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JAPANESE PRONOUNS IN DYNAMIC SEMANTICS:

THE NULL/OVERT CONTRAST

by

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A Dissertation submitted to the
Graduate School-New Brunswick
Rutgers, The State University of New Jersey
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and approved by

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ABSTRACT OF THE DISSERTATION

Japanese Pronouns in Dynamic Semantics: The Null/Overt Contrast

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This dissertation investigates the semantics of pronouns anaphoric to non-commanding, non-referential antecedents, so-called donkey pronouns, with special reference to the null/overt contrast in Japanese. We argue that, in Japanese, overt pronouns are interpreted not as E-type but as variables which must be dynamically bound whereas null pronouns are ambiguous between the two uses, defending the claim that dynamic binding and the E-type strategy are both available in natural language (cf. Chierchia 1992, 1995, Kratzer 1995, Cheng and Huang 1996).

Chapter 1 introduces theoretical assumptions. The most crucial assumptions are: (i) E-type pronouns are functions from individuals into the maximal sum of individuals (Chierchia 1992, 1995) and (ii) Japanese bare NPs are kind-denoting expressions (Krifka 1995, etc.).

Chapter 2 discusses differences in distribution between null and overt pronouns. First we show that both can be used in sentences where dynamic/unselective binding is favored over the definite description approach. Based on this fact we claim that they can be interpreted as variables. Then we observe that Japanese overt pronouns are less acceptable in contexts where dynamic binding is not available. We claim from this observation that they cannot be interpreted as E-type. We also claim that null pronouns in these contexts are interpreted as functions from individuals into kinds, and via Derived Kind Predication, existential readings are derived through the E-type strategy.

In Chapter 3 we discuss four types of donkey sentences where relative and conditional clauses are involved. We observe that in these sentences there is no interpretive difference
between overt and null pronouns, and claim that an implicit adverb of quantification plays a very important role for binding of overt pronouns.

Chapter 4 examines intensional contexts. Following Portner 1996, we claim that pronouns in these contexts should be analyzed as indexicals.

Chapter 5 aims to answer the question where the differences between null and overt pronouns come from. We suggest that the anti-E-type property of overt pronouns be assimilated to the fact that they belong to the Japanese demonstratives paradigm.
Acknowledgments

Choosing formal semantics of anaphora as a dissertation topic was a challenging decision and a reckless attempt for me, and this project would never be completed without the support from the members of my dissertation committee: Veneeta Dayal, Maria Bittner, Roger Schwarzschild and Gennaro Chierchia, to whom I would like to express my sincere gratitude.

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I was very lucky to have Gennaro Chierchia on my committee, for one of the main reasons why I chose formal semantics of anaphora as a dissertation topic was that I was very inspired by his 1995 book, Dynamics of meaning. I confess that I had not read his 1992 paper in Linguistics and Philosophy nor did I know anything about dynamic
semantics when I started looking for my dissertation topic, but his book enabled me to understand how big the impact of dynamic semantics is in the syntax-semantics and semantics-pragmatics interfaces. Like the book, his email comments on the draft of this dissertation were very instructive, substantial and exciting.

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LIST OF ABBREVIATIONS

The following abbreviations will be used, mainly in the glosses.

Acc    accusative case
Asp    aspect
Cl     classifier
Comp   complementizer
Cond   conditional marker
Cop    copula
Dat    dative case
Gen    genitive case
Inf    infinitive
Neg    negation
Nom    nominative case
Num    number
Part   discourse particle
Pass   passive
Past   past tense
Pl     plural marker
Pres   present tense
Prog   progressive
Q      question marker
Top    topic marker
Chapter I: Introduction

1.1 The aim and scope of this thesis

The present dissertation aims to investigate strategies for interpreting pronouns in English and Japanese. Especially the focus will be put on pronouns anaphoric to non-c-commanding, non-referential antecedents. This phenomenon has been studied a lot since the influential work by Heim 1982 and Kamp 1981. However, most work has focused on differences among antecedents with respect to their basic nature and their interaction with other operators. Not much attention has been paid to possible variation among pronominal elements. In English, these possibilities include the pronouns such as he/she/it/Them and the demonstratives which appear in full nominal projections, that/that man, etc. In this dissertation, I want to draw on the contrast between null and overt pronouns in Japanese to investigate donkey anaphora.

In the recent semantic literature, there are three approaches proposed for donkey anaphora: the E-type strategy, dynamic binding and the mixed approaches (their details will be introduced shortly). A representative work of the mixed approaches is Chierchia 1992 (and his 1995 book: Chierchia 1995), which claims that the E-type strategy and dynamic binding are both available in natural language and they are in a relation of “division of labor”. One of the main claims of the present study is to support Chierchia’s version of mixed approach, arguing that differences between null and overt pronouns in Japanese are reflections of the two strategies. I will show that when not c-commanded by their antecedents, Japanese overt pronouns are variables that need to be dynamically bound while null pronouns are ambiguous between E-type pronouns and variables, and therefore to be interpreted as E-type, pronouns must be null in the language.

---

1 The definition of c-command adopted here is a standard one: A c-commands B iff the first branching node that dominates A dominates B, and A does not dominate B.
In order to provide a clearer picture, I will review the studies on English pronouns. First of all, we begin with the notion of c-command and the referential status of antecedents, both of which are closely related to each other with respect to interpretation of pronouns. The importance of the notion of c-command is shown in (1).²

(1)  
   a. Everyoneᵢ thinks that heᵢ is honest.  
   b. *Every studentᵢ came in. Heᵢ sat down.³  
   c. *If everyoneᵢ is honest, heᵢ is also very kind.

The pronoun in (1) is c-commanded by the antecedent and it is possible to get the intended reading such as “for all x, if x is a person, x thinks that x is honest.” Such a pronoun is called a bound pronoun. The pronouns in the b- and c- examples, on the other hand, are not c-commanded by their antecedents, and therefore (1b) is not interpreted as “for all x, if x is a student, x came in, and x sat down,” and (1c) is not interpreted as “for all x, x a person, if x is honest, then x is also very kind.” So, the following well established generalization obtains: Bound pronouns must be c-commanded by their antecedents. The c-command requirement is not observed when antecedents are referential NPs like names, as shown in (2).

(2)  
   b. If Johnᵢ is honest, heᵢ is also very kind.

Although names can be treated as quantifiers as in Montague’s 1973 PTQ, we do not have to regard the pronouns in (2) as bound ones. After all, pronouns do have a deictic use (e.g. pointing at a good looking man walking over there, you can say “He is handsome”). So it is reasonable to assume that the pronouns in (2) have independent reference and they are (or happen to be) the same as John. An old fashioned argument for this view is that (2a) is paraphrased as John came in. John sat down., but we cannot give to (1a) a

² I use indices to indicate just anaphoric relations between pronouns and their antecedents. They don’t necessarily mean coreference.
³ There are cases where sentences like (1b) becomes possible, which are sometimes called telescoping. We will discuss such cases in chapter 2.
paraphrase like *Everyone thinks that everyone is honest.* See Reinhart 1983 for more on the differences between bound pronouns and coreference.

There are several interesting cases where anaphoric relations are established in spite of the fact that pronouns are not c-commanded by antecedents that do not have their own referents, and much attention has been paid to such cases in linguistics and philosophy. Some representative examples are given in (3). Throughout the present dissertation, I will refer to the sentences/constructions in (3) as donkey contexts, and to the pronouns in them as donkey pronouns or donkey anaphora (so that donkey sentences in (3b) and (3c) are subtypes of donkey contexts).

(3) Types of Donkey Contexts

a. Narrative sequence

A man_it walked in. He_it sat down.

b. Relative clause donkey sentence

Every farmer who owns a donkey_it beats it_it.

c. Conditional donkey sentence

If a farmer owns a donkey_it, he beats it_it.

d. Paycheck sentence

The man who gave his paycheck_it to his wife was wiser than the man who gave it_it to his mistress.

e. Bathroom sentence

Morril Hall doesn't have a bathroom_it or it_it's in a funny place.

f. Modal subordination

A wolf_it might come in. It_it would eat you first.

g. Hob-Nob sentence

Hob thinks a witch_it has blighted Bob's mare, and Nob wonders whether she_it killed Cob's sow.
The acceptability of narrative sequence cases like (3a) contrasts with the unacceptability of (1b) in spite of the fact that every CN and a CN are both non-referential expressions. (3b) and (3c) are Geach's 1962 donkey sentences. We will discuss in detail several semantic analyses of donkey sentences below. Paycheck sentences as in (3d) were first introduced by Karttunen 1969 and discussed by Jacobson 1992 among others. Unlike the other examples, the intended antecedent in (3d) is not an indefinite NP of the form of a CN, but it has a genitive pronoun in it. Most of the approaches to paycheck sentences are semantic and/or pragmatic. Actually as we will see, the anaphoric relation in paycheck sentences has intriguing properties of semantics-pragmatics interaction. Bathroom sentences like (3e), pointed out by Barbara Partee, raise interesting problems with disjunction as well as anaphora. These problems are discussed by Roberts 1987, 1989 and Simons 1996. Modal subordination cases like (3f) and Hob-Nob sentences like (3g) both concern anaphoric relations in intensional contexts. The former are extensively discussed by Roberts 1987, 1989, 1996, and the latter were first introduced by Geach 1967 and there are many works on this construction in philosophy and linguistics.

Let us take a brief look at the current semantic theories for the donkey pronouns in (3), taking (3a) as an example. With respect to referentiality, indefinite NPs like a man are the same as quantified NPs like everyone and different from names like John. The first sentence of (3a) just says that there is at least one man who walked in, and the second sentence says that the man who walked in, whoever he is, sat down. Clearly the interpretation of the pronoun depends on that of the indefinite NP and the dependency between them is not (accidental) coreference (e.g. A man walked in. A man sat down).

There are two main accounts of the cases like (3a) in the literature. One approach regards pronouns as definite descriptions and the other regards them as variables. The former approach is known as the E-type pronoun strategy and Evans 1977, Cooper 1979, 1980, Heim 1990, and Neale 1990 among others fall into this type of approach. The latter

---

4 The same type of construction is discussed in Geach (1962:130).

There are several versions of definitions (or characterizations) of E-type pronouns, which we will see in 1.2.3. The simplest and most well known paraphrase of (3) is given in (4), where the pronoun he is replaced with the definite description the man who walked in.

(4) A man walked in. The man who walked in sat down.

Given the Russelian theory of definite descriptions, the second sentence in (3a)/(4) is true only when there is a unique man who walked in and sat down, which meets our intuition about the interpretation of this sentence.

In Dynamic Binding, on the other hand, the first and the second sentence in (3a) translate into (5a) and (5b), respectively.

(5) a. \( \exists x[\text{man}'(x) \land \text{walk-in}'(x)] \)

b. \( \text{sit-down}'(x) \)

Whoever the referent of a man is, the pronoun he in the second sentence refers to the same individual that walked in. So, (3a) as a whole is represented as in (6).

(6) \( \exists x[\text{man}'(x) \land \text{walk-in}'(x) \land \text{sit-down}'(x)] \)

In this representation the scope of the existential quantifier extends beyond the sentence boundary and binds the variable in the second sentence of (3a). Formalization as to how to get such a logical representation will be introduced in 1.2.2. Note that the logical representation in (6) just says that there is at least one man such that he walked in and sat down, and it says nothing about uniqueness. So, at a glance, dynamic binding seems not to be able to provide correct truth conditions on narrative sequence cases like (4). This apparent problem can be solved by assuming that uniqueness is not part of semantics, and it is a matter of scalar implicature as noted by Chierchia (1995: 19) (cf. Horn 1988).
Although most of the works on anaphora have exclusively taken either the E-type pronoun strategy or dynamic binding, Chierchia 1992, 1995 claims that both of the strategies are available in natural language, and argues that pronouns in paycheck sentences and bathroom sentences should be E-type pronouns (note that his notion of the E-type pronoun is not just the definite description like (4), which we will discuss in 1.2.3). 5 Japanese provides interesting evidence for Chierchia’s mixed approach. In that language, overt pronouns and null pronouns seem to be in free variation, as shown in (7). 6

(7) Mary-wa kuruma-i-o mot-tei-ru. Sore-i-wa/o-i shako-ni a-ru.  
Top  car-Acc own-Prog-Pres it-Top garage-in be-Pres  
‘Mary has a car. It’s in the garage.’

Interestingly enough, however, in Japanese paycheck sentences and bathroom sentences, there is a difference between overt pronouns and null pronouns with respect to acceptability as shown in (8a) and (8b). 7

(8) a. John igai-no dare-mo-ga jibun-no kurejittokaado-i-o tsuma-ni  
except-Gen who-¥-Nom self-Gen credit.card-Acc wife-to  
watashi-ta. John-wa o/??sore-i-o aijin-ni watashi-ta.  
give-Past Top it-Acc mistress give-Past  
‘Everyone but John gave a credit card of his to his wife. John gave one of  
his to his mistress.’

5 Kratzer 1995 and Cheng and Huang 1996 also claim that grammar allows both the E-type strategy and dynamic binding.
6 I represent null pronouns as ‘ο’ instead of ‘pro’ to avoid the issue of whether they are traces bound by null topic operators or small pros. See Hasegawa 1984, Huang 1984, Nakamura 1987 among others on this issue.
7 As shown in the translation, the interpretation of (8a) is different from its English counterpart with respect to maximality. We will discuss it in detail in chapter 2.
b. Kono tatemono-ni toirei-ga na-i ka. ōji/??sorei-ga
   this building-in bathroom-Nom Neg-Pres or it-Nom
   henna tokoro-ni a-ru ka-no dochiraka-dea-ru.
   funny place-in exist-Pres or Cop which-Q Cop-Pres
   ‘It is the case either that this building does not have a bathroom or that it is
   in a funny place.’

In these contexts, the null pronouns are perfectly acceptable while the overt pronouns are
less acceptable, if not completely ungrammatical. This difference supports Chierchia’s
view that the pronouns in these contexts must be treated in a different way from those in
the other contexts.

Putting together Chierchia’s claim and the difference between the two types of Japanese
pronouns observed in (8), the present dissertation tries to defend the following theses.

(9) a. Natural language has both the E-type pronoun strategy and dynamic
      binding.\(^8\)

b. In Japanese donkey contexts, only null pronouns can be interpreted as E-
   type.

c. In Japanese donkey contexts, overt pronouns are unambiguously
   interpreted as variables that must be dynamically bound.

(9b) and (9c) serve as litmus tests to check which strategy is available in which context,
and many interesting consequences follow from these, as will be discussed in the
following chapters.

Since its focus lies on donkey anaphora, this dissertation does not discuss other uses of
Japanese overt/null pronouns or anaphora in general (e.g. VP-deletion, pro-N’ or sentential
anaphora). The reader should refer to Kameyama 1985, Hoji 1990, Iida 1992, Tomioka
1997, 1998 among others for such topics.

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\(^8\) Precisely, what Chierchia (1995: 117) says is that pronouns have bound and free
uses, and when they are in free use, they are interpreted by the E-type strategy.
1.2 Theoretical background

The purpose of this section is to provide theoretical assumptions of the present study. First I will give a brief review of what are issues of donkey pronouns and how they were analyzed in DRT like Kamp 1981 and Heim 1982. And then Chierchia’s 1992, 1995 formal system will be introduced with special reference to these issues. I will also give a concise review of the notions of E-type pronouns for two reasons: One reason is that there are several definitions of E-type pronouns found in the literature, and the other is that the definition of E-type pronouns given by Chierchia differs from any other, and using his definition is very crucial for my analysis of Japanese pronouns. Besides donkey pronouns and Chierchia’s system, I will discuss the semantics of Japanese bare or common nouns. The key claim is that they are mass /kind-denoting expressions, which is also very important to the discussions in the following chapters.

1.2.1 Issues with donkey anaphora and the DRT treatment

In this subsection I will introduce three issues of donkey pronouns and briefly review how these issues were analyzed in DRT, from which all the recent dynamic binding approaches have inherited the core idea. First I will outline the basic tools of DRT.9

1.2.1.1 The basics of DRT

What makes DRT such as Kamp 1981 and Heim 1982 innovative and different from the previous theories in the tradition of Montague’s PTQ is the treatment of indefinite NPs. In DRT, indefinite NPs are translated into variables, and they introduce new discourse referents (or new indices). This means that they don’t have their own quantificational force. Consequently they can be bound by quantificational determiners or adverbs

---

9 For the sake of exposition, I will review the 80’s version of DRT. The system proposed in Kamp and Reyle 1993 is an updated, improved version of DRT.
unselectively as long as structural requirements are met. Let me give you a simple example.

(10) A dog came in.

\[
\begin{array}{c}
x \\
dog(x) \\
\text{come-in}(x)
\end{array}
\]

In DRT, syntactic representations are mapped into semantic representations in a rigorous algorithm, which I omit here (see Kamp 1981 and Kamp and Reyle 1993 for the details). The semantic representations are called Discourse Representation Structures (DRSs), represented as boxes. Noun phrases introduce discourse referents, which are displayed at the top of a DRS. In (10), the indefinite NP *a dog* introduces a referent *x*. The set of discourse referents of a DRS is called the universe of the DRT. The NP in (10) is translated into ‘dog(x)’, which is called a condition. The VP is also translated as a condition of the DRS. Existential interpretation of the NP in (10) is not represented in the DRS, but it is encoded in the definition of truth in the theory, the informal version of which is given in (11) (Kamp and Reyle 1993: 73).

(11) A DRS is true provided we can find individuals for each of the discourse referents in its universe in such a way that the conditions which the DRS contains for particular discourse referents are satisfied by the corresponding individuals.

So (10) is true iff we can find an individual such that it is a dog and comes in. Sentences in a narrative sequence are added in the DRS, as in (12).

(12) A dog\(_i\) came in. It\(_i\) barked.

\[
\begin{array}{c}
x \\
y \\
dog(x) \\
\text{come-in}(x) \\
x=y \\
bark(x)
\end{array}
\]
Pronouns also introduce new referents, but they are linked to those that have already been introduced in the DRS. In (12), the referent \( y \) introduced by the pronoun is linked to \( x \).

Sentence connectives other than \textit{and} introduce subordinate DRSs. (13) is the DRS of

\textit{'If p, then q or r.'}

(13)

\[
\begin{array}{c}
p \\
\Rightarrow \\
\end{array}
\begin{array}{c}
q \\
\lor \\
r
\end{array}
\]

Universal quantification is also represented by introducing a sub DRS with \( \Rightarrow \), as shown in (14).

(14) \hspace{1cm} \text{Every farmer owns a donkey.}

\[
\begin{array}{c}
x \\
\text{farmer}(x) \\
\Rightarrow \\
y \\
\text{donkey}(y) \\
\text{x own } y
\end{array}
\]

Informally, the DRS in (14) is true iff for every way of finding a value for \( x \) such that it is a farmer, there is \( y \) such that it is a donkey and that that farmer owns it. This truth condition is the same as what is expressed in a predicate logic format, \( \forall x[\text{farmer}'(x) \rightarrow \exists y[\text{donkey}'(y) \land \text{own}'(y)(x)]] \).

Given these tools, in what follows we will see the issues of donkey sentences.

1.2.1.2 Accessibility

Anaphoric links between indefinite NPs and donkey pronouns are prevented from being established by negation or disjunction, as shown in (15) and (16).
(15)   *It is not the case that John has a car₁.  It₁’s in the garage.
(16)   *John has an Italian car₁ or Mary has it₁.

The DRSs of these examples are given in (17) and (18).

(17)   *It is not the case that John has a car₁.  It₁’s in the garage.

\[\begin{array}{c}
\neg \\
\text{John}(x) \\
\text{car}(y) \\
x \text{ have } y \\
z = ? \\
in-the-garage(z)
\end{array}\]

(18)   *John has an Italian car₁ or Mary has it₁.

\[\begin{array}{c}
\text{John}(x) \\
\text{Mary}(w) \\
\text{car}(y) \\
x \text{ have } y \\
z = ? \\
w \text{ have } z
\end{array}\]

In both cases, the intended readings would be obtained if the z’s were linked to the y’s as in ‘z = y’. However, these links are impossible since the y’s are contained in the different sub DRSs from those which contain the z’s. In DRT, a discourse referent introduced in a subordinate DRS is not accessible for a discourse referent in a super DRS or in another DRS. This is called the accessibility condition. In other words, the sub DRSs introduced by negation or disjunction constitute opaque domains for donkey pronouns. The DRSs in (17) and (18) are thus ill-formed since they both have unidentifiable discourse referents, namely the z’s. Incidentally note that the accessibility is asymmetric. Discourse referents in sub DRSs can see ones at super DRSs (e.g. John has a car₁, and it is not the case that it₁ is very good). Also discourse referents introduced by proper names are supposed to
always be displayed at the main DRS level, which accounts for the fact that the anaphoric relations between referential antecedents and pronouns are not blocked by opaque domains created by negation or disjunction (e.g. It is not the case that John\textsubscript{i} is stupid, and he\textsubscript{i} likes rock music).

The ungrammaticality of (19) is also accounted for by the accessibility condition on pronouns in DRT. (19) is represented as in (20).

(19) *Every student\textsubscript{i} walked in. He\textsubscript{i} sat down.

(20)

\[
\begin{array}{c}
\begin{array}{c}
\text{student}(x) \\
\Rightarrow \\
\text{walk-in}(x) \\
\text{y = ?} \\
\text{sit-down}(y)
\end{array}
\end{array}
\]

The x is invisible for the y since the former is contained in a sub DRS. There is no discourse referent linkable to the y, so that the definition in (11) makes the whole DRS uninterpretable. It should be noted that a discourse referent in a sub DRS corresponding to the antecedent of a conditional or a restriction of universal quantifier is accessible for a discourse referent in the one translated from the consequent of the conditional or a nuclear scope (i.e. VP) of the universal quantifier. As shown in (22), which is the DRS of (21), the y is in the left sub DRS is accessible for the z in the right sub DRS to ‘⇒’.

(21) If John has a donkey\textsubscript{i}, he will beat it\textsubscript{i}. 

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This contrasts to the case of disjunction where the left sub DRS to ‘v’ makes an opaque domain for the discourse referent in the right sub DRS, as in (18).

1.2.1.3 Strong readings and weak readings

Pronouns in relative clause donkey sentences and in conditional donkey sentences have been noted to have two readings: strong readings (∀-readings/universal readings) and weak readings (∃-readings/existential readings). The strong readings are interpretations obtained when donkey pronouns and their indefinite NP antecedents are both universally quantified. By contrast, if indefinite NPs are existentially quantified, the weak readings obtains. Typical donkey sentences as in (23) favor the strong reading. A possible paraphrase for both (23a) and (23b) is ‘every farmer who owns a donkey beats every donkey he owns’, where the indefinite NP a donkey is provided universal quantificational force.

(23)

a. Every farmer who owns a donkey\(_i\) beats it\(_i\).

b. If a farmer\(_j\) owns a donkey\(_i\), he\(_j\) beats it\(_i\).

The weak readings are observed in sentences as follows.

(24)

a. Everyone who has a donkey must donate its service for one day during the festival.  
(Pelletier and Schubert 1989: 200)

b. If I have a quarter in my pocket, I will put it in the parking meter.  
(ibid.)

c. Every man who owns a donkey will ride it to town tomorrow.  
(ibid.: 201)
In (24b), for example, the speaker does not have to put in the parking meter all of the quarters that she has in her pocket. Putting just one quarter in the meter make the sentence true. That is, the indefinite NP has existential quantificational force. Furthermore as argued by Chierchia (1992: 116, 1995: 64), even the sentences in (23) get the weak reading if they are uttered in the context like (25), which was originally pointed out by P. Casalengo.

(25) The farmers of Ithaca, N.Y., are stressed out. They fight constantly with each other. Eventually, they decide to go to the local psychotherapist. Her recommendation is that every farmer who has a donkey should beat it, and channel his/her aggressiveness in a way, which still morally questionable, is arguably less dangerous from a social point of view. The farmers of Ithaca follow this recommendation and things indeed improve.

Under the scenario in (24), every farmer’s beating at least one of the donkeys he owns makes the sentences true. So, Chierchia argues that the strong readings and the weak readings are always available in donkey sentences and semantic theory should predict both of the readings. We will see how to get the two readings in his system shortly.

The classical DRT approach cannot capture the weak readings of donkey pronouns, because it was originally designed to account for the fact that the indefinite NPs in donkey sentences are interpreted as universal. For example, (23a) is represented as in (26).

(26)
Informally the DRS in (26) is true iff for every way of finding values for a pair of x and y, x a farmer, y a donkey and x owns y, there is z, z equals to y and x beats z. This is equivalent to $\forall x \forall y ([\text{farmer}'(x) \land \text{donkey}'(y) \land \text{own}'(y)(x)] \rightarrow \text{beat}'(y)(x))$. The point is that the indefinite NP a donkey has no quantificational force of its own, and in this configuration the universal quantificational force is inevitably assigned to the variable introduced by the indefinite NP. This is an empirical problem with the 80’s DRT.

The recent theories of donkey pronouns are all designed to be able to represent the two readings (see Kamp and Reyle 1993, Groenendijk and Stokhof 1991, Pelletier and Schubert 1989 among many others). Moreover, there are some approaches that try to spell out determining factors of preferred readings. For example, Rooth 1987 observes that donkey sentences with upward entailing determiners such as every favor the strong readings while those with downward entailing determiners like no favor the weak ones. The latter example is given in (27), where the existence of a parent who lent the car to one of his son makes the sentence false.

(27) No parent with a son still in high school has ever lent him the car on a weeknight. (Rooth 1987: 256)

Developing Rooth’s observation, Kanazawa 1993 also claims that there is a tight connection between monotonicity of the determiners of donkey sentences and the default interpretation of the pronouns. In particular, he shows that monotonicity of the first argument and that of the second argument are both relevant to determining the readings of donkey pronouns. The relation between monotonicity and the interpretation of donkey pronouns is summarized in (28), where ↑MON stands for the first argument’s upward monotonicity and MON↑ for the second argument’s, and likewise the down arrows stand for downward monotonicity. The first argument of most is neither upward nor downward.
<table>
<thead>
<tr>
<th>Interpretation</th>
<th>Determiners</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑MON↑</td>
<td>Weak reading only</td>
</tr>
<tr>
<td></td>
<td>( a, \ some, \ several, \ at \ least \ n, \ many )</td>
</tr>
<tr>
<td>↑MON ↓</td>
<td>Strong reading preferred</td>
</tr>
<tr>
<td></td>
<td>( \text{not every, not all} )</td>
</tr>
<tr>
<td>↓MON↑</td>
<td>Strong reading preferred</td>
</tr>
<tr>
<td></td>
<td>( \text{every, all, FC any} )</td>
</tr>
<tr>
<td>↓MON ↓</td>
<td>Weak reading only</td>
</tr>
<tr>
<td></td>
<td>( \text{no, few, at most } n )</td>
</tr>
<tr>
<td>MON ↓</td>
<td>Both</td>
</tr>
<tr>
<td></td>
<td>( \text{most} )</td>
</tr>
</tbody>
</table>

cited from Kanazawa (1993: 120)

Kanazawa proposes not only a formal system of getting the two readings in a dynamic setting but also a formal mechanism to derive the preferred readings in (28) based on logical inference.

Another kind of approach to strong and weak readings pays attention to the meaning of the predicate of nuclear scope, rather than determiners. Yoon 1994, 1996 classifies predicates into two types, total predicates and partial predicates. Predicates like healthy, closed, clean, dry, rejected, move away from, spotless, etc. belong to the former, while the latter include sick, open, dirty, wet, accepted, move towards, spotted, and so on. These two types of predicates give us different readings when they are predicated of definite plural subjects, as shown in (29).

(29)

a. The glasses are spotless.

b. The glasses are spotted.  

(Yoon 1996: 222)

(29a) is true only if all of the glasses are spotless, whereas (29b) can be true even if not all of the glasses are spotted. The same contrast is also observed in donkey sentences. I give a pair of sentences from Krifka 1996 for the sake of exposition, for all of the English donkey examples Yoon discusses are involved with adverbs of quantification.

(30)

a. Every boy who had a baseball card kept it clean. (strong reading)

b. Every boy who had a baseball card got it dirty. (weak reading)

(Krifka 1996: 141-142)

(30a) is true if every boy kept clean all of the baseball cards he had, and this is the strong reading. On the other hand, the most natural interpretation of (30b) is the weak reading, in
which the sentence can be true even if every boy who had more than one baseball card got just one of them dirty.

Definition of the two types of predicates is given in (31).

(31) If P and Q are a pair of lexicalized antonyms, it holds that

a. if \( P(x) \land y \subseteq x \rightarrow P(y) \), and

b. if \( Q(x) \land x \subseteq y \rightarrow Q(y) \),

then P is a total predicate and Q is a partial predicate, where \( \subseteq \) is the semantically relevant part relation. \(^{(Yoon 1996: 224)}\)

(30a) and (30b) are represented as in (32a) and (32b), respectively, where following Neale 1990, Yoon treats the donkey pronouns as individual sums represented as ‘\( oy[\text{baseball-card'}(y) \land \text{have'}(y)(x)] \)’, which means ‘all of the baseball cards that x has’.

(32) a. \( \text{EVERY}x(\{\text{boy'}(x) \land \exists y[\text{baseball-card'}(y) \land \text{have'}(y)(x)]\}, \)

\( [\text{keep-clean'}(oy[\text{baseball-card'}(y) \land \text{have'}(y)(x)])(x)](x) \)

b. \( \text{EVERY}x(\{\text{boy'}(x) \land \exists y[\text{baseball-card'}(y) \land \text{have'}(y)(x)]\}, \)

\( [\text{get-dirty'}(oy[\text{baseball-card'}(y) \land \text{have'}(y)(x)]))(x)](x) \)

Although Yoon’s approach seems very attractive, as Krifka 1996 points out, there are cases where the total/partial distinction of predicates does not correspond to the strong/weak interpretations of definite sum individuals. According to Yoon’s classification, \textit{open} is a partial predicate and \textit{closed} a total one, but Krifka gives examples where \textit{open} functions as a total predicate whereas \textit{closed} is interpreted as a partial predicate. The contrast between (33a) and (33b) makes the point. A situation where these sentences are interpreted is: The local bank has a safe that is accessible only through a hallway with three doors, all of which must be open to reach the safe.

(33) a. I could reach the safe because the doors were open.

b. I could not reach the safe because the doors were closed.

\(^{(Krifka 1996: 139)}\)
This suggests that the distinction between total and partial predicates is not a matter of lexical semantics, but rather it is a matter of pragmatics. Whatever the nature of total and partial predicates is, however, it must be stressed that Yoon’s insight about the relevance of predicate meanings to interpretation of donkey pronouns deserves attention.

Giannakidou and Merchant 1997 also try to derive the strong and weak readings from the meanings of predicates. They claim that in Greek the difference between perfective aspect and imperfective aspect of the predicate of nuclear scope plays a crucial role to determine the interpretation of donkey pronouns. They observe the contrast between (34a) and (34b).

(34) a. Kahe xorikos pou ixe enen gaidaro ton eterne.
every farmer that had a donkey him beat.past.imperf.3sg.

‘Every farmer who owned a donkey (used to) beat it.’

b. Xthes tomesimeri, kathe xorikos pou ixe enan gaidaro ton edire.
yesterday the noon, every farmer that had a donkey him beat.past.perf.3sg

‘Yesterday at noon, every farmer who owned a donkey beat it.’

(Giannakidou and Merchant 1997: their (1) and (2))

(34a), which has imperfective aspect in the matrix clause, is true iff every farmer beat all the donkeys that he owns. That is, only the strong reading is available. On the other hand, the pronoun in (34b) can be interpreted either as existential or as universal. The ambiguity observed in (34b) is not surprising, since we have seen that English donkey sentences also can be ambiguous. Particularly interesting to us is, rather, the fact that imperfective sentences like (34a) lack weak readings. This is very relevant to our discussion in chapter 3, where we will see that in some types of Japanese donkey sentences only strong readings are available or at least they are much preferred.

Giannakidou and Merchant’s story goes as follows. First, they propose two principles of quantification, as given in (35) and (36).
(35) The Individual-based Quantification Principle
In individual-based quantificational domains, quantificational cases are provided
by individual assignment or equivalence classes of assignment.

(36) The Situation-based Individuation Principle
A situation s is distinct from a situation s' iff there is at least one individual in s
that is not in s'.

Perfective sentences (or episodic sentences) obey (35) while imperfective sentence (or
habitual/generic sentences) are subject to (36). Intuitively this distinction is
understandable. Perfective sentences describe single events, so that quantifiers in them
quantify over individuals rather than situations. On the other hand, imperfective sentences
or habitual/generic sentences express generalization over situations, and the domain of
quantification is individuated based on them.

The notion of equivalence class in (35) is defined as in (37) (cf. Root 1985 and Barker
1996).

(37) Given a formula φ with at least one free occurrence of a variable x, two
assignment functions g and g' are members of an equivalence class relative to φ
iff they agree on what they assign to x.

Let us see a simple example. Suppose that there were three farmers, f₁, f₂, and f₃, and f₁
and f₂ each owned exactly one donkey while f₃ owned three donkeys, d₁, d₂, and d₃. In
this case, pairs <f₃, d₁>, <f₃, d₂> and <f₃, d₃> constitute an equivalence class. Suppose
further that f₃ didn’t beat d₂ or d₃. This doesn’t falsify perfective donkey sentences of the
form [every φψ], because pairs <f₃, d₁>, <f₃, d₂> and <f₃, d₃> are regarded as an
equivalence class, not as three distinct cases, with respect to the variable x in φ, namely
[farmer(x) ∧ ∃y{donkey(y) ∧ own(y)(x)}]. So, the weak reading is allowed in (34b).

On the other hand, this case falsifies (34a) since with respect to the notion of situation, <f₃,
d₁>, <f₃, d₂> and <f₃, d₃> are considered to be three distinct situations. This is the reason
why imperfective donkey sentences systematically lack the weak readings.
It is interesting to see what happens in the sentences with imperfective aspect which correspond to Pelletier and Schubert's 1989 dime-meter sentences as in (24). The data in (38) are due to Anastasia Giannakidou (personal communication).

(38) a. Ekini tin epoxi, kathe odigos pu ixe mia draxmi stin tsepi tou that the era, every driver that had a drachma in-the pocket his
tin evaze s' afto to telios avolo parkometro
her put.imperf in this the absolutely inconvenient park-meter

‘In those days, every driver who had a dime in his pocket used to put it in
this absolutely inconvenient meter.’

b. Ekini tin epoxi, otan enas odigos ixe mia draxmi stin tsepi tou that the era, when a driver had a drachma in-the pocket his
tin evaze s' afto to telios avolo parkometro
her put.imperf in this the absolutely inconvenient park-meter

‘In those days, when a driver had a dime in his pocket, he always put it in
this absolutely inconvenient parkmeter.’

In spite of the fact that imperfective aspect is used, the donkey pronouns in these examples are interpreted only as existential. That is, the expected strong readings of imperfective sentences are not available in them.

This fact seems to indicate that semantics and pragmatics interact with each other in determining preferred readings of donkey pronouns.\footnote{Anastasia Giannakidou (personal communication) also suggested to me that the lack of the strong readings in (38) comes from pragmatic factors like world knowledge.} Chierchia's 1992, 1995 approach doesn't say anything about how to choose the preferred readings. His position concerning this problem is that semantics allows both readings, and which is preferred is a matter of pragmatics. This study basically follows this view, but as we will see in chapter 3, Japanese shows that syntax also plays a role for interpretation of donkey pronouns.
1.2.1.4 The proportion problem and adverbs of quantification

Since Lewis 1975, the quantifier-like behavior of some groups of adverbs has also been one of the hottest issues in the interpretation of indefinite NPs and donkey pronouns. Adverbs like always, usually, sometimes, seldom, etc. provide quantificational force to indefinite NPs, as shown in (39).

(39) Usually if a farmer owns a donkey, he beats it.

The interpretation of this sentence is very close to that of (40). In both examples, usually and most quantify over the domain of donkey-owning farmers.

(40) Most farmers who own a donkey beat it.

As is extensively discussed by Kadmon 1987, 1990 among many others, there is a crucial difference between conditional donkey sentences with adverbs of quantification (henceforth, Q-adverbs) and their relative clause counterparts. In (40) most does not quantify over farmer-donkey pairs. In other words, (40) is false in the situation where there are three farmers, two of whom own exactly one donkey each and never beat them, while the other farmer owns ten donkeys and beats all of them. (39) is also false in the same situation. However, there are cases where Q-adverbs quantify over the domain of the pairs of two indefinite NPs. An example is given in (41).

(41) Usually if a semanticist hears of a good job, she applies for it.

(Kadmon 1987: 316)

This sentence is true in the following scenario. There are three semanticists, and one of them hears about 98 good jobs and applies for all of them, and the other two semanticists hear of one good job each, and neither of them applies for the jobs. This means that usually quantifies over semanticist-good job pairs. Incidentally, the relative clause counterpart like most semanticists who hear of a good job apply for it is false in the same situation.

The readings available in (41) are often referred to as symmetric readings and the readings obtained in (39) and in relative clauses headed by most are referred to as
asymmetric readings (if the target indefinite NP is a subject of the antecedent clause, it is called subject-asymmetric reading and likewise object-asymmetric reading if an adverb quantifies over the domain denoted by an object indefinite NP). The descriptive generalization is, thus, that Q-adverbs in conditional donkey sentences can have symmetric readings or asymmetric readings whereas relative clause donkey sentences with a determiner like most have only asymmetric readings.

The classical DRT such as Kamp 1981 and Heim 1982 cannot deal with the proportion problem well. The truth condition that such a theory predicts is only the one for symmetric readings, because variables associated with indefinite NPs are bound by most, as in (42).

(42)

```
  x  y
farmer(x) donkey(y) x own y
MOST

  z
z = y
x beat z
```

In this representation, most quantifies over farmer-donkey pairs, which yields only the symmetric reading. Recent versions of DRT such as Kamp and Reyle 1993 are designed to give asymmetric readings as well as symmetric ones. As we will see shortly, Chierchia’s system also accounts for the difference between relative clause donkey sentences and conditional donkey sentences.

Another well known fact is that asymmetric readings in conditional donkey sentences are very sensitive to pragmatic factors such as topic and focus. As is observed by Rooth 1985, Kadmon 1987, 1990 and Heim 1990 among others, focal stress affects the scope of Q-adverbs. The symmetric reading becomes possible in (39) if own is stressed as shown in (43).

(43) Usually if a farmer OWNs a donkey, he beats it. (cf. Kadmon 1987: 318)
If focal stress is put on a farmer as in (44), the object asymmetric reading becomes more salient, which is falsified by the fact that 100 out of 199 farmer-owned donkeys are owned by a poor farmer.

(44) Donkeys that belong to peddlers generally are in miserable shape, whereas those that belong to farmers mostly have a comfortable life. The reason is that, if a FARMER owns a donkey he is usually rich (and uses tractors and other modern equipment for the hard work on his farm). (Heim 1990: 152-3)

It is reasonable to assume that non-focus elements are interpreted as topic, so that it can be concluded that Q-adverbs quantify over the domains denoted by topic elements.11

The topic sensitivity of Q-adverbs is also observed when an explicit discourse topic is provided in context. Chierchia gives a pair of examples as in (45a) and (45b).

(45) a. Dolphins are truly remarkable. When a trainer trains a dolphin, she usually makes it do incredible things.

b. Trainers from here are absolutely remarkable with all sorts of animals. If a trainer from here trains a dolphin, she usually makes it do incredible things.

(Chierchia 1992: 121, 1995: 68)

In (45a) the speaker is talking about dolphins, therefore they are the discourse topic. In the second sentence, the antecedent clause has two indefinite NPs and the consequent clause has two pronouns, so that a three way ambiguity is expected. But the sentence is unambiguous. It is true iff most trained dolphins do incredible things. On the other hand, in (45b), the discourse topic is trainers, so that in spite of the fact that the second sentence of (45b) is identical to that of (45a), the adverb of quantification of the b-sentence quantifies only over the set of trainers from here who train a dolphin make it do incredible things.

In sum, at least in English, Q-adverbs are sensitive to topic, and what is interpreted as topic is detectable from focal stress or context. In chapter 3 we will discuss the interaction

11 Barker 1996 points out counterexamples to this generalization.
between interpretations of Q-adverbs and the topic maker -wa in Japanese, which shows more complicated patterns.

1.2.2 Chierchia's dynamic semantics

1.2.2.1 The basic idea

A way of formalizing dynamics of meaning was first introduced by Groenendijk and Stokhof 1991. One of the strongest motivation for dynamic predicate logic (DPL) was to overcome the representational, non-compositional nature of DRT. Their attempt was very successful and its influence has been pervasive. The core idea of the dynamic approach is described as follows.

The general starting point of the kind of semantics that DPL is an instance of, is that the meaning of a sentence does not lie in its truth conditions, but rather in the way it changes (the representation of) the information of the interpreter. The utterance of a sentence brings us from a certain state of information to another one. The meaning of a sentence lies in the way it brings about such a transition.

(Groenendijk and Stokhof 1991: 43)

Dynamic semantics shares several facets with the classical DRTs, but there is a crucial difference between them. Unlike the classical DRTs, dynamic semantic approaches such as Groenendijk and Stokhof 1991 and Chierchia 1992, 1995 regard indefinite NPs as bearing existential quantificational force.

Chierchia's system consists of two modes; dynamic meaning and static meaning. In a standard static version of semantics, a sentence like John came in is translated as in (46), while the dynamic meaning of the sentence is represented as in (47).

(46) \( \text{come-in}'(j) \)  \( \text{type } t \)

(47) \( \lambda p[\text{come-in}'(j) \land \lnot p] \)  \( \text{type } cc = <<s, >, > \)

Logical representations like (47) are dynamic and called Context Change Potentials (CCPs) in that they regulate possible incoming sentences, which are supposed to be "incorporated" in the variable 'p'-position. CCPs are of type cc, an abbreviation of $<<s, >, >$, where the domain of type $<s, >$, $D_{<s, >}$, is the set of functions from the set of all possible
assignments (not possible worlds) to propositions. The two meanings are related by the \( \uparrow \)-operator, defined as in (48).

\[
(48) \quad \uparrow : t \rightarrow cc \\
\uparrow \phi = \lambda p [\phi \land \neg p]
\]

The job of the \( \uparrow \)-operator is to abstract over an incoming sentence, shifting expressions of type \( t \) to of type \( cc \). Corresponding to the \( \uparrow \)-operator, the system has the \( \downarrow \)-operator, which is called the truth (or assertion) operator.

\[
(49) \quad \downarrow A = A(\neg T), \text{ where } \neg T \text{ denotes any tautology.}
\]

The truth operator fills the \( \langle p \rangle \)-position of a CCP with a tautology, so that the CCP is shifted to a proposition. It is thus obvious that \( \downarrow \uparrow \)-cancelation holds. The \( \neg \)-operator and the \( \neg \)-operator in (47)-(49) are different from those found in Montague's PTQ. They are not operators which make expressions intensional or extensional, but they operate on assignment functions. In addition to ordinary variables, Chierchia proposes a distinguished set of variables, called discourse markers (DM). The difference between ordinary variables and DMs is that the latter are dynamically bound by the existential quantifier across sentence boundaries. Accordingly, the system has two assignment functions, \( g \) for ordinary variables and \( \omega \) for DMs. The \( \neg \)-operator and the \( \neg \)-operator are used for the DM function \( \omega \) and the semantics of them are defined as in (50).

\[
(50) \quad \begin{align*}
\text{a. } & \quad \| \alpha \| g, \omega = \lambda \omega'. \| \alpha \| g, \omega' \\
& \text{(i.e., } \| \alpha \| g, \omega \text{ is that function } h \text{ in } D_a^\Omega \text{ such that for any } \omega' \in \Omega \text{ the set of all possible assignments to DMs, } h(\omega') = \| \alpha \| g, \omega' \text{).}
\end{align*}
\]

\[
\text{b. } \quad \| \neg \alpha \| g, \omega = \| \alpha \| g, \omega(\omega).
\]

As is obvious from (50), \( \| \neg \alpha \| g, \omega = \| \alpha \| g, \omega \) (\( \neg \)-cancellation) holds.

With these operators, the logic of CCPs are defined as in (51), where the underlined symbols are dynamic counterparts to standard static semantics ones.
(51) i.  \( A \triangle B = \lambda p[A(\neg B(p))] \)

ii.  \( \neg A = \uparrow \neg \downarrow A \)

iii.  \( A \lor B = \neg [\neg A \triangle \neg B] \)

iv.  \( A \rightarrow B = \neg A \lor [A \triangle B] \)

v.  \( \exists x A = \lambda p \exists x[A(p)] \)

vi.  \( \forall x A = \neg \exists x \neg A \)

Given the definitions in (51), let us see a simple sequence of sentences like (52).

(52) A man_i came in. He_i sat down.

The dynamic translation of the first sentence is given in (53a) and that of the second sentence in (53b).

(53) a.  \( \exists x_i [\lambda p [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \neg p]] \)

b.  \( \lambda p [\text{sit-down}'(x_i) \land \neg p] \)

The two formulae in (53) are dynamically conjoined and computed as shown in (54).

(54) a.  \( \exists x_i [\lambda p [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \neg p]] \triangle \lambda p [\text{sit-down}'(x_i) \land \neg p] \)

b.  \( \lambda p[\exists x_i [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \neg p]] \triangle \lambda p [\text{sit-down}'(x_i) \land \neg p] \)

(\text{def. of } \exists, (51v))

c.  \( \lambda q[\lambda p[\exists x_i [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \neg p]](\neg \lambda p [\text{sit-down}'(x_i) \land \neg p](q))] \)

(\text{def. of } \triangle, (51i))

d.  \( \lambda q[\exists x_i [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \neg \lambda p [\text{sit-down}'(x_i) \land \neg p](q)]] \)

e.  \( \lambda q[\exists x_i [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \text{sit-down}'(x_i) \land \neg q]] \)

(\lambda-\text{conversion, } \neg\neg-\text{cancellation})

f.  \( \exists x_i \uparrow [\text{man}'(x_i) \land \text{come-in}'(x_i) \land \text{sit-down}'(x_i)] \)

(\text{def. of } \exists, (51v), \text{ def. of } \uparrow, (48))

As seen in (54f), the scope of the existential quantifier introduced in the first sentence crosses the sentence boundary and the quantifier binds the variable (or the DM) in the second sentence. So, the equivalence in (55) holds in this framework.
(55) \[ \exists x \ A \triangle A B = \exists x \ [A \triangle B] \]

In what follows, I will show how the issues concerning donkey pronouns listed in section 1.2.1 are accounted for by this dynamic approach.

1.2.2.2 Accessibility

As mentioned above, if an indefinite antecedent NP is in the scope of negation, but the pronoun is out of it, the intended coreferent reading is impossible, as in (56).

(56) It is not the case that a man came in. *He sat down.

This sequence of sentences is computed as follows.

