be absorbed by the copula, so the CN can never be referential in this position. With this much observation, it seems to be the case that referentiality is not solely related to one particular part of the CN denotation, while the genericity seems to be linked to the predicate part of the CN denotation, and the quantification, to the variable.

When we consider referentiality, we will be compelled to broaden our perspective and look into other occurrences of a CN which are between the two extremes of the spectrum: a CN in generic use, and a predicate nominal. Then, we will

find rather ordinary occurrences of a CN in which the descriptive predicate denotes a less distinctive set, (not the maximal plural entity) and the variable is referentially bound. While the predicate nominal is an extreme case of a CN in predicative use, these occurrences are unmarked cases of a CN in predicative use. They are found in indefinites and anaphorically definite NPs. Unlike in those extreme cases where a CN neglects to use its variable, in indefinites and anaphorically definite NPs, the variable plays a key role in achieving their linguistic significance. Heim (1982) analyzed indefinites and definites simply as variables. I will discuss indefinites and anaphorically definite NPs in Japanese in the following chapter.

4.3 The semantic functions of CNs

We have concluded that the unquantificational nature of the predicate nominal and the generic NPs came from the fact that a particular part of the CN denotation, the variable, is somehow neglected. At the same time, we witnessed the fact that a CN can perform a significant function without quantification, i.e., to yield genericity. Now suppose that two distinctive parts of the CN denotation, the descriptive predicate and the variable, ought to perform two distinct intrinsic functions of a CN, genericity and quantification. Then a language will have a priori two choices to construct

a nominal domain: one is to take genericity as primitive and derive quantification, and the other is to take quantification as primitive and derive genericity. Japanese seems to have taken the first choice, while English, the second choice. If that is the case, Japanese will have a simple form for the descriptive predicate part, and less simple form for the variable part. English will have a simple variable system, and less simple form for the descriptive predicate part. This will well fit the kind of system I proposed in Chapter II for the Japanese nominal domain, where a CN behaves like a single descriptive predicate with a multi-sorted variable. In such a system, we also expect that the quantification will not be completed NP-internally, but we need some external element to select a proper variable (transitive verb, classifier). This is to say that a language which takes genericity as a canonical function for a CN, will not have a truly quantificational NP. I will not speculate further on this matter. Instead, I will move on to the next chapter and see if this prediction will in fact be borne out.

Notes for Chapter IV

1. Carlson (1989) considers the following sentence as a generic:

- (i) (=48)
A master craftsman builds every house in this area.

The Japanese equivalent for this example does not seem to have a generic reading.

- (ii) Aru meijin no shokunin-ga
EXISTING MASTER-GEN CRAFTSMAN-NOM
konohen-no subete-no ie-o tateru.
THIS VICINITY-GEN ALL-GEN HOUSE BUILD-NONPAST
(A certain master craftsman builds all the houses in this area.)

In order to get a generic reading out of the accusative NP in (ii), it has to be in the topic position as in (iii).

- (iii) Konohen-no ie-wa
THIS VICINITY-GEN HOUSE-TOP
aru meijin-no shokunin-ga tateru.
EXISTING MASTER-GEN CRAFTSMAN-NOM BUILD-NONPAST
(Speaking of the houses around here, a master craftsman build sthem.)

If both subject and object NPs are headed by a CN, and the subject NP is clearly existential, there seems to be a possibility for a generic reading for the object NP. However, that object NP has to be in the topic position.

2. Genericity can be construed by quantification over many other kinds of domain. It can be time point references. Some linguists try to have new entities, some kind of generic entities, in which case no quantification will be involved. Some have created some other objects like "ensembles". (See Schubert & Pelletier 1987)

3. For those species which were already extinct from this world such as dinosaurs, it seems that a statement with the past tense like (i) can also serve as one for the necessary true proposition. However, in Japanese, (ii) might sound more usual.

- (i) kyooryuu-wa ryooseirui datta.
DINOSAUR-TOP REPTILE BE-PAST
(Dinosaurs were reptiles.)
- (ii) kyooryuu-wa ryooseirui da.
DINOSAUR-TOP REPTILE BE-NON-PAST
(Dinosaurs are reptiles.)

4. In Japanese, stative verbs and active verbs are morphologically marked. The former are adjectives which can carry the tense and the copula. So, stative predicates are either adjectives or nominal predicates which consist of a complement noun or adjectival noun and the copula.

5. See Carlson (1977) for the proper-name-like properties of bare plurals. Bare plurals do not interact with other scope creating elements as ordinary quantified NPs do. They license discourse anaphors.

6. Swift readers may already have started to wonder about the relationship between the topichood and the definiteness. That will be discussed in Chapter V.

7. There is a kind of topic NP which does not seem to fall in this category.

- (i)a. Hana-wa sakura-ga ii.
FLOWER-TOP CHERRY BLOSSOM-NOM GOOD-NON-PAST
(Among flowers, cherry blossoms are good.)
- b. Sakana-wa tai-ga ii.
FISH-TOP SNAPPER-NOM GOOD-NON-PAST
(Among fish, snappers are good.)

8. Whether or not this is specific, may depend on how you define the specificity. If you assume that an NP can be specific only if the speaker has in mind a particular individual whom he was already acquainted with, the indefinite NP in (12b) is not likely to be specific. However, we can also define the specificity a little more loosely: an NP can be specific, if the speaker has some means to fix the referent. For the case of (12b), the dog which is actually

barking now is the referent of the indefinite NP "inu-ga". Then, you might be able to say that the NP in (12b) has an indefinite specific reading. I believe that Kuroda employs the latter definition, when he calls it indefinite specific (1973). For a detailed discussion on specificity, see Abbott (1976 & 1992).

9. Distributivity has been observed and discussed in the literature for quite a long time. (ia) is a typical example relevant to this issue.

- (i)a. Three men lifted a piano.
- b. Three men lifted a piano together.
- c. Three men each lifted a piano.

(ia) can be interpreted either as (ib), collectively (yields group reading), or as (ic), distributively. Roberts, in her dissertation (1987), provides a useful overview of various approaches to account for this phenomenon. Lakoff (1970) recognized distributivity as a scope phenomenon, and related it to quantifier raising/lowering. If you identify this problem with quantifier scope differences as Roberts said Lakoff did, you would fail to account for the distributivity involved in non-quantificational NPs such as conjoined proper names. Bennett (1974) attributed distributivity to lexical property of predicate. He distinguished two classes of predicates: those which have individuals in their extension, and those which have groups in their extension. In doing so, he confused distributivity with the subcategorization of verbs. Scha (1981) proposed an account by heavily focusing on the contribution of determiners. As Roberts points out, it is difficult to account for the distributive readings for those which do not have a quantificational determiner, such as those with the definite article. Roberts herself argues that distributivity arises when we have either a quantificational determiner in the subject or an implicit or explicit adverbial distributive operator. It is not my intention here to evaluate these proposals, but to show that any of these proposals cannot be quite carried over beyond the count domain. It is my opinion that distributivity arises in one of the two processes of computing the truth value: inductive and deductive. In other words, distributive predication are made available when the subject is individualized in an inductive way, while collective predication are made available when the subject is individualized in a deductive way. If we understand this phenomenon, distributivity, in such general terms, it is not difficult to extend it to the whole nominal domain including mass terms.

- (ii)a. Water is liquid.
- b. Water is widespread.

- (iii)a. The water in this cup is warm.
- b. The water in this cup weighs 100 grams.

Natural language syntax does not seem to distinguish these two different ways of individuation. The same principle can apply for ordinary definite singulars.

- (iv)a. My ring is gold.
- b. My ring is my mother's memento.

In (iva), a mere sum of the material making up my ring is predicated of, while in (ivb), it is the structured collection of the material that is predicated.

10. I should note here that many syntacticians recently argued in favor of the VP-internal Subject Hypothesis: the clausal subject is generated not in their spec position, but within a projection of the verb (Fukui 1986, Fukui & Speas 1986, Sportiche 1988, Kuroda (1986), Koopman & Sportiche 1991, Heycock & Santorini 1992) According to this hypothesis, the subject NP receives its theta role directly from the verb, and then moves to the spec of IP to receive the structural case, nominative. It follows that the spec of IP is a nonthematic position (A-), and as such it cannot be licensed before S-structure. Heycock & Santorini present from Yiddish some evidence for the A- character of the spec of IP such that it is crucially affected by movement of the licensing head between D-structure and S-structure. I am not in the position to argue for or against this hypothesis. Since the syntax is not the primary issue here, I will allow myself to have a very general assumption such that the verb has theta roles to disperse, and that the syntactic assignment of those theta roles can be done directly (internal theta role) or compositionally through the VP (external theta role).

11. (26) presents some problems. Unlike ordinary NP-movements in English, it originates from a case-marked but nonthematic position and lands in another case-marked but non-thematic position. Although the trace seems to be properly governed, the chain presents a possible violation of Principle C. An obvious solution is not to postulate the movement, but just to allow two nonthematic positions for the subject NP to occur in order to be predicated of by these stative predicates. One drawback of this solution is that it won't

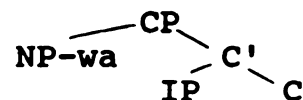
explain the markedness/unmarkedness difference between a. sentences and b. sentences.

12. Partee's type shifting system includes another operation which applies to a property and maps it into an individual, nom (nominalization). I will ignore this operation here, because presumably, nominalization does not apply to a set/property denoted by a CN.

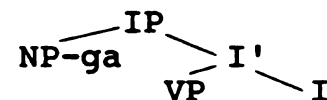
13. Kuroda (1973) discussed the difference between topic sentences and non-topic sentences. He argued that a sentence can express two different kinds of judgments. One is a categorical judgement, and the other is a thetic judgement. The topic NP is the subject of a categorical judgement which has a subject-predicate structure, while the nominative NP occurs in a thetic judgement which does not have such subject-predicate structure, but an argument structure in which the arguments are related to each other via the predicate. He points out that the traditional grammarians such as the Port-Royal grammarians were mistaken in assuming that all sentences are unambiguously to represent judgments in the subject-predicate structure (categorical judgments), whereas the modern formal logic is also misleading in assuming that all sentences are to represent judgments in argument structure (thetic judgments).

Recapitulating this claim in a little more explicit language, Kuroda's categorical judgement will have a syntactic structure as in (ia) and his thetic judgement will have a structure, (ib).

(i)a. Categorical Judgement



b. Thetic Judgement



As we can see, the topic NP in a categorical judgement is outside the locality of the theta role assignment by the lexical head of the VP. On the other hand, the nominative NP in a thetic judgement is subject to the local assignment of a theta role. Kuroda's claims seem to be well supported by these structures. In (ia), the topic NP and the IP which is an open sentence form a dichotomy which seems to correspond to the subject predicate structure. (ib) also fits his claim that a thetic judgement is to present an argument structure. This syntactic difference fits also the semantic type difference between topic NPs and nominative NPs I propose

here. A nominative NP is an argument NP (type e) of the predicate (type $\langle e, t \rangle$). A topic NP is not an argument NP for the predicate, but the predicate (type $\langle e, t \rangle$) is the argument which a topic NP (type $\langle \langle e, t \rangle, t \rangle$) takes to yield a truth value.

14. Levinson's example for this argument

- (i) It's done.
- (ii) It's done and if it's done, it's done.

(i) and (ii) share the same truth condition, but only (ii) will have a particular implicature such as (iii).

- (iii) It's no good regretting what has already happened.

Chapter V
(In)definites in Japanese

0. Introduction

0.1 The empirical coverage

As it is expected from the heading of this chapter, Japanese indefinite and definite NPs will be the topic of this chapter. What is not expected, however, especially from those readers who are familiar with the width and depth of the works which have been done for this particular area of study, English (in)definiteness, and its complexity, would be to hear that indefinites and definites in Japanese could be boiled down to nothing but a pair of sentences like the following.

- (1)a. Inu-ga hoeteiru.
DOG-NOM BARKING-EXIST-NONPAST
(A dog is barking.)
- b. Inu-wa hoeteiru.
DOG-TOP BARKING-EXIST-NONPAST
(The dog is barking.)

A pair of sentences like (1) where both share the same non-generic predicate, i.e., one which has an existential implication, but one sentence has a nominative NP which consists of a bare CN and the case-marker "ga" and the other has a topic NP which consists of a bare CN and the case-marker "wa", presents a stark contrast in NP interpretation: the NP in the former will be interpreted as indefinite and

the latter, as definite. This definite/indefinite distinction has been noted first in the literature by Kuroda (1965). If this chapter is to discuss indefinites and definites in Japanese only with respect to the sentences like (1), it would certainly owe the readers some justification for such a meager coverage of the discussion. After this introductory part, I shall start the discussion with some rationale how we could in fact boil this vast issue down to a couple of sentences in Japanese.

What I would like to do here in this introductory part is to put the empirical coverage of this chapter into perspective of what I have done so far in this study of Japanese CNs. I have been examining Japanese CNs in various syntactic contexts, especially when they occur without any modifier. In chapter II, we saw how a bare CN in the direct object position can obtain mass/count interpretation. I adopted a structured domain from Link as a basis of the semantic system, and furnished it with a multi-variable system for the interpretation of Japanese CNs. In that proposed system a CN denotes a structured set introducing various kinds of variables. The semantics provides a proper subcategorization for a transitive verbs in the lexicon, which includes sufficient information for each verb to select the right kind of variable. In other words, the variable introduced by a CN is to be bound by some external element to yield an NP

interpretation. In the cases we examined in chapter II, that external element was a transitive verb which subcategorizes its direct argument NP, the object NP.

