

博士論文

論文題目： A Unified Account for Restrictive Relative Structures at the
Syntax-Semantics Interface
(統語と意味のインターフェイスにおける制限的關係節構造に対する統一的説明)

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**A Unified Account for Restrictive Relative Structures
at the Syntax-Semantics Interface**

**by
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Abstract

The aim of this thesis is to investigate the syntax and semantics of restrictive relative structures by discussing the reconstruction effects of Head Nominals and the anti-reconstruction effects of relative clauses under the Minimalist Program for linguistic theory developed in Chomsky (1995, 2000, 2001, 2004, and 2008). In a relative clause, there is a gap position *e* in which a Head Nominal is interpreted, as shown in (1).

- (1) The picture of himself_i that John_i painted *e* in art class is impressive.
 ... <picture of himself_i>_k [that John_i painted <picture of himself_i>_k ...] ...

As illustrated in (1), the Head Nominal *picture of himself* is a subject in the matrix clause and an object in the relative clause. The Head Nominal contains the reflexive pronoun *himself*, which is coreferential with the subject *John* of the relative clause. The Head Nominal is, in a sense, reconstructed at the position of the gap *e*. Such a reconstruction effect of Head Nominals gives us insight into the syntax and semantics of restrictive relative structures: a Head Nominal is “shared” between a matrix and relative clause in the syntactic derivation. This thesis proposes that the various properties of restrictive relative structures that have not been uniformly accounted for in previous studies are given a principled explanation by a structure building process Share Merge, which is regarded as one of the autonomous consequences of applying the operation Merge.

This thesis consists of the introduction (Chapter 1), two main parts PART I (Chapter 2-3) and PART II (Chapter 4-7), and the conclusion (Chapter 8).

Chapter 1 introduces two main questions and the general framework of this thesis. Restrictive relative structures show the reconstruction effects of Head Nominals as we have seen in (1), which leads to the first question: How is a close relation between relative clauses and Head Nominals established? Considering the interpretation of the fronted Head Nominals, however, they can be interpreted independently of the relative clauses as shown in (2).

- (2) a. Which picture_k [that John_i likes e_k] did he_i buy e_{wh} ?
 b. * He_i bought a picture_k [that John_i likes e_k].

(Putnum (2007: 131) with slight modification)

In (2a), the proper name *John* inside the relative clause *that John likes* is coreferential with the matrix subject *he* as indicated by indices. This interpretation is unexpected if the entire *wh*-phrase *which picture that John likes* is to be interpreted in the gap position e_{wh} because as shown by (2b) the derivation violates Condition C. This observation demonstrates that in (2a), only the fronted Head Nominal is reconstructed in e_{wh} in the matrix clause whereas the relative clause is not reconstructed there. Such an anti-reconstruction effect leads to the second question: Why are relative clauses combined loosely with fronted Head Nominals?

What is puzzling is that Head Nominals show the reconstruction effects inside relative clauses even when the relative clauses show the anti-reconstruction effects, as observed in Henderson (2007).

- (3) Which [picture of himself_i]_k [that John_i gave e_k to Mary_j] did she_j take e_{wh} home?

(Henderson (2007: 214) with slight modification)

The fronted *wh*-Head Nominal is reconstructed at the gap position e_k , yielding the binding relation between the reflexive pronoun and its antecedent. Nevertheless, in the gap position e_{wh} , only the Head Nominal is interpreted without the relative clause, and the Condition C violation is obviated. This reconstruction puzzle leads us to consider the two main questions repeated in (4) from a new perspective.

- (4) i. How is a close relation between relative clauses and Head Nominals established?
 ii. Why are relative clauses combined loosely with fronted Head Nominals?

We must answer these two questions uniformly by postulating a single syntactic derivation for restrictive relative structures. Under the Minimalist Program, Narrow Syntax is equipped with the computational system which is optimally designed based on the simplest computational operation, Merge. In this system, both the reconstruction effects and the anti-reconstruction effects in

restrictive relative structures should follow from the operation Merge.

Chapter 2 considers the basic properties of restrictive relative structures and examines their internal structures and derivations in the previous studies. Based on the observations and discussions about the previous studies, it is plausible to claim that the reconstruction effects of Head Nominals follow from Head-Raising under the Copy Theory of movement, whereas the anti-reconstruction effects of relative clauses can be accounted for with recourse to adjunction structure. Facing the reconstruction puzzle in (3) we cannot adopt Kayne's (1994) Head-Raising analysis even when the reconstruction effects are observed because the complementation structure cannot explain the anti-reconstruction effects. Consequently, Head-Raising from the adjunction structure, such as that proposed in Henderson's (2007), should be explored to provide an adequate answer for the two main questions in (4), although Henderson's sideward movement analysis itself is untenable as it stands because of the theoretical problems of sideward movement.

Chapter 3 proposes a unified account of restrictive relative structures by claiming that a Head Nominal is shared between a matrix DP, which involves a complex layered structure and internal phrasal movement, and a relative clause, which is pair-merged in the middle of the layered DP. We point out that under no-tampering condition NTC, Narrow Syntax can build a sharing structure that is interpretable as intersecting sets by applying External Merges simultaneously.

$$\text{HN, W, Y} \rightarrow \text{Merge (W, HN)} = \{\text{W, HN}\}$$

$$\text{Merge (Y, HN)} = \{\text{Y, HN}\}$$

We also point out that the structure of Head Nominals proposed in the previous analyses, not the structure of relative clauses, is too simple to account for the properties of restrictive relative structures. More specifically, we show that a Head Nominal itself has a layered internal structure of NumP, and NumP undergoes DP-internal phrasal movement to Spec,CaseP irrespective of the presence/ non-presence of restrictive relative clauses. With these two points in mind, we propose a shared NumP movement analysis for the reconstruction effects and argue that an adjunction site of a relative clause (i.e., the site where it is pair-merged) is determined autonomously so that our computational system can yield the legitimate output of restrictive relative structures at both C-I

and SM interfaces.

In PART II, we begin with Chapter 4, which introduces three constructions in English and Japanese. The three constructions are adverbial relatives discussed in Chapter 5, amount/degree relatives discussed in Chapter 6, and Comparative Deletion constructions discussed in Chapter 7. All three constructions involve attributive modifications via filler-gap dependencies as restrictive relative structures. However, in previous studies, the account given to each of them has been slightly different from that of restrictive relatives because they have shown different interpretative properties. In this regard we consider the following two questions:

- (5) i. How is the connection between Head Nominals and non-nominal gaps established with respect to the three constructions?
- ii. To what are the differences between English and Japanese attributed with respect to the three constructions?

Chapter 5 claims that adverbial relatives involve relativizing nominal complements of silent adpositions. An English example of adverbial relatives is shown in (6).

- (6) Lily dreaded the time_k [that he had to go *e_k*].

We examine properties of the class of DPs that can function adverbially in simple sentences. In addition, adopting the silent P analysis of DP adverbs in Bresnan and Grimshaw (1978) and McCawley (1988), we claim that the gap position of Head Nominals of adverbial relatives is embedded in the silent PP structure. We show that various aspects of the adverbial relativization in English and Japanese are accounted for by the availability of the silent adpositions and by the shared NumP movement analysis proposed in PART I, in which Head Nominal NumPs can be either nominal or adverbial, depending on their upper layers.

Chapter 6 considers amount relatives such as that shown in (7).

- (7) It would take days to drink the champagne [they spilled *e* that evening].

In so-called “AR reading,” the Head Nominal is interpreted as denoting the degree of only amounts, but not an individual entity, and someone does not have to *drink the champagne they spilled* down on the floor. Questions arise as to the source of the AR reading of relative structures and whether

such an interpretation is always available. Chapter 6 also considers a type of amount/degree relatives in Japanese, which are called *Half*-relatives in Ishii (1991: 222).

- (8) John-wa [_{DP}[_{CP} Bob-ga yatin-ni tukau]hanbun]-o gyanburu-ni tukau.
 John-TOP Bob-NOM rent-for uses half-ACC gambling-for uses
 ‘John uses for gambling half as much money as Bob uses for the rent.’

The amount/degree expression *hanbun* ‘half’ is a nominal element in Japanese, but the interpretation assigned is similar to that of equative clauses. Chapter 6 addresses the question of the source of the AR reading and examines the relativization of “semi-lexical nominals” in Japanese. Head Nominals of *Half*-relatives, which are unpronounced lexical items, belong to the class of “small nouns.” They are considered semi-lexical items with only functional meaning. Sharing of such amount expressions is allowed in *Half*-relatives because those in Japanese are genuine nominal elements. In this respect, amount/degree relatives in English have a structure identical to that of restrictive relatives, although the internal A'-movement is considered a case of pied-piping by semi-lexical amount/degree expressions.

In Chapter 7 we explore the syntax and semantics of the attributive comparatives in English and Japanese and discuss their differences. More specifically, we argue against the claim that Japanese lacks degree abstraction established by a syntactic operation, which is available in English. In English the comparison of gradability, or the comparison of degrees of some quality, is not always possible, in contrast to the comparison of quantity, as shown in (9).

- (9) a. Michael Jordan has more scoring titles [than Denis Rodman {does/has tattoos}].
 b. Pico wrote a more interesting novel [than Brio {did/*wrote a play}].

The comparison of quantity in (9a) is available with or without the deletion in the comparative clause. In contrast, the comparison of quality in (9b) is possible only with the deletion of the verbal phrase. This restriction tells us that the comparison of quantity and that of quality cannot be treated in the same way. Beck et al. (2004: 290) claim that the level of acceptability of attributive comparatives varies in Japanese in the cases of the comparison of quality, as seen in (10).

- (10) *?????**Taroo-wa [[Hanako-ga katta] yori] nagai kasa-o katta.
 Taroo-TOP Hanako-NOM bought YORI long umbrella-ACC bought
 ‘ Taroo bought a longer umbrella than Hanako did.’

As also reported in Beck et al. (2004), attributive comparatives in Japanese comparing quantity are possible as shown below.

- (11) Taroo-wa [[Hanako-ga katta] yori] takusan kasa-o katta.
 Taroo-TOP Hanako-NOM bought YORI many umbrella-ACC bought
 ‘ Taroo bought more umbrellas than Hanako did.’

The contrast between quantity and quality in Japanese is exactly the same as what we observe in the English comparatives in (9). Furthermore, it shows that the comparison of quantity and that of quality cannot be treated in the same way in both English and Japanese. Thus, we argue that without deletion of a certain constituent, degree abstraction is basically unavailable (for both English and Japanese) in the syntax of attributive comparative clauses, and we propose a hidden relativization analysis where the apparent clausal comparatives in Japanese can be (re-)analyzed as phrasal comparatives derived via relativization.

The differences in the relative constructions discussed in PART II range within a prediction of our shared NumP movement analysis. That is, the differences among these constructions reside in the upper layer of the DP-structure and are grounded only in the variation in the lexicon or the morpho-syntactic features of the relativized elements.

In Chapter 8, we note three of the remaining questions concerning the sharing structure as a final remark, namely, (i) stacking of restrictive relative clauses, (ii) extraposition of restrictive relative clauses, and (iii) non-restrictive relative structures. Although the puzzling properties of restrictive relative structures are accounted for by the application of Share Merge, which is one of the possible options for creating intersecting sets, further empirical, theoretical, and cross-linguistic explorations are required for the theory of Share Merge in our future research.

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List of Abbreviations

ACC	Accusative	SG	Singular
AGR	Agreement	SM	Sensori-Motor
AR	Amount Reading	SO	Syntactic Objects
C-I	Conceptual-Intentional	TOP	Topic
DEGMod	Degree Modifier	<i>vbl</i>	Variable
EF	Edge Feature		
FP	Functional Projection		
GEN	Genitive		
NEG	Negative		
NOM	Nominative		
Num	Number		
NUMMod	Numeral Modifier		
<i>Op</i>	Operator		
Pdir	Directional Preposition/Postposition		
Ploc	Locative Preposition/Postposition		
PL	Plural		
PRES	Present		
PAST	Past		
QR	Quantifier Raising		
REL	Relative Feature		
RR	Restrictive Reading		

Chapter 1

Introduction

1.1. Restrictive Relative Clauses and Head Nominals

This thesis investigates the syntax and semantics of restrictive relative structures. An example in English is shown in (1).

- (1) The boy [who Mary saw *e*] is my younger brother.

The subordinate clause in (1) modifies the nominal expression *boy* restrictively. The modifying clause is a “relative clause,” which includes a gap *e* corresponding to the modified nominal expression, and the nominal expression is referred to as the “Head Nominal” of the relative clause.¹

One of the leading ideas of this thesis is that a Head Nominal is shared between matrix and relative clauses in the syntactic derivation. In restrictive relative structures, we observe a linking relation between a Head Nominal and a gap. For example, the Head Nominal *boy* in (1) is construed both as a matrix subject and as an object of the predicate *saw* in the relative clause. We also observe a linking relation such as that seen in (2) (Schachter (1973), Browning (1987), Kayne (1994), Aoun and Li (2003)).

- (2) The picture of himself_i [that John_i painted *e* in art class] is impressive.

In (2), the reflexive pronoun *himself* contained in the Head Nominal is coreferential with the subject *John* of the relative clause. In a sense, the Head Nominal is reconstructed and set intact for interpretation at the position of the gap. Thus, the interpretative effect in (2) is called a

¹ In this thesis, the construction including the Head Nominal and restrictive relative clause is referred to as a “restrictive relative structure.”

“reconstruction effect.” The sharing analysis that we will propose in Chapter 3 will be shown to have a variety of consequences and explain a number of facts about the reconstruction effects.

1.1.1. Reconstruction Effects in Restrictive Relative Structures

Sections 1.1.1-1.1.3 consider the reconstruction effect, which is one of the key factors in exploring a unified syntactic analysis of restrictive relative structures. Reconstruction effects are observed in various Germanic and Romance languages. First, let us examine the reconstruction for idiom interpretation in English, French, Norwegian, and German, shown in (3a), (3b), (3c), and (3d), respectively.

- (3) a. The careful **track** [that she’s **keeping** of her expenses] pleases me.

(Aoun and Li (2003: 101))

- b. Il décrit dans son livre la **part** [qu’il a **prise** aux travaux
he describes in his book the part that he has taken at the workings
du 9ème congrès].
of the 9th conference.

‘He describes in his book the part that he had in the 9th conference.’

(Bianchi (1999: 50))

- c. **Vatn** [som ein **tek seg over hovudet**], utviklar seg let til
water that one takes self over head-the, develops self easily into
alvorlege problem.
serious problem

‘Taking on too big commitments leads to a serious problem.’ (Áfarli (1994: 86))

- d. die **Rede**, [die er **geschwungen** hat]
the speech which he swung has

‘the speech he gave’

(Salzmann (2006: 95))

For the two separate parts of the idioms to be adjacent, the Head Nominals in these languages are reconstructed in the gap position inside relative clauses.

The so-called narrow scope reading of the quantified Head Nominals is the second instance of the reconstruction effects in these languages. Such Head Nominals can be reconstructed for the interpretation of the quantified scope in English, Italian, and German, as shown in (4a), (4b), and (4c), respectively.

- (4) a. We're looking for **someone** [that knows **every application**].
(someone>every, every>someone) (cf. Lee (2001: 324-325))
- b. Ho telefonato ai **due pazienti** [che **ogni medico** visiterà domain].
 I phone to.the two patients that every doctor examine tomorrow
 'I phoned the two patients that every doctor will examine tomorrow.'
(two>every, every>two) (Bianchi (1999: 46))
- c. **die Band**, [die **jeder Student** am besten findet]
 the band which every student at.the best finds
 'the band that every student likes best'
(the (band)>every, every>the) (Salzmann (2006: 95))

The possibility of a so-called distributive reading of the examples in (4), where the universal quantifier takes scope over the existential quantifier, shows that Head Nominals are interpreted within the scope of the universal quantifiers contained in relative clauses.

Third, the reconstruction is sometimes required for reflexives to be bound within the c-command domain of their binders. Examples of this phenomenon in English, Italian, Norwegian, and German are shown in (5a), (5b), (5c), and (5d), respectively.

- (5) a. The picture of **himself**_i [that **John**_i painted in art class] is impressive.
 (Aoun and Li (2003: 100))
- b. Il giudice_j invalidò l'unica prova della **propria**_i innocenza [con cui l'**imputato**_i
 The judge
 sperava di scargionarsi].
 hoped
 'The judge invalidated the only proof of his innocence by which the defendant
 hoped that he could exculpate himself.' (Bianchi (1999: 121))
- c. Det av husa **sine**_i [som **Jon**_i bor i], er Ganske falleferdig.
 that of the houses his that Jon lives in is quite miserable
 'The house of his that Jon lives in is quite miserable.' (Áfarli (1994: 89))
- d. das Foto von **sich**_i, [das **Peter**_i in der Zeitung gesehen hat]
 the picture of self which Peter in the newspaper seen has
 'the picture of himself which Peter saw in the newspaper'
 (Salzmann (2006: 117))

These examples are Condition A effects of Head Nominals.

In addition, Condition C effects are sometimes observed when the Head Nominals are reconstructed. Proper names and pronouns cannot corefer when proper names are interpreted within the c-command domain of the co-indexed pronouns, which is a violation of Binding Condition C, as shown below.

- (6) * He_i likes John_i.

The following are examples of Condition C effects in English (7a) and Italian (7b-c).

- (7) a. * The portrait of **John**_i [that **he**_i painted] is extremely unflattering.

(Schachter (1973: 32))

- b. * La recensione del libro di **Gianni**_i [che **pro**_i ha letto sul giornale] era negative.

the review of Gianni's book that pro read in the newspaper was negative

'The review of Gianni's book that he read in the newspaper was negative.'

- c. * Quello è l'amico di **Gianni**_i [a cui **pro**_i ha offerto un lavoro].

this is the friend of Gianni's to whom pro offered a job

'This is the friend of Gianni's to whom he offered a job.' (Bianchi (1999: 110))

We observe a violation of Binding Condition C in (7), wherein the Head Nominals are reconstructed within relative clauses.

However, Munn (1994) reports that the Condition C violation can sometimes be circumvented, as shown in (8).

- (8) The relative of **John**_i [that **he**_i likes *e*] lives far away. (Munn (1994: 402))

In (8), the acceptability of the coreferential reading indicates that the Head Nominal is not (fully) reconstructed in the gapped position. The acceptability of (7)-(8) indicates that Condition C effects are optional, although they are sometimes forced.

Based on the reconstruction effects (the idiomatic interpretation, scope interpretation, and reflexive/pronominal binding) observed in English, French, Italian, Norwegian, and German, we can say that the effects are a property not only of restrictive relative structures in English but also of restrictive relative structures across languages.

1.1.2. A Reconstruction Puzzle

The reconstruction of the Head Nominals is not a reflection of a tight structural bonding between Head Nominals and relative clauses. It is worth noting that reconstruction effects are also observed in *wh*-questions. Fronted *wh*-phrases are interpreted at the gap positions e_{wh} in the matrix

clauses. Consider the examples in (9).

- (9) a. What headway [did John make e_{wh} today]?
b. Which picture of himself_i [did John_i show you e_{wh}]? (Henderson (2007: 204))

The fronted *headway* in (9a) is interpreted as part of the idiom, and the reflexive pronoun *himself* in (9b) is coreferential with the subject *John*. The reconstruction effects of the fronted *wh*-phrases suggest that these *wh*-phrases are reconstructed and set to be interpreted at the gap position in the matrix.

The reconstruction effects in *wh*-interrogatives may lead us to predict that when a fronted *wh*-phrase is accompanied by a relative clause, the relative clause is interpreted with the fronted *wh*-Head Nominal at the gap position (i.e., e_{wh} in (9)) in the matrix. This prediction, however, does not hold. Consider the contrast illustrated in (10).

- (10) a. Which picture [that John_i likes e] [did he_i buy e_{wh}]?
b. * He_i [bought a picture [that John_i likes e]].

(Putnum (2007: 131) with slight modification)

In (10a), the relative clause *that John likes* accompanies the fronted *wh*-phrase *which picture*, and the proper name *John* inside the relative clause can be coreferential with the matrix subject *he* as indicated by indices. This co-indexing is unexpected if the entire *wh*-phrase *which picture that John likes* is supposed to undergo reconstruction, as shown by the ill-formedness of (10b). In (10b) the proper name *John* inside the relative clause cannot be coreferential with the c-commanding matrix subject *he*. The sentence in (10a) might also be considered ill-formed because of reconstruction, which is contrary to the fact. However, the well-formedness of (10a) shows that at the gap position in the matrix clause, fronted *wh*-Head Nominals are not interpreted in combination with the accompanying relative clauses.

Despite the non-presence of the accompanying relative clauses in the interpretation of examples such as (10a), fronted *wh*-Head Nominals show reconstruction effects inside these

relative clauses, as shown in (11) below.

- (11) a. What headway [that John_i made *e*] [did he_i later regret *e*_{wh}]?
b. Which picture of himself_i [that John_i gave *e* to Mary_j] [did she_j take *e*_{wh} home]?

(Henderson (2007: 214) with slight modification)

The fronted *wh*-Head Nominals are reconstructed at the gap position *e* in the relative clauses, yielding the idiom interpretation in (11a) and binding of the reflexive pronoun in (11b). However, these relative clauses are not interpreted at the gap position *e*_{wh} of the fronted *wh*-Head Nominals. That is, the proper names inside the relative clauses—*John* in (11a) or *Mary* in (11b)—do not cause a Condition C violation.

Head Nominals and relative clauses are in a puzzling relation: they are interpreted independently while showing strong connectivity such as the reconstruction of a Head Nominal. The reconstruction puzzle rejects the notion that some relative clauses and Head Nominals are tightly combined while other relative clauses and Head Nominals are not but supports the idea that relative clauses and Head Nominals are tightly connected AND simultaneously loosely combined.

1.1.3. Restrictive Relative Structures in the Minimalist Program

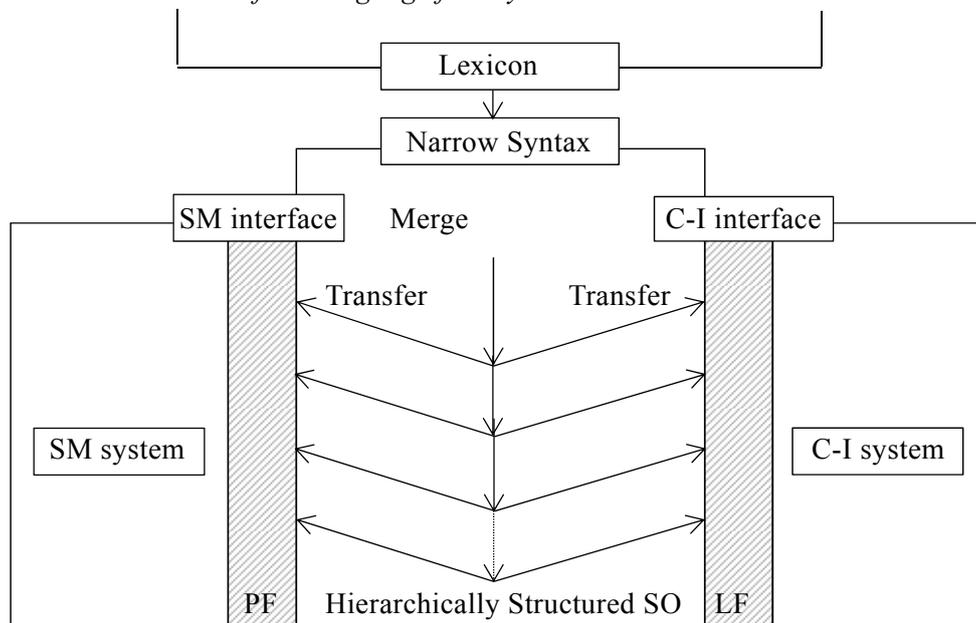
This section introduces the general framework. This thesis is based on the Minimalist Program for linguistic theory developed in Chomsky (1995, 2000, 2001, 2004, and 2008). In the Minimalist Program, Narrow Syntax is equipped with the computational system, and the relevant lexical items are chosen out of Lexicon to be combined by a series of computations in Narrow Syntax. Narrow Syntax is optimally designed based on the simplest computational operation, Merge. The operation Merge is characterized as a set-formation operation applying to two syntactic objects.

$$(12) \quad \text{Merge}(\alpha, \beta) = \{\alpha, \beta\}$$

Hierarchically structured expressions of syntactic objects (SOs) formed by applying Merge are

spelled-out and interpreted at two interfaces: the sensorymotor (SM) interface, which provides the Phonetic Form (PF), for a linearization/externalization procedure in the SM system; and the conceptual-intentional (C-I) interface, which provides the Logical Form (LF) for interpretation, inference, and other mental acts in the C-I system. Hierarchical structures are interpreted at the two interfaces via the operation Transfer, which is triggered for Full Interpretation (FI). FI requires that there be no redundant, uninterpreted symbols at either interface, in line with the fundamental assumption Strong Minimalist Thesis (SMT) (Chomsky (2004:106)): language is an optimal solution to interface condition. The architecture of the language faculty is shown in (13).^{2,3}

(13) *The architecture of the language faculty*



Under the Minimalist Program, syntactic derivation proceeds in Narrow Syntax unit by unit, and

² PF/LF is not an output in the natural world but an abstract, language-internal representation.

³ A set object can be diagrammed as a tree. In this respect, Merge joins a unit to the highest node of the syntactic object, and the highest node is referred to as a root. Note that each node in the course of the derivation must be a set, not a category.

the operation Transfer transfers the unit called “phase” to both interfaces.⁴

Any two syntactic objects can undergo Merge in Narrow Syntax unless it would be blocked by some arbitrary stipulation. When an object embedded in an already constructed structure is merged at the top, it is referred to as Internal Merge. This is illustrated in (14).

$$(14) \quad \text{Merge}(\beta, \{\gamma, \{\alpha, \beta\}\}) = \{\beta, \{\gamma, \{\alpha, \beta\}\}\}$$

Internally-merged elements are left unaffected at the “base” position because of our fundamental assumption SMT, which leads to the “no-tampering condition” (Chomsky (2008: 138)). It requires that the computation in Narrow Syntax cannot add new features. Consequently, Internal Merge creates copies, as illustrated by the two β s in (14). Here, we have an explanation for the ubiquity of movement phenomena in languages—the interpretation of a phrase where it appears as well as in another position in which its interpretation is determined. The SMT yields the Copy Theory of

⁴ More specifically, we are required to “transfer [uF] immediately, as soon as the feature is valued” (Richards (2010: 143)) to solve the distinguishability problem and to thus meet FI optimally, thereby yielding “phases” and multiple transfer points. For the efficient fulfillment of FI, our computational system obeys the Phase Impenetrability Condition (i).

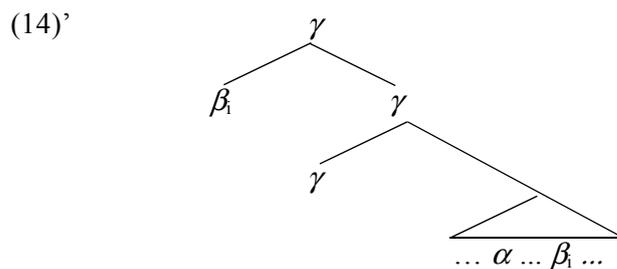
- (i) *Phase Impenetrability Condition* (PIC: Chomsky (2000, 2001))

A domain of a head H of a phase HP is not accessible to operations at ZP, the next higher phase; only H and its edge domain are accessible.

Chomsky (2000) proposes that phases are propositional and claims that a phase is “CP or ν P, but not TP or a verbal phrase headed by H lacking ϕ -features and therefore not entering into Case/agreement checking: neither finite TP nor unaccusative/passive verbal phrase is a phase” (pp. 106-107). Chomsky (2004: 21) further proposes that “the fate of the edge—the head and its specs—is not determined until later.” Therefore, only a subpart of the phases, i.e., the complement of the phase head, can be transferred.

movement, which provides an appropriate structure for interpretation at C-I, providing a principled account of the reconstruction phenomena.

We also establish the “inclusiveness condition,” dispensing with bar levels, traces, indices, and similar descriptive technologies introduced in the course of derivation of an expression. Therefore, Internal Merge creates copies (i.e., the Copy Theory of movement). In this thesis, indices are used for expository purposes as illustrated in (14)ʹ.



The mapping at the SM interface violates the inclusiveness condition, introducing linear-ordering and the pronunciation of only one of the copies by deletion of the others. Moreover, the mapping to LF at the C-I interface cannot obey inclusiveness. We assume that expressions reflecting λ -abstraction are available at the interface and that chain type dependencies are represented as binding, reflecting relations that are not syntactically encoded. In addition, indices are not morpho-syntactic objects and hence cannot be part of computation in Narrow Syntax. Such dependencies must be introduced in the translation from hierarchical structure into expressions at the C-I interface.

Internal Merge of β is triggered when γ agrees with β via the operation Agree, and the features of γ require that Internal Merge of β target the root node dominating γ .

(15) *Agree* (Chomsky (2000, 2001))

Probe γ can establish Agree with Goal β iff (a) and (b) hold.

- a. γ c-commands β .
- b. There is no Goal α such that γ c-commands α and α c-commands β .

A Probe is a head with a set of features that must be matched with a Goal of agreement. To be

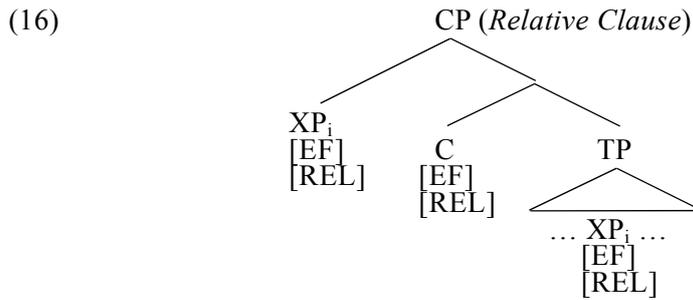
matched, Goal must be in the domain of Probe and satisfy locality conditions. Chomsky (2000:122) assumes that domain D is the c-command domain of Probe, and matching feature G is closest to P if there is no G' in D matching Probe.

Chomsky (2008) claims that Merge invariably operates “to the edge.” When a lexical item (LI) merges with an SO, it must have some property to permit the application of Merge. The property is called the *edge-feature* (EF) of the LI in Chomsky (2008), which triggers Internal Merge. For example, restrictive relative clauses are argued to be derived via A'-movement of the “relative operator” to the Spec position of CP. Thus, C has [EF] in addition to the feature [REL]. Such a C probes into the sister domain TP and makes its specifier a Goal with [REL] in the domain. In other words, the phrase undergoes A'-movement to check the REL-feature of C, as illustrated in (16).^{5,6}

⁵ Chomsky (2008: 144) assumes that only a phase head triggers movement.

⁶ Cable's (2010) Q-based theory assumes that fronting of a *wh*-element in languages such as English is only a secondary effect of Q-movement, and so is the one in relativization. Cable argues that both constructions exhibit the following three properties: “(i) inability to strand adpositions, (ii) inability to extract possessor and determiners, and (iii) possibility of pied-piping structures” (Cable (2008: 202)). In Cable's analysis, a nominal functional head named Q has REL-features in its restrictive relative structures and takes a relative pronoun as its complement. This QP undergoes A'-movement to check the REL-feature of C.

Although this Q-based analysis is a general approach to A'-movement, this thesis does not adopt this analysis. Instead, this paper will argue for a layered DP structure, which divides the DP into at least two parts: a functional layer that forces A'-movement of the entire DP and a lexical layer, which induces intersective interpretation between the Head Nominal and the relative clause.



Notice that under the Copy Theory of movement, a “relative operator” with [REL] leaves its full copy at the base position in a relative clause as illustrated in (16). One copy of the XP[REL] is interpreted as a semantic operator at the C-I interface, and another copy of the “operator” at the base position is interpreted as a variable bound by the semantic operator.

In this framework, the reconstruction is an interpretation of a copy in the position in which its interpretation is determined. Let us reconsider the reconstruction effects in (17).

- (17) a. The picture of himself_i [that John_i painted *e* in art class] is impressive.
 b. Which picture of himself_i [did John_i show you *e*]?

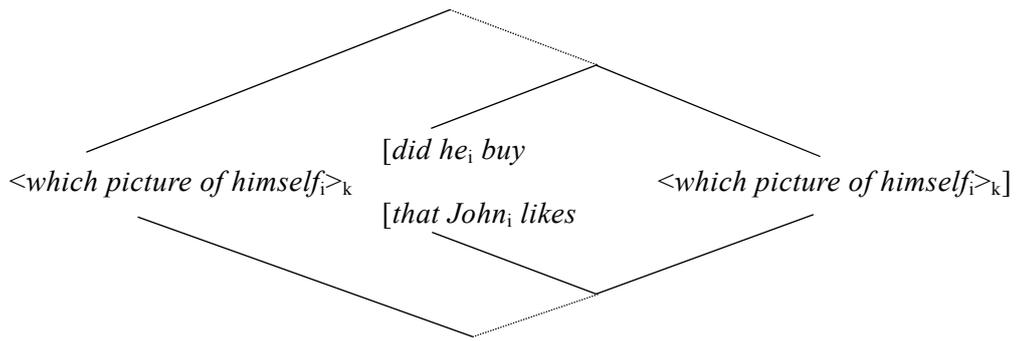
What is interpreted in (17) can be considered copies, which are enclosed in angle brackets and presented with indices in (18).

- (18) a. <the picture of himself_i>_k [that John_i painted <the picture of himself_i>_k]
 b. <which picture of himself_i>_k [did John_i show you <which picture of himself_i>_k]

In this regard, it seems promising as a first approximation to assume that the reconstruction puzzle in the restrictive relative structures, as we have already shown above concerning examples such as (11), is observed because of a multi-dimensional configuration such as the one illustrated in (19).⁷

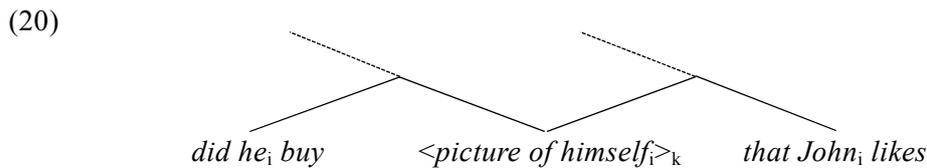
⁷ Notice that the tree diagram illustrated in (19) is of a non-convergent hierarchical structure because it has two roots.

(19) Which picture of himself_i that John_i likes did he_i buy? [= (11b)]



In (19), the Head Nominal *picture of himself* can be interpreted at the base position of the *wh*-phrase in the matrix and at the position of the gap inside the modifying relative clause. The relative clause *that John likes*, however, does not take part in the interpretation of the matrix clause *did he buy* and thus cannot be interpreted at the base position of the *wh*-Head Nominal in the matrix clause.

The configuration presented in (19) seems baroque, because it has two roots, but we will see that with a slight modification the complex structure is not problematic and fares better than the relative structures proposed in conventional analyses. Alternatively, the configuration (19) can be illustrated as involving two conjoined predications on the same argument, as shown below.



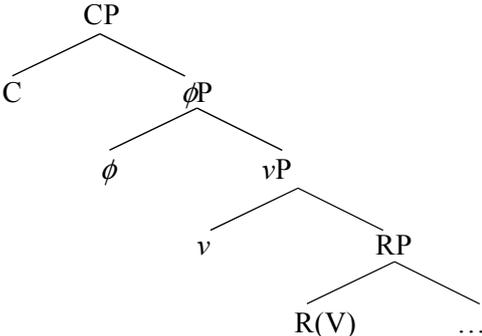
The configuration is, when transferred at the C-I interface, mapped transparently into the LF of restrictive relative structures because they initially involve such a conjunctive interpretation in their semantics. They are interpreted by combining a restrictive relative clause attributively with a common noun, and we obtain complex general terms, as illustrated in (21).

$$\begin{aligned}
 (21) \quad & [\text{picture } [\text{which}_1 [\text{John likes } e_1]]] \rightarrow \text{picture}' \ \& \ \lambda x_1 \text{ like}' (\text{John}', x_1) \\
 & = \lambda y [\text{picture}'(y) \ \& \ \lambda x_1 \text{ like}' (\text{John}', x_1) (y)] \\
 & = \lambda y [\text{picture}'(y) \ \& \ \text{like}' (\text{John}', y)]
 \end{aligned}$$

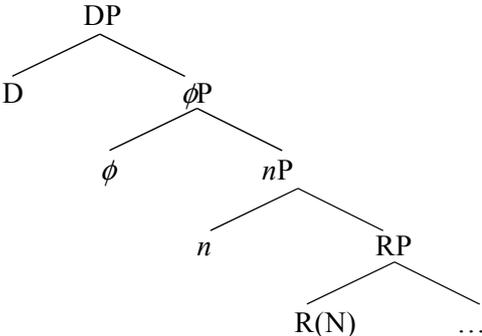
The semantic representation of restrictive relative structures that is shown in (21) derived via predicate modification (Heim and Kratzer (1998: 95)) or the generalized conjunction (Partee and Rooth (1983)) shows that they are indeed equivalent to two conjoined predications on the same argument. The question that arises here is whether our computational system of Narrow Syntax can form complex structures such as those shown in (19)-(20).

This thesis also assumes a hierarchical noun phrase structure. It is sometimes argued that the clause and the noun phrase share syntactic properties (Abney (1987), Laenzlinger (2005a, 2005b), Ritter (1991), Siloni (1997), Valois (1991), and Watanabe (2008)). That is, both the clause and the noun phrase can be divided in two functional domains (Arsenijevic and Hinzen (2012), Boeckx (2009), and Richards (2007)).

(22) *Clause Structure*



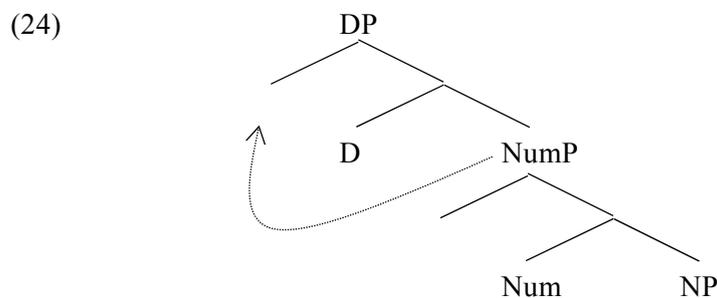
(23) *Noun Phrase Structure (to be revised)*



The bottommost field *v/nP-RP* corresponds to the thematic domain. In these shells, all arguments are merged. The middle field consists of a functional projection *φP*, which hosts the derived position for Case and *φ*-feature agreement. The topmost layer is the so-called left-periphery of the

clausal/nominal structure, which would be assigned a split structure following Rizzi (1997) for the split CP hypothesis and Aboh (2003) for the split DP hypothesis.

Recent works on the DP internal structure discussed in Bernstein (1991, 1993), Picallo (1991), Ritter (1991), Zamparelli (1995), Koopman (2000), and Watanabe (2006, 2008, 2012) have also revealed that DPs are highly structured. For instance, Koopman (2000) argues that DPs are structured with the functional layers including Num(ber)P at least, and there can be more layers. Koopman (2000) also argues that a linear order of constituents in DP is derived by a movement of a certain constituent smaller than DP as illustrated in (24).



In this regard, the DP structure of Head Nominals must have internal functional layers of this kind. Furthermore, a phrasal movement of a functional projection inside must be involved, and restrictive relative clauses are adjoined in the midst of the DP-internal syntax.