(57) a. \[ \neg \exists x_i \ [\lambda p \ [\text{man}(x_i) \land \text{come-in}(x_i) \land \neg p]] \triangle \lambda p \ [\text{sit-down}(x_i) \land \neg p] \]

b. \[ \uparrow \neg \downarrow \lambda p [\exists x_i \ [\text{man}(x_i) \land \text{come-in}(x_i) \land \neg p]] \triangle \lambda p \ [\text{sit-down}(x_i) \land \neg p] \]

   (def. of \[ \exists \], (51v), def. of \[ \neg \], (51ii))

c. \[ \uparrow \neg \lambda p [\exists x_i \ [\text{man}(x_i) \land \text{come-in}(x_i) \land \neg p]] \land \lambda p [\text{sit-down}(x_i) \land \neg p] \]

   (def. of \[ \downarrow \], (49))

d. \[ \uparrow \neg \exists x_i \ [\text{man}(x_i) \land \text{come-in}(x_i) \land \neg \neg T] \land \lambda p [\text{sit-down}(x_i) \land \neg p] \]

e. \[ \uparrow \neg \exists x_i \ [\text{man}(x_i) \land \text{come-in}(x_i)] \land \lambda p [\text{sit-down}(x_i) \land \neg p] \]

f. \[ \lambda p [\neg \exists x_i \ [\text{man}(x_i) \land \text{come-in}(x_i)] \land \neg p] \land \lambda p [\text{sit-down}(x_i) \land \neg p] \]

   (def. of \[ \uparrow \], (48))

The point is that the truth operator (\[ \downarrow \]-operator) is introduced by negation. That operator introduces a tautology, which comes in the p-position. So, the second sentence cannot be dynamically "incorporated" under the scope of existential quantifier, which makes the \( x_i \) in the second conjunct unbound as in (57f). Therefore, (56) is ungrammatical.

The ungrammaticality of sentences like (58) is accounted for straightforwardly since the dynamic universal quantifier \( \forall \) is defined in terms of the dynamic negation as given in (51vi).

(58) Every man came in. *He sat down.
1.2.2.3 Strong readings and weak readings

As mentioned above, Chierchia does not try to account for when and how interpretations of donkey pronouns are determined, and he argues that they are basically (or semantically) ambiguous between the strong reading and the weak reading and the choice between the two readings is affected by pragmatic factors. Unlike many other approaches to the problem of how to get the ambiguity, he claims that the two readings obtain by different strategies: The weak readings obtain by means of dynamic binding, while the strong ones obtain by the E-type pronoun strategy.

Let us see the weak reading case first. As is well known, natural language determiners have the property of conservativity, which is defined as in (59) (Chierchia calls it static conservativity in contrast to dynamic conservativity).

(59) Static Conservativity

\[ D(X)(Y) \leftrightarrow D(X)(X \land Y) \]

where \( X, Y \) are sets and \( \land \) is interpreted as intersection.

A dynamic version of conservativity is defined as in (60).

(60) Dynamic Conservativity

a. Quantificational determiners (all determiners but indefinite ones)

\[ D'(P)(Q) = \uparrow D(\downarrow P)(\downarrow [P \triangle Q]) \]

where:

i. \( P, Q \) are dynamic properties of type \(<s, \<e, \><c>\>\) \( D \) is a static determiner and \( D' \) a dynamic counterpart of \( D \), and \( \triangle \) is generalized dynamic conjunction

ii. \( \downarrow P = \lambda x \downarrow ^C P(x) \)

iii. \( \downarrow [P \triangle Q] = \lambda x \downarrow [^C P(x) \triangle ^C Q(x)] \)

b. Indefinite determiners

\[ \lambda P \lambda Q \exists x [P(x) \triangle Q(x)] \]
The similarity between (59) and (60a) is obvious. Unlike the static version, however, given in (60b), dynamic conservativity treats indefinite determiners separately from quantificational determiners.

It is clear from the definition of (60a) that dynamic conservativity rescues apparently non-c-commanded pronouns in relative clause donkey sentences. The key point is that the first argument of quantifier is "copied" in and dynamically conjoined with the second argument, where the scope of existential quantifier can extend beyond the boundary of the copied first argument and dynamically binds a variable in the original second argument, yielding the weak reading, as shown in (61b), where the existential quantifier associated with a *dime* in the copied argument dynamically binds the pronoun in the original second argument.

(61)   a. Everyone who had a dime put it in the meter.
      b. every(one who had a dime) is a (one who had a dime and put it in the meter)

A little bit more formally, (61b) is represented as in (62).

(62)   a. every(\(^\lambda z[\exists\,y[dime'(y) \land have'(y)(z)]]\))
      (\(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\))
      (\(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\) \land
      \(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\))
      (\(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\) \land
      \(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\))
      (\(^\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\))
      (def. (60ai))

b. \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    (def. (60aii, iii))

c. \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    \(\langle\rangle[\exists\,y[dime'(y) \land have'(y)(z)]]\)
    (def. (60aii, iii))

By definition (60ai), the arguments of the dynamic "every" are of type \(<s, <e, cc>>\), so the \(^\langle\rangle\)-operator is put on them in (62a). (62b) is reduced to (62c) by (60aii, iii) with \(\downarrow\uparrow\) - and \(^\langle\rangle\)-cancelations, which I omit here. The weak readings of donkey pronouns in
relative clauses headed by other quantificational determiners are also obtained in the same way. See Chierchia (1995: 126) for other examples.

Let us move to strong readings. As we have seen above, the DRT account of the strong readings of donkey pronouns in conditional clauses and relative clauses headed by every is very elegant. But it is also true that it cannot account for the fact that donkey pronouns have weak readings. This problem comes from the DRT assumption that indefinite NPs are not existentially quantified. On the other hand, all dynamic approaches account for the weak readings of donkey pronouns by assuming that indefinite NPs are existentially quantified, as we have seen now. The question is, then: How can we get the strong readings, keeping the assumption that indefinite NPs are existentially quantified? In Chierchia’s approach, strong readings of donkey sentences obtain not by dynamic binding, but by the E-type pronoun strategy. A typical donkey sentence like (63) is represented as in (64), where the dynamics is ignored.

(63) Everyone who owns a donkey;_i beats iti.
(64) \( \forall x [[\text{person'}(x) \land \exists y [\text{donkey'}(y) \land \text{own'}(y)(x)] \rightarrow [\text{beat'}(f(x))(x)]] \)

\( f \): a function from people into the donkey(s) they own.

Under the E-type strategy, pronouns are regarded as contextually specified functions from individuals to individuals. In (64) \( f \) is a function from people in the relevant context into the donkey or donkeys they own. So, even if someone owns more than one donkey, (63) is interpreted as true if he beats all of the donkeys he owns.

1.2.2.4 The proportion problem and adverbs of quantification

The dynamic approaches’ assumption that indefinite NPs are existentially quantified seems to give rise to a problem with Q-adverbs. What we want in (65), for example, is neither an existential reading or a universal reading of the indefinite NP but the quantificational reading like most women.

(65) Usually if a woman;_i sees this picture, shei gets sick.
Remember that DRT can best capture the fact that the Q-adverb provides quantificational force to the indefinite NP by means of unselective binding, which is represented as in (66).

(66) Usually \( i \) [woman\( ' (x_i) \land \text{see}'(\text{this-picture})(x_i) \)] [get-sick\( ' (x_i) \)]

As it stands, the dynamic approach cannot obtain a representation like (66) since the indefinite NP is existentially closed and therefore the Q-adverb cannot bind it. To solve the problem, Chierchia adopts Dekker’s 1994 idea of Existential Disclosure, defined as in (67).

(67) Existential Disclosure: For any discourse marker \( \alpha_n \) and CCP A,

\[ \lambda \alpha_n A = \lambda u[A \upharpoonright \alpha_n = u] \]

The effect of Existential Disclosure is shown in (68). (68a) is a logical representation of the if-clause of (65). Existential Disclosure wipes the existential quantifier off, yielding (68e) of type \( \langle e, cc \rangle \).

(68) a. \( \exists x_i [\text{woman}'(x_i) \land \text{see}'(\text{this-picture})(x_i)] \)

Existential Disclosure

b. \( \lambda x_i [\exists x_i [\text{woman}'(x_i) \land \text{see}'(\text{this-picture})(x_i)]] \)

c. \( \lambda u [\exists x_i [\text{woman}'(x_i) \land \text{see}'(\text{this-picture})(x_i)] \upharpoonright x_i = u] \)

d. \( \lambda u [\exists x_i [\text{woman}'(x_i) \land \text{see}'(\text{this-picture})(x_i) \land x_i = u]] \)

e. \( \lambda x_i [\text{woman}'(x_i) \land \text{see}'(\text{this-picture})(x_i)] \)

Given Existential Disclosure, the whole sentence in (65) is computed as follows. First, the s-structure of (65) is represented as in (69).

(69)

![Diagram]

(I) Quantifier (II) Restriction (III) Nuclear Scope
The antecedent and the consequent of the conditional are interpreted as the restriction and the nuclear scope of the Q-adverb, respectively. So the s-structure is mapped to the logical representation in (70), where “most” is a dynamic generalized quantifier, and the restriction and the nuclear scope are of type \(<s, <e, cc>>\).

\[(70) \quad \text{most}'(\lambda x_i \uparrow [\text{woman}(x_i) \land \text{see}(\text{this-picture})(x_i)])(\lambda x_i [\uparrow \text{get-sick}(x_i)])\]

The static counterpart of (70) is equivalent to (66).

Existential Disclosure applies optionally, so that if it does not apply, indefinite NPs are existentially quantified and donkey pronouns are dynamically bound via dynamic conservativity, yielding weak readings. It is also possible to apply Existential Disclosure to more than one indefinite NPs in a sentence like (43), repeated as (71). In such a case, the symmetric reading is obtained.

\[(71) \quad \text{Usually if a farmer OWNS a donkey, he beats it.}\]

1.2.3 The notions of E-type pronouns

We have seen that the strong readings of donkey pronouns obtain by the E-type pronoun strategy. Chierchia also argues that it applies to pronouns in paycheck sentences and bathroom sentences.

\[(72) \quad \begin{align*}
\text{a.} & \quad \text{Everyone except John gave his paycheck}_i \text{ to his wife. John gave it}_i \text{ to his mistress.} \\
\text{b.} & \quad \text{Everyone except John gave his paycheck to his wife. John gave f(John) to his mistress.} \\
\text{f:} & \quad \text{a function from individuals into their paychecks}
\end{align*}\]

\[(73) \quad \begin{align*}
\text{a.} & \quad \text{Morril Hall does not have a bathroom}_i \text{ or it}_i \text{'s in a funny place.} \\
\text{b.} & \quad \text{Morril Hall does not have a bathroom or f(Morril Hall) in a funny place.} \\
\text{f:} & \quad \text{a function from places into bathrooms located in those places}
\end{align*}\]

Dynamic binding is not applicable in these sentences. In (72) the antecedent NP \textit{his paycheck} is in the scope of universal quantifier, which “closes off” the scope of the NP.
In (73), the antecedent indefinite NP is in the scope of negation, which also prevents the scope of existential quantifier from extending beyond the sentence boundary. The E-type strategy is not subject to such a scopal opacity.

It is worthwhile noting that the notion of E-type pronouns in Chierchia's sense is slightly different from the others. The notion of E-type pronouns originates from Evans 1977, and one easy way to understand what E-type pronouns are is to regard them as going proxy for descriptions. A typical example of E-type pronouns is given in (74), to which a paraphrase like (75) is assigned.

(74) John bought some donkeys. Harry vaccinated them.
(75) John bought some donkeys. Harry vaccinated the donkeys that John bought.

But actually Evans himself does not regard E-type pronouns as going proxy for descriptions, arguing that they do not interact with other scopal elements such as negation, tense, or modality while definite descriptions do, as shown in (77) and (76).

(76) a. Boston has a Mayor and he used to be a Democrat.
    b. Boston has a Mayor and the Mayor of Boston used to be a Democrat.

    (Evans 1977: 519)

(77) a. A man murdered Smith, but John does not believe that he murdered Smith.
    b. A man murdered Smith, but John does not believe that the man who
       murdered Smith murdered Smith.

    (ibid.: 519-520)

(76a) is unambiguous while (76b), where the definite description is used, is ambiguous in that the denotation of the definite description does not have to be coreferent with a Mayor in the first sentence, and it varies depending on the time of evaluation. The same contrast is observed in (77). (77a) is unambiguous and John's belief is non-contradictory. On the other hand, (77b) is ambiguous between the non-contradictory reading and the contradictory one. So Evans concludes that unlike Russellian definite descriptions, E-type pronouns have their own references, acting as rigid designators. More specifically, for
Evans, E-type pronouns are not definite descriptions per se, but have their references fixed by them.

On the contrary, Cooper’s 1979 treatment of pronouns is purely Russellian in that pronouns do not have their own individual referents, unlike rigid designators. He proposes that pronouns in sentences like (76a) translate as (78).

\[(78) \quad \lambda x \exists y [\forall y [\sim P_i(y) \supset y = x] \land K(x)] \]

\(i\) is a natural number, \(P_i\) is a variable over properties. (Cooper 1979: 63)

Roughly speaking, the property variable \(P\) picks up the most salient property in the context and the whole translation is evaluated in that context. In (76a), \(P\) denote the property of being a Mayor of Boston and is evaluated at index \(i\). So, the pronoun must be coreferent to the indefinite NP in the first sentence. For pronouns in intensional contexts as in (77a), Cooper proposes (79).

\[(79) \quad \lambda x \exists y [\forall y [\sim \Pi(y) \supset y = x] \land K(x)] \]

\(\Pi\) is a property-denoting expression containing only free variables and parentheses. (Cooper 1979: 78)

In this case, the denotation of the property variable \(\Pi\) could be evaluated at different indices from the one for its antecedent. Pronouns in paycheck sentences and donkey sentences are also translated as (79). Uniqueness and maximality are guaranteed by the Russellian treatment: \(\exists x [\forall y [\ldots \supset y = x]].\)

As pointed out by Kadmon 1987, the pure Russellian treatment of donkey pronouns gives rise to problems mainly because it requires uniqueness. Consider the example in (80), which she credits to Fred Landman.

\[(80) \quad A \text{ strange man lives here. If he sees a cat, he screams.} \] (Kadmon 1987: 265)

The point is that under the Russellian treatment the \(if\)-clause is analyzed as ‘if there is exactly one strange man who lives here and sees a cat’. This interpretation is very

---

\[12\] Neale 1990 also defends the view of E-type pronouns as going proxy for definite descriptions, which he calls D-type pronouns to distinguish it from Evans'.
counterintuitive. Note that in Chierchia's approach the pronouns in (80) are both dynamically bound.

Heim 1990 attempts to rescue the uniqueness problem caused by the Russellian treatment of definite descriptions or the E-type pronoun strategy, by developing Berman's 1987 approach, which is based on Kratzer's situation semantics (cf. Kratzer 1989). Putting technical details aside, the conditional sentence in (80) can be paraphrased as in (81).

(81) Every minimal situation s in which there is exactly one strange man who lives in the place denoted by here and sees a cat is part of a situation s' where the man in s screams.

In (81) the uniqueness holds but it is relativized to each minimal situation. 13

It should also be noted that the linguistic data covered by the E-type strategy varies from author to author. In Cooper 1978 and Neale 1990, pronouns in paycheck sentences are treated as E-type pronouns. On the other hand, Evans 1977 and Heim 1990 regard them not as E-type pronouns but as something else, e.g. pronouns which are used to avoid repetitions of the same phrases.

So there are many possible ways of formalizing the notion of E-type pronouns with different theoretical tools, and different ways of formalization might give rise to different empirical predictions. Giving a thorough comparison of the above mentioned approaches to E-type pronouns is out of the scope of the present thesis. However, as we will see in the following chapters in detail, Chierchia's functional view of E-type pronouns, which is characterized as in (82), will play a very crucial role in considering the semantics of null pronouns in Japanese donkey contexts, which would in turn support his proposal over alternatives.

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13 See Chierchia 1992 for the problems with Heim's approach.
E-type pronouns are functions from individuals into the maximal sum of individuals (e.g. a function from farmers into the complete set of donkeys that they owns in the case of (63)).

1.2.4 Summary of Chierchia’s approach to donkey pronouns

As stressed above, one of the most significant points of Chierchia’s approach is that dynamic binding and the E-type pronoun strategy are both available in grammar. The distribution of the two strategies is summarized in (83), where modal subordination cases and Hob-Nob sentences are omitted for now since intensionality is involved (they will be discussed in chapter 4).

<table>
<thead>
<tr>
<th>narrative sequence cases</th>
<th>dynamic binding</th>
</tr>
</thead>
<tbody>
<tr>
<td>relative clause donkey sentences/</td>
<td>both (dynamic binding for weak readings,</td>
</tr>
<tr>
<td>conditional donkey sentences</td>
<td>the E-type strategy for strong readings)</td>
</tr>
<tr>
<td>paycheck sentences</td>
<td>the E-type strategy</td>
</tr>
<tr>
<td>bathroom sentences</td>
<td>the E-type strategy</td>
</tr>
</tbody>
</table>

The division of labor of the two strategies is given in (84), cited from Chierchia (1995: 120).

Dynamic Binding
a. Subject to accessibility
b. Insensitive to pragmatic factors
c. Responsible for Θ-readings in donkey anaphora
d. Not subject to uniqueness or, in the case of groups, maximality presuppositions (though they can be present if triggered by independent mechanisms)

E-Type Strategy
a. Not subject to accessibility
b. Sensitive to pragmatic factors
c. Responsible for ∀-readings in donkey anaphora contexts

d. Subject to uniqueness/maximality presuppositions

1.2.5 Semantics of Japanese bare/common nouns

Finally I present the semantics of Japanese noun phrases that is assumed in the following chapters. Unlike English-type languages, Japanese has no article such as a or the, and bare nouns are used in argument positions, as shown in (85).

(85) John-ga hon-o yon-da.
     -Nom book-Acc read-Past

‘John read a book/some books/the book(s).’

The object NP is bare and its interpretation depends on context. If it is coindexed with an individual which has already been introduced in the discourse, it is interpreted as definite. Otherwise it is interpreted as indefinite. The number of the object(s) is also underspecified. We cannot see how many books are concerned in (85). John might have read just one book or he might have read over 1000 books. This fact could be captured by assuming that Japanese bare/common nouns are existentially quantified, and the truth condition for (85) is represented as (86) in the static mode.

(86) \( \exists x [\text{book}’(x) \land \text{read}’(x)(j)] \)

However, it is well known that bare nouns in Japanese behave like kind-denoting expressions or mass terms (cf. Krifka 1995 and Chierchia 1998a, 1998b).\(^{14}\) I give some parallels between English mass nouns and Japanese bare nouns. As in (87) English mass nouns cannot be pluralized by a plural marker. Similarly Japanese does not have a productive plural marker as in (88) (but see discussion in 2.4.1.3).

(87) *furnitures, *milks

\(^{14}\) The idea that bare NPs in determiner-less languages are kind denoting expressions was first proposed by Porterfield and Srivastav 1988. According to them, Hindi bare NPs are interpreted either as definite or as kind-denoting, but not as indefinite. See Dayal 1999 for a more recent discussion.
(88)  *hon-PL, *kuruma-PL
   ‘books’ ‘cars’

Also English mass nouns and Japanese bare nouns are both incompatible with numerals. Numeral expressions can be used only with classifiers.

(89)  a.  *three furniture
   b.  three pieces of furniture

(90)  a.  *san-no  kuruma
       three-Gen car
   b.  san-dai-no  kuruma
       three-Cl-Gen car  ‘three cars’
   c.  *kuruma san
       car  three
   d.  kuruma san-dai
       car  three-Cl  ‘three cars’

(90b) is an example of classifier + noun, where the genitive case is used between them. In (90d), the classifier is ‘floating’ and no genitive marker is necessary.\(^{15}\)

Since Carlson 1977, it has been argued that mass terms and kind-denoting nouns are semantically very close concepts and can be analyzed in a similar way. Thus I assume, with Krifka 1995, that bare nouns in languages like Chinese and Japanese are kind denoting expressions, which means that (85), for example, can be represented as (91), where BOOK is the translation of hon, denoting the book-kind, of type e.

(91)  read*(BOOK)(j)

The question is, then: What is the relation between the logical representation in (86) and that in (91)?

In order to consider this question, we will begin with the semantics of kind-denoting expressions and mass terms.\(^{16}\) We follow Chierchia’s 1998a theory of plurals, which

---


\(^{16}\) For overview of semantics of mass nouns, see Landman 1995 and Pelletier and Schubert 1989. For the recent development of theories of plurality, see Landman 1995 and Schwarzschild 1996.
inherits the basic insights from Link's 1983 that the domain of individuals has an internal structure. It forms a complete join semilattice, as illustrated in (92).

(92)

```
   {a, b, c}, ...
   {a, c}   {b, c}, ...
   {a, b}   a
   b        b
   c       ... = At
```

= U

The domain of individuals consists of singular individuals and plural ones. In (92) At is a set of singular individuals. \{a, b\} is, for example, a plural individual formed by a and b.

The relations between individuals in the domain are expressed by means of a 'component-of' relation, represented as \(\leq\). In \(A \leq B\), A can be a member of or a subset of B.

(93)  
   a.  \(a \leq \{a, b, c\}\)
   b.  \(\{a, b\} \leq \{a, b, c\}\).

The sum operation U is defined with \(\leq\).

(94)  
For any elements A, B in U, \(A \cup B\) is the smallest element in which A and B are both components.

Examples:

\(a \cup b = \{a, b\}\)

\(\{a, b\} \cup \{c, d\} = \{a, b, c, d\}\)

\(a \cup \{b, c\} = \{a, b, c\}\)

In terms of U, we can define the supremum operator, which gives us the sum of all the elements of X, as in (95).

(95)  
For any \(X \subseteq U\), \(U_{X} = \{u \in At: \text{For some } u' \in X, u=u' \text{ or } u \in u'\}\)

Examples:

\(U\{a, \{a, b\}\} = \{a, b\}\)

\(U\{\{a, b\}, c\} = \{a, b, c\}\)

\(U\{a, b\} = \{a, b\}\)
An operator that selects the greatest element of a set is defined as in (96).

(96) \[
\text{For any } X \subseteq U, \text{Max}(X) = \cup X, \text{ if } \cup X \in X; \text{ otherwise undefined.}
\]

Example:
\[
\text{Max}\{\{a, \{a, b\}\}\} = \{a, b\}
\]
\[
\text{Max}\{\{a, b\}\}; \text{ undefined}
\]

And also in terms of U, the closure is defined as in (97).

(97) \[
\text{For any } X \subseteq U, \text{ } \ast X \text{ is the closure of } X \text{ under } U, \text{ i.e. the set of all sums of elements of } X: \ast X = \{UY: Y \subseteq X\}.
\]

Example:
\[
\ast \{a, b, c\} = \{\{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}
\]

Given a domain of individuals like (92), pluralization can be expressed as mapping a set of atoms into the set of pluralities constituted by those atoms. This can be formalized as in (98).

(98) \[
\text{For any set of atoms } A \subseteq U, \text{PL}(A) = \ast A - A
\]

If we have A = \{a, b, c\} as a set of atoms, the pluralization function PL, which corresponds to Link's '*' takes it as its domain, and gives us the set of pluralities PL(A) = \{\{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}. Note that here we are assuming that \{a\} = a, which Schwarzschild 1996 calls Quine's innovation.

So far we have seen the semantics of plurality. The semantics of mass terms is also explained by means of lattice theory. In Link 1983, in addition to the domain of (singular and plural) individuals, there is a set whose internal structure is a complete, but not necessarily atomic, join-semilattice, which serves as a domain of the denotation of mass nouns. On the other hand, in Chierchia 1998a, the domain of mass nouns has the same internal structure as that of count nouns. And he claims that mass nouns are lexically pluralized. This is called the Inherent Plurality Hypothesis. Denotation of mass nouns can be expressed by means of the U-closure. Suppose we have chair a and table b in world w. Then 'a is a piece of furniture', 'b is a piece of furniture', 'a and b are pieces of furniture'
are all true in w. This shows that the denotation of ‘furniture’ contains both atoms and pluralities, which is pictured as in (99).

(99) 

\[ \| \text{furniture}_w \| = \left\{ \frac{\{a, b\}}{a \rightarrow b} = \| \text{pieces of furniture}_w \| \right\} = \| \text{piece of furniture}_w \| \]

Formally, the domain of mass nouns corresponds to the U-closed atomic subsets of U. And this means that mass nouns are plurals in that they denote pluralities. The difference between mass nouns and plural count nouns is then that the latter exclude atoms while the former contains atoms but they are sometimes vague (i.e., ‘water’). The choice between Link’s theory and Chierchia’s is not crucial for the present introductory purpose. In chapter 2, however, we will mention Chierchia’s semantic parameter, which derives from the Inherent Plural hypothesis, so that we will follow his theory of plurality.

Let us see the semantics of kind denoting expressions. As is extensively discussed in Chierchia 1984, kinds are “nominalized” counterparts of predicates. Extensionally, the furniture-kind in w in (99) denotes the greatest element in w, namely, \{a, b\}. The relation between properties and kinds is illustrated in (100), where the \( \cap \) -operator changes properties into individuals, and the \( \cup \) -operator “predicativizes” individuals. So, for any properties P, \( \cap P \) is a kind, and for any kinds k, \( \cup k \) is a property.
(100)

More formally, kinds and properties are defined based on the domain designed for pluralities above, as in (101).

(101)  

a. \( U \) is a join atomic semilattice 

b. \( AT \) is the atoms of \( U \) 

c. \( S \) is the set of worlds/situations 

d. \( K \subseteq U^S \) is the set of kinds 

e. \( K \subseteq AT \) 

(102)  

Let \( k \) be a kind. Then for any world/situation \( s \),  

\[ U_k = \lambda x[x \leq k_s], \] if \( k_s \) is defined,  

where \( k_s \) is the plural individual that comprises all of the atomic members of  

the kind in \( s \); 

otherwise undefined. 

(103)  

For any property \( P \), and world/situation \( s \)  

\[ \wedge P = \lambda s \text{ MAX}(P_s), \] if \( \lambda s \text{ MAX}(P_s) \) is in \( K \),  

where \( P_s \) is the extension of \( P \) in \( s \);  

otherwise undefined. 

With these notions, mass and kind denoting nouns in English are treated as follows.

(104)  

a. Gold is rare. \( \rightarrow \) rare('GOLD')  

b. Dogs are widespread. \( \rightarrow \) widespread('\( \wedge \)dogs')
Both *rare* and *widespread* are kind-selecting predicates. Mass nouns like *gold* is a kind-denoting expression, so that it translates into GOLD. Plural count nouns like *dogs* are "nominalized" by the $\cap$-operator. Plural count nouns are also interpreted as existential if used with object-level predicates, as in (105). Following Carlson's 1977 idea that the lexical semantics of predicates forces the operation from kind to instances of the kind, Chierchia 1998b proposes a rule, called Derived Kind Predicate (DKP), formulated in (106).

(105) Lions are ruining my garden.

(106) Derived Kind Predication

If $P$ applies to objects and $k$ denotes a kind, then

$$P(..., k, ...) = \exists x [\cup k(x) \land P(..., x, ...)]$$

Given DKP, the existential reading in (105) is derived as shown in (107).

(107) ruining-my-garden'($\cap$)lions

via DKP

$$\exists x [\cup \cap lions(x) \land ruining-my-garden'(x)]$$

Now let us go to Japanese bare/common nouns. Take a world $w$ in which there are three books, say $a$, $b$, $c$, in as shown in (108). The elements of the $U$-closed set are $a$, $b$, $c$, $\{a, b\}$, $\{a, c\}$, $\{b, c\}$, and $\{a, b, c\}$, and they all can be interpreted as extensions of a bare noun *hon* 'book' in $w$. This means that Japanese bare nouns should be treated as mass.

(108)

$$\ll hon_w \gg = \begin{array}{c}
\{a, b, c\} \\
\{a, b\} & \{a, c\} & \{b, c\} \\
\hline
a & \hline
b & \hline
\text{c}
\end{array}$$

So just like *gold* in English, *hon* is kind-denoting and translates into BOOK, and (109) is represented as (110).
       -Nom book-Acc read-Past

(110) read'(BOOK)(j)

Here read' applies to objects while BOOK denotes the book-kind, so via the DKP (111) is derived.

(111) $\exists x[^{\cup}BOOK(x) \land read'(x)(j)]$

Our intuition that Japanese bare nouns are kind-denoting and they are interpreted as existential can be now captured by DKP. Notice that we are now talking about Japanese bare nouns in a static mode. In order to account for anaphoric relations, we actually need the dynamic counterparts. The shift from a static mode to a dynamic mode is done by the $\uparrow$-operator. So, (112) holds as well as (106).

(112) Derived Kind Predication (DKP): dynamic version

If $P$ applies to objects and $k$ denotes a kind, then

$$\uparrow P(..., k, ...) = \exists x[^{\cup}k(x) \land P(..., x, ...)]$$

The two-way representations of Japanese bare nouns play a very crucial role for my account of pronouns. Let me give you a minimal pair of examples.

       -Top book-Acc read-Past -also it-Acc read-Past

   ‘John read a book/books. Mary read it (= the book(s) that John read), too.’

   -Top book-Acc read-Past -also read-Past

   ‘John read a book/books. Mary read one/some, too.’

The first sentences in these examples are identical. The difference between the two examples is that in the a-example an overt pronoun is used while the b-example has a null pronoun. The interpretation of the former is that Mary read the book(s) that John read. On the other hand, in the latter what Mary read is not necessarily the same book(s) that John read. It just says that Mary read a book/books, too. This interpretive difference can be accounted for by my claim that overt pronouns are variables to be dynamically bound while
null pronouns can be interpreted as E-type. The first sentence of (113) is represented as (114a) via DKP, and the second sentence as in (114b). These two are dynamically conjoined as in (114c), where the variable in the second sentence is dynamically bound by the existential quantifier introduced in the first sentence.

\[
\begin{align*}
(114) & \quad a. \quad \exists x \uparrow [\mathcal{U} \text{BOOK}(x) \land \text{read}'(x)(j)] \\
& \quad b. \quad \uparrow \text{read}'(x)(m) \\
& \quad c. \quad \exists x \uparrow [\mathcal{U} \text{BOOK}(x) \land \text{read}'(x)(j) \land \text{read}'(x)(m)]
\end{align*}
\]

Now let us see the b-example of (113), where the null pronoun is interpreted as E-type. The first sentence is represented as in (115), where the bare noun translates into BOOK, the denotation of which is the greatest element of the \( \mathcal{U} \)-closed set.

\[
(115) \quad \text{read'(BOOK)}(j)
\]

As characterized in (82), E-type pronouns are functions from individuals into individuals. The function from John into the book-kind is also such a function, since BOOK is defined as an (intensional) individual. Let us assume thus that the most salient function in (113b) is that function from people into the book-kind. Then, the null pronoun in the second sentence is interpreted as a function from Mary into the book-kind. The logical representations of the whole (113b) are given in (116).

\[
(116) \quad \text{the first sentence of (113b)} \\
\quad \text{read'(BOOK)}(j) \Rightarrow \exists x [\mathcal{U} \text{BOOK}(x) \land \text{read}'(x)(j)] \\
\quad \text{the second sentence of (113b)} \\
\quad \text{read'(f(m))}(m) \\
\quad \text{f: a function from people into the book-kind} \\
\quad \Rightarrow \exists x [\mathcal{U} \text{BOOK}(x) \land \text{read}'(x)(m)]
\]

Suppose John read book a, and Mary read book a and book c, in the model given in (108). Book a is a component of the \( \mathcal{U} \)-closed set, so that the first sentence is true. The set \{a, c\} is also a component of the \( \mathcal{U} \)-closed set, therefore the second sentence is also true. The idea that there is a function from individuals into kinds will be defended in chapter 2.
It is worthwhile noting at this point that, in my approach, nothing prevents the null pronoun in (113b) from being dynamically bound. If it is dynamically bound, we get the same reading as (113a), and this reading seems not impossible. But as far as this example is concerned, it is not clear whether the reading obtains by dynamic binding or the book Mary read happens to be the same as the one that John read. So the question is: Are there any cases where null pronouns must be dynamically bound? The answer is yes. The evidence comes from a case like (117).

(117) Gyangu-ga betsuno gyangu-to surechiga-u-to, 
gangster-Nom another gangster-with pass.by-Pres-Cond
soitsu-wa/Ø soitsu-o/Ø niramitsuke-ru.
he-Top he-Acc glare.at-Pres

‘When a gangster passes by another gangster, he glares at him.’

This is the Japanese counterpart of the case that Heim (1990: 148) dubs the “problem of indistinguishable participants”, which is regarded as evidence for dynamic/unselective binding. The fact that null pronouns are possible in (117) strongly suggests that they be dynamically bound. We will discuss this issue in detail in 2.3 of chapter 2.

So far I have introduced the main tools which play very important roles in the discussions in the following chapters. In the rest of this chapter, I will introduce some other notions and assumptions concerning Japanese semantics.

First I will mention the semantic translation of Japanese relative clauses, since we will discuss relative clause donkey sentences in chapter 3. Let us consider the noun phrase in (118), where the head is a bare noun hon ‘book’, modified by the relative clause.

(118) [Mary-ga kat-ta ] hon
-Nom buy-Past book

‘(a) book(s) that Mary bought’

The relative clause is of type $\langle e, \Delta \rangle$, and we are assuming that Japanese bare nouns are kind-denoting of type $e$ (or $e^k$ in Carlson’s notation), but we do not want anything of type $t$
as a translation of the NP in (118). In order to obtain the appropriate type, I propose the Relative Clause Rule as in (119).

(119) Relative Clause Rule

Given a configuration

```
  NP
  |    |    |    |
  CP  NPi |   |
  |      |  κ
  Opj   C'
```

where κ is a kind-denoting expression, translating into K, and the relative CP translates into \( \lambda x[... P(x) ...] \),

the whole NP translates into \( \cap \lambda x[\cup \text{BOOK}(x) \land ... P(x) ...] \).

The idea is that an NP with a relative clause is kind-denoting in Japanese, i.e. "the kind of book that Mary bought."\(^{17}\) With (119), the NP in (118) translates as in (120).

(120) \( \cap \lambda x[\cup \text{BOOK}(x) \land \text{buy}'(x)(m)] \)

Let us then consider a full sentence with the relative clause as in (121).

     -Nom   -Nom buy-Past book-Acc read-Past

'John read (a) book(s) that Mary bought.'

The computation of (121) is illustrated in (122).

\(^{17}\) I would like to thank Roger Schwarzschild for suggesting this idea.
Now let us briefly look at the semantics of classifiers. The theory of classifiers I follow here is basically Krifka 1995. The logical representation of a sentence with a classifier like (123), for example, is represented as in (124).

(123) John-wa san satsu-no hon-o yon-da.
    -Top three Cl-Gen book-Acc read-Past

   'John read three books.'

(124) $\exists x[\cup \text{BOOK}(x) \land CL'(x) = 3 \land \text{read'}(x)(j)]$

The translation of the classifier itself is given (125).\(^{18}\)

(125) classifier: $\lambda n\lambda P\lambda x[P(x) \land CL'(x) = n]$, where $n$ is number.

(125) requires a predicate, so that the host noun BOOK of type $e$ must be lifted into $<e, \succ>$. In other words, the classifier triggers the type lifting. This is the job of the $\cup$-operator. The computation of the whole object of the example in (123) is illustrated in (126), where I assume that the genitive case marker -no is semantically vacuous.

---

\(^{18}\) CL' in (125) corresponds to Krifka’s 1995 OU(k), where OU ‘object unit’ applies to kinds $k$ and OU(k) applies to individuals.
A few comments should be given. First the object NP with the classifier is of type \(<e, \triangleright, \triangleright>\) because of the translation of classifiers given in (125). The type of the transitive verb \(\text{yonda} \ '\text{read}'\) is \(<e, \langle e, \triangleright\rangle>\). So function application doesn't apply. Following Bittner 1994 among others, I assume that type mismatch triggers LF movement. In (126) the object NP moves and adjoins to IP. The lower IP translates into \(\lambda x[\text{read}'(x)(j)]\) of type \(<e, \triangleright, \triangleright>\), which again cannot combine with the moved NP. To salvage this type mismatch, a type-lifting operation dubbed \(\exists\), which makes \(<e, \triangleright>\) into \(<<e, \triangleright, \triangleright>, \triangleright, \triangleright>\), applies as shown in 9 (cf. Partee 1987 and Bittner 1994 for further discussion on type shifting operations). Via this type lifting operation, the existential quantifier is introduced.

Finally, I mention universal quantification in Japanese. Universally quantified NPs in Japanese consist of a wh-phrase, a common noun and the universal quantificational particle -\(\text{mo}\), as given in (127).
(127)  dono-hon-mo
    which-book-∀
    'every book'

Universal quantifiers like every and -mo quantify over sets of singularity, not over U-closed sets. That is, when such quantifiers are used, the elements of the quantifier domain must be countable, and plural individuals should not be elements of it. So, in order to make universal quantification possible, we need an atomization function which gives us a set of atoms from denotation of kinds, like (128).

(128)  ATM(X) = {y ≤ X: y ∈ At}

ATM is the atomization function from U-closed sets into the sets of their atoms, so ATM(*A) = A. I propose that ATM is introduced by dono 'which'. The intuition is that countability of common nouns comes from this wh-word. The translations of the relevant lexical items are given in (129).

(129)  

<table>
<thead>
<tr>
<th>Lexical Item</th>
<th>Translation</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>-mo</td>
<td>λPλQ∀x[P(x) → Q(x)]</td>
<td>&lt;&lt;e, &gt;, &lt;&lt;e, &gt;, &gt;&gt;</td>
</tr>
<tr>
<td>dono</td>
<td>λyλx[x ≤ ATM(y)]</td>
<td>&lt;e, &lt;e, &gt;&gt;</td>
</tr>
</tbody>
</table>

The computation of (127) is shown in (130).

(130)  

```
NP:5
  NP:3
    dono:2  N:1  Q
    |     |     | hon -mo

1.  BOOK
2.  λyλx[x ≤ ATM(y)]  <e, <e, >>
3.  λyλx[x ≤ ATM(y)][BOOKS]
    = λx[x ≤ ATM(BOOKS)]  <e, >
4.  λPλQ∀x[P(x) → Q(x)]  <<e, >, <<e, >, >>
5.  λPλQ∀x[P(x) → Q(x)][λx[x ≤ ATM(BOOKS)]]
    = λQ∀x[x ≤ ATM(BOOKS) → Q(x)]  <<e, >, >
```
‘BOOKₕ’ represents the extension of the book-kind in s, the world/situation of evaluation. As illustrated in (130), I assume that the quantificational particle -*mo adjoins to NP, rather than a head taking the NP as its complement. I will discuss syntax and semantics of quantified NPs with special reference to strong and weak readings of donkey pronouns in 3.2 of chapter 3.

1.3 The organization of the thesis

In conclusion, let me lay out the organization of the thesis. In chapter 2 we will discuss the differences between overt and null pronouns in narrative sequence cases, paycheck sentences, and bathroom sentences, and provide arguments for the claim that overt pronouns are variables to be dynamically bound (i.e. DMs) whereas null pronouns are ambiguous between variables and the E-type pronouns. There we will also discuss the semantics of “plural morphemes” in Japanese (and Chinese).

Chapter 3 concentrates on several types of donkey sentences in Japanese. As we have seen, Chierchia claims that dynamic binding gives us weak readings while the E-type strategy is responsible for strong readings. If his claim and our claim about the difference between the two types of Japanese pronouns are both correct, it would be predicted that only the weak readings are available in Japanese donkey sentences with overt pronouns. This is not the case, however. There are cases where strong readings are available with overt pronouns. It will be shown that this is due to an invisible necessity operator, which plays a very important role in Japanese donkey sentences. We will also discuss the topic sensitivity of Q-adv and the difference between English and Japanese.

Chapter 4 aims to investigate anaphoric links in intensional contexts such as Hob-Nob sentences. An interesting fact is that overt pronouns are acceptable in Japanese versions of Hob-Nob sentences, which seem to be environments where dynamic binding is not available. I will argue that anaphoric links in intensional contexts can be best captured by Portner’s 1996 idea that pronouns in those contexts are indexicals. In the concluding
chapter, I will comment more generally on the consequences of our discoveries about Japanese null and overt pronouns.
Chapter II: Semantics of Japanese Pronouns

2.1 Introduction

Japanese pronouns have been studied mainly from syntactic perspectives, and as far as I know, less attention has been paid to their semantics.\(^1\) In this chapter, I will shed light on semantic differences between null pronouns and overt pronouns in the language, especially those in donkey contexts.\(^2\)

Japanese null and overt pronouns are in free variation in contexts like (1).

(1) Mary-wa kurumāi-o mot-tei-ru. Sorei-wa/∅i shako-ni a-ru.
    -Top car-Acc own-Prog-Pres it-Top garage-in be-Pres

    ‘Mary has a carī. Itī’s in the garage.’

But the alternation is not possible in contexts like (2).

(2) a. John igai-no dare-mo-ga jibun-no kurejittokaadoi-o tsuma-ni
    except-Gen who-∀-Nom self-Gen credit.card-Acc wife-to
give-Past -Top it-Acc mistress give-Past

    ‘Everyone but John gave a credit cardī of his to his wife. John gave oneī of
    his to his mistress.’

b. Kono tatemono-ni toirei-ga na-i ka, ∅i/??sorei-ga
    this building-in bathroom-Nom Neg-Pres or it-Nom
    henna tokoro-ni a-ru ka-no dochira-ka dea-ru.
    funny place-in exist-Pres or-Cop which-Q Cop-Pres

    ‘It is the case either that this building does not have a bathroomī or that itī is
    in a funny place.’

\(^1\) Cognitive linguistic approaches also have been taken recently such as Yamanashi 1992.

\(^2\) A very important preceding work is Kim 1996, where she claims that in Korean donkey contexts, overt and null pronouns should be analyzed as definite and indefinite descriptions, respectively. Although Japanese and Korean are typologically very close to each other, our observations and claims to be presented in this thesis are different from and incompatible with hers.
As would be obvious, the cases where they don’t alternate are so-called paycheck sentences and bathroom sentences, and as seen in chapter 1, pronouns in these contexts are treated as E-type pronouns in Chierchia’s system. In Japanese paycheck/bathroom sentences, null pronouns are perfectly acceptable while overt pronouns are marginal. Based on examples like (2) and others given below, I will make the following claim.

(3) In Japanese donkey anaphora contexts,
   a. null pronouns are ambiguous between variables and E-type pronouns, and
   b. overt pronouns are variables which must be dynamically bound (discourse markers).

Recall that in Chierchia’s approach, (English) pronouns are ambiguous between variables and E-type pronouns, which means that dynamic binding and the E-type strategy are both available, as far as a given context allows their availability. The present thesis aims to support his approach from the contrast between null and overt pronouns in Japanese, showing that the distribution of null pronouns are almost identical to that of E-type pronouns in Chierchia’s sense. The difference between the two types of pronouns given in (3) is observed only when they are not c-commanded by non-referential antecedents. Both overt and null pronouns are OK if the antecedents are referential as in (4). They also can be used deictically as in (5).

(4) a. John igai-no dare-mo-ga sono uwasa-o tsuma-ni except-Gen who-∀-Nom that rumour-Acc wife-to
    hanashi-ta. John-wa sô/sorei-o aijin-ni hanashi-ta. talk-Past -Top it-Acc mistress talk-Past
    ‘Everyone but John talked about that rumouri to his wife. John talked
    about it; to his mistress.’

3 The interpretations of null pronouns in Japanese paycheck sentences are different from those in English counterparts. This will be discussed in 2.4.2.2.
b. Kono tatemono-ni John-no kenkyuushitsu-ga na-i ka,
   this building-in -Gen office-Nom Neg-Pres or
   ə/soreɣi-ga henna tokoro-ni a-ru ka-no dochira-ka dea-ru.
   it-Nom funny place-in exist-Pres or-Cop which-Q Cop-Pres
   ‘It is the case either that this building does not have John’s office; or that it
   is in a funny place.’

(5) ə/Sore-wa nan-desu-ka?
   it-Top what-Cop-Q
   ‘What’s that?’

In DRT terms, the discourse referents associated with the antecedents in these examples are
introduced in the main DRS, so that the intended anaphoric links are always possible.

This chapter is organized as follows. In section 2.2, I will give some basic facts about
Japanese pronoun systems, showing that not all pronouns can be interpreted as bound
anaphora even if they are c-commanded by their antecedents. Section 2.3 gives evidence
that both overt and null pronouns can be interpreted as dynamically bound variables.
Then, in section 2.4, I will discuss contexts such as narrative sequence cases, paycheck
sentences and bathroom sentences, in which the differences between overt and null
pronouns are observed.

2.2 ə-series demonstratives as overt pronouns

In this section, I will clarify what I mean by Japanese overt pronouns, for not all
pronouns in the language behave like their English counterparts. English pronouns can be
interpreted as bound pronouns when they are c-commanded by quantifiers. In Japanese,
on the other hand, not every pronoun can be interpreted as a bound variable. Overt
pronouns such as kare ‘he’ and kanojo ‘she’ cannot be interpreted as bound variables as
shown in (6a) (cf. Montalbetti 1984 and Hoji 1990) while null pronouns and a long-
distance reflexive jibun can, as shown in (6b) and (6c), respectively.
(6)  

which student-∀ he-Nom smart-Pres Comp think-Prog-Pres  
‘Every student thinks that he is smart.’

b.  Dono gakusee-mo] [∅ j kashiko-i to] omot-tei-ru.  
which student-∀ smart-Pres Comp think-Prog-Pres  
‘Every student thinks that he is smart.’

c.  Dono gakusee-mo] [jibunj-ga kashiko-i to] omot-tei-ru.  
which student-∀ self-Nom smart-Pres Comp think-Prog-Pres  
‘Every student thinks that he is smart.’

This doesn’t mean that there is no overt pronoun which can be interpreted as a bound variable, however. As is extensively discussed in Hoji 1990, the so-called So-series demonstratives can be interpreted as bound variables. Japanese has three series of demonstratives: Ko-series, So-series and A-series, as illustrated in the following table cited from Kuno 1973.

<table>
<thead>
<tr>
<th>Ko-series</th>
<th>So-series</th>
<th>A-series</th>
</tr>
</thead>
<tbody>
<tr>
<td>kore ‘this one’</td>
<td>sore ‘that one’</td>
<td>are ‘that one there’</td>
</tr>
<tr>
<td>koitsu ‘this guy’</td>
<td>sonot ‘that guy’</td>
<td>aitsu ‘that guy there’</td>
</tr>
<tr>
<td>kono ‘(of) this’</td>
<td>sono ‘(of) that’</td>
<td>ano ‘(of) that over there’</td>
</tr>
<tr>
<td>konna ‘like this’</td>
<td>sonna ‘like that’</td>
<td>anna ‘like that over there’</td>
</tr>
<tr>
<td>koko ‘here’</td>
<td>soko ‘there’</td>
<td>asoko ‘over there’</td>
</tr>
<tr>
<td>kochira ‘this way’</td>
<td>sochira ‘that way’</td>
<td>achira ‘that way over there’</td>
</tr>
<tr>
<td>koo ‘in this way’</td>
<td>soo ‘in that way’</td>
<td>aa ‘in that way there’</td>
</tr>
</tbody>
</table>

All of these can be used without any linguistic antecedent. Which series should be used depends on several factors such as the speaker’s mental space, the hearer’s mental space that the speaker assumes, physical distance from the speaker/hearer to the referent, and so on (see Kuno 1973, Kamio 1990, Masuoka and Takubo 1992 among many others). Note that neither kare ‘he’ nor kanojo ‘she’ belongs to these demonstratives.

Of these three series, only So-series demonstratives can be interpreted as bound pronouns.
(8)  a. Dono kaisha-mo\_i soko\_i-no seehin-ga anzen-da to which company-\_V that.place-Gen product-Nom safe-Cop Comp koohyooshi-ta. announce-Past

'Every company\_i announced that its\_i products were safe.'

b. *Dono kaisha-mo\_i koko\_i-no /asoko\_i-no seehin-ga which company-\_V this.place-Gen that.place-Gen product-Nom anzen-da to koohyooshi-ta best-Cop Comp announce-Past

'Every company\_i announced that this/that company's\_i products were safe.'

