Chapter 5. Bound Variable Anaphora and E-type Links

5.1. Semantic Representation

I have examined a BVA reading in chapter 3, where 'BVA' (written in capital) has been used purely descriptively, characterized as in (1).

(1) Any anaphoric relation between α and β is called 'BVA' in the following, if
  (i) α is an expression which can induce a distributive reading, such as *kanarinokazu-no NP* 'most of the NPs', *NP-sae* 'even NP', *do-no NP* 'which NP' and so on, and
  (ii) β is a singular-denoting expression which need not refer to a specific individual.

I have shown that FD and ID can be the linguistic source of a BVA reading, and that they are subject to different conditions, as repeated in (2) and (3).

(2) Formal Dependency (FD) (*to be revised*):
  a. Structural condition:
  *FD(α,β) if α does not c-command β at LF.
  b. Lexical condition:
  *FD(α,β) if β is a ^{large}NP.

(3) Indexical Dependency (ID) (*to be revised*):
  a. Structural condition:
  *ID(α,β) if α does not precede β at PF.
  b. Lexical condition:
  *ID(α,β) if α is an A-type QP.

In chapter 4 I have argued that not only FD and ID but also co-D-indexation can yield a coreferential reading, and shown how a D-index participates in interpretation. It has not been made clear yet, however, what exactly FD and ID are, and how they can give rise to a BVA reading (and a coreferential reading). The aim of this chapter is to consider the nature of FD and ID, and to explicate in what way they are involved in the interpretation.

The rest of this section introduces some notions and notations in the preparation of the discussion of the interpretation of anaphoric relations.

5.1.1. LF and SR

As stated in footnote 149 of Chomsky 1995:ch.4, the LF representations "differ from standard logical notation, though a simple algorithm Φ will convert them to these notations." In order for the following discussion to be presented

explicitly, it is sometimes necessary to provide a representation which results from Φ, which I call a *semantic representation* (SR).

It should be understood that the SR itself is distinct from truth conditions, since it is a linguistic representation with respect to which truth conditions are calculated. Then, how is an SR different from an LF representation? I assume that an SR and an LF representation share the hierarchical structure in principle, but that the corresponding nodes may be occupied by distinct sets of objects. For example, (4) is a (possibly partial) list of LF legitimate objects and (5) is a (possibly partial) list of SR legitimate objects.

(4) LF legitimate objects:
  phrases, lexical categories, lexical items
    (*i.e.*, *syntactic objects* in the sense of Chomsky 1995:226)
  traces
  syntactic category labels

(5) SR legitimate objects:
  operators
  predicates
  constants (*i.e.*, $\sigma^{D}(n)$'s introduced in section 4.3.1)
  variables
  semantic category labels

Let us assume that the correspondence between an LF object and an SR object is specified by mapping rules, and represent the SR object corresponding to an LF object X as **SR**(X), when necessary. I suppose that a lexical item is specified in the lexicon not only for its syntactic category but also for its semantic category: for example, an English word *hit* may be specified as a verb (syntactic category), but at the same time it is specified as a two-place predicate (semantic category). We could pick up several alphabets for representing semantic categories, but it is possible to express them as a combination of two basic semantic categories, which are instantiated by proper names and (closed) sentences. Let us call these two basic semantic categories as *m* and *k*, respectively.[1] We can make other semantic category labels systematically by combining them: let us say that if *a* and *b* are semantic categories, then <*a*,*b*> is a semantic category of a linguistic expression which takes *a* and gives *b*; for example, a one-place predicate is labeled as <*m*,*k*>, a two-place predicate as <*m*,<*m*,*k*>>, a quantifier as <<*m*,*k*>,*k*>, and so on.[2]

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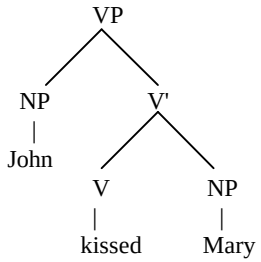
[1] We have called an expression whose semantic category is *m* as 'individual-denoting' in the foregoing discussion. Incidentally, *m* comes from a Japanese word *mono* 'thing, person', and *k* comes from a Japanese word *koto* 'fact, thought, eventuality'.

[2] One may consider that *m* and *k* correspond to *type e* and *type t* in the Type theory,

While semantic categories themselves are formal features, they can be considered to correspond to the elements and the concepts in the world. Proper names and (closed) sentences correspond to individuals and eventualities, respectively, which are the two kinds of "substances" in the world that can be pointed at.[3] Other kinds of concepts in the world can be understood as a combination of these two kinds of "substances": for example, a property (which corresponds to <*m*,*k*> at SR) can be considered as something which gives an eventuality (which corresponds to *k* at SR) when connected to an individual (which corresponds to *m* at SR), and so on.

If the semantic categories of two phrases in the sister relation cannot be combined properly, the mother node cannot have a semantic category label. I assume that the SR crashes in such cases.[4] For example, if one of the sister nodes is <*m*,<*m*,*k*>> and the other is *m*, the combination is successful and the mother node is to be <*m*,*k*>. Thus I assume that (6b) is the SR which corresponds to the LF representation in (6a).

(6) a. LF:

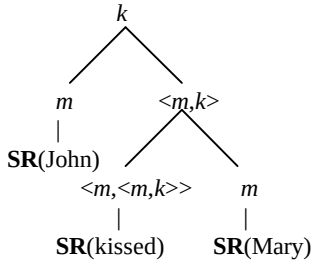


respectively. Since any alphabet should do if these are merely labels, I could also use the familiar labels instead of making the theory look exotic. Nevertheless I pick up new alphabets for the reason that the label *type t* tends to make us associate a sentence with 'truth', which is the concept that I claim to be dissociated from SR.

[3] I consider this to be an rendition of the concept 'saturated' in the sense of Frege.

[4] This is another way of expressing the so-called 'type-mismatch'. One can also say that the composition at SR consists in the 'saturation' of an 'unsaturated' thing in principle, assuming that *m* and *k* are 'saturated', and all the others are 'unsaturated'. Although this reflects a certain aspect of Frege's conjecture, it may be misleading to say that the element in SR are composed mainly by "function application", since the nature of the composition at SR is not different at all from Merge in the Computational System.

b. SR:



In contrast, if one of the sister nodes is <<*m*,*k*>,*k*> and the other is *m*, for example, the combination is not successful and the SR crashes. As a result, this assumption has the effect of having the formal part of the θ-criterion at SR.

5.1.2. QR

While many NPs can be of semantic category *m*, not every NP is 'individual-denoting'. I follow Barwise & Cooper 1981 in assuming that the semantic category of an expression such as *everyone* is <<*m*,*k*>,*k*>.[5] I also assume that an NP whose semantic category is <<*m*,*k*>,*k*> undergoes Quantifier Raising (QR), basically following May 1977, as mentioned in section 1.3.3.2.

The operation QR is roughly illustrated by (7).

(7) a. before QR: [every student] came.
b. after QR: [every student] [*t* came]

It is necessary that the trace of QR is connected to a dislocated NP by some means. It is customary to use indices to mark the relation, but we should not use D-indices for this purpose, since D-indices are to be connected to the individual in σ^D and used exclusively for constants at SR. Let us postulate another series of indices, which we call *I-indices*.[6] I consider that QR is an

[5] Kai von Fintel (class material, Fall 1994, MIT) cites Lewis 1972, Montague 1974, Cresswell 1973, Barwise & Cooper 1981, and Keenan & Stavi 1986 for such a Fregean analysis of quantifiers.

[6] Unlike D-indexed NPs, I-indexed NPs do not have a "value" independent of the linguistic discourse. I-indices would be exploited in the calculation of the truth values (perhaps in terms of some kind of sequence or assignment function), but the choice of the mechanism there is irrelevant to the proposals in this work. What is important here is the distinction between D-indices and I-indices: thus, even if an I-indexed NP is eventually related to a sequence, it is distinct from σ^D, the sequence for D-indexed NPs. (Chierchia 1992:appendix also distinguishes two types of sequences: one is for what he calls discourse

operation which consists of the following three sub-operations:

(8) Sub-operations of QR:
(i) dislocate an NP α (the semantic category of α being <<*m*,*k*>,*k*>),
(ii) adjoin the I-index of α to its c-commanding domain, and [7]
(iii) leave a trace (whose semantic category is *m*) with the same I-index with α.

Thus, according to (8), (7) can be represented as in (9).

(9) a. before QR: $[_{\alpha}$ every student$]_{I\text{-}1}$ came.
b. after QR: $[[_{\alpha}$ every student$] [_{\ I\text{-}1}\ [\ t_{I\text{-}1}\ $ came $]]]$

I further assume the mapping rules in (10) and (11) among others, so that the LF representation in (9b) is mapped to the SR in (12c).[8]

(10) $_{I\text{-}n}$ (which is stranded by the sub-operation (ii) of QR) ==> λv_{bn}

(11) $t_{I\text{-}n}$ ==> v_{bn} [9]

(12) a. before QR: $[_{\alpha}$ every student$]_{I\text{-}1}$ came.

referents, and the other is for quantificational calculation. But "discourse referents" includes our D-indexed NPs and a certain type of I-indexed NPs, which will be discussed in section 5.2 below.)

The prefixes "D-" and "I-" originate from the concepts "D-domain/I-domain" proposed in the series of works by Takubo & Kinsui under the Discourse Management Theory.

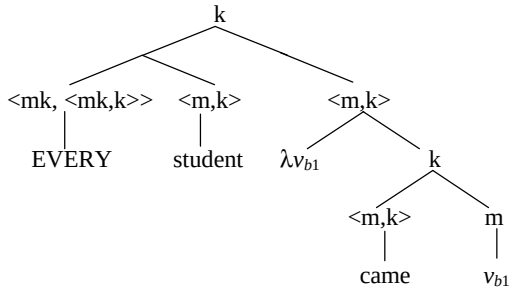
Under their Discourse Management Theory, D(irect)-domain is where information obtained through direct experience is stored, and I(ndirect)-domain is where information obtained through the discourse (and the relevant inferences) is accumulated. Their arguments are based on the fact that systematically different expressions are used in Japanese depending on whether the expression is considered to be related to D-domain or to I-domain. The contrast between *a*-words and *so*-words is one of the instances. They also discuss how D-domain and I-domain interact with each other, *i.e.*, how the knowledge by direct experience and the knowledge by verbal communication affect each other.

[7] I owe Kai von Fintel (class material, Fall 1994, MIT) for this characterization of QR, especially (ii).

[8] Note that v_{bn} in (11) is destined to be bound by an operator λv_{bn} introduced into SR by (10), since (8) states that (8-iii) be always accompanied by (8-ii), and that the value of $_n$ on v_{bn} be the same with that of λv_{bn}. One can thus consider that '$_b$' in v_{bn} stands for 'bound'. I will introduce later another series of variables, which are destined to be free and represented as v_{fn}.

[9] I do not assume that the mapping rule in (11) applies to the so-called A-traces, *i.e.*, the traces left by a movement driven by Case feature checking. I leave open an issue how to deal with A-traces at SR. The so-called A'-movements which are assumed to take place in the Computational System (such as *wh*-movement and possibly some kind of empty operator movement) are not explicitly discussed in this work, but I assume that they involve sub-operations similar to QR.

b. after QR: $[[_{\alpha}$ every student$] [_{\ I\text{-}1}\ [\ t_{I\text{-}1}\ $ came $]]]$
c. SR: EVERY (student) (λv_{b1}[came(v_{b1})]) [10]



As shown in (12c), I assume that the semantic category of an expression such as *every* is <<*m*,*k*>,<<*m*,*k*>,*k*>, and hence, it takes two arguments which are <*m*,*k*>: 'student' (or more precisely '**SR**(student)') is one of them and 'λv_{b1}[*came*(v_{b1})]' is the other. Obviously (12c) itself does not express the truth condition of this sentence. As mentioned above, I consider that the truth condition should be calculated based on SR in some cognitive module other than Grammar. I do not spell out how the truth condition are derived from SR in this work, but the algorithm should not be very complicated as long as the two arguments of *every* are explicitly represented as in (12c). Likewise, I assume that the sentences in (13a,b,c) have the SRs in (14a,b,c), respectively:

(13) a. $[_{\alpha}$ Even John] came.
b. $[_{\alpha}$ Most students] came.
c. $[_{\alpha}$ Which student] came?

(14) a. EVEN (John) (λv_{b1}[came(v_{b1})])
b. MOST (student) (λv_{b1}[came(v_{b1})])
c. WH (student) (λv_{b1}[came(v_{b1})])

We will add some more assumptions and mapping rules as they become necessary in the following discussion.

5.2. Co-I-indexation

5.2.1. Inter-sentential dependency

I have claimed in the preceding chapters that (15) exhausts the sources of a

[10] <*m*,*mk*> is a shorthand of <*m*,<*m*,*k*>>, and <*mk*,<*mk*,*k*>> is a shorthand of <<*m*,*k*>,<<*m*,*k*>,*k*>>.

BVA reading and a coreferential reading.

(15) (i) FD
(ii) ID
(iii) co-D-indexation

Since the condition on the establishment of FD refers to the LF representation and that of ID refers to the PF representation, both of them cannot extend beyond a sentence boundary by definition, as long as Grammar is a mechanism that generates a sentence, rather than a discourse. In contrast, a D-index is a feature that a lexical item can carry into a numeration, and hence two NPs can carry an identical D-index without a syntactic relation established between them.[11] Consequently, NPs in separate sentences may carry an identical D-index, and hence, co-D-indexation in effect can be established beyond a sentence boundary.

If (15) should exhaust the sources of anaphoric relations, it would follow that every inter-sentential anaphoric relation should be based on co-D-indexation. However, this is not correct: as one may have already noticed, I have suppressed in the foregoing discussion the fact that some instances of inter-sentential anaphoric relations cannot be considered to be based on co-D-indexation. In this section I propose that these anaphoric relations are based on *co-I-indexation*, and describe how an I-index contributes to the interpretation.

5.2.2. Co-I-indexation

5.2.2.1. I-indexed *so*-words

Recall the discussion in section 4.2.2, where I have argued in effect that a non-deictic *so*-word cannot be D-indexed. The argument is based on the observation that a non-deictic *so*-word is anomalous unless there is a linguistic "antecedent." Some of the relevant examples are repeated here.

(16) (*Situation*: A wife told her husband on the phone that someone had called him. He has no idea who the person is. He asks her:)

So-itu-wa nante itteta?
that-guy-TOP what said

'What did he say?

(17) (*Situation*: The detective is looking for a man. He somehow believes that the man should be hiding in a certain room. He breaks into the room and asks the people there.)

#[So-itu]-wa do-ko-da?
that-guy-TOP which-place-COPULA

'Where is [he]?'

[11] There is a possibility, however, that two co-D-indexed NPs form a syntactic relation if they occur in the same sentence, as discussed in section C.3.

Recall also that the unacceptability of (17) has nothing to do with what the speaker and the addressee know about the target individual; the sentence becomes acceptable if only there is a linguistic "antecedent," regardless of the speaker's and the addressee's knowledge of the world. For example, the sentence in (17) is not anomalous at all if it is uttered in the discourse such as (18):

(18) A: Uti-ni-wa niwasi-ga imasu yo
home-at-TOP gardener-NOM exist PARTICLE

'We have a gardener.'

B: So-itu-wa do-ko-da?
that-guy-TOP which-place-COPULA

'Where is he?'

This leads us to conclude that (17) is unacceptable for a linguistic reason, but that it should not be excluded by Grammar (*i.e.*, a system which is responsible for distinguishing well-formed sentences from ill-formed ones).

This contrasts with the anomaly with respect to an *a*-word, which has to be D-indexed. Consider again the following example which has been discussed in section 4.2.1, in contrast with (16) cited above.