In previous studies of the structure of restrictive relatives, much attention has been devoted to the questions of how the Head Nominals and the relative clauses are combined (Freidin (1986), Lebeaux (1988), Fox and Nissenbaum (1999), Stroik (2009)) and how the Head Nominals are reconstructed and interpreted within relative clauses at the syntax-semantics interface (Brane (1968), Schachter (1973), Browning (1987), Munn (1994), Kayne (1994), Sauerland (1998), Safir (1999), Aoun and Li (2003), Henderson (2007)). What the reconstruction puzzle indicates is that relative clauses are both tightly connected to AND loosely combined with Head Nominals and free from structural relations with other matrix elements. This finding leads us to consider the following two questions concerning restrictive relatives from a new perspective:

- (25) i. How is a close relation between relative clauses and Head Nominals established?
- ii. Why are relative clauses combined loosely with fronted Head Nominals?

The tight relation between relative clauses and Head Nominals seems to imply that they are inseparably connected, whereas the temporary non-presence of relative clauses in the interpretation of fronted *wh*-Head Nominals implies the opposite, even in a single restrictive relative structure. What is crucial is resolving this puzzle to provide answers to both of the questions in (25) in a principled way.

1.2. Three Constructions Related to Restrictive Relative Structures in English and Japanese

This thesis also considers three constructions in English and Japanese that are sometimes argued to involve relativization. The three constructions are adverbial relatives, amount/degree relatives, and Comparative Deletion constructions. In the previous literature, all of these constructions were given slightly different accounts than the usual types of restrictive relatives because of their different interpretative profiles.

1.2.1. Adverbial Relatives

An adverbial relative is a relative structure in which the Head Nominal has an adverbial role within the relative clause. Some examples are given in (26).

- (26) a. Our ancestors lived in a time [when the world was less complicated].
- b. My parents visited the place [where they first met].

One might argue that the attributive clauses shown in (26) do not include gaps for which Head Nominals can be substituted. They might include only gaps of adverbial operators, as illustrated in (27).

- (27) a. You may go out [when_i you have done your thesis *e_i*].
 b. Put back the book [where_i you found it *e_i*].

If we consider that the adverbial relatives in (26) include gaps, they must be of temporal or spatial adverbial expressions, as demonstrated in (28).

- (28) a. a time [when_i the world was less complicated *e_i*].
 b. the place [where_i they first met *e_i*].

We consider that nominal expressions cannot be substituted in the gap positions. In this sense, adverbial relatives seem to be gapless for the attributive modification.

Seemingly gapless temporal and spatial clauses in Japanese are also able to modify nominals, as shown in (29) and (30), respectively.

- (29) a. Hanako-wa sono hi-ni sinda.
 Hanako-Nom that.Gen day-NI died
 ‘Hanako died on that day.’
 b. sono [Hanako-ga sinda] hi
 ‘the day when Hanako died’
- (30) a. Hanako-wa sono basyo-de sinda.
 Hanako-Nom that.Gen place-DE died
 ‘Hanako died in that place.’
 b. sono [Hanako-ga sinda] basyo
 ‘the place where Hanako died’

If the attributive clauses in (29b) and (30b) include any gaps, they must be of temporal/spatial adverbial expressions, as we have just seen in the English examples presented in (28).

At this point, a question arises as to how these “adverbial” clauses function attributively. In other words, how are these clauses able to modify nominal heads, including only adverbial gaps?

1.2.2. Amount/Degree Relatives

Carlson (1977) claims that relative clauses can denote not only the property of an individual entity but also the amount of the entity. In this respect, relative clauses are potentially ambiguous between two readings: the restrictive relative (RR) reading and the amount relative (AR) reading. Consider example (31) below (cf. Heim (1987: 38)).

- (31) It would take days to drink the champagne [they spilled that evening].
- RR reading:*
- ‘the very champagne that was spilled that evening’
- AR reading:*
- ‘the same (amount) as much amount of champagne they spilled that evening’

In the RR reading, the matrix argument *the champagne* denotes the same entity as the relativized Head Nominal. In contrast, in the AR reading, the matrix argument is interpreted as denoting only degrees of amounts but not individual entities. Thus, *the champagne* that they spilled and *the champagne* that someone would drink can be different under the AR reading.

The relative clauses in the AR reading are often referred to as amount/degree relatives. The question as to whether these “amount/degree relatives” are just tokens of the restrictive relatives in the AR-reading must be clarified at this point. Carlson (1977) suggests that amount relatives such as those in (32) and comparatives such as those in (33) are much alike.

- (32) a. It would take days to drink the champagne [_{RelativeClause} that they spilled ...].
b. they spilled THAT MUCH champagne ...
- (33) a. There are more women in high school [_{ComparativeClause} than there are in college].
b. there are THAT MANY women in college.

However, there is a certain difference between amount/degree relatives and comparatives. The sortal identity (i.e., identity of kind), which is necessary for relative constructions, is required in the amount/degree relatives but is not required in the comparatives. Consider the examples in (34).

- (34) a. * It will take us the rest of our lives to drink the champagne [that they spilled beer that evening].
- b. It will take us the rest of our lives to drink as much champagne [as they spilled beer that evening].

Independent quantificational measures of amount are not permitted in comparative-like relative clauses such as (34a), whereas different measures are allowed in genuine comparative (or equative) constructions such as (34b). Thus, a second question arises as to the source of the comparative-like AR reading.

It is interesting to note that the subordinate clauses in Japanese exemplified in (35), which are observed in Ishii (1991), seem to be classified between amount relatives and comparatives.

- (35) a. John-wa [Bob-ga yatin-nitukau] hanbun-o gyanburu-ni tukau.
 John-TOP Bob-NOM rent-for uses half-ACC gambling-for uses
 ‘John uses for gambling half as much money as Bob uses for the rent.’
- b. Mary-wa [teisyu-ga hitotuki-ni kasegu] bai-o
 Mary-TOP husband-NOM one.month-in earns double-ACC
 hantuki-de kasegu.
 half.month-in earns
 ‘In half a month Mary earns twice as much as her husband earns in one month.’

In Ishii (1991), those CPs “modifying” the amount/degree expressions *hanbun* ‘half’ and *bai* ‘double’ are treated as instances of relative clauses and called *Half*-relatives because they are sufficiently nominal in Japanese. The interpretation assigned to them is similar to that of comparative clauses, as is shown in the English translations, in which the phrases containing the independent quantificational measure phrases express amounts/degrees.

1.2.3. Comparative Deletion Constructions

We consider another type of apparently attributive clauses that are known as attributive comparatives. English examples of attributive comparatives are shown in (36).

- (36) a. John bought a longer umbrella [than Mary did].
b. John bought more umbrellas [than Mary did].

The standard of comparison in English is sometimes expressed by subordinate clauses that are marked by the “standard marker” *than*. In (36a), the degrees of the length of the two umbrellas are compared, and in (36b), the quantity of umbrellas is compared. Both of the modifying clauses in (36) are called attributive comparatives because the clausal standards are apparently attached inside the noun phrases.

The construction presented in (36) is referred to as a Comparative Deletion construction because the embedded clauses in (36) involve deletion, as illustrated in (37) by the elided structure in angle brackets.

- (37) a. [than Mary did <buy a long umbrella>]
b. [than Mary did <buy many umbrellas>]

The deletion shown in (37) is considered to be the same kind of phenomenon as that observed in VP-ellipsis constructions, shown below in (38).

- (38) a. John loves Mary, and Bill does, too.
b. John loves Mary, and Bill loves her, too.

In (38a), the overt verb phrase in (38b) is elided. Again, what we observe is attributive clauses that seem to include only non-nominal gaps.

It is worth noting here that when only attributive adjectives are deleted in the clausal standards in English, a contrast can be observed between the two types of comparisons exemplified in (36) (i.e., Comparative Subdeletion constructions (Kennedy and Merchant (2000), Bhatt and Takahashi (2008, 2011), Shimoyama (2011))). Consider the contrast presented in (39).

- (39) a. Michael Jordan has more scoring titles [than Denis Rodman has tattoos].
 b. * Pico wrote a more interesting novel [than Brio wrote a play].
 c. * Anna read a longer article [than Roxani read a book].

In these Subdeletion constructions, the comparison of quantity exemplified in (39a) is available whereas the comparison of qualities exemplified in (39b) and (39c) is not available.

Note that in the examples in which the Comparative Deletion can be fully applied, (39b) and (39c) turn out to be acceptable, as demonstrated below.

- (39)' b. Pico wrote a more interesting novel [than Brio did].
 c. Anna read a longer article [than Roxani did].

This finding leads us to conclude that the comparison of degrees of quantity is always available irrespective of what is deleted, whereas the comparison of degrees of quality is not always available. It can be said that attributive comparative clauses cannot always modify matrix noun phrases unless deletion of the corresponding noun phrases occurs. This restriction indicates that the comparison of quantity and that of quality cannot be treated in the same way.

Beck et al. (2004) claim that the analysis of comparatives in English cannot be adopted for those in Japanese. In fact, the acceptability of the Comparative Deletion construction in Japanese differs depending on the lexical properties of its gradable adjectives, as shown by the variability of the judgments in (40).

- (40) ?/?/?*Taroo-wa [[Hanako-ga katta] yori] nagai kasa-o katta
 Taroo-TOP Hanako-NOM bought YORI long umbrella-ACC bought
 ‘Taroo bought a longer umbrella than Hanako did.’

(Ishii (1991), Beck et al. (2004: 290))

Beck et al. (2004) further claim that languages such as Japanese do not have syntactic binding of degree variables.

As is also reported in Beck et al. (2004), however, attributive comparatives comparing

degrees of quantity are possible in Japanese, as shown in (41).

- (41) Taroo-wa [[Hanako-ga katta] yori] takusan-no kasa-o
Taroo-TOP Hanako-NOM bought YORI many-GEN umbrella-ACC
katta.
bought
'Taroo bought more umbrellas than Hanako did.'

The contrast between comparisons of quantity and quality in Japanese is therefore considered to be exactly the same as that observed in the Comparative Subdeletion in English in (39). Moreover, the fact that some speakers do not consider the comparison of the degrees of length in (40) to be bad, as shown by the variability judgements, indicates that it is the case that a sentence that is derived from a computation in Narrow Syntax is somewhat degraded later. The question remains as to whether such a variation is parametric.

1.3. Issues to Be Discussed

We have already raised two main questions regarding restrictive relative structures to be discussed, which are repeated below.

- (25) i. How is a close relation between relative clauses and Head Nominals established?
ii. Why are relative clauses combined loosely with fronted Head Nominals?

This thesis discusses the two further questions concerning the three constructions mentioned in Section 1.2.

- (42) i. How is the connection between Head Nominals and non-nominal gaps established with respect to the three constructions?
ii. To what are the differences between English and Japanese attributed with respect to the three constructions?

Question (42i) concerns the variation in the mapping of the constructions at the syntax-semantics interface. Question (42ii) concerns the source of cross-linguistic variation among the various restrictive relative structures in English and Japanese.

1.4. Organization

This thesis comprises two main parts. PART I includes Chapter 2 and Chapter 3, exploring a unified analysis of the derivation and interpretation of restrictive relative structures. Chapter 2 considers two questions (25i-ii) with close scrutiny of three basic properties of restrictive relative structures: the types of relativizers, pied-piping, and the possibility of reconstruction effects of Head Nominals. These are treated in Sections 2.1 and 2.2. Chapter 2 also examines the previous studies of restrictive relative structures in Section 2.3. Chapter 3 proposes a unified account of restrictive relative structures in English. First, Sections 3.1 and 3.2 consider the theoretical background of this study in which a unified account of restrictive relative structures is explored. Second, Sections 3.3-3.5 examine how the properties of restrictive relative structures are explained within this framework. Finally, Section 3.6 proposes a unified account of restrictive relative structures and discusses its consequences.

PART II includes Chapter 4, Chapter 5, Chapter 6 and Chapter 7, which concern the two questions in (42i) and (42ii). This part argues that under the account proposed in PART I, all three constructions—adverbial relatives, amount/degree relatives, and attributive comparatives—involve hidden restrictive relative structures. It will also be shown that the cross-linguistic differences in these three constructions in English and Japanese can be attributed to the morpho-syntactic features of relativized elements in English and Japanese. Chapter 4 is the introduction of PART II. Chapter 5 investigates the structure of temporal/locative adjunct clauses in English and Japanese, i.e., adverbial relatives, and considers how they are modified by our analysis proposed in this thesis. Chapter 6 investigates amount/degree relatives in English and Japanese and examines their

compatibility with our analysis of restrictive relative structures. Chapter 7 examines comparative deletion constructions in English and Japanese. Chapter 8 concludes this thesis.

PART I

Chapter 2

Restrictive Relative Structures: Basic Properties and Previous Studies

2.1. Internal Syntax of Restrictive Relative Clauses

Chapter 2 considers the basic properties of restrictive relative structures and discusses their internal structures and derivations. Section 2.1.1 introduces a group of elements called “relativizers,” which occupy the left-periphery positions of restrictive relative clauses. Section 2.1.2 addresses two types of relativizers: relative particles and relative pronouns. Section 2.1.3 discusses a relative clause-internal operator movement. Section 2.1.4 concerns pied-piping in restrictive relative clauses.

2.1.1. Types of Relativizers

English has relative clause markers in the left-peripheral position, and they are often called “relativizers” (Smits (1989)). We can say that a relativizer mediates the relation between a Head Nominal and a gap inside a relative clause, as exemplified in (43).

- (43) a. [a boy [that Mary saw *e*]]
b. [a boy [who(m) Mary saw *e*]]
c. [a book [which Mary read *e*]]

Relativizers come in two types: relative particles such as *that* in (43a) or relative pronouns such as *who(m)* in (43b) and *which* in (43c). The relative pronoun *who* is used for the human filler and *which* is used for the non-human filler. In the following sections, we briefly examine the examples of the relativizers in English, French, Italian, Norwegian, and German, in order to clarify what occurs at the left-periphery of restrictive relative clauses.

Relative particles and relative pronouns are morphologically distinguished. Relative particles have the same morphological forms as complementizers or prepositions. Consider the relative particles in English, French, Italian, Norwegian, and German in (44)-(48), respectively.

(44) a. The man **that** you saw is her uncle.

b. I think *that* he will come.

(45) *French*

a. Legarcon **que** tu as invité est arrivé.

the boy thatyou have invited has arrived

‘The boy that you have invited has arrived.’

b. Tu me dis **que** tu vois ta mere.

‘You said to me that you see your mother.’ (Cinque (1982: 276-277))

(46) *Italian*

a. L'uomo**che** vedu è suo zio.

the-man thatyou-see is her uncle

‘The man *that* you see is her uncle.’

b. Penso **che** lui venga.

‘I think that he will come.’ (Cinque (1982: 248-249))

(47) *Norwegian*

a. Mannen **som** du ser der borte, må komme fra Sverige.

the-man thatyou see over there must come from Sweden

‘The man that you see over there must come from Sweden.’

b. ... står for meg **som** vakrereennnoen kvinne.

‘... strikes me as more beautiful than any woman.’ (Taraldsen (1978: 624))

In German, the complementizer *dass*, which can introduce finite clauses, cannot be used as a

relative particle.⁸

(48) *German*

- a. *Ich fand ein Buch, **dass** ich lesen soll.
I found a book that I read should
'I found a book that I should read.'
- b. Ich denke, dass er kommt.
'I think that he will come.'

Forms of relative pronouns in these languages are morphologically identical to the paradigms of pronouns, demonstratives, or articles. Some languages use *wh*-pronouns as relative pronouns. Others use *d*-pronouns, which are utilized as demonstratives/definite articles. Some languages also use complex pronouns, whose forms are compounds of the *d*-pronoun and *wh*-pronoun.

Let us look at the examples of various relative pronouns used in Germanic and Romance languages. English employs the *wh*-pronouns *who/which*, to relativize subjects, objects and prepositional objects as shown in (49a)-(49c) respectively.

- (49) a. The man **who** stands at the corner is his uncle.
b. I found a book **which** you should read.
c. I found a topic on **which** you should work.

Notice that in (49c), the *wh*-pronoun is part of the "pied-piped" phrase, which moves to the left-peripheral position of the relative clause. The preposition that accompanies the relative pronoun is not a matrix element but is an element inside the relative clause as shown in (49c)'.

- (49c)' I found a topic_j [[on [which]_j]_i you should work *e_i*].

While the relative pronoun *which* corresponds to the Head Nominal *topic*, the pied-piped phrase *on which* corresponds to the gap in the relative clause.

⁸ German utilizes only relative pronouns, as shown in (58) below.

French, Italian, and Norwegian also employ *wh*-pronouns when relative gaps occur in prepositional objects, as shown in (50).

(50) *French*

a Le garçon à **qui** tu as parlé est mon frère.

‘The boy with whom you have talked is my brother.’ (Cinque (1982: 276-277))

Italian

b L’uomo a **cui** parlavi è cieco.

‘The man to whom you were speaking is blind.’ (Cinque (1982: 248-249))

Norwegian

c Mannen om **hvilken/?hvem** du snakker, ser nervøs ut.

‘The man about whom you are talking looks nervous’ (Taraldsen (1978: 629))

All of these relative pronoun forms, except for the Italian relative pronoun *cui* in (50b), are borrowed from the interrogative pronoun paradigm. Smits (1989) claims that the relative pronoun *cui* is not counted as an exception because it is also derived from the Latin interrogative word *cuius*.

Notice that all of the cases in (50) involve pied-piping. Pied-piping of the prepositions in these languages is not only possible but also obligatory, unlike in English. This is shown in (51).⁹

⁹ P-stranding is not prohibited in these languages. As demonstrated below, the examples in (52)-(54) do not involve any stranded prepositions, but their *wh*-pronouns cannot be bare.

- (51) a. I found a topic *which* you should work on.

French

- b. * Le garçon *qui* tu as parlé à est mon frère. (Cinque (1982: 276-277))

Italian

- c. * L'uomo *cui* parlavi a è cieco. (Cinque (1982: 248-249))

Norwegian

- d. * Mannen *hvilken/?hvem* du snakker om, ser nervøs ut. (Taraldsen (1978: 629))

We can say that these *wh*-pronouns cannot be “bare.” That is, without pied-piped constituents these restrictive relative structures are ill-formed. This is also true of these languages when subjects or objects are relativized, as shown in (52)-(54).

(52) *French*

- a. Le garçon *que* tu as invité est arrivé. [= (45a)]

‘The boy that you have invited has arrived.’

- b. * Le garçon *qui* tu as invité est arrivé.

‘The boy who you have invited has arrived.’ (Cinque (1982: 276-277))

(53) *Italian*

- a. L'uomo *che* vedu è suo zio. [= (46a)]

‘The man that you see is her uncle.’

- b. * L'uomo *cui* vedu è suo zio.

‘The man whom you see is her uncle.’ (Cinque (1982: 248-249))

(54) *Norwegian*

- a. Mannen *som* du ser der borte, må komme fra Sverige. [= (47a)]

the man that you see over there must come from Sweden

- b. * Mannen *hvilken/hvem* du ser borte, må komme fra Sverige.

the man whom you see over there must come from Sweden (Taraldsen (1978))

As can be seen in (52b), (53b), and (54b), the *wh*-pronouns in these languages are never allowed unless they are accompanied by pied-piped elements. Thus, in these languages, when the Head Nominal is the subject or object in the relative clause, the relative particle must be used.

In addition to *wh*-pronouns, French and Italian employ complex pronouns. This class includes *lequel* in French and *il-quale* in Italian. Complex pronouns can be part of pied-piped constituents, as exemplified in (55).

(55) *French*

a. Le garçon ***auquel*** tu as parlé est mon frère.

‘The boy with whom you have talked is my brother.’ (Cinque (1982: 276-277))

Italian

b. L’uomo ***al quale*** parlavi è cieco.

‘The man to whom you were speaking is blind.’ (Cinque (1982: 248-249))

The form *auquel* in (55a), as well as *alquale* in (55b), is a contracted form of the preposition with the complex pronoun (i.e., the preposition, article, and relative pronoun).

If complex pronouns are utilized as relativizers, pied-piping is also obligatory, and bare complex pronouns are not allowed in these languages as shown in (56)-(57).

(56) *French*

* Le garçon ***lequel*** tu as parlé à est mon frère.

‘The boy whom you have talked with is my brother.’ (Cinque (1982: 276-277))

(57) *Italian*

* L’uomo ***il quale*** parlavi a è cieco.

‘The man to whom you were speaking is blind.’ (Cinque (1982: 248-249))

German employs *d*-pronouns. This type is borrowed from the paradigm of demonstratives or definite articles and shows agreement in number, gender, and Case with the Head Nominals. Consider the examples shown in (58).

- (58) a. Der Mann, der dort steht, ist mein Vater.
 the man who there stand is my father
 ‘The man who is standing there is my father.’
- b. Ich fand ein Buch, das ich lesen soll.
 I found a book which I read should
 ‘I found a book I should read.’
- c. Der Mann, mit dem ich gesprochen habe, ist mein Freund.
 the man with whom I spoken have is my friend
 ‘The man I have talked with is my friend.’

In (58a) and (58b), the *d*-pronouns are bare and are used when the gap is located at the subject or object position. Hence, they can be bare. In (58c), the *d*-pronoun can also be part of the pied-piped phrase. Note that pied-piping of the preposition is obligatory in German as shown in the examples below.

- (59) a. *Der Mann, dem ich mit gesprochen habe, ist mein Freund.
 the man whom I with spoken have is my friend
 ‘The man I have talked with is my friend.’
- b. Der Mann, mit dem ich gesprochen habe, ist mein Freund.
 the man with whom I spoken have is my friend
 ‘The man with whom I have talked is my friend.’

We have observed that relative particles are always bare, whereas some relative pronouns cannot be bare.

2.1.2. Relative Particles versus Relative Pronouns

Relative pronouns can pied-pipe constituents containing the gap, as illustrated in (60).

- (60) a. [a boy [_{CP} who Mary talked [_{PP} with *e*]]]
 b. [a boy [_{CP} [_{PP} with whom] Mary talked *e*]]

In contrast to relative pronouns, relative particles cannot be accompanied by such constituents as those shown in (61).

- (61) a. * I found a topic on **that** I should work.

French

- b. * Le garçon à **que** tu as parlé est mon frère.

‘The boy to whom you have talked is my brother.’ (Cinque (1982: 276-277))

Italian

- c. * L’uomo a **che** parlavi è cieco.

‘The man to whom you were speaking is blind.’ (Cinque (1982: 248-249))

Norwegian

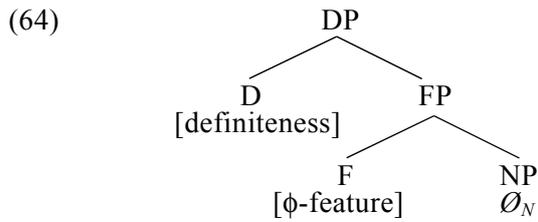
- d. * Mannen om **som** du snakker, ser nervøs ut.

‘The man about whom you are talking looks nervous.’ (Taraldsen (1978: 625))

The unavailability of pied-piping can be accounted for if we assume that relative particles are complementizers that occupy the C head of relative clause CPs.

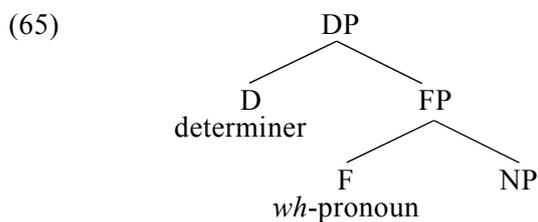
Relative pronouns can be regarded as simplex phrases (XPs) at the specifier position of the relative clause CPs (henceforth, Spec,CPs). The configuration of relative clauses is illustrated as a tree shown in (62).¹⁰

¹⁰ To be precise, the relative pronoun and the relative particle cannot co-occur overtly in the relative clause structure. The constraint operative in English requires the complementizer *that* to be covert when overt *wh*-pronouns are used. This well-known constraint is called the doubly-filled COMP filter (Chomsky and Lasnik (1977: 446)).

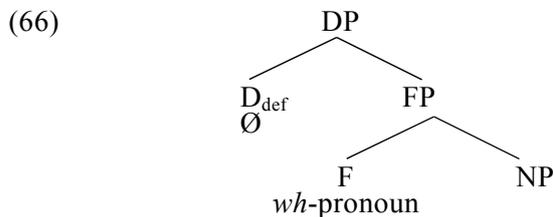


The head F of the functional projection FP takes an NP as a complement. The NP is headed by a covert lexical head N, which is a lexical core of the relative pronoun DP structure.

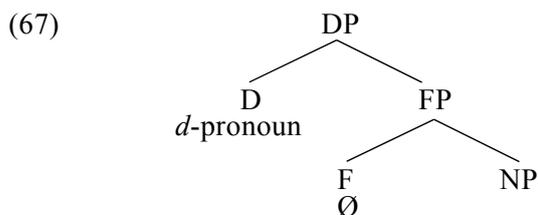
Thus, Inada (2007) presents the internal structure of complex pronouns such as *le-quel* and *il-quale* as in (65).



As for *wh*-pronouns, they occupy the head F whereas a null element occupies the head D as illustrated in (66).



Without overt determiners, *wh*-pronouns do not have inflectional endings. The head D in the DP structure of (66) is, in a sense, defective.¹³ In the case of *d*-pronouns, they occupy the position of the head D, and a null element occupies the position of the head F as illustrated in (67).



¹³ Recall that the *wh*-pronouns in French and Italian (i.e., *qui* and *cui*, respectively) are indeclinable.

Inada (2007) claims that the defective property of head D prohibits *wh*-pronouns from being bare. Thus, the head D of the English relative pronouns *who* and *which* is not defective since they can be bare. It follows that *who* and *which* in English are, despite their forms, determiners in the structure of relative pronouns. That is, English relative pronouns have a parallel structure with *d*-pronouns in (67).¹⁴

2.1.3. Relative Operator Movement

The comparative study of the relativizers in Sections 2.1.1-2.1.2 shows that relative pronouns are elements that participate in the complex DP structure. This section considers the assumption that the relative pronoun DPs are overt realization of “relative operators.”

Since the earliest studies on restrictive relative structures, it has been taken for granted that filler-gap dependencies—dependencies between Head Nominals and gaps—are mediated via an operator, as illustrated in (68).

(68) filler [_{CP} *operator* ... gap ...]

The variable bound by the operator is located at the gap position. The *operator-variable* chain formed in (68) corresponds to the dependency between the relative pronoun and the gap *e* as exemplified in (69).

- (69) a. boy [_{CP} *who* Mary saw *e* yesterday]
b. boy [_{CP} *operator* Mary saw *variable* yesterday]

¹⁴ Inada (2007) argues that the *d*-pronoun-like behavior of *wh*-pronouns in modern English can be attributed to the diachronic change in the relative pronoun. This led to the change that *wh*-words fill the gap arising from the loss of the system of demonstrative pronouns, allowing modern English *wh*-pronouns to behave like *d*-pronouns, which occupy the position of the head D in the DP structure of relative pronouns. See Inada (2007) for further discussion.

The *operator-variable* chain in relative clauses is considered to be formed via A'-movement of the operators to the Spec,CP position (Ross (1967), Chomsky (1977), Browning (1987)). Let us first examine the A'-movement operations in the *wh*-interrogative exemplified in (70).

(70) I wonder [_{who₁} Mary thinks [that Bill met e_1]].

It is known that the A'-movement operations observe the Subjacency Condition as shown in (71).

(71) a. * I wonder [_{what₁} Bill discussed [the claim [that John had mishandled e_1]]].

b. * I wonder [_{who₁} Bill had lunch [before Mary saw e_1]].

The Subjacency Condition can be stated roughly as in the following (Huang (1982), Chomsky (1986)).

(72) a. Movement must not cross an island.

b. A phrase is an island if and only if it is not a complement.

Given condition (72), the example in (71a) is ill-formed because it involves the illegitimate extraction of the *wh*-phrase *what* from the Complex-NP island *the claim that John had mishandled*.

Likewise, the example in (71b) is ill-formed because of the illegitimate extraction from the clausal adjunct. The same reasoning holds for the formation of restrictive relative clauses. Consider the examples in (73).

(73) a. the man [_{who₁} Mary thinks [that Bill met e_1]]

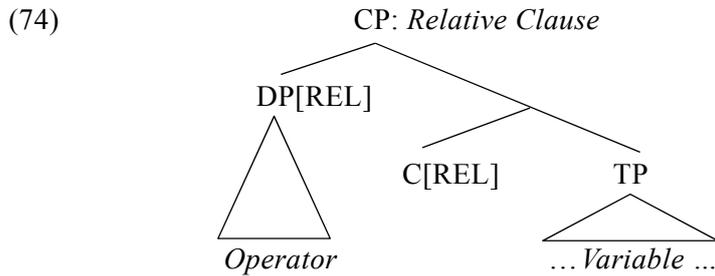
b. * the case [_{which₁} Bill discussed [the claim [that John had mishandled e_1]]]

c. * the car [_{who₁} Bill had lunch [before Mary saw e_1]]

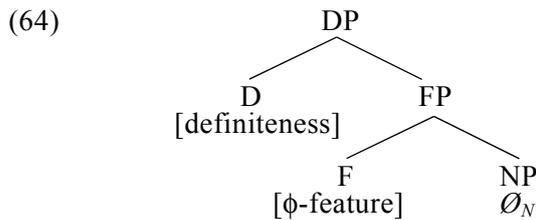
The ill-formedness in (73b) and (73c) is accounted for if they involve the same type of illegitimate extraction. That is, the dependency between a relative pronoun and its gap are also established via A'-movement.

Let us move to the mechanism of A'-movement inside relative clauses. We assume a relative pronoun DP has a formal feature [REL] on head D, which motivates relativization, and that the DP with the feature [REL] undergoes A'-movement to check another [REL] of C of the relative clause.

The DP[REL] thus occupies Spec,CP and creates a chain for the interpretation of *operator-variable* structure in LF.



Under the Copy Theory of movement, an element in the position of the operator and that in the position of the variable are the same. Namely, they are two copies of a single syntactic object. What occupies the position of the variable is a full copy of the relative pronoun DP, which includes a relative operator. As we have observed in Section 2.1.2, a relative pronoun DP has an internal structure containing functional layers at the top and a lexical layer at the bottom, as shown below.



Given that the elements *who* and *which* occupy head D of the relative pronoun DP, the filler-gap dependencies in the syntax of relative clauses can be illustrated as shown in (75).



The position of the gap e_i in (75) is occupied by the copy of the relative pronoun DP_i . The *operator-variable* chain in (74) is therefore considered a rough sketch of the LF representation of restrictive relative clauses.¹⁵ In the syntactic representation a gap e_i inside the relative clause in

¹⁵ The *operator* and the *variable* are regarded as items that function in the C-I system. The *operator-variable* chain can be obtained therein by abstracting over a variable associated with a relative operator. For example, in the relative clause *who Mary saw*, containing the relative pronoun *who*, the λ -operator represents the function from the objects that can be values of the

(75) is not a gap for the filler man_j . The actual gap in the syntactic representation is the FP_j inside the fronted DP_i .

Even without any overt relativizer, a relative structure has a covert relative operator so that it is properly interpreted. Restrictive relative clauses without overt relative pronouns, or even without any overt relativizer, observe the Subjacency Condition as demonstrated in (76).

- (76) a. the man [(that) Mary thinks [that Bill met]]
b. * the case [(that) Bill discussed [the claim [that John had mishandled]]]
c. * the car [(that) Bill had lunch [before Mary saw]]

The relative clauses in (76) involve movement of a covert element to $Spec,CP$, which is often referred to as a “null operator” movement. Let us represent this “null operator” as Op in the example below.

- (77) man_j [_{RC} [_{DP} Op [_{FP} \emptyset_F [_{NP} \emptyset_N]]]]_i (that) Mary thinks [that Bill met e_i]]

Notice that the null operator can be considered a covert instance of a relative pronoun in English. The phrase in $Spec,CP$ contains this null element and is interpreted as an operator at the C-I interface.^{16,17}

variable bound by the operator to propositions expressed by the sentences which are obtained when the reference of the variable is fixed. See the discussion in Section 3.3.1.

¹⁶ The structure of restrictive relatives and Head Nominals is further elaborated upon in Chapter 3.

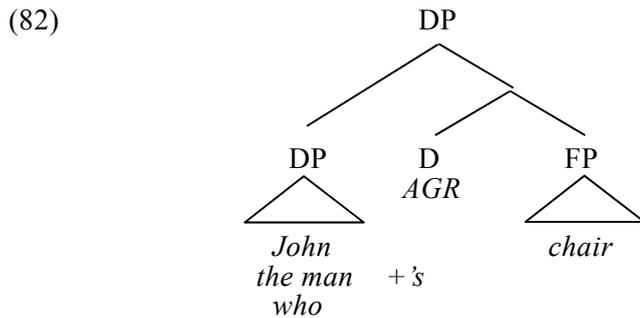
¹⁷ As exemplified in (75) and (77), the filler-gap dependency is formed by excluding matrix definite articles. This happens not only because the D head is occupied by English relative pronouns, but also because definite articles are included in the group of elements that are not reconstructed in relative clauses. See further discussions in Section 3.4.4.

A'-movement in (79)-(80) is a case of fronting of the non-operator DP_i.

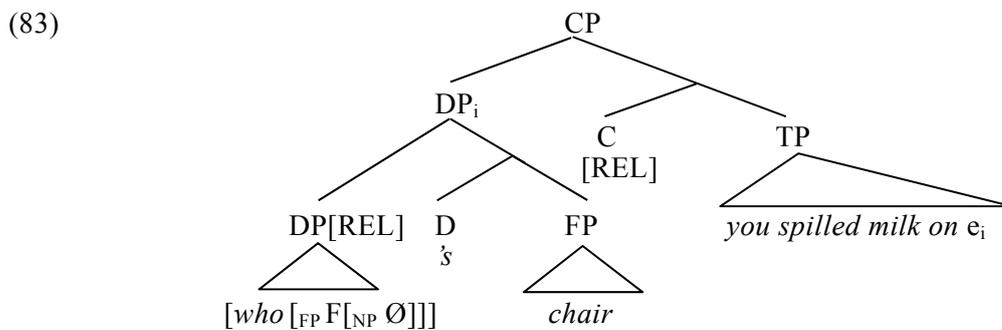
There is another type of pied-piping in restrictive relative structures, as exemplified in (81).

(81) a man [whose chair you spilled milk on e]

Let us adopt the standard assumption that possessors of noun phrases are specifiers of DP and the possessive marker 's is a reflex of an agreement with a head D of the DP, as illustrated in (82).



The possessive relativizer *whose* is obtained by the morphological combination of a relative pronoun and a possessive marker. This suggests that in (81), the element that is relativized is not the fronted element *whose chair* but the FP in the possessor DP. Therefore, the A'-movement in (82) is a case of fronting of a non-operator DP. The structure of (81) is illustrated in (83).



Given that relative operators are not simplex but rather consist of a DP, as discussed above, the actual position of the gap of the Head Nominal is the FP of the relative operator DP[REL]. In a case such as (81), the gap is contained in DP[REL] at the specifier of the fronted DP_i.¹⁸

¹⁸ In (83), the source of the possessive morpheme 's of the relative pronoun *whose* is not D (or AGR) of DP[REL] although the morpheme is incorporated into the relative pronoun. It occupies the head position of the larger, pied-piped DP.

There are constituents including DP[REL] that cannot satisfy a requirement of C[REL]. For example, relative operators cannot pied-pipe their possessor, as shown in (84).

(84) * the book [_{CP} [_{DP} [_{DP} the author]'s [which [Ø]]] John bought yesterday]

The same is true of *wh*-questions, as shown in (85).

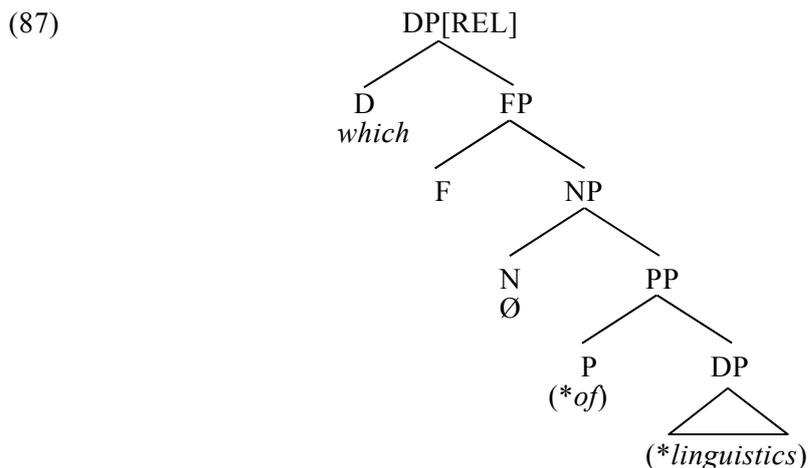
(85) * [The author's which (book)] did John buy yesterday?

The reason that (84) and (85) are unacceptable is accounted for by the decomposition of the structure of the relative operator in Inada (2007). Relative pronouns in English occupy the head D of DP[REL], and they cannot co-occur with the possessive morpheme 's, which also appears in the same DP[REL] position. Therefore, it is still possible to assume that any constituent that includes DP[REL] can satisfy the requirement of C[REL].

It is impossible to pied-pipe complements of a relative operator DP, as shown in (86).¹⁹

(86) * the student [_{CP} [_{DP[REL]} who/which [_{NP} Ø of linguistics]] John is talking with]

In (86), the DP[REL] seems to include the relative pronoun *which*, a covert N corresponding to the Head Nominal *student*, and the complement PP *of linguistics*, as illustrated in (87). We can say that in relativization, neither a complement PP nor a head N can be overt.



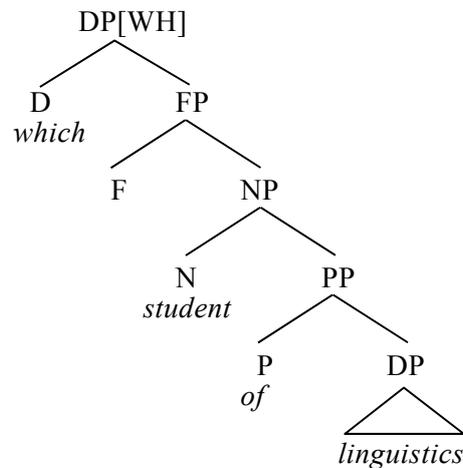
Notice that such pied-piping of PP complements by operators is applicable to *wh*-questions.

(88) [_{DP[WH]} Which [_{NP} student of linguistics]] is John talking with?

¹⁹ Note that this situation is different from the case of pied-piping BY the complement.

In (88), the internal structure of the fronted element DP[WH] seems to be the same as that of DP[REL], as illustrated in (89).

(89)



Why are both the head and complement PPs required to be covert only in the case of relativization?

This requirement cannot be accounted for by the hypothesis that a relativized gap includes only N.

Pied-piping in relativization shows that a syntactic gap in DP[REL] includes not only a head N but also a phrase containing it.^{21,22}

2.2. External Syntax of Restrictive Relative Clauses

Generally, relative clauses are considered to be adjunct to Head Nominals. However, it has been extensively argued since Kayne (1994) that these relative clauses are the complements in the

²¹ In Chapter 3, this thesis proposes that the ellipsis involved in the fronted DP[REL] is not a consequence of a deletion operation such as “deletion under identity,” as is often argued in the Matching analysis. Instead, this thesis shows that the ellipsis is a consequence of a movement operation of some DP-internal functional phrase containing the NP. The proposed ellipsis will be operative in restrictive relative clauses but not in *wh*-questions

²² For the theoretical consideration of the impossibility of so-called “Heavy Pied-piping,” see Inada’s (2007) discussion.