(9)  a. Dono ronbun-mo\_i sore\_i-ga keesaiz-are-ru zasshi-no shoshiki-ni which paper-\_V that-Nom publish-Pass-Pres journal-Gen format-Dat shitagaw-anakerebanarana-i. follow-must-Pres

'Every paper\_i must follow the format of the journal in which it\_i appears.'

b. *Dono ronbun-mo\_i kore\_i-ga /are\_i-ga keesaiz-are-ru zasshi-no which paper-\_V this-Nom that-Nom publish-Pass-Pres journal-Gen shoshiki-ni shitagaw-anakerebanarana-i. format-Dat follow-must-Pres

'Every paper\_i must follow the format of the journal in which this\_i/that\_i appears.'

(10)  a. Dono doroboo-mo\_i [soitsu\_i-ga nusun-da] shina-o jimanshi-ta. which thief-\_V that.guy-Nom steal-Past thing-Acc boast.of-Past

'Every thief\_i boasted of what he\_i stole.'

b. *Dono doroboo-mo\_i [koitsu\_i-ga /aitsu\_i-ga nusun-da] shina-o which thief-\_V this.guy-Gen that.guy-Gen steal-Past thing-Acc jimanshi-ta. boast.of-Past

'Every thief\_i boasted of what this guy\_i/that guy\_i stole.'

Soko in (8a), sore in (9a) and soitsu in (10a) are all c-commanded by their universally quantified antecedents and they are interpreted as bound variables. When the So-series
demonstratives are not c-commanded by their antecedents, they cannot be interpreted as bound variables, as shown in (11).

(11)  
(a) Dono kaisha-mo1 toosanshi-ta.  
which company-∀ go.bankrupt-Past  
*Soko1-wa takusan-no fusai-o kakae-tei-ta.  
that.place-Top many-Gen debt-Acc hold-Prog-Past  
‘Every company; went bankrupt. It; had a large debt.’

(b) John-wa sono chuukosha ya-no dono kuruma1-ni-mo  
-Top that used.car shop-Gen which car-Dat-∀  
notte-ni-ta. Yosoo-ijooni *sore1-wa yoku hashit-ta.  
drive-try-Past expectation-more.than it-Top well run-Past  
‘John tried driving every car; in the used car shop. It; ran better than expected.’

They are also not bound by their bare NP antecedents if the latter are in inaccessible domains created by negation or disjunction, as shown in (12).

(12)  
(a) John-wa kuruma1-o mot-tei-na-i.  
-Top car-Acc have-Prog-Neg-Pres  
*Sore1-wa itariasee-da.  
it-Top Italian.product-be.Pres  
‘John doesn’t have a car. It is made in Italy.’

(b) *John-ga kuruma1-o mot-tei-ru ka Mary-ga sore1-o  
-Nom car-Acc have-Prog-Neg-Pres or -Nom it-Acc  
mot-tei-ru ka no dochira-ka de-aru.  
have-Prog-Pres or Comp which-Q Cop-Pres.  
‘It is the case either that John has a car; or that Mary has it;.’

So, the So-series demonstratives behave in the same way as English (singular) pronouns. Notice that the examples in (11) and (12) are evidence for the claim that Japanese overt pronouns are variables that can only be dynamically bound, since dynamic binding is not available in these examples.

We have shown that the So-series demonstratives can be interpreted as variables. In Japanese grammars they are referred to as demonstratives, but in the present thesis I will
call them overt pronouns, to avoid potential confusion caused by using unfamiliar notions like "bound demonstratives" (but see chapter 5). 4

Before closing this section, I would like to add a note. Of the So-series demonstratives, I will pay attention only to distribution and interpretation of sore ‘it’, soko ‘it/that place’ and soitsu ‘he/that guy’ in argument position, since my primary concern is the difference between overt and null pronouns and it is not easy to verify the existence of null pronouns in non-argument position. In particular, I will avoid dealing with sono ‘(of) that’, since its status is not clear. For example, it is used as follows.

(13) Otoko$_i$-ga inu-o tsure-te hait-te-ki-ta.
    man-Non dog-Acc accompany-Inf enter-Inf-come-Past
    Sono/$\emptyset$ musume-mo hait-te-ki-ta
    that daughter-also enter-Inf-come-Past

   ‘A man$_i$ came in with a dog. A daughter of his$_i$ came in, too.’

In this case, sono musume ‘a daughter of that/that daughter’ is interpreted as ‘a daughter of the man who came in with a dog’, where the sono is interpreted as referring to the man who came in with a dog. Under this interpretation, it is reasonable to regard the sono as an argument of the nominal expression musume ‘daughter’, like John in John’s daughter, where John is received a thera-role from the head noun. However, sono also can be used as in (14).

(14) Otoko$_i$-ga inu-o tsure-te hait-te-ki-ta.
    man-Non dog-Acc accompany-Inf enter-Inf-come-Past
    Mary-wa sono/$\emptyset$ otoko$_i$-o niran-da.
    -Top that man-Acc glare-at-Past

   ‘A man$_i$ came in with a dog. Mary glared at that man$_i$. ’

The whole object of the second sentence cannot be interpreted as in (13). If the sono in (14) had a theta-relation to the head noun, sono otoko ‘a man of that/that man’ would be interpreted as ‘a man of the man who came in with a dog’. But this is not the case. It just refers to the man who came in with a dog. Sono in (14) thus seems to function as a true

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4 Hoji 1995 uses the term demonstrative binding.
demonstrative with no thematic relation to the head noun. Note that without *sono*, we can get the same interpretation in (14). So it is not clear whether the anaphoric link between the subject NP in the first sentence and the object NP in the second is mediated by *sono*. These facts suggest that *sono* be neither simple demonstrative nor simple definite determiner, and because of its unclear status, I will not discuss examples with it.5

2.3 Japanese pronouns as dynamically bound variables

In this section, I will show evidence that both overt and null pronouns are variables which can be dynamically bound. One of the strongest arguments for dynamic binding over the definite description approach (or the E-type pronoun strategy) is a symmetrical case like (15), which Heim (1990: 148) calls the problem of indistinguishable participants.6

(15) When a man resembles another man, he tries to avoid him. (Krater 1995: 173)

Krater 1995 argues that if the pronouns are treated only as definite descriptions, the truth condition for (15), with the notion of minimal situations/eventualities, should be something like (16).

(16) For every minimal situation s such that a man resemble another man in s, there is an extended situation s' such that in s', the unique man who resembles another

man in s tries to avoid the unique man who resembles another man in s.

Under the truth condition given in (16), (15) is true in all worlds in which no man resembles another man and false in all other worlds. This is counterintuitive, however, for our intuition is that the antecedent clause and the consequent clause both can be true. The problem lies in the fact that there is no unique man who resembles another man in a minimal situation, no matter how minimal it is. Krater also argues that even if we regard

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5 Imperssionistically speaking, *sono* functions ambiguously as demonstrative and as quasi-definite. See also the relevant discussion presented in chapter 5.

6 According to Heim 1990 and Krater 1995, this type of example was first pointed out by Hans Kamp and Jan van Eijck.
pronouns as indefinite descriptions, sentences like (15) cannot be accounted for. Under the pronouns-as-indefinite-descriptions approach, the truth condition for (15) should be as in (17).

(17) For every minimal eventuality s such that a man resemble another man in s, there is an extended situation s' such that in s', a man who resembles another man in s tries to avoid a man who resembles another man in s.

What (15) says that in the minimal situation s, we have two men, both of whom resemble each other, and in s' they both try to avoid the other. But the truth condition in (17) does not capture this intuition, for it makes (15) true even if only one of the two men tries to avoid the other in s'.

The anaphoric links between the indefinite NPs and the pronouns in (15) can be accounted for only by dynamic binding or unselective binding by an implicit Q-adverb which corresponds to *always*. Here I demonstrate how dynamic binding in Chierchia’s theory accounts for the facts. First, indices are assigned to (15) as in (18), and then the existential quantifiers of the indexed indefinite NPs of the restriction clause are wiped out by the existential disclosure as in (19). The nuclear scope part is represented as in (20). Finally the whole sentence is represented in (21).

(18) \text{Always}_{i,j} [\text{when a man}_i \text{ resembles another man}_j] [\text{he}_i \text{ tries to avoid him}_j].

(19) ‘a man}_i \text{ resembles another man}_j’ translates into

\begin{align*}
\text{a. } & \exists x_i \exists x_j \uparrow [\text{man}'(x_i) \land \text{man}'(x_j) \land x_i \neq x_j \land \text{resemble}'(x_j)(x_i)] \\
& \Lambda \uparrow x_i = u \Lambda \uparrow x_j = u'
\end{align*}

\begin{align*}
\text{b. } & \lambda u \lambda u' \exists x_i \exists x_j [\text{man}'(x_i) \land \text{man}'(x_j) \land x_i \neq x_j \land \text{resemble}'(x_j)(x_i) \land x_i = u \land \\
& x_j = u' \land \neg p]
\end{align*}

\begin{align*}
\text{c. } & \lambda x_i \lambda x_j \uparrow [\text{man}'(x_i) \land \text{man}'(x_j) \land x_i \neq x_j \land \text{resemble}'(x_j)(x_i)]
\end{align*}

(20) ‘he}_i \text{ tries to avoid him}_j’ translates into

\begin{align*}
\lambda x_i \lambda x_j \uparrow [\text{try-to-avoid}'(x_j)(x_i)]
\end{align*}
(21) \[ \text{ALWAYS}(\lambda x_i \lambda x_j \uparrow [\text{man}'(x_i) \land \text{man}'(x_j) \land x_i \neq x_j \land \text{resemble}'(x_j)(x_i)]) \]
\[ (\lambda x_i \lambda x_j \uparrow [\text{try-to-avoid}'(x_j)(x_i)]) \]

Now let us look at Japanese pronouns. As shown in (22), both overt pronouns and null pronouns can be used in such a context.

(22) a. Gyangu-ga betsuno gyangu-to surechiga-u-to, gangster-Nom another gangster-with pass.by-Pres-Cond
soitsu-wa/\emptyset soitsu-o/\emptyset niramitsuke-ru. he-Top he-Acc glare.at-Pres

‘When a gangster passes by another gangster, he glares at him.’

sore-wa/\emptyset sore-ni/\emptyset akueekyoo-o oyobos-u. it-Top it-Dat bad.influence-Acc give-Pres

‘If there is a magnet near another magnet, it gives bad influence to it.’

As we have seen in the English example in (15), the approach of the pronouns-as-(in)definite-descriptions cannot account for the anaphoric links between the bare NPs and the pronouns in these examples. They are accounted for only by dynamic binding; in these cases, dynamic binding by an implicit polyadic Q-adverb. This leads us to the conclusion that overt pronouns and null pronouns can both be variables in Japanese.

2.4 Differences between overt pronouns and null pronouns

In the previous section, I showed that both overt and null pronouns can be dynamically bound. Of course this doesn’t mean that they are unambiguously variables. In this section, I will show cases where null pronouns can be used while overt pronouns cannot, arguing that the former can be E-type pronouns while the latter are unambiguously variables. The cases we will discuss are narrative sequence cases with universally quantified antecedents (section 2.4.1), paycheck sentences (section 2.4.2) and bathroom sentences (section 2.4.3).
2.4.1 Narrative sequence cases

2.4.1.1 Universally quantified antecedents

In Japanese narrative sequence cases, both overt pronouns and null pronouns can be used as shown in (23).

(23)  
a. Kaisha\_i\-ga toosanshi-ta.  
company-Nom go.bankrupt-Past  
Soko_{i-wa} / \emptyset_{i} takusan-no fusai-o kakea-tei-ta.  
it-Top many-Gen debt-Acc hold-Prog-Past  
'A company\_i went bankrupt. It\_i had a large debt.'

b. John_{j-wa} hon_{j-o} kat-ta. Soshite \emptyset_{j} sore_{i-o} / \emptyset_{i} yon-da.  
-Top book-Acc buy-Past and it-Acc read-Past  
'John bought a book. And he read it.'

The pronouns in (23) translate into variables, which are dynamically bound by the existential quantifiers associated with the bare NPs in the first sentences via the dynamic version of DKP rule introduced in chapter one, repeated as (24).

(24) Derived Kind Predication (DKP): dynamic version

If P applies to objects and k denotes a kind, then

\[ \uparrow P(..., k, ...) = \exists x \uparrow [\forall x (k(x) \land P(..., x, ...))] \]

(23a) and (23b) are thus represented as (25a) and (25b), respectively.

(25)  
a. \exists x \uparrow [\forall \text{COMPANY}(x) \land \text{go-bankrupt'}(x) \land \text{have-large-debt'}(x)]

b. \exists x \uparrow [\forall \text{BOOK}(x) \land \text{buy'}(x)(j) \land \text{read'}(x)(j)]

We have seen in section 2.2 that Japanese overt pronouns are subject to accessibility conditions. As shown in (26), if overt pronouns are not c-commanded by their universally quantified antecedents, the intended anaphoric links cannot be established.
(26) a. Dono seehin$_i$-mo chuuibukaku kensas-are-ta.
which product-∀ carefully inspect-Pass-Past
Soshite ??sore$_i$-wa hako-ni tsumer-are-ta.
and it-Top box-in pack-Pass-Past
‘Every product was inspected carefully. And it was packed in the box.’

b. John-wa sono chuukoshaya-no dono kuruma$_i$-ni-mo
-Top that used.car.shop-Gen which car-Dat-∀
notte-mi-ta. Yosoo-ijooni *sore$_i$-wa yoku hashit-ta.
drive-try-Past expectation-more.than it-Top well run-Past
‘John tried driving every car$_i$ in the used car shop. They$_i$ ran better than
expected.’

c. Dono doroboo-mo$_i$ kono machi-no doko-ka-ni kakure-tei-ru.
which thief-∀ this town-Gen where-∃-in hide-Prog-Pre
Keesatsu-wa *soitsu$_i$-o sagashi-tei-ru.
police-Top that.guy-Acc search.for-Prog-Pre
‘Every thief$_i$ is hiding somewhere in this town. The police are searching
for him$_i$. ’

Clearly, these examples become acceptable if null pronouns are used in place of the overt
ones, as shown in (27) below. However, the interpretations of the sentences in (27) are
different from the intended interpretations of the sentences in (26). The examples in (27)
are OK only when the null pronouns are interpreted as plural.

(27) a. Dono seehin$_i$-mo chuuibukaku kensas-are-ta.
which product-∀ carefully inspect-Pass-Past
Soshite ø$_i$ hako-ni tsumer-are-ta.
and box-in pack-Pass-Past
‘Every product$_i$ was inspected carefully. And they$_i$ were packed in the
box.’
b. John-wa sono chuukoshaya-no dono kuruma1-ni-mo
    -Top that used.car.shop-Gen which car-Dat-∀

    notte-mi-ta. Yosoo-ijooni ø1 yoku hashit-ta.
    drive-try-Past expectation-more.than well run-Past

    ‘John tried driving every car1 in the used car shop. They1 ran better than
    expected.’

c. Dono doroboo-mo1 kono machi-no doko-ka-ni kakure-tei-ru.
    which thief-∀ this town-Gen where-∃-in hide-Prog-Pre

    Keesatsu-wa ø1 hishini sagashi-tei-ru.
    police-Top desperately search.for-Prog-Pres

    ‘Every thief1 is hiding somewhere in this town. The police are searching
    for them1.’

For example, (27a) is interpreted as describing a situation schematized in (28), not the one
in (29).

(28)

<table>
<thead>
<tr>
<th>first event</th>
<th>second event</th>
</tr>
</thead>
<tbody>
<tr>
<td>product a</td>
<td>-inspected</td>
</tr>
<tr>
<td>product b</td>
<td>-inspected</td>
</tr>
<tr>
<td>product c</td>
<td>-inspected</td>
</tr>
</tbody>
</table>

(29)

- **event 1**
  - product a -inspected and then packed

- **event 2**
  - product b -inspected and then packed

- **event 3**
  - product c -inspected and then packed

In (28), all products were first inspected carefully and then they were packed in the box.
In (29), product a was inspected carefully and it was packed in the box, and then product b
was inspected carefully and it was packed in the box, ... The difference between the
examples in (26) and those in (27) is the same as English cases like (30) in that only plural
pronouns can be anteceded by universally quantified NPs in narrative sequence cases.
(30) Every student_{i} came in. They_{i}/\{^\ast\text{He}_{i}\} sat down.

If they in (30) is an instance of the E-type pronoun strategy, we can say that the plural interpretation of Japanese null pronouns is also an instance of the strategy, which supports our claim that in order to be interpreted as E-type, null pronouns must be used in the language.

2.4.1.2 E-type pronouns, plurality, and telescoping

A missing link in the argument above is the logical relation between being an E-type pronoun and plurality. In Evans 1977, the fact that plural pronouns can be anteceded by every CN is used as diagnostic for the E-type pronoun strategy, but no theoretical explanation is given. In order to understand the relation between the E-type pronouns and plurality, in what follows, I will reproduce Chierchia's 1992 account.

As we have seen in chapter 1, in his approach, E-type pronouns are functions from individuals to individuals. They also can be functions from occasions (or events/situations) to individuals. In narrative sequence cases, the latter are chosen as the most prominent functions in contexts (cf. also Heim 1990). Let us see how Chierchia's approach accounts for the difference between (31a) and (31b).

(31)  
    a. Every man_{i} walked in. *I saw him_{i}.
    b. Every man_{i} walked in. I saw them_{i}.

Given a Davidsonian argument (an occasion variable o), the first sentences of (31) can be represented in two ways, as given in (32a) and (32b). In the former, the existential quantifier which binds the occasion variable takes wide scope over the universal quantifier. On the other hand, in (32b) the universal quantifier takes wide scope overt the existential quantifier.

(32)  
    a. \exists o \left[ \forall x[\text{man}'(x) \rightarrow \text{walk-in}'(o)(x)] \right]
    b. \left[ \forall x[\text{man}'(x) \rightarrow \exists o[\text{walk-in}'(o)(x)]] \right]
Assuming that in unmarked cases a Davidsonian argument takes wide scope over its clause
mate NPs like (32a), let us consider the interpretation of the E-type pronouns of the second
sentences of (31). In a natural situation, the function made prominent by uttering the first
sentences of (31) might be a function from occasions into men that walked in at that
occasion. But (32a) makes a function from occasions to groups of men more salient than a
function from occasions to single men. So the narrative sequence in (31) is represented as
in (33).

\[(33) \qquad \exists o \uparrow \forall x[\text{man}'(x) \rightarrow \text{walk-in}'(o)(x) \land \exists o' \uparrow [\text{saw}'(o')(f(o))(l)]\]

\[f: \text{a function from occasions into groups of men that walked in at that occasion.}\]

The variable of this function o is dynamically bound by the existential quantifier introduced
in the first sentence. This means that we are lumping each man's walking-in into one
single event. Therefore the anaphoric link between pronouns and their universally
quantified antecedents is possible only when the pronouns are plural as in (32a).\(^7\)

With this in mind, let us return to the Japanese cases. We have observed that the null
pronouns in (27) are interpreted as plural. (27a) is, for example, interpreted as in (28).
This means that we are lumping every product's being inspected into a single event. The
logical representation of (27a) is thus given in (34), where the null pronoun is interpreted
by the E-type strategy.

\(^7\) Maria Bittner (personal communication) pointed out a potential problem with the
analysis as in (32a). For example, a sentence like *exactly three men are drinking* is false in
a situation where there are five men drinking. The logical representation of this sentence
should be something like $\exists o \uparrow \text{exactly-3} \times \text{man}'(x)[\text{drink}'(o)(x)]$, where the Davidsonian
argument denotes the minimal situation in which exactly three men are drinking. But this is
not falsified in the scenario above. It seems to me that the problem comes from how
minimal a situation can or should be individuated. Presumably there are pragmatic
constraints imposed by the choice of exactly which rules out the possibility of using it in
contexts where more than one occasion of the relevant kind is available.
(34) \[\exists o \uparrow \forall x \text{product}'(x) \rightarrow \text{be-carefully-inspected}'(o)(x) \land \exists o' \uparrow [\text{be-packed-in-the-box}'(o')(f(o))]|\]

f: a function from occasions into groups of products that were carefully inspected at that occasion.

So, as far as Chierchia's E-type analysis in (33) is correct, the fact in (27) is strong evidence for the claim that Japanese null pronouns can be interpreted as E-type.

So far, we have assumed that a logical representation like (32a) is the unmarked case. There are also cases where the universal quantifier should be analyzed as having wide scope over the existential quantifier associated with a Davidsonian argument like (32b). Such cases are interpretable only if enough contextual information is supplied. So-called telescoping sentences as in (35) are such marked cases.

(35)  
a. Each degree candidate\textsubscript{i} walked to the stage. He\textsubscript{i} took his\textsubscript{i} diploma from the Dean and returned to his\textsubscript{i} seat. (Roberts 1989: 717, due to Barbara Partee)
b. I went to the circus last night. They had a number involving dogs that went like this: The circus performers put a table on some supports. Then, every dog\textsubscript{i} came in. It\textsubscript{i} lay down under the table, stood on its\textsubscript{i} back paws, and lifted the table with its\textsubscript{i} front paws. (Poesio and Zucchi 1992: 350)
c. Every story\textsubscript{i} pleases these children. If it\textsubscript{i} is about animals, they are excited, if it\textsubscript{i} is about witches, they are enchanted, and if it\textsubscript{i} is about humans, they never want me to stop. (Poesio and Zucchi 1992: 346, due to A. Belvadi)

In Chierchia's 1992 analysis, the first sentence and the second sentence of (35a), for example, are represented roughly as in (36a) and (36b).

(36)  
a. \[\uparrow \forall x \text{degree-candidate}'(x) \rightarrow \exists o \text{[walk-to-the-stage}'(o)(x)]\]
b. \[\exists o' \uparrow [\text{take}'(o')(f(o)'s diploma)(f(o))]|\]

The variable o in (36b) remains unbound. A possible way to salvage the otherwise uninterpretable sentence is to make the context informative enough by specifying not just one occasion but a range of occasions, as in (37).
(37) \( \forall o \exists o' \uparrow \text{[take}(o')\text{'(o)'s diploma)}(f(o)))\]

where \( o \in D \), for some contextually specified \( D \).

‘\( D \)’ in (37) is the set of relevant occasions that are known to be what we are talking about. It is compatible with what has been argued about telescoping. That is, telescoping is possible if the script is known to the hearer. In the case of (35a), the script is something like this: In graduation ceremonies all degree candidates perform a certain routine. By the same token, the circus script makes (35b) possible and in the case of (35c) enumerating if-then clauses makes it clear that the speaker is talking about each occasion per story.\(^8\)

What is important for our discussion is that under Chierchia’s analysis, the pronouns in telescope cases are also interpreted as E-type, namely functions from occasions into individuals. Japanese also allows for telescoping, and as is expected, only null pronouns are possible as in (38).

(38) Japanese telescoping

Dono yakuza\(-\)mo shoogendai-\(\)-ni agat-ta.
which mobster-\(\forall\) witness.stand-Loc go-Past

Soshite \( s_1/\ast soitsu_1\)\(-\)wa jibun-no bosu-no muzai-o
and that.guy-Top self-Gen boss-Gen innocence-Acc

shucoooshi-ta.
proclaim-Past

‘Every mobster took the witness stand. And he proclaimed his boss’s innocence.’

The most natural interpretation of (38) is that in the witness stand, every mobster proclaimed his boss’s innocence one by one. So, again, our claim that Japanese null pronouns are interpreted as E-type is supported by the fact concerning telescoping.

To sum up, Chierchia’s approach gives a theoretical link between being anaphoric to universally quantified antecedents and being interpreted as plural in narrative sequence cases. In such cases, the most salient function is the one from (minimal) occasions into

\(^8\) Poesio and Zucchi’s 1992 account is different. According to them, the presence of the if-then clause triggers a copy of the restriction from the preceding sentence (i.e. story').
individuals. In unmarked cases a Davidsonian argument takes wide scope over its clausemates, so that the referents of the universally quantified antecedents are lumped together in single occasions. The most salient function thus takes a single occasion and gives a group of individuals in that occasion. This is the reason why the pronouns in the second sentences in narrative sequence cases are interpreted as plural. In Japanese, only null pronouns are possible in these cases and receive plural interpretations, which indicates that they are E-type.

2.4.1.3 Plural morphemes, definiteness and the notion of semantic parameter

We observed the contrast between overt pronouns and null pronouns when their antecedents are universally quantified, in (26) and (27), repeated as (39) and (40), respectively.

(39) a. Dono seehin\textsuperscript{1}-mo chuuibukaku kensas-are-ta.
    which product-$\forall$ carefully inspect-Pass-Past
    Soshite ??sore\textsubscript{1}-wa hako-ni tsumer-are-ta.
    and it-Top box-in pack-Pass-Past
    ‘Every product was inspected carefully. And it was packed in the box.’

b. John-wa sono chuukoshaya-no dono kuruma\textsubscript{1}-ni-mo
    -Top that used.car.shop-Gen which car-Dat-$\forall$
    notte-mi-ta. Yosoo-ijooni *sore\textsubscript{1}-wa yoku hashit-ta.
    drive-try-Past expectation-more than it-Top well run-Past
    ‘John tried driving every car\textsubscript{i} in the used car shop. It\textsubscript{i} ran better than expected.’

c. Dono doroboo-mo\textsubscript{i} kono machi-no doko-ka-ni kakure-tei-ru.
    which thief-$\forall$ this town-Gen where-$\exists$ in hide-Prog-Pre
    Keesatsu-wa *soitsu\textsubscript{1}-o sagashi-tei-ru.
    police-Top that.guy.Acc search.for-Prog-Pres
    ‘Every thief\textsubscript{i} is hiding somewhere in this town. The police are searching for him\textsubscript{i}.’

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(40)  a. Dono seehinî-mo chuubukaku kensase-are-ta.
    which product-∀ carefully inspect-Pass-Past

    Soshite 91 hako-ni tsumer-are-ta.
    and box-in pack-Pass-Past

    ‘Every product was inspected carefully. And they were packed in the box.’

b. John-wa sono chuukoshaya-no dono kuruma91-ni-mo
    Top that used.car.shop-Gen which car-Dat-∀

    notte-mi-ta. Yosoo-ijooni 91 yoku hashit-ta.
    drive-try-Past expectation-more than well run-Past

    ‘John tried driving every carî in the used car shop. Theyî ran better than
    expected.’

c. Dono doroboo-moî kono machi-no doko-ka-ni kakure-tei-ru.
    which thief-∀ this town-Gen where-∃-in hide-Prog-Pre

    Keesatsu-wa 91 hisshini sagashi-tei-ru.
    police-Top desperately search.for-Prog-Pres

    ‘Every thiefî is hiding somewhere in this town. The police are searching
    for themî.’

The point is that the impossibility of the anaphoric links between the overt pronouns and
their antecedents in (39) results from the unavailability of dynamic binding. The fact that
the null pronouns in (40) are interpreted only as denoting plural objects is accounted for by
the E-type pronoun strategy with the assumption that in unmarked cases a Davidsonian
argument takes wide scope over its clause mate NPs.

Now let us look at overt pronouns with plural markers. We have seen in chapter 1 that
Japanese common nouns are, in general, not marked for plurality. But the language
actually does have plural morphemes such as -ra and -tachi although their use is very
restricted. These morphemes can be used with pronouns as in sore-ra as well as with
common nouns. Interestingly enough, if the pronouns in the ungrammatical examples in
(39) are pluralized with -ra, the anaphoric links become possible as shown in (41).
(41) a. Dono seehin{i}-mo chuibi[kaku kensas-are-ta.  
which product-∀ carefully inspect-Pass-Past
Soshite sore-ra{i}-wa hako-ni tsu[me-are-ta.  
and it-Pl-Top box-in pack-Pass-Past
‘Every product was inspected carefully. And they were packed in the box.’
b. John-wa sono chuukoshaya-no dono kuruma{i}-ni-mo  
-Top that used.car.shop-Gen which car-Dat-∀
notte-mi-ta. Yosoo-ijooni sore-ra{i}-wa yoku hashit-ta.  
drive-try-Past expectation-more.than it-Pl-Top well run-Past
‘John tried driving every car\textsubscript{i} in the used car shop. They\textsubscript{i} ran better than expected.’
c. Dono doroboo-mo\textsubscript{i} kono machi-no doko-ka-ni kakure-tei-ru.  
which thief-∀ this town-Gen where-∃-in hide-Prog-Pre
Keesatsu-wa soitsu-ra{i}-o sagashi-tei-ru.  
police-Top that.guy-Pl-Acc search.for-Prog-Pres
‘Every thief\textsubscript{i} is hiding somewhere in this town. The police are searching for them\textsubscript{i}.’

The examples in (41) seem to constitute counterevidence against my claim that Japanese overt pronouns are variables that need to be dynamically bound, since universal quantifiers cannot bind variables across sentence boundaries.

To defend the claim, I will propose that the Japanese plural morphemes introduce the definite operator $\sigma$, and for type-adjusting, the variable translated from the overt pronoun is bound by the $\lambda$-operator. The relation between plurality and definiteness in Japanese has been pointed out by Kawasaki 1989 through the study of reflexive pronouns with -tachi.

She describes the contribution of -tachi as follows:

When -tachi is attached to a common noun, the resulting expression makes a definite description for a non-atomic entity. For example, gakuse{e}-tachi (student-Plural) means ‘the students.’ It denotes an individual sum all of whose atomic individual parts are students, and it presupposes that the speaker and the hearer know which group of students is being referred to. (Kawasaki: 1989, section 1.1)
Although she does not provide evidence for the definiteness of -tachi, native speakers of Japanese agree with her intuition. And the same observation applies to -ra as well. That is, gakusee-ra ‘student-Plural’ means ‘the students’, and the speaker and the hearer know which group of students is being referred to.

A piece of evidence for the definiteness of the Japanese plural morphemes is given in (42).

(42) Oozee no gyangu-ga futa kumi-ni wakare-ta.
    many-Gen gangster-Nom two group-into separate-Past

    #Soshite soitsu-ra/-tachi-wa soitsu-ra/-tachi-o naguri-hajime-ta.
    and that.guy-Pl/Pl-Top that.guy-Pl/Pl-Acc hit-begin-Past

    ‘Many gangsters separated into two groups. And they started hitting them.’

If pronouns with plural markers are interpreted as definite, they should obey the uniqueness/maximality requirement. And in fact they do. The intended reading of (42) is that the first soitsu-ra or soitsu-tachi refers to a group of gangsters and the second to the other group of gangsters. But the context does not supply enough information to tell one from the other. As a result, these overt pronouns refer to parts of the gangsters, which violates the uniqueness/maximality requirement.

Another piece of evidence comes from the impossibility of predicative use of definite NP’s. Consider the following question answer pair.

(43) Q: John-to-Mary-wa nani-o shi-tei-ru-no-desu-ka?
    and -Top what-Acc do-Prog-Pres-Comp-Cop.Pres-Q

    ‘What are John and Mary doing?/What are John and Mary?’

    A: Kare-ra-wa gakusee(*-ra/*-tachi) desu.
    he-Pl-Top student -Pl/-Pl Cop.Pres

    ‘They are (*the) students.’

---

9 This test has been brought to my attention by Veneeta Dayal (personal communication).
In this context, the noun followed by the copula is predicative, not identificational, and that noun cannot be used with the plural morphemes. This fact indicates that the Japanese plural morphemes always induce definiteness.

Based on these facts, I propose the translation of the Japanese plural morphemes as in (44).\(^{10}\)

(44)  
<table>
<thead>
<tr>
<th>Lexical Item</th>
<th>Translation</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>-tachi, -ra</td>
<td>(\alpha x[PL(P_i(x))])</td>
<td>e</td>
</tr>
</tbody>
</table>

(45) \(\|c_{u}\phi\|g, \omega\) denotes the greatest element \(v\) which satisfies \(\|\phi\|g[v/v], \omega\);

Otherwise undefined.

As given in (44), besides the pluralization function \(PL\), the translation of the Japanese plural morphemes has two more components. \(P_i\) is the Cooperian property variable, which denotes the most salient property in the context. The definiteness of the plural morphemes comes from the \(\sigma\)-operator. As defined in (45), the \(\sigma\)-operator binds an ordinary variable. That is, the variable \(x\) in the definition (44) is assigned its value by \(g\), not by \(\omega\).

Given these assumptions and definitions, let’s see for example how the overt pronoun in (41a), repeated as (46), is interpreted.

(46)  
Dono seihin\(\_\)-mo chuuiibukaku kensas-are-ta.  
which product-\(\forall\) carefully inspect-Pass-Past

Soshite sore\(-ra\_\)-wa hako-ni tsumer-are-ta.  
and it-Pl-Top box-in pack-Pass-Past

‘Every product was inspected carefully. And they were packed in the box.’

The computation of the overt pronoun followed by the plural morpheme is given in (47).

---

\(^{10}\) I am indebted to Maria Bittner for her suggestion of the translation of Japanese plural markers in (44).
(47)  
\[ \text{DP: 4} \]
\[ \text{NP: 2, 3} \quad \text{D: 1} \]
\[ \text{sore} \quad \text{-ra} \]
\[ \text{it} \quad \text{-Pl} \]

1. \[ \sigma x[\text{PL}(P_1)(x)] \]  
2. \[ x \]  
3. \[ \lambda xx <e, e> \]  
4. \[ \lambda xx(\sigma x[\text{PL}(P_1)(x)]) = \sigma x[\text{PL}(P_1)(x)] \]  

The important point in the derivation of (47) is that *sore* translates into a variable just like the cases where no plural marker is used. Without a plural marker, it has to be dynamically bound. If it is followed by a plural marker, on the other hand, it has to be bound by the \( \lambda \)-operator to complete function application, as in 3. Giving the denotation of the contextually specified property variable \( P_1 \), the whole DP refers to the maximal sum \( x \) such that \( x \) were products and carefully inspected, namely ‘the products that were carefully checked’. So, the E-type-like behavior of overt plural pronouns is accounted for without appealing to the E-type strategy.

How about the computation of a common noun followed by \(-ra\)? The fact that the plural morphemes can be used with *gakusee* ‘student’ seems to be a serious problem for our approach, for we established in chapter 1 that Japanese common nouns such as *hon* ‘book’ are mass terms/kind denoting expressions like English *gold*, and they cannot be pluralized by a plural marker for the same reason as *gold* cannot be pluralized. More precisely, they cannot be pluralized because they are inherently pluralized (Chierchia’s 1998a Inherent Plurality Hypothesis). However, it is also a fact that common nouns like *gakusee* ‘student’ can be pluralized with \(-ra\) or \(-tachi\), as we have seen above. The generalization thus should be that all Japanese common nouns can be mass terms/kind denoting expressions, that is, they can be used in their bare forms, but some of them can also be followed by a plural marker: in other words, they can also be interpreted as countable common nouns the
extensions of which are sets of atoms. This generalization will shed a new light on the
notion of “semantic parameter” of Chierchia 1998a.

With the assumption that gakusee ‘student’ is an atom denoting property, translating
into student’ of type \(<e, \triangleright>, \triangleright\), like English student, the common noun followed by -ra is
computed as in (48).

\[(48)\]

\[
\begin{array}{c}
\text{DP:4} \\
\text{NP:3} & \text{D:1,2} \\
\mid & \mid \\
gakusee & -ra \\
\text{student} & -\text{Pl}
\end{array}
\]

\[
1. \quad \sigma[x(PL(P_i)(x))]
\]
\[
2. \quad \lambda P_i[\sigma[x(PL(P_i)(x))]]
\]
\[
3. \quad \text{student}'
\]
\[
4. \quad \lambda P_i[\sigma[x(PL(P_i)(x))][(\text{student}')]
\]
\[
\quad = \quad \sigma[x(PL(\text{student}')(x))]
\]

The point of this derivation is that the Cooperian property variable \(P_i\) is \(\lambda\)-bound, and the
resulting representation combines with student'.

For the sake of exposition, I will show why treating gakusee as mass term doesn’t
work.

\[(49)\]

\[
\begin{array}{c}
\text{DP:5} \\
\text{NP:3, 4\^{U}} & \text{D:1,2} \\
\mid & \mid \\
gakusee & -ra \\
\text{student} & -\text{Pl}
\end{array}
\]

\[
1. \quad \sigma[x(PL(P_i)(x))]
\]
\[
2. \quad \lambda P_i[\sigma[x(PL(P_i)(x))]]
\]
\[
3. \quad \text{STUDENT}
\]
\[
4. \quad \text{\^{U}STUDENT}
\]
\[
5. \quad \lambda P_i[\sigma[x(PL(P_i)(x))][(\text{\^{U}STUDENT})]
\]
\[
\quad = \quad \sigma[x(PL(\text{\^{U}STUDENT})(x))]
\]

As shown in (49), type-theoretically, function application is completed. Semantically,
however, PL(\(\text{\^{U}STUDENT}\)) makes the whole DP uninterpretable, since mass terms cannot
be pluralized. As we saw in chapter 1, for any set of atoms \(A\), PL(A) = *A - A. The
extension of $\cup_{\text{STUDENT}} (= \lambda x\{x \leq \text{STUDENT}_s\})$ is the $\cup$-closed set of atoms of being a student in $s$, namely $*_\cup\text{STUDENT}$. So $PL(\cup_{\text{STUDENT}}) = *_{\cup}\text{STUDENT} - *_{\cup}\text{STUDENT} = \emptyset$. This is the Inherent Plurality Hypothesis's account of why mass terms/kind denoting expressions cannot be pluralized.

Roger Schwarzschild (personal communication) pointed out that if we use the atomization function ATM introduced in the previous chapter, we can get sets of atoms directly from mass terms/kind denoting expressions, like $\sigma x[PL(\text{ATM}(\text{STUDENT}_s))(x)]$, where $\text{ATM}(\text{STUDENT}_s)$ denotes the set of atoms of being a student in $s$. In order to accomplish this, however, we have to assume that the translation of the plural morphemes contains the ATM function, and this amounts to saying that the plural morphemes can combine with any common noun. Obviously this is not the case. So, I do not use the ATM function here, and push forward the idea that some common nouns in Japanese are ambiguous between mass terms/kind denoting expressions (i.e. lexically pluralized nouns) and countable nouns.

The reason I claim bare/common nouns like gakusee 'student' can be countable nouns as well as mass terms is as follows. Chierchia 1998a, b proposes that there is a semantic parameter concerning the category-type mapping. The parameter he suggests is given in (50).

(50) The Nominal Mapping Parameter: $N \Rightarrow [+\text{argument}, +\text{predicate}]$

a. $N \Rightarrow [+\text{arg}, -\text{pred}]$: (e.g. Chinese/Japanese)

Nouns can be of type $e$, cannot be of type $<e, \triangleright$.

b. $N \Rightarrow [+\text{arg}, +\text{pred}]$: (e.g. English)

Nouns can be of type $e$, can be type $<e, \triangleright$.

c. $N \Rightarrow [-\text{arg}, +\text{pred}]$: (e.g. French)

Nouns cannot be of type $e$, can be of $<e, \triangleright$.

A syntactic category $N$ can be mapped onto either semantic type $e$ or type $<e, \triangleright$, and the Nominal Mapping Parameter fixes the category-type mapping in a language. According to
this parameter, in languages like Chinese and Japanese, every common noun is mapped onto type $e$, while in languages like French, every common noun is interpreted as predicate. In English, the mapping is determined item by item. For instance, desk is of type $e, \exists$ whereas furniture is of type $e$.

The [+arg, -pred] languages have characteristics listed in (51).

(51)  
  a. absence of plural marking  
  b. absence of definite and indefinite article  
  c. generalized classifier system

Based on the Inherent Plurality Hypothesis, Chierchia accounts for the relation between having or not having the characteristics in (51) and being of type $e$ or of type $e, \exists$.

Now let us reconsider the status of plural markers in Chinese and Japanese with respect to the Nominal Mapping Parameter. The distribution of Chinese -men and Japanese -tachil-ra is very restricted. They are only used with pronouns or with common nouns which denote humans. Interestingly enough, the common nouns of this natural class, namely the [+human] common nouns, behave like English-type common nouns, being mapped onto type $e, \exists$. Let us consider the definiteness of the plural markers. We already observed Japanese cases in (42) and (43). Chinese -men also makes the whole noun phrase definite, as shown in (52) and (53).

(52)  
  a. You ren lai-le.  
      have man come-Asp  
      ‘There is somebody coming.’
  b. *You ren-men lai-le.  
      have man-Pl come-Asp  
      ‘There are the people coming’

(53)  
  a. Tamen shi xueshen.  
      they be student  
      ‘They are students.’

11 Chinese examples used here are all cited from Yang 1998.
    they be student-Pl
    'They are the students.'

The examples in (52) are existential sentences and the contrast between the a-example and the b-example shows that the plural marker -men induces the definiteness effect. The ungrammaticality of (53b) makes the same point as the Japanese example in (43) does. That is, the definite NP's cannot be used as predicative. So it is reasonable to assume that the translation of -men is the same as -tachil-ra in (44); σx[PL(P₁)(x)]. This analysis amounts to claiming that [+human] nouns can be used with a definite article corresponding to the σ-operator, which is just covert, when they are followed by a plural marker. So, they behave like English common nouns with respect to the presence/absence of definite articles.

Now let us consider classifiers. In the view of Krifka 1995 and Chierchia 1998a, classifiers are usually available in Chinese/Japanese-type languages, because their bare nouns denote kinds or mass, which are not countable, and in order to count we have to use classifiers. Interestingly enough, if [+human] common nouns are pluralized by the plural morphemes, they resist classifiers both in Chinese and in Japanese. As shown in (54b), in Chinese the use of classifier with the plural marker makes the expression ungrammatical. This suggests that common nouns followed by a plural marker is countable.

(54) a.  san-ge xueshen
        three-Cl student
        'three students'

b.  *san-ge xueshen-men
    three-Cl student-Pl

Japanese also show the contrast between pluralized common nouns with classifiers and those without them, but the difference with respect to grammaticality is subtle. (55a) is an example in which a classifier is used with a common noun. In (55b) the common noun is pluralized, but no classifier is used. These two examples are perfectly OK. On the other
hand, if we use both the classifier and the plural markers, the sentence is degraded as shown in (55c).

(55) a. [San-nin-no gakusee]-ga tsukamat-ta.
    three-Cl-Gen student-Nom be.caught-Past
    ‘Three students were arrested.’

b. [Gakusee-tachi/-ra]-ga tsukamat-ta.
    student -Pl/-Pl-Nom be.caught-Past
    ‘The students were arrested.’

c. ??[San-nin-no gakusee-tachi/-ra]-ga tsukamat-ta.
    three-Cl-Gen student -Pl/-Pl-Nom be.caught-Past
    ‘(The) three students were arrested.’

These examples support the claim that a common noun followed by a plural marker is countable in Chinese and Japanese.

One might argue against the claim, pointing out that common nouns in Chinese and Japanese cannot be used with numerals, either, as in (56) and (57), respectively.

(56) a. *san xueshen-men
    three student-Pl

b. *san xueshen
    three student

(57) a. *san gakusee-tachi/-ra
    three student-Pl/-Pl

b. *san gakusee
    three student

The ungrammaticality of the b-examples is clear. If these [+human] nouns are kind-denoting expressions, they cannot be used with numerals, just like the ungrammaticality of *three furniture. On the other hand, if they are countable nouns, the extension of which is a set of atoms, then they have to be pluralized by a plural marker when used with numerals.\(^{12}\) So, the account is straightforward. The apparent problem is the

\(^{12}\) Japanese [+human] common nouns can be used with ichi ‘one’ without classifier, as in (i), although its use is very restricted.

(i) John-wa ichi gakusee toshite hantaishi-ta.
ungrammaticality of (56a) and (57a), since it seems possible to interpret them as 'the three students'. But it also follows from our story. It is reasonable to assume that they are structured as in (58), where the common noun and the plural marker make a small constituent and the numeral attaches the complex.

(58)

\[
\begin{tikzpicture}
  \node (DP) {DP};
  \node (Num) [below left of=DP] {Num}
    child {node {san}
      child {node {three}}
      child {node {xueshen}}
    }
  child {node {DP}
    child {node {NP: D}}
    child {node {-men}}
    child {node {-PL}}
  }
\end{tikzpicture}
\]

In order for them to be interpretable, they should be translated into \(\alpha x[\text{PL}(\text{\-STUDENT})(x) \land |x| = 3]\). And to obtain such a logical representation, the definite operator has to combine with a pluralized common noun, like the three students in English, as shown in (59).

(59)

\[
\begin{tikzpicture}
  \node (DP) {DP:7};
  \node (D) [below left of=DP] {D:6}
    child {node {NP: 5}
      child {node {the}}
      child {node {Num: 4}}
      child {node {N: 3}}
      child {node {three}}
      child {node {N: 1}}
      child {node {-PL: 2}}
      child {node {student}}
    }
  child {node {-s}}
\end{tikzpicture}
\]

1. student' \(\langle e, \triangleright \rangle\)
2. \(\text{PL}\) \(\langle \langle e, \triangleright \rangle, \langle e, \triangleright \rangle\rangle\)
3. \(\text{PL(student')}\) \(\langle \langle e, \triangleright \rangle, \langle e, \triangleright \rangle \rangle\)
4. \(\lambda P \lambda x[P(x) \land |x| = 3]\) \(\langle \langle e, \triangleright \rangle, \langle e, \triangleright \rangle \rangle\)
5. \(\lambda x[\text{PL(student')(x)} \land |x| = 3]\) \(\langle e, \triangleright \rangle\)
6. \(\lambda P \alpha x[P(x)]\) \(\langle \langle e, \triangleright \rangle, \langle e, \triangleright \rangle \rangle\)
7. \(\alpha x[\text{PL(student')(x)} \land |x| = 3]\) \(e\)

But we cannot derive such a representation from the structure in (58). We have argued above that a common noun followed by a plural marker is interpreted as definite NP, like

-Top one student as make.objection-Past
  'John made an objection as a student.'

In this case, gakusee 'student' is interpreted as a singular count noun, so that it can be used with the numeral ichi 'one'. On the other hand, Chinese [+human] common nouns resist yi 'one' without classifiers, which is problematic for our analysis.
the students. This means that the σ-operator is introduced in the logical representation before the numeral. If numeral expressions in Chinese and Japanese denote a function from properties to properties, like 4 of (59), which itself is a very natural assumption, then it follows that xueshen-men ‘the students’ can’t combine with san ‘three’. Simply put, the ungrammaticality of (56a) and (57a) is the same as that of *three the students in English.

The observation we have made so far is summarized as in (60).

(60)  In Chinese and Japanese, bare/common nouns which have the [+human] feature are ambiguous between count nouns and mass/kind nouns. Semantically this means that they are ambiguous between type e and type <e, ⊢>.