In chapters III and IV, we examined two cases of occurrences of bare CNs where a particular part of the CN denotation, the descriptive predicate part, can by itself become linguistically significant without their variables being bound. One is those which occur in nominal predicates, and the other is those in generic use. In the nominal predicate, a variable part of the CN is to be absorbed by the copula verb, subsequently that CN becomes a one-place predicate. CNs in generic use denote a singleton set - the set of the maximal plural entity, yielding the uniqueness implication. For such a set, there will be a unique value assignment to the variable. It was concluded that the unquantificational nature of CNs in these two cases is due to the lack or least sufficient use of the variable part of the CN denotation.

Chapters III and IV have also given another dimension to this study, which chapter II failed to address in an explicit manner: the NP level interpretation. I argued that the predicate nominal does not have an NP projection due to the lack of a syntactic element, a case-marking particle, which is to be combined with a CNP to become an NP. Such syntactic elements are called determiners in English. Although Japanese

case-marking particles share a great deal of distributional nature with English determiners, perhaps because of apparent differences in their semantic functions, they have never been treated as such in the literature. In chapter IV, it was hypothesized that case-marking particles do have some determiner-like semantic functions to shift the CN denotation into the NP denotation. Furthermore, it was argued that those functions are performed systematically following some universal type-shifting principles which have been independently proposed by Partee. We have seen that a CN in generic use denotes a right kind of set which can be shifted either to a generalized quantifier (in the topic position) or to a referring expression (in the nominative position). These two types of meanings are exactly what we need for the interpretations of Japanese generic NPs. By expanding our view to the NP level interpretations, we were exposed to another important syntactic category, determiners, which has an intrinsic relation to CNs.

Another important aspect to view the realm of CNs is two distinct usages of CNs: nominal use and predicative use. The former use can be observed in the CNs in generic use, and the extreme example of the latter use, in the predicate nominals. What this study has not explored yet are those ordinary occurrences of CNs in predicative use. These exactly correspond to the cases in which a CN denotes an ordinary set

introducing a variable which is most likely to be used effectively. If we limit our discussion to non-adjunct NPs which consist of a bare CN, which have been our primary focus in this study, they are either non-generic topic bare CNs, non-generic nominative bare CNs, or accusative CNs.¹ These NPs are subject to the definite/indefinite interpretation, whereas generic NPs are intrinsically definite as we have seen in chapter IV, and predicate nominals are not even NPs, i.e., irrelevant for this distinction. Since NP interpretation was not the primary objective of chapter II, the analysis of object bare CNs did not discuss the issue of the definite/indefinite distinction explicitly. However, the truth conditions which were tentatively given in chapter II included an existential closure to yield the existential import. Those object bare CNs are in fact always interpreted as indefinite.

Chapter V indeed takes up the place where Chapter II left off. Now that we have more or less a global view on the entire area of CN occurrences, and we are equipped with some semantic tools such as a proper structure for the nominal domain and some type-shifting principles, we should be able to complete our exploration of CNs by examining how a CN will be combined with another lexical category such as a case-marking particle to become either a definite or an indefinite NP as we see in the example (1). To sum up, the present

chapter will deal with bare CNs in ordinary predicative use. That is those CNs which denote a set which by itself has no uniqueness implication (unlike CNs in generic use) and introduce a variable which will be sufficiently used (unlike predicate nominals). This kind of bare CNs are to become definite or indefinite NPs when they are combined with a case-marking particle. In this chapter, the present study of CNs departs from the CNs proper and enter a broader area of NP interpretation, which will necessarily include such categories as determiners.

0.2 Goals and organization

There are two goals which I would like to attain in this chapter. First, I would like to provide some clarificatory discussion about the notion of definiteness in general and its implementation in languages, in particular English and Japanese. Such a discussion would also address important issues regarding the syntactic category of determiners in general. I will start with some rationale why the chosen empirical coverage of the discussion would be a proper target for the (in)definiteness in Japanese. It will be pointed out that a particular kind of definiteness is implemented in syntax in Japanese. Such a definite NP is to presuppose an indefinite antecedent.

The second goal, which is a specific one, is to provide a semantic analysis of Japanese indefinites and definites. In order to do so, I would like to raise a question: how Japanese CNs participate in a linguistic mechanism which yields the property of (in)definiteness. In other words, how can Japanese CNs succeed in gaining some properties which proper names and pronouns possess, but CNs in ordinary predicative use don't, by some syntactic interaction with another syntactic category, namely, case-marking particles? For the analysis of Japanese indefinites, I will adopt Heim's (1982) quantifier-free analysis of English indefinites for Japanese. The last two sections of this chapter will be used for this purpose. I will start with some literature review on the problems of indefinites, and will present some evidence which suggests that Japanese indefinites are essentially unquantified. Finally, I will present a semantic analysis for a fragment of Japanese.

1. The notion of definiteness

1.1 Two trends in the study of (in)definiteness

In order to reasonably handle this vast and complicated area of study I need to be as stoic as possible and set a target for a fairly limited area which would be surely worthwhile examining. What follows is my first efforts to sort out the issues so that the following discussion will be soundly

focused. Here, in particular, I will present some rationale why the study of definites and indefinites in Japanese should focus on the case-marking particles and their semantic functions.

I understand "definiteness" in general as a semantic property of an expression typically designating an identified or immediately identifiable object, and define "indefiniteness" as lacking that semantic property. In this sense, proper names are intrinsically definite, and so are most pronouns². The former refer to a unique entity, and the latter are always referentially bound in the context. In other words, their semantic properties include enough information to yield their definiteness. CNs in ordinary predicative use, however, by no means contain enough information to yield definiteness by themselves. It seems to be the case in English that they have to be combined with another syntactic category to yield an expression which can claim the property of definiteness, i.e., an NP in syntax, or a term phrase in semantics. In English, proper names and pronouns form a syntactic class which do not associate in general with the class of determiners including the definite and indefinite articles, unless they cease to be of that kind. They can stand as NPs all by themselves. It is only CNs that associate with those determiners to form their NP correlates which are syntactically marked as either definite or indefinite. The

following are some typical examples of indefinite NPs (2a), and definite NPs (2b) in English.

- (2)a. a dog (the indefinite article + CN)
 two dogs (numerals + CN)
 some water ("some" for unspecified amount + CN)
- b. the dog (the definite article + CN)
 these dogs (demonstratives + CN)
 my water (possessive pronouns + CN)

The issue of (in)definiteness for CNs, therefore, belongs to not only semantics but also syntax in English.

Milsark (1974) classified determiners into two groups: one is called weak determiners, which will yield indefinite NPs, and the other is called strong determiners, which will yield definite NPs. The diagnosis to identify whether an NP is definite or indefinite is whether or not it can occur in the "there is/are" context to give the existential reading³. Those NPs in (2a) can occur in this context to yield existential readings, but not those in (2b).

- (3)a. There is a/*the dog.
- b. There are two/*these dogs.
- c. There is some/*my water.

Milsark's study set up two major trends in the study of (in)definiteness: one is to study the determiners including proper classifications within that category (Barwise & Cooper 1981, Keenan 1987, Enc 1991), and the other is to study the syntactic distribution of (in)definite NPs (Safir 1987, Belletti 1988).⁴ It seems to be the case that in certain linguistic environments, either a definite or an indefinite

NP is exclusively allowed to occur as we have seen in the "there is/are" context. This kind of effect has been called a definiteness effect in the literature. Linguists have been puzzled by the syntactic distribution of (in)definite NPs, and are searching for a proper account for the effect. Linguists are also hoping that the proper account of this effect will lead us to the proper generalization of definite and indefinite NPs.

To follow these trends in Japanese is not a clear cut process. First, the existence of the functional category of determiners in Japanese is debatable as I mentioned in Chapter III (2.2). It seems that linguists are deeply divided on this issue. One group of linguists believe that Japanese is an unconfigurational language, and that it lacks the internal structure of NPs (Gil:1987, Fukui & Speas:1986) because it does not have the (in)definite articles, hence, it does not have determiners, hence, no full N' projection. The other group of linguists believe that Japanese is a configurational language, and it does have a syntactic category of determiner which is to host a CNP, in other words, a projection of determiner phrase in the sense that Abney suggested (1986). Recently, Saito & Murasugi (1990) convincingly argued for the existence of the determiner phrase in Japanese. Another obstacle is that those lexical items which seem to correspond to the English determiners

except for the (in)definite articles, such as "takusan" (MANY/MUCH), "sukoshi" (A LITTLE), "hotondo" (MOST), "subete" (ALL), and numerals, deictic pronouns (demonstratives and possessive pronouns) etc. could well be analyzed as nominal modifiers. If we analyze them as such, they are adjectival rather than quantificational. In other words, what they do is predication, not quantification. I will come back to this point in a later section. If we put these determiner-like elements aside, because they are not quite clear in their nature, we will not have much to search for the determiners in Japanese. The research will be limited to the English definite and indefinite articles. Here we come across another problem, i.e., the fact that Japanese apparently does not have these lexical items. Then, the study of determiners has to start with searching some other lexical items and/or syntactic mechanism which will perform the function which English definite and indefinite articles do. As I mentioned before (Ch. III, 2.2), Kuroda (1965) pointed out that Japanese particles, "wa" and "ga" function just like "the" and "a" in English. I repeat the examples (16) from chapter III here as (4).

- (4) Michi-ni otoko-ga tatteita.
 STREET-LOC MAN-NOM BE STANDING-PAST
 (There was a man standing in the street.)
- Otoko-wa kuroi koto-o kiteita
 MAN-TOP BLACK COAT-ACC BE WEARING-PAST
 (The man was wearing a black coat.)

If we follow the path Milsark laid for the study of

definiteness, in other words, examine determiners, it seems not only reasonable but also promising to study the functions of case-marking particles in Japanese before we draw a quick conclusion that Japanese does not have a functional category of determiners. Beside some obvious facts mentioned above, there are encouraging developments in both semantics and syntax which would certainly make this kind of pursuit feasible and worthwhile. We have reviewed Partee's proposal such that there are natural (universal) type-shifting functions which are performed typically by the (in)definite articles, although she carefully did not identify those functions with the meaning of English words, the and a(n) (Chapter III & IV). We also have seen the recent development in syntactic theory in which Japanese case-marking particles could be analyzed in fact as determiners. Studying case-marking particles with respect to the definiteness would also guide us directly to the second trend in this area of study: to study the syntactic distribution of definiteness. If we assume that cases are structurally assigned in Japanese, which I continue to defend, and that a certain case is associated with a certain aspect of definiteness, the syntactic distribution of definiteness, or what is called definiteness effect might be easily predicted.

1.2 The notion of definiteness

In the previous section, I presented some rationale why the study of Japanese definites and indefinites should start with a search for some syntactic elements which perform the functions English definite and indefinite articles do. Here, in what follows, I intend to pin point exactly which function among many functions the English articles seem to perform is actually relevant in Japanese. In doing so, I also hope to share some general thoughts about definiteness and its grammatical implementations in English and Japanese.

Kuno (1973) carefully distinguished the term "anaphoric" from "definite" in his discussion of the semantic nature of the topic (theme in his terms). He reserved the latter term for referring to the syntactic feature that will be determined by the presence or absence of the definite article "the", and he chose to use the former for those NPs which have a registry in the current discourse, i.e., a referential index. Those anaphoric NPs, according to him, are of two kinds. One is those which have a permanent registry⁵ because they have a unique reference. Examples are in (5).

- (5) the sun, the moon
 my wife, your children
 this book, that man

The other kind of anaphoric NPs are those which do not have a permanent registry, and hence have to register themselves

whenever they are newly introduced in the current discourse.

- (6) I saw [a man]_{NP1} on the street.
Speaking of [the man]_{NP2}, he was not wearing a coat.

NP1 in (6) is newly introduced in the discourse, and as such it will have a registry for its referent. NP2 is anaphoric, because it is co-indexed/bound by the antecedent which has already a registry in the discourse. It is this anaphoric nature which Kuno identifies with that of the topic of the sentence, which is something a speaker talks about. The topic-cased NP in Japanese, according to him, must be anaphoric.

Let us now expand the list of anaphoric NPs to encompass the definite NPs (not in Kuno's sense), including proper names and pronouns, and consider the characteristics of each kind of definite NPs.⁶

- (7)
1. John, Mary (proper names)
 2. the tallest man in East Lansing
(definite description)
 3. the sun, the moon (unique existence)
 4. my wife, this book (deictic pronoun+CN)
 5. [a man] the man (definites)
 6. [a girl] the/her mother (definites)
 7. [a/the boy] ... he (3rd person referential
pronouns)

Kuno groups 3 and 4 together because they have a permanent registry in the current discourse. These two kinds of NPs share with 1 and 2 an important syntactic characteristic which differentiates them from 5 through 7: the latter require their antecedents to determine their referents, but

the former don't. The definiteness of those NPs in 5 through 7 are context bound. In this sense, however, 4 is also context dependent in that those deictic pronouns will not be interpreted without the context. If we observe 3 and 4 carefully, we will notice a fundamental difference between the two: the source of definiteness of the former lies in the semantic property of the CN, whereas that of the latter lies in the semantic property of the determiner. Because the object referred to by the CN "sun" is a unique existence, in other words, the CN "sun" happens to denote a singleton set, "sun" is always definite. In this case, the determiner functions merely to confirm that special property of that CN. In other word, the definite article in 3 is pleonastic. So called definite descriptions such as 2 are definite because of the same reason. The CNP includes enough description to determine a unique individual. Finally, proper names which denote an individual do not even require a pleonastic appearance of the definite article. They are by themselves definite. On the other hand, the determiners in 4 play the key role in determining the object which is referred to by these NPs. It is the lexical content of these determiners, but not of the CNs, that enable us to determine the referent. And that lexical content of the determiners includes a pragmatic element such as reference to the speaker, and/or proximity to the speaker. The definite article in 5 is also holding a key role in determining the referent, hence, by no

means pleonastic. It marks the NP as anaphoric, in other words, it indicates that the NP has an antecedent which referentially binds it. The antecedent is an indefinite NP usually headed by either the same CN or the relational term of that CN as in 6.⁷ Finally, referential pronouns such as in 7 can be substituted with the whole antecedent NP. In this way, the definite NPs in 7, which are pronouns, do not include a CN which needs to be marked as anaphoric by the definite article. Hence, they do not interact with any determiner just like proper names, but from a different reason. Pronouns are intrinsically definite, because they are referentially bound by the antecedent in the context, whereas proper names are intrinsically definite, because they always denotes a unique individual.