(19) (*Situation*: A wife told her husband on the phone that someone had called him. He has no idea who the person is. He asks her:)

#A-itu-wa nante itteta?
that-guy-TOP what said

'What did he say?

(19) and (16) are supposed to be uttered under the same situation; although (19) is almost identical to (16) except for the *a*-/*so*- difference, (16) is acceptable while (19) is not. The sentence in (19) should not be regarded as syntactically ill-formed, just as the sentence in (17) should not be. However, (19) is different from (17) in that it is not for a linguistic reason that the sentence is unacceptable. (19) is anomalous because the speaker does not know the target individual himself: that is to say that the unacceptability of the sentence should be attributed to the speaker's knowledge of the world, rather than to a linguistic reason.

Let us suppose that the anaphoric relation beyond a sentence boundary as in (18) is based on *co-I-indexation*: thus, the *so*-word in (18) is I-indexed, as in (20).

(20) [So-itu]$_{I\text{-}5}$-wa do-ko-da?
that-guy-TOP which-place-COPULA
'Where is he$_{I\text{-}5}$?'

I claim that the sentence in (20) is well-formed from the syntactic point of view, but that an expression such as [*so-itu*]$_{I\text{-}5}$ '*he*$_{I\text{-}5}$' semantically requires a linguistic antecedent, which is to be marked by the identical I-index, as shown in (21), for example.

(21) Uti-ni-wa [niwasi]$_{I\text{-}5}$-ga imasu yo
home-at-TOP gardener-NOM exist PARTICLE
'We have [a gardener]$_{I\text{-}5}$.'

Thus, if (21) is included in the preceding discourse of (20) (as in the case of (18)), (20) is interpretable; but if not (as in the case of (17)), the I-indexed NP in (20) is not interpretable, and this makes us feel that the sentence is unacceptable.

5.2.2.2. E-type pronouns

Evans 1977,1980 discusses on a certain type of anaphoric relation which can go beyond a sentence boundary. Although his examples in (22) are represented as a sentence-internal dependency, the same kind of anaphoric relation can also be established inter-sententially, as shown in (23).

(22) a. Few congressmen admire Kennedy, and they are very junior.
(Evans 1980:339 (7))
b. If many men come to the ball, Mary will dance with them.
(Evans 1980:341 (18))

(23) a. Few congressmen admire Kennedy. They are very junior.
b. Many men will come to the ball. Mary will dance with them.
c. Most students came. They are diligent.

Evans 1977,1980 has given the name *E-type pronoun* to pronouns such as in (22), and Chierchia 1992 has called the type of anaphoric relation involving an E-type pronoun as *E-type link*. Since the values of the (E-type) pronouns in (22) and (23) are not pre-determined (*i.e.*, not determined independently of the linguistic discourse), they are not considered to be D-indexed, in our terms. Therefore, I regard (22) and (23) as instances of co-I-indexation. Thus, (23) should be represented as in (24) under this hypothesis.

(24) a. [Few congressmen]$_{I\text{-}3}$ admire Kennedy. [They]$_{I\text{-}3}$ are very junior.
b. [Many men]$_{I\text{-}2}$ will come to the ball. Mary will dance with [them]$_{I\text{-}2}$.
c. [Most students]$_{I\text{-}4}$ came. [They]$_{I\text{-}4}$ are diligent.

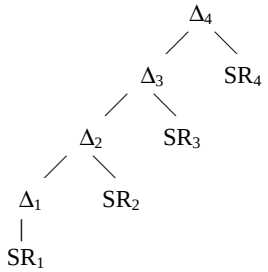
Since the first sentences in (24) involve an I-indexed NP whose semantic category is $\langle\langle m,k\rangle,k\rangle$, they undergo QR as described in section 5.1.2 above. In contrast, the second sentences in (24) involve an I-indexed NP whose semantic category seems to be *m*, and we will consider in section 5.2.3 how it should be mapped to SR and how it should be interpreted.

5.2.2.3. Syntactic dependency and semantic dependency

The observations in the preceding subsections suggest that the reason for the unacceptability of a sentence can be one of the following three: (i) because the sentence is syntactically ill-formed, (ii) because the sentence is not placed in an appropriate discourse, or (iii) because the sentence is not appropriately used with respect to the speaker's knowledge of the world. It follows that it is necessary for the research of anaphoric relations to represent a *discourse* in some way. I maintain that Grammar is a mechanism with respect to a sentence, rather than a discourse. But this assumption does not exclude the idea that output representations of Grammar are 'stored' as part of a *discourse structure* in some other cognitive module in our mind, so that the interpretation of a certain sentence can sometimes refer to the information included in the preceding discourse.

Let us assume that a discourse structure is constructed in the way illustrated in (25), in which a newly added SR simply 'Merges' with the preceding discourse.[12]

(25)



The preceding discourse of a given sentence is always represented as a

[12] Logically speaking, (25) is not the only possible way of constructing a discourse structure. I will discuss other possibilities in Appendix E.2.3.

constituent in the discourse structure in (25). I further assume that the sister nodes in the discourse structure are in a conjunction relation, so to speak. Therefore, the semantic category of Δ_n is *k*, just as each SR, and the truth condition of Δ_n is a conjunction of (i) that of Δ_{n-1} and (ii) that of SR_n.

I claim that an I-indexed dependent term (whose typical instance is an E-type pronoun) should be represented as a *free variable* at SR. More concretely, I propose the following mapping rules of an I-indexed NP:

(26) Mapping rules of an I-indexed NP whose semantic category is *m*:
(i) If it is a (QR) trace[13], $NP_{I\text{-}n}$ ==> v_{bn} (=(11))
(ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn}

A variable v_{fn} is a free variable in contrast to v_{bn}, which is destined to be bound by a λ-operator. Thus (26) states (i) that there are two series of variables, *i.e.* v_b-series and v_f-series, which are bound variables and free variables, respectively, and (ii) that a trace is mapped to a bound variable while otherwise an I-indexed NP is mapped to a free variable at SR.

Since an I-indexed NP can be mapped to an SR object independently according to the mapping rule in (26), no "antecedent" is necessary as far as the mapping to SR is concerned. Nevertheless, I claim that a free variable has to be given a proper interpretation by its linguistic antecedent, which might be included in the discourse structure rather than in the same sentence. In case a free variable does not have a linguistic antecedent, it is not assigned a proper interpretation, and it causes a semantic anomaly. Thus, I maintain that (17) is syntactically well-formed, but semantically anomalous.

(17) (*Situation*: The detective is looking for a man. He somehow believes that the man should be hiding in a certain room. He breaks into the room and asks the people there.)

#[So-itu]-wa do-ko-da?
that-guy-TOP which-place-COPULA

'Where is [he]?'

Co-I-indexation is different from co-D-indexation in that one of the co-I-indexed NPs is not independently interpretable. Therefore, one can say that co-I-indexation is an instance of dependency while co-D-indexation is not. Nevertheless, co-I-indexation is also different from FD (or ID) in that the latter but not the former is a syntactic object. One may thus consider that (i) FD (or ID) is an instance of *syntactic dependency*, (ii) co-I-indexation is an instance of *semantic dependency*, and (iii) co-D-indexation is not an instance of dependency.

[13] See footnote 9 in section 5.1.2.

It is basically an issue of Semantics how the value of a free variable is determined, and it is not the main concern of this work. Nevertheless, the discussion on the interpretation of a free variable is necessary to some extent, since I consider that it is closely related to the question why an ID can yield a BVA reading, as discussed later. The aim of the next section is to roughly characterize how an I-indexed NP should be given an interpretation in Semantics, mainly based on the idea presented in Evans 1977,1980.

5.2.3. Interpretation of I-indexed NPs

This section considers how a free variable should be interpreted (*or* how the E-type link should be characterized).[14] The characterization to be presented below is essentially a slightly more articulated version of that in Evans 1977,1980. Therefore, we begin with briefly reviewing the description of the E-type pronoun given there.

5.2.3.1. Evans' original characterization

Evans 1980:340 states with respect to the interpretation of an E-type pronoun that "[i]t looks as though the role of the pronoun in these sentences is that of referring to the object(s), if any, which *verify* the antecedent quantifier-containing clause." He continues in footnote 2 that "[b]y 'objects, if any, which verify the antecedent quantifier-containing clause' I mean those objects, if any, which satisfy the predicate in the antecedent clause and thereby make that clause true."

Let us see how the interpretation of (23a) can be described under this characterization.

(23) a. Few congressmen admire Kennedy. They are very junior.

They in (23a) is an E-type pronoun, and its "antecedent quantifier" is *few congressmen*; therefore, "the antecedent quantifier-containing clause" is the first sentence: *Few congressmen admire Kennedy*. Thus, Evans states that the role of *they* in (23a) is to refer to the objects which verify the first sentence in (23a), which could be paraphrased as 'those few congressmen that admire

[14] There have been several different characterizations of the E-type link, most of which I cannot discuss in this work. To mention a few, Cooper 1979 postulates a rule by which an E-type pronoun is replaced by a definite description while keeping the content of the definite description to be recovered from the discourse. According to Heim 1982:17-21, Lewis 1979 proposes that an anaphoric pronoun may refer to an object whose salience is raised by an utterance which contains an expression that (semantically) refers to that object. Heim 1990 postulates a transformation rule which formally replaces an E-type pronoun with a definite description. See also Chierchia 1992: section 5.1 for the discussion of the E-type pronoun analysis proposed in Heim 1990.

Kennedy'.[15]

Evans 1977,1980 points out that the following sentences are unacceptable.

(27) a. *No congressmen admire Kennedy, and they are very junior.
(Evans 1980:340 (13))
b. *If no men come to the ball, Mary will dance with them.
(Evans 1980:341 (19))

(28) *Every congressman came to the party, and he had a marvelous time.
(Evans 1980:341 (21))

These examples are instances in which an E-type pronoun (*or* a free variable, in our terms) is not given a proper antecedent. For example, sentences in (27) are semantically anomalous because there can be no objects 'which *verify* the antecedent quantifier-containing clause', and hence, no referents are given to the E-type pronoun. In the case of (28), on the other hand, there are objects 'which *verify* the antecedent quantifier-containing clause' but they are expected to be plural (because of the meaning of *every*) despite the fact that the E-type pronoun is in the singular form.

While basically I would like to adopt Evans' characterization of the E-type pronoun as the interpretation of a free variable, his key concepts have to be stated more explicitly in order to see what predictions it would make: the three concepts in (29) play important roles in his characterization of the E-type pronoun.

(29) (i) antecedent quantifier
(ii) antecedent quantifier-containing clause
(iii) the object(s), if any, which *verify* the antecedent quantifier-containing clause

At this stage, I do not have much to add to (29-iii) other than his own remark that (29-iii) refers to "those objects, if any, which satisfy the predicate in the antecedent clause and thereby make that clause true," as mentioned above.

[15] It is often stated in the literature that an E-type pronoun can be rephrased by a definite expression. I consider that this follows from the characterization of the E-type pronoun along the lines of Cooper 1979, but not from the one in Evans 1977,1980. In fact, Evans (1977:518-520) explicitly argues that a sentence with a corresponding definite expression can give rise to an interpretation distinct from the original sentence containing an E-type pronoun. This suggests that Evans does not consider (i) to be represented as in (ii), formally speaking.
(i) a. A student came. He is diligent.
b. Most students came. They are diligent.
(ii) a. A student came. The student that came is diligent.
b. Most students came. The students that came are diligent.

But the concepts in (29-i,ii) can be stated more formally, and I will present them in the rest of this section.

5.2.3.2. 'Antecedent quantifier'

First, (29-i) 'antecedent quantifier' can be rephrased as 'a co-I-indexed NP in the sentence or in the preceding discourse', roughly speaking. This assumption is supported by the argument presented in Chierchia 1992:section 4.3 that the E-type link should be based on syntactic coindexation between two NPs.[16] Consider the contrasts in (30) and (31), which is discussed in Heim 1982.[17]

(30) a. John owns a bicycle$_i$. He rides it$_i$ daily.
b. ?John is a bicycle$_i$-owner. He rides it$_i$ daily.
(Heim 1982:24 (22))

(31) a. John has a spouse$_i$. She$_i$ is nice.
b. ?John is married. She is nice.
(Heim 1982:24 (23))

If we assume that only an NP can carry an I-index, the coindexation such as in (30b) will be excluded for the reason that *bicycle* is only a part of an NP. In addition, (31b) will be regarded as an instance in which an E-type pronoun does not have any linguistic antecedent.

Strictly speaking, however, an I-index is not represented on the "antecedent quantifier" at SR, according our hypothesis. Recall that an I-indexed QP (*i.e.*, an NP whose semantic category is $<<m,k>,k>$) undergoes QR and its I-index is separated from it by one of the sub-operations of QR. But notice that the value of the I-index is retained on the bound variable as $_n$ in v_{bn}, and that the value of an I-index in the case of (26-ii) is also retained as $_n$ in v_{fn}. I repeat the mapping rules of an I-indexed NP here.

(26) Mapping rules of an I-indexed NP whose semantic category is *m*:
(i) If it is a (QR) trace, $NP_{I\text{-}n} \Longrightarrow v_{bn}$ (=(11))
(ii) Otherwise, $NP_{I\text{-}n} \Longrightarrow v_{fn}$

Thus, if a QP α and a dependent term β share an I-index, the bound variable mapped from the trace left by QR of α is marked by the same index number with the free variable mapped from β. Based on this consideration, I will

[16] Although Chierchia 1992 adopts a characterization of the E-type pronoun which is different from Evans' (and hence from the one assumed in this work), this does not affect the validity of the argument here. See section E.4 for the analysis proposed in Chierchia 1992.

[17] The acceptability markings in (30) and (31) are as in Heim 1982. Chierchia 1992 would mark them as '*'.

state the interpretation of v_{fn} referring to v_{bn} in the following subsection.

5.2.3.3. 'Antecedent quantifier-containing clause'

Let us now turn to clarify (29-ii) 'antecedent quantifier-containing clause'. I define the two notions in (32) and (33), and claim that 'K($\Sigma(v_{bn})$, v_{fn})' corresponds to what Evans 1977,1980 expresses by 'antecedent quantifier-containing clause'.

(32) $\Sigma(v_{bn})$ = the domain which includes v_{bn} and the operator which binds it

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

In terms of these notions, the original statement in Evans 1977,1980 can be expressed as in (34):

(34) Interpretation of a free variable (*to be modified a little*):
v_{fn} is understood to refer to the individual(s) that verify K($\Sigma(v_{bn})$, v_{fn}).

Let us illustrate how (34) works, using an example in (24a), whose (simplified) SR is given in (35).

(24) a. [Few congressmen]$_{I\text{-}3}$ admire Kennedy. [They]$_{I\text{-}3}$ are very junior.

(35) SR: FEW(congressman)(λv_{b3}[v_{b3} admire Kennedy]). v_{f3} are very junior.

$\Sigma(v_{b3})$ is 'λv_{b3}[v_{b3} admire Kennedy]'; and K($\Sigma(v_{b3})$, v_{f3}) is the entire SR of the first sentence, *i.e.* 'FEW(congressman)(λv_{b3}[v_{b3} admire Kennedy])'; thus, v_{f3} is understood to refer to the individuals that verify the first sentence. The discourse in (18) can be analyzed in a similar fashion: (18) can be represented as in (36) and mapped to an (informal) SR in (37).[18]

(36) A: Uti-ni-wa [niwasi]$_{I\text{-}5}$-ga imasu yo
home-at-TOP gardener-NOM exist PARTICLE
'We have [a gardener]$_{I\text{-}5}$.'

B: [So-itu]$_{I\text{-}5}$-wa [do-ko]$_{I\text{-}6}$-da?
that-guy-TOP which-place-COPULA
'Where$_{I\text{-}6}$ is [he]$_{I\text{-}5}$?'