DP structure.²³ This section discusses questions concerning where relative clauses are adjoined and when in the derivation of restrictive relative structures.

2.2.1. Adjunction of Restrictive Relative Clauses

Many previous studies have discussed how the argument and adjunct are distinguished. Generally, participants in the event or state expressed by the predicate are called semantic arguments, and constituents expressing those participants are called syntactic arguments. Elements other than the arguments that function as modifiers are called adjuncts. (90a)-(90f) are examples of phrasal adjuncts, and (90f) is an example of a clausal adjunct.

- (90) a. Gerald bought a cd in the megastore.
b. Gerald bought a cd before noon.
c. Gerald bought a cd without realizing he already had it.
d. Gerald quickly bought a cd.
e. Gerald bought a cd to impress his friends.
f. Eager to fill this gap in his enormous collection, Gerald bought a cd.

(Ackema (2015: 259))

Like the adjuncts in these examples, restrictive relatives are clausal adjuncts of noun phrases, since they convey arbitrarily complex properties.

Relative clauses are islands for the A'-movement of relative clause-internal elements because they are adjuncts, as shown below.

- (91) a. I wonder [who₁ Mary thinks [that Bill met e₁]].
b. * I wonder [who₁ Mary saw the man [who₂ she thought [that e₁ met e₂]].

²³ The complementation analysis of restrictive relative structures proposed in Kayne (1994) is examined in Section 2.3.2.

With abandonment of the notion of adjuncts as sisters of X' , adjuncts are defined by postulating separate planes of a syntactic workspace. Cited in (92) is one of the most recent considerations of the adjunction structure, given in Chomsky (2004).

- (92) An adjunction construction is plainly not the projection of a head: for NP-adjuncts, for example, the constituent appears to be something like [NP XP]. The construction is crucially asymmetric: if α is adjoined to β , the construction behaves as if α isn't there apart from semantic interpretation, which is not that of standard X' -theoretic constructions; island properties differ as well. (Chomsky (2004: 117))

Following the adjunction structure given in (92), adjuncts behave as if they are not attached at the adjoined sites. Chomsky (2004) also claims that adjuncts are built on “separate planes” (Chomsky (2004: 118)) of a workspace devoted to building the syntactic structure. Relative clauses acting as adjuncts thus prohibit the extraction of elements from within the relative clauses before they are spelled-out.

2.2.2. Late-Merger of Restrictive Relative Clauses

Freidin (1986) and Lebeaux (1988) observe an asymmetry between complements and adjuncts: while complements of *wh*-phrases may trigger Condition C effects, adjuncts of the same phrases do not. Consider the contrast shown in (93).

- (93) a. * [Which picture [of Bill_i]]_k did he_i buy e_k ?
b. * [Which claim [that John_i was wrong]]_k did he_i accept e_k ?
c. [Which picture [that John_i likes]]_k did he_i buy e_k ?

The unacceptability shows that the PP *of Bill* in (93a) and the clause *that John was wrong* in (93b), which complement the fronted nouns, are interpreted at the position e_k . In contrast, we have already observed in Chapter 1 that examples such as (93c) are acceptable even when the

R-expression *John* and the pronoun *he* are coreferential. In other words, the moved *wh*-phrases show reconstruction effects with head Ns and complements but not with relative clauses.

Recall that the reconstruction effects are a straightforward consequence of the Copy Theory of movement from the minimalist perspective as introduced in Chapter 1. Given the Copy Theory, the reconstruction effects are observed when one of the copies below the overt one is interpreted, which causes the ill-formedness in (93a-b). Thus, the acceptability of example (93c) suggests that the base copy of the raised *wh*-phrase in e_k does not include the relative clause *that John likes*; if the base copy included this relative clause, (93c) would also involve the illegitimate binding dependency shown in (94).

- (94) * <which picture [that John_i likes]>_k did he_i buy <which picture [that John_i likes]>_k

This leads us to conclude that in the course of syntactic derivation, relative clauses should not be presented in e_k so that the proper names inside cannot be bound by the co-indexed pronouns. Complements to the fronted *wh*-phrases are interpreted in e_k even though relative clauses behave as if they are not present there.

- (95) a. Which picture [of Bill_i] [that John_j likes] did he_{*i/j} buy e_k ?
 b. <which picture [of Bill_i]>_k [that John_j likes] did he_{*i/j} buy <which picture [of Bill_i]>_k

Lebeaux (1988, 1990, 1991) argues that the contrast between the complement clause *John was wrong* in (96a) and the adjunct clause (relative clause) *John made* in (96b) arises from derivational restrictions.

- (96) a. * Which claim that John_i was wrong did he_i accept?
 b. Which claim that John_i made did he_i regret?

Lebeaux claims that while complements are “merged cyclically” in the course of the derivation due to theta-criterion and the Projection Principle—which forces an s-selected element to be present at

the position in which it satisfies the requirement—adjuncts do not have to be merged cyclically. Since adjuncts are not present in the base position, no Condition C effect is triggered. The derivation involves the late-merger of adjuncts as illustrated below.²⁴

- (97) i. did he_{i/j} buy <which picture [of Bill_i]>
 / [Op_i that John_i likes e_i]
- ii. <which picture [of Bill_i]>_k did he_{*i/j} buy <which picture [of Bill_i]>_k
 / [Op_i that John_i likes e_i]
- iii. <which picture [of Bill_i]>_k [Op_i that John_j likes e_i] did he_{*i/j} buy <which picture
 [of Bill_i]>_k

In Lebeaux’s analysis, the relative clause is indeed present at the beginning of the derivation but is not attached to the *wh*-phrase until the A'-movement of the *wh*-phrase occurs. The relative clause is adjoined inside the *wh*-phrase DP in Spec,CP.²⁵

²⁴ As discussed in Chapter 3, the framework of this thesis cannot assume that Merge is applied to embedded syntactic objects without probing. In this thesis, the term “delayed” or “late-merger” is only metaphorically used to describe relevant phenomena.

²⁵ Based on Stowell’s (1981) idea that complement clauses are not normal arguments, Moulton (2015) argues that they are predicates of propositional content. It is often argued that verbs that can select *that*-clauses can take *so*, whereas nouns cannot select *so*, as shown in (i).

- (i) a. I believe/claim/am afraid {that pigs fly/so}.
- b. my belief/claim/fear {that pigs fly/*so}

He argues that *that*-clauses do not generally saturate but are combined via predicate modification, with nominals of the same semantic type; the contrast in (i) is accounted for by the massive movement of CPs and AspPs. Notice that there is an issue of asymmetry judgement for similar examples. Consider example (ii).

2.3. Previous Studies of Restrictive Relative Structures

This section examines previous analyses of restrictive relative structures. We have observed that Head Nominals are interpreted inside relative clauses, i.e., reconstruction effects of Head Nominals, and relative clauses are not interpreted with Head Nominals when they are fronted, i.e., anti-reconstruction effects of the relative clauses as adjuncts. Even so, we cannot say that relative clauses are completely separated from Head Nominals since they are interpreted as their attributive modifiers.

Section 2.3.1 introduces the traditional adjunction analysis, and Section 2.3.2 introduces the Head-Raising and complementation analyses. Section 2.3.3 considers one major point made in the previous analyses, in which Matching procedures of restrictive relative structures under the adjunction analysis are implemented. It is argued in the Matching analysis that relative clauses have a double-headed relative structure in which the external and internal Heads undergo Matching, and internal Heads remain inside relative clauses. Section 2.3.4 considers the hybrid analysis, which assumes that the two types of relative structures (Head-Raising with complementation relatives and Matching with adjunction relatives) coexist. Finally, Section 2.3.5 considers a “sideward” movement analysis of Head Nominals that is brought about by a new theoretical

(ii) ^{ok} [Which corner of John_i's room [that Mary repainted]] was he_i sitting in?

(Hulsey and Takahashi (2009: 408))

Hulsey and Takahashi (2009) observe that the sentence in (ii) is acceptable; this implies that the complement of N is sometimes not reconstructed in the gap position of the fronted *wh*-phrase.

In this respect, the argument-adjunct asymmetry we have observed in this section is not due to different interpretations between argument clauses and adjunct clauses because they are similar in the type-theoretic perspective under Moulton's analysis. However, we can say that what makes difference is whether clauses are “adjoined” or not.

possibility of movement operation.

2.3.1. Traditional Adjunction Analysis

It is generally argued that relative clauses can sometimes be separated from Head Nominals when interpreting restrictive relative structures because they are adjunct to the Head Nominals (Freidin (1986), Lebeaux (1988), Fox and Nissenbaum (1999), Stroik (2009)). This traditional adjunction analysis is so abundant in the literature that its origin is unclear (Quine (1960), Montague (1970a), Partee (1975), Chomsky (1973, 1977), Jackendoff (1977)). In this analysis, it is often argued that a simplex relative operator undergoes A'-movement—in our framework, with a feature [REL]—inside a relative clause CP and that the CP is adjoined to the superordinate argumental NP.

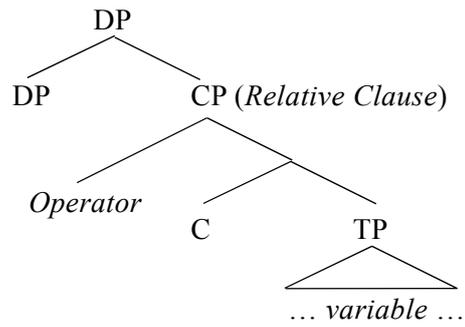
Since Chomsky (1995) there has been a complete abandonment of the notion that adjuncts are sisters of X'. Current theory of adjunction operation is more or less aligned with the idea in Chomsky (2004), which is presented below.

- (98) [DET <ADJ, NP>] receives its theta-role in the normal way, with composition of the predicates NP, ADJ. We take [DET < α , β >] to be “in a configuration” at SEM, but that seems unproblematic: “in a configuration” is not one of the relations defined for simple structures... (p.118).

Chomsky claims that when an adjunct ADJ is adjoined to a Head Nominal β , forming <ADJ, β >, the syntactic composition is interpreted via predicate composition, and this does not change the syntactic status of β .

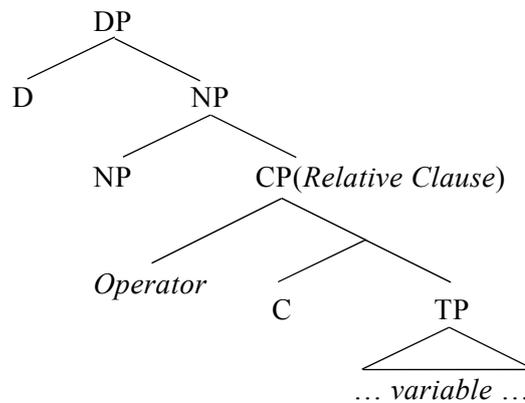
Following the DP Hypothesis, which is also the current standard for the structure of noun phrases (Brame (1982), Szabolcsi (1983), Abney (1987)), relative clauses can possibly be adjoined to DP via adjunction, which yields produce a <CP, DP> structure, as illustrated below.

(99)



Alternatively, relative clauses can be adjoined to embedded NPs via adjunction, which yields the <CP, NP> structure, as illustrated below.

(100)



The <CP, DP> structure presented in (99) is in fact proposed by Ross (1967) to account for the modification of the simplex DP by the adjunct CP as exemplified in (101).

(101) someone [who Mary saw *e* yesterday]

However, if the simplex DP *someone* has a decomposed structure, the relative clause need not be adjoined to the topmost DP layer. The <CP, NP> structure illustrated in (100) is supported by the data such as *one*-substitution and coordination. Consider the examples below.

(102) a. Bill admires the very tall [student who came to Tom’s lecture today]. Antony admires the very short one.

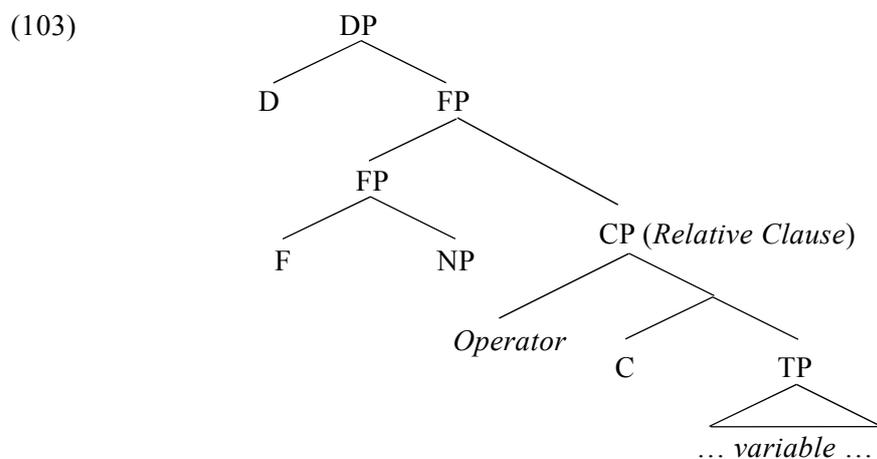
b. Clovis was the [[king who unified the Franks] and [ruler of much of Gaul]].

(Bhatt (2002: 720))

In (102a), *one* can be substituted for an NP-CP sequence, and in (102b), the sequence can be coordinated with another NP. Further support for the <CP, NP> structure comes from the principle

of Compositionality (Partee (1975)), in which both NP and CP denote a property (a type *et*) so that they can combine properly. It should be noted that a different assignment of basic types would allow the other DP, NP, and CP sequences to be interpreted properly.

Notice that there is another structural possibility for the adjunction in the layered DP structure (Bernstein (1991, 1993), Picallo (1991), Ritter (1991), and Zamparelli (1995)). The layered DP analysis makes it possible to argue that relative clauses can be adjoined to a functional projection FP, which projects between DP and NP. The <CP, FP> structure is illustrated in (103).²⁷



Since relative clauses count as adjuncts in the adjunction analysis, the late-merger of relative clauses is always an option. The example is repeated in (104).

(104) Which picture of Bill_i [that John_j likes] did he_{*i/j} buy? [= (93c)]

The reconstruction effects of Head Nominals, repeated in example (105), are accounted for by some additional assumptions about the interpretation of discontinuous elements with backward dependencies.

²⁷ Depending on the number of functional layers assumed in the DP structure, FP (and/or NP) in (103) can be further embedded by another functional projection. This thesis adopts the <CP, FP> structure for restrictive relatives. In Section 3.4, it is argued that the two functional projections—CaseP and Num(ber)P—are planted between DP and NP; we argue that relative clauses are adjoined to CaseP.

- (105) a. The headway [that John made *e*] was amazing.
 b. We're looking for someone [that *e* knows every application].
 c. The picture of himself_i [that John_i painted *e* in art class] is impressive.

Under traditional adjunction analyses, which include the late-merger of adjuncts, it should be stipulated that the idiom chunk in (105a) is construed in the inverse order after the adjunction, the scope of the quantifier *every* in (105b) is taken upward after the adjunction, and the proper name in (105c) is bound by the reflexive pronoun after the adjunction.²⁸

One of the most important issues concerning the approaches to adjunction structure is the determination of exactly where restrictive relative clauses are adjoined. There is no discussion of this question in the current literature with respect to the layered DP structure. Another issue is how

²⁸ It is worth pointing out that Head Nominals do not show reconstruction effects when relative clauses are extraposed to the right. This lack of effect is exemplified in (i).

- (i) a. Mary saw the picture of John_i yesterday [that he_i likes *e*].
 b. *Mary saw the heed last year [that John paid *e*].

It can be argued that in the case of the extraposition, the interpretation of Head Nominals without reconstruction is forced. Notice that how these relative structures are derived (e.g., via adjunction/Matching or complementation/Head-Raising, as we will see in the following sections) is another question. Because it is interpreted as a restrictive relative clause, the syntactic structure transferred to the semantic component inevitably involves the <Relative Clause, Head Nominal> structure. Then, we can assume that the Head Nominal in the output is not pronounced. Alternatively, one can assume that the relative clauses can undergo extraposition after TRANSFER of the <Relative Clause, Head Nominal> structure (although the rearrangement of the transferred elements cannot be regarded as a syntactic operation). In this case, we can further assume that such an extraposition will block the reconstruction.

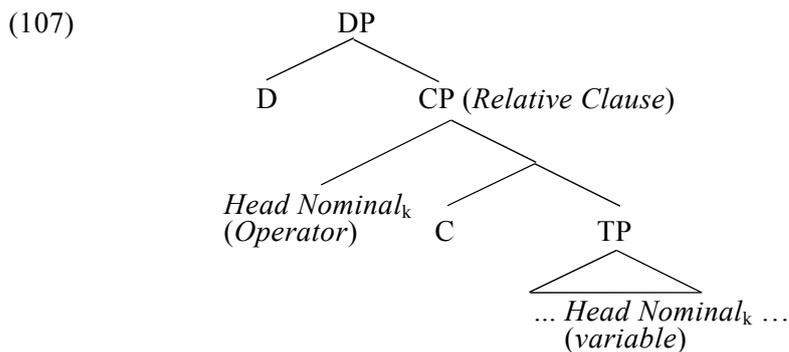
the unique adjunction site is autonomously determined.²⁹

2.3.2. Head-Raising Analysis

Kayne (1994) claims that an XP that contains a Head Nominal is the element that directly moves up to Spec,CP from the gap position inside a relative clause. The Head Nominal leaves its copy in the gap position inside the relative clause and, for example, satisfies the adjacency requirements of the idiomatic phrase, as illustrated in (106).

- (106) a. the headway that John made
 b. <headway>_k that John made <headway>_k

The claim that such a “Head-Raising” analysis is necessary for reconstruction cases dates back to Brame (1968) and Vergnaud (1974) and is revived in Kayne’s (1994) theory of antisymmetric syntax. Kayne’s (1994) Head-Raising analysis assumes a complementation structure for restrictive relatives, where the relative clause CP is a direct complement of D. Illustrated below is the configuration of restrictive relative structures under the Head-Raising analysis, including a matrix D, a Head Nominal, and a relative clause.

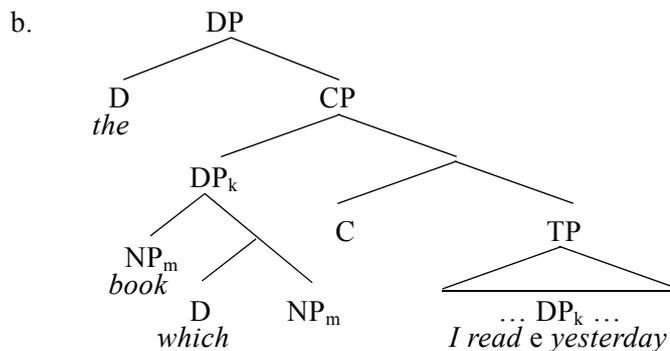


²⁹ In Chapter 3, we argue for the <CP, FP> structure. There is no positive evidence that supports the DP-NP structure specific to Head Nominals. In addition, we show that Head Nominals include weak determiners and exclude strong ones. See the discussion in Chapter 3, which introduces our proposal.

Notice that Head Nominals are internal to the relative clause CP. Within the CP, the Head Nominal of the relative clause undergoes movement from its base position to Spec,CP. The direct movement relation between the Head Nominal and the gap position within the relative clause allows for the possibility that the Head Nominal can be interpreted in the clause-internal, lower position.

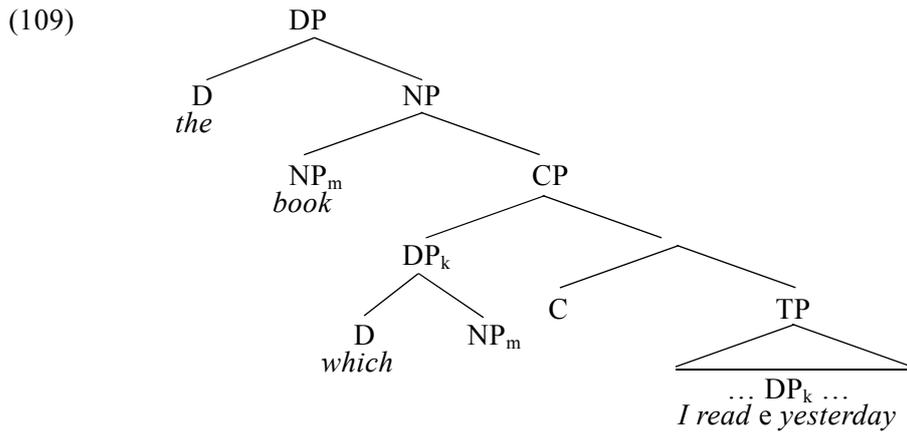
Furthermore, Kayne argues that the DP at the Spec,CP consists of a relative operator as a head D and a Head Nominal as a complement NP. The linear order between the relative pronoun *which* and the Head Nominal *book* is derived via further raising of the Head Nominal NP within the structure of the raised DP, as illustrated in (108b).

(108) a. the book which I read yesterday



In addition to the A'-movement of DP_k in (108), the “secondary” movement of NP_m yields the correct linear order of the elements. Bianchi (1999) proposes another variant of the Head-Raising analysis, in which the secondary movement of the Head Nominal is not to the Spec,DP of the A'-moved operator element, but to the matrix DP. We illustrate the result of further “promotion” of the Head Nominal as the matrix element in (109).³⁰

³⁰ More precisely, the NP moves out of the relative clause into the Spec,AgrP of the matrix DP in Bianchi’s (1999) analysis. Although Bianchi’s promotion analysis coincides with the traditional idea that Head Nominals are elements of the matrix clause, it should be pointed out that before the promotion of the NP in (109), there was no landing site for the NP. In the framework of this thesis, there is no Probe in (109) and the movement of the NP could not be triggered. See Bianchi (1999)



Support for the Head-Raising analysis comes from the fact that Head Nominals of restrictive relative clauses often show reconstruction effects. In (106), the Head Nominal *headway*, which is a part of the idiomatic phrase *make headway*, occurs at and raises from the complement position of the embedded verb *make*.

Áfarli (1994) points out that the Case-marking of Head Nominals in Norwegian relative clauses provides direct supporting evidence for the Head-Raising analysis. Consider the examples in (110).³¹

- (110) a. Vi snakket med henne/*hun.
 we talked with HER/*SHE
- b. Vi snakket med henne/hun som hadde met oss dagen før.
 we talked with HER/SHE that had met us day-the before (Áfarli (1994: 92))

In the simple sentence in (110a), the pronoun in the nominative form cannot follow the preposition *med* ‘with.’ Accompanied by the relative clause in (110b), the pronoun can be either accusative or nominative. Given the Head-Raising analysis, an explanation for the nominative Case in (110b) is that the pronoun is assigned the Case at the subject position of the relative clause.

for a detailed discussion of the restrictive relative structure.

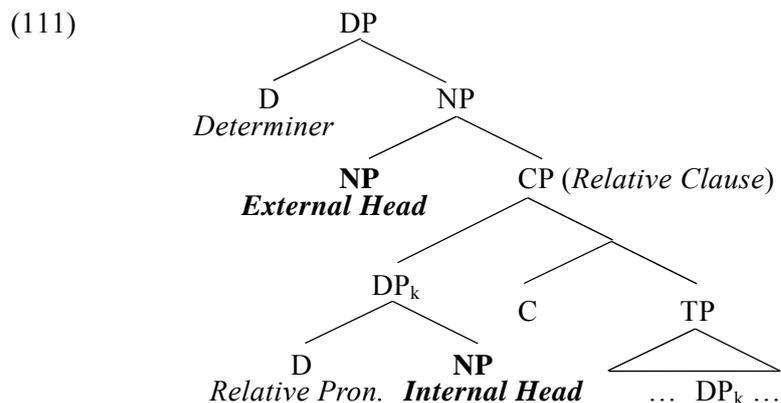
³¹ Example (110) can be analyzed as a free relative construction. See Bresnan and Grimshaw (1978) for a discussion of Case Matching in free relatives.

There are several important differences between the Head-Raising analysis and the traditional adjunction approach. First, what undergoes A'-movement via relativization is different. In the traditional approach the moved element is a simplex relative pronoun (or a null operator), whereas in the Head-Raising analysis, it is a full DP that consists of the relative pronoun and the Head Nominal. Second, relative clauses are adjunct in the traditional adjunction approach, whereas they are complements of D in the Head-Raising analysis. While the reconstruction effects of the Head Nominal follow straightforwardly from the Head-Raising analysis, the non-presence of relative clauses in the reconstruction cases of fronted *wh*-Head Nominals cannot be accounted for by the complementation structure.

2.3.3. Matching Analysis

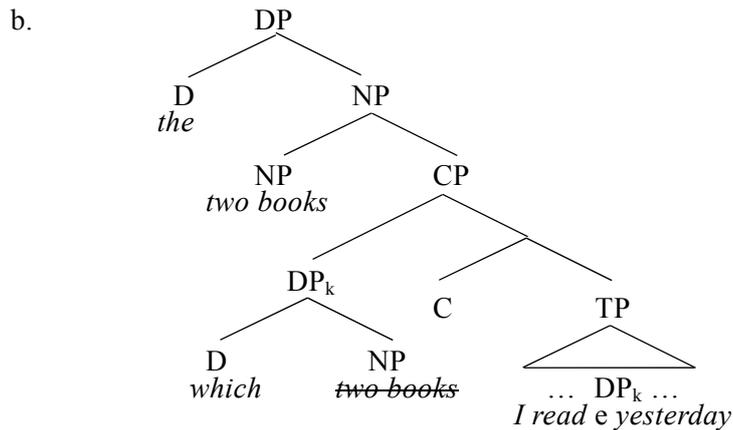
2.3.3.1. Internal Heads and External Heads

It is sometimes argued that adjunction structure also allows Head Nominals to be reconstructed, if one can postulate a relative clause-internal element identical to the overt Head Nominal of the matrix DP (cf. Sauerland (1998), Safir (1999), Salzmann (2006)). Internal elements are often called “internal Heads,” and the overt Head Nominals are called “external Heads.” Internal Heads are assumed to be deleted only phonologically under Matching procedures, which require an identity between the internal and external Head. The Matching relative with <CP, NP> structure is illustrated in (111).



Notice that in the Matching analysis, a restrictive relative clause must be adjoined at a position higher than the external Head under the identity condition of Matching because a relative clause cannot intervene in the structure of the external Head. Matching of the two Heads is exemplified in (112).

(112) a. the two books which I read yesterday



It is often taken for granted that the Matching analysis is a solution to the tension between the reconstruction effects of Head Nominals and the adjunct property of relative clauses. The Matching analysis can explain reconstruction effects of the Head Nominals because of the A'-movement of internal Heads in relative clauses. The reconstruction effects of Head Nominals can be reanalyzed as reconstruction effects of internal Heads, which are deleted in Spec,CP under identity with the matching external Heads, as illustrated in (113).

(113) a. The headway [~~<Op headway>~~_k that John made <Op headway>_k] was amazing.

b. We're looking for someone [~~<Op someone>~~_k that <Op someone>_k knows every application].

c. The picture of himself_i [~~<Op picture of himself>~~_k that John_i painted <Op picture of himself>_k in art class] is impressive.

Following the Matching analysis of restrictive relative structures, what is interpreted at the gap position is the copy of the internal Head.

Furthermore, the adjunction structure, in which the late-merger of adjuncts is operative, can

also explain the adjunct property of relative clauses. This is shown in (114).

- (114) a. Which picture of Bill_j that John_i likes did he_{i/*j} buy?
b. <which [picture of Bill_j]>_m
[<Op [picture of Bill_j]>_k that John_i likes <Op [picture of Bill_j]>_k]
did he_{i/*j} buy <which picture of Bill_j>_m

In the derivation of the Matching relative in (114), the Internal Head *picture of Bill* undergoes A'-movement with the relative operator *Op* in the relative clause. The relative clause is an adjunct to the fronted external Head Nominal *picture of Bill*, which accompanies the *wh*-word *which* and undergoes A'-movement in the main clause. The relative clause, as an adjunct, can be late-merged so that it is not interpreted at the gap position in the main clause. Given Matching analysis, the reconstruction effects of Head Nominals do not necessarily indicate that relative structures are derived via Head-Raising.

2.3.3.2. Vehicle Change

One would expect that the Case of the Head Nominal, or the inflection of modifying adjectives, is always dependent on the relative clause-internal contexts under the Head-Raising analysis, in which Head Nominals originate inside relative clauses. It is the case, however, that both Cases and inflections depend on relative clause-external contexts in German, as illustrated in (115).

(115) a. Ich fand den grossen Bären, der im Müll
 I found the.ACC big.ACC bear.ACC which.NOM in.the garbage
 gestöbert hat.
 rummaged has
 ‘I found the big bear which rummaged in the garbage.’

b. * Ich fand den grosse Bär, der im Müll
 I found the.ACC big.NOM bear.NOM which.NOM in.the garbage
 gestöbert hat.
 rummaged has
 ‘I found the big bear which rummaged in the garbage.’ (Salzmann (2006: 122))

The Head Nominal in (115) is the object of the main verb in the matrix clause, as well as a subject of the relative clause. As shown by the ill-formedness of example (115b), the Head Nominal cannot reflect the relative clause-internal properties.

If reconstruction is always available in the Matching structure, the absence of Condition C effects observed in German relative clauses becomes mysterious. Examples of this are shown in (116).

(116) das Bild von Peter_i, [das er_i am besten findet].
 the picture of Peter which he the best likes
 ‘the picture of Peter that he likes the best’

Given the assumptions made thus far, the above is unexpected because the internal Head in (116) may lead to Condition C violation if reconstruction is obligatory.

Fiengo and May (1994) point out that no Condition C effect is obtained with regard to the proper names involved in the anaphora interpretation and ellipsis, as we can see in the following examples (117).

- (117) a. John drew a picture of Mary_i, but she_i didn't like it (it = the picture of Mary_i).
 b. Mary loves John_i and he_i thinks that Sally does, too.

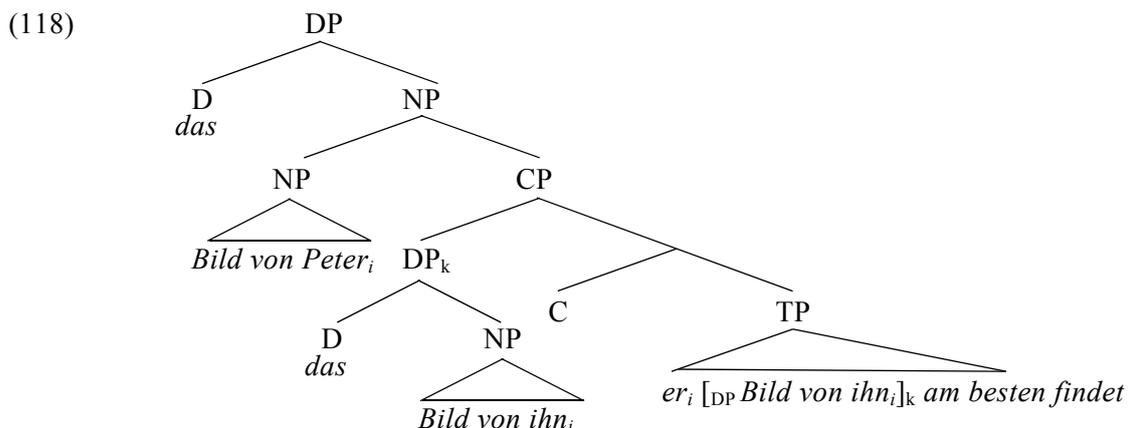
(Fiengo and May (1994: 220))

Notice that neither the proper name *Mary* in the antecedent of the pronoun *it* in (117a) nor that in the antecedent VP of the elided site in (117b) yields a Condition C violation. Fiengo and May (1994) propose that the identity relationship between the elided site and antecedent holds even when an R-expression in the antecedent VP corresponds to the coreferential pronoun in the elided VP, as illustrated below.

- (117b)' Mary loves John_i and he_i thinks that Sally does <love him_i>, too.

Fiengo and May introduce a mechanism called Vehicle Change for those cases where the exact identity of syntactic forms does not hold. Thus, the internal Head inside the Matching relative clause is also subject to the mechanism Vehicle Change, which causes the proper name contained in the internal head to be a personal pronoun with corresponding ϕ -features (cf. Sauerland (1998), Safir (1999), Salzmann (2006), Henderson (2007)).

Salzmann (2006) argues that the LF representation of the example (116a) will be the one illustrated in (118) (Salzmann (2006: 129-130)).



Since the relative clause-internal copy contains only a pronoun, the sentence does not violate Condition C.

2.3.3.3. Deletion of Internal Heads

Under Matching analysis, internal Head Nominals, which are not manifested overtly, are moved up with full contents toward Spec,CP of the relative clause, and thus, they must be deleted under identity with external Heads. For example, Sauerland (2003) proposes that internal Heads are related to external Head Nominals through an ellipsis process that is considered a variant of the deletion operation in the Comparative Deletion construction. The definition of the Relative Deletion operation proposed in Sauerland (2003) is given in (119).

(119) *Relative Deletion* (Sauerland (2003: 221)):

In matching relatives, the internal head must not be pronounced. Furthermore, the external head must be the antecedent of the internal head.

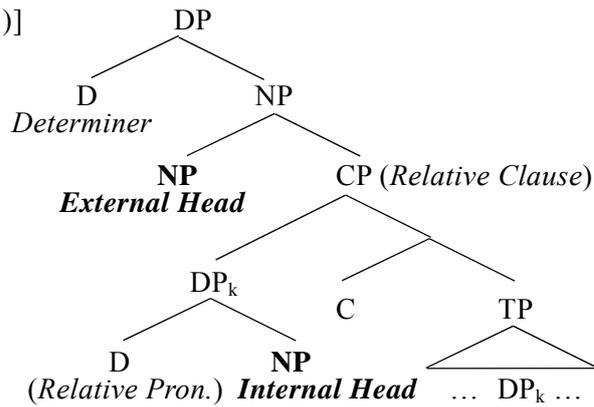
The ellipsis process in (119) is different from an ordinary ellipsis process. For instance, an ellipsis in Relative Deletion is obligatory, whereas an ellipsis in VP-deletion is optional (cf. Merchant (2001)). This is shown below.

(117b)' Mary loves John_i and he_i thinks that Sally does <love him_i>, too.

Alternatively, Szczegielniak (2004) suggests an operation called Topic Deletion, and compares the property of relativization with that of topicalization. Topic phrases are not always deleted whereas Internal Heads must be deleted and cannot be overt in relativization.

Furthermore, ellipsis of internal Heads cannot be accomplished under the normal identity condition. Consider the configuration of the Matching relatives shown below.

(120) [= (111)]



In the Matching analyses, the relative clauses are adjoined at a position higher than the external Heads because of the matching procedure between the external and internal Head. If a relative clause is adjoined below an external Head NP, matching does not hold. The notion of structural dependency is traditionally stated in terms of c-command: α c-commands β if and only if (i) α does not dominate β , (ii) β does not dominate α , (iii) the first branching node dominating α also dominates β , and (iv) α does not equal β . In (120), the matrix DP dominates the external Head NP, but the NP does not dominate the relative clause CP, so that “the first branching node” for the CP is the matrix DP. In this configuration, the relative clause CP asymmetrically c-commands the external Head NP.³²

As we discussed in Section 2.2.1, Chomsky (2004) claims that adjuncts are built on a “separate plane” (Chomsky (2004: 118)) of a syntactic workspace devoted to building syntactic structure. This thesis adopts Chomsky’s (2004) theoretical consideration of building and treating adjunction structures and thus assumes that the adjunction of α to β does not change the properties of β . Concerning the adjunction structures and c-command relation, Chomsky (2004) makes the following claim.

³² See Reinhart (1976) and Chomsky (1981, 1986) for the precise definition of c-command.

(121) For β to lose some property when α adjoins to it would be a complication, an “imperfection.” The relation c-command (X, β) is therefore not lost when α is adjoined to β : accordingly, X still c-commands β in $\langle \alpha, \beta \rangle$, as before adjunction. But extension of c-command to the adjoined element α would be a new operation, to be avoided unless empirically motivated. (pp.118-119)

In (121), Chomsky (2004) claims that (i) if β is c-commanded by X before the adjunction of α , it is still so after the adjunction and (ii) the extension of c-command to the adjoined element α should be avoided unless it is empirically motivated.

We can conclude that Matching relatives are always adjoined to a position higher than that of external Heads. For matching to be successful, external Heads cannot include modifying relative clauses. Deleted internal Heads are therefore in Spec,CP of relative clauses that are located higher than external Heads. Thus, there is no c-command relation between an external Head and a corresponding internal Head to be deleted. Thus, in the double-headed construction, some extra deletion procedure is necessary.

2.3.4. Hybrid Analysis

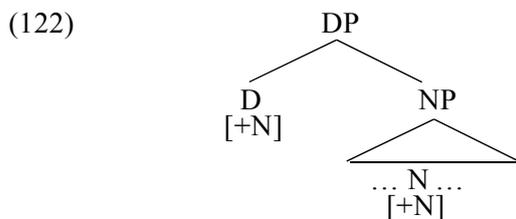
Since Carlson (1977), it has sometimes been assumed that the two structures—traditional adjunction structures and complementation structures with Head Raising—must capture all the properties of English restrictive relative clauses (see also Heim (1987) and Grosu and Landman (1998)). This subsection considers two analyses that assume both Head-Raising and Matching. One is the analysis presented in Hulsey and Sauerland (2006) and Sauerland (2003, 2004), which focuses on the division of labor by exploiting both the direct movement of Head Nominals in Head-Raising analyses and the adjunction structure of Matching analyses on a case-by-case basis. The other is the analysis presented in Inada (2007), which focuses on the question concerning why two types of restrictive relative structures emerge in Germanic and Romance languages and claims

that only certain types of relativizers force Head-Raising in relativization.

2.3.4.1. Head-Raising Relatives and Matching Relatives

Sauerland (1998, 2003) adapts Carlson's (1977) analysis of the two types of restrictive relative clauses and argues that restrictive relatives in English are structurally ambiguous between the complementation structure under the Head-Raising analysis and the adjunction structure under Matching analysis. In this hybrid analysis, Sauerland argues that when a construction shows reconstruction effects, it is derived via Head-Raising, whereas when a construction does not show reconstruction effects, it is derived via adjunction of relative clauses to Head Nominals and undergoes Matching.

Following this line of study and adapting the idea of Bianchi (1999), Inada (2007) claims that a defective property of the functional projection of the *wh*-pronoun forces its complement NP to raise further. Bianchi (1999) argues that the complement NP, which is in the [+N] category, must be head-governed by the head D, which also has a strong [+N] feature.



The complement NP cannot be properly licensed by the defective D of *wh*-pronouns, which Inada considers to be a relativizer of Head-Raising relatives. Inada also claims that the complement NP of some relativizers is properly licensed by its D and need not raise further to be licensed in other matrix configurations.³³

³³ Inada (2007) observes two types of relative clauses in Germanic and Romance languages from three points of view: (i) the restriction on the occurrence of bare relative pronouns, (ii) the restriction on the size of pied-piping, and (iii) reconstruction effects. In Inada's Head-Raising

According to Inada (2007), the Head-Raising relativizer is defective, and its complement NP must raise further, to the left-peripheral position of the relative ForceP, in order to establish a checking relation with the external non-defective D. By contrast the Matching relativizer is not defective, and thus, the complement NP of internal Heads need not raise. In Inada's (2007) analysis the external D and internal D should establish an agreement relation that forces deletion of the complement NP of internal Heads.