The notion of definiteness in English can be viewed with respect to the contextual boundness. From this point of view, Kuno's first kind of anaphoric NP seems to include two different kinds of definiteness: one is unbound in the context, the other is bound in the context. The former comes from the uniqueness of the referent of the CNPs, the latter comes from the anaphoric nature of the NPs. In the former case, the determiner, the definite article is used pleonastically, in the latter case, the determiners play the key role to determine the referent. The extreme case for the uniqueness definiteness is proper names, and the extreme case

for the anaphoric definiteness is referential pronouns. Only these extreme cases are exempt from the determiners in English. All the other definite NPs headed by CNs, even if the head CN/CNP is definite enough, have to be marked as definite by determiners. In this sense, English definite marking is absolute and complete within the NP structure. This absolute system entails the pleonastic use of the definite article, which is not inconsistent with the other parts of the grammar. English is known to be one of the languages which employ a pleonastic element such as the non-referential, non-argumental "it". Japanese, on the other hand, is known to be one of those languages which do not employ any pleonastic element in the grammar. It could be expected that Japanese does not employ such an absolute system for definite marking as English does.

1.3 The grammatical implementation of definiteness

It seems to be the case that the similar notion of definiteness is also working in Japanese. In fact, all the Japanese equivalents of 1 through 7 are eligible to be the topic of a sentence. In other words, if those NPs in (7) are a correct representation of definite NPs, the definiteness is a sufficient condition for the topic. Only those which require their antecedents in the discourse, 5 through 7, cannot occur in the discourse initial topic position. Let us

now set aside the most obvious kinds of definite NPs, proper names and referential pronouns, and the deictic determiner + CN, which are always definite, and focus on the cases in which the definite article is used to mark the NPs definite, i.e., 2, 3, 5 and 6. If these NPs are marked as definite by the definite article, they are supposed to have their indefinite correlates which are so marked by the absence of the definite article. However, as we have seen, 2 and 3 don't because the definite article in 2 and 3 is in pleonastic use. On the other hand, the definite article in 5 and 6 is used to mark the NPs as anaphoric. In other words, it is the definite article that marks the NP definite in 5 and 6, whereas it is the head CN which denotes a singleton set, or the CNP which includes enough description for us to determine the referent, that makes the NP definite in 2 and 3. Accordingly, the former has its indefinite correlate which is lacking the definite article. So, the issue of indefinite/definite distinction rises only in the cases like 5 and 6. Now suppose we analyze the definite article in 6 as a variation of possessive pronoun, and exclude that use from our discussion, then, there is only one kind left to account for, i.e., 5, in which the head CN does not have its own source to be construed as definite. In other words, those CNs which do not necessarily denote a singleton set, need to be marked either definite or indefinite by the determiner. In English, the definite article performs this task by either

its presence or its absence. In Japanese, the same task is performed by case-marking particles.

- (8)a. Inu-wa uraniwa-ni iru.
 DOG-TOP BACK YARD-LOC EXIST-NON-PAST
 (The dog is in the back yard.)
- b. Uraniwa-ni inu-ga iru.
 BACK YARD-LOC DOG-NOM EXIST.
 (There is a dog in the back yard.)

Since "inu" (dog) does not necessarily denote a singleton set, it is subject to the indefinite/definite distinction. The distinction is made through the syntactic structure: the topic position, which is the specifier position of CP in Japanese, for definites, and the nominative position, which is the specifier position of IP, for indefinites. Although both languages, English and Japanese, use the same kind of notion of definiteness, they implement that notion in the grammar quite differently. A particular function of the English definite article such that it marks an NP as anaphoric is the only function which Japanese implements in its syntax by using the difference of the structural position of that NP. The other kinds of definite NPs, which do not have their indefinite correlates, are immune to this mechanism, and are always interpreted as definite, just as proper names and pronouns are immune to the determiner system in English. The system which marks the (in)definite in Japanese is not absolute, but relative to the semantic nature of the CN denotation, and not complete within the NP structure, but incomplete within the NP structure in that it

involves the structural case-assignment.

The discussions made so far will leave us with at least a blurry big picture of the realm of NPs. In that big picture, we have three kinds of nouns: proper names on one side, pronouns, on the other, and in the middle, CNs. If we view these three kinds of nouns from the center, in other words, through the mirror of CN denotation, proper names look very much like the descriptive predicate part itself, and the pronouns, like the variable part. It seems that a proper name is an extreme case in which a noun denotes nothing but a singleton set, in other words, the predicate part became sufficient by itself to denote an individual. In this case, the variable part becomes totally ineffective. Pronouns are able to fix their reference through a referential index which is to be inherited from their antecedent. In other words, pronouns are carriers of referential indices. Such a function is generally regarded as one performed by a variable. Pronouns do not carry any description of their antecedent, but they carry their identities. If this is a correct picture, we would expect a CN to be an NP which is capable in fixing its reference at least in two different ways. One is to assimilate itself to a proper name, and the other is to assimilate itself to a pronoun. That is to say, either to make the descriptive predicate part sufficiently unique, or to make the variable part sufficiently identifiable. In the

discussion of CNs in generic use (Chapter IV), we witnessed the former case, we will see in this chapter the latter case: how a CN can be semantically very close to a pronoun.

2. Syntactic distributions and semantic interpretations of Japanese definite and indefinite NPs

What the discussion made in the previous section has brought us is not only a big yet blurry picture of NPs, but also a specific question. If Japanese makes a definite/indefinite distinction through case-marking system, how in fact does it do it? This section is my preliminary efforts towards some plausible answer to this question. I will first discuss Japanese definite NPs, in particular, those anaphorically definite NPs, which I hope will guide us to the core of the problem, indefinites.

2.1 The definites

2.1.1 Semantic nature of Japanese topic NPs

Japanese anaphorically definite NPs which consist of a bare CN and a case-marking particle seem to occur in a particular syntactic position, i.e., a topic position.⁸ Let us start with a survey of topic case-marked CNs in Japanese to examine the semantic characteristics of those topic NPs. Bare CNs which occur in the topic position are of the following four

kinds.

- (9)a. Inu-wa niwa-de hoeteiru.
DOG-TOP YARD-LOC BE-BARKING-NON-PAST
(The dog is barking in the yard.)
- b. Taiyoo-wa kumo-no ushiro-ni kakureteiru.
SUN-TOP CLOUD-GEN BACK-LOC BE-HIDING-NON-PAST
(The sun is gone in behind the clouds.)
- c. Inu-wa chuujitsu da.
DOG-TOP ROYAL BE-NON-PAST
(Dogs are royal.)
- d. Inu-wa Taroo-ga chiisaino-o katteiru.
DOG-TOP TAROO-NOM SMALL ONE-ACC OWNING-EXIST-
NONPAST
(Speaking of a dog, Taroo owns a small one.)

The topic in (9a) can only be analysed as anaphoric. There must be an antecedent in the preceding discourse through which the referent of this anaphoric topic NP can be fixed. Because of this ability of picking up its reference in the discourse, the topic NP in (9a) is definite. The topic NPs in (9bc) are also definite not because they are anaphoric, but because the head CN has the uniqueness implication. "Taiyoo" (SUN) happens to denote a singleton set, and "inu" (DOG) in generic use also denotes a singleton set of the maximal plural entity. The topic NPs in (9bc) are intrinsically definite, and as such, they do not have their indefinite correlates. The topic NP in (9a), on the other hand, is anaphorically definite, as such, as I mentioned before, it has its indefinite correlate in which the NP occurs in the nominative position like (10).

- (10) Inu-ga niwa-de hoeteiru.
DOG-NOM YARD-LOC BE-BARKING-NON-PAST
(A dog is barking in the yard.)

The first three topic NPs share the important semantic characteristic of being definite, either anaphorically or intrinsically. Considering a general understanding that a topic is something to be talked about, and that we are not likely to talk about something the reference of which has not been made available in the discourse, it would be a reasonable characterization for a topic to be definite. This generalization, however, will be easily challenged by a topic like one in (9d). The topic NP in (9d) is not definite in that it is not able to pick up its reference in the discourse.⁹ It does not refer to any particular individual. Because of the lack of definiteness we may regard it as indefinite, but we will soon notice that it is also quite different from those ordinary indefinites like the nominative NP in (10). The latter can introduce a discourse anaphor, while the former cannot.

- (11)a. [Inu-ga]_i niwa-de hoeteiru.
 DOG-NOM YARD-LOC BE-BARKING-NON-PAST
 (A dog is barking in the yard.)
- [Sore-wa]_i ookii shiroi inu da.
 THAT ONE-TOP BIG WHITE DOG BE-NONPAST
 (It is a big white dog.)
- b. [Inu-wa]_i Taroo-ga chiisaino-o katteiru.
 DOG-TOP TAROO-NOM SMALL ONE-ACC OWNING-EXIST-
 NONPAST
 (Speaking of a dog, Taroo owns a small one.)
- *[Sore-wa]_i Hanako-mo
 THAT ONE-TOP HANAKO-NOM/ALSO
 chiisaino-o katteiru.
 SMALL ONE-ACC OWNING-EXIST-NONPAST

It seems that the topichood encompasses definiteness, not the other way around. Definiteness is simply a sufficient condition for being a topic, but not a necessary one. Something which is not definite, and furthermore is not a referring expression can be allowed as a topic as we see in (9d). Is there any characteristic which all the topic NPs in (9) share?

In Chapter IV, and elsewhere (1990)¹⁰ I argued that topic NPs in Japanese are associated with a particular type of meaning, a generalized quantifier, $\langle\langle e, t \rangle, t \rangle$ type meaning, while nominative NPs are associated with another type, e-type. The arguments made in Chapter IV were for those CNs in generic use as in (9c). A sentence like (9c) does not have an indefinite correlate, but an emphatic version where the same CN occurs in the nominative position to yield an emphatic interpretation for the nominative NP. I have not discussed CNs like the one in (9b), which happens to denote nothing but a singleton set, but the same arguments would be easily extended for them. We have seen that a CN which denotes a singleton set can become either a referring expression (e-type) or a generalized quantifier ($\langle\langle e, t \rangle, t \rangle$ type) according to the universal type-shifting principles: iota, and THE respectively. In Chapter IV, we have also seen that a CN which does not denote a singleton set can become only a particular generalized quantifier (existential sublimation)

through the operation A. The topic NP in (9d) represents this case. So, the CNs in topic position in (9bcd) share the semantic feature that they are capable of being shifted into a generalized quantifier. How about the CN in (9a)? A CN heading an anaphorically definite NP does not denote a singleton set, in other words, it does not have the uniqueness implication. In this sense, it is close to the CN in (9d). However, The topic NPs in (9a) and (9d) are drastically different in that the former is referential and the latter is not. Another important difference between the topic NP in (9a) and those in (9bcd) is that only the former presupposes the existence of its antecedent from which it can inherit the referential index. If the CN in (9a) in fact possesses a potential to become a generalized quantifier, we would have at least one common semantic feature for all the topic NPs in (9). If we remember the type-shifting mechanism I reviewed in Chapter III (3.2), we will notice there is one more route for a CN to become a generalized quantifier other than THE and A. If an anaphorically used CN could inherit e-type meaning from its antecedent, it would be able to shift into a generalized quantifier through the operation lift. Before we go further on this matter, it would be proper to examine first the syntactic and semantic characteristics of the anaphorically definite NPs in Japanese.

2.1.2 Anaphorically definite NPs

(12b) illustrates the anaphoric use of a CN. The topic NP in (12b) presupposes its antecedent, which is typically an indefinite NP like the nominative NP in (12a).

- (12)a. [Inu-ga]_i ita.
 DOG-NOM EXIST-PAST
 (There was a dog.)
- b. [Inu-wa]_i hoeteita.
 DOG-TOP BE-BARKING-PAST
 (The dog was barking.)

An indefinite NP in the accusative position can also license an anaphoric use of a CN.

- (13)a. Watashi-wa niwa-de [inu-o]_i mita.
 1PER/SIN-TOP YARD-LOC DOG-ACC SEE-PAST
 (I saw a dog in the yard.)
- b. [Inu-wa]_i hirune-o shiteita.
 DOG-TOP NAP-ACC DOING-EXIST-PAST
 (The dog was taking a nap.)

The most important characteristic of anaphorically used CNs is that their interpretation is contingent to a particular syntactic position, the topic position. While English anaphoric NPs can occur in any NP position because English definiteness marking is complete within the NP structure, Japanese which employs case-marking system to mark the NP as anaphoric imposes a strong restriction on their syntactic distribution. The following short English discourse in (14) does not have a direct counterpart in Japanese,

- (14) There seems to be a dog.
 That the dog is barking weighs on my mind.

because Japanese does not license a topic NP within a complex NP structure such as a sentential argument.¹¹

- (15)a. [Inu-ga]; iru yooda.
 DOG-NOM EXIST SEEM-NON-PAST
 (It appears that there is a dog.)
- b. *[Inu-ga]; hoeteiru no-ga
 DOG-NOM IS BARKING COMP-NOM
 kininaru.
 WEIGH ON ONE'S MIND-NONPAST
- c. *[Inu-wa]; hoeteiru no-ga
 DOG-TOP IS BARKING COMP-NOM
 kininaru.
 WEIGH ON ONE'S MIND-NONPAST
- d. [Sono inu-ga]; hoeteiru no-ga
 THAT DOG-NOM IS BARKING COMP-NOM
 kininaru.
 WEIGH ON ONE'S MIND-NON-PAST
 (That that dog is barking weighs on my mind.)