(37) SR: $\exists$(gardener)(λv_{b5}[we have v_{b5}]). WH(location)(λv_{b6}[v_{f5} is in v_{b6}]).

$\Sigma(v_{b5})$ is 'λv_{b5}[we have v_{b5}]'; and K($\Sigma(v_{b5})$, v_{f5}) is the entire SR of the first sentence, *i.e.* '$\exists$(gardener)(λv_{b5}[we have v_{b5}])'; thus, v_{f5} is understood to be the individual that verifies the first sentence.

Although (34) works fine for most of the examples, Chierchia 1992 points out that the relation between an E-type pronoun (*i.e.*, a free variable, in our terms) and its "antecedent" should be constrained furthermore. Consider the contrast in (38).

(38) a. *I lost ten marbles and found nine of them. It is under the sofa.
b. I dropped ten marbles and found all but [one]$_i$. It$_i$ is under the sofa.
(Chierchia 1992:161 (103), due to B. Partee) [19]

He states that "[t]he reason why [(38a)] is out is simply that E-type pronouns need a syntactic antecedent and in [(38a)] there is none that can play this role (the syntactic features of the NP's in the first sentence do not match the features of the pronoun *it*)." [20] Chierchia 1992:158 assumes that "[s]yntactically such a coindexing plays the usual role, namely that of guaranteeing sameness of gender and number specifications." Restated more explicitly, it is assumed in Chierchia 1992 that coindexation between two NPs is well-formed only if they match in features such as [+/- plural].[21] He thus claims that (39) is ill-formed because of the mismatch in number between the two coindexed NPs.

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[18] It is assumed in (37) that both a bare NP and a *wh*-word undergo QR. Although I will argue in section 5.3.4 that an operation other than QR can apply to these phrases, this does not affect the point in question here.

[19] The similar contrast is also discussed in Heim 1982:21.

[20] Apparently, Chierchia 1992 uses the term 'syntactic' to mean 'not pragmatic': thus, it should be understood to correspond to 'linguistic' in our terms.

[21] Chierchia 1992 claims that the dependencies in (i-a,b) are both instances of an 'E-type link'.
(i) a. Chierchia 1992:(109)
Every soldier walked to the podium. The queen greeted him and handed him the medal.
b. Chierchia 1992:(107)
Every man walked in. I saw them.
The difference in number agreement is explained pragmatically: (i-a) is a case such that some set of iterated occasions is salient, and (i-b) is a case such that one occasion is specified to be salient. Thus, it is not clear what "number specification" *every NP* is considered to have under his analysis. We will discuss the type of anaphoric relation as in (i-a) in section 5.3.4.4.

(39) *I lost ten marbles and found [nine of them]$_i$. It$_i$ is under the sofa.

Since (34) does not have a constraint on the relation between the free variable and its antecedent, the representation in (39) would not be excluded under (34). Therefore, it is necessary to add some such constraint. Notice, however, that the condition proposed in Chierchia 1992 is too strict that it would incorrectly exclude an E-type link such as in (40) because of the mismatch in number between *a dog* and *they*.

(40) Every child brought [a dog]$_i$. They$_i$ are barking in the backyard.

I claim instead that both (39) and (40) can be accounted for by rephrasing (34) into (41):

(41) Interpretation of a free variable:
v_{fn} is understood to refer to the individual(s) that verify K($\Sigma(v_{bn})$, v_{fn}) with respect to v_{bn}.

Let us describe what (41) means by illustration. In our terms, (40) is represented as in (42a), and the corresponding SRs are as given in (42b).

(42) a. [Every child]$_{I\text{-}1}$ brought [a dog]$_{I\text{-}2}$. They$_{I\text{-}2}$ are barking in the backyard.
b. EVERY(child)(λv_{b1}[$\exists$(dog)(λv_{b2}[v_{b1} brought v_{b2}]). v_{f2} are barking in the backyard.

$\Sigma(v_{b2})$ is 'λv_{b2}[v_{b1} brought v_{b2}]'; and K($\Sigma(v_{b2})$, v_{f2}) is again the entire SR of the first sentence, *i.e.* 'EVERY(child)(λv_{b1}[$\exists$(dog)(λv_{b2}[v_{b1} brought v_{b2}])' according to the definition of K(A,B) given in (33).

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

Since the individuals that verify the first sentence are expected to be plural because of the meaning of 'EVERY', we can successfully predict that v_{f2} should be expressed in a plural form.

The definition of K(A,B) in (33) can also explain the fact that the anaphoric relation in (43a) should not be successful.

(43) a. John does not have [a car]$_{I\text{-}1}$. #It$_{I\text{-}1}$ is blue.
b. NOT ($\exists$(car)(λv_{b1}[John has v_{b1}])). v_{f1} is blue.

The free variable v_{f1} in (43) is supposed to refer to the individual(s) that verify K($\Sigma(v_{b1})$, v_{f1}). If K($\Sigma(v_{b1})$, v_{f1}) were the part '$\exists$(car)(λv_{b1}[John has v_{b1}])', such an individual should exist. However, the definition in (33) states that K($\Sigma(v_{b1})$, v_{f1}) is the entire clause of the first sentence, *i.e.*, 'NOT

($\exists$(car)(λv_{b1}[John has v_{b1}]))', which negates the existence of such an individual. Therefore, it is correctly predicted that v_{f1} is not given a proper interpretation in Semantics and hence the discourse in (43a) is anomalous. In this respect, one can consider that the concept K($\Sigma(v_{bi})$, v_{fi}) in our analysis plays a role similar to the concept 'accessibility' in Discourse Representation Theory (cf. Kamp 1981, Kamp & Reyle 1993).

5.2.4. Summary

I have argued in this section that some anaphoric relations (including so-called E-type links) are based on co-I-indexation. I have proposed the mapping rules in (26), and claimed that the free variable created by (26-ii) is interpreted as in (41) along the lines of Evans 1977,1980.

(26) Mapping rules of an I-indexed NP whose semantic category is *m*:
(i) If it is a (QR) trace, NP$_{I\text{-}n}$ ==> v_{bn} (=(11))
(ii) Otherwise, NP$_{I\text{-}n}$ ==> v_{fn}

(41) Interpretation of a free variable:
v_{fn} is understood to refer to the individual(s) that verify K($\Sigma(v_{bn})$, v_{fn}) with respect to v_{bn}.

(32) $\Sigma(v_{bn})$ = the domain which includes v_{bn} and the operator which binds it

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

Strictly speaking, it is not explicit enough in (41) what are exactly meant by 'verify' and 'with respect to v_{bn}'. But I leave (41) as it is in this work, since I consider that this would be sufficient for the discussion to be given below.

5.3. Theory of Anaphoric Relations

5.3.1. Conceptual problems

The descriptive generalizations that I have demonstrated so far can be summarized as in (44).

(44) (i) A coreferential reading can be based on co-D-indexation, FD or ID; and these are the only sources of a coreferential reading.
(ii) A BVA reading can be based on FD or ID; and these are the only sources of a BVA reading.
(iii) An E-type link is based on co-I-indexation.

Although the main empirical results in this work may seem to be expressed by

(44), these statements refer to the notions which are not defined in terms of theoretical primitives, as we will see shortly. It may be convenient to use notions which appear to be "natural" in describing the observations. However, "natural" notions are apt to obscure the conceptual incoherence, which does not surface until we try to articulate those notions in terms of the theoretical primitives. Once the conceptual incoherence is eliminated, a deeper understanding of the nature of the subject matter will be attained. For this purpose, the rest of this chapter is devoted to rephrase the notions used in (44) in terms of theoretical primitives, thereby transforming the observations into a theory of anaphoric relations.

The generalizations in (44) refer to the three readings, *i.e.*, coreferential readings, BVA readings, and E-type links. I have discussed in section 4.3 how a D-indexed NP is interpreted and how co-D-indexation gives rise to a coreferential reading. I have also explicated in section 5.2 how an I-indexed NP is interpreted and how co-I-indexation yields an E-type link. However, the question in (45) has not been addressed in the foregoing discussion.

(45) How is "a BVA reading" characterized in theoretical terms?

This question should not be considered separately from the discussion on the nature of FD and ID, since they are the sources of a BVA reading according to the claim in (44-ii). Thus, (45) should be paraphrased as in (46):

(46) a. How does an FD yield a BVA reading?
b. How does an ID yield a BVA reading?

FD and ID have been characterized as in (2) and (3), respectively, in the foregoing discussion.

(2) Formal Dependency (FD) (*to be revised*):
a. Structural condition:
*FD(α,β) if α does not c-command β at LF.
b. Lexical condition:
*FD(α,β) if β is a ^{large}NP.

(3) Indexical Dependency (ID) (*to be revised*):
a. Structural condition:
*ID(α,β) if α does not precede β at PF.
b. Lexical condition:
*ID(α,β) if α is an A-type QP.

However, (2) and (3) can be considered adequate only for descriptive purposes, because the status of the lexical conditions stated in (2b) and (3b) is problematic from a conceptual point of view. As mentioned in section 3.1, the distinction between ^{large}NPs and ^{small}NPs cannot be stated in syntactic terms;

therefore, Grammar should not contain (2b) (in its current form) as one of the syntactic conditions. Moreover, the notions 'A-type QP' and 'B-type QP' have been characterized only by listing some expressions for each type, and hence, it is not even indicated whether (3b) can be a condition in Grammar or not. Thus, we have yet to answer the questions in (47):

(47) a. What are the conditions on the establishment of an FD?
b. What are the conditions on the establishment of an ID?

The following sections will be devoted to the discussion of the questions in (46) and (47).

5.3.2. Formal Dependency

Let us begin with (46a) and (47a):

(46) a. How does an FD yield a BVA reading?
(47) a. What are the conditions on the establishment of an FD?

I claim in this section that the LF representation in (48a) is mapped to the SR in (48b), which clearly expresses a BVA reading.

(48) a. LF: ... $t_{I\text{-}n}$ ... β ... FD($t_{I\text{-}n}$, β)
b. SR: ... v_{bn} ... v_{bn} ...

I argue that what we have called the lexical condition on FD (*i.e.*, *FD(α,β) if β is a ^{large}NP) should be derived from a general principle in Grammar which applies to the mapping from (48a) to (48b).

5.3.2.1. Principle of recoverability of deletion

Recall from chapters 3 and 4 that β in FD(α,β) can hardly be a ^{large}NP. This generalization is based on the observation that (i) it is difficult to obtain a BVA reading if we use a ^{large}NP with an A-type QP, such as *even NP* or *NP1 and NP2* (cf. section 3.1), and (ii) a ^{large}NP barely exhibits the so-called reconstruction effects (cf. sections 3.2.4 and 4.4.2).

(49) A-type QP & ^{small}NP:
Toyota-sae-ga [so-ko-no ko-gaisya]-o suisensita.
Toyota-even-NOM that-place-GEN child-company-ACC recommended
'Even Toyota recommended its subsidiary.'

(50) A-type QP & ^{large}NP:
*?Toyota-sae-ga [so-no zidoosya-gaisya-no ko-gaisya]-o
Toyota-even-NOM that-GEN automobile-company-GEN child-company-ACC
suisensita.

recommended

'Even Toyota recommended [that automobile company's subsidiary].'

(51) "Reconstruction effects" with a ^{small}NP:
[So-ko-no ko-gaisya]-o do-no zidoosya-gaisya-ga
that-place-GEN child-company-ACC which-GEN automobile-company-NOM

suisensita no?
recommended COMP

'Which automobile company recommended [its subsidiary]?'

(52) "Reconstruction effects" with a ^{large}NP:
?*[So-no zidoosya-gaisya-no ko-gaisya]-o do-no
that-GEN automobile-company-GEN child-company-ACC which-GEN

zidoosya-gaisya-ga suisensita no?
automobile-company-NOM recommended COMP

'Which automobile company recommended [that automobile company's subsidiary]?'

I have pointed out, however, that the distinction between ^{small}NPs and ^{large}NPs is basically determined based on the 'amount of semantic content on N', which cannot be defined in syntactic terms in nature. In other words, I do not consider that the distinction should be marked by a syntactic feature, such as [+/- large], for example.

Now suppose the mapping rule in (53):

(53) Mapping rule of β in FD(α,β):
NP ==> **SR**(α) if the NP is β in FD(α,β)

According to (53), if α in FD(α,β) is $t_{I\text{-}n}$, which is to be mapped to v_{bn}, β will also be mapped to v_{bn}, and, as a result, the sentence will contain bound variable anaphora (in the technical sense).

(48) a. LF: ... $t_{I\text{-}n}$ ... β ... FD($t_{I\text{-}n}$, β)
b. SR: ... v_{bn} ... v_{bn} ...

This is basically the same with the interpretation of coindexation in Reinhart 1983ab and the "interpretive consequence of FD" in Hoji forthcoming:ch.2.[22]

Notice that the mapping rule in (53) in effect ignores the lexical and

[22] This is also basically the same as the interpretation rule of an NP$^{\beta}$ proposed in Fiengo & May 1994, where it is stated that the denotation of an NP$^{\beta}$ is the same as another NP bearing the same indexical value. Note, however, that coindexation in Fiengo & May 1994 is not constrained by the c-command requirement.

other properties of β in FD(α,β) altogether. It is therefore reasonable to consider (53) as involving 'deletion' in some sense. I claim that the contrast between ^{small}NPs and ^{large}NPs should follow from the general principle of recoverability of deletion, which Chomsky 1986:70 puts as follows: "[a] principle of recoverability of deletion states that an element can be deleted only if it is fully determined by a structurally related phrase containing its lexical features or if it is a 'designated element', where these notions have to be made precise." Compare the mapping in (54) and (55).

(54) FD with a ^{small}NP:
a. LF: ... $t_{I\text{-}1}$ ... *so-ko* ... FD($t_{I\text{-}1}$, *so-ko*)
b. SR: ... v_{b1} ... v_{b1} ...

(55) FD with a ^{large}NP:
a. LF: ... $t_{I\text{-}1}$ ... *so-no zidoosya-gaisya* ...
FD($t_{I\text{-}1}$, *so-no zidoosya-gaisya*)
b. SR: ... v_{b1} ... v_{b1} ...

I maintain that the mapping in (55) is relatively unacceptable, as compared to that in (54), because more semantic content (which is not "fully determined by a structurally related phrase containing its lexical features") is deleted.[23] Obviously the amount of semantic content of a given NP cannot be measured formally: thus, the effects of the principle of recoverability of deletion in this analysis are expected to be not absolute, which is in fact desirable, considering the nature of the distinction between ^{small}NPs and ^{large}NPs stated above.

In the foregoing discussion I have used an expression 'BVA' (written in capital) purely descriptively to refer to an anaphoric relation between a singular-denoting expression and a distributed QP, rather than to refer to the relation between the two bound variables in (56).

(56) SR: ... v_{b1} ... v_{b1} ...

It is often implicitly presumed in the literature that every BVA should be represented as in (56), irrespective of whether it is based on FD or ID.[24] Under this assumption, we expect to find the effects of the general principle of recoverability of deletion not only in FD but also in ID. As we have observed

[23] As I mentioned in section 3.1, I owe this conclusion to the insight which is stated in Hoji 1995a:section 3 as follows: "the more content on the N head a given nominal projection α has, the more difficult it is for α to be an Arg-bindee (presumably because of the increasing difficulty in "suppressing" the content of the N.)", where 'Arg-bindee' corresponds to β in FD(α,β).

[24] Especially the unselective binding approach is developed on this assumption. Therefore, the contrast between ^{small}NPs and ^{large}NPs raises a serious problem for this approach. I will also point out other problems for this approach in Appendix E below.

in chapter 3 and 4, however, there is no difficulty for a [large]NP to be β in ID(α,β), in contrast to the case of FD.