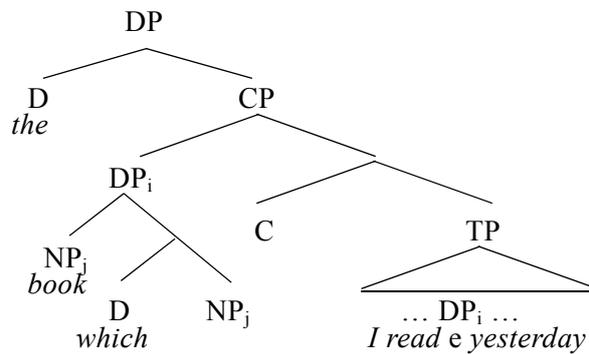
2.3.4.2. Division of Labor in Hybrid Analysis and the Reconstruction Puzzle

In the hybrid analysis, the reconstruction of Head Nominals shows that the relative structures are derived via Head-Raising, while the anti-reconstruction of Head Nominals shows that the relative structures are derived via adjunction and Matching. Thus, the presence or absence of the reconstruction effects depends on how relative structures are derived. Notice that the hybrid analyses indicate that the derivation is potentially ambiguous when a relative clause structure does not have to exhibit either reconstruction effects of Head Nominals or the anti-reconstruction of relative clauses. The two structural possibilities for the ambiguous example (123) are shown in (123i) and (123ii).

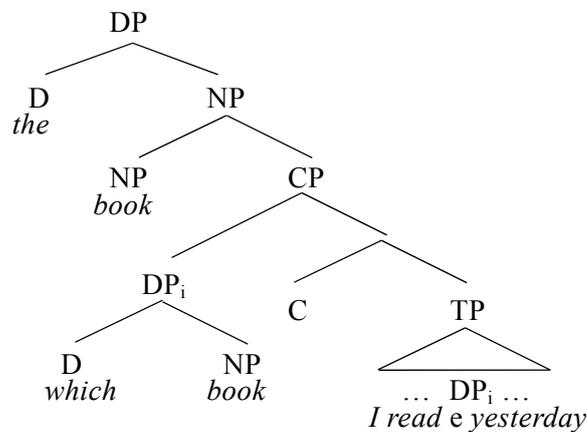
relative clauses, neither the occurrence of bare relative pronouns nor pied-piping of heavy objects are allowed; in Matching relative clauses, these are both allowed. In addition, reconstruction effects are observed in both types of relative clauses, with the exception of reconstruction into the Condition C violation configuration, which is observed only in Head-Raising relative clauses. Although Inada's (2007) analysis can capture the cross-linguistic similarities and differences in reconstruction in Germanic and Romance relative structures, we do not adopt its hybrid analysis because of the reasons discussed in this section.

(123) the book which I read yesterday

i. *derived via Head-Raising-Complementation*



ii. *derived via Matching-Adjunction*



While there is only one *book* in the derivation of the Head-Raising relative in (123i), there are two distinct NPs *book* in the derivation of the Matching relative presented in (123ii). Therefore, we can say that these two structures are derived from two different lexical arrays, and they have two different derivations that are incidentally externalized with having the same interpretation and the same phonetic string. In other words, example (123) is structurally ambiguous, although the two structures (123i) and (123ii) are eventually interpreted in the same way.

At this point, let us reconsider the anti-reconstruction of the relative clause represented below.

(124) [Which picture [that John_i likes]]_k did he_i buy e_k? [= (93b)]

The anti-reconstruction of the relative clause *that John likes* implies the presence of an adjunction structure. The array with two Head NPs yields grammatical output in the adjunction structure and

Matching of (124). When a lexical array includes only one NP *picture* for the derivation of (124), it yields only an ill-formed output of complementation structure and Head-Raising.³⁴ Next, let us consider example (125).

- (125) * Which paper that he_i gave to Bresnan_j did she_j think that every student_i would like? (Sauerland (2003: 209) from Lebeaux (1988))

If a lexical array includes only one Head NP, which forces Head-Raising and complementation, the derivation is ruled out at the C-I interface because it includes an improper binding relation, as illustrated in (126a). If a lexical array includes two Head NPs, which force adjunction and Matching, the derivation is ruled out at the C-I interface because a proper variable binding relation

³⁴ More precisely, there can be two LF representations shown in (i) at the C-I interface for the mapping of the sentence (ii).

- (i) a. * <which [<picture> that John_i likes <picture>]>_k did he_i buy <which [<picture> that John_i likes <picture>]>_k
 b. <which picture [<picture> that John_i likes <picture>]>_k did he_i buy <which picture>_k
- (ii) Which picture that John likes did he buy?

The representation in (ia) is derived via complementation and Head-Raising while that in (ib) is derived via adjunction and Matching. The lexical arrays of the two derivations are different, and there is no evaluation between them in the framework of this thesis. Since the ill-formedness of (ia) is caused by co-indexing at the C-I interface, the complementation and Head-Raising remains an available derivation in Narrow Syntax that provides an ill-formed representation in the interpretation at the interface. Therefore, the lexical array of (ii) must always include two Head NPs for Matching. Otherwise, the sentence (ii) can sometimes be judged as unacceptable.

cannot be established, as illustrated in (126b).

(126) a. *Head-Raising-Complementation: ruled out*

<which [_{<paper>} that he_i gave <paper> to Bresnan_j]> did she_i
[_{vP} <which [_{<paper>} that he_i gave <paper> to Bresnan_j]> think
[_{CP} <which [_{<paper>} that he_i gave <paper> to Bresnan_j]> that every student_i would
[_{vP} <which [_{<paper>} that he_i gave <paper> to Bresnan_j]> like
<which [_{<paper>} that he_i gave <paper> to Bresnan_j]>]]]

b. *Matching-Adjunction: ruled out*

<which paper [_{<paper>} that he_i gave <paper> to Bresnan_j]> did she_i
[_{vP} <which paper> think
[_{CP} <which paper> that every student_i would
[_{vP} <which paper> like <which paper>]]]

They yield essentially different outputs at the interfaces, although neither converges.

Notice that the hybrid analysis cannot explain the reconstruction puzzle. In the hybrid analysis, the relative structures are analyzed as Head-Raising relatives when Head Nominals show the reconstruction effects, while they are analyzed as Matching relatives when they do not show reconstruction effects. Thus, the relative clauses in (127) are instances of Head-Raising relatives (since Head Nominals show the effects).

(127) a. What headway [that John_i made *e*] did he_i later regret *e*?

b. Which picture of himself_i [that John_i gave *e* to Mary_k] did she_k take *e* home?

[= (11) in Chapter 1]

In the Head-Raising analysis, Head Nominals are assumed to be base-generated inside complement relative clauses. In this case, the adjunct property of the relative clauses in (127) remains unexplained.

2.3.5. Sideward Movement Analysis

This subsection considers another novel unified approach to the derivation of restrictive relative structures. Many previous analyses have focused on the reconstruction effects of Head Nominals. Among them are Kayne (1994) and Bianchi (1999), which claim that the reconstruction of Head Nominals is accounted for by Head-Raising, which is often assumed to be linked with the complementation structure. However, Henderson (2007) claims that the reconstruction effects are obtained via Head-Raising from adjuncts. This section examines his sideward movement analysis of restrictive relative structures and discusses its problems.

2.3.5.1. Adjunct Property of Restrictive Relative Clauses Revisited

Safir's (1999) adoption of Vehicle Change as a property of A'-movement is originally presented in the context of the "Freidin-Lebeaux Generalization." He investigates the contrast noted by Freidin (1986) and Lebeaux (1988). The Freidin-Lebeaux Generalization states that while the complement of *wh*-phrases may trigger Condition C effects, adjuncts to *wh*-phrases do not, as shown below.

- (128) a. * Which claim that John_i was wrong did he_i accept?
b. Which claim that John_i made did he_i regret? (Henderson (2007: 208))

To account for the contrast between the complement and adjunct in (128), Lebeaux (1988, 1991) proposes that the contrast arises from derivational restrictions. The complement clause *that John was wrong* in (128a) is merged cyclically in the course of the derivation due to thematic requirements and the Projection Principle. The relative clause *that John made* in (128b) does not have to be merged cyclically because it is an adjunct. Consider the derivations illustrated in (129).

- (129) a. * <which claim [that John_i was wrong]> did he_i [_{VP} <which claim [that John_i was wrong]> accept <which claim [that John_i was wrong]>]?
 b. <which claim [that John_i made]> did he_i [_{VP} <which claim> regret <which claim>]?

The complement must be present in the base position of the raised *wh*-phrase where it is c-commanded by the co-indexed pronominal and induces a Condition C violation. On the other hand, the relative clause does not have to be present in the base position and can be merged after the *wh*-movement has occurred. There is always a possible structure in which the adjunct is not present in the base position.

Henderson (2007) observes that the ill-formedness of examples such as (128a) repeated below is “highly questionable” because he, and most of the native speakers he interviewed, found that they are acceptable.

- (128a) * Which claim that John_i was wrong did he_i accept?

Suppose that Vehicle Change is available in all A'-movement contexts. Then, neither of the LF structures for (128a) or (128b) contains a copy of the proper name *John*, c-commanded by the subject *he*. This leads us to argue that, in the lower copy in (128b), then, Condition C violations are not necessarily accounted for by the non-presence of a relative clause. Henderson’s claim that the Freidin-Lebeaux Generalization is an illusion might thus lead us to conclude that late-merger analysis of adjuncts is not a necessary assumption.

Still, there is an independent argument for the late merger analysis of adjuncts. This is presented in Fox and Nissenbaum (1999), who observe that both complements and adjuncts seem equally able to undergo extraposition to the rightmost position of the matrix clause, skipping over the temporal adverbial *yesterday*.

- (130) a. Bill saw [a picture <of John>] yesterday [of John].
 b. Bill saw [a picture <from the museum>] yesterday [from the museum].

This seems surprising at first because in *wh*-question contexts, complements can be extracted from within DPs, but adjuncts cannot. This is exemplified in (131a) and (131b).

- (131) a. [Who] did you see [_{DP} a picture of <who>]?
b. * [From where] did you see [_{DP} a picture <from where>]?

We would expect that example (130b) cannot be derived via extraction of the adjunct either. The analysis that Fox and Nissenbaum propose for the apparent extraposition of the adjunct in (130b) is as follows: the argument of the matrix clause undergoes quantifier raising (QR), moving rightward to the position above the adverbial, and the adjunct is then late-merged to the upper copy of the DP in the covertly QRed position. This is illustrated in (132).

- (132) a. We saw <a picture> yesterday
b. We saw <a picture> yesterday <a picture>
c. We saw <a picture> yesterday <a picture> [from the museum].

Fox and Nissenbaum further provide evidence for the assumption that every argument undergoes covert QR by showing that the DP takes scope in a position higher than the apparent argument position. Consider the example in (133).

- (133) * I looked for <any clue> very desperately <any clue> [that the detective might have overlooked]. (Fox and Nissenbaum (1999))

The example in (133) is ill-formed because the free choice item *any* in (133) is required to be interpreted under the scope of the phrasal predicate *look for*. This suggests that the object of this phrasal predicate is in fact interpreted outside its scope.

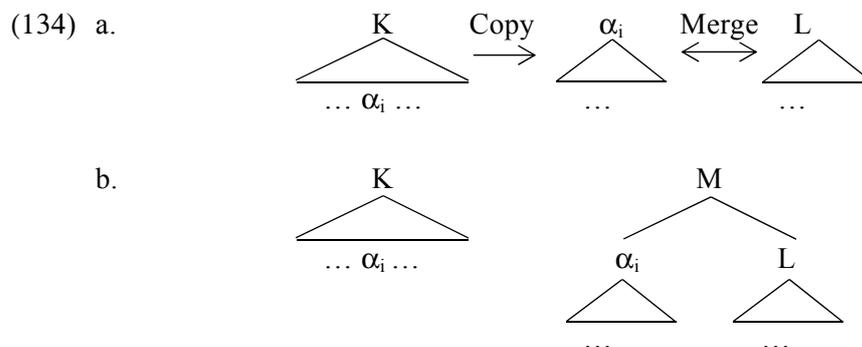
Despite Henderson's (2007) observation, we still have strong evidence that leads us to conclude that adjuncts, including relative clauses, are all "late-merged." One might argue that this conclusion is compatible only with the Matching and adjunction analysis and is not compatible with the Head-Raising and complementation analysis, although Head-Raising is considered a promising analysis that can account for the reconstruction effects of Head Nominals.

2.3.5.2. Sideward Movement and Restrictive Relative Structures

Nunes (2001, 2004) explores the boundaries of the Copy Theory of movement under the merge-based analysis of structural building in his minimalist framework. In his theory, the traditional operation “Move” is decomposed into four independent operations: Copy, Merge, Form Chain, and Chain Reduction. The operation Copy copies a syntactic object in the derivation. Merge adds an element (either a “new” element from the numeration (in our theory, External Merge), or a copy of a syntactic object already merged (Internal Merge)) to the derivation. Form Chain applies at the end of the derivation, forming chains between copies in a c-command relationship. Chain Reduction eliminates the links of a formed chain to ensure that only one is pronounced with regard to the sensorimotor system.

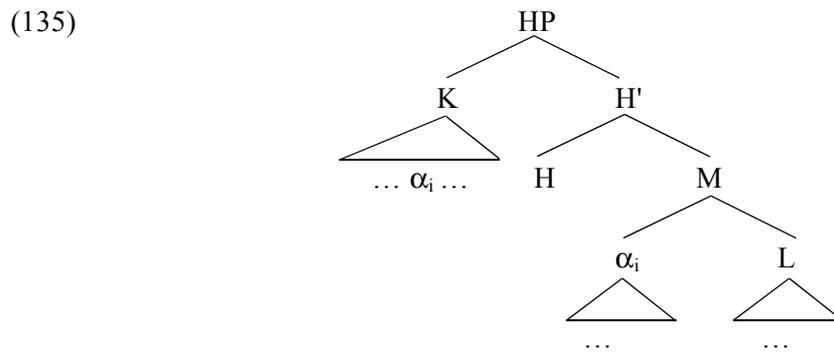
Nunes’ (2001, 2004) insight, which is crucial to our discussion, is that if all four operations above are independent, a copy within a syntactic object can merge multiple times to the same object or, rather, can be merged to distinct syntactic objects. Nunes names the latter possibility “sideward movement.” The constraints on the “free” merge are provided by Form Chain and Chain Reduction, which form chains representationally at the end of a derivation and eliminate copies to ensure proper linear sequences.

The following are the derivational steps of “sideward movement” in Nunes (2004). A constituent α is copied from K and undergoes Merge with the distinct syntactic subtree L illustrated in (134a) to constitute M , as shown in (134b).

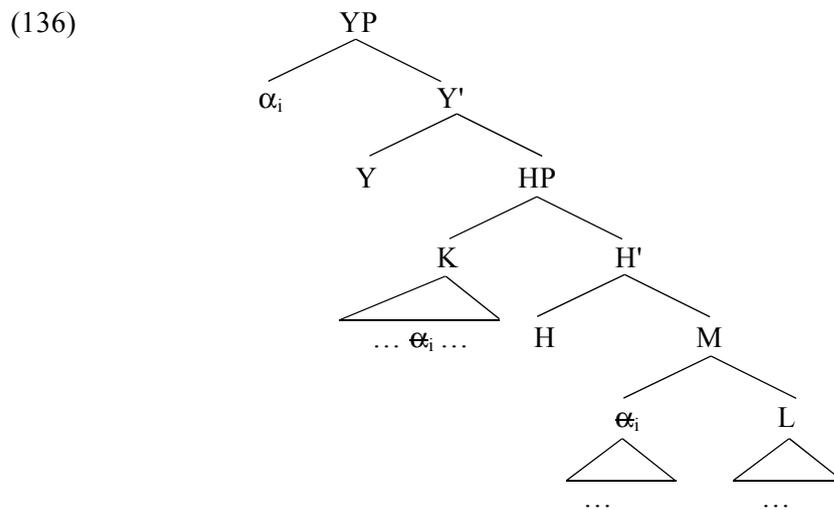


This operation is called “sideward movement” because a non-root object α in K moves to the

separate subtree M as a consequence of Copy and Merge. Later, a syntactic object HP can contain both copies of α , as illustrated in (135).



In (135), the HP establishes no dependency between the two α s because they do not respect the c-command condition of the operation Form Chain. To form the proper chain, the presence of the highest copy of α is essential. This c-commands the other two copies and leads the lower members of the two c-commanding links to be deleted in the computation at the phonological component via Chain Reduction. This is illustrated in (136).

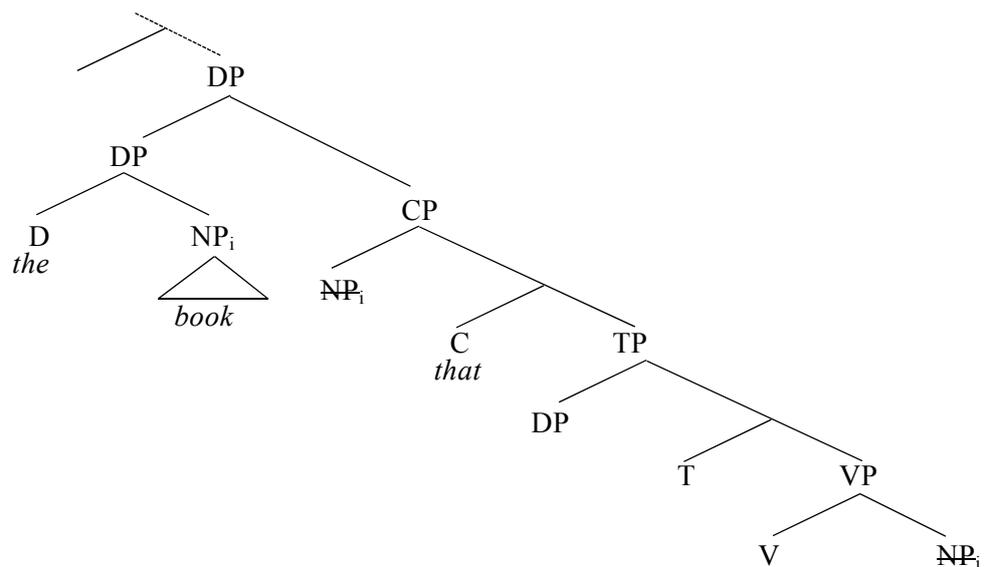


Following Nunes' (2004) idea, Henderson (2007) attempts to offer an analysis of restrictive relative structures that accounts for both the property attributed to the direct Head-Raising of Head Nominals and the property attributed to the adjunction structure. That is, he proposes a sideward movement approach to the derivation of relative structures, as shown in (137).

- (137) a. [TP John [VP read [NP book]]]
 a'. / Copy *book*: [NP book]
 b. [CP [NP book] that [TP John [VP read [NP book]]]]
 c. [CP [NP book] that [TP John [VP read [NP book]]]]
 c'. / Copy *book*: [NP book]
 d. [CP [NP book] that [TP John [VP read [NP book]]]]
 d'. / Merge *the* with [NP book]: [DP the [NP book]]
 e. [DP the [NP book]] [CP [NP book] that [TP John [VP read [NP book]]]]

Henderson claims that a copy of NP has been made inside TP, as shown in (137a-a'). Next, the copy of the NP is merged to Spec,CP to check a “Q feature” of C, as shown in (137b). Another copy of this NP is made, as shown in (137c'), and merges with D as a distinct syntactic object, as shown in (137d'). This yields the two subtrees, CP and DP, illustrated in (137d-d'). Finally, the two objects merge, yielding (137e), and Form Chain applies at the end of the derivation, as illustrated below.

(137e)'



The sideward movement analysis of restrictive relative structures in Henderson (2007) shares similarities with the Head-Raising analysis since the Head Nominal is “moved” directly to the

superordinate clause to serve as a matrix argument. Reconstruction effects of Head Nominals are accounted for under the Copy Theory of movement. At the same time, the adjunction structure can account for the late merger of the relative clause.

Concerning the adjunction mechanism in his analysis, we cannot adopt the sideward movement analysis of restrictive relative structures as it stands, although Henderson (2007) does not show the precise mechanism of the adjunction of relative clauses or the reason why relative clauses are adjoined to the topmost DP layer. It can be argued that the <CP, DP> configuration is not appropriate for restrictive relative structures because the relative clauses are too high to undergo the operation Form Chain properly.^{35,36}

2.4. Summary

Based on the observations and discussions about previous studies of restrictive relative structures, it is plausible to claim that the reconstruction effects of Head Nominals follow from the

³⁵ Notice that relative clauses cannot be adjoined to the sideward-moved NP after the step (137c-c'). Such an adjunction will result only if we make a further assumption that sideward movement can be a movement to nowhere. Therefore, the adjunction to DP will be a logical necessity in Henderson's analysis. Furthermore, the copy of the NP *book* in CP in (137c) would be created only for the purpose of undergoing Merge with the definite article *the*. That is, the sideward movement wrongly enables a movement to the complement position.

³⁶ Tonoike (2012) also proposes a sideward movement analysis of restrictive relativization, which would face the same problems discussed in this section. One tacit assumption that is required in the sideward movement analyses is that a relative pronoun would appear in the (Head-Raising) relative clauses as some morphological reflex of the relativization. Theoretical problems in sideward movement are also discussed in Section 3.2.4.2.

Copy Theory, whereas the non-presence of restrictive relative clauses can be accounted for with recourse to adjunction structure.

- (138) i. How is a close relation between relative clauses and Head Nominals established?
- ii. Why are relative clauses combined loosely with fronted Head Nominals?

Concerning the two main questions presented in (25) in Chapter 1 repeated in (138), we have shown that we cannot adopt the Head-Raising and complementation analysis even when the reconstruction effects of Head Nominals are observed. The Head-Raising and complementation analysis cannot explain the reconstruction of fronted Head Nominals, which is observed inside the adjunct relative clauses. We have reached the conclusion that Head-Raising from adjunction structure, such as that proposed in Henderson (2007), should be explored in order to provide an adequate answer for the two main questions, although Henderson's analysis itself is inadequate as it stands because of the theoretical problem of sideward movement. In the next chapter, we propose a theory of forming a sharing structure, which enables Head-Raising from adjunct relative clauses within the framework of the Minimalist Program.

Chapter 3

Shared NumP Movement and Adjunction Analysis of Restrictive Relative Structures

3.1. Toward a Unified Account

This thesis argues that the operation Merge, a general syntactic mechanism of Narrow Syntax, enables us to account for the properties of restrictive relative structures. A potential of Merge—External Merge can yield intersecting sets—has not been fully studied in the literature, and the structure of Head Nominals, not the structure of relative clauses, presented in previous analyses is too simple to account for the properties of restrictive relative structures. With these two points in mind, this chapter proposes a shared NumP movement and adjunction analysis and argues that an adjunction site of a relative clause is determined autonomously, so that our computational system can yield the legitimate output of restrictive relative structures at both the C-I and SM interfaces.

Section 3.2 introduces subtypes of Merge and discusses multi-dominance structure formed by Internal Merge. Next, Section 3.3 points out that Merge builds a sharing structure that is permissible as intersecting sets at the C-I interface. Section 3.3 also considers the legibility of the sharing structure with respect to the linearization procedure at the SM interface. In Section 3.4, Sections 3.4.1-3.4.2 show that a Head Nominal has a layered internal structure and undergoes DP-internal phrasal movement and that NumP must undergo DP-internal phrasal movement irrespective of the presence/non-presence of restrictive relative clauses for word order and interpretation. In Section 3.4.3, it is argued that the reconstruction effects of quantified Head Nominals show that a Head Nominal is a Num(ber)P, a functional projection between DP and NP.

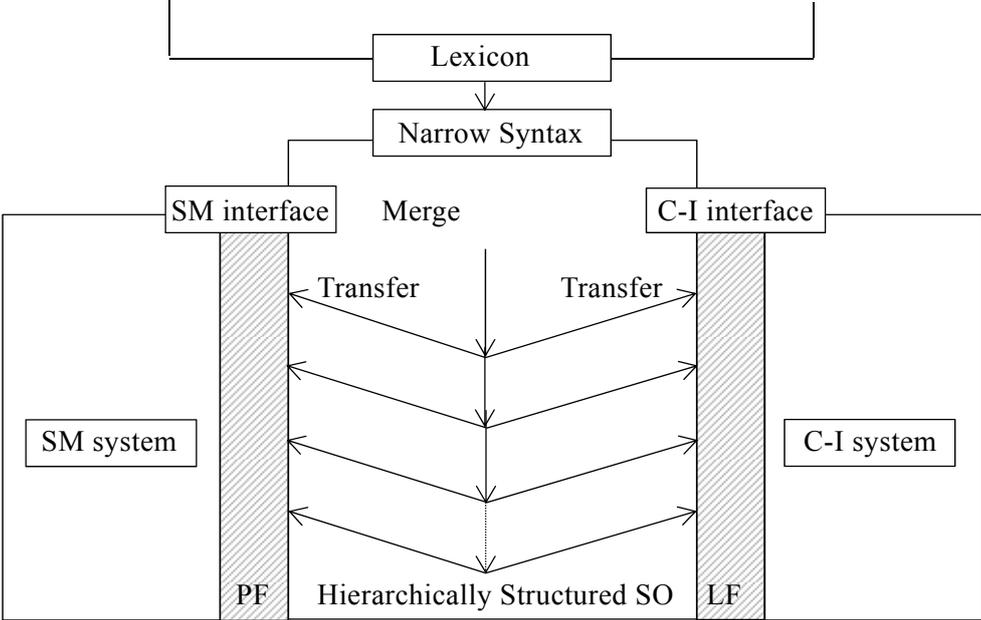
Section 3.4.4 proposes the shared NumP movement and adjunction analysis, which explains both the reconstruction effects of Head Nominals and the anti-reconstruction effects of relative clauses. Section 3.5 further explores a unique adjunction site of restrictive relative clauses in the proposed internal structure of the DP layers. Section 3.6 reexamines the sample derivation of the unified account of restrictive relative structures step by step and discusses two consequences of this account.

3.2. Forming Complex Syntactic Objects

3.2.1. General Framework

This thesis is based on the framework of the Minimalist Program for linguistic theory developed by Chomsky (1995, 2000, 2001, 2004, and 2008), which was introduced in Chapter 1 of this thesis. The architecture of the language faculty shown in (13) in Chapter 1 is repeated below.

(139) *The architecture of the language faculty*



The following sections introduce the operations Merge, Agree, and Transfer in Narrow Syntax. Based on the assumptions of these operations, we consider how a certain complex syntactic object is autonomously formed for proper interpretation of the restrictive relative structures at the C-I

interface on the one hand and for the linearization procedure at the SM interface on the other.

3.2.2. Set-Merge and Pair-Merge

In Chapter 1, we have observed that the simplest computational operation, Merge, applies to two syntactic objects and is characterized as a set-formation operation. There are two kinds of Merge concerning whether the resulting structure is ordered or not: Set-Merge and Pair-Merge.³⁷ Complementation takes the form of Set-Merge, which is characterized as a simple set formation $\{\alpha, \beta\}$, whereas adjunction takes the form of Pair-Merge, which creates an ordered pair $\langle \alpha, \beta \rangle$. Chomsky utilizes the notation of the ordered pair for Pair-Merge because of an intrinsic asymmetry between complementation and adjunction. That is, adjunction $\langle \alpha, \beta \rangle$ is an optional process that merges α to β , while complementation is order-invariant: $\{\alpha, \beta\} = \{\beta, \alpha\}$. The adjuncts are built on a “separate plane” (Chomsky (2004: 118)) of a syntactic workspace and are attached to the

³⁷ Originally, Set-Merge was defined with the notion of the label of a unit (cf. Chomsky (1995)).

- (i) Let K be the result of Merging α and β
Set-Merge: $K = \text{set-merge}(\alpha, \beta) = \{\Gamma, \{\alpha, \beta\}\}$

When α and β set-merge, it is to satisfy one of their requirements. If the requirements of α are satisfied, α projects i.e., $\Gamma = \text{label}(K) = \text{label}(\alpha)$. The requirements of α can be uninterpretable subcategorization features, as well as semantic requirements such as θ -roles. Pair-Merge is inherently asymmetrical as defined in (ii), so that if Pair-Merge adjoins α to β to form $\{\Gamma, \langle \alpha, \beta \rangle\}$, we can conclude that β projects.

- (ii) Pair-Merge: $K = \text{pair-merge}(\alpha, \beta) = \{\Gamma, \langle \alpha, \beta \rangle\}$
where Γ is the label of K , which is determined by α and β

Note that the naïve intuition that adjunction does not change the label of the host is still absent in this definition of Pair-Merge.

matrix tree in the course of the derivation. Adopting Chomsky's (2004) theoretical consideration, this thesis assumes that if β is c-commanded by X before the adjunction of α , it is still so after the adjunction, but the extension of c-command to the adjoined element α is not allowed.

At the point where the pair-merged object $\langle \alpha, \beta \rangle$ is spelled out, the adjoined element α comes down to the primary plane to become a simple structure. This is accomplished by the operation SIMPL. The operation SIMPL is a part of the operation TRANSFER, which converts the pair into $\{\alpha, \beta\}$ (Chomsky (2000: 133, 2004: 117-118)) at which Spell-Out applies. Thus, in this system, the principle (140) holds.

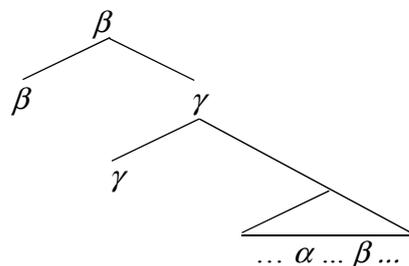
(140) *Interpretation of Adjuncts at the SM Interface (to be revised)*

In $\langle \alpha, \beta \rangle$, α is spelled out where β is. (Chomsky (2004: 119))

3.2.3. External Merge and Internal Merge

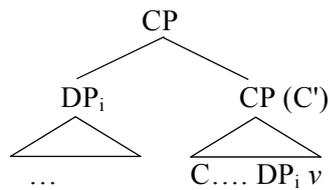
There is another distinction among applications of Merge concerning elements to be merged. We have introduced in Chapter 1 that when a syntactic object inside an already constructed object is merged to the root, it is referred to as Internal Merge. An example of Internal Merge (β, γ) is illustrated in (141).

(141) *Internal Merge*



As we have discussed in Chapters 1-2, this operation is traditionally understood as a movement. For example, CP and DP can merge as shown in (142).

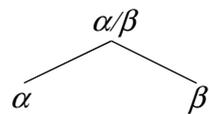
(142) *Internal Merge (DP, CP)*



The application of Internal Merge yields the so-called XP-YP structure, which resembles the traditional specifier-head relation.

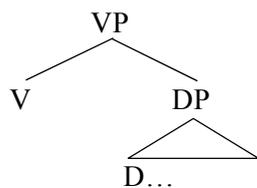
Merges other than Internal Merge are referred to as External Merges. The External Merge (α , β) is illustrated in (143).

(143) *External Merge*



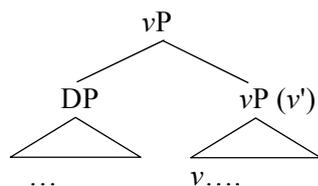
For example, one of the externally-merged items in (143) can be an already constructed syntactic object XP, as in the case illustrated in (144), in which V and its internal object DP merge, yielding a head-complement structure.

(144) *External Merge (V, DP)*



Both α and β can be XPs in cases such as (145), in which an external object DP and v P merge.

(145) *External Merge (DP, v P)*



This also yields the XP-YP structure as we have observed in the example of the application of Internal Merge in (142).

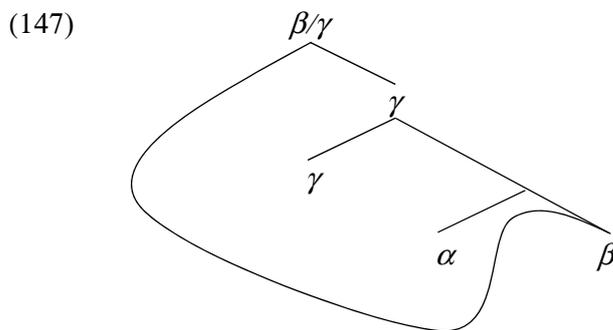
3.2.4. Copy Theory of Movement and Reconstruction Effects Revisited

3.2.4.1. Multi-dominance in Internal Merge

A set formed by Internal Merge is illustrated in (146).

$$(146) \quad \{\beta, \{\gamma, \{\alpha, \beta\}\}\}$$

We adopt the assumption that the copies of a syntactic object are utilized if and only if Merge requires the merger of the object multiple times. This is the Copy Theory of movement under the no-tampering condition. In effect, β in (146) is a member of the set $\{\beta, \{\gamma, \{\alpha, \beta\}\}\}$ and a member of the set $\{\alpha, \beta\}$ simultaneously. In this respect, the tree diagram in (141) shows a structure of multi-dominance of β , built by applying Internal Merge (cf. McCawley (1981), Phillips (1996), Wilder (1999), Cann (1999), Starke (2001), Gärtner (2002), Abels (2003), Citko (2005, 2011), de Vos and Vicente (2005), and de Vries (2009)). Given this assumption, we can say that Internal Merge creates a multi-dominance structure, as illustrated in (147).³⁸



In the tree diagram in (147), a moved element β is simultaneously located at two structural positions.

3.2.4.2. Problems in Sideward Movement Analysis for Restrictive Relative Structures

It is worth pointing out here that Nunes' (2001, 2004) sideward movement analysis does not

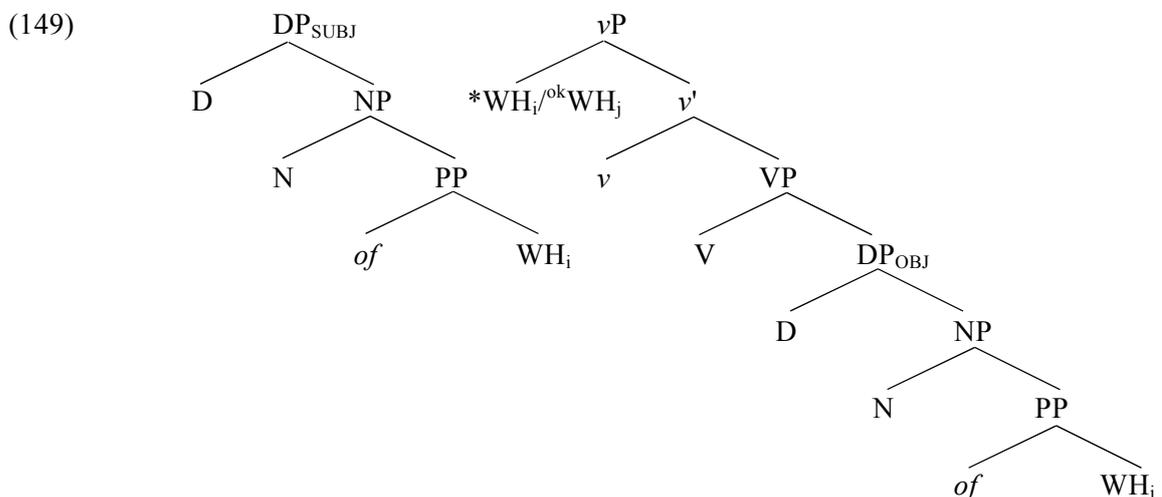
³⁸ The Copy-Theoretic implementation and the multi-dominance analysis are not fully equivalent. See Vicente (2009) for the consequences of this difference.

follow from the Agree model of Internal Merge. Following Chomsky (2000, 2001, 2004, and 2008), this thesis assumes that Internal Merge of β is always triggered when γ agrees with β and that the feature of γ requires Internal Merge of β to occur at the root node dominating γ . A Probe always searches a domain, being restricted by minimality conditions, which can be computed only from c-commanding. To be matched, the Goal of the agreement must be in the domain of Probe and must satisfy locality conditions. Domain D is the c-command domain of Probe, and the matching feature G is closest to P if there is no G' in D matching Probe. Since the search domain of the Probe is limited to the sister node, the sideward movement proposed in Nunes' (2004) and in Henderson (2007) is not an available option. Probing is a prerequisite for movement.

The general assumption that the Goal must be included in the sister of the Probe is supported by the contrast in (148).

- (148) a. * Who_i did [a picture of who_i] impress his friends?
 b. Who_j did you buy [a picture of who_j]?

The example (148a) is ill-formed because the subject phrase is an island for the A'-movement to Spec,CP. The *wh*-phrase contained inside the subject cannot be extracted by probing of the matrix C-v before the subject is merged with the matrix tree. To illustrate, the edge of the ν P phase in (149), which is an “escape hatch” for the movement toward the topmost C, is opened for the *wh*-phrase WH_j but not for WH_i.



The sideward movement analysis of restrictive relative structures presented by Henderson (2007) has the same theoretical problem, and cannot be adopted for the analysis of restrictive relative structures in our framework.³⁹

3.2.4.3. Reconstruction Effects Reconsidered

In Narrow Syntax, a relative operator leaves its full copy at the position of the gap e_k , as illustrated in (150).^{40,41}

³⁹ Without probing, the edge of the ν P phase should be equally opened for either of the two *wh*-phrases, WH_i and WH_j . This indicates that the “two-membered chain” in Nunes (2004) is not a problematic interim state that is solved by “sideward movement” but is instead the necessary condition for licensing such a “movement.” Notice, however, that Henderson (2007) does not assume that the copy is made as a Goal for the Probe of the separate tree. That is, only the assumption of free copying of non-root objects can explain the empirical effect of Henderson’s sideward movement analysis, since both NPs in (137) are non-root. Alternatively, the empirical effect of Henderson’s sideward movement analysis might also be explained by the assumption that probing can be empowered to search separate trees as well.

⁴⁰ Fox (1999) suggests two possibilities: (i) traces are always interpreted as variables that range over individuals such as pronouns, or (ii) the semantic type of a trace is determined to be the lowest type compatible with the syntactic environment. Under the Copy Theory of movement applying QR to example (ia) could result in (ib).

- (i) a. John read every book.
- b. [every book] John read [every book]

The problem involved in (ib) is that the lower copy of the QR is also a generalized quantifier, which cannot stay in-situ at the C-I interface. This issue is solved by proposing Trace Conversion

- (150) a. the man [who Mary saw e]
 b. the man_j [_{CP} [_{DP} who [_{FP} F [_{NP} man]]]_j]_i C [_{TP} Mary saw [_{DP} who [_{FP} F [_{NP} man]]]_j]_i]

Based on the Copy interpretation mechanism, the reconstruction effects follow when one of the copies located below the transferred (and hence pronounced) position is interpreted at the semantic interface.

Recall that an adjunct to a *wh*-phrase is not reconstructed in the position of the gap e_{wh} as shown below.

- (151) Which picture of Bill_i [that John_j likes] did he_{*i/j} buy e_{wh} ?

Given the principle of adjunct interpretation (140), which is repeated below, the anti-reconstruction

(Fox (2002), Sauerland (2004), Johnson (2007)), which turns the lower copy of a moved constituent into a definite description and inserts a variable that can be bound by the higher copy.

This ensures that both copies are interpreted as members of the same chain.