Therefore, (15c) is ungrammatical. (15b) is not felicitous after (15a) because the nominative position in the subordinated clause cannot sustain the anaphoricity. In order to mark the nominative NP in the sentential argument as anaphoric, we have to mark so by a demonstrative as we see in (15d). The same is true for the accusative position.

- (16)a. Niwa-ni [neko-ga]; ita.
 YARD-LOC CAT-NOM EXIST-PAST.
 (There was a cat in the yard.)
- b. *Hachikoo-ga sugu [neko-o]; oikaehajimeta.
 HACHIKOO-NOM IMMEDIATELY CAT-ACC START TO
 CHAISE-PAST
- c. Hachikoo-ga sugu [sono neko-o];
 HACHIKOO-NOM IMMEDIATELY THAT CAT-ACC
 oikaehajimeta.
 START TO CHAISE-PAST
 (Hachikoo immediately started to chaise that cat.)

(16b) is not felicitous after (16a) with the intended

coreference between the nominative NP in (16a) and the accusative NP in (16b). We need a demonstrative to secure the anaphoric relation as we see in (16c).

The interpretation of these anaphorically definite NPs totally depends on that of the antecedent. As such, they are very much like pronouns. In fact we can find a semantic characteristic which is almost exclusively found in pronouns in Japanese also in these anaphoric definites. That is number agreement.

- (17)a. [Otoko-ga]; sannin mise-ni haittekita.
 DOG-NOM THREE PERSONS SHOP-LOC COME IN-PAST
 (Three men came in the shop.)
- b. *[Otoko-wa]; totsuzen kenjuu-o dashi,
 MAN-TOP SUDDENLY GUN-ACC PULL OUT-CONJ.
 happooshita.
 SHOOT-PAST
- c. [Otokotachi-wa]; totsuzen kenjuu-o dashi,
 MAN/PL-TOP SUDDENLY GUN-ACC PULL OUT-CONJ.
 happooshita.
 SHOOT-PAST
 (Th(os)e men suddenly pulled out their guns and shot.)
- d. [Karera-wa]; totsuzen kenjuu-o dashi,
 THEY-TOP SUDDENLY GUN-ACC PULL OUT-CONJ.
 happooshita.
 SHOOT-PAST
 (They suddenly pulled out their guns and shot.)

An anaphorically used CN must be number-marked according to the number of the intended antecedent. (17a) licenses those discourse anaphors in (17cd) but not the one in (17b).

Perhaps the most fundamental analogy between pronouns and the anaphorically definite NPs comes from the way in which they both are definite NPs. What makes both definite, in other words, what makes them able to yield their referents is a variable with a referential index. Unlike those CNs which include a predicate which denotes a singleton set, hence, a uniqueness implication, these anaphorically used CNs seem to include variables referentially bound by their antecedents besides their descriptive predicates. Although pronouns and anaphoric definites seem to share a characteristic of carrying a referential index, they do not seem to share the source from which they are to inherit their reference. The former are likely to have a definite referring expression as the antecedent such as proper names, while the latter are likely to have an indefinite as the antecedent. However, it is not the case that an indefinite can not license a pronoun at all. The very same fact that someone came into the shop may be expressed by at least three different sentences like the following.

- (18)a. Taroo-ga mise-ni haittekita.
 TAROO-NOM SHOP-DAT COME IN-PAST
 (Taroo came into the shop.)
- b. Shoonen-ga mise-ni haittekita.
 BOY-NOM SHOP-DAT COME IN-PAST
 (A boy came into the shop.)
- c. Kyaku-ga mise-ni haittekita.
 CUSTOMER-NOM SHOP-DAT COME IN-PAST
 (A customer came into the shop.)

Each subject NP has a different set of possible discourse

anaphor. (18a) will be followed most naturally by (19a), less naturally by (19b), but never by (19c).

- (19)a. Kare-wa bishonure datta.
3.SIN-TOP SOAKING WET BE-PAST
(He was soaking wet.)
- b. Shoonen-wa bishonure datta.
BOY-TOP SOAKING WET BE-PAST
(The boy was soaking wet.)
- c. Sono shoonen-wa bishonure datta.
THAT BOY-TOP SOAKING WET BE-PAST
(That boy was soaking wet.)

(18b) prefers (19bc) over (19a). (19a) would sound noticeably better if (18b) has a definite description for its subject like "a boy who usually delivers coffee", or "a boy whom I had seen once before" etc. (18c) cannot be followed by any of (19). It only allows the anaphoric use of the CN which is used in the antecedent such as (20a) or (20b).

- (20)a. Kyaku-wa bishonure datta.
CUSTOMER-TOP SOAKING WET BE-PAST
(The customer was soaking wet.)
- b. Sono kyaku-wa bishonure datta.
THAT CUSTOMER-TOP SOAKING WET BE-PAST
(That customer was soaking wet.)

Probably, the indefinite in (18c) does not have enough information about gender to be replaced by a personal pronoun.

The fact is that an indefinite seems to have a power to license a discourse anaphor as a proper name does. The puzzling point is that the former does not have a referential index itself since it is indefinite, and the latter does.

Another puzzling point is that only the former can licence an anaphoric use of a CN. To account for these points, we will have to assume that an indefinite will gain some property which allows it to license an anaphor after it has appeared in the discourse and before the anaphor appears. Furthermore, we will have to assume that the property allows it to license either a pronoun or an anaphoric use of a CN. Suppose now an indefinite, when some conditions are met, is to be given a referential index on the variable its head CN introduces. For example, after the utterance of (12a) which I repeat here as (21), because (21) has an existential implication for the subject NP, it may be able to be registered as a newly introduced element in the discourse.

(21) [Inu-ga]_i ita.
 DOG-NOM EXIST-PAST
 (There was a dog.)

Such a registration may be like (22).

(22) $x = 23$
 $INU'(x) \ \& \ EXIST'(x)$

If we have such a registry in discourse, we may be able to take the referential number as its reference to license a pronoun. Then, we will have a sentence like (23) as a felicitous utterance.

(23) Sore-wa kuroi inu datta.
 3.SIN.NUT-TOP BLACK DOG BE-PAST
 (It was a black dog.)

We can also take the whole registry, i.e., the two descriptive predicates and the numbered variable to construct

an NP denotation which would clearly manifest itself as a familiar element in the discourse. Such an NP denotation must include those familiar properties such as being a dog, and existing at some particular place of the entity referred by 23. In Japanese there is only one syntactic position where such an NP denotation can be created: the topic position. The topic marker "wa", as a generalized type-shifting functor, takes that particular entity referred by 23 and creates an individual sublimation (operation lift) which would surely include those familiar properties such as being a dog and existing. Then, we will have (24) as a felicitous utterance after (21)

(24) [Inu-wa], hoeteita.
 DOG-TOP BE-BARKING-PAST
 (The dog was barking.)

If this rough sketch is in the right track, it will explain how Japanese manages to make a definite/indefinite distinction through its case-marking system. The indefinite/definite distinction it makes is a distinction of a new/old discourse element. The former is associated with a particular semantic type, e-type, which requires least presupposition (hence new), while the latter is associated with another semantic type, a generalized quantifier, which requires most presupposition (hence old).

I have entertained a desirable scenario in which we can account for the semantic nature and the syntactic

distribution of Japanese anaphorically definite NPs. This scenario, however, has a fundamental hole to be filled. That is the interpretation of indefinites. First of all we do not know quite well how the indefinite gets power to license an anaphor. What is that power? And how does the indefinite use that power? In order to answer these questions, we have to move into the realm of indefinites.

2.2 The indefinites

2.2.1 Background

- Standard analysis of English indefinite NPs

Indefinites which serve as the antecedents of discourse anaphors raise an essential question about their interpretations. Discourse anaphors are supposed to inherit their referential indices from their antecedents which are referring expressions which have their own referential indices. Indefinites, however, are regarded as non-referring expressions according to the widely held view, Russell's analysis of indefinite NPs such that indefinites are existential quantifiers. For example, the following, (25a), will have a logical form, (25b), in Russellian representation.

(25)a. A man came in.

b. $\exists x (\text{MAN}'(x) \ \& \ \text{CAME-IN}(x))$

(25b) means that the set of men who came in is non-empty. The indefinite NP, "a man", does not denote a particular individual. A familiar argument for Russell's analysis comes from the negative form of (25a).

(26) It is not the case that a man came in.

If the indefinite in (25a) refers to someone, we would expect (26) to be like the negation of a sentence which includes a clearly referring NP like (27),

(27) It is not the case that John came in.

but (26) would have a much stronger claim that no man came in. This is exactly what Russell's analysis predicts: the set of men that came in is empty. If indeed an indefinite does not refer, then how could we explain the fact that (25a) can be followed by (28).

(28) He/The man was wearing a black coat.

The anaphors, whether it is a pronoun or a definite NP, seem to be referring someone, i.e. the person who came in and is wearing a black coat¹².

It seems important to note that, although Russell's analysis of sentences with indefinites includes an existential quantification, he never explicitly said that the quantificational force comes solely from the indefinite NP. In fact, the logical form he used does not have a constituent which corresponds to the syntactic constituent of an indefinite NP. This very fact had been considered as a

problem by many authors including Montague. Considering the syntactic fact in English that the indefinite article shares its syntactic distribution with many other clearly quantificational determiners, it was a logical choice to interpret indefinite NPs as existential quantifiers, in other words, as having a quantificational force. However, to keep this assumption becomes difficult in giving a satisfactory account for a particular kind of sentence with indefinites, donkey sentences, which are the focus of Heim's 1982 proposal. She believes that donkey sentences "are the examples in which the indefinite exhibits its true semantic nature most openly" (P. 123). What Heim proposes to solve the problem once for all is to reconsider this basic assumption of indefinites as quantifiers. While it took Heim's careful and conscious efforts to separate the quantification from the interpretation of indefinites, it is rather an easy and promising choice for Japanese.

2.2.2 Some evidence for Japanese indefinites not having a quantificational force

In this section I would like to show some evidence for Japanese indefinites not having a quantificational force, in other words, to show why Heim's quantifier-free analysis of English indefinites is advantageous to Japanese. Before I start to present some arguments, let me remind you of what

the empirical coverage of the discussion is. We have seen that if a CN is not intrinsically definite, in other words, does not include a predicate which has a uniqueness implication, that CN in the nominative position (i.e., CN + ga) as well as in the accusative position (i.e., CN + o) are interpreted as indefinite. The facts so far gathered are that bare CNs carrying a thematic case such as nominative and accusative are indefinite unless that CN is intrinsically definite. The Japanese indefinites I will focus on here are those in the following examples.

- (29)a. Taroo-wa hon-o yonda.
 -TOP BOOK-ACC READ-PAST
 (Taroo read some part of a book/a book/some books.)
- b. Inu-ga hoeteiru.
 DOG-NOM BE BARKING-NON-PAST
 (A dog/Some dogs are barking.)
- c. Hima-ga nai.
 FREE TIME-NOM NONEXISTENT-NON-PAST
 (Free time is nonexistent./There is no free time.)
- d. Taroo-wa kami-o kubatta.
 -TOP PAPER-ACC DISTRIBUTE-PAST
 (Taroo distributed some sheets of paper.)

As you see from the English translations, these indefinites are unspecified as to the amount or number of the object which the predicate of the CN is true of. My first argument against analyzing Japanese indefinites as having quantificational force is based on this intuitive fact. My second argument comes from a syntactic fact that unlike the English indefinite article which shares its syntactic

distribution with other clearly quantificational determiners, Japanese case-marking particles which seem to be responsible for marking the indefiniteness do not share that syntactic property with those clearly quantificational elements in Japanese, which are nouns and occur in adjunct position as adverbs in Japanese¹³. Hence, there is a lack of syntactic motivation. In other words, it is not only the case that Japanese indefinites do not behave like quantifiers semantically, but also that there is no syntactic indication for them to be quantifiers.

Then, where should we search for the source of existential quantificational force, which seems to be existent in those examples like (29abd)? (29ad) share certain syntactic and semantic properties. Indefinites in both sentences are in the accusative position of an extensional verb in the past tense. This type of verb will yield the existential generalization for their accusative NPs. In other words, The sentences with this type of verb entail the existence of the referent of the accusative NP. For example, in order for (29a) to be true, there must be at least some portion of a book such that Taroo read it. If we change the verb "yomu" (READ) in (29a) to an intensional verb "yomitai" (WANT TO READ), we seem to lose existential generalization. (29a) can be naturally followed by (30b), which asserts that there is not any book.

- (30)a. Taroo-wa hon-o yomitakatta.
 -TOP BOOK-ACC WANT TO READ-PAST
 (Taroo wanted to read a book.)
- b. Demo, hon-ga issatsumo nakatta.
 HOWEVER BOOK-NOM EVEN ONE VOLUME NONEXISTENT-PAST
 (However, there was no book.)

If we change the tense of the verb in (29a), we also seem to lose the existential generalization. (31a) can occur with a conditional clause like (31b), which can be followed by (31c) which entails that Taroo will not read a book, hence there won't be any book Taroo reads.

- (31)a. Taroo-wa hon-o yomu
 -TOP BOOK-ACC READ-NON-PAST
 (Taroo would read a book,)
- b. hima-ga areba.
 FREE TIME-NOM EXIST-CONDI.
 (if there is free time.)
- c. Jissai, Taroo-wa hima-ga
 IN FACT -TOP FREE TIME-NOM
 zenzen nai.
 AT ALL NONEXISTENT-NON-PAST
 (In fact, Taroo has no free time.)