This result is very important with respect to the Nominal Mapping Parameter. (60) suggests that even in [+arg, -pred] languages there are common nouns of type <e, ⊢> in the lexicon. The immediate question is, then: Are Chinese and Japanese [+arg, +pred] languages like English? And a more general question is: Is the Nominal Mapping Parameter correct? A possible answer might be that there is no such parameter, and the mass/count distinction should be specified lexical item by lexical item. However, this cannot capture the fact that in French, every common noun is used only as predicates, and likewise that in Chinese and Japanese, every common noun can be used in argument position and there is no common noun which can be used only as predicate. So, I would like to suggest that [+arg, -pred] are default values in Chinese and Japanese, and once fixed, these values are not changed, and the [+human] nouns are exceptionally marked as [+arg, +pred] when the semantics of -men or -ra is learned through positive evidence. This situation is reminiscent of Itô, Mester and Padgett’s 1995 analysis of voicing of consonants after nasal in Japanese. In the framework of Optimality Theory, they claim that the constraint ranking for native Japanese vocabulary differs from the one for non-native Japanese vocabulary. This means that one language, say Japanese, can have two constraint rankings. What we are looking at is very similar to this case in that a language
has two types of vocabulary and one has the opposite value of parameter setting against the other.\footnote{13}

2.4.1.4 More on the singular/plural distinction

So far we have argued that the difference in distribution between overt and null pronouns in narrative sequence cases is due to the difference between them with respect to the strategies available. Maria Bittner (personal communication) suggested another possibility that it might be the matter of the singular/plural distinction; that is, overt pronouns without a plural marker are interpreted only as singular while null pronouns can be interpreted either as singular or as plural. She addressed the question if overt pronouns can be anaphoric to expressions like exactly/at least/at most one \textit{CN}. As given in (61), the anaphoric link can be established.

\begin{align*}
(61) & \quad \text{Johnj-wa kikkari/sukunakutomo/seezee ichi mai-no hagaki_{i-o}} \\
& \quad \text{-Top exactly /at least / at most one CI-Gen postcard-Acc} \\
& \quad \text{kat-ta. Soshite, \textit{\wedge j sorei_{i-o/\wedge j} Mary-ni okut-ta.}} \\
& \quad \text{buy-Past And it-Acc -Dat send-Past} \\
& \quad \text{‘John bought exactly/at least/at most one postcard\textsubscript{i}. And he sent it\textsubscript{i} to Mary.’}
\end{align*}

In the first order predicate logic, the truth conditions of \textit{John bought at least one postcard} and \textit{John bought exactly one postcard} are represented as $\exists x[\text{postcard}'(x) \land \text{buy}'(x)(j)]$ and $\exists x[\text{postcard}'(x) \land \text{buy}'(x)(j) \land \forall y[\text{postcard}'(y) \land \text{buy}'(x)(j) \rightarrow x=y]]$, respectively. In both cases, the existential quantifier takes wide scope. In their dynamic representations, its

\footnote{13} The Nominal Mapping Parameter can be restated in OT as follows. Suppose any lexical item can be either [arg] or [pred]. Relevant constraints are *arg: argumental use is not allowed, *pred: predicative use is not allowed, and FAITHFULNESS: Don’t change a feature of input. In French, *arg outranks FAITH and *pred, so even if an input noun has [arg], it cannot be used as argument, but had better be used as predicative, violating FAITH and *pred. The English ranking is FAITH $\gg \{*\text{arg}, \text{*pred}\}$, by which the feature specified in an input is respected. In Chinese and Japanese, [-human] common nouns obey the ranking of *pred $\gg \{*\text{arg, FAITH}\}$, whereas [+human] common nouns are subject to the English type ranking. So, if the input is \textit{gakusee} ‘student’ with the [arg] feature, the optimal output is its argumental use, and if the same lexical item happens to be assigned the [pred] feature, it is used as predicative.
scope extends beyond the sentence boundary. They are thus not problematic. However, the ordinary logical representation of John bought at most one postcard is $\forall x\forall y[[\text{postcard'}(x) \rightarrow \text{buy}'(x)(j)] \land [\text{postcard'}(y) \rightarrow \text{buy}'(y)(j)] \rightarrow x=y]$, where no existential quantifier is involved. So, if we adopted this representation, we could not account for the fact that seezee ichi mai no hagaki ‘at most one postcard’ antecedes the overt pronoun in (61).

In order to solve this problem, I propose a uniform analysis for complex quantifiers such as kikkari/sukunakutomo/seezee $X$ ‘exactly/at least/at most $X$’. More specifically, I represent them as follows.

(62)

a. kikkari ichi mai-no hagaki
   exactly one Cl-Gen postcard ‘exactly one postcard’
   $\lambda x[\uparrow \text{POSTCARD}(x) \land \text{CL'}(x) = 1]$

b. sukunakutomo ichi mai-no hagaki
   at least one Cl-Gen postcard ‘at least one postcard’
   $\lambda x[\uparrow \text{POSTCARD}(x) \land \text{CL'}(x) \geq 1]$

c. seezee ichi mai-no hagaki
   at most one Cl-Gen postcard ‘at most one postcard’
   $\lambda x[\uparrow \text{POSTCARD}(x) \land \text{CL'}(x) \leq 1]$

These representations all have the classifier predicate CL' and the cardinalities of individuals are indicated by ‘= 1’, ‘≥ 1’, and ‘≤ 1’. A piece of evidence for these representations comes from the fact that a classifier is obligatory in a sentence with a complex quantifier, as shown in (63).

(63) Johnji-wa kikkari/sukunakutomo/seezee ichi *(mai-no) hagakij-o
   Top exactly /at least / at most one Cl-Gen postcard-Acc
   kat-ta.
   buy-Past

   ‘John bought exactly/at least/at most one postcard.’
This is not surprising, for Japanese is a [+arg, -pred] language, and in unmarked cases, it requires classifiers. In 1.2.5 of chapter 1, I proposed the semantics of classifier in (64).

(64) classifier: \( \lambda n. \lambda P. \lambda x. [P(x) \land CL'(x) = n] \), where \( n \) is number.

An NP ichi mai-no Hagaki `one Cl-Gen postcard`, for example, is computed as in (65).

(65)\[\begin{array}{c}
\text{NP}\_7 \\
\text{PP:} 4 \\
\text{ClP:} 3 \\
\text{Num:} 1 \\
\text{Cl:} 2 \\
\text{ichi} & \text{mai} \\
\text{P} & \text{hagaki} \\
\text{N:} 5, 6 & \text{postcard} \\
\text{-no} & \text{-Gen} \\
\text{Classifier}
\end{array}\]

\[
\begin{align*}
1. & \quad 1 & \quad e \text{ (number)} \\
2. & \quad \lambda n. \lambda P. \lambda x. [P(x) \land CL'(x) = n] & \quad <e, <<e, \triangleright, <e, \triangleright>> \\
3-4. & \quad \lambda P. \lambda x. [P(x) \land CL'(x) = 3] & \quad <<e, \triangleright, <e, \triangleright>> \\
5. & \quad \text{POSTCARD} & \quad <e, \triangleright> \\
6. & \quad \text{\underline{POSTCARD}} (= \lambda x. [x \leq \text{POSTCARD}_5]) & \quad <<e, \triangleright> \\
7. & \quad \lambda P. \lambda x. [P(x) \land CL'(x) = 3]\left[\text{\underline{POSTCARD}}\right] & \quad <<e, \triangleright> \\
& \quad = \lambda x. [\text{\underline{POSTCARD}}(x) \land CL'(x) = 3] & \quad <<e, \triangleright>
\end{align*}
\]

This is the case where expressions like kikkari/sukunakutomo/seezee are not used. What if they are used, then? The point is how to introduce `\( \geq \)` and `\( \leq \)` in place of `\( = \)` in the case of sukunakutomo `at least` and seezee `at most`, respectively. I assume that such expressions are generated in [Spec, ClP] and enter into the spec-head agreement relation with the Cl-head, as illustrated in (66).

(66)\[\begin{array}{c}
\text{ClP} \\
\text{kikkari}_2/\text{sukunakutomo}_3/\text{seezee}_4 \\
\text{exactly /at least /at most} \\
\text{Num} \\
\text{Cl} \\
\text{mai}_{2/3/4} \\
\text{Classifier}
\end{array}\]
(66) shows that seezee$_4$, for instance, agrees with mai$_4$. In other words, if seezee is in [Spec, CIP], the Cl-head must be mai$_4$, and vice versa. I further assume that the semantics of classifiers differs depending on their indices, as in (67).\footnote{Those indices can be regarded as features in the Minimalist Program. That is, the feature that mai$_2$ in (67) has can be checked only against kikkari `exactly'; otherwise the derivation crashes.}

(67) 

<table>
<thead>
<tr>
<th>Classifier</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>mai$_2$</td>
<td>$\lambda \eta \lambda \rho \lambda x [P(x) \land \text{CL}'(x) = \eta]$</td>
</tr>
<tr>
<td>mai$_3$</td>
<td>$\lambda \eta \lambda \rho \lambda x [P(x) \land \text{CL}'(x) \geq \eta]$</td>
</tr>
<tr>
<td>mai$_4$</td>
<td>$\lambda \eta \lambda \rho \lambda x [P(x) \land \text{CL}'(x) \leq \eta]$</td>
</tr>
</tbody>
</table>

With these assumptions, we can obtain the representations in (62).

At the next step, they are combined with $\lambda y [\text{buy}'(y)(j)]$, and since their types do not match, type lifting operation $\exists$ applies (cf. 1.2.5 of chapter 1), yielding the final representations given in (68).

(68)  

    -Top exactly one Cl-Gen postcard-Acc  buy-Past  
    ‘John bought exactly one postcard.’
    $\exists x[\text{UPOSTCARD}(x) \land \text{CL}'(x) = 3 \land \text{buy}'(x)(j)]$

b. John-wa sukunakutomo ichi mai-no hagaki-o kat-ta.  
    -Top at least one Cl-Gen postcard-Acc  buy-Past  
    ‘John bought at least one postcard.’
    $\exists x[\text{UPOSTCARD}(x) \land \text{CL}'(x) \geq 3 \land \text{buy}'(x)(j)]$

c. John-wa seezee ichi mai-no hagaki-o kat-ta.  
    -Top at most one Cl-Gen postcard-Acc  buy-Past  
    ‘John bought at most one postcard.’
    $\exists x[\text{UPOSTCARD}(x) \land \text{CL}'(x) \leq 3 \land \text{buy}'(x)(j)]$

After these representations are converted into their dynamic counterparts, the existential quantifier dynamically binds variables in the following sentences. So, the grammaticality of the overt pronoun in (61) is accounted for.
Now let us consider the cases where overt pronouns are anaphoric to expressions like at most three CN? As I mentioned in 2.2, of the So-series demonstratives, we are discussing only sore ‘it’, soko ‘that place’ and soitsu ‘that guy’, and with respect to plurality there are idiosyncratic differences among them. First, sore and soitsu can be followed by a plural marker such as sore-ra ‘it-PL’ and soitsu-ra ‘those guys’ while soko cannot be used with a plural marker like *soko-ra ‘those places’. Second, soitsu ‘that guy’ can be anaphoric only to its singular antecedent while soitsu-ra ‘those guys’ can be anaphoric only to its plural antecedent, as in (69).

(69) Johni-wa seezee san nin-no dorobooji-o tsukai-ta.  
     -Top at most three Cl-Gen thief-Acc catch-Past  
Soshite øj soitsu-*ra-o nagut-ta.  
and that.guy -Pl-Acc hit-Past  
‘John caught at most three thieves. And he hit them.’

This fact seems to indicate that Bittner’s suggestion is correct in that what is crucial here is not the availability of dynamic binding but the singular/plural distinction. Interestingly enough, however, sore ‘it’ can be anaphoric to a plural antecedent without the plural marker, as in (70).

(70) Johni-wa seezee san satsu-no honi-o kat-ta.  
     -Top at most three Cl-Gen book-Acc buy-Past  
Soshite, øj sore-(ra)-o yon-da.  
and it-Pl-Acc read-Past  
‘John bought at most three books. And he read them.’

This fact suggests that sore is neutral with respect to the singular/plural distinction. But it should be noticed that its number-neutrality is not the reason of the grammaticality of (70); if so, we would lose the account for the fact that sore cannot be anaphoric to universally quantified antecedents in narrative sequence cases. We can thus conclude that sore
without -ra is grammatical in (70) since it is dynamically bound by the existential quantifier introduced via type lifting, as in (68).\textsuperscript{15}

2.4.1.5 Summary of 2.4.1

The following is the summary of observations we made in 2.4.1.

(71) \begin{itemize}
  \item[(i)] In narrative sequence cases, null pronouns can be antecedeed by universally quantified NPs, while overt pronouns cannot unless they are followed by plural markers.
  \item[(ii)] In (i) null pronouns can be interpreted either as singular or plural. The plural interpretation is easy to obtain in any context. The contexts where null pronouns are interpreted as singular are so-called telescoping cases in which contextually specified domains like scripts are required.
  \item[(iii)] In narrative sequence cases, the anaphoric links between overt pronouns and their universally quantified antecedents are established only when they are followed by plural markers. Overt pronouns are not acceptable in telescoping cases.
\end{itemize}

These observations all follow from our claim that overt pronouns are variables which must be dynamically bound, and in order to be interpreted as E-type, Japanese pronouns must be null. (71i) is a direct result of the fact that dynamic binding by universal quantifier is not available in narrative sequence cases. The E-type strategy predicts the two readings of null pronouns described in (71iii). In unmarked cases (non-telescoping cases), a Davidsonian event argument is assumed to take wide scope over the universally quantified NP, so that only the reading in which the denotation of the NP is lumped under the single occasion is available. This forces the plural interpretation of null pronouns. On the other hand, in telescoping cases, universally quantified NPs take wide scope over a Davidsonian event.

\textsuperscript{15} \textit{Sore} 'it' has another interesting use. There are cases where it refers to stage-level aminate individuals. See Fuji 1999, in progress, for detailed discussion.
argument, which gives us the reading of repetition of events, and this repetition reading gives us the singular interpretation of null pronouns.

We also discussed cross-linguistic differences in syntax-semantics mapping, and observed that Chinese and Japanese, both of which are [+arg, -pred] languages in Chierchia's 1998a, b sense, have lexical items which behave like [+pred] nouns. We suggested that Chierchia's Nominal Mapping Parameter should not be rejected by this fact, but rather it should be assumed that a language can have two types of parameter setting.

2.4.2 Paycheck sentences

In this section, we will consider Japanese paycheck sentences and show that only null pronouns are acceptable in that type of sentences. Since they are not contexts where dynamic binding is applicable, it will be argued that null pronouns can be interpreted as E-type while overt pronouns cannot. The notion of E-type used so far is the one characterized in (72).

(72) Functions from individuals (or occasions) into individuals

In addition, as mentioned in chapter 1, functions as in (73) are also available in languages like Japanese.

(73) Functions from individuals into kinds

The latter type of functions will play an important role in accounting for interpretive differences between English and Japanese paycheck sentences.

2.4.2.1 English paycheck sentences

Before discussing Japanese cases, we will observe English paycheck sentences to see what makes pronouns in this type of sentence possible. Paycheck sentences were first introduced by Karttunen 1969, where he called the pronouns in the sentences "pronouns of laziness", a term originally coined by Geach 1962. Unlike the narrative sequence cases or
others, antecedents of pronouns of laziness are not indefinite NPs but definite NPs which have bound pronouns in them. Some examples are given in (74).

(74)  
a. The man who gave his paycheck to his wife was wiser than the man who gave it to his mistress.  
(Karttunen 1969: 114)  
b. John gave his paycheck to his mistress. Everybody else put it in the bank.  
(Cooper 1979: 77)  
c. John reads his newspaper in the morning and Peter glanced at it in the afternoon.  
(Haïk 1985: 301)

The complete descriptive generalization of the distribution of English pronouns of laziness has not been given yet. However, we can give some characteristics of acceptable paycheck sentences. First of all, putting Karttunen’s original paycheck sentence (74a) aside, the antecedent NPs and the lazy pronouns are contained in different clauses and the two clauses are conjoined with the non-temporal ordering and, being contrasted with each other. If the two clauses are not conjoined with each other, the lazy interpretation is difficult to obtain. For example, in (75a) the clause containing a pronoun is embedded in the other clause as an argument, and in (75b) the clause with a pronoun is an adjunct. So, in both cases, the pronouns are not interpreted as pronouns of laziness.

(75)  
a. *Nancy reminded her brother that Lucy was convinced that he (=Lucy’s brother) would be drafted.  
(Haïk 1985: 299)  
b. *Linda did not want to leave her hometown, because Elsa said that she missed it (= Elsa’s home town).  
(ibid.)

Second, comparative sentences are used to compare something with the other, so that they seem to function as coordinate structures conjoined by the non-temporal ordering and. But just being comparative does not always make pronouns of laziness possible. (74a) is OK but the sentences in (76) are not acceptable.

(76)  
a. *John told his brother a story that was funnier than what Robert has told him (= Robert’s brother).  
(Haïk 1985: 299)
b. *John told his brother more stories than Robert told him (= Robert’s brother) (ibid.)

Probably, being in the relative clauses is an important factor for a pronoun to be interpreted as a pronoun of laziness, as shown in (77). But some kind of syntactic parallelism is also required, as in (78).

(77) The man who gave his paycheck to his wife likes the man who gave it to his mistress. (Haïk 1985: 322)

(78) *The man who gave his paycheck to his wife was wiser than the person who knows the man who gave it to his mistress. (ibid.: 321)

Third, mood and tense are also relevant. As Haïk (1985: 300, fn.64) and Kempson 1988 point out, the more generic the sentence, the better the lazy interpretation. Examples are given in (79).

(79) a. John always gives his profits to overseas aid, but Sam uses them to expand his business. (Kempson 1988: 400)

b. John gave his profits to overseas aid, but Sam used them to expand his business. (ibid.: 403)

According to Kempson’s judgment, (79b) is less acceptable than (79a) under the lazy interpretation of the pronouns. Finally there are semantic and/or pragmatic restrictions with respect to the genitive pronouns and the head nouns in the antecedent NPs. As Haïk (1985: 300, fn.64) observes:

Also, inalienable possessions or part-whole relationships sound better than alienable possessions. In general, the sentences are improved when it is pragmatically presupposed that there is a one-to-one correspondence between the thing possessed and the possessor. Hence paychecks and glasses are more felicitous than dollar-bills or suitcases, etc... These observations indicate that the notion of natural relations (like inalienable possessions) play a role in the acceptability of the sentences, and perhaps are at the root of it.

Tomioka 1998 also reports that personal pronouns are hard to interpret as lazy pronouns, as in (80).
(80)  

a. Gary likes his mother, and Tim likes her (=*Tim’s mother), too.  

(Tomioka 1998: his (30a))

b. Gary lost his ID in the gym. Tim lost it (=??Tim’s ID) in a bar.  

(Tomioka 1998: his (30b))

But there are examples like (81), where the personal pronoun is interpreted as a lazy pronoun, although there are native speakers of English who don’t get the intended reading.

(81) The man who sent his grandmother to a nursing home was kinder than the man who threw her out on the street.  

(Barker 1996: 255)

Some characteristics of acceptable paycheck sentences are summarized as follows;

(82) In ... [S1 ... antecedent ...] ... [S2 ... pronoun of laziness ... ] ...,

a. the antecedent contains a pronoun,

b. if the pronoun in the antecedent and the rest of it enter into one-to-one relations, especially like an inalienable possession relation or a part-whole relation, the lazy interpretation of the pronoun in S2 is easier to obtain,

c. the event described in S2 does not depend on that in S1, in other words, there is no time-based causal relation between S1 and S2,

d. S1 and S2 can be relative clauses, and

e. S1 and S2 are contrasted with each other.

Of course this list is not exhaustive, and there might be other characteristics of English paycheck sentences. But the most important property of paycheck sentences is, I think, (82e), for it is observed in all the acceptable cases. Probably it might be a necessary condition on pronouns of laziness in paycheck sentences. If so, we have to consider why (82e) functions as a condition which makes pronouns of laziness easier to obtain. I cannot provide a definite answer to this question, but my speculation is as follows. In Chierchia’s approach, which we follow here, E-type pronouns are functions. In order to interpret an E-type pronoun, we have to find the appropriate function, which is the most salient one in a context. In other words, the context must be specific or informative enough to let the
hearer know what is the most salient function in it. Contrastive and comparative sentences are typical cases where we can easily see what the most salient function is. When two things are compared with each other, everything but the contrastive point should be as invariable as possible. For example, in Karttunen's original paycheck sentence in (74a), one man is compared with another, putting the contrast on the difference of the goals of their paychecks: one's wife vs. one's mistress. So, for the sentence to make sense, everything but this contrastive point should be the same both in the subject and in the complement of than. This contextual information makes the function from men into their paychecks the most salient, since it makes the two sentences parallel. In other words, in contrastive and comparative sentences, if we know what is compared with what, we can find out what is the most salient function, and this makes pronouns of laziness, or E-type pronouns, possible.

2.4.2.2 Japanese paycheck sentences: The core cases

In this and the next subsections, we will discuss Japanese paycheck sentences, arguing that only null pronouns can receive lazy interpretations, that is, they are interpreted as E-type in the language. But it is not a priori determined which sentences should be referred to as Japanese paycheck sentences. We will begin with the Japanese counterparts of English paycheck sentences, which have some of the characteristics listed in (82). Then, we will discuss the other cases where the lazy interpretation of pronouns are available. Although they differ from English paycheck sentences in some crucial respects, we will refer to them as Japanese paycheck sentences, and show that our claim that only null pronouns can be interpreted as E-type is correct.

First let us consider the Japanese counterpart to English paycheck sentences.
(83) a. [Tsuma-ni [jibun-no kurejittokaado]i-o watashi-ta] otoko-wa wife-Dat self-Gen credit.card-Acc give-Past man-Top
 [aijin-ni φi/??sorei-o watashi-ta] otoko-yori funbetsu-ga at-ta. mistress-Dat it-Acc give-Past man-than wisdom-Nom be-Past
 'The man who gave a credit card of his to his wife was wiser than the man who gave one of his to his mistress.'

b. [NY Times-ni [jibun-no kiji]i-o tokooshi-ta] otoko-wa -Dat self-Gen article-Acc contribute-Past man-Top
 wisdom-Nom be-Past
 'The man who contributed his article to *The New York Times* was wiser than the man who contributed it to *The Washington Post.***'

(84) a. John igai-no dare-mo-ga [jibun-no kurejittokaado]i-o tsuma-ni except-Gen who-∀-Nom self-Gen credit.card-Acc wife-Dat
 watashi-ta. John-wa φi/??sorei-o aijin-ni watashi-ta. give-Past -Top it-Acc mistress-Dat give-Past
 'Everyone but John gave a credit card of his to his wife. John gave one of his to his mistress.'

 Bill-wa itsumo φi/??sorei-o hikidashi-ni hokanshi-tei-ru. -Top always it-Acc drawer-in keep-Prog-Pres
 'John always puts a credit card of his in his wallet. Bill always keeps one of his in the drawer.'

In (83a) and (83b), the pronouns and their antecedents are both in the relative clauses, and the nouns modified by those relative clauses are arguments of the matrix clauses. In (84a) and (84b), the pronouns and their antecedents are in different sentences. The obvious fact
is that at least in these examples, the null pronouns are much preferred to the overt ones, which suggests that in order to be interpreted as E-type, Japanese pronouns must be null.16

What functions, then, are they interpreted as? In English paycheck sentences, both singular and plural pronouns are interpreted as functions from individuals into the maximal sum of individuals. For example, (85) has a uniqueness presupposition with respect to the interpretation of the pronoun since it is singular. The pronoun is thus interpreted as a function from individuals into their credit card.17 In (86), the pronoun is plural and maximality is required, so that it is interpreted as a function from individuals into the credit cards they have.

(85) Everyone except John gave his credit card; to his wife. John gave it;
    (= f(John)) to his mistress.
    f: a function from individuals into their credit card

(86) Everyone but John gave his credit cards; to his wife. John gave them;
    (= f(John)) to his mistress.
    f: a function from individuals into their credit cards

Both functions satisfy the characterization of E-type pronouns given in chapter 1, repeated as (87).

(87) E-type pronouns are functions from individuals (or occasions) into the maximal sum of individuals.

---

16 It is fair to note that there are native speakers of Japanese who accept the overt pronouns in these examples. I will discuss idiolectal differences in 2.4.2.5. It is also worth noting that there are native speakers who recognize the difference between (83) and (84) with respect to the acceptability of the overt pronouns. That is, for them, the overt pronouns in (83) are perfectly acceptable (cf. Ueyama 1998: 2). I also found some speakers who accept the overt pronoun in (83a) but judged the one in (83b) as marginal. I agree with the last type of judgment, but still it seems to me that the null pronoun is better than the overt pronoun even in (83a).

17 Chierchia 1995 argues that E-type pronouns are neutral with respect to the singular/plural distinction. (85) can be interpreted as true in the situation where John has more than one credit card and gave all of them to his mistress in spite of the fact that the donkey pronoun is singular. However, there are some native speakers who strongly favor the singular interpretation in (85).
On the other hand, as shown by the translations given in (83) and (84), neither uniqueness nor maximality is required in Japanese paycheck sentences. The first sentence of (84a), for example, can be interpreted as true in the situation where everyone has more than one credit card and gives one of them to his wife. By the same token, the second sentence of (84a) can be interpreted as true if John had more than credit card and gives one of them to his mistress. So, it seems that null pronouns in Japanese paycheck sentences should not be treated as functions characterized in (87).

Nevertheless, I will argue that they are interpreted like those in (87), and the difference between English and Japanese with respect to maximality observed in paycheck sentences can be derived from an independent rule. Let us consider the second sentence of (84a). I propose that it should be analyzed as in (88), where the null pronoun is interpreted as a function from individuals into kinds.

(88) the second sentence of (84a)

\[
\text{John-wa } f(\text{John}) \text{ aijin-ni watashi-ta.}
\]

\[
-\text{Top mistress-Dat give-Past}
\]

\[
f: \text{a function from individuals into the credit-card-kind that they have}
\]

(88) is represented as in (89), where \( f(j) \) denotes the kind of credit card that John has, and since \( \text{watashi} \) 'give' is a verb which applies to objects, the DKP rule yields the existential reading as in (90).\footnote{The logical representation in (90) has 'have'(x)(j)', which is not expressed in the original representation in (89). I assume that this condition is contextually supplied when the null pronoun is interpreted. In this case, the first sentence of (84a) contains an expression like a credit card of everyone's which provides the possessive relation.}

(89) \( \text{give'(j's mistress)}(f(j))(j) \)

\( f(j): \) the credit card-kind that John has

(90) via DKP

\[
\exists x [\text{\textasciitilde CREDIT-CARD}(x) \land \text{have}'(x)(j) \land \text{give'(j's mistress)}(x)(j)]
\]

What is, then, the kind of credit card that John has? As we have discussed in chapter 1, extensionally it is the maximal sum of the credit cards that John has in the world of
evaluation. So the function $f$ in (88) is not different from the functions in (85) and (86), with respect to the characteristic in (87). The former differs from the latter only in that it is intensional.

It should be noted that functions from individuals into the maximal sum of individuals are available in Japanese as well if such functions are most salient in given contexts. Let us look at the following example.

(91)  
\[
\text{John igai-no dare-mo-ga [jibun-no hahaoya]-o amerika-ni except-Gen who-V-Nom self-Gen mother-Acc America-to}
\]
\[
\text{tsureteit-ta. John-wa $\emptyset_1$ chuugaku-ni tsureteit-ta take-Past -Top China-to take-Past}
\]

‘Everyone but John took his mother to the US. John took his mother to China.’

The truth condition of the first sentence is expressed as “for every $x$, if $x$ is a person and $x \neq \text{John}$, $x$ took the unique individual $y$ such that it has the ‘mother-of’ relation to $x$’, where the antecedent NP $\text{jibun-no hahaoya}$ ‘self’s mother’ is interpreted as definite description. This interpretation is very reasonable since a one-to-one relation holds between individuals and their mothers. It is also very reasonable to interpret the null pronoun in the second sentence as a function from individuals into their mothers, not to the mother-kind.

To sum up, the strategy for interpreting pronouns in English paycheck sentences is available for interpreting null pronouns in the Japanese counterparts, too. That is, they are interpreted as functions from individuals into the maximal sum of individuals. The interpretive difference between Japanese null pronouns and English pronouns with respect to uniqueness/maximality follows from the fact that Japanese E-type pronouns have an additional strategy of being interpreted as functions from individuals into kinds, the extensions of which are also the maximal sum of individuals, and the DKP rule derives the existential readings.

One might wonder at this point whether a function from individuals into kinds is available in English. As pointed out by Veneeta Dayal (personal communication), it is also available in English. Let us consider (92).
(92) Everyone but John gave flowers\textsubscript{i} to his wife. John gave them\textsubscript{i} to his mistress.

Since dynamic binding is not available in this context, the plural pronoun *them* in the second sentence must be interpreted via the E-type strategy. What function is, then, the pronoun interpreted as? In 2.4.1.2, we discussed narrative sequence cases where English plural pronouns are interpreted as functions from occasions into individuals. It is clear, however, that such a function cannot derive the intended reading of (92). But if the pronoun in (92) is interpreted as a function from individuals into the flower-kind, we can obtain the intended reading, as in (93).

(93) \text{give}'(j's mistress)(f(j))(j)

\text{f: a function from individuals into the flower-kind via DKP}

\exists x [\bigcup \text{FLOWER}(x) \land \text{give}(j's mistress)(x)(j)]

So, pronouns in English paycheck sentences can also be interpreted as functions from individuals into kinds, which supports our analysis.\textsuperscript{19}

\textbf{2.4.2.3 Extension of the E-type strategy to similar cases}

In this subsection, I will try to extend the analysis just presented to other cases which are similar to paycheck sentences, but whose English counterparts are not regarded as paycheck sentences. Let us consider (94) and (95), which are identical except that the former has the overt pronoun while the latter the null pronoun. I will claim that the null pronouns in sentences like (95) should be interpreted as functions from individuals into kinds.

\textsuperscript{19} Roger Schwarzschild (personal communication) pointed out that the function in (93) and those I will propose in the following subsection are constant functions, which always yield the same value, and that assuming such functions in natural language is not desirable, just like the ban on vacuous quantification. I do not know if his point is empirically correct or not, but if it is, I would like to suggest that the pronoun in (93) is interpreted as a function from John into the kind of flowers that have some relation to him.
(94) Mary-wa chokoreeto-o booiurendo-ni okut-ta.
    -Top chocolate-Acc boy.friend-Dat present-Past

    Jane-wa sorei-o chichioya-ni okut-ta.
    -Top it-Acc father-Dat present-Past

    'Mary gave a chocolate to her boy friend. Jane gave to her father the chocolate
    that Mary gave to his boyfriend.'

(95) Mary-wa chokoreeto-o booiurendo-ni okut-ta.
    -Top chocolate-Acc boy.friend-Dat present-Past

    Jane-wa øi chichioya-ni okut-ta.
    -Top father-Dat present-Past

    'Mary gave a chocolate to her boy friend. Jane gave one to her father.'

The reading of the overt pronoun in a sentence like (94) is often called a token reading or a
strict reading while that of the null pronoun in a sentence like (95) is referred to as a type
reading or a sloppy reading, which I will use interchangeably with a lazy interpretation.

The null pronouns in such constructions seem to be able to be treated as kind-anaphora or
property anaphora. Under the kind-anaphora approach, the interpretation of the second
sentence in (95) results from copying the antecedent NP, which denotes the chocolate-
kind, to the position occupied by the null pronoun, as shown in (96), and the truth
condition obtains via DKP as in (97).

(96) Jane-wa [NP chokoreeto-o] chichioya-ni okut-ta.
    -Top chocolate-Acc father-Dat present-Past

(97) \[\text{give'}(\text{CHOCOLATE})(j\text{'}s father})(j)\]

    via DKP

\[\exists x[\ulcorner \text{CHOCOLATE}(x) \land \text{give'}(x)(j\text{'}s father})(j)]\]

On the other hand, Tomioka 1997, 1998 claims that Japanese null pronouns should be
treated as property-anaphora, with the assumption that Japanese common nouns denote
properties, contra Chierchia/Krifka's thesis. In his approach, the null pronoun in (95)
refers to the property of being chocolate, so the denotation of the null pronoun is chocolate'
of type \(<e, \varnothing>\), and the existential quantifier is introduced via a type shifting operation. In
this approach, too, a property in the preceding sentence is copied to the position occupied by a null pronoun. I will refer to these two approaches as the copy approach unless they need to be distinguished.

The English counterpart of (95) does not qualify as a paycheck sentence, since the antecedent has no pronoun in it, so that one might claim that (95) should not be analyzed as a paycheck sentence. However, the E-type strategy proposed above can derive the intended reading of the second sentence if the null pronoun is interpreted as a function from individuals into the chocolate-kind, as given in (98).

(98) \[ \text{give'(f(j))'(j's father)(j)} \]

f: a function from individuals into the chocolate-kind

via DKP

\[ \exists x [ \forall \text{CHOCOLATE}(x) \land \text{give'}(x)(j's \ father)(j)] \]

So, the question is: Which approach is better, the copy approach or the E-type strategy? We will discuss this point in detail in the next section, but before that, let us note some properties of the null pronouns in sentences like (95). In (99), an affirmative and a negative sentence are juxtaposed, and the second sentences have a null pronoun.

    -Top interesting paper-Acc read-Past.
    Shikashi Bill-wa ə; yom-ana-katta.
    but -Contrast read-Neg-Past

    ‘John read an interesting paper. But Bill didn’t.’

b. John-wa omoshiroi ronbun-i-o yom-ana-katta.
    -Top interesting paper-Acc read-Neg-Past
    Shikashi Bill-wa ə; yon-da.
    but -Contrast read-Past

    ‘John didn’t read an interesting paper. But Bill did.’

---

20 *Wa* functions as contrastive marker as well as topic marker. The difference between the two functions is not clear. Just for convenience, I will give the gloss ‘-Contrast’ to *-wa* in a sentence that begins with a connective like *shikashi* ‘but’.

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The affirmative-negative contrasts like (99) have two points worth mentioning. One is that
the null pronoun in (99a) never takes wide scope over negation. This is parallel to the
well-known fact that kind-denoting plurals in English do not take wide scope over
negation.

(100)  
  a. John didn’t see a spot on the floor. (ambiguous between \(\exists\neg\) and \(\neg\exists\))
  b. John didn’t see spots on the floor. (only \(\neg\exists\)) \(\text{Carlson 1977: 19}\)

In the E-type strategy and the kind-anaphora approach, the null pronoun in (99a) is
analyzed as denoting the interesting-paper-kind, so that the narrow scope property of the
null pronoun follows. The property-anaphora approach also can account for this fact by
assuming that \(\lambda x \lambda y [\text{read}'(y)(x)]\) of type \(<e, <e, \succ\rangle\) is type-shifted to \(\lambda \mathcal{P} \lambda x \exists y [\mathcal{P}(y) \land \text{read}'(y)(x)]\) of type \(<<e, \succ, <e, \succ\rangle\), in which the existential quantifier takes minimal
scope over ‘\(\mathcal{P}(x)\)’ and ‘\(\text{read}'(y)(x)\)’.\(^{21}\) Second, the anaphoric link between the null
pronoun and its antecedent can be established in (99b) in spite of the fact that the latter is in
the inaccessible domain created by negation. Under the E-type strategy, this fact is
accounted for straightforwardly since not being subject to accessibility conditions is an
important aspect of E-type pronouns. The kind/property-anaphora approaches, namely the
copy approach, can also account for this fact since kinds and properties are both name-like
and copying is not subject to the accessibility condition. As far as the data discussed above
are concerned, it seems that either approach can do the job. In the next section, however, I
will argue that the E-type strategy is preferable to the copy approach.

2.4.2.4 Comparison between the E-type strategy and the copy approach

One might claim that even the core cases of Japanese paycheck sentences like (84a),
repeated as (101), can be accounted for by the copy approach.

---

\(^{21}\) See Tomioka 1997, 1998 for details. See also Van Geenhoven 1998, where she
discusses semantic properties of noun incorporation in West Greenlandic and proposes the
same operation.
(101) John igai-no dare-mo-ga [jibun-no kurejittokaado]-o except-Gen who-∀-Nom self-Gen credit-card-Acc
tsuma-ni watashi-ta.
wife-Dat give-Past
John-wa ø i aijin-ni watashi-ta.
-Top mistress-Dat give-Past

‘Everyone but John gave a credit card of his to his wife. John gave one of his to his mistress.’

The second sentence of (101) can be represented as in (102) in which the null pronoun is analyzed as referring to the credit-card-kind. (For the sake of exposition, I will only show the treatment of the kind-anaphora approach, since the results obtained by that approach are not different from those obtained by the property-anaphora approach.)

(102) give’(CREDIT-CARD)(j’s mistress)(j)

via DKP

∃x[∀CREDIT-CARD(x) ∧ give’(x)(j’s mistress)(j)]

The resulting representation in (102) is slightly different from the one we get by the E-type strategy as in (90), repeated as (103), in that the latter contains an additional condition ‘have’(x)(j)’, which is contextually supplied.

(103) give’(j’s mistress)(f(j))(j)

via DKP

∃x[∀CREDIT-CARD(x) ∧ have’(x)(j) ∧ give(j’s mistress)(x)(j)]

In fact, the most natural interpretation of the second sentence in (101) is the one in (103), that is, John gave to his mistress a credit card of his, not somebody else’s. However, there is an example which seems to suggest that the simple kind-anaphora approach as in (102) provides the correct representation. Tomioka’s 1998 example in (104), which is attributed to Ayumi Ueyama (see also Hoji 1998), makes the point.

(104) A: Ken-wa jibun-no kuruma-i-o arat-ta-yo.
-Top self-Gen car-Acc wash-Past-Part

‘Ken washed his car, you know.’
B: Hoka-no minna-mo গুলি arat-ta-yo. Dare-no-ka-wa  
other-Gen all-also wash-Past-Part who-Gen-Q-Top  
shira-na-i-kedo.  
know-Neg-Pres-but  
‘Everybody else washed one, too. I don’t know whose, though.’

(Tomioka 1998: his (25))

The first part of B does not have to be interpreted as ‘for all x, x person, x ≠ Ken, x washed x’s car, too’, but the ownership of the cars that they washed is outside the speaker’s concern, as indicated by the possible continuation of ‘I don’t know whose’, in spite of the fact that the apparent antecedent has a reflexive pronoun as in jibun-no kuruma ‘self’s car’. This is accounted for by analyzing the null pronoun as simply referring to the car-kind.

Of course, our E-type strategy also yields the correct interpretation by assuming that the null pronoun is interpreted as a function from people into the car-kind, not as a function from people into the kind of car that they have. So, the core cases like (101) and (104) do not serve as examples to argue which approach is superior to the other. In what follows, I will present three pieces of evidence for the E-type strategy over the copy approach.

2.4.2.4.1 The effect of additive particle

In 2.4.2.1, we observed several features of English paycheck sentences, and I suggested that contrastiveness is the most distinctive characteristics in making the lazy pronouns interpretable. In Japanese, contrastiveness is typically indicated by topic-, contrastive-, or additive-markers, and such markers affect the interpretation of null pronouns in Japanese paycheck sentences. Hoji 1998 points out a very interesting paradigm which shows the effect of additive particle on the interpretation of null pronoun, as follows.
(105) A: John-wa jibun-no gakusei-o suisenshi-ta.  
   -Top self-Gen student.Acc recommend-Past  
   ‘John recommended a student of his.’  

B: Mary-wa [CP Bill-mo ɕi suisenshi-ta to] omot-tei-ta.  
   -Top also recommend-Past Comp think-Prog-Past  
   ‘Mary thought that Bill recommended a student of his, too.’

(106) A: John-wa jibun-no gakusei-o suisenshi-ta.  
   -Top self-Gen student.Acc recommend-Past  
   ‘John recommended a student of his.’  

B: Mary-wa [CP Bill-ga ɕi suisenshi-ta to] omot-tei-ta.  
   -Top Nom recommend-Past Comp think-Prog-Past  
   ‘Mary thought that Bill recommended a student of hers.’

(Hoji 1998: 136)

The A-sentences in (105) and (106) are identical. The B-sentences are also identical except that the subject of the embedded clause in (105) is followed by additive particle -mo while in (106) the additive marker is replaced with nominative marker -ga. And this small difference causes a dramatic interpretive difference of the null pronouns in the embedded clauses. The null pronoun in (105) is interpreted as one of Bill’s students whereas the one in (106) is interpreted as one of Mary’s students.22 In our E-type pronoun approach, this fact is accounted for as follows. In both cases, the context gives a function from people into the kind of student that has some contextually specified relation to them (e.g. the kind of student that is taught by them). In (105) the input of that function is Bill, because the

22 Hoji’s purpose in presenting the contrast between (105) and (106) is as follows. Otani and Whitman 1991 argue that null pronouns in object position in Japanese are actually VP-deletion in disguise (VP-deletion after V-to-I raising), based on the observation that interpretations of “null pronouns in object position” is the same as those in English VP-deletion. Hoji presents many pieces of evidence against their claim. The contrast between (105) and (106) is one of them. As is convincingly argued by him, the presence or absence of too does not affect the interpretation of elided VP in English as in (i) (his (32)).

(i) John recommended his student. Mary thought Bill did (, too).

See also Tomioka 1998 for criticism on Otani and Whitman 1991.
additive particle indicates that Bill is contrasted with John. On the other hand, in (106), nothing has the additive particle, so that the topic-marked matrix subject goes into the argument slot of the function. The logical representations of these are derived as illustrated in (107) and (108), where the teacher-student relation is expressed by a transitive predicate teach'.

(107) the embedded sentence of (105 B)

\[ \text{recommend}'(f(b))(b) \]

\[ f: \text{a function from people into the kind of student that is taught by them} \]

via DKP

\[ \exists x[\text{STUDENT}(x) \land \text{teach}'(x)(b) \land \text{recommend}'(x)(b)] \]

(108) the embedded sentence of (106 B)

\[ \text{recommend}'(f(m))(m) \]

\[ f: \text{a function from people into the kind of student that is taught by them} \]

via DKP

\[ \exists x[\text{STUDENT}(x) \land \text{teach}'(x)(m) \land \text{recommend}'(x)(m)] \]

What Hoji's paradigm suggests is that in order to interpret null pronouns in paycheck sentences, we have to find out what is contrasted with what, which is usually indicated by topic markers or additive markers. An advantage of taking the E-type pronoun strategy is that we can represent such information as the argument of a given function. The difference between presence and absence of additive particle gives two distinct representations such as \( f(b) \) and \( f(m) \). On the other hand, the kind-anaphora approach is silent about the effect of the additive marker and it remains unspecified whose students are recommended. So, Hoji's paradigm supports our E-type strategy over the kind-anaphora approach.

2.4.2.4.2 A syntactic condition on functions

A second piece of evidence for the E-type analysis of null pronouns in paycheck sentences comes from a syntactic condition on functions. In every grammatical example of
E-type pronouns we have discussed so far, both in English and Japanese, when an E-type pronoun is parsed, the phrase that denotes the domain of the function has already been introduced in context. For example, ‘John gave f(John) to his mistress’, ‘Everyone came in in occasion o and f(o) sat down’, and so on. This can be stated descriptively as in (109), which I think is presupposed in any theory explicitly or implicitly (cf. Chierchia 1992: 159).

(109) Condition on Functional Interpretation

At LF an expression denoting (an element of) the domain of that function has to be available (i.e. it has to have been introduced in the preceding discourse, or it has to c-command that function).

The necessity of the condition in (109) is observed in paradigm other than the E-type pronoun strategy. The contrast between (110a) and (110b) is well-known and has been studied by May 1985 and Chierchia 1993 among others.

(110) a. Q: Who does everyone love?
     A: His mother.

b. Q: Who loves everyone?
     A: *His mother.

So-called functional answers like “his mother” are appropriate for questions like (110a) while they are not for those like (110b). The Condition on Functional Interpretation in (109) accounts for this contrast by assuming, with Chierchia 1993 among others, that wh-traces are represented as functions, as given in (111).

(111) a. Who does everyone_{x} love f(x)?

b. Who f(x) loves everyone_{x}?

The domain of the function in (111) is the set denoted by *everyone*. In (111a), the function is c-commanded by *everyone*, satisfying the condition, whereas in (111b), the QP is syntactically lower than the function, so that the functional answer is not available in (111b). Chierchia 1993 further argues that even if the QP moves over the function at LF,
the resulting representation is ruled out because of the Weak Crossover violation, as illustrated in (112).

(112) \([CP \\text{ who} [IP \text{ everyone} [IP [\text{ ej}]^{1} \text{ loves } x_{1} ]]]\]

The superscript and the subscript represent the domain and the codomain of the function, respectively. The moved QP c-commands the functional trace, serving as the domain, but at the same time it c-commands its own trace, yielding a Weak Crossover violation.

Now let us see what happens in a Japanese paycheck sentence where a null pronoun c-commands a phrase denoting the domain of the function.

(113) Terebi bangumi-\text{ga} Kennedy-o hihanshi-ta
TV program-Nom -Acc criticize-Past
koto-wa na-katta.
fact-Top Neg-Past
*Shikashi $\sigma_{1}$ dono koohosa-o-mo hihanshi-ta
but which candidate-Acc-$\forall$ criticize-Past
koto-wa at-ta.
fact-Top exist-Past
'It was not the case that a TV program criticized Kennedy. But it was the
case that it criticized every candidate.'

The intended reading of the second sentence of (113) is "(it was the case that) every candidate was criticized by at least one TV program. But this is not obtained. The reason is very clear. In order to get such a reading, the null pronoun have to be interpreted as a function from individuals into the TV program-kind. But it c-commands the phrase denoting the domain, namely, dono koohosa-o-mo ‘every candidate-Acc’, as schematized in (114), not satisfying the condition in (109).

(114) \([IP f(x) \text{ criticized every candidate}_{x}]\]
f: a function from individuals into the TV program-kind

Note that (113) becomes acceptable if the null pronoun is interpreted as a specific TV program, and it seems to me that in this reading, the specific TV program should be the same as the one that didn’t criticize Kennedy. So, the whole discourse in (113) is
interpreted as "there is a certain TV program such that it didn't criticize Kennedy but criticized every candidate." If my judgment is correct, this means that the null pronoun is interpreted as a discourse marker dynamically bound by the existential quantifier associated with the *terebi bangumi* 'TV program' in the first sentence.

What about the copy approach? It is clear that this approach cannot capture the fact. Under this approach, the second sentence of (113) is interpreted as "a TV program criticized every candidate" where the referent of *a TV program* is not necessarily the same as that in the first sentence. But such reading is not available in (113), so that the E-type strategy is to be favored over the copy approach. It should be also noted that if a bare NP is used in place of the null pronoun, we can obtain the intended reading, as given in (115).

(115) Terebi bangumi-J-ga Kennedy-o hihansi-ta
TV program-Nom -Acc criticize-Past
koto-wa na-katta.
fact-Top Neg-Past
Shikashi terebi bangumi-J-ga dono koohosha-o-mo hihansi-ta
but TV program-Nom which candidate-Acc-∀ criticize-Past
koto-wa at-ta.
fact-Top exist-Past

'It was not the case that a TV program criticized Kennedy. But it was the

case that a TV program criticized every candidate.'

In the second sentence, the object QP undergoes QR and the bare NP subject is interpreted as existential via DKP, yielding $\forall x[candidate'(x) \rightarrow \exists y[TV\cdot PROGRAM(y) \land criticize'(x)(y)]]$.

### 2.4.2.4.3 Definite plural interpretations in narrative sequence cases

A third piece of evidence is concerned with narrative sequence cases where the facts follow straightforwardly under the E-type approach whereas under the copy approach further stipulation would be required. In 2.4.1.1, we discussed cases like (116), where
the null pronoun is interpreted as a function from occasions into the maximal sum of individuals.

(116) Dono seehin̄-mo chuuibukaku kensas-are-ta.
which product-∀ carefully inspect-Pass-Past

Soshite ɕi hako-ni tsumer-are-ta.
and  box-in pack-Pass-Past

'Every product i was inspected carefully. And they i were packed in the box.'

If null pronouns were always interpreted as referring to properties or kinds, the null pronoun in (116) could be interpreted as "a product was packed in the box", where the sentence is existentially quantified. But such an interpretation is impossible in this context. To derive the definite plural reading, the copy approach has to say something additional. On the other hand, under the E-type strategy, we need nothing else. Null pronouns are always interpreted as contextually salient functions from individuals (or occasions) into the maximal sum of individuals, unless dynamic binding is applicable.