(57) B-type QP & [large]NP:
Do-no zidoosya-gaisya-ga [so-no zidoosya-gaisya-no
which-GEN automobile-company-NOM that-GEN automobile-company-GEN
ko-gaisya]-o suisensita no?
child-company-ACC recommended COMP
'Which automobile company recommended [that automobile company's subsidiary]?'

If one is to maintain that BVA based on ID is an instance of bound variable anaphora as in (56), the contrast between [small]NPs and [large]NPs would have to be stipulated as a condition on FD, rather than as the general principle of recoverability of deletion: however, as I have pointed out above, this restriction should not be a condition on a syntactic object in nature, since the relevant distinction cannot be stated in syntactic terms. I propose therefore that BVA based on ID should not be represented as bound variable anaphora in the technical sense (as in (56)). I will discuss how an ID can yield a BVA reading in section 5.3.4.

5.3.2.2. FD as an LF object

Let us now consider the question in (47a).

(47) a. What are the conditions on the establishment of an FD?

I have stated so far that the establishment of an FD has the following two conditions.

(2) Formal Dependency (FD) (*to be revised*):
a. Structural condition:
*FD(α,β) if α does not c-command β at LF.
b. Lexical condition:
*FD(α,β) if β is a [large]NP.

But I have argued above that (2b) should not be stated as a syntactic condition and that the effects of (2b) can be derived from the general principle of recoverability of deletion. I would like to show in the following that there is no need to stipulate the types of NPs in FD(α,β).[25]

First suppose that α in FD(α,β) is something other than a trace.

[25] The possibility of such a 'non-restricted view' of FD has been discussed on several occasions in the personal communications with Hajime Hoji, Yukinori Takubo, and Daisuke Bekki, among others.

(58) a. FD(John$_{D\text{-}5}$, β)
b. FD(him$_{I\text{-}1}$, β)
c. FD(everyone$_{I\text{-}1}$, β)

In the case of (58a), β is mapped to a constant $\sigma^D(5)$, just as *John*$_{D\text{-}5}$ is. In the case of (58b), β is mapped to a free variable v_{f1}, just as *him*$_{I\text{-}1}$ is. In the case of (58c), however, there is no SR object which corresponds to the expression *everyone*$_{I\text{-}1}$, since (i) this is an NP of <<*m*,*k*>,*k*> which undergoes QR and (ii) the I-index will be separated from the NP by a sub-operation of QR. Thus, (58c) is not interpretable, but no specification needs to be added on the establishment of an FD, since (58c) can be excluded for the reason that the mapping rule in (53) cannot apply to it.

(53) Mapping rule of β in FD(α,β):
NP ==> **SR**(α) if the NP is β in FD(α,β)

Next, suppose that β in FD(α,β) can be any NP whose semantic category is *m*.

(59) a. FD(NP, him)
b. FD(NP, John$_{D\text{-}5}$)
c. FD(NP, him$_{I\text{-}1}$)

A non-indexed NP, such as *him* in (59a), would not be mapped to an SR object but for FD. Recall that an SR object whose semantic category is *m* is either (i) $\sigma^D(n)$ (constants), (ii) v_{bn} (bound variables), or (iii) v_{fn} (free variables). Since all of them need an indexical value, a non-indexation NP cannot be mapped to such an SR object independently. One can consider therefore that the lack of an index in effect requires the establishment of FD, since otherwise it would cause a violation of the principle of Full Interpretation.

We have argued above that the fact that a [large]NP can hardly be β in FD(α,β) because of the principle of recoverability of deletion. While the same principle may exclude (59b,c) as well, these cases can also be ruled out for another reason. Recall that a D-indexed NP and an I-indexed NP are subject to their own mapping rule.

(60) NP$_{D\text{-}n}$ ==> $\sigma^D(n)$
(26) (ii) NP$_{I\text{-}n}$ ==> v_{fn}

If we assume that a mapping rule has to be accomplished whenever the condition is satisfied, (59b,c) can be automatically excluded; for example, *John*$_{D\text{-}5}$ in (59b) would have to follow (53) and (60) at the same time, which is

obviously impossible.[26] One can thus assume that FD(α,$\beta_{D\text{-}n}$) or FD(α,$\beta_{I\text{-}n}$) cannot be mapped to an SR, but again no specification needs to be added on the establishment of an FD.

I conclude therefore that there is no need to stipulate the types of NPs in FD(α,β). Thus, we have only to state the c-command requirement, as in (61).

(61) Formal Dependency (FD):
*FD(α,β) if α does not c-command β at LF.

As mentioned in section 1.3.2 above, Chomsky 1995 assumes the inclusiveness condition which states that "no new objects are added in the course of computation" (Chomsky 1995:228). In contrast, I have argued in this section that it is necessary to add an relation FD to the representation. If one wishes that the Computational System should conform to the inclusiveness condition by all means, one possibility is to postulate another component in which an FD is added onto the output representation of the Computational System to construct a complete LF representation. Hoji forthcoming proposes such organization of Grammar and calls the component as *Formal Dependency System*.[27] One can assume, on the other hand, that the Computational System is free from the inclusiveness condition and that an FD can be established at any stage of the derivation. I consider that the choice is purely conceptual, and I leave it open in this work.

5.3.2.3. Summary
To summarize: we have discussed on the questions in (46a) and (47a).

(46) a. How does an FD yield a BVA reading?
(47) a. What are the conditions on the establishment of an FD?

Regarding (46a), I have proposed the mapping rule in (53).

(53) Mapping rule of β in FD(α,β):
NP ==> **SR**(α) if the NP is β in FD(α,β)

[26] I believe that what is meant by Higginbotham 1983:(26), which is cited in (i), should be understood as describing that a linguistic object in a given representation cannot be subject to more than one mapping rules:
(i) The interpretation of an expression is given in one and only one way.

[27] If one adopts Hoji's view in this respect, one can also assume that QR occurs in this component so that only a feature-driven movement takes place in the Computational System. Then the Computational System that is described in Chomsky 1995 will be properly included in the organization of Grammar under Hoji's view. It is quite suggestive in this context that Chomsky 1995 excludes most of the past observations regarding anaphoric relations in discussing the nature of the Computational System in his sense.

According to this mapping rule, the LF representation in (48a) is mapped to the SR in (48b), which contains bound variable anaphora in the technical sense, and hence yields a BVA reading.

(48) a. LF: ... $t_{I\text{-}n}$ ... β ... FD($t_{I\text{-}n}$, β)
b. SR: ... v_{bn} ... v_{bn} ...

I have argued that ID should not involve a mapping such as in (48), on the basis of the observation regarding the distinction between ^{large}NPs and ^{small}NPs.

Regarding (47a), I have claimed that (61) is sufficient as a condition on the establishment of an FD.

(61) Formal Dependency (FD):
*FD(α,β) if α does not c-command β at LF.

It has been demonstrated that the mapping will be carried out successfully with respect to FD only if β in FD(α,β) is non-indexed and the semantic category of α in FD(α,β) is *m*.

5.3.3. Co-I-indexation and ID
Let us now discuss the question in (47b):

(47) b. What are the conditions on the establishment of an ID?

5.3.3.1. Hypothesis on the establishment of ID
I would like to propose that ID is required to be established because of the rule in (62):[28]

(62) If β is an NP whose semantic category is *m* and β is co-I-indexed with an NP α within the same sentence, ID(α,β) has to be established.

[28] Since (62) specifies that both of the two NPs should have an I-index, it may follow that a D-indexed NP cannot be an "antecedent" of an I-indexed dependent term. It is basically an empirical issue whether we want to allow a D-indexed NP to be an "antecedent" in ID. The possible way out in case we want to rule in such an ID is to allow a representation such as in (i), as is implied in the works by Takubo & Kinsui under some reinterpretation of their claims along the lines of footnote 6:
(i) [$John_{D\text{-}2}$]$_{I\text{-}4}$
The representation in (i) is not very implausible, if one considers the parallelism between (i) and (ii).
(ii) [$John_{D\text{-}2}$-sae]$_{I\text{-}4}$
John-even
'even John'
Consequences of allowing the representation in (i) are not discussed in this work.

According to our analysis, an I-indexed dependent term (*i.e.*, an I-indexed NP whose semantic category is *m*) must be mapped to a free variable at SR. This mapping itself is completely regardless of the existence or the location of the "antecedent." Then under the assumption that ID always involves co-I-indexation, it follows that there is no mapping rule for β in ID(α,β). In other words, the establishment of ID is not required from the interpretive point of view, which is a situation quite different from the case of FD.

Recall that the conditions on ID have been stated as in (3):

(3) Indexical Dependency (ID) (*to be revised*):
  a. Structural condition:
  *ID(α,β) if α does not precede β at PF.
  b. Lexical condition:
  *ID(α,β) if α is an A-type QP.

If we retain the condition in (3b), it is impossible to conflate ID with co-I-indexation, since some instances of co-I-indexation discussed in section 5.2 involve an A-type QP, such as *most* or *few*. If we suppose, on the other hand, that (3a) is the only condition of the establishment of ID, as in (63), the claim in (62) can be maintained.

(63) Indexical Dependency (ID):
  *ID(α,β) if α does not precede β at PF.

I will argue that the effects of (3b) obtain only if co-I-indexation yields a BVA reading, the characterization of which will be discussed in section 5.3.4 below.

Since the well-formedness of an ID is checked at PF according to (63), it follows that an ID should not be established after Spell-Out in the covert component. This is guaranteed if we assume that (62) has to be fulfilled as soon as two co-I-indexed NPs appear in the syntactic representation.

Note again that the establishment of ID is not necessary for interpretation: ID itself need not be 'interpreted', unlike FD, since the interpretation is carried out with respect to the I-index. ID is a purely syntactic object which is constructed because of the rule in (62): if it violates the condition in (63), it causes the derivation of the sentence to crash at PF (in the sense of Chomsky 1995:171), but otherwise, it does not affect the interpretation of output representations at all.

One may feel uncomfortable to postulate a rule such as (62), since it seems that the establishment of an ID does not contribute to the interpretation. However, recall from section C.3 that we have suggested a similar rule in order to express Condition D.

(64) In case there are co-D-indexed NPs in a sentence, a syntactic relation (say *R*, tentatively) has to be established between them.

It is likely that (62) and (64) are of the same nature. Given that (62) and (64) are of the same nature, *i.e.*, given that there are more than one instance of the rule of this nature , it seems plausible that they reflect some intrinsic property of Grammar. Although it will remain true that the establishment of these relations are 'purposeless' from the viewpoint of interpretation, it may turn out, exactly for this very reason, that they exhibit a property of Grammar itself, rather than a property of some 'bare output condition' in the sense of Chomsky 1995. I will leave (62) and (64) as they are in this work without trying to generalize them, since we have not yet understood the nature of (64) well enough to do so.

In section 5.3.3.2, I will point out an advantage of assuming that ID is in fact based on co-I-indexation. In section 5.3.3.3, I will demonstrate that instances of intra-sentential co-I-indexation exhibit the properties of ID. In section 5.3.3.4, I will show that the so-called donkey anaphora can be regarded as an instance of (intra-sentential) co-I-indexation, and that it also exhibits the properties of ID. It will thus be shown in these subsections that ID and co-I-indexation are not distinct relations in nature.

5.3.3.2. ID and ^{large}NPs

The instances of co-I-indexation that are discussed in section 5.2 allow a ^{large}NP.

(65) A: Uti-ni-wa niwasi-ga imasu yo
home-at-TOP gardener-NOM exist PARTICLE
'We have a gardener.'

B: So-no niwasi-wa do-ko-da?
that-GEN gardener-TOP which-place-COPULA
'Where is the gardener?'

(66) a. Few congressmen admire Kennedy. Those congressmen are very junior.
  b. Many men will come to the ball. Mary will dance with those men.
  c. Most students came. Those students are diligent.

Recall the mapping rules of an I-indexed NP, repeated here.

(26) Mapping rules of an I-indexed NP whose semantic category is *m*:
  (i) If it is a (QR) trace, $NP_{I\text{-}n}$ ==> v_{bn} (=(11))
  (ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn}

We have assumed that the content of the free variable yielded by (26-ii) is computed based on the information contained in the discourse structure. In order to accommodate the cases in which the $NP_{I\text{-}n}$ in (26-ii) itself carries some

information, we can assume that the semantic content on N is represented in SR as part of the description of the free variable.[29]

(26') Mapping rules of an I-indexed NP whose semantic category is *m*:
(i) If it is a (QR) trace, $NP_{I\text{-}n}$ ==> v_{bn} (=(11))
(ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn} : **SR**(N)

(67) [that automobile company]$_{I\text{-}n}$ ==> v_{fn} : automobile-company

It is evident that the mapping rule in (26'-ii) does not involve 'deletion', in contrast to the mapping rule for β of FD(α,β), discussed in section 5.3.2. The fact that co-I-indexation is insensitive to the distinction between ^{small}NPs and ^{large}NPs, as demonstrated by the examples in (65) and (66) above, therefore follows naturally.

We have also noticed earlier that ID allows a ^{large}NP, unlike FD.

(57) B-type QP & ^{large}NP:
Do-no zidoosya-gaisya-ga [so-no zidoosya-gaisya-no
which-GEN automobile-company-NOM that-GEN automobile-company-GEN
ko-gaisya]-o suisensita no?
child-company-ACC recommended COMP
'Which automobile company recommended [that automobile company's subsidiary]?'

Although this observation does not exclude the possibility that β in ID(α,β) is a type of free variable different from those involved in co-I-indexation, this still shows an advantage of assuming that ID is based on co-I-indexation, since if we consider that ID always involves co-I-indexation, the acceptable status of (57) automatically follows from the characterization of co-I-indexation without any additional stipulation.

5.3.3.3. E-type links and ID

I have claimed in section 5.2 that E-type links are instances of co-I-indexation. Let us examine the syntactic properties of an E-type link in case it is intra-sentential.

(68) a. Few congressmen admire Kennedy, and they are very junior.
b. If many men will come to the ball, Mary will dance with them.

Obviously, the "antecedent" does not c-command the dependent term in the

[29] I am grateful to the participants of the Kaken workshop (Kobe University; December 1997) for clarifying this point. In particular I thank Barry Schein for articulating this idea in the way similar to (26').

examples above, and hence, it is impossible that FD is involved in these anaphoric relation (which has been analyzed as an instance of co-I-indexation). On the other hand, such type of an anaphoric relation basically exhibits the properties of ID.

First, a ^{large}NP can be used as a dependent term.

(69) a. Few congressmen admire Kennedy, and those congressmen are very junior.
b. If many men will come to the ball, Mary will dance with those men.

Furthermore, the "antecedent" has to precede the dependent term.

(70) a. *They are very junior, and few congressmen admire Kennedy.
b. *Mary will dance with them, if many men will come to the ball.

We have also considered an inter-sentential anaphoric relation such as in (18) in section 5.2.

(18) A: Uti-ni-wa niwasi-ga imasu yo
home-at-TOP gardener-NOM exist PARTICLE
'We have a gardener.'

B: So-itu-wa do-ko-da?
that-guy-TOP which-place-COPULA
'Where is he?'

(71) can be regarded as an intra-sentential version of (18).

(71) Uti-ni-wa niwasi-ga iru no desu ga, so-itu-wa
home-at-TOP gardener-NOM exist COMP POLITE but that-guy-TOP
ima dekaketeimasu.
now out
'We have a gardener, but he is out now.'

In this case, it is fully expected that this type of anaphoric relation can exhibit the properties of an ID, since (71) expresses a coreferential reading, which we have discussed in chapter 4. (72) and (73) confirm this prediction.

(72) Uti-ni-wa niwasi-ga iru no desu ga, so-no niwasi-wa
home-at-TOP gardener-NOM exist COMP POLITE but that-GEN gardener-TOP
ima dekaketeimasu.
now out
'We have a gardener, but that gardener is out now.'