- (ii) *Trace Conversion* (Fox (2002))
- a. Determiner Replacement: [_{QP} every book]₁ → [_{QP} THE book]
 b. Variable Insertion: [_{QP} THE book] → [_{QP} THE [$\lambda x.x$ is a book & $\lambda y.y = 1$]]

The formulation in Johnson (2007) is the following.

- (iii) a. In the movement structure $DP_n [\phi \dots DP_n \dots]$, interpret ϕ as a function that maps x to the meaning of $\phi [x/n]$.
 b. The meaning of $\phi [x/n]$ is the result of replacing the head of every constituent with index n in ϕ with the head the_x , where $[[the]] = \lambda P. [[the]] [P \ \lambda y.y=x]$.

See also Sauerland (2004) for detailed discussions.

⁴¹ The lower relative pronoun *who* might be replaced with the definite article *the*. Notice, however, that the Head Nominal is not always assigned a definite interpretation at the gapped position inside the relative clause. See the discussions in Section 3.4.4.

(153b)' <which (of the) paper(s) [that **he*_i wrote for *her*_j]>
 did Ms. Brown_j <*wh* ...[that **he*_i **her*_j]> get every student_i <*wh*...[that ***he*_i
*her*_j]]>**

to revise <*wh* ...[that ***he*_i *her*_j]]>?**

(153c)' <which (of the) paper(s) [that ****he***_i wrote for Ms. Brown_j]>
 did every student_i <*wh* ...[that ***he*_i, *Brown*_j]]> get *her*_j <*wh* ...[that *he*_i, **Brown*_j]]>
 to grade <*wh* ...[*he*_i, **Brown*_j]]>?**

The ill-formedness of (153a) should be explained as follows. The proper binding relation can be obtained in none of the three positions, i.e., the base position, the intermediate position, and the transferred position of the fronted *wh*-phrase, as illustrated below.

(153a)' <which (of the) paper(s) [that ****he***_i wrote for Ms. Brown_j]>
 did she_j <*wh* [that **he*, **Brown*_j]]> get every student_j <*wh* [that *he*, **Brown*_j]]>
 to revise <*wh* [that *he*, **Brown*_j]]>?

Based on the discussion above, the principle of adjunct interpretation given in (140) must be revised as follows.

(154) *Interpretation of Adjuncts at the SM and C-I Interfaces*

- (i) In < α , β >, α is spelled out where β is, and
- (ii) α is interpreted wherever a copy including α is.

As a consequence, relative clauses are pronounced at the transferred positions of the Head Nominals, while they are interpreted in the positions into which they fit adequately.⁴²

⁴² Fox (1999) observes that relative clauses are interpreted in positions that are even higher than those of the pronounced Head Nominals. Consider the examples shown in (i).

- (i) a. I < \forall [he]> expected John_i to < \forall [he]> buy <everything [that *he*_i thought I did]>.
 (VP = buy / expect him to buy)

3.3. Multi-dominance in Restrictive Relative Structures

Under the Copy Theory of movement, the reconstruction effects observed in restrictive relative structures can be illustrated as in (155).

- (155) Which $\langle \text{picture of himself}_i \rangle_{k/wh}$ [that John_i likes $\langle \text{picture of himself}_i \rangle_k$]
 [did he_i buy $\langle \text{picture of himself}_i \rangle_{wh}$]?

In (155), the Head Nominal *picture of himself* is interpreted at e_{wh} , the base position of the *wh*-phrase in the matrix clause and also at e_k , the position of the gap inside the modifying relative clause. In contrast, the relative clause *that John likes* is not interpreted at e_{wh} . This situation is puzzling because in previous studies, the reconstruction effects of the Head Nominal implies Head-Raising from e_k while the complementation structure of the Head-Raising analysis is incompatible with the anti-reconstruction effect of the relative clause in e_{wh} .

Given the Copy Theory of movement, the reconstruction puzzle can be resolved by claiming that a Head Nominal originates both in a matrix clause and an adjunct clause in a separate plane. Thus, the relative clause, as an adjunct in the separate plane, is pronounced at the final position of the fronted *wh*-Head Nominal while it can be interpreted with one of the copies of the Head Nominal, as we have discussed in 3.2.4.3. Thus the question to be considered is whether a complex syntactic object, such as that presented in (155), can be formed in Narrow Syntax and, if it can, how it is formed.

-
- b. I $\langle \forall [\text{John}] \rangle$ expected him_i to $\langle \forall [* \text{John}] \rangle$ buy $\langle \text{everything} [\text{that } \text{John}_i \text{ thought I did}] \rangle$. (VP = *buy / expect him to buy) (Fox (1999: 185-187))

The interpretation of the elided VP in the relative clauses shows that the relatives are interpreted along with the QR of universal quantifiers. Although these examples partly follow our principle (154), the meaning of the “interpretation of Head Nominals” must be explored in future research.

3.3.1. Interpretation of Restrictive Relative Structures

Thompson (1971) suggests that the underlying representation of restrictive relative structures is a conjunction, claiming that what underlies the sentence in (156a) is a structure shown in (156b).

- (156) a. I met the girl who speaks Basque.
b. (I met girl) (girl speaks Basque) (Thompson (1971: 81))

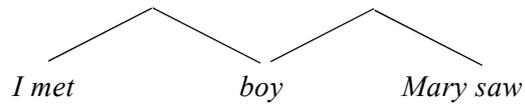
Thompson's (1971) idea is that the restrictive relativization construction is equivalent to two conjoined predications on the same argument. In this structure, the Head Nominal is shared between the matrix and relative clauses. In other words, the Head Nominal is multi-dominated, as shown in (157).⁴³

⁴³ The underlying "D-structure," exemplified in (156b) lacks the definite article *the* presented in (156a). Thompson claims that the restrictiveness of a relative clause is shown not to be a property best described in terms of embedding by arguing that restrictive relative clauses with indefinite nouns do not "restrict" the Head Nominals in the way that relative clauses with definite nouns do. Consider the examples below.

- (i) a. I met a boy who Mary saw.
b. Mary saw a boy I met.
c. I met a boy and Mary saw him.
(ii) a. I met the boy who Mary saw.
b. Mary saw the boy who I met.

She also claims that the apparent restricting nature of the restrictive relative clauses with definite Head Nominals is a function of the presuppositions. If the speaker presupposes that the hearer knows about *the girl whom Mary saw*, the sentence will have the conjunct *Mary saw* as the relative clause, and the Head Nominal will be definite.

(157) I met the boy who Mary saw.



In the interpretation of restrictive relative structures, a restrictive relative clause “creates from a sentence ‘... x ...’ a complex adjective summing up what that sentence says about x (Quine (1960: 110-111))” and “restricts” reference of its Head Nominal. Such an interpretation of a relative clause is obtained by interpreting a relative pronoun as a λ -operator at the C-I interface. The λ -operator represents the function from the objects, which can be values of the variable, to the propositions expressed by sentences, which are obtained when the reference of the variable is fixed. The variable x in $\lambda x F(x)$ is bound by λ , and $F(x)$ is the scope of the occurrence of the λ -operator. For the relative clause in (157), such an LF representation is obtained at the C-I interface by abstracting over the variable associated with the lower copy of the relative pronoun *who*. Thus, we obtain the relative clause *who Mary saw*, which denotes “the people that *Mary saw*” by λ -abstraction and can be used as a general term (i.e., one-place predicate) to modify a Head Nominal.

(158) $[who_1 [Mary \text{ saw } who_1]] \rightarrow \lambda x_1 \text{ see}'(Mary', x_1)$

The restrictive modification with a relative clause is obtained by intersecting a Head Nominal with its extension, (using generalized conjunction (Chierchia and McConnell-Ginet (2000: 408))). Combining the relative clause with another general term *boy* by using the generalized conjunction, the complex general term *boy who Mary saw* is obtained.⁴⁴

⁴⁴ In Chierchia and McConnell-Ginet (2000: 408), conjunction to predicates is extended as follows. For any predicates P_1 and P_2 of predicate calculus, we can define a new operator that gives us their conjunction. The λ -operator makes this, as illustrated in (i).

(i) $[P_1 \wedge P_2] = \lambda x [P_1(x) \wedge P_2(x)]$

$$\begin{aligned}
(159) \quad & [\text{boy } [\text{who}_1 [\text{Mary saw } e_1]]] \rightarrow \text{boy}' \ \& \ \lambda x_1 \text{ see}' (\text{Mary}', x_1) \\
& = \lambda y [\text{boy}'(y) \ \& \ \lambda x_1 \text{ see}' (\text{Mary}', x_1) (y)] \\
& \text{(by generalized predicate conjunction)} \\
& = \lambda y [\text{boy}'(y) \ \& \ \text{see}' (\text{Mary}', y)] \\
& \text{(by } \lambda\text{-conversion)}
\end{aligned}$$

Notice that since the extension of general term (i.e., one-place predicate) is a set, conjunction as applied to predicates amounts to set intersection. Thus the modified noun *boy who Mary saw* winds up denoting the set of boys such that Mary saw those boys.

The interpretation of the entire DP *the boy who Mary saw* in (157) can be obtained by introducing an *t*-operator. To demonstrate, using the *t*-operator, we can write “the *x* which is such that it has the property *F*,” as shown in (160).

$$(160) \quad t_x F(x).$$

In this regard, a definite description is external to a restrictive relative structure—Head Nominal plus restrictive relative clause—and selects a certain individual object by describing it as “the object that has such and such a property.”

Recall that as we have discussed in Sections 2.1.2-2.1.3, a Head Nominal is a functional projection FP in the DP structure. The Head Nominal FP is the filler of the gap contained in the relative operator DP, as illustrated below.

$$(161) \quad \text{the } \langle [\text{FP boy}] \rangle_k [\text{CP } [\text{DP who } \langle [\text{FP } \emptyset_F [\text{NP boy}]] \rangle_k]_i \text{ C } [\text{TP Mary saw } e_i]]$$

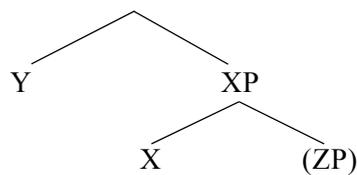
This is done by extending the sentential operator \wedge to a predicate operator. $P_1(x) \wedge P_2(x)$ gets the values when we assign each individual in U to x . In the domain in U , the individuals contained in U constitute the points, and we look at the values of $P_1(x) \wedge P_2(x)$ point by point, or individual by individual. See also predicate modification in Heim and Kratzer (1998: 95), which is sometimes called generalized conjunction (Partee and Rooth (1983))

The definite article *the* in (161) is external to the restrictive relative structure in Narrow Syntax.

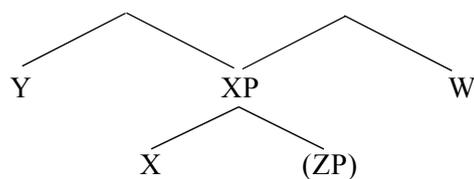
3.3.2. Forming Intersecting Sets in Narrow Syntax: Share Merge

Under the Minimalist Program, if it is the case that a restrictive relative structure is interpreted as two conjoined predications on the same argument, then the best way to make possible the transparent mapping between syntax and semantics is to form a restrictive relative structure by applying Merge as two conjoined predications on the same argument in Narrow Syntax. Citko (2005, 2011) proposes, under the assumption that Merge in general can freely apply to any syntactic object—whether it is a root object or not—that a derivation in which an XP is first externally-merged with an element Y “and then” is merged with another element W is possible. This two-step derivation is shown in (162)-(163).

(162)



(163)



In (163), the XP is multi-dominated by the two heads Y and W. The application of Merge in (162)-(163) is called “Parallel Merge.”

In the multi-dominance structure in (163), XP constitutes an intersective set of the two syntactic objects YP and WP. However, the derivation of Parallel Merge presented in (162)-(163) cannot be counted as a legitimate operation under the Minimalist framework. Without probing, only root nodes undergo Merge, and probing requires a Goal β of a Probe γ to be contained in the

sister of γ .⁴⁵

For the complex syntactic object represented in (163) to be formed, we must assume that External Merge is allowed to independently target multiple elements (Y and W) at a root object (XP). This simultaneous targeting yields the multi-dominance structure in (163) from the three root objects, Y, W, and XP, all at once. This structure is not derived from (162) by merging the non-root object without probing. Notice that each External Merge applies to only two root syntactic objects and yields the structure (163). Thus, it is plausible to consider that this option is available, unless simultaneous applications of Merge are prohibited in principle.

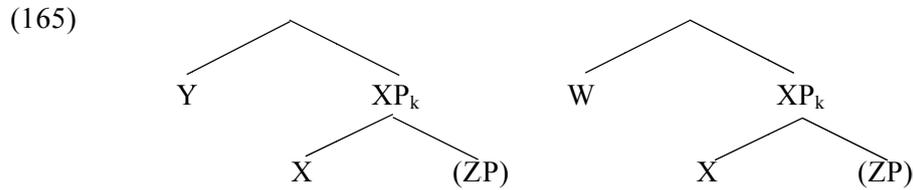
There might be an argument against the legitimacy of the multi-dominance structure. That is, it cannot be a representation of the object(s) formed by a legitimate set-formation operation. However, we can say that the tree diagram in (163) is a representation of two sets that have a member in common. This is shown in (164).

$$(164) \quad \{Y, \{X, ZP\}\}$$
$$\{W, \{X, ZP\}\}$$

Each of these two sets is a normal set that can be defined in terms of other sets by using set operations. Given two sets A and B , we may define the set that consists of all the objects that are members of both A and B . This set is called an intersection of A and B and denoted by $A \cap B$. In the intersecting sets (164), the intersection is the overlapping member $\{X, ZP\}$. Since the object is to

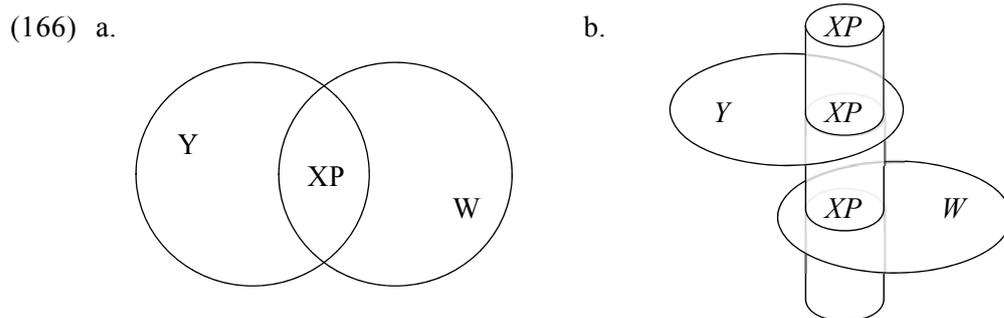
⁴⁵ de Vries (2009) also refers to the same configuration obtained by the application of free Merge as “External Rmerge.” According to de Vries (2009), External Rmerge is not an instance of Internal Merge but an External Merge between a root and an embedded syntactic object. However, External Rmerge still seems to require targeting at a non-root object in a separate subtree, which cannot be permitted in a computation in Narrow Syntax (cf. McCawley (1982), Phillips (1996), Wilder (1999), de Vos and Vicente (2005), Larson (2009), and de Vries (2009)).

be shared by simultaneous applications of Merge, this thesis calls the application Share Merge. The identity of the shared member $\{X, ZP\}$ is, thus, guaranteed between the two separate sets $\{Y, \{X, ZP\}\}$ and $\{W, \{X, ZP\}\}$, as illustrated in (165).



In (165), the two copies of XP are instances of a shared/multi-dominated element in (163) (or a shared member in (164)). If our Narrow Syntax is equipped to form intersecting sets, a simultaneous application of multiple External Merges is available.⁴⁶

Let us further elaborate on the notion that the two XPs shared in (164) are multiple copies in (165). When each of the sets A and B includes only X and ZP , A (i.e., $\{X, ZP\}$) is identical to B (i.e., $\{X, ZP\}$). This is represented symbolically as $XP = XP$ —the (two) copies of XP. This possibility of copy-creation leads us to hypothesize that a set can be “multi-dimensional” if necessary. To illustrate, the shared member XP of the intersecting sets in (166a) is the multiple “superpositioned” copies of XP illustrated in (166b).



In (166b), the identity of the two objects, the XP of $\{Y, \{X, ZP\}\}$ and that of $\{W, \{X, ZP\}\}$, are guaranteed between separate subsets in different planes, and each of the superpositioned sets (XPs)

⁴⁶ Alternatively, we can say that Narrow Syntax cannot build intersecting sets. Then, intersections emerge in the interpretation of restrictive relative structures. This would be possible if what was shared could be identifiable at the C-I interface.

can always be ready to add independent members.⁴⁷

Chomsky (2015: 6) notes that “[o]ne should also view with caution the resort to multi[di]imensionality, late merge, sideways movement, etc., along with the complex tree notations used standardly with lines connecting various nodes. Tree notations may misleadingly suggest that these operations are special cases of Merge. They are not. They are new operations, and therefore carry a burden of proof.”

Notice that our sharing analysis is not based on the special tree notation of this kind. The sharing structure proposed in this chapter is obtained via applications of only (External) Merge, forming two intersecting sets. It is no doubt that there can be multiple complex sets that are built simultaneously in a single workspace and all accessible to the computation in Narrow Syntax, as seen in the cases such as Merge (DP, v'). In addition, no tampering condition yields an autonomous copy-creation in sharing, without assuming new operations. Consequently, our sharing structure is obtained as legitimate intersecting sets although it is impossible to capture in terms of tree diagram. In this regard, our restrictive relative structure is adequately represented in terms of the set notation.

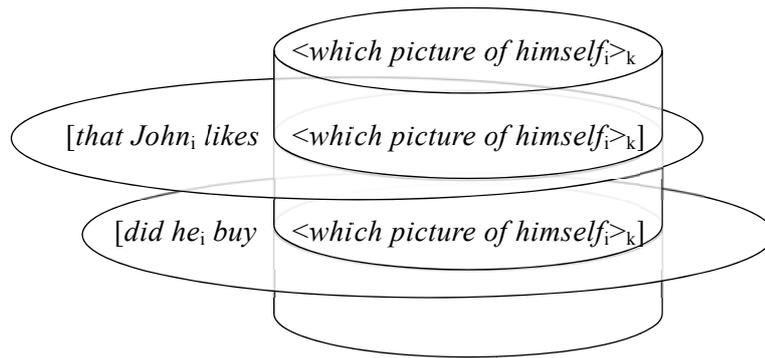
In sum, there are two types of multi-dominance structures: (i) multi-dominance structures built by the application of Internal Merge and (ii) multi-dominance structures built by Share Merge, i.e., the application of External Merge. The former yields a single root object, whereas the latter yields two root objects expressing intersecting sets. Under the multi-dominance structure, the relative structure which leads to the reconstruction puzzle can be illustrated as below.

⁴⁷ See Chomsky’s (2004) idea that movement creates another occurrence of the moved element.

We can say that in (166b), the three XPs are distinguishable only in their occurrences.

(167) a. Which picture of himself_i that John_i likes did he_i buy?

b.



In (167), the identities of the copies of the shared XP *which picture of himself* are guaranteed between separate subsets in different planes. If one syntactic object satisfies the selectional property of the two distinct input of External Merge, then the emerging structure in the workspace is two subsets sharing one object, constituting two new roots. At the C-I interface, such an output is automatically mapped onto the representation of intersection, namely, two conjoined predications on the same argument.⁴⁸

3.3.3. Linearizing Intersecting Sets

The sharing structure obtained by Share Merge can be a problem for the SM system: the output constitutes an “unlinearizable” structure. In this respect, one might argue that Share Merge is not allowed in principle. Kayne (1994: 33) proposes that linear order is determined by hierarchical structure by introducing (168).

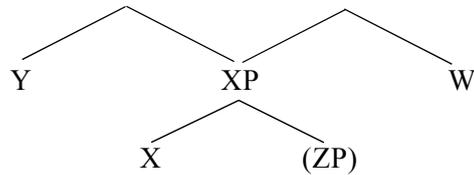
(168) *Linear Correspondence Axiom (LCA)*

Let X, Y be nonterminals and x, y terminals such that X dominates x and Y dominates y. Then if X asymmetrically c-commands Y, x precedes y.

⁴⁸ We cannot argue that the *wh*-movement in (167) is what that resolves the problem, since the sharing structure emerges in every relative structure. In the following sections 3.4-3.5, this thesis proposes that the sharing structure is unlinearizable as it is and argues that sharing is dissolved by some DP-internal movement associated with the adjunction of the relative clause.

Under LCA, the Share Merge is problematic because it yields the symmetrical structure as shown in (169), which assigns no linear order between the two sequences, that is, Y-XP and W-XP.

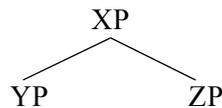
(169) [= (162b)]



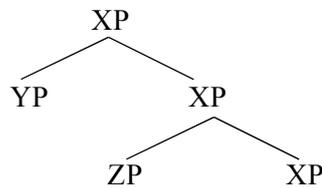
When the two subtrees in (169) are integrated into one single syntactic object, the outcome can be an “unlinearizable” symmetric structure.

Such a “point of symmetry” is, however, allowed as long as it is dissolved during the derivation. Moro (2000) focuses on three kinds of symmetric structure: small clauses, multiple specifiers, and clitic adjunctions, all of which involve a symmetric c-command relationship as illustrated in (170a), (170b), and (170c), respectively.

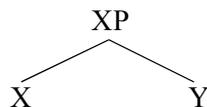
(170) a.



b.



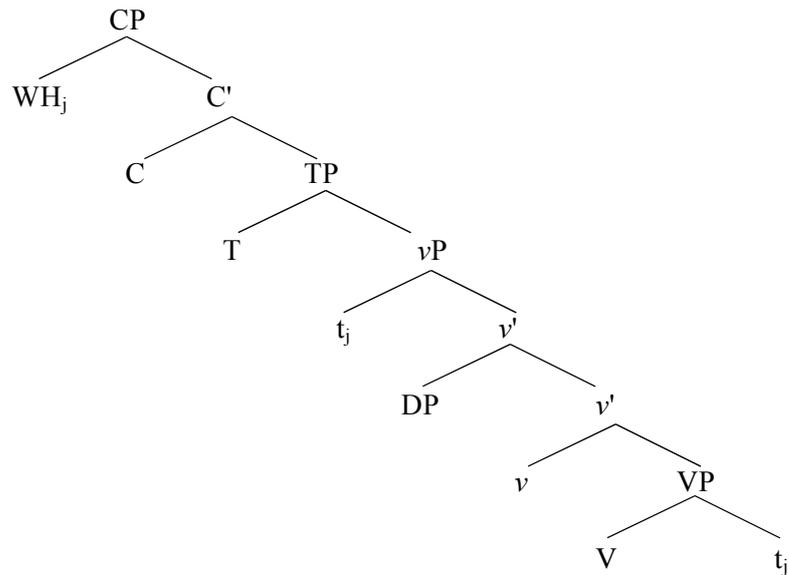
c.



According to Moro, movement is driven by purely architectural consideration, that is, by the need to break the symmetric structure. Conversely, all moved elements have the origin in a symmetric structure. Otherwise, there would be no need for them to move, as Moro claimed.

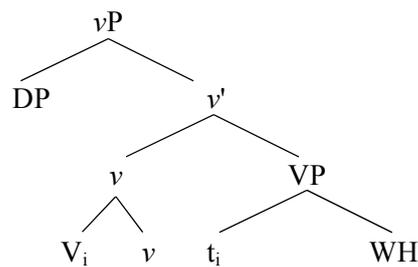
Within the framework of this thesis, however, the raising of XP, i.e., Internal Merge, cannot occur for dissolving the unlinearizability; Internal Merge requires probing. Consider the *wh*-movement illustrated in (171).

(171)



Although the *wh*-movement in (171) breaks the symmetric structure of VP, we do not find the optionality of verb movement of the kind illustrated in (172), which could break down the symmetric structure, as argued in Citko (2011: 22).

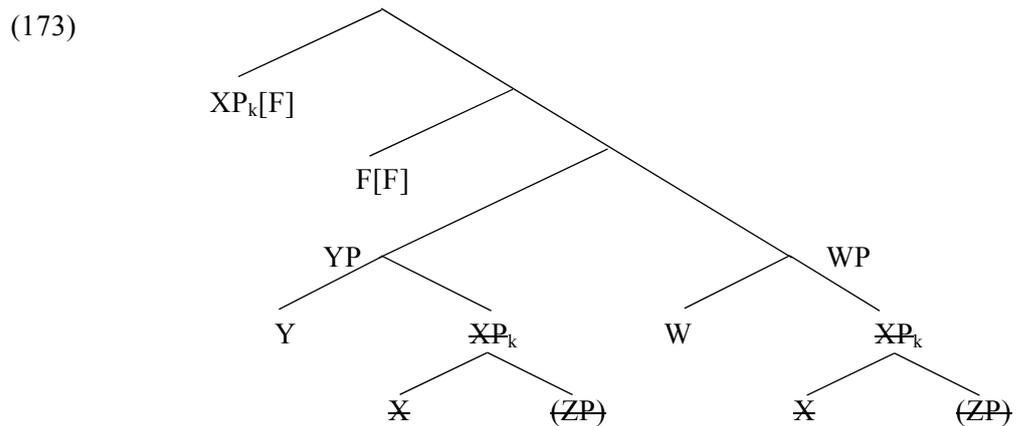
(172)



In (172), the verb movement to *v* could dissolve the symmetric structure, and the overt *wh*-movement would never be motivated. Nonetheless the *wh*-phrases always undergo A'-movement when C[WH] probes them. Although Moro's (2000) primary motivation to regard movement as a "symmetry-breaking" operation comes from the desire to eliminate probing, it is not clear how the landing sites of the raised syntactic objects are determined if movement does not involve probing.

The configuration obtained by Share Merge satisfies the interface condition only when the raising of XP occurs for an independent reason. To demonstrate, the integration of two subtrees with a shared syntactic object, such as an XP in (173), would violate the interface condition unless the shared XP is somehow required to be externalized at a position higher than where the subtrees

are merged.



The legitimate representation cannot be obtained unless the two phrases YP and WP, which share the XP, are merged under the functional head with some agreeing feature [F] that probes into both phrases and induces movement of the shared element.

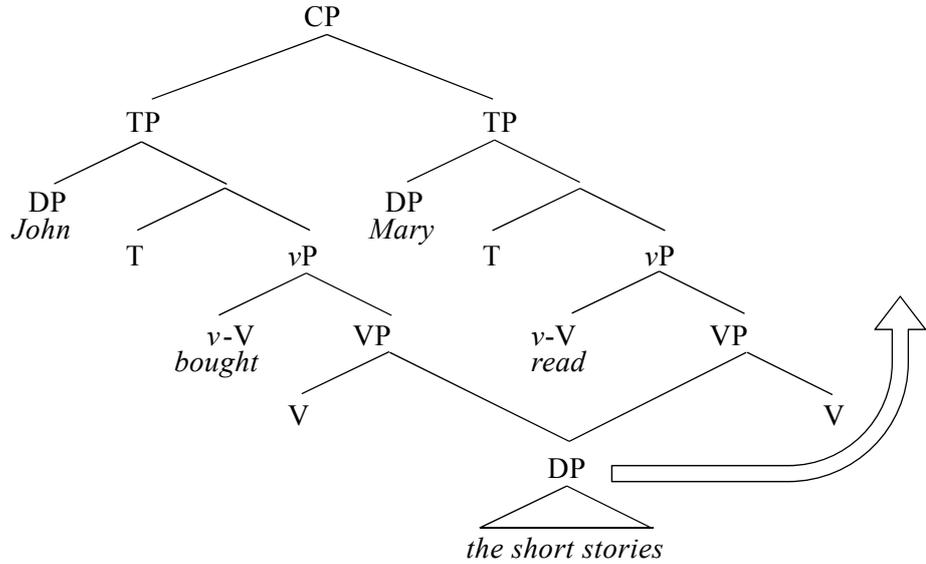
It is worth noticing here that raising of a shared object is proposed in the literature when both the matrix tree and the subtree involve the same type of movement operation. For instance, it is often argued that the Right-Node-Raising construction involves raising of the shared object as illustrated in (174).⁴⁹ Also, across-the-board (ATB) *wh*-movement is often considered to involve raising of the shared *wh*-phrase, as illustrated in (175).⁵⁰

⁴⁹ See Ojeda (1987), de Vries (1992), Wilder (1999), Chung (2004), and Bachrach and Katzir (2009) for the discussion.

⁵⁰ See Williams (1978), Goodall (1987), Citko (2005), and Mayr and Schmitt (2009) for the discussion.

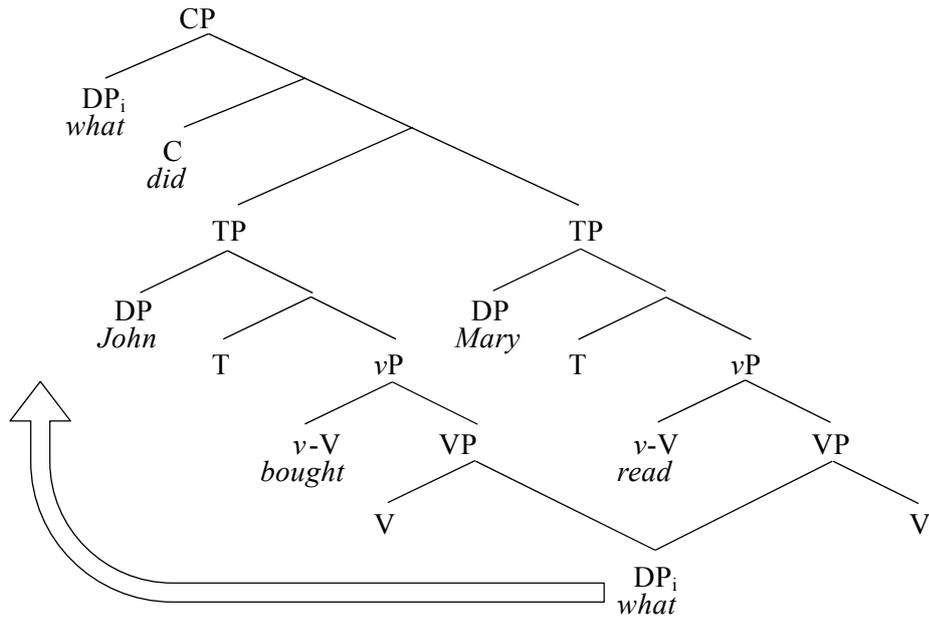
(174) *Right-node Raising*

John bought, and Mary read, the collection of short stories.



(175) *Across-the-Board Wh-movement*

What did John buy and Mary read?



We can conclude that Share Merge is observed in these ATB-like constructions, whose LF representations involve one raised element and multiple variables bound by the element.

In this respect, one might consider that examples of the reconstruction puzzle such as those repeated below also involve movement of shared elements, that is, the *wh*-movement of shared Head Nominals.

- (176) a. What headway [that John_i made *e*] [did he_i later regret *e*]?
 b. Which picture of himself_i [that John_i gave *e* to Mary_k] [did she_k take *e* home]?
 [= (11) in Chapter 1]

However, we have considered that the best way to make possible the transparent mapping between syntax and semantics is to form a restrictive relative structure by applying Merge as two conjoined predications on the same argument. It follows that without any *wh*-movement, a relative structure involves sharing. In the following, we would like to consider the question concerning what moves and where it moves to so that the symmetric structure can be dissolved.

3.4. Split DP Hypothesis and DP-internal Syntax

3.4.1. DP-internal Structure and DP-internal Syntax

Most studies on the syntax of restrictive relative structures focus on the internal syntax of relative clauses, but they pay little attention to the fine-grained noun phrase-internal structure. In the restrictive relative structures, we have to consider what syntactic arrangement is formed in the structure of Head Nominals because there is no reason why they lack the DP-internal structure and DP-internal syntax. For instance, a certain phrasal movement occurs in the DP structure, and relative clauses may be adjoined over or under the landing site of the moved element. This section shows that a proper understanding of the internal syntax of nominal phrases is important in connection with the syntax of restrictive relative structures.

3.4.2. NumP Movement

It is often argued that on the basis of the layered DP structure, the word order difference concerning the relative position of the attributive adjective is accounted for by assuming DP-internal phrasal movement. Ishii (1991) observes that quantifier floating (FQ) in Japanese is allowed with stage-level predicates, as shown in (177a), while FQ is not allowed with

individual-level predicates, as shown in (177b).

- (177) a. (San-nin-no) gakusei-ga (san-nin) eigo-o hanasi-ta.
3-CL-GEN students-NOM English-ACC spoke-PAST
‘Three students (three of the students) spoke English.’
- b. (San-nin-no) gakusei-ga (??san-nin) eigo-ga umai.
3-CL-GEN students-NOM English-NOM well
‘Three students (three of the students) are good at English’ (Ishii (1991: 109))

Moreover, he observes that the acceptability of the sentences with FQ correlates with that of the comparatives, as shown in (178).

- (178) a. Kono kurasu-dewa [[eigo-o hanasita] yori] takusan-no hito-ga
this class-in English-ACC spoke THAN many-GEN people-NOM
furansugo-o hanasi-ta.
French-ACC spoke-PAST
‘More people spoke French than spoke English.’
- b. ?* Kono kurasu-dewa [[eigo-ga umai] yori] takusan-no hito-ga
this class-in English-NOM good THAN many-GEN people-NOM
furansugo-ga umai.
French-NOM good
‘More people are good at French than are good at English.’ (Ishii (1991: 118))

Ishii (1991) suggests that the deviance of (177b) with Measure Phrase (MP) *san-nin* ‘three-CL_{human}’ in the post-subject position can be explained by the restriction that prohibits individual-level predicates from taking a nonspecific subject (Diesing (1992)).

As for the relation between specificity and word order, Watanabe (2008) argues based on Kamio (1977) that the word order in example (179a) allows the nonspecific reading of DP whereas (179b) does not.

- (179) a. John-wa piano-o ni-dai kai-tagatta.
 John-TOP piano-ACC 2-CL buy-wanted
- b. John-wa ni-dai-no piano-o kai-tagatta.
 John-TOP 2-CL-GEN piano-ACC buy-wanted
- ‘John wanted to buy two pianos.’ (Watanabe (2008: 520))

This interpretative difference typically arises when the presence of a relative clause turns the relevant nominal into a definite expression, as pointed out by Inoue (1978) in the examples shown below.

- (180) a. [Mae-o hasitteita] ni-dai-no kuruma-ga tukamatta.
 front-ACC were.running 2-CL-GEN car-NOM got.caught
 ‘The two cars that were driving (ahead of us) got caught.’
- b. [Mae-o hasitteita] kuruma-ga ni-dai tukamatta.
 front-ACC were.running car-NOM 2-CL got.caught
 ‘Two of the cars that were driving (ahead of us) got caught.’

As shown in the English translation of example (180b), the cars that were running refer to the specific entities, while the (two) cars that got caught are nonspecific, i.e., we do not care which one of the cars was caught.

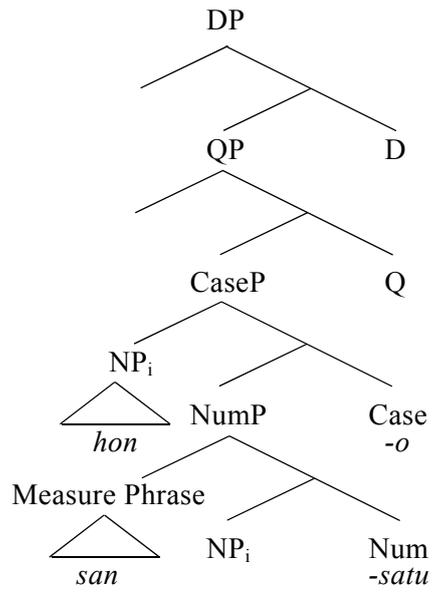
To account for the relation between the interpretative property and word order, Watanabe (2008) claims that the two sequences presented in (181) are derived from the same basis.

- (181) a. [DP san satsu-no hon -o]
 three CL-LINK book -ACC
- b. [DP hon -o san satsu]
 book -ACC three CL
- ‘three books’ (Watanabe (2008: 517))

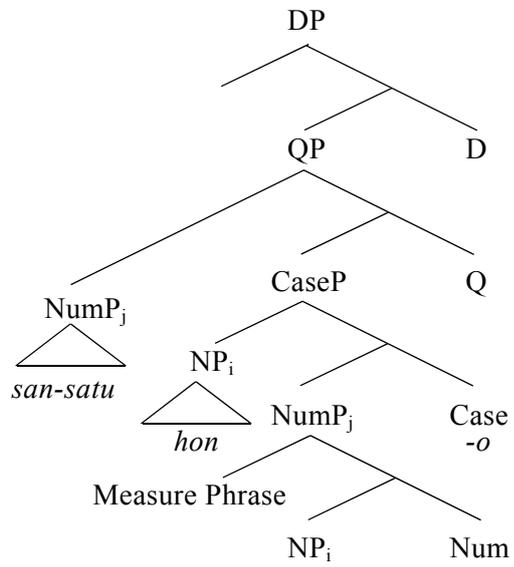
Watanabe argues that the most embedded NP *hon* ‘book’ obligatorily moves to Spec,CaseP to

check the Case feature of DP. This yields the non-specific reading of DP *hon-o san-satu*. Furthermore, NumP can optionally move to Spec,QP, yielding the word order in (181a). This is demonstrated in (182b), with the word order *san-satu(-no) hon-o*. CaseP can also move up to Spec,DP optionally. If it does after NumP movement, the word order (181b) is derived. The movement of CaseP is triggered by D because specificity is a property of D, as Watanabe claims, and it ensures the nonspecific reading. This is illustrated in (182c), which yields the specificity-reading of DP *hon-o san-satu*.

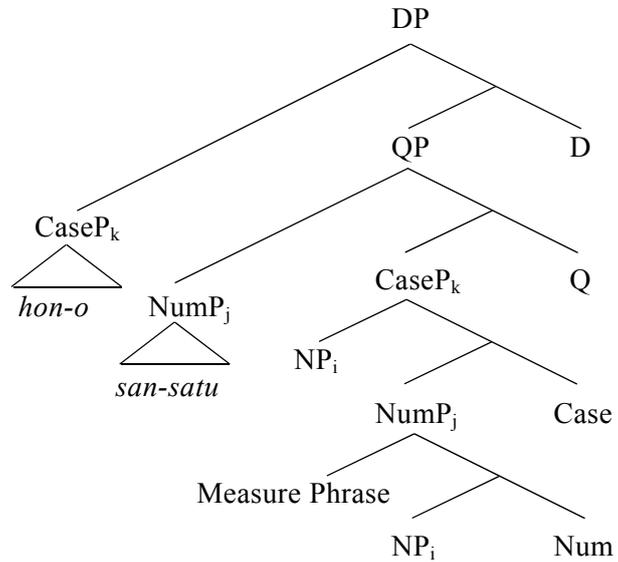
(182) a.



b.

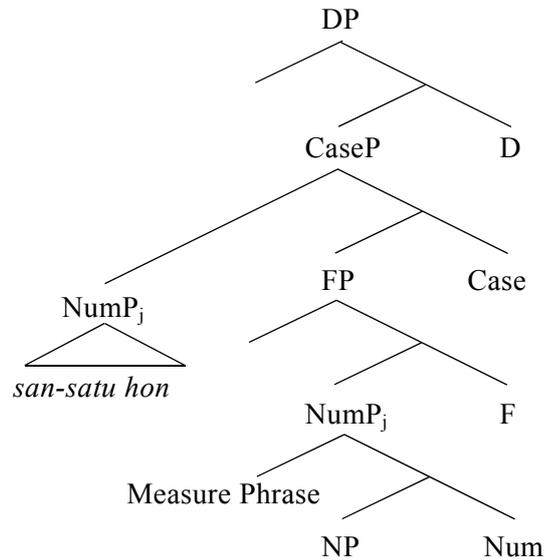


c.