So, it can be concluded from the above three cases that the E-type strategy is to be preferred over the copy approach. And this also suggests that a contrastive context like (95) can be regarded as a sort of paycheck sentence with respect to the way of interpreting the null pronoun in it.

2.4.2.5 A note on idiolectal differences

Our argumentation so far has been based on the observation that in Japanese paycheck sentences, overt pronouns are interpreted as dynamically bound variables (the token-readings) while null pronouns are interpreted as E-type (the type-readings or lazy interpretations). It is worthwhile noting that there are some native speakers of Japanese who judge both overt and null pronouns as equally acceptable under the lazy interpretations in the core cases of paycheck sentences like (83) and (84), repeated as (117) and (118) with their judgments.
(117) a. [Tsuma-ni jibun-no kurejittokaado]-o watashi-ta otoko-wa
    wife-Dat self-Gen credit.card-Acc give-Past man-Top

[aigin-ni $i$/sore$e_1$-o watashi-ta] otoko-yori funbetsu-ga at-ta.
mistress-Dat it-Acc give-Past man-than wisdom-Nom be-Past

'The man who gave a credit card of his to his wife was wiser than the man
who gave one of his to his mistress.'

b. [NY Times-ni jibun-no kiji]-o tokooshi-ta] otoko-wa
    -Dat self-Gen article-Acc contribute-Past man-Top

[Washington Past-ni $i$/sore$e_1$-o tokooshi-ta] otoko-yori
    -Dat it-Acc give-Past man-Acc despise-Pres

funbetsu-ga at-ta.
wisdom-Nom be-Past

'The man who contributed his article to The New York Times was wiser
than the man who contributed it to The Washington Post.'

(118) a. John igai-no dare-mo-ga [jibun-no kurejittokaado]-o tsuma-ni
    except-Gen who-∀-Nom self-Gen credit.card-Acc wife-Dat

give-Past -Top it-Acc mistress give-Past

'Everyone but John gave his credit card to his wife. John gave it to his
mistress.'

    -Top always self-Gen credit.card-Acc wallet-in put-Prog-Pres

Bill-wa itsumo $i$/sore$e_1$-o hikidashi-ni hokanshi-tei-ru.
    -Top always it-Acc drawer-in keep-Prog-Pres

'John always puts his credit in his wallet. Bill always keeps it in the
drawer.'

I call such people cooperative hearers. What mechanism, then, do the cooperative hearers
utilize to understand the paycheck sentences with overt pronouns? One possibility is that in
their lexicon overt pronouns are marked for E-type uses. This possibility should be
rejected for empirical reasons, however. We have discussed the Japanese telescoping
cases where overt pronouns cannot be used. If Chierchia's 1992 account is correct,
pronouns in telescoping cases should be treated as E-type, and it would be predicted that the cooperative hearers accept them. But this prediction is not borne out. No cooperative hearers accept overt pronouns in telescoping cases.

The other possibility is that when they parse paycheck sentences, they accommodate a phrase like "... has a credit card and ..." before the overt pronouns, and the existential quantifier introduced by 'a credit card' via DKP dynamically binds them. For example, they interpret (117a) and (118a) as (119a) and (119b), respectively (I use English words for convenience).

(119)  

  a. The man who gave his credit card to his wife was wiser than the man who had a credit card; and gave it to his mistress.

  b. Everyone but John gave his credit card to his wife. John had a credit card; and gave it to his mistress.

It seems to me that accommodation like this is very plausible. As I argued several times above, one of the important characteristics of well-formed paycheck sentences is the contrastiveness between antecedent-containing clauses and pronoun-containing ones. The antecedent has a form of jibun-no-CN 'self-Gen-CN', which presupposes that the binder of jibun possesses what the CN denotes. But the second clause has no phrase which expresses such a possessive relation. So, to make the two clauses contrastive, the cooperative hearers accommodate a phrase which expresses a possessive relation like "... has CN and ..." in an appropriate place. In (117), accommodation should take place in the second relative clauses, while in (118), it should take place just after the subjects of the second sentences.

In this accommodation-based account of cooperative hearers' judgment, the existence of a possessor in the antecedent phrase plays a very crucial role, since it functions as a clue for accommodation. And actually no cooperative hearer accepts the lazy interpretations of overt pronouns in the similar cases discussed in 2.4.2.3, one example of which is repeated as (120).
(120)  Mary-wa chokoreeto-o booiruendo-ni okut-ta.
        -Top chocoholate-Acc boy.friend-Dat present-Past

Jane-wa $\phi$/sore$_i$-o chichiyoa-ni okut-ta.
    -Top/Contrast  $\text{it}$-Acc  father-Dat  present-Past

'Mary gave a chocolate to her boy friend. Jane gave one to her father.'

In this example the antecedent has no pronoun, and it is impossible to interpret the overt
pronoun as a lazy one, even for cooperative hearers. The reason is straightforward.
Nothing triggers accommodation.

The non-trivial question is, then: Why isn't accommodation available for non-
cooperative hearers? Accommodation is a pragmatic operation, and hence we should not
assume that availability of such an operation varies from language to language, or from
speaker to speaker. So, we should induce the difference in the judgments between the two
types of speakers from something else. I would like to suggest that the difference be
accounted for by the notions of economy and comparison. More specifically the two types
of speakers differ in what is compared with what. For non-cooperative hearers, a null
pronoun competes against an overt pronoun. If the former is used in a paycheck sentence,
it is interpreted as E-type without any other operations, whereas if the latter is used in the
same situation, accommodation has to take place. In this case, accommodation is not
regarded as the last resort, since there is another option, namely a null pronoun. So, using
null pronouns is more economical than using overt ones, and therefore the latter is always
regarded as ungrammatical in paycheck sentences. On the other hand, cooperative
speakers do not compare an overt pronoun with a null counterpart. Consequently
accommodation takes place with no cost, since otherwise the overt pronoun remains
unbound. Accommodation is, therefore, the last resort, and they judge the overt pronouns
in paycheck sentences as grammatical. As the reader may notice, this story can be
reconsidered in the current theories based on economy and comparison, such as the
minimalist approach and Optimality Theory, but formalizing such an idea is non-trivial and
lies outside the scope of this thesis.
2.4.2.6 The A-to-yuu-B ‘B called A’ -construction

In this subsection we will discuss apparently puzzling contrasts between kind-expressions like konpyuutaa ‘computer’ and those like Apple PowerBook 5300 with respect to the antecedency of overt pronouns in paycheck sentences, as in (121) and (122).

To the best of my knowledge, no attention has been paid to such contrasts in the literature.

  -Top computer-Acc buy-Past -also it-Acc buy-Past
  ‘John bought a computer. Mary bought one, too.’

  -Top -Acc buy-Past
  Mary-mo ø₁/sore₁-o kat-ta.
  -also it-Acc buy-Past
  ‘John bought an Apple PowerBook 5300. Mary bought one, too.’

  -Top car-Acc wash-Past -also it-Acc wash-Past
  ‘John washed car. Mary washed one, too.’

  -Top -Acc wash-Past -also it-Acc wash-Past
  ‘John washed a Honda Civic. Mary washed one, too.’

We have already seen the contrast between overt pronouns and null pronouns in the a-examples of (121) and (122), where the overt pronouns are not acceptable on the intended readings. They are interpreted only as dynamically bound (the token readings, so to say) such as ‘the computer(s) that John bought’ and ‘the car(s) that John washed’, respectively. But this is not the case in the b-sentences. They are identical to the a-counterparts except that the objects of the first sentences denote specific names of products, and interestingly enough both the overt pronouns and the null pronouns are interpreted as lazy pronouns.

The question is, then: What is the difference between expressions like konpyuutaa ‘computer’ and kuruma ‘car’ on the one hand and those like Apple PowerBook 5300 and Honda Civic on the other? In our semantics, both types of expressions are regarded as
kind-denoting. The latter are subkinds of the former. So, semantically there seems to be no difference between them. Closer scrutiny reveals, however, that there is a difference between the a-examples and the b-examples in (121)-(122) with respect to the interpretation of the sentences, not with respect to the meaning of the antecedents. (121b) and (122b) are actually interpreted as in (123a) and (123b), respectively.

(123) a. John-wa Apple PowerBook 5300\textsubscript{i}-to-\textsubscript{yu}u konpyuutaa-o kat-ta. 
   -Top -Comp-say computer-Acc buy-Past
   Mary-mo ə/sore\textsubscript{i}-o kat-ta.
   -also it-Acc buy-Past
   ‘John bought a computer the name of which is/called Apple PowerBook 5300. Mary bought one (= an Apple PowerBook 5300), too.’

b. John-wa Honda Civic-to-\textsubscript{yu}u kuruma-o ara-ta.
   -Top -Comp-say car-Acc wash-Past
   Mary-mo ə/sore\textsubscript{i}-o ara-ta.
   -also it-Acc wash-Past
   ‘John washed a car the name of which is/called Honda Civic. Mary washed one (= a Honda Civic), too.’

These paraphrases have an expression A-to-\textsubscript{yu}u B, the word-to-word translation of which is ‘B that (people) call A’.\textsuperscript{23} This phrase expresses that A is the name of B or A is a subconcept of B. I will propose that the A of A-to-\textsubscript{yu}u B ‘B called A’ remains a name (i.e. DKP does not apply to it), and the overt pronoun refers to it in the referential use.

In order to understand what happens in (123), let us consider Carlson’s 1977 famous raccoon examples as in (124).

(124) a. Raccoons\textsubscript{i} [object] have stolen my mother’s sweet corn every year, so she really hates them\textsubscript{i} [kind] a lot.

b. My mother hates raccoons\textsubscript{i} [kind] because they\textsubscript{i} [object] stole her sweet corn last summer.

\textsuperscript{23} Analytically -\textsubscript{yu}u can be decomposed further as -\textsubscript{yu}-\textsubscript{u} ‘say-Pres’, but I ignore this, since -to-\textsubscript{yu}u is lexicalized.
In both examples, the anaphoric link between *raccoons* and *them* is possible in spite of the fact that their interpretations are different with respect to the kind/object distinction. In (124a), the antecedent is used in the episodic sentence while the pronoun is used with a kind-level predicate. It has been argued by Carlson 1977, Webber 1978, Root 1985 among others that predicates like *raccoon* introduce their kind counterparts such as *RACCOON*, and since kinds are name-like, pronouns can refer to them. On the other hand, in (124b), the antecedent is interpreted as kind-referring while the pronoun is existential. In this case, too, the referential use of the pronoun makes the anaphoric link possible.\(^24\) I will claim that the anaphoric links in (123) are established in the same way as that in (124b). Notice that kind reference associated with indefinites in episodic sentences can be picked up only when pronouns are used with kind-level predicates, as in (125), adapted from Krifka et.al. (1995: 105).

\begin{align}
(125) & \quad a. \quad \text{John didn't keep a spider; because they; are ugly.} \\
& \quad b. \quad \text{John didn't keep a spider because *they; / *it; scared his kitty.}
\end{align}

The ungrammaticality of (125b) comes from the usual accessibility condition created by negation. So, we can obtain a descriptive generalization as in (126).

\begin{align}
(126) & \quad \text{A kind reference for a pronoun is available only when either the antecedent or the pronoun is used with a kind-level predicate.}
\end{align}

Now let us return to the *-to-yyu* construction in Japanese. Following Krifka 1995, I will introduce a taxonomic relation \(T_s\), and *-to-yyu* translates as in (127), which can be paraphrased as "\(y\) is a subkind of \(x\) in world \(s\)."\(^25\)

\begin{align}
(127) & \quad \text{John found a dodo; although it; was believed to be extinct.} \\
(128) & \quad \text{John drank some milk; even though he's allergic to it;}. \quad \text{(Krifka, et.al. 1995: 105)}
\end{align}

\(^24\) There are cases in which a singular pronoun can be interpreted as kind-referring, as in (i) and (ii).

\begin{align}
(i) & \quad \text{John found a dodo; although it; was believed to be extinct.} \\
(ii) & \quad \text{John drank some milk; even though he's allergic to it;}. \quad \text{(Krifka, et.al. 1995: 105)}
\end{align}

\(^25\) I would like thank Veneeta Dayal for pointing out the error of the definition of *-to-yyu* in an earlier version.
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(129) John-wa Apple PowerBook 5300i-to-yuu konpyuutaa-o
       -Contrast -Comp-say computer-Acc
       mot-tei-na-i.
       have-Prog-Neg-Pres
Shikashi Mary-wa øi/sorei-o mot-tei-ru.
but -Contrast it-Acc have-Prog-Pres
‘John doesn’t have a computer the name of which is/called Apple
PowerBook 5300. But Mary has one (= an Apple PowerBook 5300).’

The head noun is in the scope of the negation but the anaphoric link between Apple
PowerBook 5300 and the overt pronoun is established. This indicates that the pronoun is
referentially linked to the antecedent.

Going back to the original contrast between (121a) and (121b), our account crucially
depends on the assumption that the latter is interpreted as (123a) where the higher concept
konpyuutaa is recovered with the phrase -to-yuu. What we have to consider next is why
the same process of interpretation does not take place in (121a). Interestingly enough, if
we are forced to use -to-yuu in (121a), then the lazy interpretation of the overt pronoun
becomes available, as shown in (130).

(130) John-wa konpyuutaa-i-to-yuu kikai-o kat-ta.
       -Top computer -Comp-say machine-Acc buy-Past
       Mary-mo øi/sorei-o kat-ta.
       -also it-Acc buy-Past
‘John bought a machine called computer. Mary bought one (= a computer), too.’

This example has an expression kikai ‘machine’, which is one of the super concepts of
computers. Due to the -to-yuu phrase, the konpuutaa ‘computer’ remains kind-denoting,
and the anaphoric link between it and the overt pronoun is established, yielding the lazy
interpretation. So the question is: Why can’t (121a) be interpreted as in (130)? Differently
put, we can recover a higher concept like computers from Apple PowerBook 5300 with the
-to-yuu phrase, but we usually don’t recover machines from computers. Why? I suggest
that this difference comes from the felicity condition on the use of -to-yuu.
The expression *A-to-yuu B* is very often used, and typically proper names come in the A-slot as shown in (131).

(131)  
   a. John-to-yuu hito
         -Comp-say man
      ‘a/the man whose name is John’
   b. Beraruushi-to-yuu kuni
      Belarus-Comp-say country
      ‘a/the country called/the name of which is Belarus’

Interpretations of nouns in the B-slots are context dependent. They can be interpreted either as definite or as indefinite. The interesting point is that Japanese tells ‘John’ from ‘the man whose name is John’ and, in fact, they are very different from each other in the language. As is convincingly argued by Takubo 1989, Japanese proper names like *John* can be felicitously used only when the speaker knows that the hearer can identify the referent of *John*, while *John-to-yuu hito ‘a/the man whose name is John’* has to be used if the speaker presupposes that the hearer cannot connect *John* to its referent. Following Takubo’s insight, I would like to propose a conversational strategy as follows.

(132) Put an NP in the A-slot of *A-to-yuu B* if it is supposed to be less familiar.

I assume that (132) is a strategy for both the speaker and the hearer, and what is interesting to our discussion is (132) as the hearer’s strategy. (132) says that if there is a less familiar noun in a given context, it should be put in the A-slot of *A-to-yuu B* with an appropriate super concept B recovered. This is what happens in (121b) and (122b). If product names like *Apple PowerBook 5300* or *Honda Civic* are regarded as less familiar, *-to-yuu* can be used with their super concepts. And actually they are. On the other hand, nouns like *konpyuutaa ‘computer’* and *kuruma ‘car’* are not considered to be less familiar in our common knowledge, so that (132) does not apply. Needless to say, what is less familiar depends on contexts or on our world knowledge. For example, in 1950’s when computers

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26 This is a very rough reproduction of what Takubo claims. His claim is formalized in terms of mental spaces.
were rare, they should have been interpreted as konpyuutaa-to-yuu kikai ‘machines called computers’ and lazy interpretations of overt pronouns would have been possible.

To sum up the discussion of this subsection, we observed that there is a difference between expressions like konpyuutaa and those like Apple PowerBook 5300 with respect to their antecedency of overt pronouns in paycheck sentences. Unlike the former, the latter allow the lazy interpretation of overt pronouns. We claimed that when the latter type of nouns are interpreted, their super concepts are recovered with the phrase -to-yuu ‘called’. So, Apple PowerBook 5300 is actually interpreted as Apple PowerBook 5300-to-yuu konpyuutaa ‘a computer called Apple PowerBook 5300’. And I proposed that the -to-yuu takes a kind as its first argument, so that Apple PowerBook 5300 keeps its status as a kind referring expression, and because of its referentiality, overt pronouns can refer to it without obeying the accessibility condition. It was also suggested that the use of -to-yuu comes from the unfamiliarity of expressions like Apple PowerBook 5300.

2.4.2.7 Lazy overt pronouns: Exceptions or real lazy pronouns?

Finally let us turn to cases that do not fall into our generalization. Among So-series demonstratives, only the locative pronoun soko ‘that place’ can be interpreted as a lazy pronoun in very restricted contexts. Examples are given in (133).

(133) a. Johnj-wa [jibunj-no migi kata]-o itame-tei-ru.
    -Top self-Gen right shoulder-Acc hurt-Prog-Pres
    Bill-mo ʃi/soko]-o itame-tei-ru.
    -also that.place-Acc hurt-Prog-Pres

    ‘John has a pain in his right shoulder. Bill has a pain in it (= Bill’s right shoulder), too.’
b. John-ji-wa nagesugi-de [jibun-ji-no migi kata]-o
   -Top too.much.throwing-because self-Gen right shoulder-Acc
   itame-ta. Bill-wa hito-to butsukat-ta-toki
   hurt-Past -Contrastive person-with collide-Past-when
   $\emptyset$/soko-i-o itame-ta.
   that.place-Acc hurt-Past

   'John has a pain in his right shoulder because of too much throwing. Bill
   has a pain in it (= Bill's right shoulder) because he collided with a man.'

As is obvious, these sentences satisfy all of the characteristics of English paycheck
sentences listed in (82), repeated as (134), with the minor exception of (134d);

(134) In ... [S1 ... antecedent ...] ... [S2 ... pronoun of laziness ... ] ...,
   a. the antecedent contains a pronoun,
   b. if the pronoun in the antecedent and the rest of it enter into one-to-one
      relations, especially like an inalienable possession relation or a part-whole
      relation, the lazy interpretation of the pronoun in S2 is easier to obtain,
   c. the event described in S2 does not depend on that in S1, in other words,
      there is no time-based causal relation between S1 and S2,
   d. S1 and S2 can be relative clauses, and
   e. S1 and S2 are contrasted with each other.

Interestingly, the soko in (135) is not interpreted as a pronoun of laziness even though its
intended antecedent contains a bound pronoun and it has a one-to-one relation to the noun
head (i.e. the relation between a man and his birth place).

(135) John-ji-wa chizu-de [(jibun-ji-no) shusshinchi]-i-o sagashi-tei-ru.
   -Top map-at self-Gen birth.place-Acc look.for-Prog-Pres
   Bill-mo $\emptyset$/soko-i-o sagashi-tei-ru.
   -also that.place-Acc look.for-Prog-Pres

   'John is looking for his birth place on the map. Bill is looking for it (= Bill’s
   birth place), too.'
The overt pronoun in (135) is acceptable only when it is interpreted as John's birth place. So, in order for *soko* to be a pronoun of laziness, its antecedent must denote an inalienable body-part relation. In fact, a very strong inalienable body-part relation is required, as shown in (136).

\[(136) \quad \text{John-wa sensoo-de [(jibun-no) migi ashi]-o ushinat-ta.} \]
\[-\text{Top war-by self-Gen right leg-Acc lose-Past} \]
\[\text{Bill-wa kootsujiko-de } \varnothing/{*soko}-o /*sore-o ushinat-ta.} \]
\[-\text{Top traffic.accident-by that.place-Acc/it-Acc lose-Past} \]

'John lost his right leg in the war. Bill lost it (=Bill's right leg) in a traffic accident.'

One's right leg is a part of her/his body. Nevertheless the overt pronouns in (136) is ungrammatical. This might be caused by perceiving that amputated body parts are no more a part of one's body. Because its distribution is very restricted, I regard this particular use of *soko* as an exception to our generalization that overt pronouns are variables to be dynamically bound.

### 2.4.2.8 Summary of 2.4.2

In 2.4.2, we have discussed paycheck sentences and claimed the following:

\[(137) \]
\[(i) \quad \text{Both in English and Japanese, contrastiveness of antecedent-containing clauses and pronoun-containing ones is very important to get lazy interpretations of pronouns.} \]
\[(ii) \quad \text{Unlike English, Japanese paycheck sentences do not require bound pronouns in antecedents.} \]
\[(iii) \quad \text{Both in English and Japanese, pronouns of laziness are interpreted as functions from individuals into the maximal sum individuals. In typical English paycheck sentences, pronouns are interpreted as definite descriptions. On the other hand, null pronouns in Japanese paycheck sentences and plural pronouns anaphoric to bare plural NPs in English} \]
paycheck sentences are interpreted as functions from individuals into kinds, and DKP derives existential readings.

(iv) The E-type strategy is better than alternatives such as the copy approach in that (a) it can represent the effects of the additive marker -mo, (b) it can account for the syntactic distribution of null pronouns and (iii) the copy approach has to say something additional when the antecedent of a null pronoun is universally quantified.

2.4.3 Bathroom sentences

Pronouns in English bathroom sentences are also treated as E-type pronouns in Chierchia's 1992, 1995a approach, and in Japanese counterparts, null pronouns are much preferred to the overt ones. This fact supports our claim that in order to be interpreted as E-type, Japanese pronouns must be null. In this section, we will discuss Roberts’ 1987, 1989, 1996 approach to bathroom sentences and what the null/overt distinction of pronouns in Japanese says about her analysis.

2.4.3.1 Roberts’ accommodation-based approach

The reason that bathroom sentences draw much attention and interest is as follows. As we have seen in chapter 1, negation and disjunction both create inaccessible domains as shown in (138) and (139).

(138)  

a. Morril Hall does not have a bathroomi. *l[i is in a funny place.

b. John doesn’t have a cari. *l[i is in a garage.

(139)  

a. *Morril Hall has a bathroomi or iti’s in a funny place.

b. *John has a cari or iti’s in a garage.

Simons 1996 suggests that the ungrammaticality of (139) comes not from the failure of dynamic binding but from the lack of informativeness, for the second disjunct presupposes the first disjunct. See also Stone 1992.
But if the two types of inaccessible domains are used together in a form of \( \neg A \lor B \), the anaphoric links become possible, as in (140).

(140) a. Morril Hall does not have a bathroom; or it’s in a funny place.

b. John doesn’t have a car; or it is in a garage.

It seems that approaches like the DRT and dynamic binding fail to account for the grammaticality of bathroom sentences, since the antecedents are still in inaccessible domains. So, Chierchia 1992, 1995a claims that the pronouns in bathroom sentences should be interpreted as E-type; a function from the buildings into the bathrooms located in those buildings in (140a) and a function from people into the cars that they have in (140b).

However, there is a way of applying the DRT or dynamic binding to bathroom sentences. Roberts 1987, 1989, 1996 proposes that examples like (140) are actually interpreted as in (141), where the negation of the first disjuncts are accommodated as antecedent clauses of conditionals, which are underlined.

(141) a. Morril Hall does not have a bathroom or \textit{if it has a bathroom}, it’s in a funny place.

b. John doesn’t have a car or \textit{if he has a car}, it is in a garage.

Now, the indefinite NPs in the accommodated clauses dynamically bind them, since antecedent clauses of conditionals do not create inaccessible domains for pronouns in the consequent clauses. In the DRT, (140a), for example, is represented as in (142).
Roberts’ accommodation-based approach seems very plausible, for \( \neg A \lor B \) is logically equivalent to \( A \rightarrow B \). So, the truth condition for (142) is equivalent to the one for the right hand side sub DRS, in which the anaphoric link between \( y \) and \( z \) is represented.

The question is: Which is empirically correct, the accommodation approach or the E-type strategy? As we will see in the next subsection, Japanese paycheck sentences provide empirical evidence for the E-type approach.

### 2.4.3.2 Japanese bathroom sentences and their theoretical implications

In Japanese bathroom sentences, null pronouns are much preferred to overt ones, as in (143) (Since sentential disjunction is not common in the language, I use an expression \( A-ka B-ka-no dochira-ka da \) ‘it is the case either \( A \) or \( B \)’ or the like).

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**28** See also Krahmer and Muskens 1994 for constructing conditional DRSs \( \Box \Rightarrow \Box \) from sentences of the form of \( \neg A \lor B \).
(143) a. Kono tatemono-ni toire1-ga na-i ka, ø1/??sore1-ga
this building-in bathroom-Nom Neg-Pres or it-Nom
henna tokoro-ni a-ru ka-no dochira-ka dea-ru.
funny place-in exist-Pres or-Cop which-Q Cop-Pres
'It is the case either that there is not a bathroom1 in this building or that it1 is
in a funny place.'

b. John-ga kuruma1-o mot-tei-na-i ka, hoka-no dare-ka-ga
-Nom car-Acc have-Prog-Neg-Pres or else-Gen who-3-Nom
ø1/??sore1-o tsukat-tei-ru ka-no dochira-ka dea-ru.
it-Acc use-Prog-Pres or-Cop which-Q Cop-Pres
'It is the case either that John does not have a car1 or that somebody else is
driving it1.'

Interestingly enough, if we explicitly use antecedent clauses of conditionals like *if this
building has a bathroom* in (143a) and *if he has a car* in (143b), overt pronouns become
acceptable, as shown in (144), where the accommodated clauses are underlined.

(144) a. Kono tatemono-ni toire1-ga na-i ka,
this building-in bathroom-Nom Neg-Pres or
moshi ø1/ *sore1-ga / toire1-ga a-ru-nara,
if it-Nom bathroom-Nom exist-Pres-Cond
ø1/sore1-ga henna tokoro-ni a-ru ka-no dochira-ka dea-ru.
it-Nom funny place-in exist-Pres or-Cop which-Q Cop-Pres
'It is the case either that there is not a bathroom1 or that if there is a
bathroom, it1 is in a funny place.'
b. John-ga kuruma-i-o mot-tei-na-ī ka,
   -Nom car-Acc have-Prog-Neg-Pres or
   moshi kare-ga ō / *sorei-o / kuruma-i-o mot-tei-ru-nara.
   if he-Nom it-Acc car-Acc have-Prog-Pres-Cond
hoka-no dare-ka-ga ői/sorei-o tsukat-tei-ru ka-no
else-Gen who-3-Nom it-Acc use-Prog-Pres or-Cop
dochira-ka dea-ru.
which-Q Cop-Pres

'It is the case either that John does not have a car; or that if he has a car,
somebody else is driving it.'

The contrast between (143) and (144) is very important. Suppose that the Robertsian
accommodation took place in (143). Then it would be predicted that the overt pronouns
should be dynamically bound by their antecedents in the accommodated conditional
clauses, as in (144). But this is not the case. So, we can conclude that the pronouns in
bathroom sentences are not interpreted via Robertsian accommodation.

It is also worth noting that the overt pronouns in the if-clauses in (144) are not
interpretable, while the use of null pronouns and the repetition of bare nouns are totally
acceptable. The ungrammaticality of the overt pronouns in this context follows from our
claim. They must be dynamically bound, but they are not, since their antecedents are in
the inaccessible domain created by negation and/or disjunction.

How are Japanese bathroom sentences accounted for by the E-type approach? For
example, the most natural interpretation of the second disjunct in (143a) is ‘all of the
bathrooms in the building are in a funny place’, where the null pronoun is interpreted as
universal, or the maximal sum, like English bathroom sentences. So (143a) is represented
as in (145).
(145) the first disjunct of (143a)
\[ \neg \text{be-in('this-building')(BATHROOM)} \]
via DKP
\[ \neg \exists x[\cup \text{BATHROOM}(x) \wedge \text{be-in('this-building')(x)}] \]
the second disjunct of (143a)
\[ \text{be-in('a-funny-place)(f(this-building))} \]
\[ f: \text{a function from places into the bathrooms located in those places} \]

In the analysis of Japanese paycheck sentences, we proposed that Japanese E-type pronouns have an option of being interpreted as functions from individuals into kinds, and the DKP rule derives existential readings. So, if the null pronoun in (143a) is interpreted as a function from places into the bathroom-kind, the logical representation in (146) will be derived.

(146) the second disjunct of (143a)
\[ \text{be-in('a-funny-place)(f(this-building))} \]
\[ f: \text{a function from places into the bathroom-kind} \]
via DKP
\[ \exists x[\cup \text{BATHROOM}(x) \wedge \text{be-in('a-funny-place')(x)}] \]

If this truth condition is correct, it would be the case that there are some bathrooms that are in this building but not in a funny place, and clearly this is not the reading we want. How can we exclude such a undesirable reading, then? My answer is that we do not have to rule it out, and in fact semantics should generate two types of readings and pragmatics determines which is more suitable in a given context. (143a) favors the maximal sum interpretation rather than the existential interpretation of the null pronoun. But it seems to me that (143b), repeated as (147), allows for the latter interpretation.
(147) John-ga kuruma1-o mot-tei-na-i ka, hoka-no dare-ka-ga
-Nom car-Acc have-Prog-Neg-Pres or else-Gen who-∃-Nom

ø1 tsukat-tei-ru ka-no dochira-ka dea-ru.
use-Prog-Pres or-Cop which-Q Cop-Pres

'it is the case either that John does not have a car1 or that somebody else is
driving it1.'

That is, (147) can be interpreted as true in the situation where John has more than one car
and somebody else is now driving one of them, and the other cars' whereabouts are out of
the speaker's concern. If this judgment is correct, the existential reading of the null
pronoun should be derived, and it is done by assuming that the pronoun is interpreted as a
function from individuals into the car-kind.

Incidentally note that the Robertsian accommodation-based approach can also derive the
existential readings, since there are some conditional donkey sentences that favor existential
readings, like the dime-meter sentences. In other words, accommodating if-clauses does
not guarantee that bathroom pronouns are always interpreted as universal or the maximal
sums. So, with respect to generating two types of interpretations, there is no difference
between our proposal and the Robertsian approach.

2.4.3.3 Summary of 2.4.3

In the discussion of Japanese bathroom sentences, we have made the following points:

(148) (i) In Japanese bathroom sentences, null pronouns are much preferred to overt
pronouns.

(ii) If the antecedent clauses of conditionals are used before the second disjuncts,
the overt pronouns become acceptable. This shows that pronouns in
bathroom sentences are not interpreted via accommodation, contrary to
Roberts 1987, 1989, 1996. Rather, they should be interpreted as E-type,
which is supported by (i).
(iii) Our semantics developed in paycheck sentences derives the existential readings of pronouns in the second disjunct as well as the maximal sum readings, and the choice between the two readings is pragmatic-sensitive.

It is fair to note that there are cooperative hearers who accept the intended readings with overt pronouns in bathroom sentences. I guess that in such cases the Robertsian accommodation like $\neg A \vee A \to B$ takes place and the overt pronoun in B is dynamically bound by its antecedent in A.

2.5 Conclusion

In this chapter we have discussed the semantics of null and overt pronouns in Japanese. Both types of pronouns are interpreted as variables if c-commanded by their antecedents. We also observed that they both can occur in contexts where (in)definite descriptions are rejected, such as when a gangster passes by another gangster, he glares at him (cf. (22)). This suggests that they both can be interpreted as variables to be dynamically bound. Then we discussed the three cases where null pronouns and overt pronouns are not interchangeable: namely narrative sequence cases with universal antecedents, paycheck sentences and bathroom sentences. In these contexts, where dynamic binding is not available, overt pronouns are less acceptable. This shows that they cannot get E-type readings. On the other hand, null pronouns are allowed in such cases. This is because they are interpreted as functions. In narratives sequence cases, a typical function is the one from minimal occasions into the people in those occasions. In paycheck and bathroom sentences, we proposed, based on the assumption that Japanese bare/common nouns are kind-denoting, that null pronouns have an option of being interpreted as functions from individuals into kinds, as well as English-type functions from individuals into the maximal sums of individuals, and the Derived Kind Predicate rule yields existential interpretations from kinds. Such an option is not ad hoc, since semantically the extensions of kinds are the maximal sums of individuals. In other words, functions from individuals into kinds
are not substantively different from those from individuals into the maximal sum of individuals. So, our claim in (3), repeated as (149), is maintained:

(149) In Japanese donkey anaphora contexts,

a. null pronouns are ambiguous between variables and E-type pronouns, and

b. overt pronouns are variables that must be dynamically bound (discourse markers).
Chapter III: Japanese Donkey Sentences

3.1 Introduction

In this chapter, we will turn our attention to the behavior of pronouns in dynamic binding contexts. In particular, strong and weak readings of pronouns and the proportion problem will be discussed. One of the central issues is an apparent discrepancy between the claim we made in chapter 2 and Chierchia’s 1992, 1995 claim. On the one hand, we observed that overt pronouns and null pronouns are not interchangeable in narrative sequence cases with universally quantified antecedents, paycheck sentences and bathroom sentences, and we made the claim in (1).

(1) In Japanese donkey contexts,
   a. overt pronouns are variables to be dynamically bound, and
   b. null pronouns are ambiguous between variables and E-type.
      (i.e. only null pronouns can be interpreted as E-type.)

On the other hand, Chierchia claims that the E-type strategy is responsible for strong readings while dynamic binding yields weak readings. Then, it would be predicted that Japanese donkey sentences with overt pronouns give only weak readings. This prediction is not borne out, however. As shown in (2), there is no difference between the overt and the null pronoun with respect to the two interpretations.

(2) [[Rel Ronbun]-o yon-da] dono gakusei]-mo sore]-o/σ̄ hihanshi-ta.
    paper-Acc read-Past which student-∀ it-Acc criticize-Past
   (i) ‘Every student that read a paper criticized one paper that she read.’
   (ii) ‘Every student that read a paper criticized all the papers.’

The availability of the weak reading is not a problem, for dynamic binding with dynamic conservativity can apply in this context just like in English. The fact that the strong reading can be obtained with the null pronoun is not a problem, either, if we say that it is interpreted optionally as E-type, that is, it can denote a function from students into the
papers that they read, again, just like English. But the serious problem is how to get the
strong reading with the overt pronoun. The question is: Does this mean either our claim in
(1) or Chierchia’s approach is wrong? My answer is negative, and I will argue that our
claim and Chierchia’s approach are still compatible with each other, claiming that an
implicit Q-adv is involved in the strong readings of overt pronouns. In (2), for example,
the wh-phrase and -mo undergo movement, leaving the relative CP behind, and an implicit
necessity operator, which corresponds to always, binds the donkey pronoun. The rough
LF representation is given in (3a) and the truth conditions in (3b).

\(\text{(3a)}\)

\[
\begin{array}{c}
\text{IP} \\
\text{QP}_k \\
\text{dono gakusei} \cdot -mo \\
\text{which student} \\
\land \\
\text{Subj} \\
\text{t}_k \\
\text{ALWAYS}_j \\
\text{VP} \\
\text{e}_i \text{ ronbun}_{-o} \text{ yonda} \\
\text{paper-Acc read} \\
\text{sore}_j \cdot -o \text{ hihanshi} \\
\text{it-Acc criticize} \\
\text{-ta Past}
\end{array}
\]

(1) Outer Quantifier (II) Restriction (III) Q-Adverb (IV) Nuclear Scope

\(\text{b. } \forall x[\text{student}'(x) \rightarrow \text{ALWAYS } y[\text{paper}'(y) \land \text{read}'(y)(x)] [\text{criticize}'(y)(x)]]\)

The idea is that the moved wh-phrase serves as outer quantifier and the stranded CP as the
restriction of the implicit Q-adv. Given this representation, the overt donkey pronoun is
bound by the Q-adv.

Along the line of this account, we will discuss four types of donkey sentences: (i) wh-
head relative clause donkey sentences, (ii) embedded wh relative clause donkey sentences,
(iii) concessive donkey sentences, and (iv) conditional donkey sentences. Examples of

\(\text{(3b) is a “mixed” representation in which an ordinary logical representation like}\)
\(\forall x[P(x) \rightarrow Q(x)]\) \(\text{and a tripartite, relational, representation like EVERY [P][Q] are both}\)
\(\text{used. I will use such a mixed representation with the particular purpose of showing that}\)
\(\text{the former style representation is the translation of the universal quantificational particle}\)
\(-mo.\)
these sentences are given in (4)-(8). (4a) is an example of a wh-head relative clause donkey sentence, in which the noun head is a wh-phrase followed by the universal quantificational particle -mo, and the relative CP contains a bare NP which serves as an antecedent of the donkey pronoun. Its s-structure is illustrated in (4b). We will argue for the syntactic representation and show how to derive the LF representation in (3a) in the next subsection.

(4)  
   a. Wh-head relative clause donkey sentence

   \[\text{[Ronbun}_i\text{-o yon-da] dono gakusee]-mo \text{sore}_i\text{-o} \emptyset_i \text{ hihanshi-ta.}}\]
   paper-Acc write-Past which student-\forall \text{ it-Acc criticize-Past}

   ‘Every student that read a paper criticized it.’

   b. 

   \[
   \begin{array}{c}
   \text{IP} \\
   \text{NP} \\
   \text{relative CP} \\
   \text{ronbun}_i\text{-o yonda} \\
   \text{read} \\
   \text{dono gakusee} \\
   \text{which student} \\
   \end{array}
   \begin{array}{c}
   \text{VP} \\
   \text{sore}_i\text{-o} \emptyset_i \text{ hihanshita} \\
   \text{it-Acc} \\
   \text{criticized} \\
   \end{array}
   \]

   An example of embedded wh relative clause donkey sentences is given in (5a) and its structure is illustrated in (5b). In this case, the noun head is bare, followed by -mo and the donkey pronoun is anteceded by a wh-phrase in the relative CP.

(5)  
   a. Embedded wh relative clause donkey sentence

   \[\text{[[Dono ronbun}_i\text{-o yon-da] gakusee]-mo \text{sore}_i\text{-o} \emptyset_i \text{ hihanshi-ta.}}\]
   which paper-Acc read-Past student-\forall \text{ it-Acc criticize-Past}

   ‘No matter which paper a student read, he criticized it.’
b.

\[
\begin{array}{c}
\text{IP} \\
\text{NP} \\
\text{VP} \\
\text{NP} \\
\text{QP} \\
\text{relative CP} \\
\text{NP} \\
\text{it-Acc} \\
\text{criticized} \\
\text{sore}_{i-o/\emptyset_i} \\
\text{criticized} \\
\text{it-Acc} \\
\text{NP} \\
\text{gakusee} \\
\text{student} \\
\text{dono ronbun}_{i-o} \\
\text{read Inf-\forall} \\
\text{paper-Acc} \\
\text{Which paper} \\
\text{read} \\
\text{Mary} \\
\text{wa sore}_{i-o/\emptyset_i} \\
\text{hihanshi-ta.} \\
\text{Mary} \\
\text{read Inf-\forall} \\
\text{paper} \\
\text{criticize-Past} \\
\text{No matter which paper Mary read, she criticized it.'}
\end{array}
\]

The English translation might be misleading, for the no matter wh-phrase is an independent adverbial CP in English, not a relative clause, and it might give the reader an impression that paper is a head of the expression, like every paper that a student read. As (5b) shows, however, the syntactic head is gakusee ‘student’ and the wh-phrase in the relative CP is to be universally quantified by -mo.

As for concessive donkey sentences, we will discuss two subtypes. One is given in (6), in which the wh-phrase in the adjunct IP$_2$ antecedes the pronouns in the matrix IP$_1$, as illustrated in (6b).

(6)  

a. Concessive donkey sentence I:

A donkey pronoun is anteceded by a wh-phrase.

\[
\begin{array}{c}
\text{[Dono ronbun}_{i-o} \text{ yon-de]}-\text{mo} \\
\text{Mary-wa sore}_{i-o/\emptyset_i} \text{ hihanshi-ta.} \\
\text{which paper-Acc read-Inf-\forall} \\
\text{Top it-Acc criticize-Past} \\
\text{No matter which paper Mary read, she criticized it.'}
\end{array}
\]

b.

The other subtype of concessive donkey sentence is given in (7a), where a bare NP in the adjunct IP serves as antecedent of a pronoun in the matrix IP.
(7) a. Concessive donkey sentence II:

A donkey pronoun is anteceded by a bare NP.

\[\text{Dono gakusee-ga} \text{ ronbun}^{-i-o} \text{ kai-te]}^{-mo} \text{ Mary-wa} \]
which student-Nom paper-Acc read-Inf-\(\forall\) -Top

\[\text{sore}^{-i-o/\emptyset}^{-i} \text{ yon-da.} \]
it-Acc read-Past

'No matter which student wrote a paper, Mary read it.'

b.

We will also discuss ordinary conditional donkey sentences as in (8), where no wh-
phrase is involved.

(8) Conditional donkey sentence

\[\text{Atarashii jaanaru}^{-i-ga} \text{ shuppans-are-ru-to,} \text{ sare}^{-i-wa/\emptyset}^{-i} \]
new journal-Nom publish-Pass-Pres-Cond it-Top

\[\text{kokuritsu toshokan-ni kisoos-are-ru.} \]
national library-Dat donate-Pass-Pres

'If a new journal is published, it will be donated to the national library.'

Interpretations of these types of donkey sentences are summarized in (9).
This table has two generalizations that need to be accounted for. One is that when a donkey pronoun is anteceded by a wh-phrase, only the strong reading is available, whereas when it is anteceded by a bare NP, both readings are possible. The other generalization is that, in all of the four types of donkey sentences, there is no difference between overt and null pronouns with respect to strong/weak readings. The purpose of the present chapter is to account for these facts and to show that our account is compatible with what we have proposed in chapter 2.

This chapter is organized as follows. In 3.2, I will introduce two theoretical assumptions necessary for the following discussion. They are (i) that syntactically, the universal quantificational particle -mo is a head of adjunct QP and the wh-phrase associated with it moves to the specifier position of it, and semantically it provides universal quantificational force to the wh-phrase, and (ii) that Japanese adverbs of quantification such as taitte ‘usually, mostly’ are interpreted as exceptive expressions. Based on these assumptions, donkey sentences with wh-phrases and -mo, namely wh-head relative clause, embedded wh relative clause and concessive donkey sentences will be discussed in 3.3. Conditional donkey sentences will be discussed in 3.4 from the perspective of topic sensitivity of Q-adv.
3.2 Theoretical assumptions

3.2.1 The syntax and semantics of indefinite wh-phrases and -mo

This section discusses the syntax and semantics of the universal quantificational particle -mo and wh-phrase *dono* 'which' since they are involved in three of the four types of donkey sentences. I will follow the view proposed by Kuroda 1965 and Nishigauchi 1990 among many others, that Japanese wh-phrases are indefinites (or indeterminates) and their quantificational force is provided by particles such as -mo or the question marker -ka.\(^2\) In chapter 1, we gave the syntactic representation of *dono hon-mo* 'every book' as in (10), where -mo is analyzed as an adjunct, not the head of DP taking an NP complement.

\[
\begin{array}{c}
\text{NP} \\
\text{NP} \quad \text{QP} \\
\text{dono} \quad \text{N} \quad \text{Q} \\
\text{‘which’} \quad \text{‘book’} \\
\text{hon} \quad -\text{mo} \\
\text{‘every’}
\end{array}
\]

A piece of evidence for the adjunct status of -mo comes from the fact that it can be used with PP or IP as well as NP, as shown in (11) (cf. Nishigauchi 1990).

\[
\begin{align*}
(11) & \quad \text{a.} \quad [\text{PP dono kuni kara }]\text{-mo} \\
& \quad \text{which country from -∀} \\
& \quad \text{‘from every country’} \\
& \quad [\text{IP dono gakusee-ga ki-te }]\text{-mo, ...} \\
& \quad \text{which student-Nom come-Inf-∀} \\
& \quad \text{‘no matter which student comes, ...’}
\end{align*}
\]

Another important aspect of Japanese indefinite wh-phrases is that they are not interpretable without -ka or -mo, as shown in (12). This fact suggests that they be regarded as polarity items to be licensed by such particles.

\[^2\text{Apparently -ka also has a function as an existential quantifier, but as in the case of the English indefinite article a, there is an issue as to whether the existential force is given by -ka or whether it comes from somewhere else. See Imani 1993 for relevant discussions.}\]
(12) a. Dono kuni kara daihyoo-ga ki-ta-*\(^{(ka)}\)?
which country from representative-Nom come-Past-Q

'Which country did a representative come from?'

b. Dono kuni kara-*\(^{(mo)}\) daihyoo-ga ki-ta.
which country from -\(^{AV}\) representative-Nom come-Past

'A representative came from every country.'

Based on the fact given in (12), I assume that the wh-phrases move to the specifier position of their licensors at LF, motivated by feature checking. In the case of (12a), this movement is identified with wh-movement to [Spec, CP] headed by the Q-marker -\(^{ka}\). In the case of (12b), first the wh-phrase moves to the specifier position of the QP headed by -\(^{mo}\), and then the whole QP undergoes QR to IP, yielding the LF representation in (13), where irrelevant details such as V-to-I movement are ignored.\(^3\)

(13)

\[
\begin{align*}
\text{IP} & \quad \text{VP} \\
\text{IP} & \quad \text{NP}_2 \\
\text{QP} & \quad \text{Q}' \\
\text{dono kuni} & \quad \text{Q} \\
\text{which country} & \quad -\text{\^{mo}} \\
\end{align*}
\]

\[
\begin{align*}
\text{daihyoo-ga} & \quad \text{rep.-Nom} \\
\text{PP} & \quad \text{t}_{QP} \\
\text{ki-ta} & \quad \text{come-Past} \\
\text{VP} & \quad \text{P} \\
\text{t}_2 & \quad \text{from} \\
\end{align*}
\]

A minor problem with (13) is that the trace t\(_2\) seems not to be bound by its antecedent NP\(_2\), since the former is not c-commanded by the latter. This problem is easily solved if we adopt Reinhart's 1987 definition of Specifier Binding in (14).

---

\(^3\) Brockett 1994 also proposes movement of wh-phrases in cases like (12b) based on different theoretical assumptions. He claims that wh-phrases move to [Spec, CP] via the specifier position of -\(^{mo}\). His approach might make different predictions than ours, but I leave this as an open problem here.
Specifier Binding (Reinhart 1987: 155)

A node $\alpha$ binds a node $\beta$ iff $\alpha$ and $\beta$ share an index and $\alpha$ either c-commands $\beta$ or is the specifier of a node that c-commands $\beta$.