(73) *Uti-ni-wa so-itu-ga iru no desu ga, niwasi-wa
home-at-TOP that-guy-NOM exist COMP POLITE but gardener-TOP
ima dekaketeimasu.
now out
'We have him, but a gardener is out now.'

I have discussed above that co-I-indexation can yield an E-type link or a coreferential reading. It has been shown in this subsection that co-I-indexation exhibits the properties of ID in the case of intra-sentential anaphoric relation. The observations in this subsection thus indicates that co-I-indexation is compatible with ID, and that the assumption in (64) does not induce a problem regarding the syntactic properties of ID.

(74) In case there are co-D-indexed NPs in a sentence, a syntactic relation (say *R*, tentatively) has to be established between them.

5.3.3.4. Donkey anaphora as an instance of co-I-indexation

One might say that co-I-indexation should be distinct from ID in that the value of the dependent term is always fixed in the former. This subsection demonstrates that donkey anaphora, in which the value of the dependent term is not fixed, can be regarded as an instance of intra-sentential co-I-indexation. It will also be demonstrated that donkey anaphora also exhibits the basic properties of ID. This reinforces the generalization that ID is not distinct from co-I-indexation in nature.

Consider the celebrated example of donkey anaphora in (75).[30]

(75) Every farmer who owns a donkey beats it.

Let us suppose that the two underlined NPs in (75) are co-I-indexed, as illustrated in (76),[31] in which it is assumed that both phrases *every NP* and

[30] I believe that the analysis of donkey anaphora presented in this section basically follows the core idea of Evans' analysis, but it is articulated in a way different from the analysis in Evans 1977: (I) section 5 (pp.521-532). Informally speaking, the shared basic idea is that donkey anaphora contains the type of anaphoric relation in (i) within the scope of a quantifier.
(i) He owns a donkey. He beats it.
In this respect, my analysis is similar to Discourse Representation Theory (DRT) (cf. Kamp 1981, Kamp & Reyle 1993); but it is different from DRT in that I do not regard the anaphoric relation in (i) as bound variable anaphora. The analyses of donkey anaphora presented in Heim 1982 and Chierchia 1992 will be critically reviewed in Appendix E below.

[31] As implied in section 5.2.3.2 above, Chierchia 1992 argues that the donkey anaphora should be based on the syntactic coindexation between two NPs. He points out in particular that the contrast between (75) and (i) would pose a serious problem for the analysis in which the content of an E-type link is determined totally pragmatically or by inference.

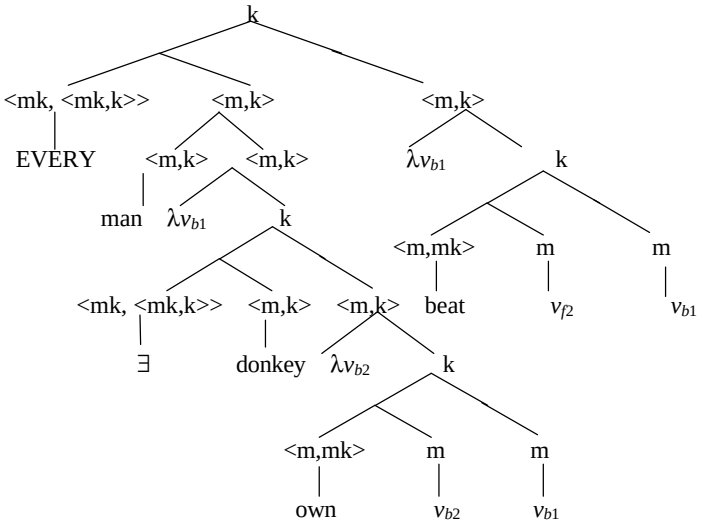
a(n) NP undergo QR.[32]

(76) a. before QR:
[every man who$_{I\text{-}1}$ $t_{I\text{-}1}$ owns [a donkey]$_{I\text{-}2}$]$_{I\text{-}1}$ beats it$_{I\text{-}2}$.
b. after QR:
[every man who$_{I\text{-}1}$ [a donkey]$_{I\text{-}2}$ [$t_{I\text{-}1}$ owns $t_{I\text{-}2}$]]$_{I\text{-}1}$ $t_{I\text{-}1}$ beats it$_{I\text{-}2}$.

Then the SR should be as in (77), and (78) is the tree diagram of (77), using semantic categories as the labels on the nodes:[33]

(77) SR: EVERY (man & λv_{b1}[$\exists$(donkey)(λv_{b2}[own(v_{b2})(v_{b1})])])
(λv_{b1}[beat(v_{f2})(v_{b1})])

(78)



Let us now consider how the free variable v_{f2} in (77)-(78) is interpreted according to our analysis.

(i) *Every donkey owner beats it.
(Chierchia 1992: (101))
This observation also supports our assumption that donkey anaphora is based on co-I-indexation.

[32] As mentioned in footnote 18, I will argue in section 5.3.4 that an operation other than QR can apply to *a(n) NP*, but this does not affect the point in question.

[33] I simply assume that two nodes of <*m*,*k*> can compose into one <*m*,*k*> in a modification construction. As should be evident, the choice of the analysis of modification is irrelevant to the point here.

(41) Interpretation of a free variable:
v_{fn} is understood to refer to the individual(s) that verify K(Σ(v_{bn}), v_{fn}) with respect to v_{bn}.

(32) Σ(v_{bn}) = the domain which includes v_{bn} and the operator which binds it

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

In the case of (75)-(78), Σ(v_{b2}) corresponds to 'λv_{b2}[own(v_{b2})(v_{b1})]', and K(Σ(v_{b2}), v_{f2}) to '∃(donkey)(λv_{b2}[own(v_{b2})(v_{b1})])'. Then v_{f2} refers to the individuals that verify '∃(donkey) (λv_{b2}[own(v_{b2})(v_{b1})])' with respect to v_{b2}, which can be roughly paraphrased as 'that donkey that v_{b1} owns'. Notice that v_{f2} is contained in the scope of EVERY and that the variable bound by EVERY (*i.e.*, v_{b1}) is included in K(Σ(v_{b2}), v_{f2}): see the simplified schematic representation in (79).

(79) EVERY (... λv_{b2}[... v_{b2} ... v_{b1} ...] ...)(λv_{b1}[... v_{f2} ... v_{b1} ...])

Therefore, the individuals which verify K(Σ(v_{b2}), v_{f2}) vary depending on the value of v_{b1}, which means that the value of v_{f2} varies accordingly. The Japanese example in (80) exemplify the same configuration.[34]

(80) [Hon-o hiraita hito]-wa minna so-re-o
book-ACC opened person-TOP all that-thing-ACC
kaw-anakerebanaranai.
buy-must
'[Everyone who has opened a book] must buy it.'

As shown above, so-called donkey anaphora can be regarded as being

[34] I assume that the anaphoric relation in the following examples can be analyzed basically in the same way.
(i) a. If a farmer owns a donkey, he always beats it.
b. If a man enters his room, he will trip the switch.
(Evans 1980:(23))
c. If there is a man in the garden, John will tell him to leave.
(Evans 1980:(24))
(ii) It is always the case that when there is a man in the garden, John tells him to leave.
(iii) [Daikigyoo-ga tubure-kakatteiru to], John-wa kanarazu
giant:company-NOM bankrupt-close:to if John-TOP always
so-ko-o koogekisi-tagaru.
that-place-ACC attack-want
'If a giant company is going bankrupt, John always wants to attack it.'

based on co-I-indexation and involving a free variable at SR. In this case, a free variable is not given a fixed value because of the fact that both the free variable and its "antecedent" are included in the scope of the same quantifier.

What is crucial to the current discussion is the fact (i) that donkey anaphora allows a ^{large}NP as a dependent term, and (ii) that it is constrained by the PF precedence requirement. (i) is illustrated by (81), and (ii) is illustrated by (82).[35]

(81) ^{large}NP:
a. ?Every farmer who owns a donkey beats that donkey.
b. [Mado-o aketa hito]-wa minna so-no mado-o simeta.
window-ACC opened person-TOP all that-GEN window-ACC closed
'[Everyone who had opened a window] closed that window.'

(82) Relevance of PF precedence:
a. *[Every farmer who owns it] beats a donkey.
b. *[Every farmer who owns that donkey] beats a donkey.
c. *[So-re-o hiraita hito]-wa minna hon-o
that-thing-ACC opened person-TOP all book-ACC
kaw-anakerebanaranai.
buy-must
'[Everyone who has opened it] must buy a book.'
d. *[So-no mado-o aketa hito]-wa minna mado-o simeta.
that-GEN window-ACC opened person-TOP all window-ACC closed
'[Everyone who had opened that window] closed a window.'

Thus, the interpretation and the syntactic properties of donkey anaphora can be accounted for without any additional assumptions under the analysis proposed here.

5.3.4. BVA readings in terms of co-I-indexation

5.3.4.1. Problem

The final question is (46b):

(46) b. How does an ID yield a BVA reading?

Recall that we also have to derive the effects of the lexical condition on ID (*i.e.*,

[35] Heim 1982:ch.2 also argues that precedence relation is relevant to donkey anaphora, although she refers to the LF representation rather than to the PF representation. The analysis proposed in Heim 1982:ch.2 will be critically reviewed in Appendix E below.

*ID(α,β) if α is an A-type QP), which should now be rephrased as in (83), where A-type QPs and B-type QPs are characterized simply by their extension as in (84).

(83) Intra-sentential co-I-indexation can yield a BVA reading with a B-type QP, but not with an A-type QP.

(84) a. A-type QPs:
NP-*sae* 'even NP'
kanarinokazu-no NP 'most of the NPs'
10 *izyoo-no* NP 'ten or more NPs'
55%-*no* NP '55% of the NPs'
NP1 *to* NP2 (*to*) 'NP1 and NP2'
NP1 *ka* NP2 (*ka*) 'either NP1 or NP2'

b. B-type QPs:
do-no NP 'which NP'
do-no NP-*mo* 'every NP'
(*subete-no* NP 'every NP')

I have proposed above that ID is based on co-I-indexation. Under this hypothesis, the dependent term in ID should also be mapped to a free variable, which is interpreted according to (41), repeated here.

(41) Interpretation of a free variable:
v_{fn} is understood to refer to the individual(s) that verify K(Σ(v_{bn}), v_{fn}) with respect to v_{bn}.

(32) Σ(v_{bn}) = the domain which includes v_{bn} and the operator which binds it

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

We face a serious problem here, since it appears that the characterization in (41) never allows a BVA reading. Consider (85).

(85) Do-no daikigyoo-ga so-no daikigyoo-no ko-gaisya-o
which-GEN giant:company-NOM that-GEN giant:company-GEN child-company-ACC
suisensita no?
recommended COMP
'Which giant company recommended that giant company's subsidiary?'

If the *wh*-phrase in (85) undergoes QR, the SR of (85) should look like (86):

(86) WH(giant-company)(λv_{b1}[v_{b1} recommended v_{f1}'s subsidiary])

Σ(v_{b1}) would be 'λv_{b1}[v_{b1} recommended v_{f1}'s subsidiary]', but Σ(v_{b1}) itself contains v_{f1} in this case. Therefore, there cannot be any domain which dominates Σ(v_{b1}) but not v_{f1}, making it impossible to obtain K(Σ(v_{b1}), v_{f1}). It thus follows that v_{f1} in (86) will not be given any interpretation according to our current theory.

I will claim below that (85) can have an SR distinct from (86), and that a free variable in that SR can in effect yield a BVA reading successfully without modifying the characterization in (41) above.

The proposal is divided into two parts:
(i) I claim that (85) (and the other relevant examples with ID as well) has a structure as in (87), roughly speaking, presumably in terms of some kind of a raising operation.

(87) which [giant company recommended that giant company's subsidiary]

Thus I consider that the anaphoric relation is in fact established between the bare NP and the dependent term, rather than between the B-type QP and the dependent term. (ii) I propose that a bare NP can undergo what I shall call *EQR* instead of QR, and that a BVA reading can be expressed in terms of a free variable under (41), as long as EQR is available.

I start with the proposal (ii) in section 5.3.4.2, and then move on to the proposal (i) in section 5.3.4.3. I will argue in section 5.3.4.4 that the phenomenon referred to as 'telescoping' in the literature can be accommodated smoothly under this analysis, which in effect supports the claim that some instances of a BVA reading should involve a free variable.

5.3.4.2. Bare NPs and EQR

A bare NP usually yields a coreferential reading, as given in (88) and (89).

(88) a. A giant company recommended its subsidiary.
b. A student did not bring his textbook.

(89) a. Ginkoo-ga Toyota-ni [so-ko-no torihikisaki]-o
bank-NOM Toyota-DAT that-place-GEN business:partner-ACC
syookaisita.
introduced
'A bank introduced [its business partner] to Toyota.'

b. Daikigyoo-ga so-no daikigyoo-no ko-gaisya-o
giant:company-NOM that-GEN giant:company-GEN child-company-ACC

suisensita.
recommended

'A giant company recommended that giant company's subsidiary.'

However, when the anaphoric relation is embedded within the scope of a quantificational expression, it can yield a BVA reading, as illustrated in (90) and (91).

(90) a. It often happens that a giant company recommends its subsidiary.
b. It never happened in this class that a student did not bring his textbook.

(91) a. Mukasi-wa [ginkoo-ga Toyota-ni [so-ko-no torihikisaki]-
before-TOP bank-NOM Toyota-DAT that-place-GEN business:partner-

o syookaisuru koto]-ga yoku atta.
ACC introduce fact-NOM often existed

'It often happened before [that a bank introduced [its business partner] to Toyota].'

b. [Daikigyoo-ga so-no daikigyoo-no ko-gaisya-o
giant:company-NOM that-GEN giant:company-GEN child-company-ACC

suisensuru no]-wa yoku aru koto da.
recommend COMP-TOP often exist fact COPULA

'It is common that a giant company recommends that giant company's subsidiary.'

The fact that a [large]NP is easily allowed in (91b) indicates that the relevant BVA reading is not based on FD. According to our generalization that a BVA reading should be based on either FD or ID and the hypothesis that ID is based on co-I-indexation, it follows (i) that the two underlined NPs in (91b) should be co-I-indexed, and (ii) that the dependent term is mapped to a free variable. Let us consider first in what configuration it would be possible for a free variable to be involved in a BVA reading.

According to (41), two occurrences of a free variable with the identical index can be covariant with each other as long as (i) they share the value of 'K(Σ(v_{bn}), v_{fn})', and (ii) both occurrences of v_{f1} are not contained in Σ(v_{b1}). Let us consider the configurations in which these conditions are satisfied. For example, (92) is a schematic representation in which two coindexed free variables are covariant with each other.

(92) ... [$_{k1}$ ... Operator v_{b1}[... v_{b1} ...] ...] ... [$_{k}$ ... v_{f1} ... v_{f1} ...] ...

For both occurrences of v_{f1}, $k1$ is the value of K(Σ(v_{bn}), v_{fn}) in (92). (92) is exemplified by (93), where the two underlined NPs appear to stand in bound

variable anaphora.

(93) a. before QR of *every NP*:
[Every farmer who owns [a donkey]$_{I-1}$] calls it$_{I-1}$ by its$_{I-1}$ name.
b. after QR of *every NP*:
[Every farmer who owns [a donkey]$_{I-1}$] [*t* calls it$_{I-1}$ by its$_{I-1}$ name]

In contrast, (94) is not a configuration in which two free variable are covariant with each other, since they do not share the value of 'K(Σ(v_{bn}), v_{fn})'.

(94) ... [$_{k2}$ ... [$_{k1}$ ... Operator v_{b1}[... v_{b1} ...] ... v_{f1} ...] ... v_{f1} ...] ...

While $k1$ is the value of K(Σ(v_{bn}), v_{fn}) for the first occurrence of v_{f1}, $k2$ is the value for the second one in (94). (94) is illustrated by an example such as in (95).

