Chapter 6. Organization of Grammar

This chapter shows the summary of the claims in two ways. In section 6.1 the main discussions and conclusions will be recapitulated in the order presented in the preceding chapters. In section 6.2, on the other hand, they will be rearranged so that it is shown how Grammar is supposed to work according to the theory of anaphoric relations proposed in this work. Then in section 6.3 I will add some remarks regarding the relation of Grammar and other modules in our mind in concluding this thesis.

6.1. Summary of the Claims

6.1.1. Chapter 2: the scrambling construction

Chapter 2 has reviewed the previous analysis of the OS-type construction (*i.e.*, the so-called scrambling construction) in Japanese, and proposed that there are two kinds of OS-type construction as in (1) and (2), as opposed to the SO-type construction (*i.e.*, the so-called unmarked word order construction) as in (3).

(1) Deep OS-type:
PF: NP-ACC/DAT (=DL) ... NP-NOM ... V
LF: NP-ACC/DAT (=DL) ... NP-NOM ... V

(2) Surface OS-type:
PF: NP-ACC/DAT (=DL) ... NP-NOM ... V
LF: NP-NOM ... NP-ACC/DAT (=DL) ... V

(3) SO-type:
PF: NP-NOM ... NP-ACC/DAT ... V
LF: NP-NOM ... NP-ACC/DAT ... V

A DL (*i.e.*, the dislocated NP-ACC/DAT preceding the NP-NOM) in (1) was called a Deep DL, and one in (2) a Surface DL, for convenience.

It has been demonstrated that there are syntactic environments in which a Surface DL can appear but a Deep DL cannot. (4) summarizes the relevant observations:

(4) a. The DL in the long distance OS-type construction is necessarily a Surface DL (section 2.4.1).
b. There is at most one Deep DL in a clause. In the case of the multiple OS-type construction, it is harder for the second DL to be a Deep DL than the first DL (section 2.4.2).

c. A DL within a clause expressing an *eventuality* is necessarily a Surface DL (section 2.4.3).

This chapter was meant to give some background for the subsequent chapters. In particular, the Surface OS-type, which is unambiguously identified in the syntactic environment described in (4), provides crucial evidence for the claim to be made in the following chapters. The specific analyses of the Deep OS-type and the Surface OS-type, on the other hand, do not affect the subsequent discussion substantially.

6.1.2. Chapter 3: BVA readings

Chapter 3 examined the syntactic conditions under which a BVA reading is available, where the term 'BVA' (written in capital) is used purely descriptively, characterized as in (5).

(5) 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 the two structural considerations in (6) and the two lexical considerations in (7) are relevant in describing the availability of a BVA reading.

(6) Structural considerations:
a. Does the QR-trace of α c-commands β at LF?
b. Does α precede β at PF?

(7) Lexical considerations:
a. Is α one of the A-type QPs, which are listed in (8a) in contrast to (8b)?
b. Is β a ^{large}NP, as exemplified in (9a) in contrast to (9b)?

(8) 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')

(9) a. ^{large}NPs:
so-no zidoosya-gaisya 'that automobile company'
so-no daigaku-insei 'that graduate student'

b. ^{small}NPs
so-ko 'it/that institution'
so-re 'it/that thing'
(*so-itu* 'he/that guy')

The result of the observation is summarized in (10):

(10)

	LF c-command	PF pre-cedence	α	β	BVA ok?
SO-type configuration I	yes	yes	A-type	^{large}NP	*
			A-type		ok
				^{large}NP	ok
					ok
SO-type configuration II	no	no	A-type	^{large}NP	*
			A-type		*
				^{large}NP	*
					*
OS-type configuration I	no	yes	A-type	^{large}NP	*
			A-type		*
				^{large}NP	ok
					ok
OS-type configuration II	yes	no	A-type	^{large}NP	*
			A-type		ok
				^{large}NP	*
					ok

In order to account for the observation in (10), I have proposed that there are two and only two sources for a BVA reading: *i.e.* FD and ID, which are characterized as in (11) and (12), respectively.