Given (14), the wh-phrase in (13) can bind its trace since it is in $\text{[Spec, QP]}$ and the QP c-commands the trace. Reinhart’s Specifier Binding in (14) was proposed under the classical hypothesis that determiners and quantifiers are the specifiers of nouns phrases. But its necessity is still motivated even under the current DP-analysis, as shown in (15), where every boy is in the specifier position of DP and binds the pronoun he.

\[\text{[DP every boy}_{i} \mid \text{D 's [NP mother]]] thinks he; is a genius.}\]

It is worthwhile noting that movement of an indefinite wh-phrase also takes place in a simple case like (10), in which the wh-phrase seems to be close enough to -mo without movement, but it is in fact forced to move since the wh-phrase and -mo are not in the checking relation. To satisfy the feature checking requirement, the lower segment of the NP moves to $\text{[Spec, QP]}$ as in (16).

\[\text{(16) }\]

\[\begin{array}{c}
\text{NP} \\
\downarrow \\
\text{QP} \\
\downarrow \\
\text{NP}_2 \\
\downarrow \\
\text{Q'} \\
\downarrow \\
\text{dono hon} \\
\downarrow \\
\text{Q} \\
\downarrow \\
\text{-mo} \\
\text{V} \\
\end{array}\]

\[4\text{ Incidentally note that Specifier Binding seems not to be able to account for the distribution of reflexives. The standard binding theory A correctly rules out a sentence like (i), since John does not c-command himself. On the contrary, Specifier Binding allows the intended antecedent to bind the anaphor, and seems to make the sentence grammatical incorrectly.}\]

\[\text{(i) }\]

\[*\text{John's mother likes himself.}\]

Reinhart 1983 proposes a different version of the binding theory A, which roughly says that a reflexive and its antecedent must be in the same binding domain (i.e. the minimal argument structure). In (i), the binding domain for John is the subject NP, but the reflexive is not contained in that domain. Therefore (i) is ungrammatical.
Contra recent theories of phrase structure and movement (cf. Chomsky 1995), I assume that segments can move, which will play a very crucial role in interpreting Japanese donkey sentences as we will see later.\(^5\)

Now let us see syntactic and semantic derivations of constructions concerning wh-phrases and -mo. Semantic translations of -mo and *dono* are given in (17).

\[
\begin{array}{lll}
\text{Lexical Item} & \text{Translation} & \text{Type} \\
-mo & \lambda P \lambda Q \forall x[P(x) \rightarrow Q(x)] & <<e, \triangleright, <<e, \triangleright, \triangleright> > \\
dono & \lambda y \lambda x[x \leq \text{ATM}(y)] & <e, <e, \triangleright>
\end{array}
\]

As discussed in chapter 1, the semantics of -mo is the same as that of English *every*, and ATM in the translation of *dono* is an atomization function defined as ATM(X) = \{y \leq X: y \in \text{At}\} (see 1.2.5 of chapter 1). Given these, let us see how (12b), repeated as (18), is computed.

---

\(^5\) In 3.3.1, I will claim that by segment movement, the lower NP in (4b) moves to [Spec, QP], and then the complex undergoes QR, leaving the relative CP behind. This analysis is solely based on the necessity of getting the logical representation in (3b). This might be problematic, however, since there is no independent evidence for assuming such movement. As pointed out by Maria Bittner (personal communication), no language has overt movement of an NP leaving behind the relative CP that modifies it. Furthermore, Roger Schwarzschild (personal communication) suggested to me that pronouns in Japanese donkey sentences are interpretable without movement of wh-phrases plus -mo, which casts doubt on my analysis. Nevertheless, I maintain the movement analysis (i) to capture the intuition that wh-phrases are licensed by quantificational particles such as -mo via spec-head agreement, and (ii) to account for interpretive differences between English and Japanese as discussed in 3.3.1.
(18) [PP Dono kuni kara]-mo daihyoo-ga ki-ta.
     which country from - ∀ representative-Nom come-Past

     ‘A representative came from every country.’

IP: 13
   QP: 12
      NP: 10
         dono kuni Q daihyoo-ga rep.-Nom
      Q': 11
         -mo ∀
      NP: 8
      VP: 7
         PP: 5
            PP: 3
               tQP: 4
                  kita came
               t: 2
            P: 1
               kara from

1.  from’  <e, <e, t>>
2.  xi  e
3.  from’(xi)  <e, t>
4.  λαα  <t, t>
5.  from’(xi)  <e, t>
6.  λPλx[come’(P)(x)]  <<e, t>, <e, t>>
7.  λx[come’(from(xi))(x)]  <e, t>
8.  REPRESENTATIVE  e
9.  ∃x[¬REPRESENTATIVE(x) ∧ come’(from(xi))(x)]  t
10.  λxi[xi ≤ ATM(COUNTRYs)]  <e, t>
11.  λPλQ∀x[P(x) → Q(x)]  <<e, t>, <e, t>, t>>
12.  λQ∀x[x ≤ ATM(COUNTRYs) → Q(x)]  <<e, t>, t>
13.  ∀x[x ≤ ATM(COUNTRYs) →
             ∃x[¬REPRESENTATIVE(x) ∧ come’(from(xi))(x)]  t

For the sake of exposition, I assume that kita ‘came’ is a two-place predicate taking a source PP and a theme NP, which has no theoretical significance here. A non-trivial assumption is that the trace of the QP translates into the semantically vacuous representation λαα, since it is an adjunct trance with no thematic role.6 The existential quantification in 9 is driven by the DKP rule since the predicate requires an object-level argument but combines with the kind-level expression.

6 Alternatively it can be assumed that the QP trace is deleted in the sense of Lasnik and Saito’s 1992 Affect α.
3.2.2 Adverbs of quantification as exceptives

In the previous subsection, we assumed that -mo differs from every in that the former adjoins to an NP while the latter takes an NP as its complement, but they both translate into the same semantic representation \( \lambda P \lambda Q \forall x [P(x) \rightarrow Q(x)] \). This means that -mo is the source of universal quantificational force, just like every. Recently, however, Kawashima 1994 proposes a very interesting analysis of wh-phrases + mo. Her main concern is the well-known fact that wh-phrases + mo are interpreted as universal in some contexts but as existential/negative polarity in the other contexts, and she claims, following Kadmon and Landman 1993, that -mo functions like English any rather than every, and the universal quantificational force comes from the definiteness of wh-phrases, especially that of dono 'which', plus an implicit distributive operator DST. So with respect to where the universal quantificational force comes from, our analysis differs from Kawashima's. Her claim is very attractive in that it proposes a uniform treatment of -mo, but it should be noted that her analysis depends on Kadmon and Landman's theory of any, and it is still an open issue whether or not the chameleon-like character of English any (and Japanese -mo) should be treated in a uniform way (cf. Dayal 1998).

An adequate analysis of the existential/negative polarity interpretation of -mo is not our concern here. The point that I would like to discuss instead is that there is a case which seems to suggest that -mo does not provide universal quantificational force, which might support Kawashima's view, and might constitute counterevidence against our assumption. Consider the following.

(19) a. Darei-ga ki-te-mo, boku-wa taiite \( \phi_i \) a-u.
   who-Nom come-Inf-\( \forall \) I-Top mostly meet-Pres
   'I meet most people who come over.' (Nishigauchi 1990: 166)

b. Darei-ga ki-te-mo, boku-wa \( \phi_i \) a-u.
   who-Nom come-Inf-\( \forall \) I-Top meet-Pres
   'No matter who comes over, I meet him.'
(20) a. [[Dono gakusee-ga kai-ta] ronbun]-mo taitee saiyoos-are-ta.
    which student-Nom write-Past paper-∀ mostly accept-Pass-Past

     (i) ‘For all x, x a student, most papers that x wrote were accepted.’

     (ii) ‘Most students are students who wrote (an) accepted paper(s)’

     (Ohno 1989, his (64))

b. [[Dono gakusee-ga kai-ta] ronbun]-mo saiyoos-are-ta.
    which student-Nom write-Past paper-∀ accept-Pass-Past

    ‘For all x, x a student, (a) paper(s) that x wrote was/were accepted.’

(19a) is an example of a concessive donkey sentence, and (20a) is a sentence with an
embedded w̩h relative clause (but with no donkey pronoun). (20a) is ambiguous as
indicated, and the relevant reading is the one in (ii). The point is clear. As shown in (19b)
and (20b), without the adverb of quantification, the w̩h-phrases are universally quantified
whereas if taitee ‘mostly’ is used as in (19) and (20), the domains denoted by the w̩h-
phrases are quantified over by that Q-adv. It thus seems that -mo is not a source of
universal quantificational force.7

Nishigauchi assumes that universal quantification by -mo is the default. He says (1990:
169):

...the properties of the Q-element mo is parallel with those of if in Heim’s
analysis of indefinite NPs - they both have the ability to determine the
quantificational force of the indefinite NPs/w̩h-expressions under certain
structural relations, but if there is another element which has the ability as
unselective binder in the same domain, the latter is allowed to ‘override’ the effect
of the binding force of molif. That is, unselective binding by molif is a ‘default’
case of the process under consideration.

As far as I understand, however, Heim claims that the universal quantificational force
comes from an implicit necessity operator, not from if per se, so that if we want to
assimilate -mo to if, then it should be stated that -mo itself is not a universal operator and

7 The list of Q-adv in Japanese is very restricted, as follows:

    kanarazu ‘always’, mettani ‘never (negative polarity item)’,
    taitee ‘mostly’ daitai ‘mostly’, etc.

Notice that Japanese have no Q-adv which corresponding to English sometimes.
the quantificational force comes from somewhere else, which is in fact very close to Kawashima's position.

I think Kawashima's approach is an alternative worth pursuing, but we will not do so here since it is not compatible with other crucial facts that we have established in the discussion so far. The question is, then: How can we derive the interpretations induced by Q-adv observed in (19a) and (20a) without giving up the assumption that the semantics of -mo is the same as that of every? I would like to propose that Q-adv should be treated as exceptive expressions. A key example is found in English like (21).

(21) Almost every student left.

*Almost* is not a Q-adv, but it is morphologically related to a real Q-adv *mostly*, which is also related to a quantificational determiner *most*. In the literature (Keenan and Stavi 1986, Moltmann 1992 and von Fintel 1993, 1994), it is suggested that *almost* in *almost every/no* CN is an exceptive expression. (21) is thus roughly paraphrased as (22).

(22) Every student except a minority of students left.

To consider how to represent the semantics of exceptive expressions, let's see the truth condition of a typical exceptive expression *except for* as in (23).

(23) \[ \text{I} \text{except for} \top C, D \implies P \text{ is true iff} \]
\[ P \in D(A-C) \]  
(cf. von Fintel 1993)

The idea is that the exceptive phrase makes the restriction of a quantifier smaller by subtracting a subset of the restriction C which is expressed by that exceptive phrase. The truth condition of *almost* in (21) can be expressed in a similar way.

---

8 Needless to say, *almost every* CN VP and *most* CN VP are not synonymous with each other. But I disregard this difference since giving the precise definitions of these expressions is not our purpose.

9 This is not a full description of the semantics of *except for*. But for our present purpose, it is enough. See Moltmann 1992 and von Fintel 1993 for more issues on exceptives.
(24) \( \ll \text{almost} \ll \Delta A P \) is true iff

\[ P \in D(A-C), \]

where \( |A-C| \) is overwhelmingly greater than \( |C| \).

Now let us go to Japanese adverbs of quantification with \(-mo\). I propose that the semantics of \( \text{taitee} \) ‘mostly’ in (19) and (20) is the same as that of \textit{almost} described in (24). That is, it denotes an exception set of the restriction of the universal quantifier introduced by \(-mo\).

(25) \[ \text{Dare}^2\text{-ga ki-te-mo}^2, \quad \text{boku-wa} \ \text{taitee}^2 \ \emptyset_1 \ \text{a-u.} \]

who-Nom come-Inf-V I-Top mostly meet-Pres

‘I meet most people who come over.’

The superscript 2 in (25) indicates that there is an exception subset to be subtracted from the domain denoted by \( \text{dare} \) ‘wh-person’. The truth condition of (25) thus can be described as (26).

(26) \( \ll (25) \ll \) is true iff

\[ \ll \text{boku-wa a-u} \ll \in \text{EVERY}(\ll \text{dare-ga-ki-tell} - C), \]

where \( \ll \text{dare-ga ki-tell} - C \) is greater than \( |C| \).

The truth condition given in (26) is equivalent to (27), which is represented by a tripartite structure.

(27) \[ \text{MOST} x [\text{person}'(x) \land \text{come-over}'(x)] [\text{meet}'(x)(l)] \]

In the case of sentences with embedded \( wh \) relative clauses like (20), the syntax-semantics correspondence is not so straightforward as in the case of concessive sentences. We will return to this issue later.

\( Q \)-advs are also used in conditional donkey sentences without \(-mo\), and give quantificational force to bare NPs in the antecedent and pronouns in the consequent, as shown in (28).
(28) Atarashii jaanaru$_1$-ga shuppans-are-ru-to, taitee$_1$ sore$_1$-wa
new journal-Nom publish-Pass-Pres-Cond mostly it-Top
kokuritsu toshokan-ni kisoos-are-ru.
national library-Dat donate-Pass-Pres

'Mostly if a new journal is published, it is donated to the national library.'

In such a case, I assume that a Q-adv quantifies over the domain denoted by a bare NP. To (28) is thus represented as in (29).

(29) MOSTx [new-journal'(x) \land be-published'(x)] [be-donated-to(t.n.l)(x)]

To sum up, the fact that -mo can cooccur with Q-adv does not suggest that -mo does not provide universal quantificational force. The apparent problem is solved by analyzing Q-adv as exceptive expressions.

3.3 Interpretation of pronouns in donkey sentences with wh-phrases and -mo

This section provides semantic descriptions of wh-head relative clause, embedded wh relative clause and concessive donkey sentences, and shows how the theoretical assumptions discussed in the previous section help in deriving the representations which encode correct truth conditions for them.

---

10 It seems to be possible to assume that in case like (28) the Q-adv denotes exceptions to the domain quantified over by an implicit necessity operator, represented as in (i).

(i) Atarashii jaanaru$_2$-ga shuppans-are-ru-to, ALWAYS$_2$ taitee$_2$
new journal-Nom publish-Pass-Pres-Cond mostly
sore$_1$-wa kokuritsu toshokan-ni kisoos-are-ru.
it-Top national library-Dat donate-Pass-Pres

'Mostly if a new journal is published, it is donated to the national library.'

I do not assume this option, since we will discuss complicated cases like concessive donkey sentences in which taitee$_2$ denotes exceptions to a restriction of -mo while the implicit necessity operator quantifies over events embedded in the nuclear scope of that -mo.
3.3.1 Wh-head relative clause donkey sentences

We will first consider a wh-head relative clause donkey sentence in (4a), repeated as (30).

(30) Wh-head relative clause donkey sentence

[[Ronbun₁-o yon-da] dono gakusee₁-mo sore₁-o/Ø₁ hihanshi-ta.
paper-Acc read-Past which student-∀ it-Acc criticize-Past

'Every student that read a paper criticized it.'

This sentence has both strong and weak readings, and this ambiguity obtains with either the overt or the null pronoun. Let us see how we can get the two readings with the null pronoun, which can be E-type. We argued in chapter 2 that by definition E-type pronouns are functions from individuals into individual sums of type \(<e, e>\), and they also can be interpreted as functions from ordinary individuals into kinds, since kinds are defined as (intensional) individual sums. This notion of E-type pronouns gives us the two readings of (30). The strong reading obtains if the null pronoun is interpreted as a function from students to the maximal sums of the papers that they read, as illustrated in (31a). This is the same treatment as for the strong reading of a donkey pronoun in English. The weak reading, on the other hand, obtains by interpreting the null pronoun as a function from students to the paper-kind that they read, as in (31b). The \(f(x)\) in (31b) is kind-denoting, so that via DKP the existential quantification is derived.

(31) a. Strong reading

\[
\forall x [x \leq \text{ATM(STUDENTs)}] \land \exists y [\cup \text{PAPER}(x) \land \text{read}'(y)(x)]
\]

\[\rightarrow \text{criticize}'(f(x))(x)\]

\(f\): functions from students to the papers that they read
b. Weak reading

\[ \forall x [x \leq \text{ATM(\text{STUDENT}_{S})}] \land \exists y [\cup\text{\textsc{paper}}(x) \land \text{read'}(y)(x)] \]

\[ \rightarrow \text{criticize'}(\bar{f'}(x))(x)] \]

\( f' \): functions from students to the paper-kind that they read via DKP

\[ \forall x [x \leq \text{ATM(\text{STUDENT}_{S})}] \land \exists y [\cup\text{\textsc{paper}}(x) \land \text{read'}(y)(x)] \]

\[ \rightarrow \exists y [\cup\text{\textsc{paper}}(x) \land \text{read'}(y)(x) \land \text{criticize'}(y)(x)] \]

The two readings are also available with the overt pronoun, which we have claimed cannot be an E-type pronoun, but must be dynamically bound. The weak reading is easy to obtain. In our present system, -\textit{mo} is analyzed as a universal quantifier, so that disregarding the linear order, the s-structure of \(wh\)-head relative clauses is identical to that of English relative clause donkey sentences, as shown in (4b), repeated as (32).

\[(32)\]

\[
\begin{array}{c}
\text{IP} \\
\text{NP} \\
\text{QP} \\
\text{NP} \\
\text{relative CP} \\
\text{ronbun}_{\text{ACC}}-\text{o yonda read} \\
\text{NP} \\
\text{dono gakusee which student} \\
\text{VP} \\
\text{sore}_{\text{ACC}}-\text{o hihanshita criticized} \\
\end{array}
\]

The structure has the sequence \([(A)Q](P)\), where \(Q\) stands for a quantifier, universal quantifier in this case, \((A)\) corresponds to the restriction of the quantifier and \((P)\) to the nuclear scope. Dynamic conservativity applies here, yielding \([(A)Q](A \land P)\), and the dynamic existential quantifier, which is introduced by the dynamic version of DKP, associated with the bare \(NP\) \textit{ronbun} 'paper', dynamically binds the overt pronoun in the nuclear scope. The paraphrase in pseudo-Japanese is given in (33), which can be represented in the static mode as in (34).

\[(33) \uparrow-\text{mo}(\lambda x \downarrow[\text{x is a student that read a paper}])(\lambda x \downarrow[\text{x is a student that read a paper; and x criticized it;}])\]
(34) \[\forall x [x \leq \text{ATM} \left( \text{STUDENT}_S \right)] \land \exists y [\uparrow \text{PAPER} (y) \land \text{read}' (y) (x)] \rightarrow \]
\[x \leq \text{ATM} \left( \text{STUDENT}_S \right) \land \exists y [\uparrow \text{PAPER} (y) \land \text{read}' (y) (x) \land \text{criticize}' (y) (x)] \]

Now let us discuss the strong reading with the overt pronoun. The problem is: How can we derive the reading without the E-type strategy? As mentioned in the beginning of this chapter, my claim is that there is an option that an implicit Q-adv binds the bare NP and the overt pronoun in (32), providing the universal quantificational force to them. The claim that Q-adv's are actually involved is supported by a wh-head relative clause donkey sentence with *taitee 'mostly’ like (35).

(35) \[[[\text{Ronbun}_1\text{-o } \text{yon-da}] \text{ dono } \text{gakusee}\text{-mo taitee } \text{sore}_1\text{-o } \text{hihanshi-ta.} \]
\text{paper-Acc } \text{read-Past } \text{which student-} \forall \text{ mostly it-Acc } \text{criticize-Past}

(i) ‘Most student that read a paper criticized it.’

(ii) ‘For all x, x a student, mostly when x read a paper, x criticized it.’

(35) has at least two readings, as shown in the translations (i) and (ii). The former is the one we discussed in 3.2.2. This interpretation obtains when the Q-adv is interpreted as exceptive. The other reading is (ii), which is judged as true, in the situation described in the top part of (36), for instance.\(^\text{11}\)

(36)

\begin{itemize}
  \item \text{student read paper criticize}
  \item 1 \checkmark
  \item 2 \checkmark
  \item 3 \checkmark
  \item 4
  \item 5 \checkmark
  \item 6 \checkmark
  \item 7 \checkmark
  \item 8
  \item 9 \checkmark
  \item 10
  \item 11
  \item 12
\end{itemize}

\(^{11}\) The existence of the second reading is documented by Brockett 1994. Yoon 1994 also discusses the Korean counterpart.
The lines between students and papers stand for the read-relation, and the check mark for the criticize-relation. For example, student A reads paper 1, paper 2, paper 3, and paper 4, and he criticizes paper 1, paper 2 and paper 3, but he doesn't criticize paper 4. (35) is true if the domain of students does not include student C. In other words, if there is a student like C, who reads three papers but criticizes less then half of them, (35) is false. The truth condition for the second reading of (35) is thus represented as in (37).

(37) \[ \forall x [x \leq \text{ATM} (\text{STUDENTs}) \rightarrow \text{MOST} y [\uparrow \text{PAPER}(y) \land \text{read}'(y)(x)]] \]

[\text{criticize}'(y)(x)]

The next question is: How is the logical representation in (37) derived? The outer quantifier \( \forall x \) and its restriction correspond to \(-mo\) and \(\text{dono gakusee}\) 'which student', respectively, and the restriction of MOSTy, namely \([\uparrow \text{PAPER}(y) \land \text{read}'(y)(x)]\) is the translation of the relative CP. So, the logical representation in (37) is derived by moving \(-mo\) and the wh-head leaving behind the relative CP. The syntactic process is illustrated in (38). First, the wh-head \(\text{dono gakusee}\) 'which student' moves to [Spec, QP] for feature-checking, stranding the relative CP. As mentioned above, I assume that segments can move. So the lowest segment of the NP moves to the specifier position of \(-mo\). And then the whole QP undergoes QR, yielding (39).
(39)

(1) Outer Quantifier (II) Restriction (III) Q-Adverb (IV) Nuclear Scope

In Kratzer-Diesing style tree splitting, VP-external indefinite subjects are interpreted as restriction and the materials in VP as nuclear scope of Q-adv, which can occur in the IP- or I'-adjoined position (see also Chierchia 1995). The LF structure of (39) has an extra outer quantifier which takes scope over the sentence. So, the sentence is considered true if and only if every student in the domain satisfies the truth conditions derived from the lower IP.

The detailed derivation of (37) is given below. The translation of the lower NP in the domain of the restriction proceeds as in (40). The bare object NP ronbun ‘paper’ is a kind-denoting expression, so that the dynamic version of DKP applies, introducing the dynamic existential quantifier. This quantifier is wiped off by Existential Disclosure.

(40) \[ \uparrow \text{read'}(\text{PAPER}_j)(x) \]

via the dynamic version of DKP

\[ \exists y_j [ \uparrow \text{UPAPER}(y_j) \wedge \text{read'}(y_j)(x)] \]

Existential Disclosure

\[ \exists y_j [ \uparrow \text{UPAPER}(y_j) \wedge \text{read'}(y_j)(x)] \downarrow y_j = u \]

\[ = \exists y_j [\uparrow \text{UPAPER}(y_j) \wedge \text{read'}(y_j)(x) \wedge y_j = u] \]

\[ = \lambda p \exists y_j [\uparrow \text{UPAPER}(y_j) \wedge \text{read'}(y_j)(x) \wedge y_j = u \wedge p] \]

\[ = \lambda y_j [\uparrow \text{UPAPER}(y_j) \wedge \text{read'}(y_j)(x)] \]
As mentioned in (18) above, the trace of the QP is assumed to be semantically vacuous. So, the final translation of the restriction is what is given in (40). The nuclear scope of (39) is represented as in (41).

\[ \lambda y_j [\uparrow \text{criticize}'(y_j)(x)] \]

The lower IP of (39) is thus represented as in (42) and its static, usual tripartite counterpart is given in (43).

\[ \text{MOST}'(\lambda y_j [\uparrow \text{PAPER}(y_j) \land \text{read}'(y_j)(x)]) (\lambda y_j [\uparrow \text{criticize}'(y_j)(x)]) \]

\[ \text{MOST} y_j [\uparrow \text{PAPER}(y_j) \land \text{read}'(y_j)(x)] [\text{criticize}'(y_j)(x)] \]

The \( x \)'s are bound by the outer universal quantifier, and the logical representation (37) obtains. The important point is that the overt donkey pronoun is translated into a variable and bound by the Q-adv. The same story holds in (30), where an implicit necessity operator binds the overt pronoun, providing the universal quantificational force. The static logical representation of (30) is given in (44).

\[ \forall x [x \leq \text{ATM(STUDENTs)} \rightarrow \text{ALWAYS} y [\uparrow \text{PAPER}(y) \land \text{read}'(y)(x)] [\text{criticize}'(y)(x)]] \]

It is worthwhile noting that an English relative clause donkey sentence like (45) does not have the reading in (37): for all \( x \), \( x \) a student, mostly when \( x \) read a paper, \( x \) criticized it.

\[ \text{Mostly every student who read a paper criticized it.}^{12} \]

A non-trivial question is where the difference between English and Japanese with respect to Q-adv in relative clause donkey sentences comes from. This cross-linguistic difference is accounted for syntactically. In Japanese wh-head relative clause donkey sentences, the crucial point in deriving the logical representation in (44) is the fact that the wh-head and -mo make a constituent and the complex undergoes QR to IP. This is possible and in fact obligatory since Japanese wh-phrases are polarity items which are forced to move to [Spec,
QP| headed by -mo. On the other hand, as originally argued by Partee 1975 and defended by Dayal 1996, the internal structure of English quantified noun phrases with relative clauses is represented as in (46).

(46)  
```
                  DP
                   D
                    NP
                     |
                      every
                      NP
                          CP
                          |
                         student
                         who read a paper
```

In this structure, every and student do not make a constituent, so that they cannot move as a unit, leaving behind the relative CP. Furthermore, English common nouns are not polarity items. Hence nothing motivates (head-)movement of student to every. Consequently there is no way to derive a representation like (39). In sum, the asymmetry between English and Japanese with respect to the interpretation of Q-advs in relative clause donkey sentences is deduced from the syntactic differences between the two languages.\(^{13}\)

3.3.2 Embedded wh relative clause donkey sentences

Let us consider the syntactic and semantic derivation of a sentence which has a relative clause headed by a bare NP and a wh-phrase like (47).

(47)  
```
[[Dono ronbun\-i-o yon-da] gakusee\-mo \textit{so}re\textsubscript{i}-o/\emptyset_i \textit{hihanshi-ta}.  
which paper-Acc read-Past student\-V it-Acc criticize-Past
```

‘No matter which paper a student read, he criticized it.’

The s-structure of (47) is represented in (48).

\(^{13}\) Roger Schwarzschild (personal communication) pointed out that (i) seems to have the reading with most quantifying over papers.

(i) Students who read papers mostly criticized them.

At this point, I leave open how to derive this reading.
The universal quantificational particle -mo quantifies over the domain of papers. The wh-phrase *dono ronbun* 'which paper' does not c-command the pronouns in the VP, but it can antecede them. And only the strong reading is available with either the overt or the null pronoun. On the other hand, the bare head *gakusee* 'student' can be interpreted either as universal or as existential. Nishigauchi 1986, 1990 first paid attention to the fact that both the wh-phrase embedded in the relative CP and the bare NP head are universally quantified, and claimed that -mo unselectively binds them. Ohno 1989 argues against Nishigauchi's analysis, pointing out that the bare head NP can also be interpreted as existential. (47) is true in the following situation (see also Watanabe 1993).

(49)  

\[
[paper] = \{p1, p2, p3\} \\
[student] = \{s1, s2, s3, s4\} \\
[read] = \{<s1, p1>, <s2, p2>, <s3, p3>, <s4, p3>\} \\
[criticize] = \{<s1, p1>, <s2, p2>, <s3, p3>\}
\]

In (49), student 4 read paper 3, but he didn't criticize it. So, for (47) to be true, it does not have to be the case that every student criticized all the papers he read.

The facts to be accounted for concerning embedded wh relative clause donkey sentences are then (i) that only the strong reading is available with either the overt or the null pronoun and (ii) that the bare head NP is ambiguous between existential and universal. These facts
follow straightforwardly from our claim. The s-structure (48) is mapped to the LF representation in (50).

\[(50)\]

\[
\begin{array}{c}
\text{QP:7} \\
\text{NP}_1 \\
\text{Q'} \\
\text{do no ron bun} \\
\text{which paper} \\
\text{mo} \\
\text{Q} \\
\text{NP:3} \\
\text{tQP} \\
\text{sore-qi/phi} \\
\text{hi hanshita} \\
\text{it-Acc} \\
\text{criticized} \\
\text{CP:1} \\
\text{NP:2} \\
\text{gakusee} \\
\text{student} \\
\text{Opj} \\
\text{C'} \\
\text{IP} \\
\text{C} \\
\text{yonda} \\
\text{read} \\
\text{tj} \\
\text{ti}
\end{array}
\]

1. \(\lambda x[\text{read}'(y)(x)]\)  \(<e, \triangleright>\)
2. STUDENT  \(e\)
3-4. \(\bigwedge x[\text{STUDENT}(x) \land \text{read}'(y)(x)]\)  \(e\)
5. \(\lambda x[\text{criticize}'(y)(x)]\)  \(<e, \triangleright>\)
6. \(\text{criticize}'(y)(\bigwedge x[\text{STUDENT}(x) \land \text{read}'(y)(x)])\)  \(t\)
7. \(\lambda Q\forall y[y \leq \text{ATM}(\text{PAPER}_S) \rightarrow Q(y)]\)  \(<<e, \triangleright, \triangleright>\)
8. \(\lambda Q\forall y[y \leq \text{ATM}(\text{PAPER}_S) \rightarrow Q(y)][\lambda y[\text{criticize}'(y)(\bigwedge x[\text{STUDENT}(x) \land \text{read}'(y)(x)])]]\)  \(t\)

\(= \forall y[y \leq \text{ATM}(\text{PAPER}_S) \rightarrow \text{criticize}'(y)(\bigwedge x[\text{STUDENT}(x) \land \text{read}'(y)(x)])]\)  \(t\)

\(= \forall y[y \leq \text{ATM}(\text{PAPER}_S) \rightarrow \exists x[\text{STUDENT}(x) \land \text{read}'(y)(x) \land \text{criticize}'(y)(x)]\]  \(\text{(DKP)}\)

\(= \forall y[y \leq \text{ATM}(\text{PAPER}_S) \rightarrow \exists x[\text{STUDENT}(x) \land \text{read}'(y)(x) \land \text{criticize}'(y)(x)]\]  \(\text{(\bigwedge\text{-cancellation})}\)

The wh-phrase moves to [Spec, QP], and the whole QP moves to IP, where it c-commands the pronouns in the VP. This is the reason why only the strong reading is available with either the overt or the null pronoun. In other words, in our approach, the embedded wh relative clause donkey sentences are not authentic donkey sentences, because the pronouns are c-commanded by their antecedents at LF. Incidentally note that the movement of the wh-phrase to [Spec, QP] out of the relative clause violates Subjacency. It should be thus assumed, contrary to Nishigauchi 1990 and following Huang 1982, that
Subjacency does not apply at LF. The existential reading of the bare head NP is easy to derive. In chapter 1, we introduced a translation rule for a bare NP with a relative clause, repeated as (51).

(51) Relative Clause Rule

Given a configuration

\[
\begin{array}{c}
\text{NP} \\
\text{CP} \\
\text{Op}_i \\
\text{C'} \\
\kappa
\end{array}
\]

where \( \kappa \) is a kind-denoting expression, translating into \( K \), and the relative CP translates into \( \lambda x[\cdots P(x) \cdots] \),

the whole NP translates into \( \cap \lambda x[\cup K(x) \land \cdots P(x) \cdots] \).

This rule applies in 3-4 of (50). The existential quantifier in 8 is introduced via DKP. This is the source of the existential interpretation of the bare head NP. The resulting logical representation means that for all \( y \), \( y \) a paper, there is at least one student who read and criticized \( y \).

Let us consider next how the universal interpretation of the bare head NP obtains. Like the case of wh-head relative clause donkey sentences we discussed in the previous section, the interpretation of Q-adv gives us a clue.

(52) [[Dono ronbun\-o yon-da] gakusee\-mo taitee sore\(\_\)\(\_\)\(\_\)\(\_\) hihanshi-ta.
which paper-Acc read-Past student-\(\forall \) mostly it-Acc criticize-Past

'For all \( x \), \( x \) a paper, most students who read \( x \) criticized \( x \).'

The translation given here is one interpretation that the example has, where the Q-adv quantifies over the domain of students. This reading is derived just like the other cases we have seen so far.

---

14 See also von Stechow 1996, where he claims that Japanese wh-phrases can move out of the relative clauses which they are embedded in, without LF pied-piping.
The Q-adv binds both the bare head NP and the VP internal subject trace, providing the proportional interpretation for them. The wh-phrase moves to [Spec, QP] and the QP moves to IP, where it c-commands the overt pronoun. The LF is interpreted as in (54) by the tree splitting algorithm.\(^\text{15}\)

\[(54) \quad \forall y[y \leq \text{ATM}(\text{PAPER}_g) \rightarrow \text{MOST } x [\text{\Uparrow STUDENT}(x) \land \text{read'}(y)(x)]
\]

\[\text{[criticize'}(y)(x))\]]

It is now clear how the bare head NP is universally quantified in (47). In that case, the implicit necessity Q-adv provides universal quantificational force to it. The truth condition of (47) is given in (55).

\[(55) \quad \forall y[y \leq \text{ATM}(\text{PAPER}_g) \rightarrow \text{ALWAYS } x [\text{\Uparrow STUDENT}(x) \land \text{read'}(y)(x)]
\]

\[\text{[criticize'}(y)(x))\]]

This is the account of the second fact concerning embedded wh relative clause donkey sentences.

---

\(^{15}\) Embedded wh relative clause donkey sentences have been discussed by many scholars. Brockett's 1994 analysis is basically the same as the one proposed here, though based on different assumptions. Yoon 1994 also discusses a Korean counterpart and proposes truth conditions logically equivalent to (54) within DRT.
Returning to (52), let us consider its other interpretation. This reading is shown in (56), where the Q-adv is co-superscripted with -mo and the wh-phrase associated with it. This means that the Q-adv is denoting exceptions to the domain of papers.

(56)  [[Dono ronbun\textsuperscript{2-o} yon-da] gakusee\textsuperscript{-mo} taitee\textsuperscript{2} sore\textsubscript{i-o/\textcircled{i}} hihanshi-ta.
     which paper-Acc read-Past student-\textforall mostly it-Acc criticize-Past

     'Most papers are papers that a student read and criticized.'

It is noted in the literature, for example Brockett 1994 and Yoon 1994, that an embedded wh relative clause donkey sentence with a Q-adv like (52)/(56) doesn't have such a reading, and only the truth conditions in (54) are available. However, as shown in (20), repeated as (57), Ohno 1989 points out that the Q-adv can quantify over the domain denoted by the wh-phrase plus -mo.

(57)  [[Dono gakusee-ga kai-ta] ronbun\textsuperscript{-mo} taitee saiyoos-are-ta.
     which student-Nom write-Past paper-\textforall mostly accept-Pass-Past

     'Most students are students who wrote an accepted paper.' (Ohno 1989, his (64))

This is not a donkey sentence, since the VP has no pronoun. But it shares crucial properties with (56). That is, the wh-phrase is embedded in the relative clause and the relative head is a bare NP followed by -mo. Ohno discusses the situation in (58), where (57) is interpreted as true.

(58)

\begin{center}
\begin{tikzpicture}[level distance=1.5cm, sibling distance=1.5cm, every node/.style={scale=0.8}]
  \node {student A}
    child {node {paper 1}}
    child {node {paper 2}}
    child {node {paper 90}}
  \node {student B}
    child {node {paper 91} edge from parent [sloped, above]}
  \node {student C}
    child {node {paper 92} edge from parent [sloped, above]}
  \node {student J}
    child {node {paper 99} edge from parent [sloped, above]}
\end{tikzpicture}
\end{center}

In this situation, student A wrote the majority of papers, but they were not accepted. This is supported by the fact that (59a) is, but (59b) isn't, a felicitous continuation.
(59)  
  a. ... but student A didn't get a single paper accepted.
  
  b. #... but students B through J didn't get their papers accepted.

In the case of (56), too, uttering something like (60) after (56) is perfectly felicitous.

(60) ..., but no students who read 'On Wh-Movement' criticized it.

This suggests that the existence of a paper that was read but not criticized by one or more students does not falsify (56). The truth conditions of (56) with the continuation in (60) are thus described as in (61).

(61) \( \ll (56) \ll \) is true iff

\( \ll \text{be-read-and-criticized-by-a-student} \ll \in \text{EVERY}(\ll \text{paper} \ll - \{\text{On Wh-Movement}\}), \)

and \( \ll \text{paper} \ll - \{\text{On Wh-Movement}\} \) is two or more than two.

If the denotation of the exceptive expression is recoverable from context and the number of non-exception members are greater than exceptions, (56) is represented as in (62).

(62) \( \text{MOST } y \ [y \leq \text{ATM(PAPER}_S)] \)

\[ \exists x [\uparrow \text{STUDENT}(x) \land \text{read'}(y)(x) \land \text{criticize'}(y)(x)] \]

Putting the introduction of MOST aside, this formula corresponds to the LF representation in (53). In particular, the nuclear scope of (62) obtains exactly in the same way as what we proposed in (50). Our story also applies to Ohno's (57), yielding (63).

(63) \( \text{MOST } x \ [x \leq \text{ATM(STUDENT}_S)] \)

\[ \exists y [\uparrow \text{PAPER}(y) \land \text{write'}(y)(x) \land \text{be-accepted'}(y)] \]

It should be noted that (63) is different from the truth condition that Ohno himself proposes, which is given in (64), where "**" is a distributive operator.

(64) Mostx, student(x), *accepted(\text{cy[paper(y) & wrote (x, y)]})

Ohno's truth condition requires that all of the papers written by the majority of the students should be accepted. This is falsified in a situation like (65), which is like (58) except that student J wrote 202 papers, but of the papers he wrote, only paper 99 was accepted.
In this situation, (57) seems true, which suggests that Ohno’s (64) is too strong.

To sum up, we have shown that the facts concerning embedded wh relative clause donkey sentences follow from our approach. Our claim that the wh-phrase plus -mo undergoes LF movement accounts for the fact that there is no difference between overt and null pronouns and both of them are interpreted only as universal. This means that pronouns in this type of donkey sentence are not real donkey pronouns, since they are c-commanded by a wh-phrase plus -mo at LF. The existential/universal alternation of bare head NPs is due to binding by a Q-adv, which is also observed in wh-head relative clause donkey sentences. We also discussed Q-adv/wh-mo interaction and showed that the interpretation which has been described as impossible interpretation is in fact possible.

3.3.3 Concessive donkey sentences

Concessive donkey sentences can be analyzed just like embedded wh relative clause donkey sentences, since those two are syntactically similar to each other. An important distinction between the two is that in the former, -mo adjoins to IP and that IP per se functions as an adverbial clause.
(66)  \[ \text{IP} \ \emptyset_j \ \text{dono ronbun}_i\text{-o yon-de}_j\text{-mo, Mary}_j\text{-wa sore}_j\text{-o/} \emptyset_i \text{hihansi-ta.} \]
\[ \text{which paper-Acc read-Inf-} \forall \text{-Top it-Acc criticize-Past} \]

'No matter which paper she read, Mary criticized it.'

The s-structure is exhibited in (67). Like before, at LF, the wh-phrase moves to [Spec, QP] and the QP undergoes QR, as in (68).

(67)

```
  IP1
     IP2
        IP2
           NP  VP
               \emptyset_j
                dono ronbun_i\text{-o yonde which paper-Acc read}
```

(68)

```
  IP1 (I)
     QP
      NP_i  Q'_i
       \emptyset_j \emptyset_i
        dono ronbun-o which paper-Acc read
       -mo \forall

  IP1 (II)
     \text{ALWAYS}

  IP1 (III)
     \text{IP}_2
       IP2
          \text{QP}
           \emptyset_j \text{t}_i
                yonde read
           -mo \forall

  IP1 (IV)
     \text{M}_j\text{-wa sore}_j\text{-o/} \emptyset_i \text{hihanshita criticized}
```

(I) Outer Quantifier  (II) Restriction  (III) Modal  (IV) Nuclear Scope

In this configuration, the donkey pronouns in the lowest IP\textsubscript{1} are c-commanded by their antecedent, yielding only the strong reading.

IP\textsubscript{2} and the lower IP\textsubscript{1} have a Davidsonian event argument, which is existentially bound by default. The existential quantifier is wiped off by Existential Disclosure and the event variables are bound by that necessity operator. The relevant translations and derivations are illustrated in (69).
(69) Initial translations

a. \( \text{IP}_2: \exists o[\uparrow \text{read}'(o)(y)(m)] \)

b. the lowest \( \text{IP}_1: \exists o[\uparrow \text{criticize}'(o)(y)(m)] \)

Existential Disclosure

\( a'. \lambda o'[\exists o[\uparrow \text{read}'(o)(y)(m)] \Delta \uparrow o = o'] \)

\( = \lambda o[\uparrow \text{read}'(o)(y)(m)] \)

\( b'. \lambda o'[\exists o[\uparrow \text{criticize}'(o)(y)(m)] \Delta \uparrow o = o'] \)

\( = \lambda o[\uparrow \text{criticize}'(o)(y)(m)] \)

Binding by the necessity operator

\( c. \text{ALWAYS } o[\uparrow \text{read}'(o)(y)(m)] [\uparrow \text{criticize}'(o)(y)(m)] \)

Binding of the open variables x's by the outer universal quantifier gives the truth condition in (70), which is represented in the static mode.

(70) \( \forall y[y \leq \text{ATM(PAPER}_5) \rightarrow \text{ALWAYS } o[\uparrow \text{read}'(o)(y)(m)] [\uparrow \text{criticize}'(o)(y)(m)]] \)

If *taitee* 'mostly' is used in place of the null operator, the sentence becomes ambiguous, as shown in (71).

(71) \( \text{IP } \emptyset_i \text{ dono ronbun}_i-o \text{ yon-de]-mo, taitewa Mary}-j-wa \)

\( \text{ which paper-Acc read-Inf-\forall mostly } \text{-Top} \)

\( \text{sore}_1-o/\emptyset_i \text{ hihanshi-ta.} \)

\( \text{it-Acc criticize-Past} \)

(i) 'For all x, x a paper, usually when Mary read x, she criticized x.'

(ii) 'Most papers are papers that Mary read and criticized.'

When *taitee* is interpreted as quantifying over events, the reading given in (71)(i) obtains. On the other hand, if the Q-adv is interpreted as denoting exceptions to the domain of papers, the reading in (70)(ii) obtains. The truth conditions of these interpretations are represented in (72a) and (72b), respectively.
(72) a. \( \forall y [y \leq \text{ATM(PAPERs)} \rightarrow \text{MOST o [read'(o)(y)(m)] [criticize'(o)(y)(m)]}] \)

b. \( \text{MOST y [y \leq \text{ATM(PAPERs)}]} \)

\([\text{ALWAYS o [read'(o)(y)(m)] [criticize'(o)(y)(m)]}]\]

In both logical representations, the quantifiers quantifying over the domain of papers have wide scope over the modal operators quantifying over events. This results from the LF movement of the QP, which c-commands the variables in the nuclear scope. So, again, neither the overt nor the null pronouns in (66) and (71) is a discourse marker, but rather they are ordinary variables.

Let us next consider an example where a pronoun in the consequent clause is anaphoric to a bare NP in the antecedent clause, as given in (73).

(73) \([\text{IP øj dono gakusee-ga ronbun}_{1-o} \text{ kai-te]-mo, which student-Nom paper-Acc write-Inf-¥ Tanaka-kyoouju]{-wa \text{sore}_{1-o/ø}_{1} \text{ yon-da. Prof.-Top it-Acc read-Past}}\]

‘No matter which student wrote a paper, Prof. Tanaka read it.’

This sentence is evaluated in (74), which has two situations, (74a) and (74b). For instance, in (74a) student A wrote paper 1, paper 2 and paper 3, and all of them were read by Prof. Tanaka. On the other hand, in (74b), only paper 1 was read by him. So, (74a) and (74b) are situations that bring out strong and weak readings, respectively. And (73) is interpreted as true in either of the two situations.
Both readings are available with either the overt or the null pronoun. This fact is accounted for by the same strategy proposed above. In what follows, I will only demonstrate how the two readings with the overt pronoun are derived, omitting the E-type interpretation of the null pronoun since it is obvious.

Let us first discuss the weak reading of (73). The LF representation of (73) is roughly illustrated as in (75).

(75)  [[dono gakusei]-mo] ALWAYS [IP2 ti ronbunj kaite] [IP1 T sorej yomu] which student-∀ paper write it-Acc read

The translations of the IP2 and the IP1 are given in (76).

(76)  IP2: \( \lambda o[\exists y[\uparrow \text{PAPER}(y) \land \text{write}'(o)(y)(x)]] \)

IP1: \( \lambda o[\uparrow \text{read}'(o)(y)(\text{Prof. T})] \)

The event/occasion variables o’s are bound by the modal operator. So ‘ALWAYS IP2 IP1’ in (75) means that every occasion in which x writes a paper is an occasion in which x writes a paper and Prof. Tanaka reads it. This is represented as in (77), where the variable y in the IP1 is dynamically bound by the existential quantifier associated with ronbun ‘paper’.
(77) \[\text{ALWAYS}\ o\ [\exists y \uparrow [\text{UPAPER}(y) \land \text{write}'(o)(y)(x)]]
\]
\[\exists y \uparrow [\text{UPAPER}(y) \land \text{write}'(o)(y)(x)] \triangle \text{read}'(o)(y)(\text{Prof. T})]]\]

The static representation of the whole LF in (75) is given in (78).

(78) \[\forall x[x \leq \text{ATM(STUDENTs)} \rightarrow \text{ALWAYS}\ o\ [\exists y [\text{UPAPER}(y) \land \text{write}'(o)(y)(x)]]]
\]
\[\exists y [\text{UPAPER}(y) \land \text{write}'(o)(y)(x) \land \text{read}'(o)(y)(\text{Prof. T})]]\]

Now let us discuss the strong reading of the overt pronoun. Like the other cases of the strong readings of overt pronouns, we will argue that a null necessity operator provides the universal quantificational force to the bare NP antecedent and the overt pronoun. Our claim is again supported by an example with an overt Q-adv like (79).

(79) [IP$_2$ øj dono gakusee-ga ronbun$_1$-o kai-te]-mo,
which student-Nom paper-Acc write-Inf-V

[IP$_1$ Tanaka-kyooju]-wa taitee sore$_1$-o yon-da].
Prof.-Top mostly it-Acc read-Past

(i) ‘For all $x$, $x$ a student, mostly when $x$ wrote a paper, Prof. Tanaka read it.’

(ii) ‘Most students are students that wrote a paper and Prof. Tanaka read it.’

(79) is ambiguous as shown by the translations. In the reading given in (79)(i), the Q-adv quantifies over the domain of papers. On the other hand, (79)(ii) obtains when the Q-adv is interpreted as exceptions to the domain of students who wrote a paper. What is relevant to our discussion is the former reading. This obtains as follows. The LF of (79) is represented as in (80), where the Q-adv is coindexed with the bare NP in the lower IP$_2$ and the overt pronoun in the lowest IP$_1$. 

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(80) 

This LF is mapped into the static logical representation (81), where the existentially bound occasion variables are omitted.

(81) \( \forall y[y \leq \text{ATM}(\text{PAPER}_s) \rightarrow \text{MOST} \ y [\text{\text{IP}}(\text{PAPER}(y) \land \text{write'}(y)(x))] \]

\( \text{read'}(y)(\text{Prof}.T)) \]

When IP2 is translated, the existential quantifier is introduced. But it is erased by Existential Disclosure, and the variable y is bound by the co-indexed Q-adv. The overt pronoun in the lowest IP1 is also bound by the Q-adv. Replacing taitee with the null necessity operator gives us the strong reading of (73), the logical representation of which is (82).

(82) \( \forall y[y \leq \text{ATM}(\text{PAPER}_s) \rightarrow \text{ALWAYS} \ y [\text{\text{IP}}(\text{PAPER}(y) \land \text{write'}(y)(x))] \]

\( \text{read'}(y)(\text{Prof}.T)) \]

The reading in (79)(ii) is obtained by interpreting the Q-adv as an exceptive expression. The story goes as follows. IP2 and the lower IP1 in (80) function as restriction and nuclear scope, respectively, and the existential quantifier associated with the bare NP in IP2 dynamically binds the overt pronoun in IP1. The immediate question is: What functions as the quantifier quantifying over the events/occasions expressed by IP2 and IP1? The answer is that it is assumed that when an overt Q-adv is interpreted as an exceptive expression, a default rule provides a null necessity operator. This is expressed by the schematic LF shown in (83).