(95) [[Every farmer who owns [a donkey]$_{I-1}$] beats it$_{I-1}$], and they$_{I-1}$ do not live long.

Thus, under this analysis, two coindexed free variables can be covariant as if they stand in bound variable anaphora, as long as they share the value of K(Σ(v_{bn}), v_{fn}). I argue below that the instances in which co-I-indexation yields a BVA reading involves a configuration such as (92) at SR.

Let us now return to (91b):

(91) b. [Daikigyoo-ga so-no daikigyoo-no ko-gaisya-o
giant:company-NOM that-GEN giant:company-GEN child-company-ACC

suisensuru no]-wa yoku aru koto da.
recommend COMP-TOP often exist fact COPULA

'It is common that a giant company recommends that giant company's subsidiary.'

I propose that the SR of the embedded clause of (91b) should be roughly as in (96), an instance of the configuration in (92):[36]

(96) ... [$_{k1}$ ∃[giant-company(v_{b1})]] & [$_{k}$ v_{f1} recommends v_{f1}'s subsidiary]

Informally speaking, the SR in (96) can be read as follows: 'supposing that

[36] I am grateful to Robert May (personal communication; spring 1997) who suggested to me the possibility that some kind of 'existential presupposition' may be relevant to the apparent BVA reading based on co-I-indexation, with respect to the corresponding English examples.

there is a giant company, that giant company recommends that giant company's subsidiary'. Obviously, we need to postulate an LF operation other than QR to derive an SR such as (96), since QR would derive an SR such as (86), repeated here.

(86) WH(giant-company)(λv_{b1}[v_{b1} recommended v_{f1}'s subsidiary])

Let us tentatively call the relevant operation 'E(xistential)QR'. In comparing (91b) and (96), we see that the bare NP in (91b) corresponds to the part '$\exists$[giant-company(v_{b1})]' in (96), whose semantic category is *k*. I claim for now that the semantic category of a bare NP can be *k*, and that EQR only applies to an NP whose semantic category is *k*, while QR applies to an NP that is <<*m*,*k*>,*k*>.

The sub-operations of EQR are described as follows:

(97) Sub-operations of EQR:
(i) dislocate an NP (of *k*) with the I-index, and
(ii) leave an NP with the same I-index which is to be mapped to a free variable.

Thus, I assume that the LF representation of (91b) should look like (98): I consider that it would be more or less straightforward to derive the SR in (96) from (98), although I do not spell them out in this work.[37]

(98) ... [[a giant company]$_{I\text{-}1}$ [NP$_{I\text{-}1}$ recommends [*so-no* giant company]$_{I\text{-}1}$'s subsidiary]]

According to the analysis here, QR has to take place when FD yields a BVA reading, and EQR has to occur when a BVA reading obtains based on co-I-indexation. I have claimed that EQR applies to an NP whose semantic category is *k*, while QR applies to an NP of <<*m*,*k*>,*k*>, and that the semantic category of a bare NP can be *k*. Note that I am not claiming that a bare NP has to undergo EQR: in case it is <<*m*,*k*>,*k*>, QR can apply to it. Thus, descriptively speaking, a bare NP patterns with what I have called B-type QPs in that it is compatible with either FD or ID, in principle. We thus make the predictions summarized in (99).

[37] A forthcoming work by Ai Kawazoe will include a more detailed discussion on the nature of EQR.

(99)

LF c-com-mand	PF prece-dence	β	FD	ID	anaphoric relation
yes	yes	^{small}*so-*	FD	ID	ok
		^{large}*so-*	*	ID	ok
no	no	^{small}*so-*	*	*	*
		^{large}*so-*	*	*	*
no	yes	^{small}*so-*	*	ID	ok
		^{large}*so-*	*	ID	ok
yes	no	^{small}*so-*	FD	*	ok
		^{large}*so-*	*	*	*

I will now illustrate that these are in fact correct predictions.

(90) and (91) above illustrate the configuration in which both FD and ID can be established, structurally speaking. The fact that a ^{large}NP is allowed, as in (91b), provides evidence that the anaphoric relation does not need to be based on FD.

If the configuration allows neither FD nor ID to be established, an anaphoric relation is not available, as shown in (100)-(101).[38]

(100) a. *It rarely happens that its subsidiary recommends a giant company.
b. *It often happened in this class that his friend invited a student to a

[38] One may find examples such as in (i) to be much less unacceptable than (101b).

(i) a. ?/??Mukasi-wa [[so-ko-no torihikisaki]-ga Toyota-ni
before-TOP that-place-GEN business:partner-NOM Toyota-DAT
ginkoo-o syookaisuru koto]-ga yoku atta.
bank-ACC introduce fact-NOM often existed
'It often happened before [that [its business partner] introduced a bank to Toyota].'

b. ?So-ko-ga tubure-kakatteiru toki dake, John-wa
that-place-NOM bankrupt-close:to when only John-TOP
syookengaisya-o koogekisuru.
securities:company-ACC attack
'Only when it is going bankrupt, John attacks a securities company.'
(I owe this example to Hajime Hoji (p.c.:1996 winter).)

c. ?[So-ko-no syatyoo-ga daikigyoo-o suisensuru
that-place-GEN president-NOM giant:company-ACC recommend
no]-wa yoku aru koto da.
COMP-TOP often exist fact COPULA
'It is common that its president recommends a giant company.'

The remarks made in Appendix D apply here. While the sentences in (i) appear to allow a covariant reading despite the fact that it is a construction in which neither FD nor ID can be established, I maintain that these sentences contain a non-individual-denoting *so*-word.

party.

(101) a. *[So-no daikigyoo-no ko-gaisya-ga daikigyoo-o
that-GEN giant:company-GEN child-company-NOM giant:company-ACC

suisensuru no]-wa mettani nai koto da.
recommend COMP-TOP hardly not fact COPULA

'It is rare that that giant company's subsidiary recommends a giant company.'

b. *Mukasi-wa [[so-no ginkoo-no torihikisaki]-ga Toyota-ni
before-TOP that--GEN bank-GEN business:partner-NOM Toyota-DAT

ginkoo-o syookaisuru koto]-ga yoku atta.
bank-ACC introduce fact-NOM often existed

'It often happened before [that [that bank's business partner] introduced a bank to Toyota].'

The examples in (102) illustrate that a bare NP can yield a BVA reading even if it does not c-command the dependent term at LF, as long as the former precedes the latter at PF.

(102) a. Mukasi-wa [Toyota-o ginkoo-ni [so-no ginkoo-no
before-TOP Toyota-ACC bank-DAT that-GEN bank-GEN

torihikisaki]-ga *t* syookaisuru koto]-ga yoku atta.
business:partner-NOM introduce fact-NOM often existed

'It often happened before that [that bank's business partner] introduced Toyota to a bank.'

b. Mukasi-wa [Toyota-o ginkoo-ni [so-ko-no torihikisaki]-ga
before-TOP Toyota-ACC bank-DAT that-place-GEN business:partner-NOM

t syookaisuru koto]-ga yoku atta.
introduce fact-NOM often existed

'It often happened before that [its business partner] introduced Toyota to a bank.'

c. Mukasi-wa [Toyota-ni ginkoo-o [so-no ginkoo-no
before-TOP Toyota-DAT bank-ACC that-GEN bank-GEN

torihikisaki]-ga *t* syookaisuru koto]-ga yoku atta.
business:partner-NOM introduce fact-NOM often existed

'It often happened before that [that bank's business partner] introduced a bank to Toyota.'

d. Mukasi-wa [Toyota-ni ginkoo-o [so-ko-no torihikisaki]-ga

before-TOP Toyota-DAT bank-ACC that-place-GEN business:partner-NOM

t syookaisuru koto]-ga yoku atta.
introduce fact-NOM often existed

'It often happened before that [its business partner] introduced a bank to Toyota.'

Finally, a BVA reading is available in case a ^{small}NP precedes a bare NP, as long as the latter c-commands the former at LF.[39]

(103) a. [So-ko-no ko-gaisya-o zidoosya-gaisya-ga suisensuru
that-place-GEN child-company-ACC automobile-company-NOM recommend

no]-wa yoku aru koto da.
COMP-TOP often exist fact COPULA

'It is common [that an automobile company recommends its subsidiary].'

b. [Toyota-ni so-ko-no ko-gaisya-o zidoosya-gaisya-ga
Toyota-DAT that-place-GEN child-company-ACC automobile-company-NOM

suisensuru no]-wa yoku aru koto da.
recommend COMP-TOP often exist fact COPULA

'It is common [that an automobile company recommends its subsidiary to Toyota].'

In contrast, a BVA reading is unavailable if a ^{large}NP precedes a bare NP, irrespective of their structural relation at LF.

(104) a. ?*[So-no zidoosya-gaisya-no ko-gaisya-o zidoosya-gaisya-
that-GEN automobile-company-GEN child-company-ACC automobile-company-

ga suisensuru no]-wa yoku aru koto da.
NOM recommend COMP-TOP often exist fact COPULA

'It is common [that an automobile company recommends that automobile company's subsidiary].'

b. ?*[Toyota-ni so-no zidoosya-gaisya-no ko-gaisya-o
Toyota-DAT that-GEN automobile-company-GEN child-company-ACC

zidoosya-gaisya-ga suisensuru no]-wa yoku aru koto da.
automobile-company-NOM recommend COMP-TOP often exist fact COPULA

---

[39] I thank Hajime Hoji for making me realize that the proposed analysis should not exclude a possibility that the dependency with a bare NP can be based on FD. Note, however, that the assessment of what (103) shows involves some complication regarding the remarks in Appendix D.

'It is common [that an automobile company recommends that automobile company's subsidiary to Toyota].'

If one assumes that a BVA reading with a bare NP has to be based on co-I-indexation, the acceptable status of (103) and the contrast between (103) and (104) are not accounted for. Therefore, I claim that a bare NP is ambiguous between <<*m*,*k*>,*k*> and *k*, and hence it can undergo either QR or EQR.

5.3.4.3. Quantifier as a one-place predicate

Consider now the cases in (105):

(105) a. Do-no kaisya-ga [so-no kaisya-no ko-gaisya]-o
which-GEN company-NOM that-GEN company-GEN child-company-ACC

suisensita no?
recommended COMP

'Which company recommended [that company's subsidiary]?'

b. Do-no kaisya-mo [so-no kaisya-no ko-gaisya]-o
which-GEN company-also that-GEN company-GEN child-company-ACC

suisensita.
recommended

'Each company recommended [that company's subsidiary].'

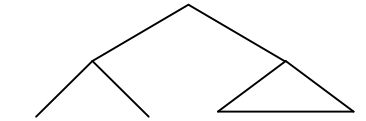
Although apparently these examples do not contain a bare NP, I would like to consider that they are not very different from (91b) in the configuration at SR. More concretely, I claim that the semantic category of a quantifier such as *which* or *every* is ambiguous between <<*m*,*k*>,<<*m*,*k*>,*k*>> and <*k*,*k*>: (i) when it is <<*m*,*k*>,<<*m*,*k*>,*k*>>, it is a two-place predicate which takes two arguments of <*m*,*k*>, as in (107), but (ii) when it is <*k*,*k*>, it is a one-place predicate which takes a sentential argument, roughly as in (108).[40]

(106) a. Which student came?
b. Every student came.

(107) a. WH(student)(λv_{b1}[v_{b1} came])
b. EVERY(student)(λv_{b1}[v_{b1} came])

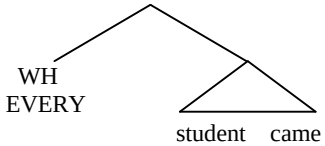
[40] One might wonder what the truth condition can be for (108b), since it does not specify the domain of the quantification for EVERY. However, this is not a novel problem which is caused by this particular assumption: the domain of quantification for *always* in (110b) is also not expressed linguistically (cf. Lewis 1975). Thus, if the sentence in (110b) can be assigned a truth condition, (108b) should also be assigned one in the similar way.

c.



(108) a. WH(student came)
b. EVERY(student came)

c.



Informally speaking, I assume that *WH* and *EVERY* in (108) are interpreted as in (109a) and (109b), respectively.

(109) a. WH(*k*) = Tell me the individual(s) that verify *k*
b. EVERY(*k*)
= It is always the case that *k* / It happened in every case that *k*

Thus I claim that the SRs of the examples in (105) more or less correspond to the paraphrases in (110).

(110) a. Tell me the individual(s) that verify "[a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary"
b. It is always the case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary / It happened in every case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary

Then the embedded clause in (110) is not different from the one in (91b), repeated here.

(91) b. [Daikigyoo-ga so-no daikigyoo-no ko-gaisya-o
giant:company-NOM that-GEN giant:company-GEN child-company-ACC

suisensuru no]-wa yoku aru koto da.
recommend COMP-TOP often exist fact COPULA

'It is common that a giant company recommends that giant company's subsidiary.'

Therefore, as long as the paraphrasing of (105) given in (110) is valid, (105)

can be accounted for in a way similar to (91b), in which a bare NP undergoes EQR and in effect yield a BVA reading.

It is expected from this analysis that there is a contrast between (111a) and (111b).

(111) a. ?Each student wrote a letter to that student's advisor.
b. ?*Each of John and Bill wrote a letter to that student's advisor.

According to our analysis (111a) can have an SR corresponding to (112), if the speaker allows *each* to be *<k,k>*.

(112) It happened in each case that a student wrote a letter to that student's advisor.

Even if the paraphrasing as in (112) is allowed, however, a similar paraphrasing of (111b) would not contain a bare NP, which means that EQR cannot take place in (111b).

(113) It happened in each case that John and Bill wrote a letter to that student's advisor.

Then the two underlined NPs in (112) cannot be co-I-indexed for the reason that the interpretation of *that student* would fail. FD is hardly established either, since *that student* is (normally) a ^{large}NP. Therefore it is expected under our analysis that (111b) does not allow a BVA reading, in contrast to (111a).

5.3.4.4. Telescoping

As discussed in Heim 1982, Roberts 1989, Poesio & Zucchi 1992 among others, there are some cases in which a BVA reading appears to obtain inter-sententially. According to Poesio & Zucchi 1992:347, Roberts 1987 called this phenomenon 'telescoping'. Here are some examples of 'telescoping'.

(114) a. Karttunen (1976) (cited in Heim (1982:261 (10))):
Harvey courts a girl at every convention. She always comes to the banquet with him.

b. Stenning (1978) (cited in Roberts (1989:716 (32))):
In each room, there was a cat and a goldfish. The goldfish dived. The cat caught it.

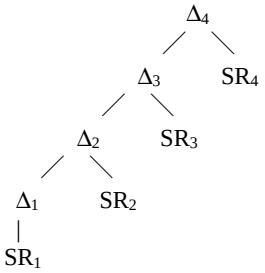
c. Sells (1985) (cited in Roberts (1989:716 (33))):
A train leaves every hour for Boston. It always stops in New Haven.

d. Sells (1985) (cited in Roberts (1989:717 (35))):
Every chess set comes with a spare pawn. It is taped to the top of the box.

If every BVA reading had to be based on FD, these examples would raise a serious problem, since FD, being an LF object, can only be defined within a sentence. If, on the other hand, co-I-indexation can yield a BVA reading as proposed here, these examples are manageable, since co-I-indexation can go beyond a sentence boundary. Let us thus consider how the instances of 'telescoping' can be accommodated in our analysis.

I have claimed in section 5.2.2.3 above that the discourse structure is normally constructed by an operation similar to Merge, as in (25).

(25)



If the discourse structure is constructed in this way, it is impossible that the following sentence enters into the scope of the preceding one. In 'telescoping' examples, however, the second sentences appear to be in the scope of the first sentences, unlike the unmarked discourse.