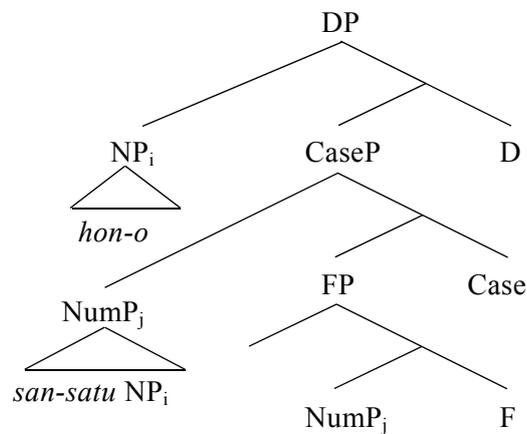


For our purpose, let us simplify the apparent structural dissociation between the numeral quantifier and the numeral classifier as illustrated in (183), assuming that the numeral classifier such as *satu* in the examples above is included in the Measure Phrases, although it is licensed by the functional head Num agreeing with NP.

(183) a.



b.



The DP-internal Case assignment assumed in Watanabe (2008) is satisfied by postulating NumP movement to the Spec,CaseP in (183b). The word order that ensures the “specific reading” of the entire DP is obtained via further movement of NP to Spec,DP in (183b).⁵¹

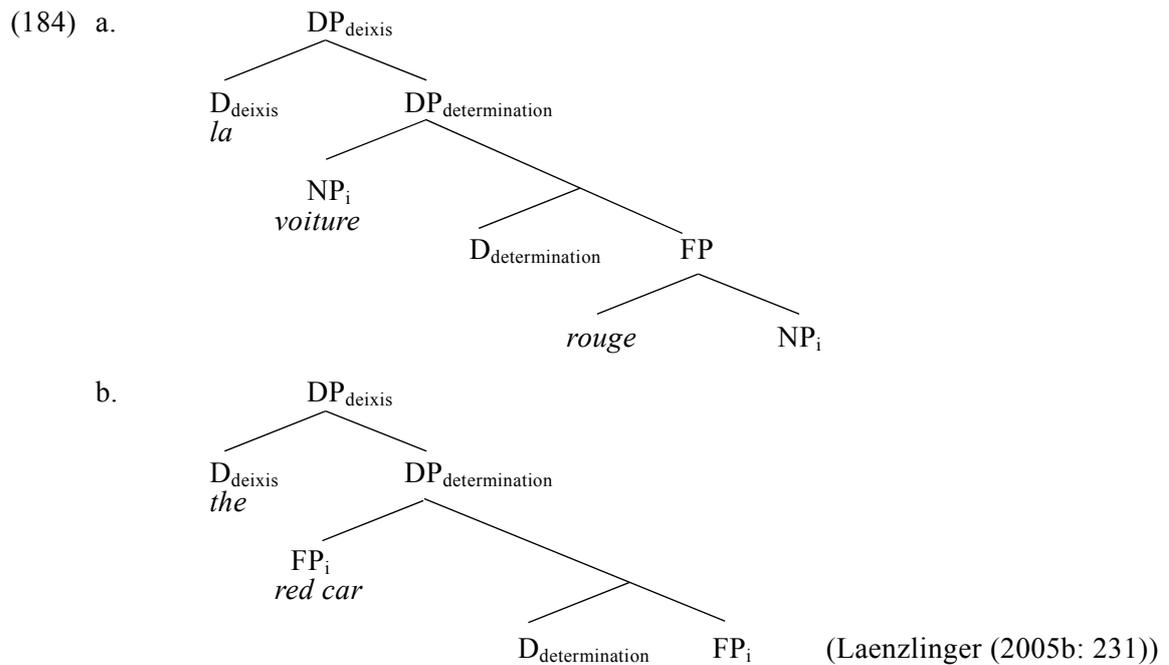
⁵¹ The FP in (183) is a functional layer that is different from the one we postulated in Chapter 2. It is hypothesized simply because the NumP movement avoids the so-called anti-locality condition with the layer: Do not move too close. See the discussions in Abels (2003) and Grohmann (2003)

This thesis assumes in Section 3.2.4 that Internal Merge is triggered when a Probe agrees with the moved object, and in (183), the NumP agrees with Case with a formal feature [SP]. The feature forces the NumP movement to Spec,CaseP, so that as argued in Watanabe (2008), the values of the feature make the entire DP as a specific (or non-specific) entity for the clausal syntax.⁵²

Laenzlinger (2005a, 2005b) pursues Cinque's (1994) specifier-based approach to adjectives by proposing that the post-nominal placement of the attributive adjectives in Romance languages is derived via NP movement. Laenzlinger proposes, by analogy with Rizzi's (1997) split-CP hypothesis, that nominal-domain is also composed of a ForceP-like projection and a FinP-like projection. The former is referred to as "high external DP" expressing deixis and the latter is referred to as a "low internal DP" expressing determination. The NP movement targets the specifier position of the lower DP. According to his analysis, the difference between (184a) and (184b) lies in the application of NP movement.

for the anti-locality of movement dependencies. The semantic reality of the FP layer should be explored in the future research although we do not conclusively discuss the existence of the layer of FP in (183) hereafter because it is irrelevant in the current discussion in this thesis.

⁵² While NumP movement inside the highly structured DP plays an essential role in our analysis, the phasehood of DP is not examined, but just assumed to force a movement. Given that only a phase head triggers movement, a precise mechanism of the inheritance of a certain feature of D to Case, which triggers NumP movement, must be clarified. Notice that the raised NumP cannot be considered as an "external argument" of DP since it is standardly assumed since Abney (1987) that the external argument of DP is a possessor expression. In this respect, the DP syntax is not completely parallel with the clausal syntax, which also needs further theoretical and cross-linguistic investigations.



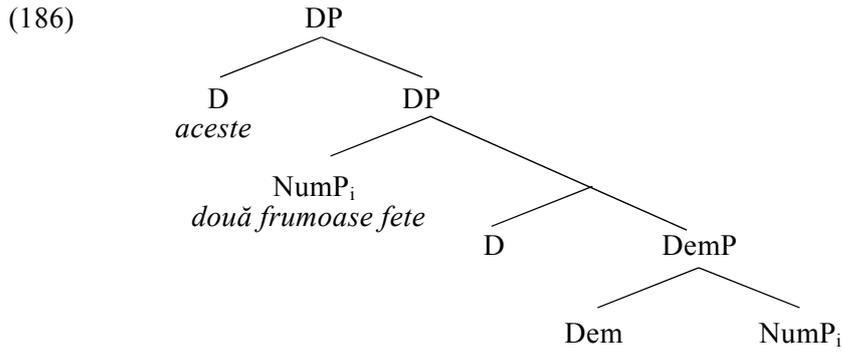
The difference concerning the relative position of the attributive adjective between Germanic and Romance languages is accounted for by assuming both NP movement and FP movement.

Giusti (1995) discusses the syntactic behavior of demonstratives in Romanian.⁵³ The Romanian demonstrative in its short form can occur in the prenominal domain, as shown in (185).

- (185) *aceste două frumoase fete*
 these two beautiful girls

Fronted demonstratives are incompatible with the definite determiner *le*. Hence, if we assume that the short demonstratives occupy the higher D and the fronted NP accompanied by the numeral and adjective targets the subject position in the split-DP structure as well, then the word order in (185) is properly derived. This is illustrated in (186).

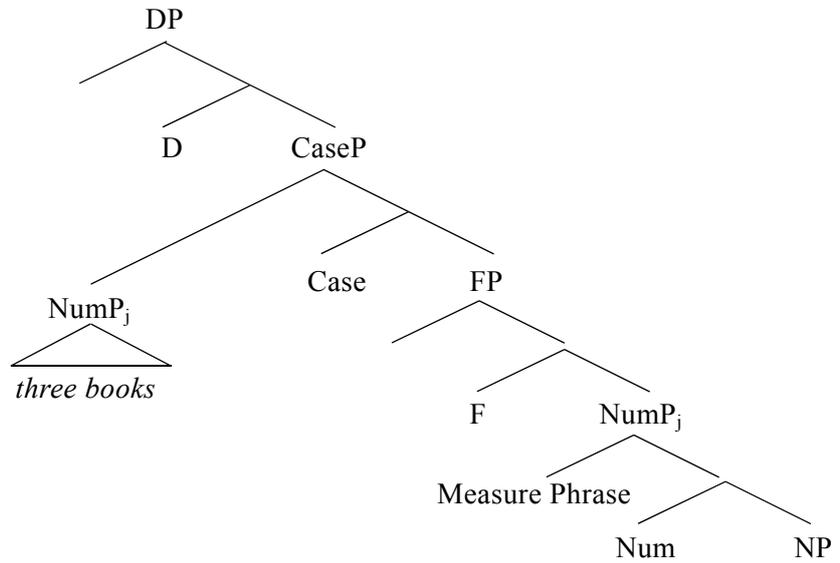
⁵³ Guasti (1995) observes that in its long form *acestea*, it can occur in the postnominal domain, being compatible with the occurrence of the definite article *le*. This word order would be obtained by postulating the NP movement to the higher DP.



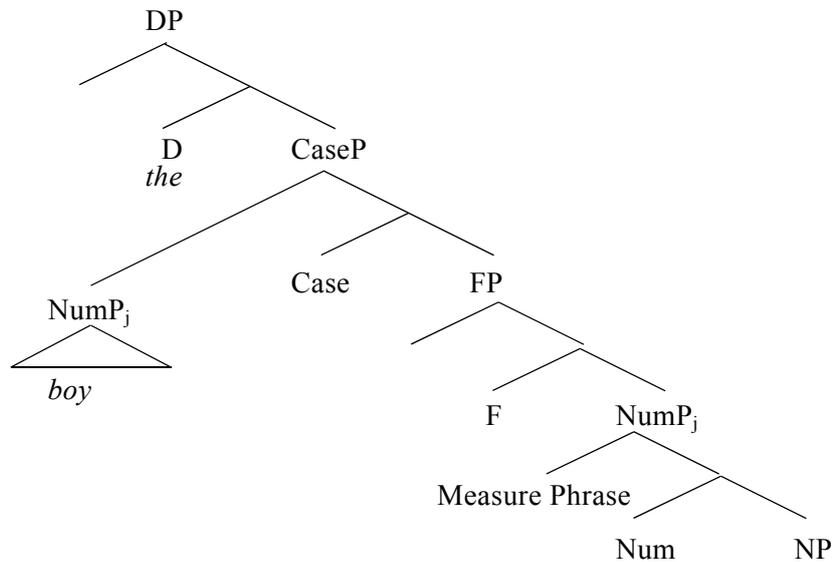
The NumP movement to the lower Spec,DP in (186) must be forced by the feature of the lower D.

The word order difference between Romanian and English implies that DP-internal syntax involves the raising of at least some nominal functional projection, and a movement of NumP is the candidate best motivated, as illustrated in (187).

(187) a.



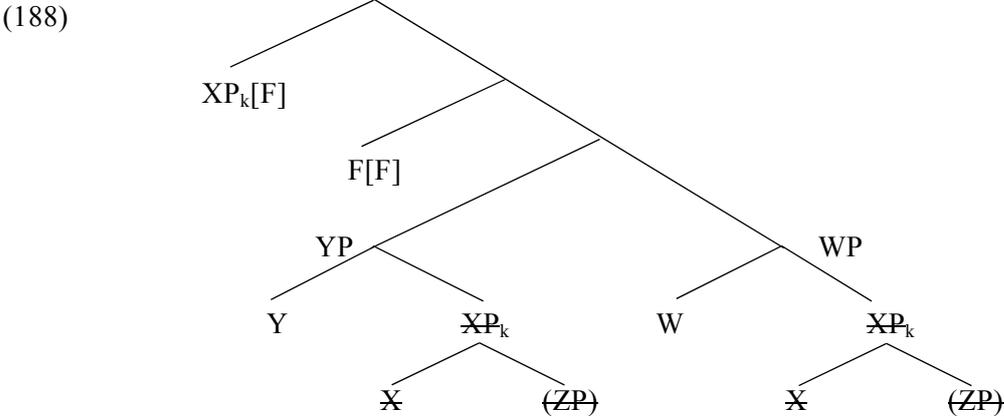
b.



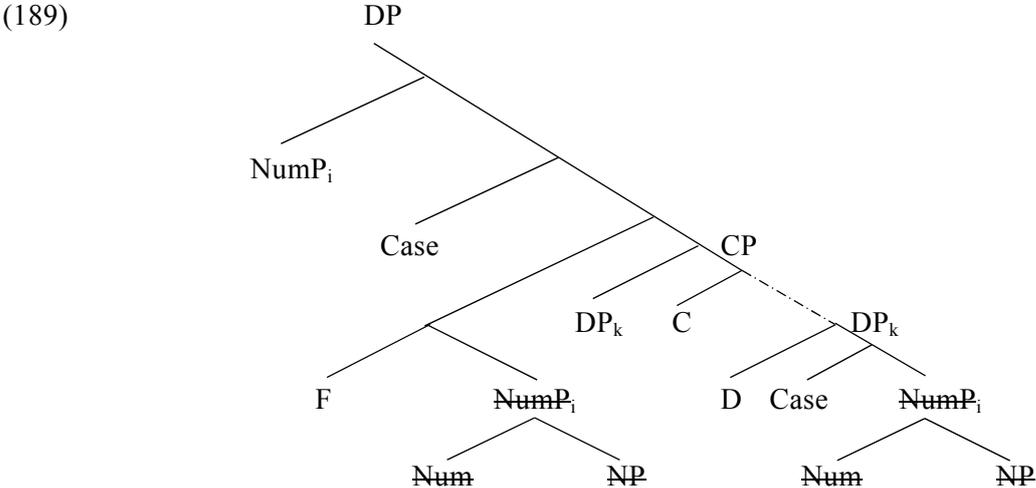
In the absence of compelling evidence to the contrary, let us assume that the FP movement that occurs in English DPs can be analyzed as the movement of NumP.

3.4.3. A Shared NumP Movement Analysis in the Multi-dominance Structure

As discussed in Section 3.3, restrictive relative structures are interpreted as conjoined predications to a shared argument since they involve sharing in Narrow Syntax. This indicates that the shared object is raised to a position higher than the adjunction site, as illustrated in (188).

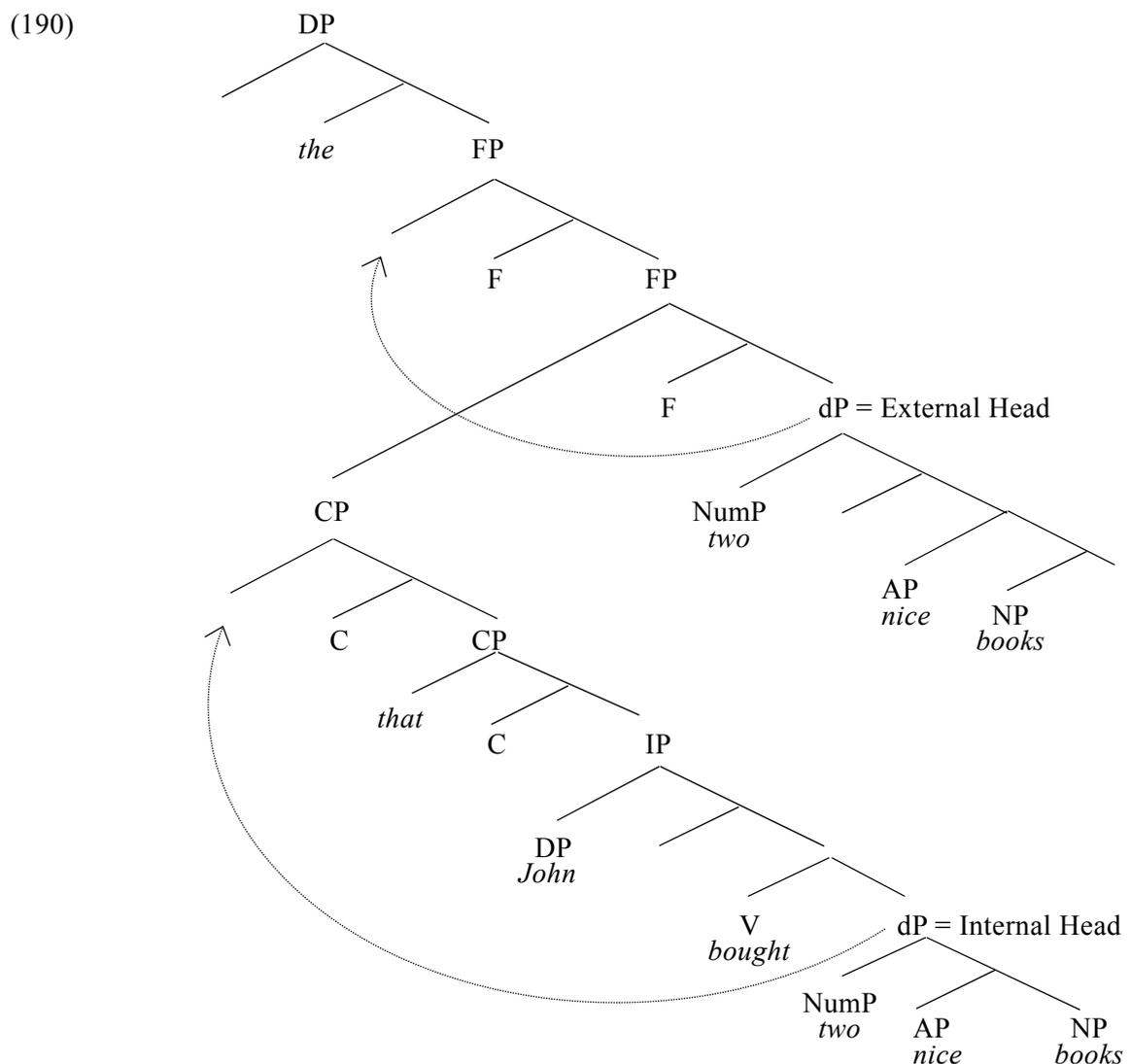


The two phrases YP and WP, which share the XP, are merged under the functional head F with some agreeing feature [F] that probes into both of them and induces movement of the shared XP. In restrictive relative structures, one candidate of the shared XP is NumP, which we have just argued always moves in the DP-internal syntax. The NumP movement in the sharing structure is illustrated in (189).



In (189), NumP is shared between the matrix DP and the relative clause CP. This shared NumP moves to Spec,CaseP in the layered-DP structure because the feature [SP] of Case forces probing and triggers the movement, yielding the linearizable configuration for the SM interface.

The structure involving the movement of NumP is also assumed in Cinque's (2015) analysis of restrictive relative structures, although the movement in his analysis is assumed for the proper arrangement of the word order of restrictive relative structures. Let us examine the NumP movement analysis of restrictive relative structures given in Cinque (2015). Under the hybrid analysis, he argues that only an internal Head Nominal dP raises to Spec,CP in Head-Raising relatives, while both the external Head Nominal dP and the internal Head Nominal dP raise in Matching relatives, as illustrated below.



He claims that the movement of the two dPs, which he assumes include the core NP and its number information, causes the internal Head Nominal either to be “deleted completely” or to be “reduced.” The deletion is illustrated in (191a), and the reduction is illustrated in (191b).

- (191) a. the books ~~which books~~ that I bought
 b. the books which ~~books that~~ I bought (Cinque (2015: 6))

The moved constituent dP in Cinque’s (2015) analysis is an intermediate functional layer within the DP structure, which must be considered NumP in our analysis. In the analysis discussed thus far in this thesis, the movement of dP/NumP as an external Head Nominal depends on whether the upper F of the matrix DP, which always probes into the sister node and finds dP with its [SP], has an EF for Internal Merge or not.

It is also worth noticing that the relative clause in his analysis is a specifier of the lower FP. Therefore, his analysis does not say anything about the adjunction property of relative clauses.

Cinque argues that in Head-Raising relatives, which he argues do not undergo extraposition, their Head Nominals do not show the Inverse Case Attraction observed in various languages, including two Farsi varieties, an Albanian dialect, and a Finnish variety. The contrast observed in Iranian Farsi, one of the Farsi varieties of Persian, is exemplified below.

- (192) a. zan-i [ke diruz did-i] ?emruz ?injā-st
 woman-RES (NOM) [that yesterday see.PST-2SG] today here-be.PRS.3SG
 ‘The woman whom you saw yesterday is here today.’
 b. zan-i ro [ke diruz did-i] ?emruz ?injā-st
 woman-RES ACC [that yesterday see.PST-3SG] today here-be.PRS.3SG
 ‘The woman whom you saw yesterday is here today.’

He argues that if a Head Nominal is overtly marked by a nominative marker that is a null-morpheme assigned in the matrix in Farsi as in (192a), then the relative clause can be separated from the Head Nominal as in (193a). In contrast, if it is assigned the accusative marker

3.4.4. A Shared NumP Movement Analysis and Scope Reconstruction

The relative structure briefly illustrated in (189) is similar to the one in Cinque (2015) shown in (190) in that the DP-internal functional layer NumP, which is often assumed to be raised in the DP-internal syntax, is the Head Nominal of the relative clause. The analysis leads to the prediction that all of the DP-internal elements included in NumP show the reconstruction effects in the relative clause and also that the other DP-internal elements that belong to CaseP and DP layers do not show the effect. This is illustrated in (196).

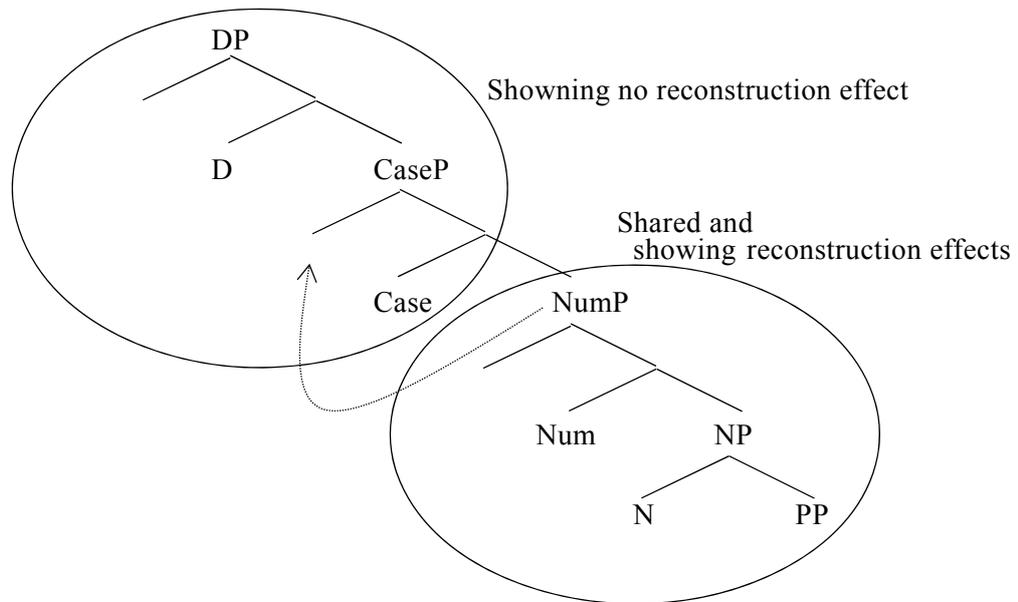
⁵⁶ Cinque (2015) assumes those two derivations because the hybrid analysis including them accounts for the ambiguity exemplified below.

- (i) a. John guessed the price [that Mary guessed].
- A. John and Mary happened to guess the same price, but not necessarily anything about one another. John and Mary need not even know of the other's existence.
- B. John guessed something about Mary; that is, John guessed the answer to the question "What price did Mary guess?".
- b. John guessed the price yesterday [that Mary guessed].
- A / #B (Cinque (2015: 9-10))

Cinque (2015) argues, following Harris (2008) that the reading A is derived from a structure of Matching relatives and that reading B is derived from a structure of Head-Raising relatives.

The reduction of *that* in the derivation of Matching relatives presented in (191) would be optional since (ib) is also considered a Matching relative clause. In addition, the relative pronoun *which* might also be a target of the reduction.

(196)



Inada (2008) carefully examines the scope interpretation of the reconstructed Head Nominals, and shows that reconstruction of the larger phrase including NP, though smaller than DP, properly explains the reconstruction effects. In restrictive relative structures, we observe, for example, that (197) is two-way ambiguous with respect to the relative scope of the universal quantifier *every* and the numeral *two*.

(197) John will interview the two patients that every doctor would examine *e*.

(*two* > *every*, *every* > *two*)

(Aoun and Li (2003))

The structure of the relative clause in (197) is illustrated in (198).

(198) [_{DP} the [_{CP} <[_{DP} D [_{NumP} two patients]]>_k

that [_{TP} every doctor would examine <[_{DP} D [_{NumP} two patient]]>_k]]

Adopting the split DP hypothesis, the numeral *two* is considered to be the element that occupies the head (or specifier) position of the distinct functional projection between DP and NP, namely, NumP.⁵⁷ Similar to the binding reconstruction, the reconstructed interpretation results from interpreting the copy of the Head Nominal. Thus, the ambiguity is accounted for if we assume that

⁵⁷ Inada (2008) refers to this projection only as FP at first, indicating the theoretical necessity of at least one functional projection between DP and NP.

the Head Nominal is not the noun *patients* alone, but it includes the modifying numeral *two*.

There seems to be an apparent counterexample in the scopal interaction between a quantified Head Nominal and a quantifier within the relative clause. Consider the example in (199). Consider the example repeated below.

(199) Ford recalled all the '75 models which were put out by a factory of theirs in Detroit.

(all > a, a > all) (Fodor and Sag (1982: 371))

(199) is ambiguous with respect to the relative scope of the universal quantifier *all* and the indefinite *a*. The availability of the narrow scope interpretation of the quantified Head Nominal initially seems to demonstrate that the universal quantifier *all* is reconstructed in the position of the copy inside the relative clause. Under our shared NumP movement analysis, quantifiers that precede the definite determiner are obviously outside the relative structure and cannot show the reconstruction effects. This is illustrated in (200).

(200) $[_{DP} \text{ all the } [_{NumP} \text{ '75 models}]_i \text{ } [_{CP} <[_{DP} \text{ which } [_{NumP} \text{ '75 models}]_i >_k \text{ } C \text{ } [_{TP} <[_{DP} \text{ which } [_{NumP} \text{ '75 models}]_i >_k \text{ were put out by a factory}]]]]]$

The apparent scope reconstruction of *all the '75 models*, then, cannot be accounted for by ascribing to the presence of the copy of the Head Nominal within the relative clause.

In the following sections, based on Inada's (2008) analysis, I argue that the apparent scopal reconstruction results from two different mechanisms: (i) scope construal via a choice function mechanism and (ii) scope construal via the interpretation of the copy of the Head Nominals. I also show that the availability of the narrow scope interpretation of the quantified Head Nominals determines whether the determiners/quantifiers of the Head Nominal are internal or external to NumP. This indicates that the shared element between the relative clause and the matrix clause is indeed NumP.

3.4.4.1. Scope Reconstruction Revisited

Quantifiers of Head Nominals can take narrow scope when the other quantifiers in the relative clauses are indefinite, such as *a*.

- (201) a. Ford recalled all the '75 models which were put out by a factory of theirs in Detroit. [= (199)]
(*all* > *a*, *a* > *all*)
- b. John wants to date exactly half the girls who go out with a professor who flunked him out of Linguistics 101.
(*exactly half* > *a*, *a* > *exactly half*) (Fodor and Sag (1982: 372))
- c. Mary dates at least five men who know a producer I know.
(*at least five* > *a*, *a* > *at least five*) (Fodor and Sag (1982: 372))

It can also take narrow scope under the subordinate indefinite even when the modifying quantifier is *every*, as shown in (202).

- (202) Mary dates every man who has met a producer I know.
(*every* > *a*, *a* > *every*) (Ruys (2006: 184))

The quantifier of the Head Nominal can sometimes take narrow scope under the universal quantifier, as repeated below.

- (203) John will interview the two patients that every doctor would examine *e*.
[= (197)]
(*two* > *every*, *every* > *two*)

In contrast, quantifiers of the Head Nominals sometimes cannot take narrow scope when the lower quantifiers are universal quantifiers such as *every*, as shown in (204).

- (204) Mary dates a man who *e* has met every producer I know.
(*a* > *every*, **every* > *a*) (Ruys (2006: 185))

In (204), the indefinite *a* of the Head Nominal cannot take narrow scope under the lower quantifier

every. Thus, we can say that when a lower quantifier inside a relative clause is an indefinite, narrow scope interpretation of the quantified Head Nominals is always possible, but it is not always possible when a lower quantifier is a universal quantifier.

3.4.4.2. Semantic Account for Scope Reconstruction

Let us examine the scope properties of indefinites and universal quantifiers. Consider the examples in (205).

- (205) a. Every girl watched some movie.
b. Some girl watched every movie.

(205a) and (205b) are ambiguous in that both the universal quantifier *every* and the indefinite *some* in the object position take wide scope, as well as narrow scope, relative to the quantifier *some/every* in the subject position. The indefinite *some* can still take wide scope when it is embedded in an island, as shown in (206a), while the universal quantifier *every* cannot take wide scope, as shown in (206b).

- (206) a. Every girl will be happy [if some movie is shown].
(*every* > *some*, *some* > *every*)
b. Some girl will be happy [if every movie is shown].
(*some* > *every*, **every* > *some*)

It is necessary to apply the covert operation QR in order to obtain the wide scope interpretation of the lower quantifier. It is generally assumed that the covert QR is clause-bounded and thus should be island-sensitive. Thus, the absence of the wide scope interpretation of the universal quantifier *every* in (206b) is expected; that is, it is due to the scope construal via impossible QR.

We cannot have recourse to QR to obtain the wide scope interpretation of the indefinite *some* in (206a), because existential quantification occurs across a clause boundary and scopes out of an adjunct island. The problem is, therefore, how the wide scope interpretation of the indefinites in

(206a) is obtained.

One of the plausible solutions is provided by Reinhart's (1992, 1997, 2006) choice function mechanism. Let us observe how the choice function mechanism can explain the wide scope taking of indefinites. The example (208a) is construed as (208b) by the choice function defined in (207).

(207) *Choice Function* (Reinhart (2006: 81)):

A function f is a choice function (CH (f)) if it applies to any nonempty set and yields a member of that set.

(208) a. If we invite some philosopher, Max will be offended.

b. $\exists f (\text{CH} (f) \wedge (\text{we invite } f (\text{philosopher}) \rightarrow \text{Max will be offended}))$

(208b) says that a function exists such that if we invite the philosopher it selects, Max will be offended. It is equivalent to the representation of the wide scope interpretation that might be obtained by the application of the island-free QR.⁵⁸

⁵⁸ It is worth noticing that Reinhart (2006) shows that QR would not assign the correct truth conditions for the scope of indefinites. Plural indefinites can take scope out of an island but cannot “distributively scope out” (Reinhart (2006)).

(i) a. Three relatives of mine inherited a house.

“there are three relatives of mine who together inherited a house”

“there are three relatives of mine who each inherited a house”

b. If three relatives of mine die, I will inherit a house.

“there are three relatives of mine such that if they all die, I will inherit a house”

* “there are three relative of mine the death of each of whom will leave me with a house”

In (ib), the plural indefinite *three relatives* can take scope out the QP *a house* in the matrix clause since the first interpretation is acceptable, but the distributive reading of this plural indefinite, as

Let us now consider the scopal relation between the quantifier of the Head Nominal and the one within the relative clause. The contrast repeated in (209) parallels the contrast between (210a) and (210b).

shown in the second interpretation, is impossible. This indicates that existential scope and distributivity are two separate matters. Suppose that QR is an operation that raises quantifiers to be understood distributively. Then, the lack of the distributive interpretation in (ib) is straightforward, and we need a non-QR solution to the problem of the separated collective interpretation, which would be obtained by the wide scope of indefinites.

One might argue that the wide scope interpretation over an island is provided via binding by the existential operator, such as unselective binding, which involves no movement. Under Heim's (1982) analysis of unselective binding, QR is first applied, which generally moves the whole NP containing the N-restriction, although this QR is the movement to the topmost IP position, violating the Subjacency Condition. Reinhart (2006) points out, however, that there is a problem with the analysis in which the wide scope of indefinites is attributed to unselective binding. Consider the following examples.

- (ii) a. If we invite some philosopher, Max will be offended. [= (208)]
- b. \exists_i [if we invite [some philosopher]_i Max will be offended]
- c. $\exists x ((\text{philosopher } (x) \wedge \text{we invite } x) \rightarrow (\text{Max will be offended}))$

(Reinhart (2006: 73))

The interpretation that we must account for is that there is some philosopher such that if we invite that philosopher Max will be offended. The LF derived via unselective binding is (iib), where we introduce an existential operator as a binder. The structure is thus interpreted as in (iic). The problem is that if the restrictive clause *philosopher (x)* (*x* is a philosopher) remains in-situ as in (iib), the sentence results in a necessary truth in any world that contains non-philosophers.

- (209) a. Every girl will be happy [if some movie is shown]. [= (206a)]
(every > some, some > every)
- b. Some girl will be happy [if every movie is shown]. [= (206b)]
*(some > every, *every > some)*
- (210) a. Mary dates every man [who has met a producer I know]. [= (202)]
(every > a, a > every)
- b. Mary dates a man [who has met every producer I know]. [= (204)]
*(a > every, *every > a)*

(210a) is ambiguous although it does not involve any copies that yield the narrow scope interpretation of the higher quantifier. The apparent reconstructed interpretation of the quantifier of the head in (210a) is not necessarily derived from the interpretation of the copy inside the relative clause, since it is obtained from the application of the choice function mechanism to the lower indefinite.

Given the choice function mechanism, we can account for the unexpected narrow scope interpretation of the quantified Head Nominals in the examples repeated below.

- (211) a. Ford recalled all the '75 models which were put out by a factory of theirs in Detroit. [= (199)]
(all > a, a > all)
- b. John wants to date exactly half the girls who go out with a professor who flunked him out of Linguistics 101. [= (201b)]
(exactly half > a, a > exactly half)
- c. Mary dates at least five men who know a producer I know. [= (201c)]
(at least five > a, a > at least five)
- (212) Mary dates every man who has met a producer I know. [= (202)]
(every > a, a > every)

Since the quantifiers of the Head Nominals are outside the shared NumP, our shared NumP movement analysis of relative structures predicts that these quantifiers cannot take narrow scope syntactically. In addition, the indefinite in the relative clause can take wider scope than these NumP external quantifiers via the semantic mechanism, as shown in (213).

- (213) a. Mary dates every man who has met a producer I know.
 b. $\exists f(\text{CH}(f) \wedge \forall y(\text{man}(y) \wedge y \text{ has met } f(\text{producer}) \rightarrow \text{Mary dates } y))$

When the lower quantifier inside the relative clause is an indefinite, the narrow scope interpretation of the quantifier of the Head Nominal is obtained via existential quantification over the choice function that applies to the indefinite, regardless of what the higher quantifier of the Head Nominal is. When the lower quantifier is universal, the choice function does not apply. In addition, the universal quantifier cannot take wide scope over the islands. Thus, the wide scope interpretation of the lower universal quantifier *every* is obtained only if the quantifier modifying the Head Nominal is interpreted inside the relative clause, which is considered a genuine example of the scopal reconstruction.

3.4.4.3. Syntactic Account for Scope Reconstruction

When the lower quantifiers inside relative clauses are universal quantifiers, the choice function mechanism is not available. In that case, the narrow scope interpretation of the quantified Head Nominals is possible only if they are included in the NumP layer, which can be interpreted in the base positions inside the relative clauses. Consider the examples in (197) and (204), which are repeated below.

- (214) a. John will interview the two patients that every doctor would examine *e*.
 (*two* > *every*, *every* > *two*)
 b. Mary dates a man who *e* has met every producer I know.
 (*a* > *every*, **every* > *a*)

The narrow scope interpretation is possible in (214a) but is impossible in (214b). Suppose that both the numeral *two* and the indefinite *a* are elements within the DP-internal functional projection FP. Then, both of them would have been interpreted at the position of the copy inside the relative clause.

Based on the contrast in (214), it can be argued that universal quantifiers in the subject position inside relative clauses can take wider scope than the quantified Head Nominals, whereas those in the object position cannot take such a wide scope interpretation. The position of the copy of NumP inside the relative clause provides a cue for the determination of the relative scope.⁵⁹

Next, consider another contrast repeated below.

(215) John will interview the two patients that every doctor would examine *e*.

(*two* > *every*, *every* > *two*)

In (215) the quantifier with the Head Nominal is the numeral, and the narrow scope interpretation of the quantified Head Nominal is possible. The position of the copy of NumP is in the object position. It is necessary to examine what type of quantifier is internal to NumP.

⁵⁹ The subject-object asymmetry observed in (214) is considered to be a property of the universal quantifiers in the object position. They cannot take wide scope over the moved *wh*-phrase, as shown in (i).

(i) Who bought everything? (*who* > *every*, **every* > *who*)

The application of QR is somehow blocked by A'-movement of the *wh*-phrase. Because the same type of A'-movement is involved within the relative clause, the application of QR to the lower universal quantifier *every* is blocked. Without the A'-movement, the narrow scope interpretation is possible, as shown in (ii).

(ii) Some man met every producer I know. (*some* > *every*, *every* > *some*)

In (ii) the wide scope interpretation of the lower universal quantifier *every* is obtained by QR.

With respect to the types of determiners/quantifiers, Aoun and Li (2003) point out the following interesting contrast.

- (216) a. {The/All/That/What} headway that Mel made was astounding.
b. * {Some/Much/Most/Little/Ø} headway that Mel made was satisfactory.

Aoun and Li (2003) observe that there are two types of determiners/quantifiers: one type can co-occur with the non-referential NP *headway* with relative clause, as in (216a), and the other type cannot as in (216b). According to Aoun and Li (2003), the type of determiners/quantifiers in (216a) is called Type I, and the one in (216b) is called Type II.⁶⁰

Based on the difference concerning the structural positions of quantifiers, we can conclude that Type II can take narrower scope than the determiners/quantifiers in relative clauses via reconstruction of the Head Nominals syntactically, while Type I takes the matrix scope only. The contrast between Types I and II can be predicted under our shared NumP movement analysis if we assume that the Type II determiners/quantifiers are internal to NumP, whereas the Type I determiners/quantifiers are external to NumP. Consider the relative structure presented in (217).

⁶⁰ Aoun and Li (2003) observe that Type II cannot co-occur with numerals, whereas Type I can.

- (i) a. *the* forty men, *these* two insects, *every* ten minutes, *all* fifty Vikings,
any five cigars
b. **most* nine squids, **many* twelve pounds, **a few* ten oboes, **each* fifty minutes

If the structural positions of the numeral and Type II are assumed to be the same, the type of the determiners/quantifiers in (iia), which can co-occur with Type II, is also considered to be Type I, and the type in (iib), which cannot co-occur with Type II, is also Type II.