(83) \[[\text{IP} \ [\text{QP} \ [\text{dono gakusee}^{-2}-\text{ga}]\ -\text{mo}^{-2}] \ \text{ALWAYS} \ [\text{IP}_1 \ \text{IP}_2 \ \text{taitee}^{-2} \ \text{IP}_1]] \]

which student-Nom-\( \forall \) ‘exceptive’
The truth condition of the reading of (79)(ii) is represented as in (84), which means ‘most students are students such that every occasion in which they write a paper is an occasion in which they write a paper and Prof. Tanaka reads it’.

(84) \[
\text{MOST } x [ x \leq \text{ATM(STUDENT}_s) ] \\
[ \text{ALWAYS } o [ \exists y [ \text{UPAPER}(y) \land \text{write'}(o)(y)(x) ] ] \\
[ \exists y [ \text{UPAPER}(y) \land \text{write'}(o)(y)(x) \land \\
\text{read'}(o)(y)(\text{Prof}:T) ] ]
\]

3.3.4 Brief summary and discussion

We have discussed three types of Japanese donkey sentences in which wh-phrases and -mo are involved. One of the most crucial points in our approach is that a wh-phrase moves to [Spec, QP] and the QP undergoes QR. This movement accounts for the fact that the pronouns anaphoric to wh-phrases give us only strong readings, since they are c-commanded by the QP at LF. The QR of the QP headed by -mo has another important role, in particular, in relative clause donkey sentences. The QP movement leaves a relative CP behind, which makes it possible for a Q-adv to bind a bare NP in the relative clause and a pronoun in the VP. This analysis suggests that Japanese relative clause donkey sentences are, LF-syntactically, like conditional donkey sentences in that they allow for binding by Q-adv. In the overt syntax, their subjects have a relative clause structure such as [CP NP-mo], but at LF, they are opened up and dealt with as if they were antecedent clauses of conditionals.

Cross-linguistic investigation suggests that our QP-movement approach is more convincing than the approach which claims that donkey pronouns are always definite descriptions in disguise. We pointed out the difference between a Japanese example like (35) and an English one like (45), repeated as (84a) and (85), respectively.
(84) a. \[ [[\text{Rel Ron bun} \text{-o yon-da}] \text{ dono gak usee} \text{-mo tai tee sore} \text{-o}} \]
\[ \text{paper-Acc read-Past which student-\forall mostly it-Acc} \]
\[ \text{hihanshi-ta. criticize-Past} \]

b. \[ \forall x [x \leq \text{ATM(STUDENT}_{S}) \rightarrow \text{MOST } y [\cup \text{PAPER(y) } \land \text{read}'(y)(x)] \]
\[ [\text{criticize}'(y)(x)] \]

(85) Every student who read a paper mostly criticized it.

These two examples are similar to each other in that the donkey pronouns in the VPs are anteceded by the indefinite/bare NPs in the relative clauses, and the subject NPs are universally quantified. Nevertheless, (85) does not have the reading expressed in (84b). This interpretive difference between (84a) and (85) is very difficult, if not impossible, to account for by the definite description approach to donkey pronouns. The definite description approach can account for the fact that (85) does not have the reading in (84b), since it gives a paraphrase like ‘every student who read a paper mostly criticized the papers he read’. However, if the pronoun in (84a) is also interpreted as a definite description in disguise, the reading in (84b) never obtains. On the contrary, all our approach needs is Chierchia’s system plus QP movement and nothing else. As discussed above, the absence of the reading in (84b) for (85) follows simply from the fact that English doesn’t allow every and student to move out of the subject as a constituent. So, our analysis is favored over the definite description approach.
3.4 Conditional donkey sentences and the topic sensitivity of adverbs of quantification

3.4.1 Strong and weak readings

Unlike the other three types, conditional donkey sentences do not have wh-phrases or -mo, so that nothing particular happens in their LFs. Japanese conditionals are expressed as in (86), where ‘Cond’ stands for a conditional morpheme on a verb.16

(86)  \[ [\text{IP}_2 \ldots \text{a bare NP}_i \ldots ]-\text{Cond}, \ [\text{IP}_1 \ldots \text{pronoun}_i \ldots ] \]

‘If IP\(_2\), IP\(_1\).’

IP\(_2\) and IP\(_1\) are interpreted as the restriction and the nuclear scope, respectively, of a possibly null Q-adv. A donkey dependency is possible between the pronoun in IP\(_1\) and the bare NP in IP\(_2\). The present system gives the two readings to the overt and null pronouns without adding anything additional. Let us begin with the null pronoun under the E-type interpretation.

(87)  a. Strong reading

\[ [\text{IP}_2 \ldots \text{a bare NP}_i \ldots ]-\text{Cond}, \ [\text{IP}_1 \ldots f(a) \ldots ] \]

f: a function from a into the individual sum denoted by the NP\(_i\) that stand in the relation expressed in the IP\(_2\)

b. Weak reading

\[ [\text{IP}_2 \ldots \text{a bare NP}_i \ldots ]-\text{Cond}, \ [\text{IP}_1 \ldots f'(a) \ldots ] \]

f: a function from a into the kind denoted by the bare NP\(_i\) that stands in the relation expressed in the IP\(_2\)

Taking an example of a Japanese sentence corresponding to ‘if John has a donkey, he beats it’, when the null pronoun is interpreted as a function from John into the donkeys that he owns, like the f in (87a), the strong reading obtains. On the other hand, the weak reading

16 Japanese has four conditional morphemes; -to, -(r)eba, -ara and -(n)ara. The choice depends on verb forms to which a conditional morpheme is attached. See Kuno 1973, Abe 1990, the papers contained in Masuoka 1993 and Shirai 1996 among many others for descriptions and theoretical analyses of these morphemes.
is derived by interpreting the null pronoun as a function from John into the donkey-kind that he owns, the consequent being represented as $\exists x[\cup_{\text{DONKEY}}(x) \land \text{own}'(x)(j) \land \text{beat}'(x)(j)]$.

It is also easy to derive the two readings with the overt pronoun. The tripartite structure of (86) is represented as in (88).

\[(88)\quad \text{ALWAYS } [\text{IP}_2] [\text{IP}_1]\]

When the Q-adv quantifies over the events expressed by IP$_2$ and IP$_1$, (88) means something like ‘every event in which IP$_2$ happens is an event in which IP$_2$ and IP$_1$ happen.’ This interpretation is guaranteed by (dynamic) conservativity as in (89).

\[(89)\quad \text{ALWAYS } [\text{IP}_2] [\text{IP}_2 \text{ and IP}_1]\]

Given (89), the existential quantifier associated with the bare NP in IP$_2$ dynamically binds the overt pronoun in IP$_1$, yielding the weak reading. On the other hand, if the existential quantifier is wiped off by Existential Disclosure and the Q-adv binds the individual variables in IP$_2$ and IP$_1$, as illustrated in (90), we can obtain the strong reading.

\[(90)\quad \text{ALWAYS } [\text{IP}_2 \lambda x[\ldots x\ldots]] [\text{IP}_1 \lambda x[\ldots x\ldots]]\]

So, our semantics derives the two readings with both overt and null pronouns, and more importantly this is compatible with our claim about the difference between the two types of pronouns.

I have so far used only schematic representations for conditional donkey sentences to show how to derive the strong and weak readings. The reason is that in fact many actual examples of Japanese conditional donkey sentences favor strong readings over weak ones.

Some allow only for strong readings.

\[(91)\quad \text{a. } \text{Atarashii jaanaru$_1$-ga shuppan-are-ru-to, sore$_1$-wa/\text{\textit{\textbeta}}$]}_{\text{\textit{\textbeta}}} \text{new journal-Nom publish-Pass-\text{\textit{\textbeta}}$_1$it-Top kokuritsu toshokan-ni kisoos-are-ru. national library-Dat donate-Pass-\text{\textit{\textbeta}}$_1$}\]

‘If a new journal is published, it will be donated to the national library.’
b. John-wa ronbun-J-o yom-eba, sore\textsubscript{i}-o/\textsubscript{b} hihansur-u.
   \hspace{1cm} \text{-Top paper-Acc read-Cond it-Acc criticize-Pres} \\
   'As for John, if he reads a paper, he criticizes it.'

c. John-ga atarashii kuruma-J-o kaw-to, okusan-ga sore\textsubscript{i}-o/\textsubscript{b}
   \hspace{1cm} \text{Nom new car-Acc buy-Pres wife-Nom it-Acc} \\
   jimansu-ru.
   \hspace{1cm} \text{show.off-Pres} \\
   'If John buys a new car, his wife shows it off.'

In these examples, weak readings are almost impossible. This contrasts with the fact that
the other three types of donkey sentences allows for both readings when bare NPs antecede
pronouns.

Judging from the history of donkey sentences, it is true that the strong reading is
preferred in English conditionals (as well as in the 'every CN VP' construction), to which
primary attention was paid. However, as reviewed in chapter 1, the existence of the weak
reading was pointed out by many scholars. A famous case is Schubert and Pelletier's 1989
quarter-meter sentence as in (92).

(92) If I have a quarter in my pocket, I'll put it in the parking meter.

(Schubert and Pelletier 1989: 200)

An interesting fact is that the Japanese version of the quarter-meter sentence like (93)
allows only for the strong reading.

(93) John-wa koin-J-o mot-tei-reba, sore\textsubscript{i}-o/\textsubscript{b} paakingu meetaa-ni ire-ru.
   \hspace{1cm} \text{-Top coin-Acc have-Pred-Cond it-Acc parking meter-into put-Pres} \\
   'As for John, if he has a coin, he will put it in the parking meter.'

Based on these facts, I would like to suggest that binding by an implicit necessity operator
as given in (90) above, yielding the strong readings, is the default strategy for resolution of
overt/null pronouns in Japanese conditional donkey sentences. And only when the strong
reading causes pragmatic weirdness, the weak reading becomes available. In (94) the
weak reading is much preferred.
(94) John-wa baikuji-ga a-reba, sorei-ni/∅i not-te asu
      -Top motor.bike-Nom exist-Cond it-Loc ride-Inf tomorrow
       machi-ni ik-u.
town-to go-Pres

‘As for John, if he has a motor bike, he will ride it and go to town tomorrow.’

(94) is a Japanese conditional version corresponding to Schubert and Pelletier’s (1989: 201) ‘every man who owns a donkey will ride it to town tomorrow’, where the weak reading is the more natural interpretation. The strong reading of (94) is something like ‘if John has a motor bike, he will ride the motor bikes that he has and go to town tomorrow’. World knowledge tells us that this reading is not acceptable, so the weak reading becomes available.

There are also cases in which lexical meanings seem to determine which reading is preferred. In chapter 1, we introduced Yoon’s 1994, 1996 approach, where she claims that the meaning of the predicate in the nuclear scope affects the interpretation of donkey pronouns, arguing that total predicates such as clean and closed favor strong readings and partial predicates such as dirty and open yield weak readings. However, Japanese predicates corresponding to these do not behave as expected.

(95) a. John-wa yakyuu kaadoi-o mora-u-to,
      -Top baseball.card-Acc receive-Pres-Cond
       sorei-o/∅i kireeni hokansu-ru.
it-Acc clean keep-Pres

‘As for John, if he receives a baseball card, he will keep it clean.’

b. John-wa yakyuu kaadoi-o mora-u-to,
      -Top baseball.card-Acc receive-Pres-Cond
       sorei-o/∅i yogos-u.
it-Acc make.dirty-Pres

‘As for John, if he receives a baseball card, he will make it dirty.’

It seems that both examples favor strong readings over weak ones, in spite of the fact that (95b) has the partial predicate yogos ‘make (something) dirty’. We witnessed in chapter 1 that Krifka 1996 notes English cases in which the total/partial distinction doesn’t work
well, and argues that the strong/weak ambiguity is a matter of pragmatics, which we totally agree with. Yet, let me point out in this connection that there is a group of Japanese predicates which seem to enhance interpretations like weak readings of conditional donkey sentences in the language. They are predicates such as *tabe* 'eat', *nom* 'drink', *tsukaw* 'spend, use', which I would like to dub consumptive predicates.

    -Top    -Nom cake-Acc bake-Cond it-Acc eat-Pres

    ‘As for John, if Mary bakes a cake, he will eat it.’

    -Top money-Acc receive-Pres-Cond it-Acc spend-Pres

    ‘As for John, if he receives money, he will spend it.’

c. John-wa shooyu-ga a-reba, sorei-o/øi tsuka-u.
    -Top soy.sauce-Nom exist-Pres-Cond it-Acc use-Pres

    ‘As for John, if there is (a bottle of) soy sauce, he will use it.’

In order for (96a) to be true, John doesn’t have to eat all the cakes that Mary baked. It can be interpreted as true even if John eats just a small portion of one of the cakes that she baked. By the same token, (96b) is true even if John doesn’t spend all the money he received, and in (96c), he doesn’t have to empty a bottle of soy sauce. One might claim that these readings are different from what we have called the weak readings since the denotations of the antecedent NPs seem not to be well-individuated, conceptually. I have no objection to such a claim. The cognitive/conceptual nature of the antecedent NPs do matter. But this is not all. In (97), the antecedent is *keeki* ‘cake’ like (96a), but the strong reading is preferred, probably because the predicate of the consequent is not a consumptive predicate.

(97) John-wa keekij-o mora-u-to, sorei-o/øi reezooko-ni ire-ru.
    -Top cake-Acc receive-Pres-Cond it-Acc fridge-in put-Pres

    ‘As for John, if he is given a cake, he will put it in the refrigerator.’

What’s really going on in these examples is far from clear, and I leave it open for future research.
3.4.2 Topic sensitivity of adverbs of quantification

As introduced in chapter 1, Chierchia 1992, 1995 observes that when a conditional has two or more indefinites and donkey pronouns anaphoric to them, which of the indefinites is quantified over by a (possibly null) Q-adv is affected by pragmatic factors. One crucial factor is what is interpreted as topic. Let me reproduce the relevant example of Chierchia’s that we discussed in chapter 1.

(98) Dolphins are truly remarkable. When a trainer trains a dolphin, she usually makes it do incredible things.

The prominent reading of (98) is the object asymmetric one, that is, the Q-adv quantifies over the domain of dolphins, rather than the domain of trainers or trainer-dolphin pairs. The reason why this reading is prominent is that the speaker is talking about dolphins, which is indicated by the sentence before the conditional.17 This topic effect seems to be well attested in Japanese, since it has the topic-marker -wa. As we will see shortly, however, it will be shown that, as far as Japanese is concerned, asymmetric quantification by a Q-adv is affected by syntactic factors such as grammatical functions as well as pragmatic factors.

To begin with, let us consider cases in which the topic sensitivity of Q-adv is observed. (99) has two donkey pronouns in the consequent clause soko ‘it (place)’ anaphoric to shuppansha ‘publisher’ and sore ‘it (thing)’ anaphoric to atarashii jaanaru ‘new journal’, and the former is followed by the topic marker. This indicates that the speaker is talking about publishers.

17 There are several notions of topic found in the literature (see von Fintel 1994, Büring 1997, Portner and Yabushita 1998 among others for recent discussions in this area). But what we will adopt in the present study is a simple and intuitive notion; the topic is what is talked about in the context.
(99) Shuppanshaj-ga atarashii jaanaru-j-o hakkoosu-ru-to, 
publisher-Nom new journal-Acc issue-Pres-Cond

taijee sokoj-wa sorej-o gakkai-de tenjisu-ru.
usually it-Top it-Acc conference-at exhibit-Pres

‘When a publisher issues a new journal, usually it exhibits it at a conference.’

Now let us evaluate (99) in the following two situations (100a) and (100b). In (100a), publisher p1, p2 and p3 issue a new journal each, while p4 issues four new journals, and the new journals issued by p1, p2 and p3 are exhibited at a conference while those by p4 are not. In this situation, (99) is interpreted as true. In (100b), too, most of the new journals are issued by publisher p4, but in this case only the new journals issued by p4 are exhibited at a conference. In this scenario, (99) seems to be interpreted as false.

(100) a. [publisher] = {p1, p2, p3, p4}
[new journal] = {j1, j2, j3, j4, j5, j6, j7}
[issue] = {<p1, j1>, <p2, j2>, <p3, j3>,
<p4, j4>, <p4, j5>, <p4, j6>, <p4, j7>}
[exhibit-at-a-conference] = {<p1, j1>, <p2, j2>, <p3, j3>}

b. [publisher] = {p1, p2, p3, p4}
[new journal] = {j1, j2, j3, j4, j5, j6, j7}
[issue] = {<p1, j1>, <p2, j2>, <p3, j3>,
<p4, j4>, <p4, j5>, <p4, j6>, <p4, j7>}
[exhibit-at-a-conference] = {<p4, j4>, <p4, j5>, <p4, j6>, <p4, j7>}

Thus, the natural interpretation of (99) is the subject asymmetric one, and this seems to result from the fact that the subject pronoun anaphoric to the subject in the antecedent clause is marked by the topic marker -wa.

What if the topic marker is attached to the object pronoun instead of the subject, as in (101), where the topic marked object is scrambled over the subject?
(101) Shuppansha1-ga atarashii jaanaru1-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee sorej-wa soko1-ga t_j gakkai-de tenjisru-ru. usually it-Top it-Nom conference-at exhibit-Pres

‘When a publisher1 issues a new journal1, usually it1 exhibits it1 at a conference.’

Contrary to (99), it seems that (101) is interpreted as true in the situation in (100b) but it is less natural in the situation of (100a).18 So, this example also supports the topic sensitivity of Q-adv.

It should be noted, however, that topic-marking on a donkey pronoun in a consequent clause is not obligatory. The topic marker -wa in (99) can be replaced with the nominative case marker -ga, as in (102).

(102) Shuppansha1-ga atarashii jaanaru1-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee soko1-ga sorej-o gakkai-de tenjisru-ru. usually it-Nom it-Acc conference-at exhibit-Pres

‘When a publisher1 issues a new journal1, usually it1 exhibits it1 at a conference.’

The most natural interpretation of this sentence is the subject asymmetric reading, that is, the Q-adv quantifies over the domain of publishers. Scrambling of the object pronoun over the subject in the consequence, as in (103), seems not to affect the interpretation, although the judgment is not completely clear.

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18 Without scrambling, the sentence is ungrammatical as in (i).

(i) *Shuppansha1-ga atarashii jaanaru1-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee soko1-ga sorej-wa gakkai-de tenjisru-ru. usually it-Nom it-Top conference-at exhibit-Pres

‘When a publisher1 issues a new journal1, usually it1 exhibits it1 at a conference.’
(103) Shuppansha\textsubscript{i}-ga atarashii jaanaru\textsubscript{j}-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee sore\textsubscript{j}-o sokoj\textsubscript{i}-ga tj gakkai-de tenjisu-ru. usually it-Acc it-Nom conference-at exhibit-Pres

‘When a publisher\textsubscript{i} issues a new journal\textsubscript{j}, usually it\textsubscript{j} exhibits it\textsubscript{j} at a conference.’

Based on the observations in (102)-(103), it can be concluded that a Q-adv quantifies over the domain denoted by the subject pronoun in the consequent clause, unless the topic marker is used. This is confirmed by (104), which is almost the same as (102) except that the consequent clause is passivized.

(104) Shuppansha\textsubscript{i}-ga atarashii jaanaru\textsubscript{j}-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee sore\textsubscript{j}-ga sokoj\textsubscript{i}-niyotte gakkai-de tenjis-are-ru. usually it-Nom it-by conference-at exhibit-Pass-Pres

‘When a publisher\textsubscript{i} issues a new journal\textsubscript{j}, usually it\textsubscript{i} is exhibited at a conference by it\textsubscript{j}.’

(104) is interpreted as false in the situation in (100a) and as true in the situation in (100b), where the Q-adv quantifies over the domain of new journals. So, the surface subject is the target of the Q-adv. Finally let us consider a case where a consequent clause has an object pronoun and an adjunct pronoun as in (105), the truth condition of which is evaluated in the situations given in (106).

(105) Shuppansha\textsubscript{i}-ga atarashii jaanaru\textsubscript{j}-o hakkoosu-ru-to, publisher-Nom new journal-Acc issue-Pres-Cond
taitee John-wa sore\textsubscript{j}-o sokoj\textsubscript{i}-kara chokusetsu koonyuusu-ru. usually Top it-Acc it-from directly purchase-Pres

‘When a publisher\textsubscript{i} issues a new journal\textsubscript{j}, usually John purchase it\textsubscript{j} directly from it\textsubscript{j}.’
Although the judgment is very delicate, it seems that it is interpreted as true in (106a) and as false in (106b). If this judgment is correct, we can say that a Q-adv targets an object pronoun rather than an adjunct one if neither of them are topic-marked.

To sum up, in Japanese conditional donkey sentences, the discourse or grammatical functions of donkey pronouns (i.e. the case markers of donkey pronouns) affect interpretation of Q-adv, and there is a hierarchy of grammatical functions to which Q-adv are sensitive, as given in (107).

(107) The hierarchy of Q-adv’s sensitivity in Japanese:

Topic >> Subject >> Object >> Adjunct/Demoted subject

What (107) says is that if a pronoun is topic-marked, it is always the target of a Q-adv, and if there is no such pronoun, then a Q-adv targets the subject pronoun, and adjunct pronouns are the least possible target candidate.\(^19\)

It is not clear how rigid the hierarchy is, however. If it is respected strictly, it is predicted that Japanese conditional donkey sentences do not allow symmetric readings,

\(^{19}\) Investigation into what happens if donkey pronouns are accusative and dative seems relevant in this connection. Judgments, however, are far from clear and I therefore set this aside.
since a Q-adv is forced to pick up only one pronoun in accordance with the hierarchy. As far as the examples we have discussed so far are concerned, this prediction seems to be borne out. But I guess there would be cases where symmetric readings are possible, so that I would like to claim that the hierarchy indicates just the unmarked tendency.

It is also worthwhile considering where the hierarchy comes from. I cannot provide an answer to this question, but intuitively it reflects the prominence of grammatical functions. The topic is the most prominent element in a sentence and the subject comes next, and so on. Interestingly enough, the obliqueness hierarchy found in the literature is very close to (107).\textsuperscript{20} Pollard and Sag 1992 propose the obliqueness hierarchy in (108) to account for binding in the framework of Head-driven Phrase Structure Grammar.

\begin{equation}
(108) \quad \text{Subject} \gg \text{Primary object} \gg \text{Second object} \gg \text{Other complements}
\end{equation}

In Pollard and Sag's approach, (108) is regarded as primitive in that it cannot be derived from anything. Of course their idea cannot be transplanted directly into our framework, since theoretical assumptions are different, but at least it can be said that (107) is not an arbitrarily ordered hierarchy stipulated only for the Q-adv's sensitivity.

Related to these issues, we should also pay attention to a cross-linguistic difference with respect to the interpretations of Q-adv's. From what is described in the literature, it appears that English follows a hierarchy like (109) where the topic/non-topic distinction is the crucial boundary.

\begin{equation}
(109) \quad \text{The hierarchy of Q-adv's sensitivity in English:}
\end{equation}

\begin{itemize}
    \item Topic \gg Non-topic
\end{itemize}

The immediate question is, then, why and how grammar allows the difference between (107) and (109). My speculation about this question is as follows. Japanese is a language which has a strategy such as "Represent a discourse topic syntactically and/or

\textsuperscript{20} The obliqueness hierarchy was first proposed by Keenan and Comrie 1977 through the investigation of the universal tendency of relativization. Similar hierarchies are also assumed in other frameworks such as Categorial Grammar and Relational Grammar. See Steedman 1996 and the references therein.
morphologically”. In unmarked cases, this strategy is accomplished by the topic marker -wa. If -wa is not used for some reason, subjects play the role of topic, but objects can never be topic. If underlying objects are supposed to be interpreted as topic, they must be passivized. On the other hand, English does not have such a strategy. In other words, what is topic is not detected from surface structures. Consequently, objects in situ can be interpreted as topic, if enough information is given in discourse.

4 Conclusion

In this chapter, we have discussed four types of Japanese donkey sentences. We observed that there is no interpretive difference between overt and null pronouns in those sentences. So our primary purpose was to show that this doesn’t contradict the claim we made in the previous chapter that overt pronouns are variables while null pronouns are ambiguous between variables and E-type. In particular, the apparent problem was how to get strong readings with overt pronouns since the E-type strategy is not available for them. We proposed two solutions. When an overt donkey pronoun is anteceded by a wh-phrase, we proposed that the wh-phrase plus -mo moves to the IP-joined position where it c-commands the pronoun. Precisely speaking, thus, in this case, the overt pronoun is not a donkey pronoun or a discourse marker. When an overt pronoun is anteceded by a bare NP, we proposed that an implicit Q-adv binds it, giving universal quantificational force. So, our observation about Japanese donkey sentences is compatible with the claim in chapter 2 and with Chierchia’s claim that dynamic binding gives us weak readings while the E-type strategy is responsible for strong readings.

We also argued that the Japanese Q-adv taiete ‘mostly’ should be analyzed as an exceptive phrase, based on the fact that it can be used with -mo. The topic sensitivity of Q-advvs was also discussed. Japanese Q-advs behave like English ones in that they are sensitive to a discourse topic, namely a wa-marked pronoun. But we observed that there is
a hierarchy of Q-adv's sensitivity, which roughly corresponds to the hierarchy of grammatical functions like subject >> object.
Chapter IV: Intensional Contexts

4.1 Introduction

This chapter investigates the semantics of intensional contexts, which have given rise to many philosophical and linguistic puzzles. Our main interest lies in intersentential anaphoric dependencies involving modals and propositional attitude verbs. As we will see shortly, in spite of the fact that modals and propositional attitude verbs make inaccessible domains in which dynamic binding is not available, overt pronouns are acceptable in Japanese intensional donkey contexts. This seems to be a serious problem for our claim that overt pronouns are variables which must be dynamically bound. To resolve this, I will follow Portner's 1996 idea that pronouns in such contexts are used as referential like demonstratives. Intuitively as well as theoretically, his analysis is very convincing since what we are calling overt pronouns in the present thesis are classified as Sa-series demonstratives in traditional Japanese grammar, as mentioned in chapter 2. So, his analysis does capture the traditional intuition. This chapter will thus serve as a piece of empirical evidence for his approach.

The present chapter is organized as follows. In the next section, we will briefly introduce the semantics of modality and propositional attitude verbs. In section 4.3, the distribution and interpretations of pronouns in English and Japanese intensional contexts will be provided. Before dealing with Japanese overt pronouns, which are the most problematic cases, we will discuss null pronouns in intensional contexts under the E-type strategy in section 4.4. In section 4.5, Portner's 1996 analysis will be introduced. Although he doesn't discuss Geach's Hob-Nob sentences, it will be shown that his approach can be extended to them. In 4.6, we will argue that some ungrammatical cases should be treated not as the failure of establishing intended anaphoric links but as the failure of satisfaction of presupposition. We will also discuss Roberts's 1987, 1989 modal subordination cases in 4.6. Conclusion will be given in 4.7.
4.2 Theoretical background

4.2.1 The semantics of modality: Kratzer 1981, 1991

In English (and many other languages), modals are ambiguous. For example, the *must* in (1a) is interpreted as epistemic, while that in (1b) is as deontic.

(1)  
   a. (In view of what we know) John must have murdered Bill.  
   b. (In view of what the law provides) John must go to jail.

Kratzer 1981, 1991 claims that interpretation of modals is determined by context, which can be expressed by phrases like *in view of*. She calls such contexts conversational backgrounds. The conversational background expressed as *in view of what we know* gives us an epistemic reading, while *in view of what the law provides* makes modals deontic.

She introduces two types of conversational background, modal base and ordering source, and modalized sentences are evaluated with respect to these two parameters. The modal base is a conversational background which determines the set of worlds accessible from the world of utterance. For examples, a phrase like *in view of what we know* gives us a set of worlds epistemically accessible from the world of utterance. The ordering source is a conversational background which induces an ordering on the set of worlds accessible from the world of utterance. To see the basic idea of modal base and ordering source, let us consider (1a). Suppose that it is uttered by a detective. He reaches the conclusion that John must be the murderer based on the evidence available to him. The evidence is, for example, that the gun by which Bill was murdered is John's, John has no alibi, and so on. Suppose that there are ten pieces of evidence which support that John murdered Bill. Then, these ten pieces of evidence form the modal base, and all and only worlds where the ten pieces of evidence are true are epistemically accessible from the world of utterance. Possible worlds where the gun is John’s but he does have an alibi are not accessible. An ordering source gives an order among these possible worlds determined by the epistemic modal base. In this particular case, a stereotypical conversational background
(in view of the normal course of events) plays a role of ordering source. For example, someone else might have stolen John’s gun and shot Bill by it. This story might be compatible with the ten pieces of evidence. He might have come from another town. We could even make a story such that he might come from another country or another planet, which still might be compatible with the ten pieces of evidence. However, when the detective makes inferences, he must reject the story of the murder of Bill by someone from another planet, because this story is more far-fetched than the story of John’s murder of Bill. The ordering source of stereotypical conversational backgrounds accounts for this type of far-fetchedness.

The idea of modal base and ordering source can be formalized as follows (adapted from Kratzer 1991).

(2) A modal base $f$ is a function from worlds to sets of propositions.

(3) Every modal base $f$ uniquely determines an accessibility relation $R_f$ as follows:
For all $w, w' \in W$: $wR_f w'$ iff $w' \in \cap f(w)$

(4) Ordering
For all $w, w' \in W$, for any $\gamma \subseteq \mathcal{P}(W)$:
$w \leq_{\gamma} w'$ iff $\{ p: p \in \gamma \text{ and } w' \in p \} \subseteq \{ p: p \in \gamma \text{ and } w \in p \}$

(5) A proposition $p$ is a necessity in a world $w$ with respect to a modal base $f$ and an ordering source $\gamma$ iff the following condition is satisfied:
For all $u \in \cap f(w)$ there is a $v \in \cap f(w)$ such that $v \leq_{\gamma (w)} u$ and for all $z \in \cap f(w)$: if $z \leq_{\gamma (w)} v$, then $z \in p$.

(6) A proposition $p$ is a possibility in a world $w$ with respect to a modal base $f$ and an ordering source $\gamma$ iff $\neg p$ is not a necessity in $w$ with respect to $f$ and $\gamma$.

The relation between a modal base and accessibility defined in (3) will be important for the following discussion.
4.2.2 The semantics of propositional attitude verbs

In the traditional analysis of propositional attitudes such as Hintika 1962, the truth condition of a sentence like John believes that $\phi$ is represented as in (7).

(7)  \[ \parallel \text{John believes that } \phi \parallel \text{ is true in } w \text{ iff } \parallel \phi \parallel \text{ is true in John's doxastic alternatives.} \]

John's doxastic alternatives relative to $w$ are the set of propositions given by a doxastic modal base. In this traditional view, propositional attitude verbs like believe are regarded as relations between attitude holders and propositions.

Quine 1956, Kaplan 1969, Lewis 1979, and Cresswell and von Stechow 1982 argue against such a traditional treatment of propositional attitudes, pointing out the problem concerning de re belief.\(^1\) Let us consider Quine's famous Orttcutt-example given in (8).

(8)  Ralph believes that Orttcutt is a spy.

The scenario goes as follows. Ralph has glimpsed Orttcutt in a brown hat and he believes that the man in a brown hat that he has glimpsed is a spy. He also has glimpsed Orttcutt in a gray hat and he doesn't believe that the man in a gray hat that he glimpsed is a spy. We can felicitously report this situation by uttering (7) in spite of the fact that Ralph believes both that Orttcutt is a spy and that Orttcutt is not a spy. In the traditional analysis, (8) is incorrectly interpreted as false, since there is no (John's belief) world in which both Orttcutt is a spy and Orttcutt is not a spy are true.

The above mentioned authors' approach to this problem is as follows. First, propositional attitude verbs are not relations between attitude holders and propositions, but rather they are relations between attitude holders, res, and properties. (8) is thus understood as in (9).

(9)  Ralph ascribes to Orttcutt the spy-property.

Second, there is a special relation between attitude holders and res. Following Lewis 1979, Cresswell and von Stechow 1982 characterize this relation as follows.

\[^1\] For recent analyses of de rel de dicto interpretations, see Sharvit 1998 and the references therein.
... if \( a \) is to have a belief about \( b \) then \( b \) must stand in a relation to \( a \) which puts him into cognitive contact with \( a \). We shall say (using the terminology of David Lewis in 1979) that such a relation \( \xi \) is suitable for a person \( a \) and a res \( b \) in a world \( w \).  

(Cresswell and von Stechow 1982: 508)

The suitable relation is also called an acquaintance relation. In the scenario in (8), there are two acquaintance relations, \( R \) and \( R' \); \( R \) is the relation 'x glimpsed y in a brown hat on a certain occasion \( O \)' and \( R' \) is the relation 'x glimpsed y in a gray hat on a certain other occasion \( O' \)'. Due to the different relations, for Ralph, the man in a brown hat is a different individual than the man in a gray hat, and hence his belief worlds contain no contradiction.

Such an analysis of propositional attitudes is sometimes called the De Se analysis, and it will play a crucial role in Portner's approach in accounting for anaphoric links in intensional contexts.

4.3 Interpretations of pronouns in intensional contexts

This section describes the basic facts about the interpretation of pronouns in intensional contexts. Indefinite NPs in the scope of modals and propositional attitude verbs cannot antecede pronouns in the following sentences.

(10) John must have caught a fish\( i \). *It was a salmon\( i \).
(11) Hob thinks a witch\( i \) blighted Bob's mare. *She\( i \) is old.

The anaphoric links between the indefinite NPs and the pronouns cannot be established unless the former are interpreted as de re. This fact follows from the assumption that modals and propositional attitude verbs create inaccessible domains. In our current framework, these examples are ruled out due to the failure of dynamic binding.

But if pronouns are also in the scope of intensional expressions, the anaphoric links become possible, as in (12) and (13).

(12) John must have caught a fish\( i \). He must have eaten it\( i \).
(13) Hob thinks a witch\( i \) blighted Bob's mare, and Nob thinks she\( i \) killed Cob's sow.
(12) is a case of modal subordination. This is so called because the proposition embedded in the modal in the second sentence, in this case [he ate it], seems to be semantically subordinated to the scope of the modal in the first sentence, like "John must have caught a fish and have eaten it." (13) is a version of Geach's Hob-Nob sentence, where the pronoun can be anaphoric to the indefinite NP even if there is no witch in the world of evaluation. Hob-Nob sentences should be considered in at least two situations, as described in Edelberg 1986.

(14) Scenario I:

Last night, Bob's mare became quite ill. Hob, who tends Bob's barn, inferred that a witch blighted her. This morning Hob said to his friend, Nob, "A witch blighted Bob's mare." Nob believes what Hob has told him. He thinks for a moment, and says, "Cob's sow died early this morning. I'll bet the same witch killed the sow, too." But in fact both animals fell ill due to perfectly natural causes. (Edelberg 1986: 1-2)

In this case, Nob knows what Hob thinks, so the second sentence of (13) is paraphrased as "Nob thinks that the witch who Hob thinks blighted Bob's mare killed Cob's sow." A harder case is a scenario like (15).

(15) Scenario II:

The Gotham City newspaper have reported that a witch, referred to as "Samantha", has been on quite a rampage. According to the article she has been blighting farm animals and crops and throwing people down wells. In reality, there is no such person: the animals and crops all died of natural causes, and the people found at the well-bottoms had all stumbled in by accident in a drunken stupor. The news reporters simply assumed that a witch was responsible for all the mishaps, and dubbed her "Samantha." Hob and Nob both read the Gotham Star and, like most folks, they believe the stories about the witch. Hob thinks
Samantha must have blighted Bob's mare, which took ill yesterday. Nob thinks
Samantha killed his friend Cob's sow. (Edelberg 1986: 2)

In this situation, the possible paraphrase of the second sentence of (13) is "Nob thinks that
the same witch killed Cob's sow." As Edelberg points out, the important fact is that the
anaphoric link in this interpretation can be established even if Nob knows nothing about
Hob or Bob's mare.

Now let us see if the E-type strategy derives intended readings of Hob-Nob sentences.
For the reading obtained in the scenario I, the following function gives us the desirable
interpretation.

(16) Scenario I:
Nob thinks that f(h) killed Cob's sow.
f: functions from individuals into the witches that those individuals think blighted
Bob's mare.

But it is not clear how the reading in scenario II is derived. Suppose the most salient
function is the one from individuals into the witches that those individuals think exist.
Then there are two possibilities, as in (17a) and (17b).

(17) Scenario II:
a. Nob thinks that f(h) killed Cob's sow.
f: functions from individuals into the witches that those individuals think
exist
b. Nob thinks that f(n) killed Cob's sow.
f: functions from individuals into the witches that those individuals think
exist

(17a) gives us the interpretation such that Nob thinks that the witch that Hob thinks exists
killed Cob's sow. This is not the interpretation that we want, since, by assumption, Nob
doesn't know what Hob thinks exists. In (17b), the function takes 'Nob', and returns 'the
witch that Nob thinks exists.' But nothing guarantees that the witch that Nob thinks exists
is identical to the one that Hob thinks exists. Again, this is not the reading we want, and it can be concluded that the E-type strategy can't account for at least the reading obtained in (15).

Japanese provides interesting data that forces us to consider a third way of establishing anaphoric links in intensional contexts. Like English, Japanese modals and propositional attitude verbs create opaque domains for variables, as in (18) and (19).²

(18)  Johnj-wa sakanaî-o tsut-ta-nichigaina-i.  (Soshite) proj *soreî-o tabe-ta.
     -Top fish-Acc catch-Past-must-Pres and it-Acc eat-Past
     'John must have caught a fishî. He ate itî.'

     -Top -Nom alien-Acc catch-Past Comp think-Prog-Pres
     (Soshite) Scully-ga  *soreî-o uchikoroshi-ta.
     and -Nom it-Acc shoot.dead-Past
     'John thinks that Mulder caught an alienî. Scully shot itî dead.'

If the second sentences have intensional expressions, however, the intended anaphoric links become possible, and interestingly overt pronouns are acceptable, as in (20) and (21).

(20)  Johnj-wa sakanaî-o tsut-ta-nichigaina-i.
     -Top fish-Acc catch-Past-must-Pres
     (Soshite) proj soreî-o tabe-ta-nichigaina-i.
     and it-Acc eat-Past-must-Pres
     'John must have caught a fishî. He must have eaten itî.'

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² The null pronouns in intensional contexts will be discussed in the next section.
   Top Nom alien-Acc catch-Past Comp think-Prog-Pres
Mary-wa [Scully-ga sore\textsubscript{\texti} o uchikoroshi-ta to] omot-tei-ru.
   Top Nom it-Acc shoot.dead-Past Comp think-Prog-Past
(i) ‘John thinks that Mulder\textsubscript{i} caught an alien\textsubscript{i}. Mary thinks that Scully shot
   it\textsubscript{i} (= the alien that John thinks that Mulder caught) dead.’
(ii) ‘John thinks that Mulder caught an alien\textsubscript{i}. Mary thinks that Scully shot
   it\textsubscript{i} (= the same alien) dead.’

b. Hob-wa [majo\textsubscript{\texti} ga Bob-no uma-o koroshi-ta to]
   Top witch-Nom Gen horse-Acc kill-Past Comp
omot-tei-ru. Nob-wa [soitsu\textsubscript{\texti} ga Cob-no buta-o
   Top that.guy-Nom Gen pig-Acc
koroshi-ta to] omot-tei-ru.
   kill-Past Comp think-Prog-Pres
(i) ‘Hob thinks that a witch\textsubscript{i} killed Bob’ horse. Nob thinks that she\textsubscript{i} (= the
   witch that Hob thinks killed Bob’s horse) killed Cob’s pig.’
(ii) ‘Hob thinks that a witch\textsubscript{i} killed Bob’s horse. Nob thinks that she\textsubscript{i} (= the
   same witch) killed Cob’s pig.’

The overt pronouns in (21) are ambiguous. In (21a) the overt pronoun can be interpreted
either as the alien that John thinks Mulder caught (like scenario I) and as the same alien that
John thinks Mulder caught, without Mary’s knowing what John thinks (like scenario II).
(21b) also has the same ambiguity observed in the English Hob-Nob sentence in (13).

In sum, as Edelberg 1986 points out, the E-type strategy cannot account for the
interpretation obtained in the scenario II. The fact that overt pronouns can be used in
Japanese Hob-Nob sentences also suggests the inadequacy of the E-type strategy. As I
said at the beginning of this chapter, I will claim that the pronouns in question are used like
demonstratives in direct referential use. One might cast doubt on this idea, asking how
demonstratives can refer to intensional objects. As the answer to this question, I will
introduce Portner 1996, who argues that pronouns in intensional contexts are analyzed in
the same way as demonstratives in deictic use. He proposes that acquaintance relations
between attitude holders and the res provide the referents of pronouns under the scope of
intensional operators.

4.4 Null pronouns in intensional contexts

Before going to the analysis of pronouns as referential, we will discuss the
interpretations of Japanese null pronouns in intensional contexts. In (18)-(21), we
observed the behavior of overt pronouns in intensional contexts. Let us see their overt
counterparts in the same contexts.

(22) Johnj-wa sakana1-o tsut-ta-nichigaina-i. (Soshite) proj *φi tabe-ta.
    -Top fish-Acc catch-Past-must-Pres and eat-Past
    'John must have caught a fishi. He ate iti.'

    -Top -Nom alien-Acc catch-Past Comp think-Prog-Pres
    (Soshite) Scully-ga *φi uchikoroshi-ta.
    and -Nom shoot.dead-Past
    'John thinks that Mulder caught an alieni. Scully shot iti dead.'

(24) Johnj-wa sakana1-o tsut-ta-nichigaina-i.
    -Top fish-Acc catch-Past-must-Pres
    (Soshite) proj φi tabe-ta-nichigaina-i.
    and eat-Past-must-Pres
    'John must have caught a fishi. He must have eaten iti.'
     -Top   -Nom alien-Acc catch-Past   Comp think-Prog-Pres  
Mary-wa [Scully-ga øi uchikoroshi-ta to] omot-tei-ru.  
     -Top   -Nom shoot.dead-Past Comp think-Prog-Past  
(i) ‘John thinks that Mulder; caught an alieni. Mary thinks that Scully shot  
iti (= the alien that John thinks that Mulder caught) dead.’  
(ii) ‘John thinks that Mulder caught an alieni. Mary thinks that Scully shot  
iti (= the same alien) dead.’  
(iii) ‘John thinks that Mulder caught an alien. Mary thinks that Scully shot  
an alien dead.’  

b.  Hob-wa [majoî-ga Bob-no uma-o koroshi-ta to]  
     -Top witch-Nom   -Gen horse-Acc kill-Past   Comp  
omot-tei-ru.  Nob-wa [øi Cob-no buta-o  
think-Prog-Pres   -Top   -Gen pig-Acc  
koroshi-ta to] omot-tei-ru.  
kill-Past   Comp think-Prog-Pres  
(i) ‘Hob thinks that a witchi killed Bob’ horse. Nob thinks that shei (= the  
witch that Hob thinks killed Bob’s horse) killed Cob’s pig.’  
(ii) ‘Hob thinks that a witchi killed Bob’s horse. Nob thinks that shei (=  
the same witch) killed Cob’s pig.’  
(iii) ‘Hob thinks that a witch killed Bob’s horse. Nob thinks that a witch  
killed Cob’s pig.’  
The null pronouns in (22), (23) and (24) behave in the same way as the overt counterparts.  
Those in (22) and (23) are ungrammatical and the one in (24) is acceptable. The null  
pronouns in (25) are also acceptable but they have the interpretations that their overt  
counterparts lack, namely the interpretations given in (iii). So two points should be  
discussed concerning null pronouns in Japanese intensional contexts; (i) Why isn’t the E-  
type strategy available in (22) or (23)? (ii) How are the null pronouns in (25) interpreted?
Let us consider the first question. The examples in (22) and (23) could be regarded as a kind of narrative sequence. We discussed the E-type strategy in narrative sequence cases with universally quantified antecedents in chapter 2, as in (26).

(26)  
   a. Every man walked in. I saw them.
   b. \( \exists o \uparrow \forall x[\text{man}'(x) \rightarrow \text{walk-in}'(o)(x) \land \exists o' \uparrow [\text{saw}'(o')(f(o))(I)]] \)

   \( f \): a function from occasions into groups of men that walked in at that occasion.

In (26) the most salient function is the function from the (minimal) occasion into the men that walked in at that occasion. It is clear that such a function cannot derive the desirable interpretations in (22) or (23), since the individuals denoted by \textit{sakana} ‘a fish’ in (22) and \textit{eirian} ‘an alien’ in (23) do not exist in the (minimal) occasions denoted by the first sentences. Rather the former exists in all epistemically accessible worlds and the latter in all John’s doxastically accessible worlds from the world of utterance. We also discussed in chapter 2 that null pronouns can be interpreted as functions from individuals into individuals or into kinds. The null pronouns in (22) and (23) cannot be interpreted this way either, since such functions are available only in contrastive contexts or the like. So, the unavailability of the E-type strategy in (22) and (23) is quite straightforward.

What if, then, we make a contrastive pair of sentences with null pronouns in intensional contexts? The Hob-Nob sentences in (25) are such cases, so let us consider the second question addressed above. The interpretation given in (i) of (25a), for instance, is basically the same as the one in scenario I, and it can be derived by assuming that the null pronoun is interpreted as a function from John into the alien that he thinks Mulder caught. The interpretation in (ii) corresponds to the scenario II-reading, which cannot be obtained by the E-type strategy. As mentioned above, our plan is to analyze the pronoun under this reading as indexical. So, it needs to be shown that null pronouns can also be used as demonstratives/indexical. Examples are given in (27).
(27) a. (Pointing an object)

\[ \emptyset_i \text{ nan-desu-ka?} \]
\[ \text{what-Cop-Q} \]

'What's that?'

b. (When a bowl of salad, for instance, is served at dinner)

\[ \emptyset_i \text{ kocchi-ni mawashi-te-kudasai.} \]
\[ \text{this way-to pass-Inf-please} \]

'Pass it to me, please.'

The null pronoun in (24) will also be analyzed as demonstrative in the same way as its overt counterpart in (20). As shown by the translations in (iii), the pronouns in (25a) and (25b) are also interpreted as existential, which the English Hob-Nob sentences aren't. As discussed in detail in chapter 2, such an existential reading can be derived via the E-type strategy by assuming that the null pronoun is interpreted as a function from individuals into kinds. In (25a), for instance, it is a function from Mary into the kind of witch that she thinks exists, as illustrated in (28).

(28) \[ \text{think('shoot-dead'(f(m))(scully))(m)} \]
\[ \text{f: a function from individuals into the witch-kind} \]
\[ = \]
\[ \text{think('shoot-dead'(WITCH)(scully))(m)} \]
\[ \text{via DKP} \]
\[ \text{think('}\exists x[\bigcup WITCH(x) \land \text{shoot-dead'}(x)(scully)][(m)]3} \]

This analysis is parallel to the one presented for Hoji's examples in chapter 2, repeated as (29) and (30).