Sentences like (29bc) contain more explicitly existential verbs: *iru* (EXIST), *nai* (NONEXISTENT). My third argument, which is by no means comprehensive, is that the existential force does not seem to come from the indefinites, but from other part of the sentences, which are responsible for generating existential generalization for the indefinites.

Finally, I will argue that even those NPs which look like quantified NPs are not doing the quantification but the predication. Japanese quantifiers are nouns which occur

either as an adverb or a nominal modifier. In the former case, they are not case-marked, but in the latter, they are case-marked as genitive NPs. My argument is that those NPs which contain a quantifier-like genitive NP are not quantified, although they look like so because of the structural similarity to English quantified NPs. The relevant examples are like the following.

- (32)a. Taroo-wa issatsu-no hon-o yonda.
 -TOP ONE VOLUME-GEN BOOK-ACC READ-PAST
 (Taroo read a (volume of) book.)
- b. Taroo-wa oozei-no gakusei-o mita.
 -TOP MANY PEOPLE-GEN STUDENT-ACC SEE-PAST
 (Taroo saw many students.)

The NPs in (32ab) seem to be doing exactly the same thing as the adverbs in (33ab).

- (33)a. Taroo-wa hon-o issatsu yonda.
 -TOP BOOK-ACC ONE VOLUME READ-PAST
 (Taroo read a (volume of) book.)
- b. Taroo-wa gakusei-o oozei mita.
 -TOP STUDENT-ACC MANY PEOPLE SEE-PAST
 (Taroo saw many students.)

However, if we have another quantificational NP in the subject position, the NP in (32a) does not seem to present an expected scope interaction.

- (34)a. Minna-ga issatsu-no hon-o yonda.
 ALL-NOM ONE VOLUME BOOK-ACC READ-PAST
 (Everyone read a book.)
- b. Minna-ga hon-o issatsu yonda.
 ALL-NOM BOOK-ACC ONE VOLUME READ-PAST
 (Everyone read a book.)

(34a) seems to have only the wide scope reading for "a book", while (34b) has both the wide scope and narrow scope reading.

- (35)a. Minna-ga onaji issatsu-no hon-o yonda.
 ALL-NOM SAME ONE VOLUME BOOK-ACC READ-PAST
 (Everyone read the same book.)
- b.*Minna-ga chigau issatsu-no hon-o yonda.
 -NOM DIFFERENT ONE VOLUME BOOK-ACC READ-PAST
- (36)a. Minna-ga onaji hon-o issatsu yonda.
 -NOM SAME BOOK-ACC ONE VOLUME READ-PAST
 (Everyone read the same (one volume of) book.)
- b. Minna-ga chigau hon-o issatsu yonda.
 -NOM DIFFERENT BOOK-ACC ONE VOLUME READ-PAST
 PAST
 (Everyone read a (volume of) different book.)

As we see, (35b) results in a semantic anomaly. Adverbial quantification in Japanese shares the same characteristics with English quantified NPs, while the nominal modification by a quantity noun doesn't. This difference becomes more obvious when we have those quantificational nouns which go with either mass or count nouns like "hotondo" (MOST).

- (37)a. Taroo-wa hotondo-no hon-o yonda.
 -TOP MOST-GEN BOOK-ACC READ-PAST
 (Taroo read most of the books.)
- b. Taroo-wa hon-o hotondo yonda.
 -TOP BOOK-ACC MOST READ-PAST
 (Taroo read most of the book/books.)
- c. Taroo-wa hotondo-no suupu-o nonda.
 -TOP MOST-GEN SOUP-ACC DRINK-PAST
 (Taroo ate most kinds of soup.)
- d. Taroo-wa suupu-o hotondo nonda.
 -TOP SOUP-ACC MOST DRINK-PAST
 (Taroo ate most of the soup.)

As we can see from the English translations, (37a) is lacking the mass reading for "hon" (BOOK). "Hotondo" in the prenominal position imposes plural reading of the following noun, even for mass nouns as in (37c). Suppose X is a

variable for a plural-individual, "hotondo" in the nominal position seems to introduce only this kind of variable. The logical form for (37a) would be roughly as follows:

(38) HON'(X) & HOTONDO'(X) & YONDA'(t, X)

For (38) to be true, there must be a plural entity which consists of books, and is large enough to be called "majority" and Taroo read. (37b), on the other hand, seems to have a quantifier. Suppose Wx is a quantifier which reads "for most x", and mx is a variable for a mass-part individual, (37b) would have the following logical form.

(39) $Wm_{x_{HON'(mx)}} YONDA'(t, mx)$

(39) reads "for most mass-part individual mx with a property of being books, Taroo read it. It seems that the prenominal modification by a quantity noun, which appears to make the whole NP as a quantified one, is merely adding another predication, a property (a set). "Hotondo-no hon" in (37a) denotes an intersection of two independent properties: one is being books, the other is being majority members. Because the only available variable for the latter property is X, the denotation range of the other part of the sentence will be restricted to the same kind of denotation range, hence only plural reading. "Hotondo" in (37b) does not introduce any independent property, but directly acts on the set denoted by "hon" and picks up some subset out of it. If this is correct, how could those bare NPs, which are formed by a single CN and a particle, be quantified NP?

I believe that the above arguments are enough for us to motivate ourselves to explore a possibility of analyzing Japanese indefinites from a different perspective from the one the standard analysis provides. In the following, I will introduce one of those perspectives, Heim's quantifier-free interpretation of English indefinites.

3. Heim's quantifier free interpretation of indefinites

3.1 The overview

Before I start reviewing Heim's proposal, I should acknowledge a couple of points. One is that Kamp (1981) also developed a very similar analysis as one we are going to review here. His work has been very influential in the efforts of developing a proper framework in which the discourse representation can be implemented. Since my present interests are not in the representation of discourse, but mainly in conceptual analysis of indefinites and their anaphoric definites, I will allow myself to ignore some important part of the literature. Another point which needs to be mentioned here is that I will not be able to provide a thorough review of Heim's recent proposal (1990), in which she seems to take a different direction. Since I believe that her 1982 proposal still has a lot to offer for us to understand Japanese indefinites, and it constitutes a basis

of my analysis, I will render the next several pages for her innovative proposal.

Heim's 1982 dissertation aims to construct the semantics of not only indefinite but also definite NPs. Her enterprise proceeds in two steps. In the first step she provides an alternative analysis for indefinites and definites, in which they are basically quantifier free, i.e., they contain a free variable and the descriptive predicate, if any. She argues that this analysis is well motivated in order to solve a long-standing problem surrounding so-called donkey sentences. This variable analysis for both definite and indefinite NPs would have as a *prima facie* result that the definite/indefinite contrast is to be obliterated. The second step of her enterprise is to provide a theory to restore this contrast. In the proposed semantic theory, definites and indefinites are to get bound under different felicity conditions: a variable is felicitously definite when it is "familiar", while a variable is felicitously indefinite when it is "novel". For a variable to be familiar in the discourse is for a variable to have its antecedent in the text or a contextually salient referent. Heim thinks that this notion of familiarity which unites the two cases will be best captured in an extra level of interpretation, the "file level". Her main efforts in this second part are in making the relationship of that level to the conventional truth-

conditional semantics precise.

My interest is mainly in the first part of her enterprise, and in particular, the interpretation of indefinites. We have seen that among those Japanese NPs which are formed by a single CN and a case-marking particle, definites are either intrinsically definite, or anaphorically definite, and that only the latter kind of definites are to get bound with their antecedents, which are indefinites. Assuming that some co-indexing mechanism would successfully transfer the semantic property of the antecedent to its anaphor, our investigation can be focused on the interpretation of indefinites. Because of these reasons, the following will leave out a substantial part of Heim's semantic theory, although I believe that the most innovative insight remains in her alternative interpretation of indefinites, which initially motivated her to develop her semantic theory.

3.2 Donkey sentences and their problems

The kind of sentences which motivated Heim to propose her new interpretation of indefinites are so-called donkey sentences. The following are some examples from Heim.

- (40)a. If someone is in Athens, he is not in Rhodes.
- b. If a man owns a donkey, he beats it.
- c. Every man who owns a donkey beats it.

Donkey sentences contain an indefinite NP which is inside an

if-clause or relative clause, and a pronoun which is outside that if-clause or relative clause, but anaphorically related to the indefinite. The most commonly given logical forms for these sentences contain a universal quantification:

- (41)a. (= 40a)
 $\forall x(x \text{ is in Athens, } \rightarrow \neg(x \text{ is in Rhodes}))$
- b. (= 40bc)
 $\forall x \forall y((x \text{ is a man \& } y \text{ is a donkey \& } x \text{ owns } y) \rightarrow x \text{ beats } y)$

Here, we have an essential problem involving a supposedly non-referring expression, an indefinite NP, which seems to be capable in licensing a discourse anaphor, and another problem such that an indefinite NP appears to have not only an existential quantificational force, but also a universal quantificational force. After examining several approaches to this matter, Heim classifies them into two groups: one is those that revisit and diversify the semantics of pronouns (Evans, Cooper, Parson), and the other is those that revisit and diversify the semantics of indefinites. The former approaches purport to maintain a simple semantics of the indefinites as expressing existential quantification, and diversify the semantics of pronouns by acknowledging the third kind of pronouns (besides referential pronouns and bound variables) which are responsible for the donkey sentences: disguised definite descriptions which have the logical characteristics of Russell's definite descriptions. The latter approaches (Geach, Egli, Smaby) purport to

maintain a simple semantics of pronouns such that all non-referring pronouns are bound variables, and concede indefinites a larger range of quantificational force: an indefinite can change itself from an existential into a universal quantifier under certain conditions. Heim agrees with the latter in that what we should revisit is the semantics of indefinites, not pronouns. However, she believes that we need a more drastic change than proposed by her predecessors.

The examples like the following make Heim wonder if the indefinites have any quantificational force of their own at all.

- (42)a. If a man own a donkey, he always beats it.
- b. In most cases, if a table has lasted for 50 years, it will last for another 50.
- c. Sometimes, if a cat falls from the fifth floor, it survives.
- d. If a person falls from the fifth floor, he or she will very rarely survive.

These are donkey sentences which contain a quantificational adverb. (42a) through (42d) might be paraphrased under the intended readings as the following.

- (43)a. For every man and donkey such that the former owns the latter, he beats it.
- b. Most tables that have lasted for 50 years last for another 50.
- c. Some cats that fall from the fifth floor survive.

- d. Very few people that fall from the fifth floor survive.

We notice that in these paraphrases, the indefinites have been eliminated and replaced with various indisputably quantified NPs. If the indefinites are in fact quantifiers, then it seems that their quantificational force varies widely according to whatever quantificational adverb happens to be in the linguistic environment. Of course, we may have an alternative view on this, which seems more sensible. If the indefinites do not seem to hold any determining factor over deciding which quantificational force will be employed, why should we assume that they have any quantificational force of their own at all in the first place? The above examples rather suggest that indefinites are behaving just like variables which may get bound by whatever quantifier is available to bind them. The quantificational force which appeared to be of the indefinites is in fact here construed by the quantificational adverbs. If we go back to the ordinary donkey sentences without explicit adverbial quantifiers with this line of thoughts, we may analyze them as including an implicit operator "always". This is exactly what Heim does in her analysis. Heim, furthermore, argues that this implicit operator will rise in the process of providing truth conditions, in other words, it will be defined in terms of an interpretive principle which is not linked to a lexical meaning of any particular expression in

a sentence.

3.3 Adverbial quantification

In her quantifier-free analysis of indefinites, Heim adopts Lewis' analysis of "adverbs of quantification" (1975). According to Lewis, Q-adverbs are operators which take two sentential arguments in the following canonical form.

(44) Q-Adv (A, B)

Unlike ordinary selective quantifiers such as existential or universal one, Q-adverbs are unselective quantifiers which are to bind not just one particular variable, but a number of variables simultaneously. Now take "always" as such a Q-Adv, the truth condition of a formula "always (A,B)" will be as follows:

(45) always (A,B) is true, iff every assignment to the free variables in A which makes A true also makes B true.

Applying (45) to (42a), it will have the following logical form.

(46) always((x is a man & y is a donkey & x owns y),
(x beats y))

According to (45), the truth condition of this logical form turns out identical to the one which uses the selective quantifier in (41b) which is here repeated as (47).

(47) $\forall x \forall y ((x \text{ is a man} \ \& \ y \text{ is a donkey} \ \& \ x \text{ owns } y) \rightarrow x \text{ beats } y)$

In this analysis of adverbial quantifiers by Lewis, the

indefinites in an if-clause are interpreted as free variables with a descriptive predicate, which themselves do not have a quantificational force. The question which we should raise here is whether or not this variable analysis of indefinites can be carried over to the other kind of constructions which do not involve adverbial quantification. Heim claims that it can, and in fact the variable-reading is "contributed by the lexical meaning of the indefinite" (P.130). In other words, the indefinites will not contribute any more than a variable reading in the sentence it occurs, regardless of the syntactic construction of that sentence.

3.4 Some implications in Japanese

Heim's quantifier-free analysis for indefinites is well suited to Japanese indefinites. As we have seen, quantification in Japanese seems to be performed by adverbs. Sentences like the following which typically include an indefinite do not seem to be quantified until the variable introduced by that indefinite NP is bound by a quantificational adverb.

- (48)a. Onna-no hito-ga kita.
FEMALE-GEN PERSON-NOM COME-PAST
- b. Onna-no hito-ga hitori kita.
FEMALE-GEN PERSON-NOM ONE PERSON COME-PAST
(A woman came.)
- c. Onna-no hito-ga oozei kita.
FEMALE-GEN PERSON-NOM MANY PEOPLE COME-PAST
(Many women came.)