As pointed out in the literature, the availability of 'telescoping' is largely determined by pragmatics, which suggests that it is based on some marked operation that is only allowed in certain contexts. I assume that the second sentences in 'telescoping' examples happen to be "conjoined" with the nuclear scope of the matrix quantifier of the first sentences. An informal representation is given in (115), just to show how the first and the second sentences in (114a) are put together.

(115) EVERY(convention)(λv_{b1}[Harvey courts a girl at v_{b1}] & [she always comes to the banquet with him])

Once a structure such as (115) obtains, the relevant anaphoric relation can be analyzed as an instance of co-I-indexation with a bare NP. Thus, except for the fact that the discourse structure is constructed in a marked way, no special analysis is necessary for accounting for the anaphoric relation in the 'telescoping' examples.

This analysis also extends to examples such as (116a), if we assume that *each* can be <*k*,*k*>, which would correspond to the paraphrase in (116b).

(116) a. Partee (cited in Roberts (1989:717 (34))):
Each degree candidate walked to the stage. He took his diploma from the Dean and returned to his seat.
b. It is always the case that a degree candidate walked to the stage. He took his diploma from the Dean and returned to his seat.

The informal SR of (116a) is given in (117).

(117) EVERY (∃ [degree candidate(v_{b1})] & v_{f1} walked to the stage & v_{f1} took v_{f1}'s diploma from the Dean and returned to v_{f1}'s seat)

Just as the preceding examples, the SR in (117) can express a BVA reading, owing to the availability of EQR.

It is further predicted from this analysis that 'telescoping' is possible only if a bare NP is involved in some way. The prediction seems to be borne out at least based on the preliminary observation of the examples in (118).

(118) a. *Even John walked to the stage. He took his diploma from the Dean and returned to his seat.
b. *Each of John and Bill walked to the stage. He took his diploma from the Dean and returned to his seat.

The unacceptability of (118) cannot be accounted for if 'telescoping' examples are to be regarded as a special case in which bound variable anaphora (in the technical sense) extends beyond a sentence boundary. If, on the other hand, they are considered as instances of co-I-indexation as proposed here, the contrast between (116) and (118) can be accounted for without any additional stipulation.

5.3.4.5. Summary

We have discussed the question in (46b) under the hypothesis that ID is based on co-I-indexation.

(46) b. How does an ID yield a BVA reading?

I have demonstrated that two coindexed free variables are covariant to each other in the configuration as in (92), under our analysis of free variables.

(92) ... [$_{k1}$ ... Operator v_{b1}[... v_{b1} ...] ...] ... [$_{k}$ ... v_{f1} ... v_{f1} ...] ...

Thus, two co-I-indexed NP can yield a BVA reading, if not only the dependent NP but also the "antecedent" NP can correspond to a free variable at SR, so to

speak. I have claimed that an anaphoric relation in (119) can be mapped to a configuration in (92) if α is a bare NP, for the reason that a bare NP can undergo an operation EQR, which is roughly characterized as in (97).

(119) ... $\alpha_{I\text{-}1}$ ... $\beta_{I\text{-}1}$ ...

(97) Sub-operations of EQR:
(i) dislocate an NP (of *k*) with the I-index, and
(ii) leave an NP with the same I-index which is to be mapped to a free variable.

In order to account for the cases of B-type QPs other than a bare NP, I have further claimed that a B-type QP, such as *which* and *every*, can be <*k*,*k*>, in addition to <<*m*,*k*>,<<*m*,*k*>,*k*>>. This means that examples such as in (120) are in effect paraphrased as in (110), which involve a bare NP.

(120) a. [Which company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary?
b. [Every company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary.

(110) a. Tell me the individual(s) that verify "[a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary"
b. It is always the case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary / It happened in every case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary

Finally I have argued that the so-called 'telescoping' phenomenon can be accommodated into this analysis without much difficulty.

5.4. Summary

According to the theory of anaphoric relations proposed above, (121) exhausts the sources of anaphoric relations allowed in Grammar.

(121) The sources of anaphoric relations:
(i) co-D-indexation
(ii) FD
(iii) co-I-indexation

No syntactic condition is required in principle in order for co-D-indexation to obtain (*pace* Condition D, as discussed in Appendix C). Semantics does not need to refer to this relation, either, since each of the two NPs are independently connected to σ^{D}.

The establishment of FD, on the other hand, is constrained by (61).

(61) Formal Dependency (FD):

*FD(α,β) if α does not c-command β at LF.

β in FD(α,β) is subject to the following mapping rule.

(53) Mapping rule of β in FD(α,β):
NP ==> **SR**(α) if the NP is β in FD(α,β)

I have argued that this mapping rule in effect allows only a non-indexed NP to be β in FD(α,β). In addition, it is expected from the general principle of recoverability of deletion that a ^{large}NP can hardly be β in FD(α,β).

Co-I-indexation itself is a semantic dependency, but a syntactic dependency ID sometimes accompanies to it, because of the rule stated in (62).

(62) If β is an NP whose semantic category is *m* and β is co-I-indexed with an NP α within the same sentence, ID(α,β) has to be established.

The establishment of ID is constrained by (63).

(63) Indexical Dependency (ID):
*ID(α,β) if α does not precede β at PF.

An I-indexed NP is subject to the mapping rule in (26').

(26') Mapping rules of an I-indexed NP whose semantic category is *m*:
(i) If it is a (QR) trace, $NP_{I\text{-}n}$ ==> v_{bn} (=(11))
(ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn} : **SR**(NP)

A free variable mapped from an I-indexed NP is interpreted in the way specified below.

(41) Interpretation of a free variable:
v_{fn} is understood to refer to the individual(s) that verify K(Σ(v_{bn}), v_{fn}) with respect to v_{bn}.

(32) Σ(v_{bn}) = the domain which includes v_{bn} and the operator which binds it

(33) K(A,B) = the biggest domain (i) whose semantic category is *k* and (ii) which dominates A but not B.

I have argued that an anaphoric relation in (119) can be mapped to a configuration in (92) (in which two coindexed free variables are covariant to each other) if α is a bare NP, for the reason that a bare NP can undergo an operation EQR, which is roughly characterized as in (97).

(119) ... $\alpha_{I\text{-}1}$ ... $\beta_{I\text{-}1}$ ...

(92) ... [$_{k1}$ ... Operator v_{b1}[... v_{b1} ...] ...] ... [$_{k}$ ... v_{f1} ... v_{f1} ...] ...

(97) Sub-operations of EQR:
(i) dislocate an NP (of *k*) with the I-index, and
(ii) leave an NP with the same I-index which is to be mapped to a free variable.

I have also suggested that a BVA reading with a B-type QP is an extended case of an anaphoric relation with a bare NP. I have proposed that (120) can be in effect paraphrased as in (110) at the relevant level of representation, and accounted for the generalization in (83).

(120) a. [Which company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary?
b. [Every company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary.

(110) a. Tell me the individual(s) that verify "[a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary"
b. It is always the case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary / It happened in every case that [a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary

(83) Intra-sentential co-I-indexation can yield a BVA reading with a B-type QP, but not with an A-type QP.

The effects of (83) used to be the lexical condition on ID, but they turn out to be attributed to the availability of the 'paraphrasing' into the form of (110).

Although some of the relevant consequences are not fully considered yet at this stage, I have argued that the observations made in the preceding chapters can fit into Grammar which distinguishes three types of SR objects of *m* (*i.e.*, σ^{D}(*n*) (constants), v_{bn} (bound variables) and v_{fn} (free variables)) and, correspondingly, three sources of anaphoric relations (*i.e.*, co-D-indexation, FD, and co-I-indexation).

Appendix E: Problems for Unselective Binding Approach

I have presented an analysis of donkey anaphora in terms of co-I-indexation in section 5.3.3.4. There are works, on the other hand, in which donkey anaphora is regarded as an instance of bound variable anaphora under the so-called *unselective binding approach*. In this appendix, I briefly review the analyses in Heim 1982:ch.2 and Chierchia 1992, and point out the problems of them.

E.1. Heim 1982: an indefinite NP as a variable

According to Heim 1982:9, Geach 1962:126ff in effect describes the semantic representation of (122a) as in (122b), and Lewis 1975 in effect characterizes the semantic representation of (123a) as (123b).[41]

(122) a. A student came. He is diligent.
b. $\exists v_{b1}$[v_{b1} is a student & v_{b1} came & v_{b1} is diligent]

(123) a. If a farmer owns a donkey, he always beats it.
b. $\forall v_{b2}, v_{b1}$[[v_{b2} is a farmer & v_{b1} is a donkey & v_{b2} owns v_{b1}] $\rightarrow$ v_{b2} beats v_{b1}]

Based on these intuitions that the anaphoric relations in (122)-(123) should be characterized as bound variable anaphora, Heim 1982:ch.2 constructs a theory, according to which the underlined NPs in (122)-(123) fall within the scope of the same quantifier. Let us briefly introduce the mechanism in informal terms.

If one assumes that an indefinite NP has its own scope (presumably by means of QR), the dependent terms in (122)-(123) would end up in positions outside the scope of its "antecedent" indefinite NP. Therefore, Heim 1982:ch.2 claims that an indefinite NP is not a quantifier, and postulates a mechanism in which the indefinite NP and the dependent term in (122)-(123) can be bound by the same quantifier. Her crucial assumptions are informally stated in (124)-(126):[42]

(124) Indefinite NPs:
a. An indefinite NP is not a quantifier, and hence, it does not have its own scope.

[41] According to Cooper 1979:81, Geach 1962: paragraph 79 in effect proposes that the indefinite article in *a donkey* should correspond to a universal quantifier.

[42] Heim 1982:ch.2 states the truth condition of a universal quantifier as in (i):
(i) Heim 1982:160 (iii)
Let ϕ be a quantified molecular formula, consisting of a universal quantifier with the selectional indices $i_1,...,i_n$, and of the two formulas ϕ^1, ϕ^2 (in that order).
Then for any $a_N \in A^N$:
a_N $sat_{A,Ext}$ ϕ
iff for every sequence b_N that agrees with a_N on all $i \in \{i_1,...,i_n\}$:
if b_N $sat_{A,Ext}$ ϕ^1, then b_N $sat_{A,Ext}$ ϕ^2.
(For b_N to "agree" with a_N on a number i means that $b_i = a_i$.)
(i) could also be restated as in (ii):
(ii) In case $\phi = \forall_{i\text{-}1,...,i\text{-}n}(\phi^1)(\phi^2)$,
$[[\phi]]^a$=1 iff for every assignment function b such that $[[\phi^1]]^b$=1, $[[\phi^2]]^b$=1,
where b is a modified assignment of a such that $b = a^{x1/i\text{-}1,...,xn/i\text{-}n}$ for any $x_1,...,x_n \in D_e$.

b. An indefinite NP is represented as an open sentence at a logical form. (An expression such as *a farmer* is represented as *farmer*(x), for example.)
c. The variable included in the open sentence mapped from an indefinite NP must be bound by the (hierarchically) closest quantifier.

(125) Pronouns:
a. A pronoun is mapped to a variable at a logical form.
b. The variable mapped from a pronoun can be bound by any quantifier.

(126) $\exists$ operator:
a. At a logical form, an existential quantifier $\exists$ is inserted at the beginning of the second argument of the quantifier.
b. A set of sentences can be represented as a constituent at a logical form, and $\exists$ can be inserted at the beginning of it.

It is assumed in Heim:ch.2 that the anaphoric relations are based on a syntactic relation of *coindexation* and that coindexed NPs are mapped to identical variables. Under these assumptions, the (a) sentences in (127)-(130) will be mapped to the logical forms in (b), respectively.

(127) a. [A man]$_1$ came in. He$_1$ smiled.
b. $\exists v_{b1}$[man(v_{b1}) & came-in(v_{b1}) & smiled(v_{b1})]

(128) a. [Every man who owns [a donkey]$_2$]$_1$ beats it$_2$.
b. $\forall v_{b1}, v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2}))($\exists$[beat (v_{b1},v_{b2})])

(129) a. If [a man]$_1$ owns [a donkey]$_2$, he$_1$ always beats it$_2$.
b. $\forall v_{b1}, v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2}))($\exists$[beat (v_{b1},v_{b2})])

(130) a. [Every man who owns [a donkey]$_2$]$_1$ gives it$_2$ to [a girl]$_3$.
b. $\forall v_{b1}, v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2})) ($\exists v_{b3}$[give (v_{b1},v_{b2},v_{b3})])

It is indicated in (127)-(130) that each anaphoric relation is represented as bound variable anaphora.

In sum, Heim 1982 claimed that an indefinite NP is not a quantifier, in order to derive a representation in (122b) from (122a).

(122) a. A student came. He is diligent.
b. $\exists v_{b1}$[v_{b1} is a student & v_{b1} came & v_{b1} is diligent]

The anaphoric relation in (122) contrasts with the case of other quantifiers

such as *every NP*.

(131) Every student came. *He is diligent.

Thus, we can say that Heim 1982 has attributed the contrast between (122a) and (131) to the property of the "antecedent"—whether it is a quantifier or not.

E.2. Indefinite NPs

In the rest of this section, I summarize the problems of this analysis that have been pointed out in the literature.

E.2.1. Proportion problem

First, the famous 'proportion problem' arises, from the assumption in (124). Notice that (128) and (129) are assigned an identical logical form according to this analysis. Similarly, it assigns (132a) and (132b) the identical logical forms (132c), in spite of the fact that they have distinctive truth conditions.

(132) a. [Most man who owns [a donkey]$_2$]$_1$ beats it$_2$.
b. If [a man]$_1$ owns [a donkey]$_2$, he$_1$ mostly beats it$_2$.
c. MOST$v_{b1,}v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2}))(∃[beat(v_{b1},v_{b2})])

The truth value of (132a) has to be determined based on the number of the farmers who own one or more donkeys. In contrast, the truth value of (132b) can be determined based on the total number of the farmer-donkey pairs such that the farmer owns the donkey. Therefore, (132a) is false but (132b) can be true under the situation depicted in (133):

(133) There are 10 men; one of them owns 100 donkeys and beats them all; the others each own just one donkey and do not beat it.

Nevertheless, the logical form in (132c), which is considered to be assigned to both (132a) and (132b), states that both sentences can be true with respect to the situation in (133).

This is a problem which arises as a consequence of the assumption that indefinite NPs are not quantifiers.

E.2.2. Availability of $-reading

Second, it is expected from (124) that an indefinite NP which is contained in the first argument of a non-existential quantifier (*i.e.* the restrictive clause of the quantifier) cannot have an existential reading.

(124) Indefinite NPs:
a. An indefinite NP is not a quantifier, and hence, it does not have its own scope.
b. An indefinite NP is represented as an open sentence at a logical form. (An expression such as *a farmer* is represented as *farmer*(*x*), for example.)
c. The variable included in the open sentence mapped from an indefinite NP must be bound by the (hierarchically) closest quantifier.

Thus, in (128) and (129), the variable mapped from an indefinite NP *a donkey* must be bound by a universal quantifier.

(128) a. [Every man who owns [a donkey]$_2$]$_1$ beats it$_2$.
b. ∀$v_{b1,}v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2}))(∃[beat (v_{b1},v_{b2})])

(129) a. If [a man]$_1$ owns [a donkey]$_2$, he$_1$ always beats it$_2$.
b. ∀$v_{b1,}v_{b2}$ (man(v_{b1}) & donkey(v_{b2}) & own(v_{b1},v_{b2}))(∃[beat (v_{b1},v_{b2})])

However, it has been pointed out that there are cases in which an existential reading is possible: the relevant reading is sometimes called "weak reading" or "∃-reading" as opposed to "strong reading" or "∀-reading", respectively. For example, the sentences in (134), which are cited from Chierchia 1992:6, readily allow ∃-readings.

(134) a. Every (most, etc.) person who has a credit card, will pay his bill with it. (Cooper)
b. Every (most, etc.) person who has a dime will put it in the meter (Pelletier & Schubert 1989)
c. Every (most, etc.) person who has a hat will wear it to go to the stadium.