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3 This is not the final representation, since the acquaintance relation between Mary and a witch is not specified. The final representation should be something like (i):

(i) \[ \text{\models think('}\exists x[\bigcup WITCH(x) \land \text{shoot-dead'}(x)(scully)][(m)]3(\text{w}, y, \emptyset) \text{ is true iff for some acquaintance relationship } R, R(y)(i) = \text{the thing presented to } y \text{ under the i-th guise provided in } w, \text{ and for all } y \in \text{Dox(}\text{lim}_{w}, \emptyset), \]
\[ \text{\models \exists x[\bigcup WITCH(x) \land \text{shoot-dead'}(x)(scully)]3(\text{w}, y, R(y)} \]

See the discussion in 4.3 for details.
In (29) the additive marker -mo ‘also’ indicates that it is Bill that is contrasted against John, so that the null pronoun is interpreted as a function from Bill into the kind of student that he teaches. On the other hand, (30) has no additive marker, so it is reasonable to assume that the topic-marked subject serves as an argument of the function, yielding the kind of student that Mary teaches. The second sentences of (25) also have no additive marker, and hence it is natural to interpret the topic-marked subjects as arguments of the functions.

In sum, there is nothing special about the behavior of null pronouns in intensional contexts. The ungrammaticality of (22) and (23) comes from the unavailability of functions which are supposed to be available in narrative sequence cases. The additional existential reading in (25) is derived via DKP. All other aspects of null pronouns in intensional contexts are the same as those of overt pronouns, and an account for them will be given in the next section.

4.5 Pronouns in intensional contexts as referential: Portner 1996

In this section, I will outline Portner’s 1996 approach to anaphoric links in intensional contexts. He claims that pronouns in these contexts should be treated as referential. So
first we will introduce the semantics of demonstratives that he adopts, and then we will see how it will be related to the analysis of pronouns in intensional contexts.

4.5.1 Demonstratives

The referent of a demonstrative expression is determined in several ways. For example, in cases like (31), the referent of a demonstrative is provided by a pointing gesture by the speaker, which is, probably, the easiest case.

(31) [That dog\textsubscript{2} eats apples.

Now suppose that that dog\textsubscript{2} refers to Shelby. Suppose further that Carol is giving some food to Shelby. Then I can say (32).

(32) She\textsubscript{3} is giving him some apples.

In this case, no demonstrating gesture like pointing is necessary. If we are acquainted with her by the appearance she presents as she gives Shelby some food, we can link she\textsubscript{3} to Carol. Following Heim 1998, Portner calls a mode of presentation 'a guise', and he labels the pointing gesture in (31) \texttt{can} and the mode of presentation in (32) \texttt{car}. The relation between the speaker \texttt{s}, a guise, and the reference is represented by a function \texttt{F} as given in (33), and as Portner notes, this is essentially Kaplan's 1977 semantics of demonstratives.

(33) a. \texttt{F(s)(can)} = Shelby

b. \texttt{F(s)(car)} = Carol

Based on the idea that indices are the bearers of reference, he further introduces a function \texttt{H}, a function from indices onto guises. So, \texttt{H(2)} = \texttt{can} and \texttt{H(3)} = \texttt{car}. With \texttt{F} and \texttt{H}, the assignment function \texttt{g} is defined as in (28), where \texttt{g} maps indices of directly referential terms onto individuals.

(34) If \alpha\textsubscript{i} is a directly referential term, then g(i) = F(s)(H(i)) Portner (1996: his (68))
4.5.2 Acquaintance relations as guises

The semantics of demonstratives given in the last subsection is assimilated to the acquaintance relation between the content of attitude and the attitude holder. In order to understand this, let us begin with the simple de re reading of (35).

(35) John believes that Mary$_2$ walked in.

As introduced above, in Quine-Kaplan-Lewis-Cresswell&von Stechow’s analysis of de re readings, (35) is paraphrased as follows: There is an acquaintance relation R such that (i) John bears R to Mary, and (ii) John believes that whoever he bears R to walked in. In Portner’s 1996 approach, the truth conditions of (35) are represented as in (36).

(36) $\llbracket \text{believe}'(\text{John, Mary}_2, \lambda x[\text{walk in}]) \rrbracket^w$ is true iff for some acquaintance relationship R,

$R(\llbracket \text{John} \rrbracket^w, \llbracket \text{Mary}_2 \rrbracket^w)$, and

for all $y \in \text{Dox}(\llbracket \text{John} \rrbracket^w), \llbracket \lambda x[\text{walk in}] \rrbracket^w y$ ($\tau z(R(y, z))$).

He follows Lewis’s 1968 theory, in which individuals are treated as existing in only one world and correspondences between individuals are established by counterpart relations. The accessibility relation Dox in (36) is one of the counterpart relations. John exists only in the world of evaluation w, while in worlds other than w, John’s counterparts y exist. ‘wy’ stands for the world in which y exists.

The truth condition of a belief sentence with more than one relation like John believes Mary$_2$ introduced Bill$_3$ to Sue$_4$ is generalized as in (37) (cf. Cresswell and von Stechow 1982).
\[ (37) \quad \llbracket \text{believe}'(a, \langle b_1, \ldots, b_n \rangle, \lambda x_1 \ldots \lambda x_n[\phi]) \rrbracket^w \quad \text{is true iff for acquaintance relationships } R_1, \ldots, R_n, \]
\[
R_1(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G}, \llbracket b_1 \rrbracket^w, \mathcal{G}), \text{ and } \ldots \\
R_n(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G}, \llbracket b_n \rrbracket^w, \mathcal{G}), \text{ and} \\
\text{for all } y \in \text{Dox}(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G}), \llbracket \lambda x_1 \ldots \lambda x_n[\phi] \rrbracket^w \quad \mathcal{G} \quad (\lambda z(R_n(y, z)) \ldots (\lambda z(R_1(y, z))).
\]

Instead of \( n \)-many relations as in (37), we can assume a single acquaintance relation, which applies to indices and individuals (\( = \) attitude holders) and returns individuals. For example, \( R(\text{John})(2) = \text{Mary} \), \( R(\text{John})(3) = \text{Bill} \), \( R(\text{John})(4) = \text{Sue} \). This is generalized as in (38).

\[ (38) \quad \llbracket \text{believe}'(a, \langle b_1, \ldots, b_n \rangle, \lambda x_1 \ldots \lambda x_n[\phi]) \rrbracket^w \quad \mathcal{G} \quad \text{is true iff for some acquaintance relationship } R, \\
R(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G})(1) = \llbracket b_1 \rrbracket^w, \mathcal{G}, \text{ and } \ldots \\
R(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G})(n) = \llbracket b_n \rrbracket^w, \mathcal{G}, \text{ and} \\
\text{for all } y \in \text{Dox}(\llbracket \lambda \cdot \rrbracket^w, \mathcal{G}), \llbracket \lambda x_1 \ldots \lambda x_n[\phi] \rrbracket^w \quad \mathcal{G} \quad (R(y)(n)) \ldots (R(y)(1))).
\]

Suppose that John is acquainted with Mary by seeing her on his left. Then the function \( R \) means that John stands in the ‘seen-on-his-left’ relation to Mary. This is exactly the same as a guise. Let us call Mary’s guise \text{mar}. Then \( F(\text{John})(\text{mar}) = R(\text{John})(2) = \text{Mary} \). So we get (39) (Portner’s (84)).

\[ (39) \quad \text{For any individual } y \text{ and index } i, \quad F(y)(H(i)) = R(y)(i).
\]

\( R \) is now defined in terms of \( F \) and \( H \) as in (40).

\[ (40) \quad R =_{\text{def}} \lambda y \lambda i[F(y)(H(i))]
\]

With \( R(y) \), (38) is represented as in (41), where the indexed variables in \( \llbracket \phi \rrbracket \) are interpreted with respect to \( R(y) \).
(41) \( \llbracket \text{believe}'(a, \langle b_1, \ldots, b_n \rangle, \lambda x_1 \ldots \lambda x_n[\phi]) \rrbracket_{w, g} \) is true iff for some acquaintance relationship \( R \),
\[
R(\llbracket \text{all}_{w, g} \rrbracket)(1) = \llbracket b_1 \rrbracket_{w, g}, \text{ and } \\
R(\llbracket \text{all}_{w, g} \rrbracket)(n) = \llbracket b_n \rrbracket_{w, g}, \text{ and }
\]
for all \( y \in \text{Dox}(\llbracket \text{all}_{w, g} \rrbracket), \llbracket \lambda x_1 \ldots \lambda x_n[\phi] \rrbracket_{w, y} R(y) \).

Portner’s main attention is an intensional contexts created by \textit{imagine}, as in (42).

(42) Mary imagined that there was \( [a \text{ unicorn}]_1 \) in the forest.

The \textit{de re} analysis in (41) seems not to apply to (42), since there is no unicorn with which Mary is acquainted. But Portner argues that all of Mary’s imagining counterparts are acquainted with unicorns. His account goes as follows. Suppose that Mary forms an image of a unicorn standing somewhat ahead of her and to her left. This image provides a guise, which he calls \textit{uni}; a ‘seen-somewhat-ahead-and-to-the-left’ guise.

(43) For any individual \( y \), \( F(y)(\textit{uni}) \) is the individual seen by \( y \) somewhat ahead and to the left.

So informally, (42) is true iff all of Mary’s imagining counterparts \( y \) see a unicorn somewhat ahead and to the left and it is in the forest. This is represented as in (44), where ‘\( I(\alpha) \)’ stands for the set of \( \alpha \)’s imagining counterparts.\(^4\)

(44) \( \llbracket \text{imagine}'(\text{Mary, } [\text{unicorn}(x_1) \land \text{in-the-forest}(x_1)] \rrbracket_{w, g} \) is true iff for some acquaintance relationship \( R \), \( R(y)(i) = \) the thing presented to \( y \) under the \( i \)-th guise provided by Mary’s image in \( w \),
\[
\text{and for all } y \in I(\llbracket \text{Mary} \rrbracket_{w, g}), \llbracket [\text{unicorn}(x_1) \land \text{in-the-forest}(x_1)] \rrbracket_{w, y} R(y).
\]

Contrary to (41), (44) does not have a condition like \( R(\llbracket \text{Mary} \rrbracket_{w, g})(1) = \llbracket a \text{ unicorn} \rrbracket_{w, g} \), since there is no actual unicorn. Instead, \( R \) encodes Mary’s image as guise like the one in (43).

\(^4\) Portner 1996 seems to assume that indefinite NPs are not existentially quantified, à la the classical DRT. In our semantics, the existential quantifier associated with \textit{a unicorn} is wiped off by existential disclosure.
(42) can be followed by a sentence (45), where the pronoun is anaphoric to a unicorn in (42).\footnote{5}

(45) She imagined that it\textsubscript{1} was white.

The truth condition of (45) is given in (46).

\[
\ll\text{imagine}'(\text{Mary, white}'(x_1)\ll^w, \beta) \text{ is true iff for some acquaintance relationship } R, \\
R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided by Mary's image in } w, \text{ and} \\
\text{for all } y \in I(\ll\text{Mary}\ll^w, \beta), \ll\text{white}'(x_1)\ll^{wy}, R(y).
\]

(45) is true iff the individual, namely 1, somehow ahead and to the left of all of Mary's imagining counterparts is white. A rough paraphrase of (45) is thus something like "She imagined that the same unicorn is white."

As Portner says, the analysis of imagine presented here is the de re analysis minus the requirement that \( R(\ll\text{Mary}\ll^w, \beta)(1) = \ll\text{a unicorn}\ll^w, \beta \). He extends the approach to cases where propositional attitude verbs other than imagine are used as in (47).

(47) John believed that [a woman]\textsubscript{1} was in the room. He believed that she\textsubscript{1} was happy.

Suppose John looked at a sign on the door saying "Occupied" and guessed that there was a woman inside but actually there was nobody inside. In this situation, the first sentence of (47) is interpreted as true, and the indefinite NP receives the de dicto-reading. Portner suggests that the sentence should be analyzed as de re about the room and proposes that the women in their respective worlds are presented to John's counterparts under the guise 'in the room whose door I am looking at.' The truth condition of the sentence is represented as in (48).

---

\footnote{5} (42) can also be followed by a sentence like (i).

(i) It\textsubscript{1} was white.

Portner argues that verbs like imagine introduce permanent accessibility relations, which guarantee that the R in (44) is maintained in (i).
(48) $\llbracket \text{believe}'(\text{John}, [\text{woman}'(x_1) \wedge \text{in-the-room}'(x_1)]w, s) \text{ is true iff for some acquaintance relationship } R, R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w,$ and for all $y \in \text{Dox}(\llbracket \text{John}w, s), \llbracket \text{woman}'(x_1) \wedge \text{in-the-room}'(x_1)]wy, R(y)$. This says that the first sentence of (47) is true iff all of John's doxastic counterparts looked at the door of the room, in which a woman $x_1$ existed. The second sentence of (47) is analyzed in the same way, as in (49).

(49) $\llbracket \text{believe}'(\text{John, happy}'(x_1)]w, s) \text{ is true iff for some acquaintance relationship } R,$ $R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w,$ and for all $y \in \text{Dox}(\llbracket \text{John}w, s), \llbracket \text{happy}'(x_1)]wy, R(y)$. According to the truth condition in (49), the second sentence of (47) is true iff all of John's doxastic counterparts looked at the door of the room, in which the same woman was happy.

The intuition behind this analysis is, I think, that as long as an attitude holder keeps the modal base (and the ordering source) constant (in other words, unless he changes his attitude to a proposition), the acquaintance relations in the first sentence and that in the second sentence remain the same, and hence the pronoun refers to the same individual denoted by the antecedent. Obviously, this referential analysis of pronouns in intensional contexts directly applies to the modal subordination cases like (12), repeated as (50), and its Japanese counterpart with the overt pronoun in (13) and the one with null pronoun in (24), repeated together as (51).

(50) John must have caught a fish$_2$. He must have eaten it$_2$.

(51) $\text{John}_1$-wa sakana$_2$-o tsut-ta-nichigaina-i.
-Top fish-Acc catch-Past-must-Pres

(Soshite) proj sore$_2$-o/∅$_2$ tabe-ta-nichigaina-i.
and it-Acc eat-Past-must-Pres

'John must have caught a fish$_2$. He must have eaten it$_2$.'
Suppose that the speaker utters (50), judging from the fact that John’s fishing rods were out of the case, the fishing net was wet, and so on. I assume that such epistemic evidence provides a guise, say, fis. Then, the truth condition of (50) is represented as in (52).

\[ \Box \langle \text{fish}'(x_2) \land \text{catch}'(x_2)(j) \rangle \text{ is true iff for some acquaintance relationship } R, \]
\[ R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w, \text{ and} \]
\[ \text{for all } y \in \text{Epis}(\ll \text{the-speaker}\rr w, \langle \rangle), \ll \text{fish}'(x_2) \land \text{catch}'(x_2)(j) \rr w y, R(y). \]

‘Epis(\ll \text{the-speaker}\rr w, \langle \rangle)’ stands for the set of the speaker’s epistemic counterparts. \( R(y)(2) = \text{the individual that is a fish and 2-indexed.} \) So, the whole formula says that the first sentence of (50) is true iff all of the speaker’s epistemic counterparts have evidence, which leads to the conclusion that John caught a fish \( x_2 \). The truth condition of the second sentence of (50) is given in (53), where the acquaintance relation \( R \) is supposed to be the same as the one in (52), and the pronoun is interpreted as ‘the same fish’.

\[ \Box \langle \text{eat}'(x_2)(j) \rangle \text{ is true iff for some acquaintance relationship } R, \]
\[ R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w, \text{ and} \]
\[ \text{for all } y \in \text{Epis}(\ll \text{the-speaker}\rr w, \langle \rangle), \ll \text{eat}'(x_2)(j) \rr w y, R(y). \]

The Japanese example in (51) is accounted for in the same way. Remember that the grammaticality of the overt pronoun in (51) indicates that the E-type strategy is not available in this context, and hence this provides a piece of empirical evidence for Portner’s approach.

### 4.5.3 Hob-Nob sentences

The apparent difficulty of applying Portner’s approach to Hob-Nob sentences like (54) comes from the fact that different attitude holders are concerned.

\[ \text{Hob thinks } [a \text{ witch}]_2 \text{ blighted Bob’s mare, and Nob thinks she}_2 \text{ killed Cob’s sow}. \]

In order to obtain the identity of the witch in question, the equality between (55a) and (55b) must be guaranteed. And actually, it is easily shown.
(55)  a.  \(F(\text{Hob})(H(2))\)
    b.  \(F(\text{Nob})(H(2))\)

Let us consider if the same guise is provided to Hob and Nob. As described in the
scenario II in (15), they got acquainted with Samantha by reading the Gotham Star. This
means that reading the paper serves as a guise. Let us call this guise \textit{sam}. The function in
(55) is thus represented as in (56).

(56)  a.  \(F(\text{Hob})(\text{sam})\)
    b.  \(F(\text{Nob})(\text{sam})\)

Recall that guises are modes of presenting individuals to attitude holders. So, if two
attitude holders are presented something in the same mode, then the presented objects
should be identical. Hence, in general, (57) holds (cf. (43)).

(57)  For any individual \(y\), \(F(y)(\text{sam})\) is the individual whose article in the Gotham
Star was read by \(y\).

Now, the truth condition of (54) is straightforward, as given in (58) for the first sentence
and (59) for the second.

(58)  \(\ll \text{think}'(\text{Hob}, \lbrack \text{witch}'(x_2) \land \text{blight}'(\text{Bob's mare})(x_2)\rbrack)^{w}, g\) is true iff for some
acquaintance relationship \(R\), \(R(y)(i) = \text{the thing presented to } y\) under the \(i\)-th guise
provided in \(w\), and

    for all \(y \in \text{Dox}(\ll \text{Hob}^{\ll w}, g), \ll \text{witch}'(x_2) \land \text{blight}'(\text{Bob's mare})(x_2)^{\ll w}, y\), \(R(y)\).

(59)  \(\ll \text{think}'(\text{Nob}, \lbrack \text{kill}'(\text{Cob's sow})(x_2)\rbrack)^{w}, g\) is true iff for some acquaintance
relationship \(R\), \(R(y)(i) = \text{the thing presented to } y\) under the \(i\)-th guise
provided in \(w\), and

    for all \(y \in \text{Dox}(\ll \text{Nob}^{\ll w}, g), \ll \text{kill}'(\text{Cob's sow})(x_2)^{\ll w}, y\), \(R(y)\).

When the acquaintance relation \(R\) in (58) is the same as that in (59), the individual with
index 2 in (58) is identical to that in (59). In other words, the Hob-Nob type anaphoric
dependency is acceptable only when we can set up a context that is specific enough to
provide the identical acquaintance relationship to different attitude holders, as scenario II in
(15). With an identical acquaintance relationship, the referent of the indefinite noun phrase for one attitude holder can be identical to the referent of the pronoun for the other. Like the imagine case, this analysis regards a witch and she as referential as if there were an actual individual. And this is the right way to go, as suggested by Roberts 1996:

(60) The witch in Hob’s belief worlds must share certain properties with that in Nob’s world, but their beliefs about this witch needn’t be identical, as in the case where Hob and Nob don’t know of each other’s beliefs about her relations to Bob’s mare and Cob’s sow. This is not different in principle than beliefs about actual persons: I may believe that Mozart died of poisoning, while you believe that he died of a hematoma of the brain, and you and I may not even have met. But should we meet, we would have no problem agreeing that it is the same Mozart about whom we hold these contradictory beliefs – the Mozart in my belief worlds and that in yours are in some sense counterparts. Hence, the problem of intentional identity in examples like [(54)] reduces to the more general problem of intensional identity, i.e. identity across possible worlds. (Roberts 1996: 237)

The Mozart case given by Roberts in (60) indicates the correctness of Portner’s adopting the De Se analysis of propositional attitudes, for the problem of the identity of Mozart is parallel to Quine’s Orcutt’s problem in (8).

4.5.4 Summary

To sum up, in this subsection, we introduced Portner’s idea that pronouns in intensional contexts are analyzed as referential by giving an acquaintance relationship,

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6 Roger Schwarzchild (personal communication) pointed out a problem of this analysis as follows. Suppose that everything is as scenario II in (15), but it is also true that Hob believes that witches all have read hair, and Nob believes they all have black hair. Under this scenario, (54) is still acceptable, but $F_{(Hob)}(\text{sam})$ cannot be identical to $F_{(Nob)}(\text{sam})$. In order to discuss the problem, let us consider (i) under scenario II.

(i) Hob believes that Samantha has red hair. Nob believes that she has black hair.

As in (i), even when an individual level predicate like have red hair is used, the intended anaphoric link is established (see also the Mozart case described in (60)). This means that the acquaintance relationship $R$ in the first sentence is the same as that in the second sentence, and crucially that acquaintance relationship lacks information of $F_{(Hob)}(\text{sam})$’s and $F_{(Nob)}(\text{sam})$’s hair color. In other words, if the Gotham City newspaper is the only source of information about Samantha, and it reports nothing about her hair color, then Hob and Nob beliefs about it do not matter. So, I tentatively assume that $F_{(Hob)}(\text{sam})$ can be identical to $F_{(Nob)}(\text{sam})$ under Schwarzchild’s scenario.

7 She also cites Portner’s works on mood and modality.
which serves as a guise. We showed that his approach accounts for the fact that overt pronouns can be used in Japanese intensional contexts. We also applied his approach to Hob-Nob sentences, based on the idea that if different individuals, say, Hob and Nob, are presented a thing under the same guise, then they are presented the identical thing. Consequently, the anaphoric links in Hob-Nob sentences become possible even if the two attitude holders do not share their beliefs.⁸

4.6 Combination of different modals

Finally, we will discuss cases in which two sentences have different modal expressions, as in (61)-(63).⁹

(61) John must have caught a fish₂. He might have eaten it₂.

(62) John might have caught a fish₂. *He must have eaten it₂.

(63) A thief₂ might break into the house. He₂ would steal the silver.

The contrast between (61) and (62) or the like has been discussed by many linguists such as Jackendoff 1971, Lakoff 1972, DeCarrico 1980, McCawley 1981, Heim 1992, Roberts 1996 among others. (63) is Roberts’ 1987, 1989 modal subordination case, which has also attracted many linguists’ interest. Our starting point is: Can the analysis presented in

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⁸ Another important claim by Portner 1996 is that accessibility relations serve as discourse referents. This claim, combined with the idea that acquaintance relationships as guises, is formalized in the framework of file change semantics.

⁹ The same contrast is observed in Japanese, too.

(i) John-wa sakana₂-o tsut-ta-nichigaina-i.
   -Top fish-Acc catch-Past-must-Pres
   Soshite pro sore₂-o/ø₂ tabe-ta-kamoshirena-i.
   and it-Acc eat-Past-might-Pres
   ‘John must have caught a fish₂. And he might have eaten it₂.’

(ii) John-wa sakana₂-o tsut-ta-kamoshirena-i.
    -Top fish-Acc catch-Past-might-Pres
    Soshite pro sore₂-o/ø₂ tabe-ta-nichigaina-i.
    and it-Acc eat-Past-must-Pres
    ‘John might have caught a fish₂. *And he must have eaten it₂.’

In (ii) both the overt and the null pronouns are unacceptable. Incidentally, Japanese has no expression corresponding to irrealis would.
the previous section account for examples like (61)-(63)? As we will see, the answer is negative. It will then be discussed how to deal with these cases. Our solution is the same as the traditional treatments and nothing new will be proposed. The contrast between (61) and (62) is a matter of presupposition projection whereas (63) can be best accounted for by Robertsian accommodation-based approach.

4.6.1 Failure of presupposition projection

Let us consider the truth conditions of the two sentences in (61).

(64)  

a. John must have caught a fish$_2$.

\[ \square [\text{fish}'(x_2) \land \text{catch}'(x_2)(j)] \| w, \| w. \] is true iff for some acquaintance relationship $R$, $R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w$, and for all $y \in \text{Epis}(\| w, \| w. \), $\square [\text{fish}'(x_2) \land \text{catch}'(x_2)(j)] | w, R(y)$.

b. He might have eaten it$_2$.

\[ \Diamond [\text{eat}'(x_2)(j)] \| w, \| w. \] is true iff for some acquaintance relationship $R$, $R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w$, and for some $y \in \text{Epis}(\| w, \| w. \), $\Diamond [\text{eat}'(x_2)(j)] | w, R(y)$.

It is reasonable to assume that the speaker of (61) utters the two sentences based on the same modal base and the same ordering source. In this case, in view of the evidence available to the speaker, it is necessary that John caught a fish and it is possible that he ate it. Accordingly the acquaintance relation $R$ in (64a) is the same as that in (64b), and hence the anaphoric link is possible.

It is clear, however, that this analysis doesn't work for the ungrammatical case in (62), since the acquaintance relationship between the speaker's counterpart and the individual with index 2 in the first sentence is maintained in the second sentence, too. So, our pronouns-as-referential analysis cannot account for the contrast between (61) and (62). In
what follows, however, I will argue that the contrast in question is not a problem of how to establish the anaphoric links.

Lakoff 1972 discusses the same kind of contrast as in (65) and proposes a constraint in (66).

(65)  

a. It’s certain that Sam will find a girl and possible that he will kiss her.

b. *It’s possible that Sam will find a girl and certain that he will kiss her.

(Lakoff 1972: 619)

(66) The antecedent must have a referent in all the worlds in which the anaphoric noun phrase (or pronoun) has a referent. (Lakoff 1972: 620)

The effect of (66) is self-evident. ‘certain(φ)’ entails ‘possible(φ)’ but not vice versa. So, in (65a), the indefinite NP can have a referent in all the worlds in which the pronoun has a referent. But this is not the case in (65b). Likewise, ‘must(φ)’ entails ‘might(φ)’ but not vice versa, which accounts for the contrast between (61) and (62). In our current framework, (66) can be restated as follows: The counterparts of the attitude holder in all relevant worlds must have an acquaintance relationship with the referent of the antecedent as well as the referent of the pronoun. Crucially the pronoun depends on the antecedent for identification, but in these examples, there are worlds in which the antecedent fails to refer.

Although Lakoff 1972 discusses only the anaphoric links between indefinite NPs and the anaphoric NPs/pronouns (and therefore (66) is a constraint only on them), as is well known, the same kind of contrast is observed in other cases, too (cf. Heim 1992 and Roberts 1996).

(68)  

a. John must have come to the party. Bill might have come to the party, too.

b. John might have come to the party. *Bill must have come the party, too.

(69)  

a. John must have become a Chair. He might have regretted becoming a Chair.

b. John might have become a Chair. *He must have regretted becoming a Chair.
These examples show that the contrast we are looking at is actually a matter of presupposition projection. In the ungrammatical sequences in (68) and (69), the first sentences do not satisfy the presuppositions of the second sentences in all the worlds where the second sentences are true. By the same token, (62) and (65b) are unacceptable not because the intended anaphoric links cannot be established, but because there are some worlds where the referents of pronouns (i.e. an individual with index 2 and an individual with index 4) are not determined. So, they are just like the case of *the king of France is bald*, where the presupposition of the definite description is not satisfied if it is evaluated in this real world.

This is good news for us, for our approach regards indefinite NPs and pronouns in intensional contexts as referential, so that neither (62) nor (65b) is ruled out because of the failure of establishing the intended anaphoric links. But rather they are ruled out because the presupposition of the second sentences are not satisfied in all the relevant worlds. (70) also makes the same point.

(70)  
   a. The captain must have caught Moby-Dick$_2$. He might have killed it$_2$.
   b. The captain might have caught Moby-Dick$_2$. *He must have killed it$_2$.

Here a name is used in place of an indefinite NP, but still the same contrast is observed.

4.6.2 Irrealis *would*

One might ask whether our approach accounts for the grammaticality of (63), but, in fact, this is not really a valid question. This is because how to establish the intended anaphoric link is not at issue, just like the cases discussed in the previous subsection. The real problem is determining what the logical relation between ‘might(ϕ)’ and ‘would(ϕ)’ is. With Roberts 1987, 1989, we will claim that (63) should be interpreted as in (71), where the underlined part is accommodated.

(71)  
   A thief might break into the house. *If a thief breaks into the house, he would steal the silver.*
Let us consider first the interpretation of (63). The modal base of the first sentence of (63) is circumstantial, that is, "in view of the present state of the house or of the area where the house is located, a thief might break into the house," and the ordering source is stereotypical. On the other hand, the would in the second sentence is interpreted as counterfactual and it is evaluated relative to the empty modal base and the totally realistic ordering source (see Kratzer 1981, 1991). The truth conditions of the two sentences are given in (72).

(72) a. A thief_2 might break into the house.

\[ \lll \diamond \text{thief}'(x_2) \land \text{break-into-the-house}'(x_2) \rrl_w, w \text{ is true iff for some acquaintance relationship } R, R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w, \text{ and for some } y \in \text{Cir}(\lll \text{the-speaker}\rrl_w, w), \]

\[ \lll \text{thief}'(x_2) \land \text{break-into-the-house}'(x_2) \rrl_{wy}, R(y). \]

b. He_2 would take the silver.

\[ \lll \square \text{take-the-silver}(x_2) \rrl_w, w \text{ is true iff for some acquaintance relationship } R, R(y)(i) = \text{the thing presented to } y \text{ under the } i\text{-th guise provided in } w, \text{ and for all } y \in \text{Irr}(\lll \text{the-speaker}\rrl_w, w), \lll \text{take-the-silver}(x_2) \rrl_{wy}, R(y). \]

'\text{Cir}(\lll \text{the-speaker}\rrl_w, w)' and '\text{Irr}(\lll \text{the-speaker}\rrl_w, w)' stand for the set of the speaker's circumstantial counterparts and the set of the speaker's irrealis counterparts, respectively. As for the interpretation of the pronoun, it is interpreted referentially by the acquaintance relation R.

At a glance, the sequence in (63) looks like the might-must pattern, in that the modal in the first sentence existentially quantifies over the set of counterparts while the one in the second sentence universally quantified over it. And, in fact, this difference of quantificational force is the reason of the ungrammaticality of the fish example in (62). The difference between the might-must pattern and the might-would pattern is obvious. In the former, the two modals are indicative and introduce the same modal base and the same
ordering source, so the entailment relation holds between ‘might(ϕ)’ and ‘must(ϕ)’, and hence Lakoff’s constraint can apply. On the other hand, as mentioned above, might and would introduce different kinds of modal bases and ordering sources, so that there is no logical relation between ‘might(ϕ)’ and ‘would(ϕ)’. So, the grammaticality of (63) does not follow from the satisfaction of Lakoff’s constraint.

As Roberts argues, (63) should be analyzed as in (71). The accommodation like (71) is triggered by the semantic property of would. Even if no anaphora is concerned, (74a) is interpreted like (74b), where the counterfactual conditional is accommodated.

(74) a. It might be raining outside. Tomorrow’s game would be postponed.
    b. It might be raining outside. If it is raining outside, tomorrow’s game would be postponed.

This is very important since it suggests that accommodation takes place not for the purpose of anaphora resolution. In chapter 2, we argued against Robertsian accommodation in bathroom sentences, where the negation of the first disjunct is supposed to be accommodated in the second disjunct as in (75).

(75) \neg A \lor B \equiv \neg A \lor (A \rightarrow B)

The question is: Is there any independent reason why accommodation in (75) would have to take place other than anaphora resolution? I don’t think there is any. To interpret a sentence like John is not a linguist or Mary is a logician, accommodation like John is not a linguist or if John is a linguist, Mary is a logician is not necessary. In the case of would, on the contrary, accommodation must take place if the counterfactual if-clause is implicit. Otherwise, the would-sentence cannot be interpreted. Such a restricted use of accommodation is necessary to account for the ungrammatical might-must sequence. If accommodation took place for anaphora resolution, (62) and (65b) would be grammatical, but this is not the case. So, it should be concluded that the semantics of would requires
accommodation, and it is not anaphora-resolution-driven. It is an open issue, however, what else can trigger accommodation.\footnote{Heim (1992: 202) also suggests a restrictive use of accommodation.}

4.7 Conclusion

In this chapter, we have discussed intersentential anaphoric links in intensional contexts. We had two main problems concerning intensional contexts. One is that in spite of the fact that intensional expressions such as modals and propositional attitude verbs create inaccessible domains, Japanese overt pronouns can be used in intensional contexts. This seems to be counterevidence for our claim that they are variables to be dynamically bound. The other problem is that neither dynamic binding nor the E-type strategy derive the identity reading in Hob-Nob sentences. We showed that Portner’s approach solves these problems. In his approach, pronouns in intensional contexts are interpreted as indexicals, like demonstratives. This is consistent with the fact that overt pronouns belong to the demonstratives paradigm in Japanese. We also discussed some cases of combination of different modals, and suggested that Robertsian accommodation has to take place in \textit{would}-sentence, but should not in other cases like the \textit{might-must} sequence and bathroom sentences.
Chapter V: Final Remarks

The main purpose of this dissertation was to argue that dynamic binding and the E-type strategy are both available in natural language. Our discussion began with differences between overt and null pronouns in Japanese with respect to their distributions. In narrative sequence cases with universally quantified antecedents, paycheck sentences, and bathroom sentences, null pronouns are perfectly acceptable while overt pronouns are marginal. This observation fits in with Chierchia’s 1992, 1995 claim that pronouns in these contexts are interpreted not by dynamic binding but by the E-type strategy. We also observed that Japanese null pronouns can be used in contexts like when a gangster passes by another gangster, he glares at him, where only dynamic binding derives desirable interpretations. Based on these observations, we claimed (1).

(1) In Japanese donkey contexts,
   a. null pronouns are ambiguous between variables and E-type pronouns, and
   b. overt pronouns are variables which must be dynamically bound (discourse markers).

We considered some apparent problems concerning (1). First, the interpretations of null pronouns in Japanese paycheck sentences are different from those in English counterparts. The latter are always interpreted as the maximal sum whereas the former interpreted as existential. We claimed that in languages like Japanese, E-type pronouns are interpreted as functions from individuals into kinds, and DKP derives existential readings. We also argued that functions into kinds are not different from functions into the maximal sum of individuals in that they both denote the greatest elements. Second, in Chierchia’s approach, dynamic binding is responsible for weak readings of donkey sentences, but strong readings are available with overt pronouns in Japanese donkey sentences. We discussed in chapter 3 that overt pronouns in such contexts are actually not donkey pronouns but ordinary bound pronouns c-commanded by their antecedents at LF. Third,
in chapter 4, we observed that Japanese overt pronouns can be used in intensional contexts such as Hob-Nob sentences. With Portner 1996, we claimed that like demonstratives they are interpreted as indexicals in these contexts.

There are many interesting issues that this approach raises, some of which have been mentioned in the course of the discussions. One of the most fundamental questions that I have left to the last, however, is: Why (1)?

This is a tough question, and in fact I had thought at an early stage of the present project that (1) is a matter of lexical specification, and it could have been the other way around. There might be better ways of deriving the difference between overt and null pronouns described in (1), and I will speculate on two possibilities.

Maria Bittner (personal communication) directed my attention to other languages that allow for null pronouns and languages that have stressed and unstressed pronouns or strong and weak forms of pronouns. She informed me that Polish has strong and weak forms of pronouns, and interestingly enough, only weak ones are grammatical in paycheck and bathroom contexts. Likewise in English it is possible to put stress on pronouns, and stressed pronouns are not allowed in paycheck or bathroom sentences, as given in (2), where caps are used to indicate emphatic stress.

(2)  

a. Everyone but John gave his paycheck to his wife.  *John gave IT\textsubscript{i} to his mistress.

b. *This building doesn’t have a bathroom\textsubscript{i} or IT\textsubscript{i} is in a funny place.

This fact seems to suggest that stressed and unstressed pronouns in English correspond to overt and null pronouns in Japanese. If so, the semantics of Japanese overt pronouns could be assimilated to that of English stressed pronouns. It will be shown below,

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1 This question was raised by Veneeta Dayal, Maria Bittner and Pauline Jacobson.
2 For the relation between phonological realizations of pronouns and their semantic/pragmatic effects (mainly in Romance pro-drop languages and English), see Samek-Lodovici 1996 and the references therein.
3 Richard Larson (personal communication) also pointed out the ungrammaticality of examples like (2).
however, that the ungrammaticality of (2) is caused by a factor that is not detected in Japanese, which will lead us to the conclusion that the distribution of English stressed pronouns is irrelevant to that of Japanese overt pronouns.

As is well-known, a sentence like *HE is singing is interpreted as ‘he is singing, not anyone else’, where contrastive interpretation is assigned to the stressed pronoun. Luján 1986 points out that an ungrammatical example like (3a) becomes grammatical when put in a contrastive context, as in (3b):4 5

(3)  
   a. After hei/*/HEi woke up, Johni went to town.  
   b. What did John and his wife do this morning?  
      After HEi woke up, Johni went to town, but I have no idea of what  
      SHE did.  
      (Luján 1986: 251)

Let us consider donkey pronouns in contrastive contexts. The example in (4) makes the same point as those in (2).

(4) There isn’t an American female student in this building or shei /*SHEi is hiding in a funny place.

Interestingly, the stressed pronoun becomes acceptable if used in a contrastive context like (5).

(5) There isn’t an American female studenti or an Asian male professorj in this building, or SHEi is hiding in a funny place and HEj is lost in the basement.

It might be safe to conclude that it is not the stressed E-type pronouns that make the sentence in (2) and (4) ungrammatical, but rather it is the inappropriate use of contrastive stress.

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4 I am indebted to Maria Bitter for bringing Luján’s 1986 work to my attention.
5 Luján’s conclusion seems to suggest that the semantic/pragmatic differences between stressed and unstressed pronouns in English can be extended to those between strong and weak pronouns in languages like Polish.
Do Japanese overt pronouns have such a contrastive function, then? Obviously not. A sentence like (6) is not necessarily interpreted as “John read it, not anything else”.

(6) John-wa sore-o yon-da.
    -Top it-Acc read-Past
    ‘John read it.’

And both overt and null pronouns can be used in a cataphoric context as in (7).

(7) o/o-sore-i-o yom-azu-ni, John-wa LGBi-o hihanshi-ta.
    it-Acc read-Neg-Inf -Top -Acc criticize-Past
    ‘Without reading it, John criticized LGBi.’

These examples show that Japanese overt pronouns behave differently from English stressed pronouns, and it should be concluded that assimilating the former to the latter is not the right way to go.

Gennaro Chierchia (personal communication) suggested to me that the anti-E-type property of overt pronouns should be related to the fact that they are So-series demonstratives. As shown in (8) and (9), demonstratives are not acceptable in paycheck or bathroom sentences.

(8) Every man but John gave his paychecki to his mistress. *John gave that paychecki /thati to his mistress.

(9) *This building doesn’t have a bathroomi or that bathroomi /thati is in a funny place.

These data show that demonstratives are subject to accessibility conditions. On the other hand, demonstratives can be used in a donkey sentence if an appropriate context is set up, as in (10).

(10) a. Every farmer who owns a donkeyi beats thati.

b. Every boy who has a dogi for a long time thinks that thati is the cutest dog
    on earth. (Gennaro Chierchia: personal communication)

The pronouns in relative clause donkey sentences are interpreted by dynamic binding via dynamic conservativity. For example, (10a) is understood as “every farmer who owns a
donkey is a farmer who owns a donkey_i and beats that_i," where the demonstrative is anaphoric to the second a donkey. And interestingly enough, the demonstrative allows only for the weak reading, which indicates that it is actually interpreted by dynamic binding and never interpreted as a function.

Chierchia suggests that (8)-(10) can be accounted for by assuming that demonstratives are identity maps, which are represented as follows.

(11)  a. that paycheck_i  ==⇒  ∀y [paycheck'(y) ∧ C(y) ∧ y = x_i]
     b. that_i  ==⇒  ∀y [C(y) ∧ y = x_i]

'C' is some contextually specified property.

An indexical interpretation of the demonstrative obtains if x_i is associated with an act of demonstration like pointing. In the notion used in chapter 4, this is represented as in (12).

(12)  ∀y [paycheck'(y) ∧ C(y) ∧ y = F(s)(H(i))],

where H is a function from indices onto guises.

On the other hand, if x_i is dynamically bound by its coindexed antecedent, it is interpreted anaphorically, as in (10). The translations given in (11) account for the ungrammaticality of (8) and (9), since the demonstratives are not dynamically bound. The unavailability of overt pronouns in Japanese paycheck and bathroom sentences also follows from the translation in (11b).

There is, however, a difference between Japanese overt pronouns (So-series demonstratives) and English demonstratives. As given in (13), the former can be c-commanded by their antecedents, whereas the latter resist being c-command-bound, as in (14).
(13) Dono nyuuusu bangumi\textsubscript{i}-mo [Chomsky-ga sore\textsubscript{i}-o which news program-\textbar -Nom it-Acc
bujokushi-ta to] hoodooshi-ta.
insult-Past Comp report-Past

'Every news program\textsubscript{i} reported that Chomsky insulted it\textsubscript{i}.'

(14) *Every man\textsubscript{i} thinks that Mary hates that man\textsubscript{i}/ that\textsubscript{i}.

Chierchia suggested several ways to go, and I (tentatively) follow one of them, probably the simplest one. That is, English demonstratives are R-expressions, and hence cannot be c-command-bound (but can be dynamically bound), while Japanese overt pronouns are pronominal. The immediate question is, of course: Where does this difference come from? And a related question is: Of the three series of Japanese demonstratives, why can only So-series demonstratives be c-command-bound? It might be good if we could find some principled answer to these questions, rather than assume that they are matters of the lexicon. However, I must leave this for future research.

Let me conclude this dissertation by pointing out that the study of Japanese pronouns has provided us with a novel window into the well-studied phenomenon of discourse anaphora. So far, the primary handle on anaphora resolution was obtained by varying potential antecedents. The present study has shown that it may be as fruitful to study distinctions among the anaphoric elements themselves. While differences between null and overt pronouns had been analyzed syntactically, I believe their semantic properties have largely been ignored. I hope this study promotes further research into the semantics of pronominals.
Appendix

The syntax and semantics of the revised version of intentional logic (Chierchia 1995: 122-123)

The set $\text{TYPE}$ of types is defined as follows:

1. The set of $\text{TYPE}$ of types is the smallest set such that:
   i. $e, t \in \text{TYPE}$
   ii. if $a, b \in \text{TYPE}$, $<a, b>, <s, a> \in \text{TYPE}$

2. For each $a \in \text{TYPE}$, the set $\text{ME}_a$ of well-formed expressions of type $a$ is the smallest set such that:
   i. $\text{DM} \subseteq \text{Var}_e$, where $\text{DM}$ is the set of ‘discourse markers’
   ii. $\text{Var}_a, \text{Cons}_a \subseteq \text{ME}$
   iii. If $\beta \in \text{ME}_{<a, b>}$ and $\alpha \in \text{ME}_a$, $\beta(\alpha) \in \text{ME}_b$
   iv. If $\alpha \in \text{Var}_a$ and $\beta \in \text{ME}_b$, $\lambda \alpha[\beta] \in \text{ME}_{<a, b>}$
   v. If $\phi, \psi \in \text{ME}_t$, and $\alpha \in \text{Var}_a$, then $\neg \phi, [\phi \land \psi], [\phi \lor \psi], \exists \alpha \phi, \forall \alpha \phi$ are all in $\text{ME}_t$
   vi. If $\beta \in \text{ME}_a$, $\text{^}\beta \in \text{ME}_{<s, a>}$
   vii. If $\beta \in \text{ME}_{<s, a>}$, $\text{^}\beta \in \text{ME}_a$

Let $U$ be a domain of individuals and $\Omega$ be the set of $\text{DM}$-assignments (i.e., $\Omega = U^{\text{DM}}$).

For any type $a$, the set $D_a$ of denotations of type $a$ (relative to $U$) is defined as follows:

3. i. $D_e = U$
   ii. $D_t = \{0, 1\}$
   iii. $D_{<a, b>} = D_b^{D_a}$
   iv. $D_{<s, a>} = D_a^{\Omega}$

A model $M$ is a pair of the form $<U, F>$, where $U$ is a set of individuals and for any $a \in \text{TYPE}$, and $\alpha \in \text{Cons}_a$, $F(\alpha) \in D_a$. Let $g$ be an assignment to the variables that are not discourse markers (i.e., for any type $a$ and any memeber $a$ of $\text{Var}_a$-$\text{DM}$, $g(\alpha) \in D_a$). For any assignment $g$ and any $\text{DM}$-assignment $\omega$, the interpretation function $\| \|_g \omega$ is defined as follows (relative to a model $M$):
(4) i. If \( \alpha \in \text{DM} \), \( \| \alpha \|_\mathcal{G}. \omega = \omega(\alpha) \)

ii. If \( \alpha \in \text{Var}_\alpha - \text{DM} \), \( \| \alpha \|_\mathcal{G}. \omega = g(\alpha) \)

iii. If \( \alpha \in \text{Cons}_\alpha \), \( \| \alpha \|_\mathcal{G}. \omega = F(\alpha) \)

iv. \( \| \beta(\alpha) \|_\mathcal{G}. \omega = \| \beta \|_\mathcal{G}. \omega (\| \alpha \|_\mathcal{G}. \omega) \)

v. \( \| \phi \|_\mathcal{G}. \omega = 1 \text{ iff } \| \phi \|_\mathcal{G}. \omega = 0, \text{ etc.} \)

vi. If \( \alpha \in \text{DM} \), \( \| \forall \alpha \phi \|_\mathcal{G}. \omega = 1 \text{ iff for every } e \in U, \| \phi \|_\mathcal{G}. \omega(\alpha/e) = 1 \), where \( \omega(\alpha/e) \) is identical to \( \omega \) except that \( \omega(\alpha) = e \)

If \( \alpha \in \text{Var}_\alpha - \text{DM} \), \( \| \forall \alpha \phi \|_\mathcal{G}. \omega = 1 \text{ iff for every } e \in D_\alpha, \| \phi \|_\mathcal{G}(\alpha/e), \omega = 1 \)

vii. If \( \alpha \in \text{DM} \), \( \| \exists \alpha \phi \|_\mathcal{G}. \omega = 1 \text{ iff for some } e \in U, \| \phi \|_\mathcal{G}. \omega(\alpha/e) = 1 \), where \( \omega(\alpha/e) \) is identical to \( \omega \) except that \( \omega(\alpha) = e \)

If \( \alpha \in \text{Var}_\alpha - \text{DM} \), \( \| \exists \alpha \phi \|_\mathcal{G}. \omega = 1 \text{ iff for some } e \in D_\alpha, \| \phi \|_\mathcal{G}(\alpha/e), \omega = 1 \)

viii. If \( \alpha \in \text{DM} \), \( \| \lambda \alpha \beta \|_\mathcal{G}. \omega = \lambda e \in U, \| \beta \|_\mathcal{G}. \omega(\alpha/e) \) (i.e., \( \| \lambda \alpha \beta \|_\mathcal{G}. \omega \) is that function \( h \) from \( U \) into \( D_\beta \) (where \( b \) is the type of \( \beta \)) such that for any \( e \in U \),

\[ h(e) = \| \beta \|_\mathcal{G}. \omega(\alpha/e) \]

If \( \alpha \in \text{Var}_\alpha - \text{DM} \), \( \| \lambda \alpha \beta \|_\mathcal{G}. \omega = \lambda e \in D_\alpha, \| \beta \|_\mathcal{G}(\alpha/e), \omega \)

ix. \( \| \neg \alpha \|_\mathcal{G}. \omega = \lambda \omega'. \| \alpha \|_\mathcal{G}. \omega' \) (i.e., \( \| \neg \alpha \|_\mathcal{G}. \omega \) is that function \( h \) in \( D_\alpha^\omega \) such that for any \( \omega' \in \Omega, h(\omega') = \| \alpha \|_\mathcal{G}. \omega' \)

x. \( \| \neg \alpha \|_\mathcal{G}. \omega = \| \alpha \|_\mathcal{G}. \omega(\omega) \).
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