Applying her analysis to Japanese indefinites which are formed by a single CN and a case-marking particle, they are free variables with descriptive predicates. Throughout my study, we have been assuming that the CN is a combination of a descriptive predicate and a free variable. Then, what is the difference between a CN interpretation and the interpretation of an indefinite NP? The difference is that the variable of the former is not bound, whereas the variable of the latter is bound by an NP-external quantificational force. The adverbial quantifier will bind such a free variable.¹⁴ When there isn't any adverbial quantifier, if the sentence which hosts an indefinite yields the existential generalization for an object which satisfies the descriptive predicate of the head CN of that indefinite, its free variable will be bound through an existential closure in the provided truth condition for the sentence. Japanese indefinites are essentially unquantified within the NP structure, in other words, Japanese NPs are not quantificational. They don't have a quantificational force by themselves.¹⁵

Heim's variable analysis of indefinites and definites has revealed the fact that in order for an NP to be able to licence a discourse anaphor, that NP does not necessarily have to be a truly referential NP. It seems to be the case

that an e-type variable, if it can create a salient referent in the discourse, is capable of serving as an antecedent. Analyzing an indefinite antecedent as denoting an e-type meaning is in fact vital for us to understand the definite/indefinite marking in Japanese through the case-marking system. Together with the hypothesis that Japanese topic NPs are associated with $\langle\langle e, t \rangle, t \rangle$ type meaning, and the thematic NPs are associated with e-type meaning, the analysis explains the syntactic distribution of indefinites in Japanese. They have to be in the NP position which are compatible with this particular type of meaning, i.e., e-type. Thus, they occur in thematic NP position such as nominative, and accusative. It also explains the syntactic distribution of the anaphorically definite NPs which inherit the semantic content from the indefinite antecedent, e-type meaning. In order for them to denote a generalized quantifier which can include the familiar properties of the referent, they must be in the topic position, which is the only position where they can be lifted to a generalized quantifier.

One remaining problem in Japanese is how to extend the present analysis to plural and mass indefinites. For example, the NPs in the following sentences seem to require different truth conditions, but those cannot be attributed to the NP syntax, which seems to be a reasonable thing to do in

English.

- (49)a. Gakusei-ga kita.
 STUDENT-NOM COME-PAST
 (A/Some student/students came.)
- b. Gakusei-ga atsumatta.
 STUDENT-NOM GATHER-PAST
 (Some students gathered.)

How could we provide a right kind of existential closure for each sentence? In order for (49a) to be true, there must have been at least one student who came. In order for (49b) to be true, there must have been at least two students who came. In the following section, I will provide a semantic analysis of a small fragment of Japanese which contains indefinites and the anaphorically related definites NPs. In that analysis, I intend to deal with the above problem.

4. A semantic analysis of Japanese CNs - Part IV

4.1 Preliminaries

Here, finally I will present some semantic analysis of Japanese indefinites and their anaphorically related definite NPs. A specific goal of this analysis of a small fragment of Japanese is to illustrate how Japanese succeeds in marking the indefinite/definite distinction through its abstract case assignment. In other words, how Japanese is to dispense with the indefinite and definite articles. In doing so, I will adopt Link's structured nominal domain, Partee's universal type-shifting principles, and Heim's quantifier-free variable

analysis of indefinites. I also intend to defend my multiple-variable system for Japanese nominal domain (proposed in Chapter II.), and an analysis of Japanese case-marking particles as generalized type-shifting functors (proposed in Chapter IV). Furthermore, I will propose a new account for the fact that anaphorically definite NPs which consist of a bare CN and a case-marking particle in Japanese are always in the topic position. A general purpose of this section is to examine those cases in which the variable part of the CN interpretation is to be sufficiently used to yield some linguistic significance. The analysis will show two major tasks it performs: one is being bound by a quantifier, the other is to carry a referential index.

The empirical coverage of the present analysis comprises the following three short discourses.

- (50) [inu-ga]_i iru.
 DOG-NOM EXIST-NONPAST
 [Inu-wa]_i hoeteiru.
 DOG-TOP BARKING-EXIST-NONPAST
 (There is a dog. The dog is barking.)
- (51) Taroo-wa [sara-o]_i narabeta.
 TAROO-TOP DISH-ACC PLACE IN ORDER-PAST
 [Sara-wa]_i juumai datta.
 DISH-TOP TEN PIECES BE-PAST
 (Taroo placed some dishes in order. The dishes were
 ten.)
- (52) Hanako-wa [gyuunyuu-o]_i nonda.
 HANAKO-TOP MILK-ACC DRINK-PAST
 [gyuunyuu-wa]_i suppakatta.
 MILK-TOP SOUR-PAST
 (Hanako drank some milk. The milk was sour.)

The first sentence in these examples includes an indefinite either in the nominative or accusative position. The second sentence has an anaphorically definite NP in the topic position. The example (50) represents the singular interpretation of a CN, (51), plural, and (52), mass, respectively.

I will assume all the theoretical tenets that I have adopted in the previous analyses as well as all the consequences thereof. Although the empirical coverage of the present analysis extends beyond the sentence level onto the discourse, I will not intend to commit myself to a particular theory of discourse representation. I adopt the very core analysis of indefinites of Heim's, but not her file keeping semantics. I intend to keep the part which requires some discourse representation minimum and general.

4.2 A semantic analysis of Japanese indefinites and definites

4.2.1 The hypotheses

The present analysis has three major components. The first component consist of the interpretation of the indefinite which serves as an antecedent of a discourse anaphor, which includes the logical form of that NP and the truth condition of the sentence which includes it. Here, I continue to assume that a CN denotes a structured set, and introduces a free

variable of various kinds which ranges over entities in that set. It will be further hypothesized that the free variable can be bound in the interpretation process through an existential closure. In this case the truth conditions of the sentence entail the existence of an object in the extension of the CN. The second component deals with the discourse representation. In other words, it will illustrate how the discourse information created by the utterance of a sentence will be stored in the discourse. It is in this part of the grammar that the variable existentially bound will get the referential index. A crucial consequence which follows is that an e-type variable with a referential index can denote an individual. The last component of the analysis will explain why an NP anaphorically related to the indefinite has to occur in the topic position in the following discourse. It will be argued that it is so because the denotation of such an anaphorically definite NP must be a property set which can include the properties which have already been made familiar in the discourse. If we assume that only the topic position is associated with a generalized quantifier (a property set), and that the topic marker "wa" is a generalized type-shifting functor which systematically shifts the given meaning to a generalized quantifier, it will explain why the anaphorically definite NP occurs exclusively in the topic position.¹⁶

4.2.2 Analysis

4.2.2.1 Informal discussion

Let us start by looking at those sentences which contain an indefinite antecedent, which are in the first half of the discourse of (50) through (52). I repeat them here as (53abc). One common characteristic among these three sentences is that they all have an extensional verb with a positive polarity and an indefinite NP in the thematic position. Furthermore, they all seem to entail the existence of an object which is in the extension of the CN of the indefinite.

- (53)a. [inu-ga] iru.
DOG-NOM EXIST-NONPAST
(There is a dog.)
- b. Taroo-wa [sara-o] narabeta.
TAROO-TOP DISH-ACC PLACE IN ORDER-PAST
(Taroo placed some dishes in order.)
- c. Hanako-wa [gyuunyuu-o] nonda.
HANAKO-TOP MILK-ACC DRINK-PAST
(Hanako drank some milk.)

And we know that these indefinites are capable of being an antecedent for a discourse anaphor as we see in (50) through (52). Let us now add to these sentences some scope creating element such as negation to see if the indefinites can still license an anaphor. With the negation, the first example seems no longer capable of licensing an anaphor.

- (54)a. [inu-ga], inai.
DOG-NOM EXIST-NEG-NONPAST
(There isn't a dog.)

*[Inu-wa]_i hoeteinai.
 DOG-TOP BARKING-EXIST-NEG-NONPAST

(54a) literally denies the existence of an object which can be called by the CN "inu" (DOG). As a result, the indefinite does not seem to be able to license a discourse anaphor.

(55)a. Taroo-wa [sara-o]_i narabenakatta.
 TAROO-TOP DISH-ACC PLACE IN ORDER-NEG-PAST
 (Taroo didn't place dishes in order.)

b. [Sara-wa]_i yogoreteita.
 DISH-TOP DIRTY-PAST
 (The dishes were dirty.)

(56)a. Hanako-wa [gyuunyuu-o]_i nomanakatta.
 HANAKO-TOP MILK-ACC DRINK-NEG-PAST
 (Hanako didn't drink any milk.)

b. [Gyuunyuu-wa]_i suppakatta.
 MILD-TOP SOUR-PAST
 (The milk was sour.)

(55a) and (56a), on the other hand, are not contradictory even if there is no such object referred to by a CN in the indefinite. They do not preclude, however, the existence of such an object, either. Those indefinites in (55a) and (56a) seem to retain their power to serve as an antecedent of a discourse anaphor as we see in (55b) and (56b). However, if you read the examples carefully, you would notice that only one kind of reading of (55a) and (56a) is associated with their b. sentences: the specific reading or de re reading. A speaker who utters (56a), for example, may know about the existence of an object such that Hanako did not drink it. He or she either knows that such an object existed, as in (57a), or may not know whether or not it was there, as in (57b), or

else, knows that there wasn't such an object, as in (57c).

- (57)a. Atta keredo,
 EXIST-PAST ALTHOUGH
 Hanako-wa gyūnyū-o nomanakatta.
 HANAKO-TOP MILK-ACC DRINK-NEG-PAST
 (Although there was some milk, Hanako didn't drink any.)
- b. Nakatta-no kamoshirenai ga,
 NONEXISTENT-PAST-COMP MAYBE BUT
 Hanako-wa gyūnyū-o nomanakatta.
 HANAKO-TOP MILK-ACC DRINK-NEG-PAST
 (There may not have been any milk, and
 Hanako did not drink milk.)
- c. Nakatta node,
 NONEXISTENT-PAST THEREFORE
 Hanako-wa gyūnyū-o nomanakatta.
 HANAKO-TOP MILK-ACC DRINK-NEG-PAST
 (Because there wasn't any, Hanako didn't drink
 milk.)

Only (57a) can be felicitously followed by (56b). Now we go back to the example (54a), we will notice that it does have a specific reading of the indefinite. If a speaker has a specific dog in mind, such as one which the speaker may have seen before, the speaker would felicitously say after (54a) "Inu-wa doko daroo" (WHERE IS THE DOG, I WONDER).

In 2.2.2, we have seen that a particular tense, and the intensionality of the predicate may cancel the existential implication about the referent of an indefinite. There seem to be at least two kinds of semantic conditions where an indefinite can serve as an antecedent of a discourse anaphor: one is in those sentences which have an existential generalization, and the other is when the indefinite has a specific reading (de re reading). Such a reading will have

a logical form in which existential closure has the widest scope.

4.2.2.2 The logical form

Now suppose that a CN contains a combination of a descriptive predicate and a free variable of any kind as we have been assuming, and a proper name acts like an individual constant. Suppose also that transitive verbs subcategorize their direct argument NPs with a specification of a particular kind of variable. Then (53abc) will roughly have the following logical forms.

(58)a. (=53a)

DOG'(x) & EXIST'(x)

b. (=53b)

DISH'(X) & PLACED-IN-ORDER'(t, X)

c. (=53c)

MILK'(mx) & DRANK'(h, mx)

These logical forms are not quite complete as truth conditions. In order to provide a truth condition for each of these logical forms, we have to count for the important semantic property which all these sentences seem to share, i.e., existential closure. In other words, any free variable must be properly bound by an existential quantifier. The truth conditions for (53abc) will be like (59abc).

(59)a. (=53a)

$$\exists x [\text{DOG}'(x) \ \& \ \text{EXIST}'(x)]$$

b. (=53b)

$$\exists X [\text{DISH}'(X) \ \& \ \text{PLACED-IN-ORDER}'(t, X)]$$

c. (=53c)

$$\exists mx [\text{MILK}'(mx) \ \& \ \text{DRANK}'(h, mx)]$$

A sentence like (56a), which contains a scopal element such as negation, will have two spots for an existential quantifier: one is on the left of the interacting element like in (60a), and the other is on the right like in (60b)

(60)a. $\exists mx [\text{MILK}'(mx) \ \& \ \neg [\text{DRANK}'(h, mx)]]$

b. $\neg [\exists mx [\text{MILK}'(mx) \ \& \ \text{DRANK}'(h, mx)]]$

We have seen that only the reading such as (60a) makes it possible for an indefinite to license an anaphor.

When a free variable introduced by a CN is bound by the leftmost existential quantifier as it is in (59abc) and (60a), the discourse recognizes a new salient discoursal element which can be a proper referent for a discourse anaphor. An elaborate system for such discourse representations can be found in Heim's file-keeping semantics, or Kamp's comprehensive theory of discourse representation (1981). Instead of developing or adopting a theory of discourse representation, here I will propose a simple step which can be taken in some level of interpretation after the level in which the truth condition

is provided. In such a level of semantic representation, those truth conditions in (59abc) and (60a) will be reanalyzed with a new referential index for the free variable. The reanalyzed logical forms will be like (61abcd).

(61)a. (=53a)

DOG'(x23) & EXIST'(x23)

b. (=53b)

DISH'(X13) & PLACED-IN-ORDER'(t, X13)

c. (=53c)

MILK'(mx4) & DRANK'(h, mx4)

d. (=56a)

MILK'(mx6) & $\neg$ [DRANK'(h, mx6)]

These free variables with a different referential index in (61) each denote a different individual. In other words, the semantic type of such expressions is e-type. One important difference between those indexed variables and individual constants such as "t" (Taroo) and "h" (Hanako) is that the former carry some descriptive predicates, and the latter don't. For example, a newly analyzed individual such as x23 carries two descriptive predicates, DOG' and EXIST'. This means that the individual referred to by x23 is known to have at least two properties such as being a dog, and existing.