(11) a. Structural condition on FD:
*FD(α,β) if α does not c-command β at LF.

b. Lexical condition on FD:
*FD(α,β) if β is a ^{large}NP.

(12) a. Structural condition on ID:
*ID(α,β) if α does not precede β at PF.
b. Lexical condition on ID:
*ID(α,β) if α is an A-type QP.

(13) shows that the observations in (10) can be captured elegantly in terms of FD and ID characterized in this way.

(13)

LF c-command	PF pre-cedence	α	β	FD ok?	ID ok?	BVA ok?
yes	yes	A-type	^{large}NP	*	*	*
		A-type		FD	*	ok
			^{large}NP	*	ID	ok
				FD	ID	ok
yes	no	A-type	^{large}NP	*	*	*
		A-type		FD	*	ok
			^{large}NP	*	*	*
				FD	*	ok
no	yes	A-type	^{large}NP	*	*	*
		A-type		*	*	*
			^{large}NP	*	ID	ok
				*	ID	ok
no	no	A-type	^{large}NP	*	*	*
		A-type		*	*	*
			^{large}NP	*	*	*
				*	*	*

6.1.3. Chapter 4: coreferential readings

Chapter 4 examined the syntactic conditions on the availability of a coreferential reading, and claimed that either FD, ID, or co-D-indexation can be the source of a coreferential reading.

I assume that only an independently "referential" NP can carry a D-index. Although it is hard to determine in English whether a given pronoun is independently "referential" or not, I have demonstrated based on the works by Takubo & Kinsui 1996 and Kuroda 1979 that the contrast between

a-demonstratives and *so*-demonstratives in Japanese can be best described by assuming that the former must be D-indexed while the latter cannot be D-indexed (except for the deictic use, in which they are used in the presence of the target individual). Thus, in Japanese, the instances of co-D-indexation can be separated from those of FD and ID by simply looking at the form.

The observations on the availability of a coreferential reading are summarized in (14).

(14)

LF c-com-mand	PF prece-dence	β	FD	ID	co-D-index-ation	coreferential reading
yes	yes	^{small}*so*-	FD	ID	*	ok
		^{large}*so*-	*	ID	*	ok
		a-	*	*	co-D	ok
no	no	^{small}*so*-	*	*	*	*
		^{large}*so*-	*	*	*	*
		a-	*	*	co-D	ok
no	yes	^{small}*so*-	*	ID	*	ok
		^{large}*so*-	*	ID	*	ok
		a-	*	*	co-D	ok
yes	no	^{small}*so*-	FD	*	*	ok
		^{large}*so*-	*	*	*	*
		a-	*	*	co-D	ok

I have concluded on the basis of (14) that we should consider that FD, ID, and co-D-indexation are the only sources of a coreferential reading.

6.1.4. Chapter 5: theory of anaphoric relations

Chapter 5 has first discussed on the characterization of the so-called E-type links, and then revised the notions FD and ID from the viewpoint of presenting a theory of anaphoric relations.

6.1.4.1. E-type links

I have proposed that an E-type link is based on co-I-indexation, assuming that the I-indexed dependent term (*i.e.*, an I-indexed NP whose semantic category is *m*) is subject to the mapping rule in (15).

(15) 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}
(ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn} : **SR**(NP)

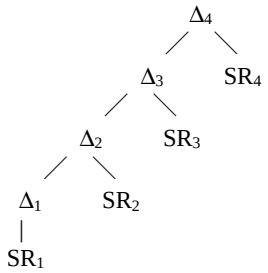
The free variable in (15-ii) is interpreted in Semantics according to the way described in (16)-(18), with respect to the discourse structure constructed as in (19).

(16) 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}.

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

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

(19)



6.1.4.2. FD

I have concluded that (20) is the only condition on the establishment of FD.

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

The observation that a ^{large}NP can hardly be β in FD(α,β) is now accounted for by the general principle of recoverability of deletion which applies to the mapping rule in (21).

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

If an NP of *m* is generated without an index, the only way for it to be interpreted is to enter into FD. Therefore, we can consider that the establishment of an FD is in effect required in such a case.

6.1.4.3. ID

I have claimed that the establishment of an ID is governed by the rules in (22)

and (23).