Chierchia 1992:116 further argues that even a typical donkey sentence such as (134) allows an ∃-reading under the context given in (136) (which he attributes to P. Casalegno):

(135) Every farmer who owns a donkey beats it.

(136) 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, while still morally questionable, is arguably less dangerous from a social point of view. The farmers of Ithaca follow this recommendation and things indeed improve.

The precise description of the distribution of ∃-readings and ∀-readings is not

our concern here. For our purposes, it suffices to observe that ∃-readings exist, and that its existence is not predicted under Heim's theory since it deprives indefinite NPs of the existential quantificational force.

E.2.3. Chierchia 1992: an indefinite NP as a quantifier

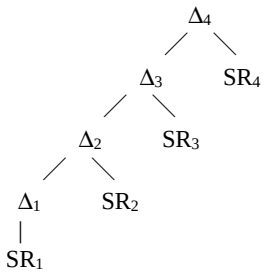
In order to solve the proportion problem (section E.2.1) and to account for the availability of ∃-reading (section E.2.2), it is necessary to assume that an indefinite NP is a quantifier. It then appears impossible to obtain a representation such as (122b) from (122a).

(122) a. A student came. He is diligent.
b. $\exists v_{b1}[\ v_{b1}$ is a student & v_{b1} came & v_{b1} is diligent]

Chierchia 1992 in effect argues, however, that the representation in (122b) can be derived from (122a) if the way of constructing a discourse structure is changed.

Recall from section 5.2.2.3 the discourse structure that we have assumed.

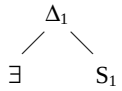
(25)



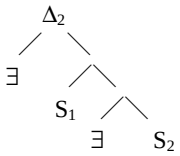
Obviously, if the indefinite NP in the first sentence in (122a) is a quantifier, the pronoun in the second sentence cannot be located in its scope, if we assume the discourse structure as in (25). On the other hand, suppose a discourse as in (137), and that the discourse structure is constructed in a way illustrated in (138):

(137) $\Delta_1 = SR_1$: $SR_1 = \exists\ [S_1]$
$\Delta_2 = \Delta_1 + SR_2$: $SR_2 = \exists\ [S_2]$
$\Delta_3 = \Delta_2 + SR_3$: $SR_3 = S_3$

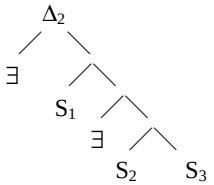
(138) a.



b.



c.

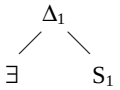


Thus it is assumed that the newly added sentence can go into the scope of the quantifier in an earlier sentence.

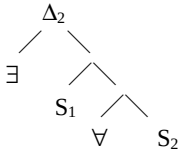
On the other hand, a discourse such as (139) is supposed to be represented as in (140).

(139) $\Delta_1 = SR_1$: $SR_1 = \exists\ [S_1]$
$\Delta_2 = \Delta_1 + SR_2$: $SR_2 = \forall\ [S_2]$
$\Delta_3 = \Delta_2 + SR_3$: $SR_3 = S_3$

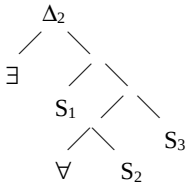
(140) a.



b.



c.



Thus, it is hypothesized that a newly added sentence can go into the scope of an existential quantifier but not into that of a universal quantifier. In other words, the contrast between (122a) and (131) is attributed to the different ways of constructing the discourse structure in Chierchia 1992.

(122) a. A student came. He is diligent.
(131) Every student came. *He is diligent.

Therefore, he can maintain that an indefinite NP is a quantifier, and his analysis does not suffer from the problems discussed in sections E.2.1 and E.2.2.

E.3. Unselective binding approach and types of dependency

We have seen that the problems for Heim's analysis pointed out in sections E.2.1 and E.2.2 do not arise if we assume the way of constructing the discourse structure illustrated in (138) and (140). Such modification, however, does not solve the problem to be discussed in this section, since it is directly due to the hypothesis that the donkey anaphora should be considered as an instance of bound variable anaphora.

Recall that there are two types of dependency according to the analysis proposed in this thesis: (i) bound variable anaphora (due to FD), and (ii) E-type links (due to co-I-indexation). Since the LF c-command requirement (that the QR-trace must c-command the dependent term) is a necessary condition for the establishment of FD, it follows that donkey anaphora cannot be an instance of bound variable anaphora. In other words, the LF c-command requirement need not be satisfied in donkey anaphora exactly because the anaphoric relation is not based on FD, but on co-I-indexation, to which the PF precedence requirement may apply instead.

Under the unselective binding approach, on the other hand, every BVA is supposed to be an instance of bound variable anaphora, based on coindexation, for example. Let us consider if such an approach can accommodate the observations reported in chapter 3 above.

Heim 1982:ch.2 proposes the following two conditions on BVA:

(141) Weak Crossover Constraint in Heim (1982:209-210):
NP and NP', where NP is quantifying, cannot be coindexed unless NP c-commands NP' in surface structure.

(142) Novelty Condition in Heim (1982:151):
An indefinite NP must not have the same referential index as any NP to its left.

Since Heim 1982 considers an indefinite NP not to be 'quantifying', she in effect divides dependencies into two groups according to the type of the "antecedent" NP:[43] thus this is essentially similar to our distinction between

[43] Peter Lasersohn (1994: seminar at University of Rochester) pointed out, in effect, that (i) can be a counterexample of the generalization that a dependency must be contingent upon either the c-command requirement or the precedence requirement.
(i) If it smiles at him, John buys a donkey.
If (ii) is much less acceptable than (i), the discussion in Appendix D may be relevant, but I leave this issue open here.
(ii) If that donkey smiles at him, John buys a donkey.

A-type QPs and B-type QPs. Restated in our terms, Heim 1982:ch.2 is suggesting that the dependency with an A-type QP must be contingent upon S-structure c-command, while the dependency with a B-type QP must satisfy LF precedence.[44]

First we have seen in chapter 3 that the c-command requirement and the precedence requirement should refer to LF and PF, respectively.[45] In addition, it is not the case that a B-type QP must always precede the dependent term: just like an A-type QP, a B-type QP also allows the reconstruction effects, in which the dependent term precedes the QP. Finally, if every dependency is regarded as an instance of bound variable anaphora, we would lose an account why some dependencies are not compatible with a ^{large}NP.

Chierchia 1992:156 claims that his system distinguishes three types of relations: (i) 'syntactic binding', (ii) 'dynamic binding', and (iii) 'E-type links'. But it is not clearly stated in Chierchia 1992 how 'syntactic binding' is

[44] The Novelty condition in (142) is claimed to apply to some kind of semantic representation of the discourse. In addition, it is assumed in Heim 1982:ch.2 that an inter-sentential dependency is also restricted by the Novelty condition in (142).

[45] More consideration may be necessary with respect to the relation between the word order at PF and the word order in the utterance. Consider (i-a) and (i-b):
(i) a. *So-no kaisya-ga tubure-kakatteiru to, John-wa kaisya-o koogekisi-tagaru n(o) da.
that-GEN company-NOM bankrupt-close:to if John-TOP company-ACC attack-want COMP COPULA
'If that company is going bankrupt, John attacks a company.'

b. ?John-wa so-no kaisya-o koogekisi-tagaru n da,
John-TOP that-GEN company-ACC attack-want COMP COPULA
kaisya-ga tubure-kakatteiru to ne.
company-NOM bankrupt-close:to if PARTICLE
'John wants to attack that company, if a company is going bankrupt.'
The dependent term appears to precede its antecedent in both (i-a) and (i-b), but (i-b) is much more acceptable than (i-a). It is worth noting that we strongly feel that (i-b) is an 'inverted' sentence, and that (i-b) would not violate the precedence requirement if it is changed to a 'non-inverted' sentence, as in (ii):
(ii) Kaisya-ga tubure-kakatteiru to, John-wa so-no kaisya-o koogekisi-tagaru n da,
company-NOM bankrupt-close:to if John-TOP that-GEN company-ACC attack-want COMP COPULA
'If a company is going bankrupt, John wants to attack that company.'
The contrast between (i-a) and (i-b) will be accounted for if (ii) is the PF representation of (i-b), since, under this assumption, (i-b) does not violate the PF precedence requirement.

distinguished from 'dynamic binding', descriptively or theoretically. While it seems that 'syntactic binding' refers to the dependencies which are contingent upon some version of the c-command requirement, it is not made explicit under what conditions a dependency must satisfy the c-command requirement. If he assumes, as in Heim 1982:ch.2, that the type of the "antecedent" NP determines whether the dependency is 'syntactic binding' or 'dynamic binding', and that 'dynamic binding' is contingent upon some version of the precedence requirement, this theory will suffer from the same kind of problems just mentioned above.

E.4. On the characterization of E-type links

Notice that, irrespective of the analysis of donkey anaphora, a semantic relation other than bound variable anaphora needs to be postulated, since an anaphoric relation such as in (143) cannot be an instance of bound variable anaphora, as Evans 1977, 1980 argues.

(143) Most student came. They are diligent.

Recall that Chierchia 1992 argues that there are three types of dependencies: (i) 'syntactic binding', (ii) 'dynamic binding', and (iii) 'E-type links'. Among them, 'syntactic binding' and 'dynamic binding' are bound variable anaphora, but 'E-type links' are not. Assuming that his 'syntactic binding' roughly corresponds to our FD, the other anaphoric relations are divided into 'dynamic binding' and 'E-type links' under the analysis in Chierchia 1992 while they are all regarded as an instance of co-I-indexation (*i.e.*, an E-type link) under my analysis. Let us discuss in this section if it is necessary to distinguish the third type of dependency—'dynamic binding'—from FD and E-type links.

Chierchia 1992 argues that an ∃-reading and a ∀-reading of donkey anaphora should be based on 'dynamic binding' and an 'E-type link', respectively. The conjecture that an 'E-type link' cannot derive a $-reading is due to the way of characterizing an 'E-type link' under his theory. Chierchia 1992:section 4.3 characterizes the E-type pronoun as a function from individuals into individuals, the nature of the function being largely contextually specified.[46] (144) is the characterization of the E-type pronoun given in Chierchia 1992:

(144) In a configuration of the form NP_i ... it_i, if it_i is interpreted as a function, the range of such functions is the (value of the) head of NP_i.
(Chierchia 1992:(100))

[46] As Chierchia 1992 notes in footnote 34 (p.158), he is 'using the notion of "individual" rather liberally here'. For example, he states that the relevant salient function for *them* in (i) is one from occasions to groups of men.
(i) [Every man]$_i$ walked in. I saw them$_i$. (Chierchia 1992:(107))
Thus, even an 'occasion' is included in the notion of 'individual' in this analysis.

By arguing against the three-way distinction of dependency, we will also be rejecting the characterization of an 'E-type link' as in (144).

Chierchia 1992 argues that the ∃-readings and the ∀-readings of donkey anaphora can be derived from the distinction between 'dynamic binding' and 'E-type links'. According to him, the ∃-reading is yielded by paraphrasing (135) as in (145), informally speaking.

(135) Every farmer who owns a donkey beats it.

(145) Chierchia 1992:(61b)
[Every farmer that has a donkey] has a donkey and beats it

The nuclear scope of (145) (*i.e.* the part *has a donkey and beats it*) corresponds to a semantic representation such as in (146), in which the dependency between *a donkey* and *it* is represented by the two occurrences of the variable *y*.

(146) Based on Chierchia 1992:(66)
$\exists y[\text{donkey}(y) \wedge \text{own}(x,y) \wedge \text{beat}(x,y)]$

Notice that the paraphrase in (145) is valid only if the relevant quantifier is conservative (*i.e.* only if Q(A)(B)=Q(A)(A&B) holds). Therefore, as Barry Schein (p.c.; fall 1996) pointed out to me, this analysis does not extend to the donkey sentences with a non-conservative quantifier, such as *only* or *even*.

(147) a. Only a farmer who owns a donkey beats it.
b. Even a farmer who owns a donkey beats it.

One of Chierchia's (1992) arguments that the distinction between 'dynamic binding' and 'E-type link' is necessary goes as follows. He first states that the ∀-reading of donkey sentences is a result of an 'E-type link'. The ∀-reading is claimed to have a semantic representation as in (148), where *it* is interpreted as an E-type pronoun.

(148) Chierchia 1992:(102)
$\forall x[[\text{man}(x) \wedge \exists y[\text{donkey}(y) \wedge \text{has}(x,y)]] \rightarrow \text{beat}(x,f(x))]$

According to him, (148) is true just in case it is true relative to every possible assignment of the variable *f* to the functions that the context makes salient, and this yields the ∀-reading.

Chierchia 1992:163 argues that this characterization of the ∀-reading successfully predicts that downward entailing quantifiers like *no* lack a

∀-reading.

(149) Chierchia 1992:(110a)
No father with a teenage son lends him the car on weekdays.

The reading which he claims (149) lacks is as follows: 'for no father *x* that has a teenage son, for every teenage son *y* that *x* has, *x* lends *y* the car on weekdays', which can be true even if there is a father who lends the car to one of his teenage sons on weekdays as long as he does not lend it to another teenage son of his on weekdays. According to his analysis, (149) corresponds to the following semantic representation in case *him* is an E-type pronoun:

(150) Chierchia 1992:(110b)
$\forall x[[\text{father}(x) \wedge \exists y \text{ teenage son of } (y,x)] \rightarrow \neg$lend the car on weekdays $(x, f(x))]$

If we understand that *f* is a function from fathers into one of their teenage sons, (150) is true if and only if it is true relative to all such functions, and the sentence should be false if there is a father who lends the car to one of his teenage sons. Thus, the interpretation yielded by an 'E-type link' turns out to be indistinguishable from the one yielded by 'dynamic binding' in cases such as (149) and he claims that this is the reason why it appears to lack a ∀-reading.

However, the contrast between the ∃-reading and the ∀-reading and the lack of ∀-reading in (149) need not be accounted for in this particular way. Suppose that (135) can have a semantic representation which is similar to the one for (151) under some condition:

(135) Every farmer who owns a donkey beats it.

(151) It is always the case that a farmer who owns a donkey beats it.

Let us informally express the two semantic representations which (135) can have as in (152), assuming that NP_x and *x′* are related by an E-type link.

(152) a. EVERY (farmer who owns [a donkey]$_x$) (λy[*y* beats *x′*])
b. EVERY (∃ (farmer who owns [a donkey]$_x$) (λy[*y* beats *x′*]))

The truth condition of (152a) and (151)/(152b) correspond to what is called the ∃-reading and the ∀-reading of (135), respectively. Now consider (149), repeated here, and the two semantic representations it might have.

(149) Chierchia 1992:(110a)
No father with a teenage son lends him the car on weekdays.

(153) a. NO (father with [a teenage son]$_x$) (λy[*y* lends *x′* the car on weekdays])

b. NO (∃ (father with [a teenage son]$_x$) (λy[*y* lends *x′* the car on weekdays]))
(cf. It is never the case that a father with a teenage son lends him the car on weekdays.)

Just as the analysis in Chierchia 1992, the two semantic representations in (153) turn out to have the same truth condition. Therefore, the 'lack of the ∀-reading' in (149) is also predicted by this analysis.

E.5. Summary

To summarize, I have introduced the theory presented in Heim 1982 in section E.1, and shown in section E.2 that some of its problems are solved under the theory proposed in Chierchia 1992. Nevertheless, both theories are similar in considering that every instance of BVA should be analyzed as bound variable anaphora. I have pointed out in section E.3 that such theories fail to predict the apparently complicated distribution of BVA as described in chapter 3 above. In section E.4, I have argued that the facts which are discussed in Chierchia 1992 in support of his theory can also be accounted for under the mechanism proposed in this thesis.