An anaphorically definite NP which is meant to refer to this individual, x23, must have a denotation which sufficiently includes these known or familiar properties of this

individual. Only by doing so, the anaphorically definite NP properly relates itself to its intended antecedent, x23. Such a denotation, i.e., a property set ($\langle\langle e, t \rangle, t \rangle$) can be generated from an e-type denotation through a type-shifting principle called lift. In Japanese, according to the present hypotheses, the topic position is the only position where an NP denoting an $\langle\langle e, t \rangle, t \rangle$ type meaning can occur. In other words, the topic case-marker "wa" is a generalized type-shifting functor which takes a given denotation to shift it into a generalized quantifier. This explains why all the anaphorically definite NPs which consist of a bare CN and a case marking particle occur in the topic position as we see in (50) through (52), which I repeat here as (62ab) through (64ab).

- (62)a. [Inu-ga]_i iru.
 DOG-NOM EXIST-NONPAST
 (There is a dog.)
- b. [Inu-wa]_i hoeteiru.
 DOG-TOP BARKING-EXIST-NONPAST
 (The dog is barking.)
- (63)a. Taroo-wa [sara-o]_i narabeta.
 TAROO-TOP DISH-ACC PLACE IN ORDER-PAST
 (Taroo placed the dishes in order.)
- b. [Sara-wa]_i juumai datta.
 DISH-TOP TEN PIECES BE-PAST
 (The dishes were ten.)
- (64)a. Hanako-wa [gyuunyuu-o]_i nonda.
 HANAKO-TOP MILK-ACC DRINK-PAST
 (Hanako drank some milk.)
- b. [Gyuunyuu-wa]_i suppakatta.
 MILK-TOP SOUR-PAST
 (The milk was sour.)

After the a. sentences have been interpreted, and reanalyzed with a referential index for the free variable as in (61abc), the indexed variable will be able to stand as an antecedent. In each of the anaphorically definite NPs in the b. sentences, the e-type denotation of the antecedent is inherited with a descriptive predicate, and is shifted into a generalized quantifier by a generalized type-shifting functor, "wa", which performs the operation lift so that the anaphorically definite NP will denote a property set which includes familiar properties of the entity. The topic NP in (62b) denotes a generalized quantifier - the individual sublimation of the entity, "x23", i.e., a set of all the properties that x23 has including those familiar ones such as being a dog, and existing at some particular place. The logical forms of the anaphorically definite NPs in the b. sentences in (62) through (64) are (65abc) respectively.

(65)a. $\lambda P [\text{DOG}'(x23) \ \& \ \text{EXIST}'(x23) \ \& \ P(x23)]$

b. $\lambda P [\text{DISH}'(X13) \ \& \ \text{PLACED-IN-ORDER}'(t, X13) \ \& \ P(X13)]$

c. $\lambda P [\text{MILK}'(mx4) \ \& \ \text{DRANK}'(h, mx4) \ \& \ P(mx4)]$

4.2.3 Conclusion

Although the present analysis has started with a set of quite different assumptions from that of Evans (1977, 1980 see also note 9 in this chapter), it has reached the logical form like

in (65) which presents a striking similarity to his analysis. In his analysis, the indefinite antecedent does not bind its anaphor, hence it does not need to refer. So he keeps the standard analysis of indefinites being an existential quantifier. It is anaphors themselves that have power to be referring expressions, he claims. He analyzed anaphors with hidden descriptions which are systematically provided by the sentence in which the antecedent occurs. In other words, anaphorically definite NPs are definite descriptions, the descriptions of which are hidden. One difference between Evans' analysis and the present one, besides the fundamental difference in the understanding of indefinite antecedents, is the link between the indefinite antecedent and its anaphor. Evans' analysis fails to establish such a link, or does not even require such an establishment. In the present analysis, such a link which is established through transferring a referential index is crucial for the anaphor to obtain a proper denotation, a generalized quantifier, which rightly contains all the familiar properties of that entity. Another difference is that Evans' analysis does not provide any rationale why the anaphor has to drag all the hidden descriptions, whereas the present analysis does. In order for the definite to create some presuppositions about its familiar properties, it has to be associated with some particular type of meaning, generalized quantifier, which can accommodate those properties. The present analysis can also

provide a semantic account for such old notions in pragmatics as "old information" and "new information". Heim (1990) recently questioned her early treatments of donkey anaphora: whether those innovations including a quantifier-free analysis of indefinites were necessary. In her new paper, she explores an alternative in which she takes back a more traditional view and tries to make Evans' analysis workable. Japanese, however, seems to encourage us to hang on to her original idea a little longer than Heim seems to be willing to.

- (i) Who could take care of the kids
during those three days?
There is Mrs. Jones.

6. I here exclude those NPs which contain determiners of totality. The definiteness of these NPs will be explained by the semantic nature of the referent such that totality entails the unique existence.

7. This, of course, is not necessary as we see in (i). The example was given by B. Abbott.

- (i) [A very strange individual]_i entered the room.
[The man]_i was wearing no clothes.

8. I should remind the reader of the empirical coverage of my discussion here. Anaphorically definite NPs are those NPs which have their linguistic antecedents. Since I focus on those anaphorically definite NPs which consist of a bare CN and a case-marking particle, I will not discuss those NPs which include deictic pronouns such as "sono inu" (THAT DOG).

9. For the interpretation of the topic NP of this kind, see Ch. IV.

10. In 1990 discussion, generic sentences and sentences with a stative predicates were excluded. The discussion was focused on those ordinary sentences with an active predicate.

11. Topic NPs never occur inside a relative clause. A syntactic account for this fact was given in Takano (1989). As for sentential arguments, see Ch. IV.

12. One direction we can take to solve this problem is to reconsider the anaphoric relation between an indefinite antecedent and a discourse anaphor. Geach (1962) proposed that the anaphoric relation here is not such that two NPs are sharing the same referential index, but such that the former binds the latter as a bound variable. This analysis presupposes that indefinites are in fact existential quantifiers. However, it has an undesirable consequence that we have to have an exceptional case such that those existential quantifiers will have a scope which exceeds the sentence in which they occur. Accordingly, he has to assign a truth condition to not an individual sentence, but to a sequence of sentences. This even precludes the assignment of a truth condition to the individual sentence which seems to deserve a truth condition independently. In other words, in

his approach, there is no way to make a contrast between (ia) and (ib):

- (i)a. A man came in the shop.
He/The man was wearing a coat.
- b. A man came in the shop who was wearing a coat.

Another way to resolve this problem was proposed by Evans (1980). He claimed that the anaphors themselves have power to be referring expressions. They are containing hidden descriptions which are systematically formed by the sentence in which their antecedents occur. According to this proposal, (ia) will be analyzed as meaning the same as:

- (ii) A man came in the shop.
The man who came in the shop was wearing a coat.

The indefinite antecedent does not bind the anaphor here. Instead, the linguistic environment in which that indefinite antecedent occurs, systematically provides a disguised description for the anaphor. In this approach, the indefinite antecedent does not need to refer at all. So, Evans can keep Russellian interpretation of indefinite antecedent, and avoid the problems Geach's approach might face. A criticism will arise, however, when he presupposes the standard analysis of definite description for those disguised definite descriptions. Under the standard analysis, a definite description carries a uniqueness implication such that there is only one individual who uniquely satisfies the descriptive predicate. Heim (1982) finds it not correct or at least doubtful that uniqueness implication is required for an anaphoric use of a definite to be felicitous. Heim discusses in detail on this issue, in particular those anaphoric definites which occur in so-called donkey sentences. Among many counter arguments against the uniqueness interpretation for the anaphoric definites, I will introduce one, which seems most straightforward. The following example is a typical example of those donkey sentences.

- (iii) If a man enters this shop, the man/he will be caught by the hidden camera.

According to Evans' analysis, (iii) will be paraphrased as (iva). and assigned a logical form like (ivb).

- (iv)a. If a man enters this shop, the man who enters the shop will be caught by the hidden camera.
- b. $x(\text{MAN}'(x) \ \& \ \text{ENTER THIS SHOP}'(x))$
 $\rightarrow \forall x \ \forall y ((\text{MAN}'(y) \ \& \ \text{WILL BE CAUGHT BY A HIDDEN CAMERA}'(y)) \leftrightarrow x=y)$

(ivb) says that there is exactly one man who enters the shop and will be caught by the hidden camera. The question is whether or not a speaker who utters (iii) is committed to the truth of (ivb). Heim thinks that it is certainly not the case, because (ii) can be uttered felicitously even in a situation in which more than one man may enter the shop simultaneously.

The third kind of approach is a pragmatic one. Kripke (1977) and also Lewis (1979) think that a discourse anaphor is able to pick up not only semantic referent, but also the speaker's referent, or any salient object in the discourse. An utterance can raise an object's salience by containing an expression which semantically refers to that object. However, this is not the only way to raise an object's salience. Lewis (P.180) says that there is another way to do so without involving any semantic reference, i.e., by an existential statement. Although an existential statement does not involve any reference, uttering an existential statement can create a conventional implicature (Grice, 1967) such that there must be some particular object which is responsible for the truth of that utterance or for the fact that the speaker uttered that statement. This is to say that the potential to allow us to use a discourse anaphor can be independent of the truth condition of a sentence. The following examples illustrate this point.

- (v)a. John has a house.
- b. He wants me to paint it/the house.

- (vi)a. John is a house-owner.
- b. He wants me to paint *it/?the house.

(va) and (via) seem to have the same truth condition, but they don't seem to share the potential of raising an object's salience. This would leave us a couple of problems. First of all, we have to explain somehow this very fact. Suppose we could come up with a reasonable generalization, then, we would face a theoretical problem such that the semantics has to provide not only the truth conditions but also the salience raising potential independently.

13. Those include numeral classifiers, and other quantificational words such as "hotondo" (MOST), "sukoshi" (A LITTLE), "takusan" (A LOT), etc. Because they are nouns, they occur in the prenominal position with the genitive case-marker "no". Later I will argue that what these quantificational words do in the prenominal position is not quantification, but predication.

14. For a relevant discussion for the adverbial quantification by floating numeral classifiers, see Fukushima (1991).

15. For an application of Heim's analysis to Japanese Wh-words, and donkey sentences, see Nishigauchi (1990).

16. It was pointed out by Mutsuko Endo that an anaphorically definite NP which consists of a bare CN and a particle may occur in other positions as well. The following example appears to represent such a case.

- (i)a. *Otoko to onna-ga ita.*
MAN AND WOMAN-NOM EXIST-PAST
(There are a man and a woman.)
- b. *Otoko-ga onna-ni kisu-o shita.*
MAN-NOM WOMAN-DAT KISS-ACC DO-PAST
(The man kissed the woman.)

Although coordinate NPs like the nominative NP in (ia) are outside the empirical coverage of the present discussion, I believe that the expected behaviour will be basically the same as what we have observed from those NPs which consist of a bare CN and a case-marking particle. The coordinate NP "otoko to onna-ga" (A MAN AND A WOMAN) seems to create three salient discourse referents: a man, a woman, and a man and a woman. First, either of the following can be uttered felicitously after (ia), which was exactly expected from the present assumption.

- (ii)a. *Otoko to onna-wa basu-o matteita.*
MAN AND WOMAN-TOP BUS-ACC WAITING-EXIST-PAST
(The man and woman were waiting for a bus.)
- b. *Otoko-wa tabako-o sutteita.*
MAN-TOP CIGARETTE SMOKING-EXIST-PAST
(The man was smoking a cigarette.)
- c. *Onna-wa kotoo-o kiteita.*
WOMAN-TOP COAT-ACC WEARING-EXIST-PAST
(The woman was wearing a coat.)

What seems problematic, however, is that (iibc) (but not (ia)) have a marked version with a nominative NP such as

(iii) for (iib). (iii) has an implication such that the man, but not the woman, was smoking a cigarette.

(iii) Otako-ga tabako-o sutteita.
 MAN-NOM CIGARETTE SMOKING-EXIST-PAST
 (THE MAN was smoking a cigarette.)

Now go back to (ib), and compare that with (iv), which is also felicitous after (ia).

(iv) Otoko-wa onna-ni kisu-o shita.
 MAN-TOP WOMAN-DAT KISS-ACC DO-PAST
 (The man kissed the woman.)

The contrast between (iib) and (iii) is exactly the same as that between (iv) and (ib). The topic versions are unmarked, and the nominative versions are marked as emphatic. In order to have this marked/unmarked distinction, we have to assume that (iib) and (iv) are the underlying structures of (iii) and (ib) respectively. (iab), which appears to be a counter example for the claim that an anaphorically definite NP consisting of a bare CN and a particle has to be in the topic position in order to be anaphorically definite, does provide some evidence for that claim because the particular interpretation (marked reading) (ib) will have presupposes the underlying structure with a topic NP from only which the nominative NP in (ib) can inherit the anaphoric definiteness.

Chapter VI

NP Typology and a Parametric Approach

0. Introduction

In this concluding chapter, all the findings made in the present study will be summarized with an effort to bring them together to draw a reasonable picture of the intrinsic natures of CNs. Such a picture, according to my general hypothesis, which I repeat here as (1),

- (1) A parametric schema in syntax can be provided in UG by semantic feature differences intrinsic to a universal lexical class.

will guide us eventually to a parametric theory which would be able to explain various surface typological differences of CNs and NPs among languages. While summarizing, I will also discuss some repercussions of those findings on some existing parametric approaches to NP typology. Finally, it will be argued that the CN denotation which is equipped to perform the intrinsic functions of CNs does provide a priori parametric choices for a language to choose from.