(22) 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.

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

Since (22) indicates that ID is necessarily based on co-I-indexation, it follows that the dependent term in ID should also be subject to the mapping rule in (15) and the interpretation described in (16)-(18).

In order to account for the fact that ID can yield a BVA reading I have proposed the following analysis. An anaphoric relation in (24) can be mapped to a configuration in (25) (in which the 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 (26).

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

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

(26) 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 proposed that a B-type QP in effect allows the paraphrasing such as from (27) to (28), thereby accounting for the generalization in (29), which used to be the lexical condition on ID.

(27) 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.

(28) 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

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

6.2. Organization of Grammar

Let us rearrange the claims so that we can review how Grammar is supposed to work according to the theory of anaphoric relations proposed in this work.

6.2.1. Numeration

I have argued that a lexical category have a specification with respect to its semantic category as well as its syntactic category. For example, individual-denoting expressions (*i.e.*, expressions which are to be interpreted in connection with an individual) are labeled as semantic category *m* in this work. There are three types of NP of *m* which can enter into a numeration.

(30) NPs of *m*:
a. D-indexed NPs
b. I-indexed NPs
c. non-indexed NPs

Thus I assume that D-indices and I-indices are among the optional features which a lexical item can carry into the numeration.

6.2.2. Structure-changing operations

The theory of anaphoric relations presented in chapter 3-5 refers to the following three structure-changing operations.

An NP of <<*m*,*k*>,*k*> undergoes QR, which is characterized as in (31).

(31) 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
(iii) leave a trace (whose semantic category is *m*) with the same I-index with α.

An NP of *k* undergoes EQR, which is characterized as in (32).

(32) 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.

The 'paraphrasing' from (33a) to (33b) might involve some kind of raising operation, but I have not stated it clearly in this work.

(33) a. [Which company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary?
b. Tell me the individual(s) that verify "[a company]$_{I\text{-}1}$ recommended [that company]$_{I\text{-}1}$'s subsidiary."

6.2.3. Establishment of syntactic relations

I have argued that Grammar contains some operation which adds a syntactic relation onto the representation.

FD can be established if the condition in (34) is satisfied.

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

The establishment of an FD is itself optional. However, as mentioned above, if a non-indexed NP of *m* is generated, it in effect requires the establishment of an FD, since, otherwise, it cannot be mapped to an SR object and the derivation will crash.

While the establishment of an FD is thus optional, that of an ID is obligatory in the environment specified in (35).

(35) 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 an ID is subject to the condition in (36).

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

Since the well-formedness of an ID is checked at PF according to (36), it follows that an ID should not be established after Spell-Out in the covert component. This is guaranteed if we assume that (35) has to be fulfilled as soon as two co-I-indexed NPs appear in the syntactic representation.

6.2.4. Mapping from LF to SR

I have proposed the following mapping rules from LF to SR.

(37) Mapping rule of a D-indexed NP:
$NP_{D\text{-}n}$ ==> $\sigma^D(n)$

(38) 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}
(ii) Otherwise, $NP_{I\text{-}n}$ ==> v_{fn} : **SR**(NP)

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

(40) Mapping rule of an I-index stranded by the sub-operation (ii) of QR:
$_{I\text{-}n}$ ==> λv_{bn}

While (37) and (38) can apply to an NP independently, (39) requires the existence of an FD in order for an NP to be mapped to an SR object. Thus, non-indexed NPs of *m* are semantically 'defective' in that they cannot be mapped to an SR object independently.

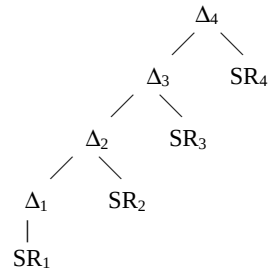
The mapping in (39) involves some kind of 'deletion' in the sense that β is overwritten by α altogether, and hence, the principle of recoverability of deletion is relevant to this mapping. I have argued that this is the reason why a ^{large}NP can hardly be β in FD(α,β).

In contrast, the mapping in (38-ii) does not involve deletion in the relevant sense, and this accounts for the fact that co-I-indexation is insensitive to the distinction between ^{large}NPs and ^{small}NPs.