- (ii) a. *what* few remarks, *-er* many bottle, *my* many dreams
b. **ten* many people **lots of* many boys, **several* many ladies

(217) a. *DP structure and Type I/Type II determiners/quantifiers:*

[_{DP} **TypeI determiners/quantifiers** [_{NumP} **TypeII determiners/quantifiers** NP]]

b. *Restrictive relative structure and Type I/Type II determiners/quantifiers:*

[_{DP} **TypeI** <[_{NumP} **TypeII** + NP]>_k

[_{CP} [_{DP} D_[REL] <[_{NumP} **TypeII** + NP]>_k]_i C_[REL]

[_{TP} ... *TypeI/TypeII*... [_{DP} D_[REL] <[_{NumP} **TypeII** + NP]>_k]_i... *TypeI/TypeII* ...]]

The Type I determiners/quantifiers can be interpreted under the scope of the Type II determiners/quantifiers inside relative clauses since the scope of these Type II determiners/quantifiers can be construed via the choice function mechanism.

In this subsection, we have reviewed Inada's (2008) analysis, which claims that there are two different mechanisms for scope reconstruction. One is scope construal via the choice function mechanism, from which the island-free wide-scope interpretation of indefinites results. The other is scope construal via interpretation of the base copy of fronted Head Nominals, from which their narrow scope interpretation results. The former is taken to be semantic reconstruction, and the latter is taken to be syntactic reconstruction. In the latter case, the narrow scope interpretation is derived directly from the Copy Theory of movement. This leads us to conclude that the Head Nominals include Type II, excluding Type I, which is the distinction that follows from our shared-NumP movement analysis of restrictive relative structures.

3.5. A Proper Adjunction Site for Restrictive Relative Clauses

3.5.1. Adjunction of Adjuncts Involving *Operator-Variable Chains*

This section returns to the relative clause-internal syntax by reconsidering relative operator movement and how the adjunction site of restrictive relative clauses is determined within DP. Under our analysis discussed above, the relative clauses are adjuncts that are adjoined somewhere inside the DP structure of the modified nouns. The operation adjunction is regarded as the subclass

of Merge operation, named Pair-Merge in the Minimalist Program. Chomsky (2008: 144) claims that “Merge can apply freely, yielding expressions interpreted at the interface in many different kinds of ways.” Given that External Merge applies freely, the legitimate adjunction site will be determined uniquely for the satisfaction of the interface conditions, and then, the type-preserving property of Pair-Merge repeated in (218) will follow automatically.

(218) [= (98)] ... and [DET <ADJ, NP>] receives its theta-role in the normal way, with composition of the predicates NP, ADJ. We take [DET < α , β >] to be “in a configuration” at SEM, but that seems unproblematic: “in a configuration” is not one of the relations defined for simple structures... (Chomsky (2004: 118)).

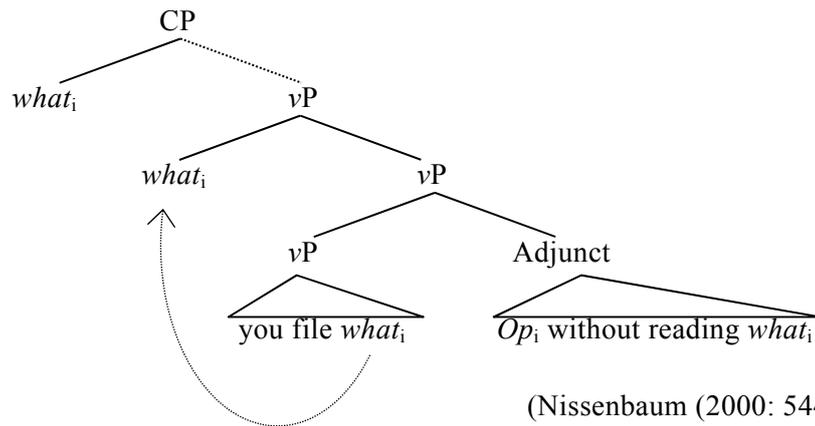
The identification of a unique adjunction site of clausal adjuncts has been a long-standing issue in the research on parasitic gap constructions, which involve an *operator-variable* chain. A defining property of parasitic gap constructions is that the adjunct clause involves a gap that is licensed in a certain movement configuration. A variety of movements are able to license the gap inside the adjunct clause, including wh-movement, topicalization, relativization, and heavy-NP shift.

- (219) a. Which article_i did you file _i [without reading _i]?
 b. John, I talked to _i [in order to impress _i].
 c. Mary’s the person who_i called _i up [after meeting with _i]
 d. John filed _i [without reading _i] a recent article about Amazonian frogs_i.

(Nissenbaum (2000: 543))

The parasitic gap constructions shown above have in common a matrix *vP* configuration “which makes the parasitic gap not only possible but obligatory” (Nissenbaum (2000: 543)) as illustrated in (220).

(220) Which article_i did you file _{-i} [without reading _{-i}]? (Nissenbaum (2000: 543))



Nissenbaum (1998a, b) claims that by raising XP to an outer Spec,*vP*, the semantic composition is made possible for the clausal adjuncts to modify *vP*s. Consequently, the lower segment of *vP* turns into a derived predicate. It is interpreted as a lambda abstract that binds the variable in the base position of the raised XP.

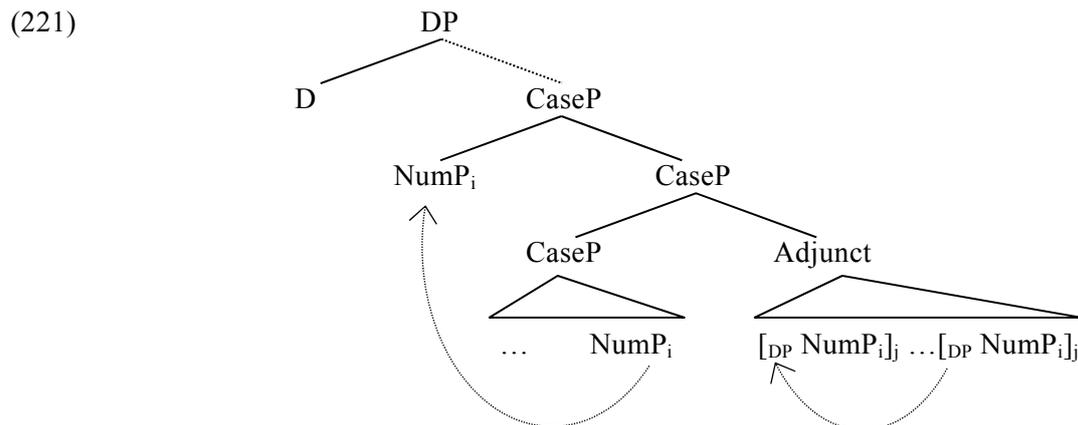
The composition of the matrix *vP* with the clausal adjunct is the following. The two predicates, the lower *vP* and the adjunct, are composed by predicate modification, and the result applies to the raised XP by function application.

Nissenbaum (2000) also claims that λ -abstraction is simply an interpretive reflex of a configuration involving a chain. Given these assumptions about the syntax of the parasitic gap constructions, their semantic interpretation is straightforward using a minimal arsenal of independently needed interpretive mechanisms, that is, predicate abstraction, predicate modification, and function application. No special semantic rule is required. As long as the appropriate configuration can be derived, the existence of the parasitic gap is predicted.⁶¹

⁶¹ Nissenbaum argues that the syntactico-semantic composition of the adjunct and *vP* in the parasitic gap construction is similar to that of the relative and matrix clauses and offers the type-preserving adjunction structure. In this respect, Sakamoto (2014) claims under the current Minimalist Program that the syntax of the parasitic gap construction can be regarded as having a

3.5.2. Adjunction and NumP Chain Formation

Following the mechanism determining a unique site of adjunction from the perspective of compositional well-formedness, NumP movement in DP-internal syntax provides an appropriate, unique adjunction site for the restrictive relative clause. Consider the configuration of restrictive relative structures presented in (221).



The NumP movement within the matrix DP in (221) licenses the NumP chain in the relative clause, though the chain is formed along with the A'-movement of the relative operator DP. In other words, the restrictive relative structures are DP-internal examples of the parasitic gap licensing in (220).

By this raising of NumP to Spec,CaseP in the matrix DP, the semantic composition makes it possible for relative clauses to modify CaseP. In (220) in (220) turns into a derived predicate because it is interpreted as a λ -abstract that binds the variable in the base position of the raised NumP. In the computation of the C-I system, the two predicates, the lower CaseP and the relative

relative structure. See Sakamoto (2014) for the detailed derivation. Notice that in this thesis, restrictive relative structures are regarded as a DP-internal parasitic gap construction, which involves DP-internal phrasal movement of NumP. It is worth noting here that Chomsky (1986) offers an argument for the empty operator in such a configuration. If both gaps were bound by the single operator, reconstruction effects ought to apply equally in both reconstruction sites, or reconstruction ought to behave symmetrically with respect to both gaps.

clause, are conjoined via predicate modification as we have observed in Section 3.1.2, and the result applies to the raised NumP by function application.

3.6. A Unified Account: A Shared NumP Movement Analysis of Restrictive Relative Structures

In the previous sections, it is shown that the relative structures derived via NumP movement and adjunction is the one that satisfies the structure-preserving nature of the adjunction. Furthermore, the relative structure automatically offers the adjunction site lower than the Head Nominal. The relative clause is adjoined where they are interpreted properly with respect to the semantic composition, and in that position, the unlinearizable structure of Share Merge is dissolved automatically. In this section of Chapter 3, we (re-)examine the derivation of restrictive relative structures in our analysis step by step and discuss how the various reconstruction effects, including the reconstruction paradox, follow from the analysis.

3.6.1. Forming Intersecting Sets by NumP Sharing

The derivational steps of restrictive relative structures proposed in this thesis are outlined in (222).

(222) i. {Num, NP} Case1 Case2

ii. Sharing of NumP by Share Merge

Matrix: {Case1, {Num, NP}_k}

Relative: {Case2, {Num, NP}_k}

iii. Shared NumP Movement to Spec,CaseP in Relative Clause

Matrix: {Case1, {Num, NP}_k}

Relative: {{Num, NP}_k, {Case2, {Num, NP}_k}}

iv. **Forming Relative Pronoun DP in Relative Clause**

Matrix: {Case1, {Num, NP}_k}

Relative: {D_[REL], {{Num, NP}_k, {Case2, {Num, NP}_k}}}

v. **A'-movement (Internal Merge) of Relative Pronoun DP in Relative Clause**

Matrix: {Case1, {Num, NP}_k}

Relative: {{D_[REL], {{Num, NP}_k, {Case2, {Num, NP}_k}}}, {C_[REL], TP}}

vi. **Adjunction (Pair Merge) of Matrix CaseP and Relative Clause CP**

<{Case1, {Num, NP}_k} ,

{{D_[REL], {{Num, NP}_k, {Case2, {Num, NP}_k}}}, {C_[REL], TP}}>

vii. **Shared NumP movement in Matrix Clause**

{{Num, NP}_k, <{Case1, {Num, NP}_k} ,

{{D_[REL], {{Num, NP}_k, {Case2, {Num, NP}_k}}}, {C_[REL], TP}}>

viii. **Forming Matrix DP**

{D, {{Num, NP}_k, <{Case1, {Num, NP}_k} ,

{{D_[REL], {{Num, NP}_k, {Case2, {Num, NP}_k}}}, {C_[REL], TP}}>}}

Let us consider the derivation step by step. First, this thesis argues that the Head Nominal—a shared element between a matrix DP and a relative clause—is the NumP shown in (222i), which consists of a nominal functional head Num and NP. Second, the NumP is targeted by External Merge with another nominal functional head, Case. This time, there are two distinct Case heads, Case1 and Case2. With these two functional heads, the two separate CasePs are built, sharing the identical NumP, as illustrated by the two intersecting sets in (222ii).

(222ii) *Matrix:* {Case1, {Num, NP}_k}

Relative: {Case2, {Num, NP}_k}

The relative structures involve sharing at the very beginning, obtained by the simultaneous applications of External Merge. Third, each of the two CasePs merges with D, inducing NumP

movement to Spec,CaseP, which specifies the definiteness and specificity of the DPs. Illustrated in (222iii) and (222iv) is the NumP movement to Spec of Case2 and the formation of DP[REL].

(222iii)' *Relative:* { {Num, NP}_k, {Case2, {Num, NP}_k} }

(222iv)' *Relative:* { D_[REL], { {Num, NP}_k, {Case2, {Num, NP}_k} } }

The DP[REL] occupies its legitimate position in TP and undergoes A'-movement to the Spec of C[REL], forming a relative clause, as shown in (222v).

(222v)' *Relative:* { { D_[REL], { {Num, NP}_k, {Case2, {Num, NP}_k} } } }, { C_[REL], TP } }

The relative clause and Case1P pair-merge as shown in (222vi), forming conjoined intersecting sets and inducing movement of the shared NumP_k to the Spec of Case1, as shown in (222vii).

(222vii)' { {Num, NP}_k,

< {Case1, {Num, NP}_k } ,

{ { D_[REL], { {Num, NP}_k, {Case2, {Num, NP}_k} } } }, { C_[REL], TP } } > }

Finally, the matrix D and Case1P merge, as shown in (222viii), and the derivation of the matrix clause continues.

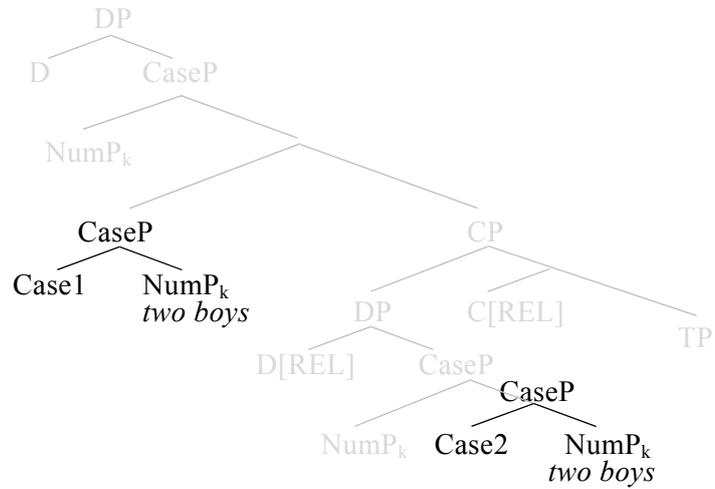
Let us examine an example. Consider the sentence presented in (223), which involves relativization.

(223) The two boys who Mary saw yesterday are my younger brothers.

In (223), a NumP that consists of the nominal expression *boy(s)* and its number information *two* undergoes Share Merge with Case1 and Case2, forming the two intersecting sets that share the NumP {*two, boys*} in common, as illustrated in (224).

(224) *Matrix*: {Case1, {two, boys}}

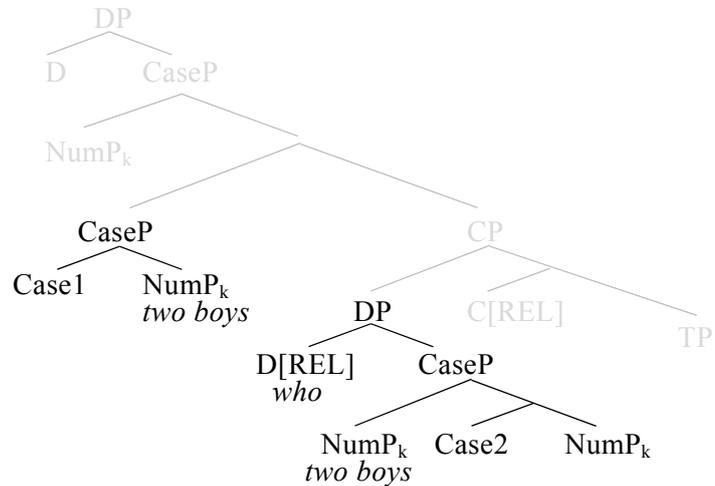
Relative: {Case2, {two, boys}}



Of the two intersecting sets, one undergoes a shared NumP movement that is followed by External Merge with the relative pronoun *who*, which bears the feature [REL], as illustrated in (225).

(225) *Matrix*: {Case1, {two, boys}_k}

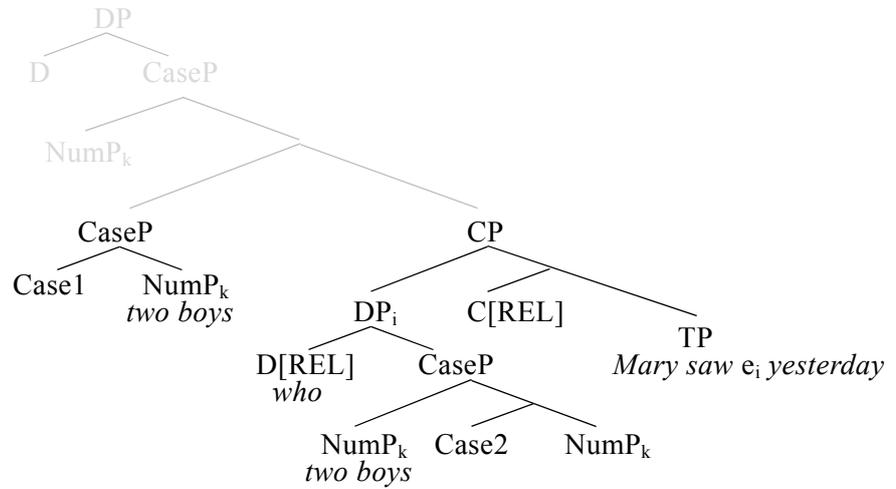
Relative: {*who*_[REL], {{two, boys}_k, {Case2, {two, boys}_k}}}



The set {*who*_[REL], {{two, boys}_k, {Case2, {two, boys}_k}}}, which is now included in TP, undergoes Internal Merge with the superset {C[REL], {TP}} by probing of C[REL], as illustrated in (226).

(226) *Matrix:* {Case1, {two, boys}_k}

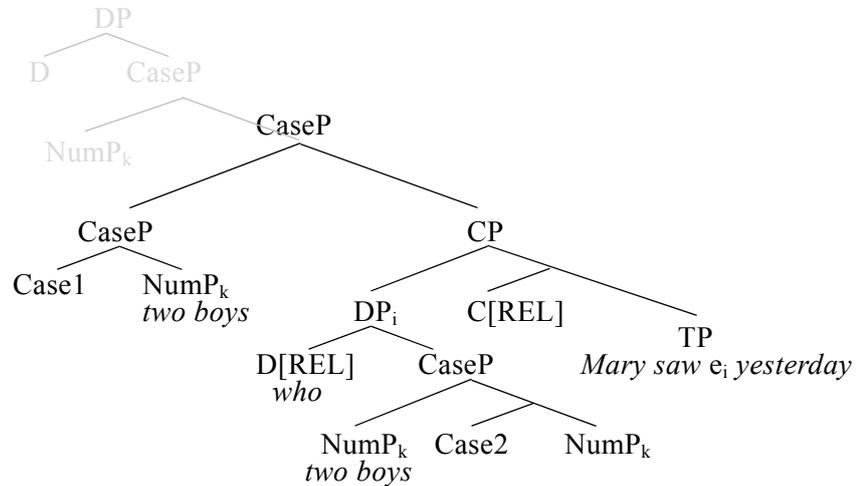
Relative: {{who_[REL], {{two, boys}_k, {Case2, {two, boys}_k}}}, {C_[REL], TP}}



Next, the two intersecting sets in (226) are integrated as a single tree via Pair-Merge as illustrated in (227).⁶²

(227) <{Case1, {two, boys}_k},

{{who_[REL], {{two, boys}_k, {Case2, {two, boys}_k}}}, {C_[REL], TP}}>

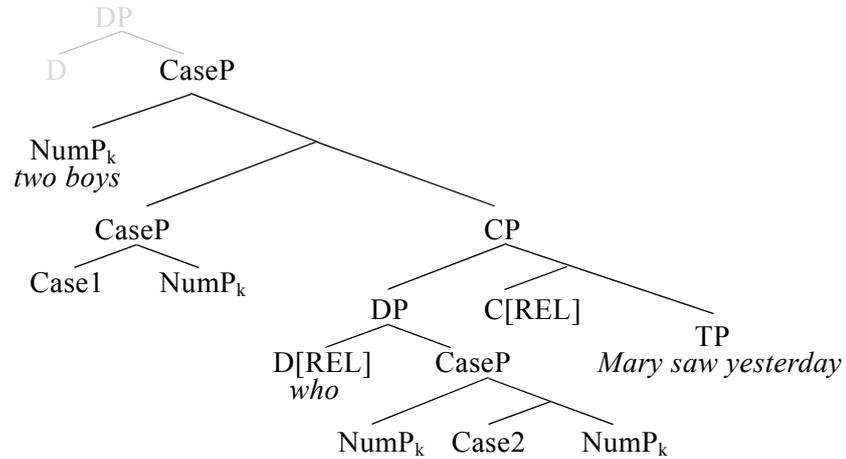


Finally, Case1 of the matrix, which is dominant in the ordered pair <CP, CaseP> in (227), forces

⁶² As shown in (227), it is assumed in this thesis that the relative clause CP always pair-merges with the (matrix) CaseP so that the <Relative Clause, Head Nominal> structure of restrictive relatives is obtained. This might be because the DP[REL] is predisposed to serve as an embedded topic—an assumption that requires further exploration.

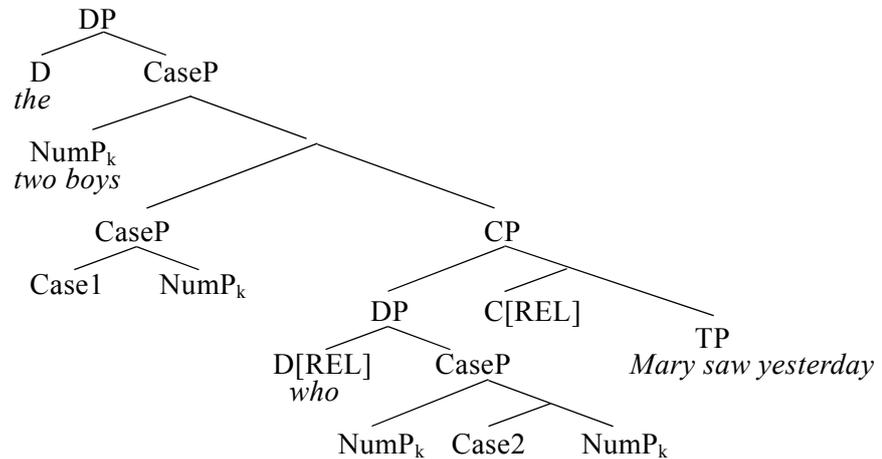
the application of Internal Merge of NumP, as illustrated in (228).

- (228) $\{\{two, boys\}_k, <\{Case1, \{two, boys\}_k\},$
 $\{\{who_{[REL]}, \{\{two, boys\}_k, \{Case2, \{two, boys\}_k\}\}, \{C_{[REL]}, TP\}\}\>\}$



As a matrix object, the CaseP in (228) undergoes further applications of set-formation, such as that shown in (229).

- (229) $\{the, \{\{two, boys\}_k, <\{Case1, \{two, boys\}_k\},$
 $\{\{who_{[REL]}, \{\{two, boys\}_k, \{Case2, \{two, boys\}_k\}\}, \{C_{[REL]}, TP\}\}\>\}\}$



The convergent derivation involves no operations other than Merge, no application of Merge targeting non-root elements without probing, and no probing into a non-sister domain.

3.6.2. Possibility of Reconstruction Predicted in the NumP Sharing Analysis

Now, let us examine how the DP-internal NumP sharing analysis presented in this thesis

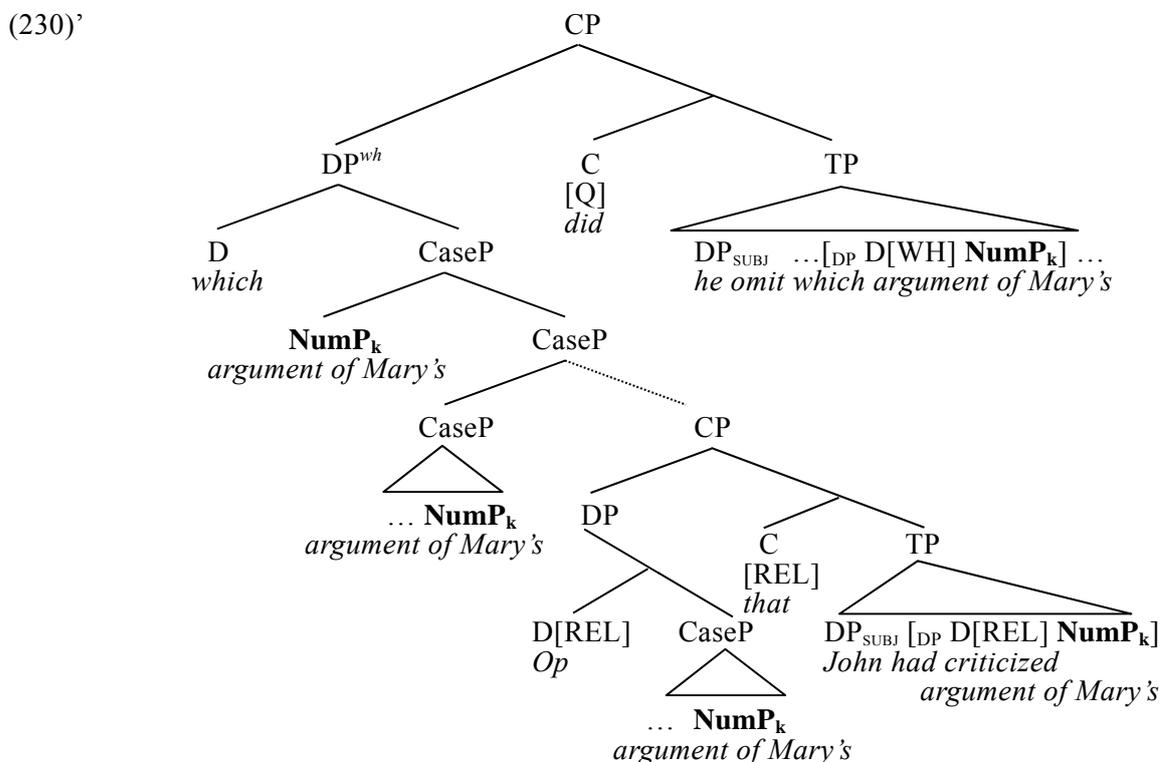
accounts for various facts about reconstruction. Consider the example shown in (230).

- (230) Which argument of Mary's [that John_i had criticized] did he_i omit *e* in the final version? (Sauerland (2003: 208))

In (230), the relative clause is interpreted only at the transferred position of the fronted *wh*-Head Nominal. Only adjuncts show such a selective reconstruction while complements of the fronted *wh*-Head Nominals are required to be interpreted in the gap position. Thus, the proper name in the complement cannot avoid a Condition C violation, as shown in (231).

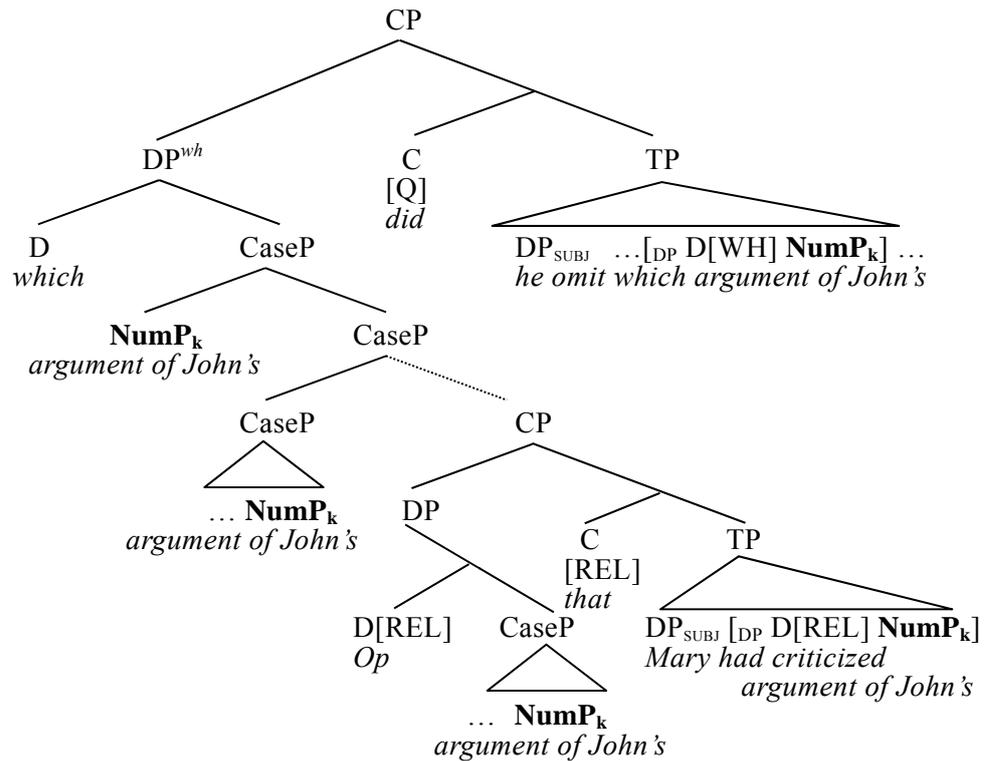
- (231) * Which argument [of John_i's] that Mary had criticized did he_i omit *e* in the final version? (Sauerland (2003: 208))

In our analysis of restrictive relative structures, the relative clauses are adjoined at CaseP, while the complement PP is included in the shared NumP and its multiple copies. In the case of (230), therefore, no NumP violates Condition C, as illustrated below.



In the case of (231), the NumP in the base position of *wh*-movement in the matrix TP violates the condition, as illustrated below.

(231)'

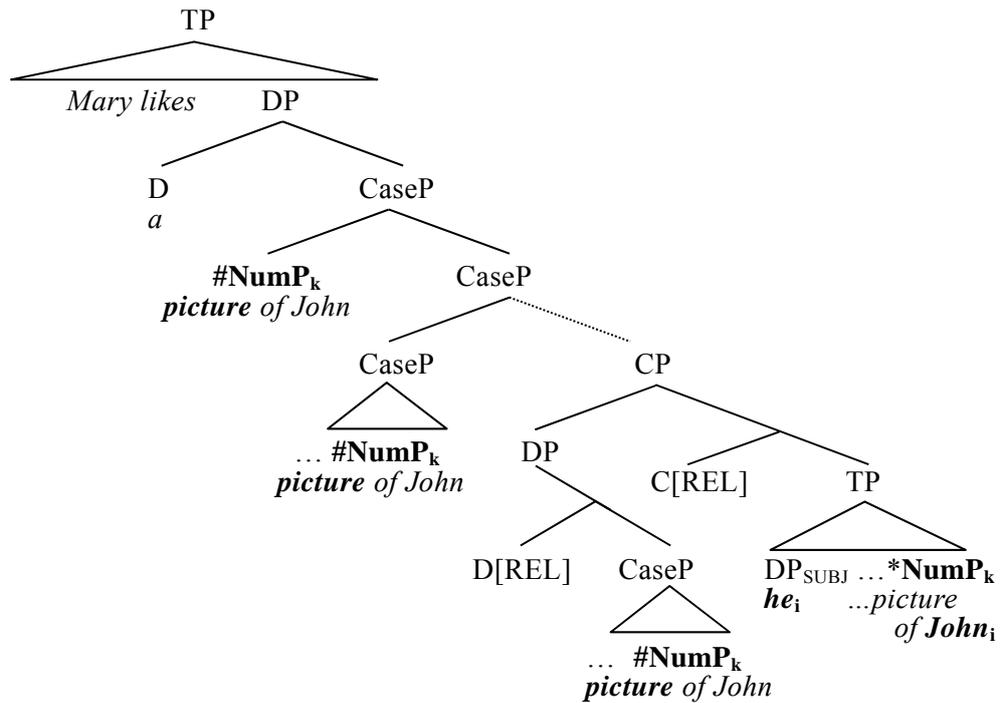


Our DP-internal multi-dominance structure with the shared NumP movement can also explain the reconstruction effects of the Head Nominals exemplified in (232).

- (232) a. Mary likes [a picture of himself_i [that John_i took *e* last year]].
 b. * Mary likes [a picture of John_i [that he_i took *e* last year]].

Idiomatic expressions such as *take picture* in (232) force the shared NumP to be interpreted at the position inside the relative clause, where it is c-commanded by the embedded subject *John* in (232a) or by *he* in (232b). Therefore, the reflexive pronoun *himself* contained in the shared NumP in (232a) can be c-commanded by the antecedent, whereas the proper name *John* contained in (232b) induces a Condition C violation. The relative structure of (232b) is illustrated below.

(232b)'



In (232b)', no copy of the shared NumP satisfies both the adjacency requirement for idiom interpretation and Condition C.

In our analysis, the absence of the reconstruction of relative clauses that modify the fronted *wh*-Head Nominals is accounted for via the adjunction structure. Moreover, the reconstruction effect (and forced Condition C violation) of the Head Nominal is also accounted for by interpretation of the copies of the shared NumP. That is, both the adjunct property of relative clauses and the reconstruction effects of Head Nominals follow from the unified analysis of relative structures.

The reconstruction paradox discussed repeatedly in this thesis can be regarded as one of the phenomena that confirm the proposed unified analysis of restrictive relative structures.

(233) a. What <headway> [that John_i made *e*] [did he_i later regret *e*]?

b. Which <picture of himself_i> [that John_i gave *e* to Mary_j] [did she_j take *e* home]?

What is shared between the relative and matrix clauses in (233) is not the fronted *wh*-phrase but the shared NumP, *headway* or *picture of himself*, which can be reconstructed in each clause. Hence, in (233), we observe the reconstructions of only NumPs.

3.6.3. Movement versus Sharing

We must consider two tacit assumptions concerning the reconstruction effects in restrictive relative structures. One is given in (234a), which is a basic assumption of the previous studies concerning the reconstruction effects, and another is given in (234b), which is an assumption in our analysis.

- (234) a. A'-movement forces reconstruction.
b. Intersection enables interpreting any copy of the shared member.

The statement in (234a) is a basic assumption because the idea that the complements cannot be detached like adjuncts does not necessarily require the reconstruction effects. In examples such as (230)-(231), what is tacitly assumed is that the complement cannot be detached AND that the A'-reconstruction is obligatory. The statement in (234b) is a new assumption based on our discussion concerning the sharing structure. In the examples of the reconstruction of the Head Nominals, what moves, creates multiple copies, and hence is reconstructed is a shared NumP. In contrast to the A'-movement cases, the shared NumP fulfills the requirement of, and is satisfied with, the Case- or theta-marking in each separate set/plane.

In fact, reconstruction of the shared NumPs is not applied obligatorily if the application is not forced. Consider the examples in (235).

- (235) a. The relative of John_i [that he_i likes *e*] lives far away.
b. The relative of his_i [that everybody_i likes *e*] lives far away. (Munn (1994: 402))

Both (235a) and (235b) are acceptable. In (235a) the Head Nominal does not show the reconstruction effect for Condition C because it need not do so. In (235b), it shows Condition A reconstruction (variable binding) because it is allowed to and is required to. The assumption (234b) enables the selective interpretation of the shared NumP in relative structures to obviate Condition C violations at times and satisfies variable binding or adjacency of idiom chunks at other times. The reconstruction effects of the Head Nominals are not the same as the reconstruction effects of

the fronted *wh*-phrases. The reconstruction in the former case is optional unless it is forced, whereas the one in the latter is obligatory even if it induces ill-formedness.

- (236) a. * Which picture of John_i did he_i see *e*?
 b. * <which picture [of John_i]> did he_i [see <which picture [of John_i]>]

In (236) the fronted *wh*-phrase *which picture of John* is reconstructed obligatorily even though the interpretation at the gap position amounts to the Condition C violation. The selective reconstruction of the Head Nominals in (235) is not due to A'-reconstruction but due to the sharing structure.⁶³

⁶³ Following Carlson (1977) and Heim's (1987) argument that only Head-Raising analysis is possible if the gap inside the relative clause is involved in a *there*-construction, Sauerland (2003) points out a contrast presented in (i).

- (i) a. ?? I visited all the relatives of Mary_i's [that she_i said [there are *e* left]].
 b. I visited all the relatives of hers_i [that Mary_i said [there are *e* left]].

Sauerland (2003) also observes that “a [Head-Raising] analysis seems impossible when the [Head Nominal] is the complement of an indefinite determiner.” The correlation between definiteness and Head-Raising is also corroborated by (ii), where “the [Head Nominal] appears in a context that only allows an existential reading” (Sauerland (2003: 215)).

- (ii) * On the table, there's {a/one} picture of herself [every girl sent *e*].

In our proposal, the matrix existential construction in (ii) forces the anti-reconstruction of the indefinite Head Nominal.

The amount reading of the Head Nominal will sometimes favor the reconstruction, as shown in (iii), so that it is interpreted in the embedded existential construction.

- (iii) * It would have taken us all year to read the letters for John_i [he_i expected [there would be *e*]].
 (Sauerland (2003: 215))

Sauerland (2003) points out that the contrast in (230) and (231) or in (235a) and (235b) is the consequence of the structural ambiguity between Head-Raising and Matching. Recall that in Head-Raising relatives the restrictive relative structure is derived via “promotion” of the Head Nominal from inside the relative clause (cf. Kayne (1994)), and in Matching relatives, the derivation of the relative clause is analogous to that of *wh*-questions in that a phrase containing the relative operator (i.e., the internal Head) undergoes A'-movement in the relative clause, matching with the external Head. Based on this hybrid analysis, Sauerland argues that the elements pied-piped internal to the Matching relatives behave exactly the same as those in *wh*-movements. Consider the examples in (237).

(237) a. There's a singer [whose picture [in John_i's office] he_i's very proud of].

(Sauerland (2003: 210) from Safir (1998))

b. * There's a singer [whose picture [of John_i's office] he_i's very proud of].

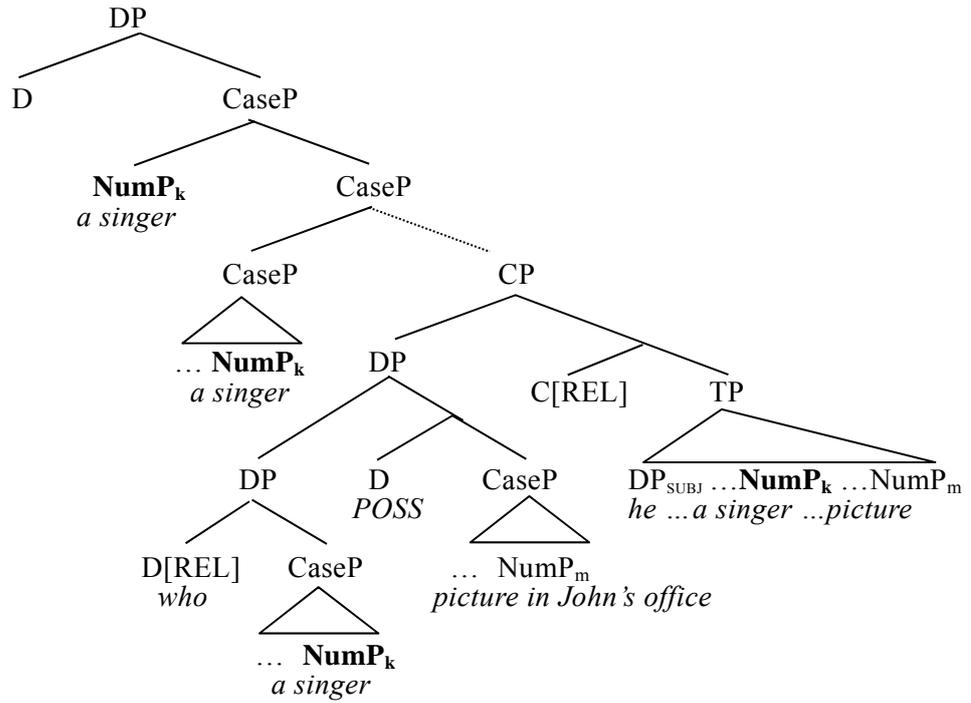
(Sauerland (2003: 210))

The examples in (237) show that the phrases that undergo relativization exhibit argument-adjunct asymmetry in the reconstruction obligatorily, as with *wh*-questions.