1. The findings

1.1 The mass/count distinction

In this study, I made some seemingly very controversial points. One is that Japanese does make a mass/count

distinction. This point seems to directly contradict the widely accepted understanding in typology that Japanese, which "has no nominal plural marking whatsoever" (Gil, 1987:p.257), treats all nouns as mass nouns. It is, however, quite misleading to say that Japanese is a language which does not make a mass/count distinction, because Japanese does not make such a distinction in morphosyntax just as English and other European languages do. In other words, it is not only probably wrong, but also illogical to say that, if a language does not make a mass/count distinction exactly in the same way English does, that language does not make such a distinction at all. In Chapter II, we have seen Japanese making sufficient distinctions in the mass/count interpretations of CNs in semantics. We have explored a semantic system in which the covert part of the CN interpretation, the multi-sorted variable, is to carry out the task roughly equivalent to the one that pluralization does in English syntax. That task is to fix the right kind of denotation range. English fixes the right kind of denotation range for a CN by dividing the nominal domain into subdomains. Each of the subdomains are defined by a different descriptive predicate. The morphosyntactic forms: singular, plural and mass are syntactic manifestations of these different descriptive predicates. Japanese also fixes the right kind of denotation range for a CN without dividing the nominal domain. It keeps one unified domain, but uses

different kinds of variables: singular, plural and mass, each of which ranges over its matching entities in the domain. The morphosyntactic form in Japanese represents always the single unified nominal domain, hence, no need to have more than one form.

Stein (1981) and Gil (1982) propose a general parameter governing the structure of NPs in a language: the mass/count distinction. This parameter divides languages at least into two groups: those which have such a distinction including English, and those which do not have such a distinction including Japanese. Gil (1987) states two direct consequences of this mass/count parameter. One is obligatory marking of nominal plurality. The other is obligatory marking of numeral classifications. According to him, +[mass/count distinction] languages like English have an obligatory marking of nominal plurality, but not an obligatory marking of numeral classifications, and -[mass/count distinction] languages like Japanese have an obligatory marking of numeral classifications, but not an obligatory marking of nominal plurality. What is fundamentally wrong with this parametric picture is that this parameter does not give us any insight into what the universal grammar (UG) looks like. If we suppose that the advocates of this parameter wished to say more than that English syntactically imposes pluralization on count CNs, but Japanese doesn't, or that English allows

numerals to occur with a CN without a classifier, but Japanese doesn't, then they seem to have a presumption that languages will have a parametric choice over the mass/count distinction. In other words, if this parameter is meant to be simply a restatement of those typological syntactic differences, it won't give us any insightful information about UG, hence, it is ineffectual as a parameter. If this parameter is meant to say that UG provides a parametric choice for a language either to have the mass/count distinction or not to have it, that conjecture is clearly wrong. As we have seen in Chapter II, and summarized above, both English and Japanese do make the mass/count distinction. They do so in a different way. The question we should ask is not whether or not a language has the mass/count distinction, but how a language makes such a distinction. To answer that question probably still won't be enough to form a parameter. Once we know how, then, we should further ask why it is so.

1.2 Configurationality

Another controversial point made in this study is that Japanese makes the definite/indefinite distinction using a syntactic category, determiners, just like in English using the definite and indefinite articles. Considering the fact that English definite and indefinite articles are very hard to analyze as anything other than determiners, this

conjecture seems to go against the generally accepted fact that Japanese does not have the definite and indefinite articles. Gil also concludes that the lack of this kind of syntactic category is a direct consequence of the configurationality parameter (Hale 1981; Chomsky 1981). Because NPs in Japanese are nonconfigurational, "there is no distinction between the syntactic categories N^n and N^{n+1} and there can exist no syntactic category of determiner" which has a function of raising the category from N^n to N^{n+1} . The configurationality parameter was originally developed to account for the phenomenon of relatively free constituent order in some languages including Japanese, and meant to encompass a broader range of syntactic phenomena. I do not have enough evidence to dispute this parameter once for all, but as far as the NP internal configurationality, or the existence of a syntactic category of determiners, is concerned, I believe that the present study has provided enough evidence to dispute Gil's claim. Japanese case-marking particles are to be combined with a CNP to yield an NP denotation. We have seen that those particles are also to perform some type-shiftings according to the universal principles independently proposed by Partee. They behave not only syntactically but also semantically as determiners. In this sense, Japanese supports the "Determiner Universal" by Barwise & Cooper (1981): every natural language contains basic expressions (called determiners) whose semantic

function is to assign CN denotations A a quantifier that lives on A (p. 179).¹

One difficulty in making an analogy between English articles and Japanese particles comes from the fact that the former mainly line up with many other quantificational elements and have lost the semantic function of carrying the case-marking, while the latter do not line up with other quantificational elements, but perform mainly the function which English articles are completely exempt from: the case-marking. German articles, for example, whose syntactic status is quite similar to that of English articles, do perform the case-marking function. I believe that to identify determiners too much with quantificational elements and dismiss the possibility of determiners being something unquantificational is dangerous. It could misguide us to draw a rather odd conclusion, as Fukushima (1991) did after having analyzed Japanese floating numeral quantifiers as adverbs throughout his thesis, that Japanese floating quantifiers can indeed be considered semantically equivalent to determiners of Barwise & Cooper. Such a conclusion, to my opinion, will not clarify, but muddle the issue. The semantic notion of quantification and the syntactic category, determiners, are two separate issues. Quantification seems to be carried out in many ways which involve many syntactic categories including determiners. Determiners do not perform exclusively

quantification. They also perform the definite/indefinite marking. For some languages, they also perform the case-marking. As far as NP typology is concerned, the configurational parameter does not work because of the reasons mentioned above. Both English and Japanese NPs seem to be configurational. The difference which should be accounted for by the parameter is not the configurationality. Then, what is the difference which should be parameterized?

1.3 Quantification

I mentioned in the previous section that English determiners play a significant role in quantification. Fukushima (1991) thinks that what we account for by a parameter is the difference in the way quantification is accomplished. He proposes that "Japanese is a floating quantifier oriented language as opposed to a Det oriented language like English" (p.99). For the former, floating quantifiers are basic and NP-internal quantifiers are derived², while for the latter, NP-internal quantifiers are basic and floating quantifiers are derived. This distinction is also related to the point Gil raised concerning the mass/count distinction: - [mass/count distinction] languages like Japanese have an obligatory marking of numeral classifications, while +[mass/count distinction] language like English doesn't. Although English does not have an obligatory marking of

numeral classification, that doesn't mean that English does not have such markings at all. In fact, as I mentioned in Chapter II, classifier or NP-external quantification is the unmarked case for both languages, the NP-internal quantification by numerals or quantificational determiners is the marked case. Furthermore, this follows from the different kinds of nominal domain these two languages employ. The NP-internal quantification is compatible with the divided domain. With the unified domain, where a single descriptive predicate introduces different kinds of variables, we need some NP-external element which picks the right kind of variable and binds that variable to fix the denotation range for a CN. We have seen one case in which a transitive verb can be that NP-external element in Chapter II. Although I did not directly discuss numeral classifiers in this study, this mechanism could be naturally extended to them.

The parametric distinction Fukushima meant to make in his proposal may be equivalent to the one Gil intended to make in terms of the obligatory marking of numeral classification. That is a distinction between languages which allow NP-internal, in addition to NP-external quantification, and those which only use the unmarked choice, NP-external quantification. If we perceive quantification in these terms, we will face an unavoidable consequence, i.e., that in those languages which only have NP-external quantification,

including Japanese, NPs are essentially unquantified. This means that Japanese, for example, does not have any syntactic equivalent to those typically quantified NPs in English, "any one", "everyone" or "no one". In order to translate these phrases, we have to use an interrogative and a particle such as "daremo" in "daremo inai" (There is no one.). Although these NPs which consist of an interrogative and a particle have been often treated as if they were quantified NPs (Ogihara, 1987; Ohno, 1988), it would be more accurate to analyze them as being derived from concessive clauses such as "whoever...., no matter who...". Nishigauchi (1990) analyzes Japanese Wh-words in concessive clauses as essentially quantifier-free. What we found in Chapter V in the examination of indefinites in Japanese seems to support such a claim that Japanese NPs are essentially unquantified. This claim, however, is too strong a claim to be made without further substantial arguments. It is beyond my capacity to provide such arguments here. I will simply raise that claim and wait for future research.

The typological distinction such as one made by Fukushima would become more meaningful, if we could answer why it is the case. Why does English allow both NP-internal and NP-external quantification, while Japanese doesn't? The answer seems to follow if the former employs a divided nominal domain, and the latter, a unified domain. A language which

employs a unified domain and multi-sorted variable system would need some element which can select the right kind of variable. However, it is not clear that such an element must be outside the NP. In other words, why can determiners not select a right kind of variable? If we suppose that the selection of variables is done through a matching process with other variables, the answer to this question is obvious: determiners do not introduce any variable. A language which employs a divided domain, on the other hand, will have a separate subdomain for count CNs which can be unambiguously quantified directly by numerals and quantificational determiners. Two different kinds of domains described above were also the key to understanding how languages make the mass/count distinction on CNs. Then, we are forced to ask another question: why some languages use the divided domain, and some languages, the unified domain for CNs? To answer this question, we need to enter the areas where the mass/count distinction, or quantification, ceases to matter - where CNs are in generic use.

1.4 Genericity

This study devoted two chapters to examine two particular occurrences of CNs which are of unquantificational nature: predicate nominals and CNs in generic use. I concluded that the unquantificational nature comes from the lack or least

sufficient use of one part of the CN denotation, i.e., the variable. In these two occurrences, the descriptive predicate part of the CN denotation alone by itself becomes sufficiently significant. In the nominal predicate, predicate nominals lose their variable and simply become one-place predicates, the principle of application. CNs in generic use always denote the maximal plural entity, hence, always a singleton set. As such, they denote unique individuals. The variable will have always a unique value assignment.

One most significant finding in this study is that a distinct part of the CN denotation is associated with a distinct function a CN carries out: the descriptive predicate defines the sortal object (a set) as a whole, and the variable provides some means to quantify over the entities in that set. The former represents the generic nature of CNs, while the latter, the quantificational nature of CNs. In other words, a universal lexical class, CNs, has two intrinsic semantic functions: genericity, and quantification. They are discrete functions performed by a discrete part of the CN denotation. If this is correct, I believe that it will also provide an answer to the question raised above: why some languages use the divided domain, and some languages, the unified domain for CNs?

2. NP typology and the parametric approach

2.1 The hypothesis

If CNs have two intrinsic semantic functions: genericity and quantification, each of which is performed by a discrete part of the CN denotation, the language seems to have a priori two choices to build the nominal domain: taking the genericity as primitive to derive the quantification, or taking the quantification as primitive to derive the genericity. If a language employs the former choice, that language will have a simple predicate system, and multi-sorted variable system, and if a language employs the latter choice, that language will have a simple variable system, and multi-sorted predicates. Japanese obviously is among the first group, whereas English, among the second. Suppose that the lexicon in UG cites these intrinsic semantic features for CNs: [+/-G +/-Q]. The following two combinations of the features entail a certain structure for the nominal domain.³

- (2)a. [+G, -Q] CN' (x/X/mx)
- b. [-G, +Q] CN' / CN^{Pl}' / CNⁿ' (x)

2.2. Consequences

In (2a) languages, the syntax won't have more than one form to refer to a sortal object, hence, no pluralization on count nouns. They have a simple syntax for generic expressions. For

the quantification, a proper variable must be selected and bound in (2a) languages. They require some other element which can specify the matching variable such as classifiers which themselves introduce a certain kind of variable or transitive verbs which have sufficient information for the ontological phase of their direct objects. In (2b) languages, the syntax will have more than one form to refer to a sortal object: singular, plural, and mass. For these languages, the syntax for generic expressions are not simple. English has bare plurals, singular indefinites, and singular definites for generic expressions. For quantification, because the domain is properly divided, and the variable is already selected, (2b) languages can combine CNs directly with quantificational determiners, especially count CNs with bare numerals.

3. Conclusion

I will stop here sharing any more speculative thoughts on the parametric approach I suggested in very coarse terms in this chapter. I will conclude this short chapter with one defending argument for my parametric approach over the existing proposals. I believe my approach, no matter how sketchy it is, has one strength such that it does provide some insights about UG. The theory explains not only the intrinsic semantic functions of CNs, but also how the UG

provides parametric choices over the nominal domain in terms of those semantic features. Consequences of such a parametric choice which will result in many typological surface syntactic differences among languages could be also reasonably explained by the present approach.

In this entire study, I have learned that many particular phenomena surrounding the realm of CNs are in fact deeply rooted in the most fundamental ground: the CN denotation itself. This reminded me of an obvious reality that until we really know the meaning of something, we will never fully understand the various phenomena surrounding it. In this sense, the study of linguistics is no different from the study of physics: only by the fundamental knowledge of an object will we reach the true understanding of the phenomena surrounding that object. So we must keep asking fundamental questions. At the same time we must be aware of another reality that the search for the fundamentals starts with an observation of some tangible phenomenon. So we must also pay attention to particulars. To be successful in finding some parameter in UG, however, we seem to have to do one more thing: not to stay with those particulars too long to grow out of them with some universals. I hope that I did grow out with some plausible universals. However, I certainly did not stay with those particular phenomena long enough to tie all the loose ends of my accounts. All the points I made in my

study deserve further scrutinies and proper formalization, which I have to do without due to my limitations.

Notes for Chapter VI

1. In a model $M = \langle E, \Vdash \rangle$, a quantifier Q lives on a set $A \subseteq E$ if Q is a set of subsets of E with the property that, for any $X \subseteq E$, $X \in Q$ iff $(X \cap A) \in Q$. (p. 178)

2. Fukushima thinks that "Japanese does not exclude the availability of NP-internal quantificational elements that combine directly with a common noun to form a GQ (generalized quantifier)" (p.100). From other parts of his thesis, it seems to be the case that what is meant by "NP-internal quantificational elements" is prenominal numeral classifiers.

3. I will not provide any speculation on any other possible combinations of these features.

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