6.2.5. Interpretation of SR

A constant $\sigma^D(n)$ is interpreted to refer to the individual which is paired with the indexical value *n* in σ^D (*i.e.*, the set of ordered pairs of a natural number (index) and an individual). A bound variable v_{bn} is interpreted according to the semantics of operators to be specified in Semantics. Regarding a free variable v_{fn}, I have claimed that its interpretation has to refer to the linguistic information stored in the discourse structure as in (41).

(41)



(42) specifies how a free variable has to be interpreted.

(42) 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}.

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

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

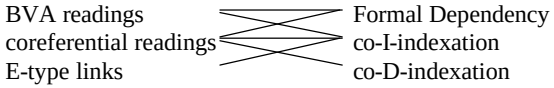
According to this characterization, a free variable v_{fn} will not be interpreted, (i)

if there is no v_{bn} in the discourse structure, (ii) if $K(\Sigma(v_{bn}), v_{fn})$ does not exist, or (iii) if there is no individual that verifies $K(\Sigma(v_{bn}), v_{fn})$ with respect to v_{bn}. In such cases, the sentence becomes unacceptable because of the semantic anomaly.

6.3. Concluding Remarks

The aim of this work has been to propose a theory of Grammar which explains under what conditions two linguistic expressions can be related to the same individual(s). I have argued that anaphorically related readings—BVA readings, coreferential readings, E-type links—obtain based on three linguistic relations in the way diagrammed in (45).

(45)



I have demonstrated how these three linguistic relations are differentiated syntactically and semantically.

As stated in the beginning of this thesis, generative linguistics is an enterprise which aims to argue for the existence of Grammar by demonstrating that there are aspects of language that are controlled by an autonomous mechanism. It is significant in this respect that the interpretation of the dependent term in an FD is not affected by any information outside Grammar. The existence of such a relation reassures us that language is generated by an autonomous system.

On the other hand, the interpretation of an I-indexed dependent term or a D-indexed NP needs to utilize some information outside Grammar. In most literature any information outside Grammar is often vaguely referred to as 'contextual information'. But, if the theory of anaphoric relations presented in this thesis is on the right track, it follows that we should distinguish two kinds of 'contextual information', so to speak. One kind of 'contextual information' is based on our knowledge of the world that are acquired in terms of direct experience possibly independently of language: this is the type of information that is accessed by a D-indexed NP. The other kind is the 'contextual information' expressed in the discourse, which supplies the interpretation of an I-indexed dependent term.

As has been mentioned in footnote 6 in section 5.1.2, this partition has been inspired by the series of works by Takubo & Kinsui where 'D-domain' and 'I-domain' are distinguished. D-domain is characterized as a cognitive interface where information obtained through direct experience is available, and I-domain as another cognitive interface where information obtained

through the discourse (and the relevant inferences) is available.[1] They argue that each linguistic expression is related to either D-domain or I-domain, on the basis of the observation that there are some linguistic expressions which are exclusively connected to D-domain or to I-domain in Japanese (and other languages as well).[2] Throughout this thesis, we have seen that the distinction between *a*-words and *so*-words in Japanese plays a crucial role in examining the properties of anaphoric relations. This was made possible based on the characterizations of these items in Takubo & Kinsui's works.

Let *Semantics* be the cognitive system in our mind in which the output representation of Grammar—an SR—is related with the knowledge regarding the world. An SR enters into Semantics, which checks whether it is compatible with what the language user knows of the world: in other words, Semantics is a system which derives truth conditions of a given SR, and determines whether it is *true* of a given situation or not.

I would like to propose on the basis of the consideration above that an SR is interpreted with respect to two kinds of knowledge: one is the knowledge based on the language user's direct experience, and the other is the knowledge based on the preceding discourse.

σ^D, the sequence which a D-indexed NP refers to, should be considered to be part of our knowledge of the world, since only the individuals who the language user knows through direct experience can enter into it.

On the other hand, I assume that Semantics "stores" SRs in a systematic way (as illustrated in section 5.2.2.3) during the on-going discourse session. An I-indexed dependent term is interpreted referring to the discourse structure in Semantics: in case there is no appropriate antecedent, the interpretation fails, even if the SR should be syntactically well-formed.

Thus, the relation between Grammar and Semantics, or the interaction of an SR with 'contextual information' can be diagrammed as in (46).

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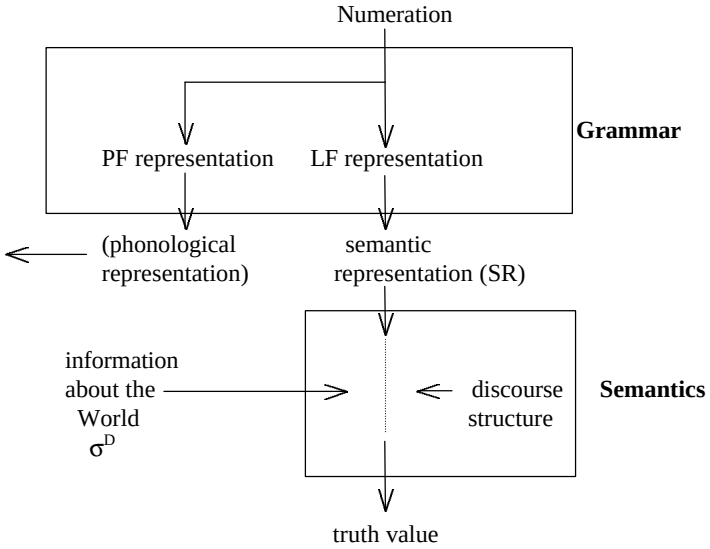
[1] It is not explicit in Takubo & Kinsui's works how their D-domain and I-domain interact with Grammar.

[2] Takubo & Kinsui's theory treats not only nominal expressions, but sentence final particles, some kind of modality and so on.

(46)



Our main object of inquiry is to reveal the internal mechanism of Grammar. If we could always tell what is a well-formed representation and what is not, we might not need to consider the compatibility between the information based on an SR and the knowledge of the world. However, sometimes we even may not know how many distinct LF representations Grammar yields while we are allegedly "repeating the same sentence several times." Semantics gives us a partial clue regarding this problem: if there is a certain set of information of the world (or *situation*) under which the "same" sentence can be true and false, we can conclude that at least two distinct output representations are involved there, since Semantics, as a mechanism, should not give both value 1 (*true*) and 0 (*false*) to the identical pair of an SR and a situation.[3]

If one believes that Grammar exists as an autonomous mechanism in our mind, one is also led to believe the existence of the output representations of this mechanism. Since an output representation of Grammar corresponds to an "idea," we can consider that an "idea" is yielded because of the generation of a sentence. At the same time, we also know that we can conceive of an

[3] Note that the converse does not hold: even if no situation distinguishes two sentences, we cannot conclude that they have the same LF representation or the same SR. For instance, the fact that there may not be any situation which distinguishes *John voted for John* and *John voted for himself* does not necessarily mean that the two sentences have the same LF representation or the same SR.

"idea" which cannot be expressed by language, which means that some "idea" can appear in our mind independently of Grammar. Thus, if one says that "a sentence S has a meaning M," it can be understood in two ways: (i) M is directly expressed by an output representation of S, or (ii) an idea corresponding to M is invoked in our mind upon the usage of S. Strictly speaking, we should consider only (i) in pursuing the mechanism of Grammar, since we do not know for sure how much of (ii) has to do with the output representation of Grammar.[4] Obviously we cannot tell *a priori* (i) from (ii). Rather I consider that it is the ultimate goal of the linguistic research to distinguish them properly. In this thesis I have presented my view at this stage regarding the linguistic basis of anaphoric relations. Naturally other researchers (including myself in the future) may have different opinions as to what property should be attributed to the output representation of Grammar, and will demonstrate that some of my claims cannot be maintained on the basis of the considerations which are not found in this thesis. I believe that such discussion will lead us to the better understanding of the mechanism of Grammar in our mind.

[4] Of course this is not to deny that (ii) may be useful in finding out the overall workings of language.