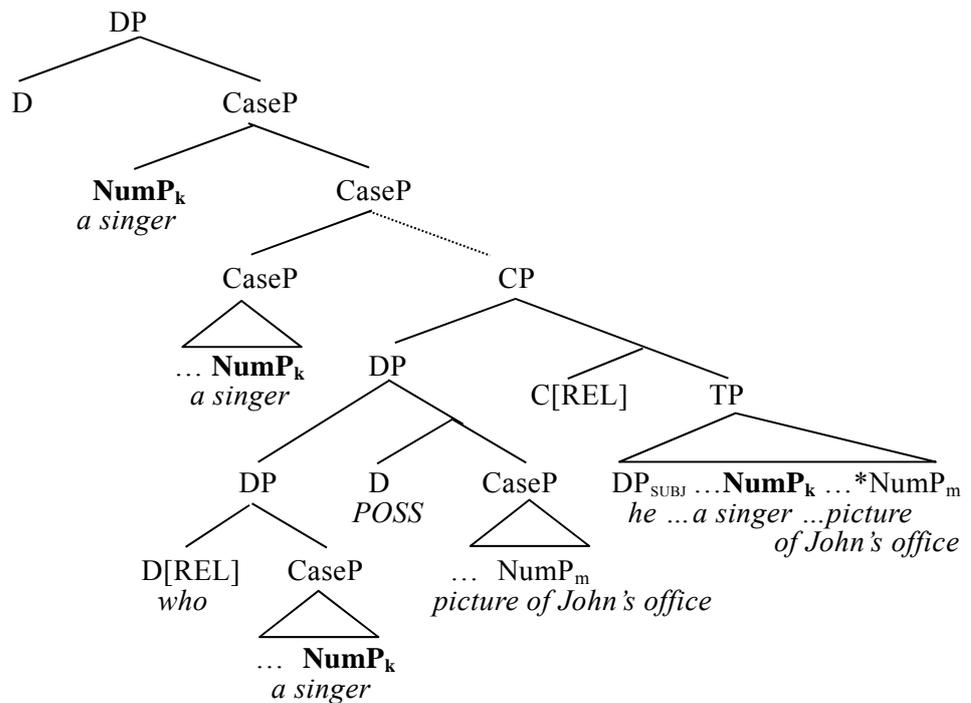
In our relative structures, the contrasts in (237) are attributed to the difference between A'-movement and NumP sharing. It does not matter whether the proper name *John* is contained in the adjunct PP in (237a) or contained in the complement PP in (237b). What is important here is that none of the proper names are contained in the shared NumP, as illustrated below.

The analysis needs further investigation and will be another topic for future research. See also the discussions in Section 3.2.4 and Section 6.2, and the footnote 78 in Chapter 6.

(237a)'



(237b)'



The shared NumP in (237a) and (237b) includes only *a singer* and is embedded in the possessor DP at the specifier of the larger pied-piped DP. The fronted DP and its complement are, thus, reconstructed at the base position in the relative clause obligatorily because it is derived via A'-movement. In (237a), the proper name *John* is contained in the adjunct to the fronted DP, which can be interpreted only at the Spec of the relative clause. In (236b), on the other hand, the proper name is contained in the complement of the fronted DP, and A'-movement requires the complement

to be interpreted at the base position of the movement. The ill-formedness of (237b) is not due to the relativization (or Matching relatives) but is caused by the obligatory reconstruction of A'-movement.

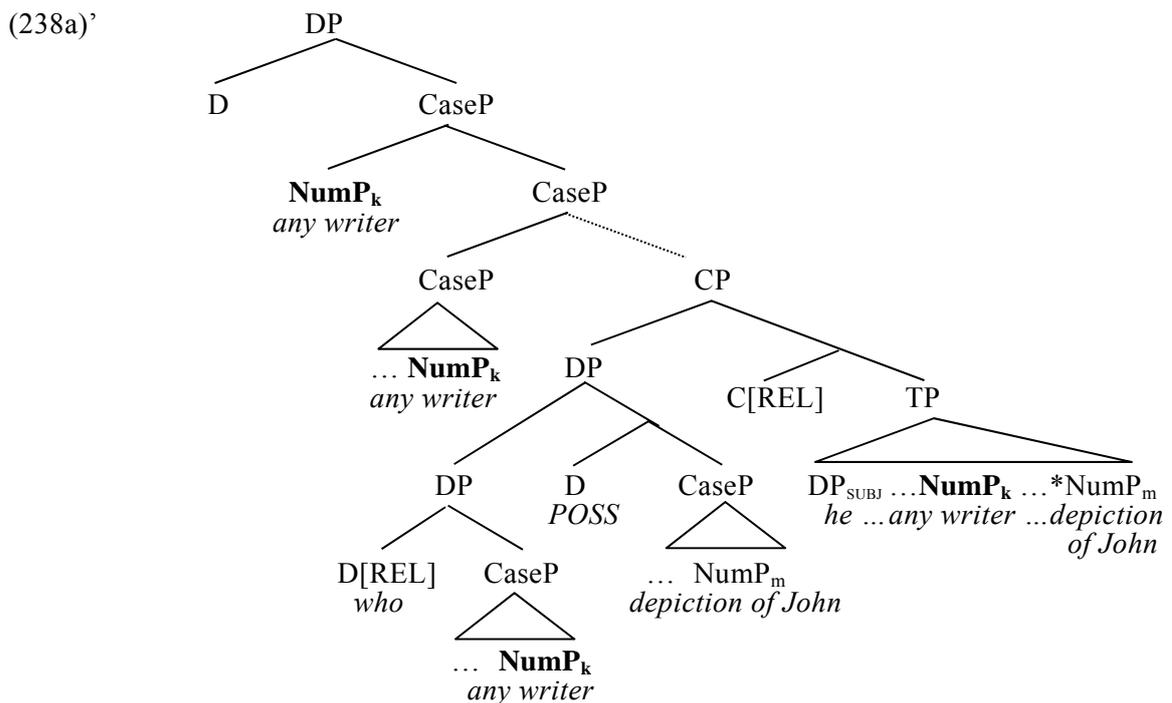
The effect of the optionality is observed again when the violation-inducing proper name is part of the shared NumP. Consider the contrasts presented in (238).

(238) a. * I respect any writer [whose depiction of John_i he_i'll object to].

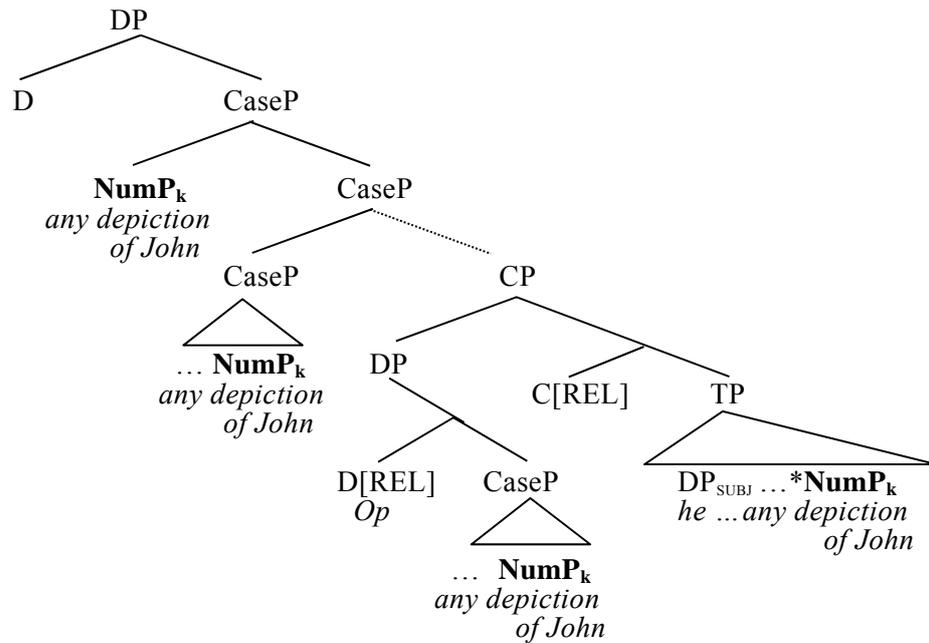
(Sauerland (2003: 211) from Safir (1998))

b. I respect any depiction of John_i [he_i'll object to]. (Sauerland (2003: 211))

In both (238a) and (238b), the proper name *John* is contained in the complement PP of the noun *depiction*. While the noun *depiction* is NOT included in the shared NumP but is only pied-piped via A'-movement in (238a), it is included in the shared NumP in (238b). This is illustrated below.



(238b)'



In (238a)', the shared NumP includes only *any writer*, excluding the proper name *John*. Again, the elements of the A'-moved phrase outside the shared NumP are forced to be interpreted at the base position, as with *wh*-questions in the same configuration.

(239) * Which report on Bob_i's division will he_i not like? (Sauerland (2003: 211))

In contrast, the shared NumP in (238b)' is *depiction of John*. The well-formedness of the sentence shows that, as we assume in (234b), any of the copies of the shared NumP can be interpreted, unless interpretation at a certain position is forced for the idiom interpretation or variable binding.⁶⁴

⁶⁴ Sauerland (2003) observes the contrast in (i) which he claims shows essentially the same point.

- (i) a. Max is a prince [<[John_i's] description of whom> he_i varies < > when spies are around]. (Sauerland (2003: 210) from Safir (1998))
- b. * Max is a prince [<whose description [of John_i]> he_i varies < > when spies are around]. (Sauerland (2003: 210))

The observation leads us to conclude that the prenominal genitive subject in (ia) is also an adjunct to the noun *description*.

3.6.4. Some Predictions for Word Order Variation

We observe a strong tendency among the world languages for relative clauses to follow Head Nominals. Examine the figure (240).

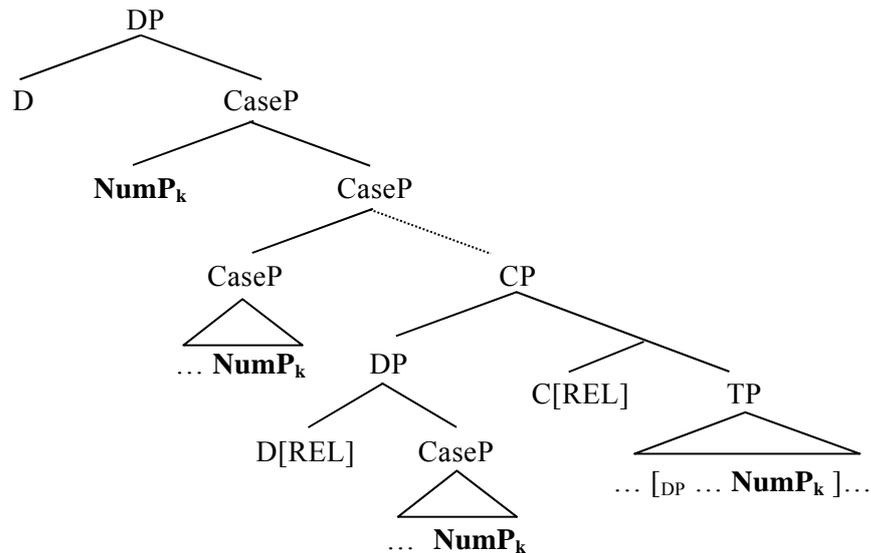
(240) *The World Atlas of Language Structures* (Haspelmath et al. (2005))

Overt Wh-fronting and the Order between Relative Clauses and Head Nominals

Number of Languages	Order between Relative Clause and Head Nominal	Overt <i>Wh</i> -fronting
219	Head Nominal > Relative Clause	No
117	Head Nominal > Relative Clause	Yes
76	Relative Clause > Head Nominal	No
27	Head Nominal > Relative Clause	No
	Relative Clause > Head Nominal	
13	Head Nominal > Relative Clause	Mixed
8	Relative Clause > Head Nominal	Yes
7	Head Nominal > Relative Clause	Yes
	Relative Clause > Head Nominal	
2	Head Nominal > Relative Clause	Mixed
	Relative Clause > Head Nominal	
1	Doubly Headed	No
1	Relative Clause > Head Nominal	Mixed

Of the 471 languages, 336 show only the Head Nominal-relative clause order, and the availability of that order is observed in 385 languages. One initially wonders why the adjunction theory of relativization allows relative clauses to follow while they are adjoined to the Head Nominals. The traditional adjunction structure of restrictive relatives predicts that adjuncts are pronounced before Head Nominals unless the Head Nominals are not raised. In our analysis, however, the question does not arise even though we also assume adjunction of relative clauses. Our analysis of restrictive relative structures is repeated in (241).

(241)



As we have argued in Section 3.5, the legitimate adjunction site of restrictive relative clauses is autonomously determined at a position lower than the landing site of the DP-internal NumP movement. This results in the structure where Head Nominals are located and ordered higher than the pair-merged relative clauses. Thus, Head Nominals precede relative clauses.

We can also observe an implicational universal concerning the inverse ordering between relative clauses and Head Nominals in (240) in accordance with the availability of overt *wh*-fronting.⁶⁵ A strong tendency is that the availability of the *wh*-in-situ entails that relative clauses can precede Head Nominals. Note that only eight of the 471 languages can license the relative-Head order while they do not the *wh*-in-situ.⁶⁶

⁶⁵ Obligatory overt movement of the null operator *Op* is stipulated in general even in languages such as Japanese. Although *Op* is considered phonologically null in many languages, it is often argued to move “overtly” in *wh*-in-situ languages. It does so partially because it is semantically parallel with the fronting of topical constituents, which are also fronted in many *wh*-in-situ languages.

⁶⁶ Among the eight languages are Cherokee, Evenki, Ingush, Khoekhoe, Maidu, Quechua, and Zayse. This is the case if overt *wh*-fronting means the pronunciation of the upper copy of the shared NumP. Cross-linguistic variation in the covert movement internal to DP needs further

Suppose that there are languages that allow pronunciation of lower copies of NumP created via the predicate-creating NumP movement in DP. It follows the word order in which adjoined relative clauses precede shared NumPs and are preceded by the edge elements of DP. No such choice seems to be observed in English on the phonological side of the Copy Theory of movement. If we pronounce the lower link of the chain, a PF violation will occur. Deletion of the upper copy is required at PF without violating the syntactic requirement that forces movement and without looking ahead from the syntax to the phonology.

Bošković (2002) examines the Serbo-Croatian multiple *wh*-movement shown in (242) and (243) and claims that it shows an instance where a *wh*-phrase is prohibited from moving.

- (242) a. Ko šta kupuje?
 who what buys
 b. *Ko kupuje šta?
 who buys what
 ‘Who buys what?’ (Nunes (2004: 35))

- (243) a. *Šta šta uslovljava?
 what what conditions
 b. Šta uslovljava šta?
 what conditions what
 c. Šta neprestano šta uslovljava?
 what constantly what conditions
 ‘What (constantly) conditions what?’ (Nunes (2004: 35))

As shown in (242), all of the *wh*-phrases in *wh*-questions should be fronted in Serbo-Croatian. However, when a multiple *wh*-question involves the adjacent occurrence of *wh*-phrases of the same

investigation.

type, the pattern in (243b) arises. Bošković (2002) argues that although (243b) involves overt movement of the *wh*-phrase that is pronounced at the base position, a morphological constraint blocks its pronunciation at the head of the chain.

At this point, we need a mechanism to eliminate some of the copies generated in Narrow Syntax and to leave the ones required for a well-formed PF (Bobaljik (2002), Fanselow and Cavar (2002), Nunes (2004), Corver and Nunes (2007), Landau (2006)).

(244) *Economy of Pronunciation* (Landau (2006: 81))

Delete all chain copies at PF up to P-recoverability.

Bošković (2002) presents evidence for the analysis by showing that a *wh*-phrase pronounced at the base position in Romanian, which obeys the same restriction on the multiple *wh*-fronting, licenses parasitic gaps.

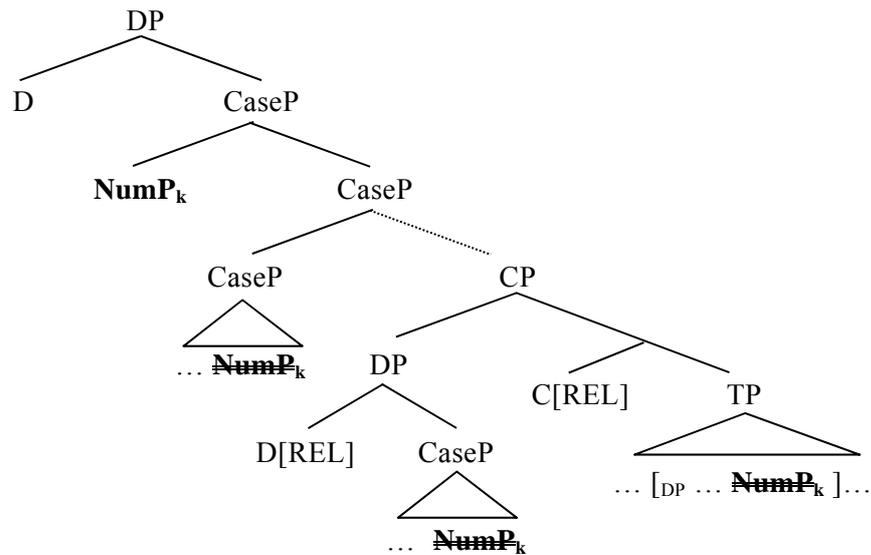
(245) Ce precede ce fara sa influenteze?
what precedes what without SUBJ.PRT influence.3P.SG
‘What precedes what without influencing?’

(Nunes (2004: 36) from Bošković (2002))

This leads us to suggest that under our analysis of the restrictive relative structures, a choice of the pronunciation of a certain NumP explains some tendency concerning the word order variation of restrictive relative structures.

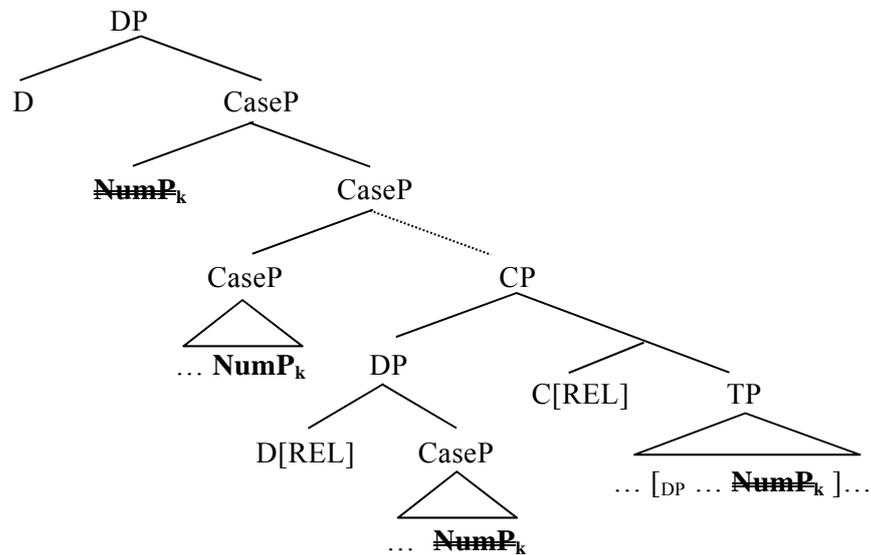
Let us consider some word order possibilities derived from our unified analysis of restrictive relative structures. If a language is forced to pronounce the head of the chain of NumP, it will lead to the Head Nominal-relative clause order shown in (246).

(246) *Pronounce the highest NumP: D > NumP > CP*



On the other hand, if a language requires pronouncing one of the lower NumPs, the word order between relative clauses and Head Nominals will be ambiguous. More specifically, when a language allows pronunciation of a lower NumP located at the bottom of the matrix DP, it will lead to the relative clause-Head Nominal order of the language, as illustrated in (247).

(247) *Pronounce a lower NumP: D > CP > NumP*



Since the relative clause CP is adjoined higher than the lower copy of the matrix NumP, the process SIMPL at the interface, for instance, leads to the relative clause-Head Nominal order in (247).⁶⁷

⁶⁷ Note that given the head-parameter, C precedes TP in head-initial languages whereas TP

3.7. Summary

This chapter has proposed the shared NumP movement analysis of restrictive relative structures, which can derive the most optimal and transparent output at the C-I and SM interfaces. In our analysis, relative clauses are adjoined where they are interpreted properly with respect to the semantic composition. Moreover, it has been shown that the sharing structure of NumP, which is potentially problematic in the interpretation at the SM interface, is dissolved automatically. The shared NumPs always moves in the layered DP irrespective of relativization.

We have argued that a sharing structure is obtained by Share Merge, the simultaneous application of multiple External Merges which yields intersecting sets, and DP-internal movement of the shared NumP explains Head-Raising from the adjoined relative clauses and the reconstruction effects inside them. We have presented the assumption that in order to explain the optionality in the reconstruction of Head Nominals, the interpretation of shared copies and that of A'-moved elements are different. Given this assumption, the illegitimate Condition C effects of *wh*-phrases can be accounted for by the obligatoriness of reconstruction in A'-movement. On the other hand, the obviation of the Condition C effects of Head Nominals can be accounted for by the optionality of reconstruction in the interpretation in the sharing structure. It is shown that the former is regarded as a matter of clausal syntax whereas the latter is regarded as a matter of DP-internal syntax.

Without any construction specific mechanism, the reconstruction effects of shared NumPs (i.e., Head Nominals) and anywhere interpretation of adjunct clauses (i.e., relative clauses) follow from our unified analysis. The various (anti-)reconstruction effects do not constitute any evidence for the alleged structural ambiguity because in our analysis they are also accountable in a principled way.

precedes C in head-final languages.

PART II

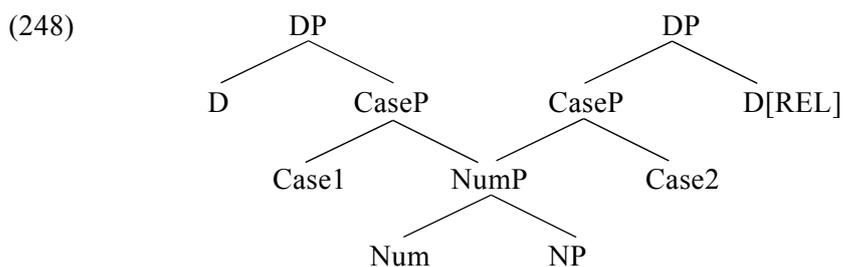
Chapter 4

What a Unified Account Tells Us about Operator-Variable Constructions

4.1. The Shared-NumP Movement Analysis and Other *Operator-Variable* Constructions

Based on the analysis of restrictive relative structures in English given in PART I, Chapters 5-7 investigate three constructions that involve attributive modification through the formation of *operator-variable* chains. The three constructions are adverbial relatives, amount/degree relatives, and attributive comparatives, all of which have received different accounts in the previous studies because of their different interpretative profiles. By briefly examining properties of the three constructions in English and Japanese that are discussed in Inada (2009, 2010, 2011a, 2011b, 2012, and 2013), we will determine whether the assumptions of our unified analysis can adequately account for the three constructions in English and Japanese.

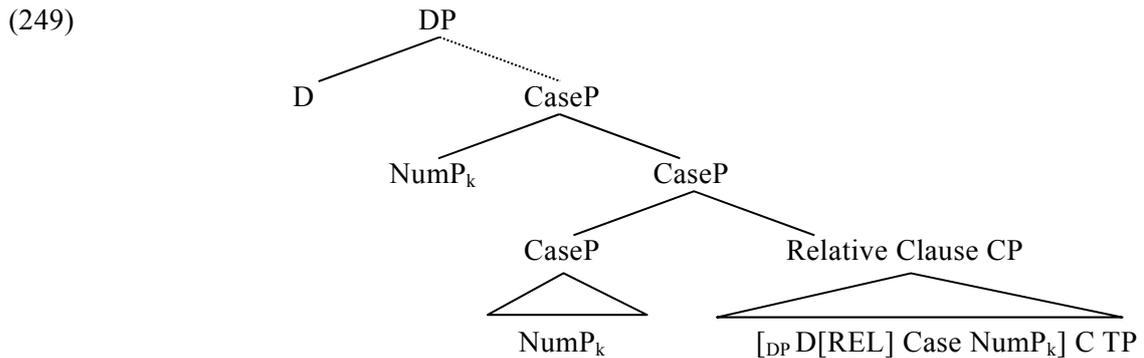
We have proposed a unified account for restrictive relative structures in PART I that involve the sharing of NumP at the beginning of the derivation, as illustrated in (248).



In (248), the syntactic object {Num, NP} is shared between the matrix and the relative clause, while its value of definiteness, Case, and specificity can be assigned in multiple ways depending on the context in each clause. Our theory predicts that lexical information in N and number information specified by Num are necessarily shared. In contrast, our theory says nothing about other functional information such as the definiteness, specificity and Case of the two independently

projecting DPs.

In PART I, we argued that the shared NumP undergoes DP-internal movement for an independent reason, which results in resolving the unlinearizable sharing structure in (248). This is roughly illustrated in the structure below, in which the two NumP_ks at the bottom (CaseP and Relative Clause CP) are shared.



Since the raised NumP is shared at the beginning, the structure in (249) is considered to be derived via Head-Raising of the shared NumP. The raising analysis accounts for the reconstruction effects of the shared NumP, and the adjunction structure accounts for the late-merger effects of the relative clause. Furthermore, we pointed out that the derived structure presented in (249) provides an appropriate and transparent structure for adjunction of adjunct clauses that involve the formation of *operator-variable* chains.

All three constructions involve attributive modifications through the operator-variable, or filler-gap, dependencies as restrictive relative structures, but in the previous studies, an account given to each of the three constructions is slightly different from that of restrictive relatives because they show different interpretative properties. In this regard we consider the following two questions:

- (250) i. How is the connection between Head Nominals and non-nominal gaps established with respect to the three constructions?
- ii. To what are the differences between English and Japanese attributed with respect to the three constructions?

Considering (250i), PART II argues that under the unified account proposed in PART I, the three constructions—adverbial relatives, amount/degree relatives, and attributive comparatives—are adequately explained as involving hidden restrictive relative structures. Our theory of restrictive relativization enables us to claim that the adjoined position of these “relative” clauses is automatically determined when they involve an operator movement. That is, if there is a variable derived in Narrow Syntax, the adjunct clause is adjoined just beneath the binder of the variable in the syntactic derivation, as in the configuration illustrated in (249). As for (250ii), PART II shows that the cross-linguistic differences in these three constructions may be attributed to the lexicon and the morpho-syntactic features of the relativized elements in each language.

4.2. Organization of PART II

4.2.1. Adverbial Relatives

Chapter 5 considers so-called adverbial relatives in English and Japanese. Adverbial relatives have relative-like structures in which the roles of the Head Nominals inside relative clauses are adverbial. Let us recall the examples in Chapter 1, repeated in (26).

- (251) a. Our ancestors lived in a time [_{CP} when the world was less complicated].
 b. My parents visited the place [_{CP} where they first met].

Apparently, the attributive clauses shown in (26) include only gaps of adverbial operators, which we may observe in adverbial clauses such as those illustrated in (27).

- (252) a. You may go out [_{CP} when_i you have done your thesis e_i].
 b. Put back the book [_{CP} where_i you found it e_i].

Note that the adverbial relatives in (26) are not adverbial clauses as the CPs in (27) are, but they are undoubtedly attributive clauses. Our theory of relativization holds that these relatives do not in fact include any adverbial gaps but rather involve relativization of nominal elements from within a hidden PP structure, where a prepositional head is only phonologically null (cf. Lehman

(1984)).⁶⁸

In Chapter 5, Section 5.1 examines properties of the class of DPs that can function adverbially in simple sentences. Section 5.2 considers the structure of adverbial relatives in English and Japanese, in which subordinate clauses that seem to involve only adverbial gaps modify noun phrases. Section 5.3 proposes a derivation and structure of adverbial relatives from the perspective of the unified account of restrictive relative structures proposed in this thesis. Finally, Section 5.4 claims that in accordance with the proposed structure of adverbial relatives, spatio-temporal R-pronouns are not adverbial DPs, although they themselves have PP structure. In this regard, we can say that Japanese adverbial relatives involve the movement of null adverbial operators.

4.2.2. Amount/Degree Relatives

Chapter 6 considers so-called amount/degree relatives in English and the corresponding constructions in Japanese. Carlson (1977) claims that in contrast to (253a) the relative clauses illustrated in (253b) may denote not a property of the individual entity but only its amount.

(253) a. Huey put everything which was red in his crib.

$(\forall x)$ (x was red Huey put x in his crib)

b. Marv put everything he (possibly) could in his pocket.

$(\forall x)$ (Marv could put x in his pocket Marv put x in his pocket)

The interpretation of the relative clause in (253b) may be shown by the paraphrase in (254).

(254) Marv could (possibly) put THAT MANY THINGS in his pocket

⁶⁸ Lehman (1984) refers only to the construction exemplified in (252) as an adverbial relative. Here, the role of the “implicit” Head Nominal must be adverbial in both the matrix and relative clauses. See the data and discussion in Chapter 5.

We can say that they are similar to comparative clauses with respect to the interpretation of the abstraction over amount expressions such as *that many*, as shown in (255).

- (255) a. There are more women in high school than there are in college.
b. There are THAT MANY WOMEN in college. (Carlson (1977))

In contrast to comparative clauses such as (255a) that modify the adjectival amount expression *more* in the matrix clause, however, there is no doubt that the amount/degree relatives in (253) are attributive clauses.

Chapter 6 treats the question of the source of the amount interpretation of amount relatives. One might consider there to be a unique derivation for the amount reading (cf. Grosu and Landman (1998), Szczegielniak (2012)). Alternatively, one might argue that there is a semantic principle that forces a restrictive relative structure to be mapped onto the semantic representation to yield the expected reading (Carlson (1977), Heim (1987), McNally (2008)). The position of this thesis falls between those two views. In Chapter 6, Section 6.2 examines basic properties of amount/degree relatives in English. Section 6.3 considers the relativization of semi-lexical nominals in Japanese. By integrating these two types of relative structures under the unified account proposed in this thesis, we can argue that amount/degree relatives in English involve pied-piping, whereas those in Japanese need not. Finally, it is shown that amount/degree relatives in English have a structure identical to that of restrictive relatives, even though the internal A'-movement is considered a case of pied-piping by amount/degree expressions occurring at the Spec,NumP. The sharing of amount expressions in the course of syntactic derivation is allowed in Japanese because such expressions are genuine nominal elements in Japanese.

4.2.3. Attributive Comparatives

Chapter 7 considers attributive comparatives in English and Japanese. Consider the examples shown in (41).

- (256) a. Taroo bought [_{DP} more umbrellas [than [Hanako did *e*_{VP}]]].
- b. Taroo-wa [_{DP} [[Hanako-ga *e*_{DP} katta] yori] takusan kasa-o] katta.
 Taroo-TOP Hanako-NOM bought YORI many umbrella-ACC bought
 ‘Taroo bought more umbrellas than Hanako did.’

The comparative clauses appear to be adjoined inside DP. In addition, it is often argued that the comparative clauses involve *operator-variable* chains established via A'-movement in Narrow Syntax. The examples in (256) are called Comparative Deletions because (256a) and (256b) involve the deletion of VP and DP, respectively. Based on an observation of Ishii (1991), Beck et al. (2004) claim that Comparative Deletions in Japanese and English differ in the lexical properties of the gradable adjectives, as shown by (257)-(258), with variability of judgments observed only in the case of the Japanese example in (258).

- (257) Taroo bought [a longer umbrella [than [Hanako did *e*_{VP}]]].
- (258) ?/?/?/?*Taroo-wa [[[Hanako-ga *e*_{DP} katta] yori] nagai kasa-o] katta
 Taroo-TOP Hanako-NOM bought YORI long umbrella-ACC bought
 ‘Taroo bought a longer umbrella than Hanako did.’

Following Inada’s (2010, 2011b, 2012) analysis of attributive comparatives in Japanese, Chapter 7 argues that the apparent parametric variation between English and Japanese attributive comparatives can be given a syntactic account through the relativization of semi-lexical nominals under the unified account of restrictive relative structures.

Section 7.2 investigates the syntax and semantics of Comparative Deletions in English. Next, Section 7.3 considers properties of Comparative Deletions in Japanese and explores their differences from English comparatives. More specifically, this section examines the claim that Japanese lacks any degree abstraction established by a syntactic operation (Beck et al. (2004), Kennedy (2007)). Section 7.4 introduces an argument from Inada’s (2010, 2011b, 2012), showing that without deletion of a certain constituent, the degree abstraction is basically unavailable for

both English and Japanese attributive comparative clauses. Finally, Section 7.5 considers a hidden relativization analysis, where the apparent clausal comparatives in Japanese must be (re-)analyzed as phrasal comparatives derived via relativization.

Chapter 5

Hidden Preposition Analysis of the Adverbial Relatives in English and Japanese

5.1. Properties of DP Adverbs

5.1.1. Bare-NP Adverbs as DP Adverbs

Some spatio-temporal nominal phrases in English can be used adverbially without spatio-temporal adpositions, as shown in (259).

- (259) a. John arrived (on) that day.
b. You have lived (in) some place warm and sunny. (Larson (1985: 596-597))

Nominal phrases such as *that day* or *some place warm and sunny* in (259) are known as “bare-NP adverbs” (Larson (1985)). Although the question of how “bare” they cannot be easily answered, we can at least say that they have DP structure because they often involve determiners such as *some* and *that*. In this thesis, therefore, these adverbial nominal phrases are referred to as “DP adverbs” (Inada (2013)).

The membership of the class of DP adverbs in a particular language is determined on lexical grounds. Let us examine some examples. Larson (1985) observes that in English, DPs can occur without adpositions when they have common nouns denoting the temporal point as their lexical heads, as shown in (260a), and when they are “proper names for the temporal periods,” as in (260b).

- (260) a. John arrived [that {moment/minute/hour/day/week/month/year}].
b. John arrived [{the previous April/March 12th/Sunday/the Tuesday that I saw Max}].

In addition, Larson (1985) notes “the only [DP] adverbs of location are those headed by the common noun *place*” (Larson (1985: 596)).

(261) You have lived [{some place warm and sunny/every place that Max has lived}].

According to Larson (1985), spatio-temporal deictic proforms such as *then*, *there*, and *here*, which are called R-pronouns in van Riemsdijk (1978), are also instances of DP adverbs.

(262) a. John arrived [then].

b. John lived [here/there].

Larson (1985) also states that DPs headed by temporal nouns denoting the time span during which the event described in the sentence occurs cannot occur without adpositions, as shown in (263).

(263) a. John arrived {*(on) [that occasion]/*(during) [this vacation]}.

b. John stayed in New York {*(during) [that period of his life]/*(before) [that interval]}.

Moreover, other common spatial nouns or spatial proper names cannot occur without adpositions, as shown in (264).

(264) a. You have lived *(at) [some {location/address/area} near here].

b. You have lived {*(on) [43rd St]/*(in) [Germany]}.

We argue that these spatio-temporal DP adverbs are divided into two types: (i) spatio-temporal DPs that are in the complement position of a silent adposition and (ii) R-pronouns, which are adverbials that incorporate an adposition.

5.1.2. Types of DP Adverbs

Let us briefly consider previous analyses concerning the syntactic category of DP adverbs. Bresnan and Grimshaw (1978) claim that adverbial nominals are PPs in which the adposition selects the nominal phrase under the identity of a certain feature and is deleted when the value of

the feature is [Temporal], [Locative], [Direction], or [Manner]. The deleted adposition is only phonologically null. McCawley (1988) modifies Bresnan and Grimshaw's (1978) silent PP analysis, claiming that the adverbial DPs are to be analyzed as objects of a silent adposition. On the other hand, Larson (1985) claims that the adverbial nominals are NPs, i.e., DPs in our present terminology. The feature of N optionally assigns Oblique Case to the phrase it projects when the value of the feature is [Temporal], [Locative], [Direction] or [Manner]. Larson also claims that an adverbial θ -role is assigned to α , where α is any phrase. DPs that are assigned an Oblique Case can occur as an adverbial phrase in the sentence if the adverbial θ -role is assigned to it. Henceforth, the value of the feature that allows Ns to be lexical heads of DP adverbs is referred to as [θ_{ADV}].

Larson (1985) observes that DP adverbs can be conjoined with other adverbial categories, such as simplex adverbs and PPs, as shown in (265).

- (265) a. They will be arriving [Thursday] and/or [subsequently].
 b. The entire company will be arriving [at two o'clock] and/or [the next day].

(Larson (1985: 599))

These DP adverbs show a distribution parallel with simplex adverbs and PPs. They can occur where the occurrence of the adverbial category is obligatory, as shown in (266).

- (266) a. Peter {worded/phrased} the letter {* \emptyset /[tactlessly]/[in a thoughtful manner]/[that way]}.
 b. Peter put the letter {* \emptyset /[in the mailbox]/[some place]}. (Larson (1985: 599))

McCawley (1988) observes that DP adverbs can occur in sentence-final position, as shown in (267a), where simplex adverbs can also occur, as shown in (267b).

- (267) a. Smith may have withdrawn his lawsuit [DP_{adv} that day].
 b. Smith may have withdrawn his lawsuit [ADV subsequently].

(McCawley (1988: 585))

This is the position where PPs can also occur, as exemplified in (268).

- (268) The final axe is expected to come after Birt takes over as the new director general [_{PP} in March]. (Haumann (2007: 266))

However, as observed in McCawley (1988), DP adverbs cannot occur in the mid-position of the sentence, as shown in (269a), whereas simplex adverbs can indeed occur there, as shown in (269b).

- (269) a. * Smith may have [_{DP_{adv}} that day] withdrawn his lawsuit.
b. Smith may have [_{ADV} subsequently] withdrawn his lawsuit.

(McCawley (1988: 585))

In the mid-position of the sentence, PPs are less than fully acceptable or are unacceptable, as shown in (270).

- (270) a. ?? Smith may have [_{PP} on a subsequent day] withdrawn his lawsuit.

(McCawley (1988: 585))

- b. * BT will [_{PP} in March] begin to market Europe's first international videophone ...

(Haumann (2007: 266))

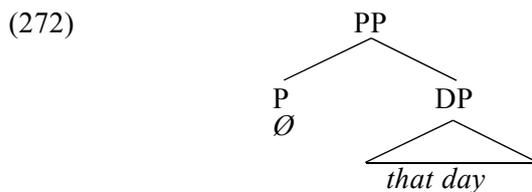
McCawley (1988) claims that the examples in (269) and (270) constitute evidence in favor of the silent PP analysis of DP adverbs. DP adverbs cannot occur in the mid-position of the sentence since PPs are not allowed there. If DP adverbs did not have such an invisible PP structure, we would have to further assume, for example, that the inherent Case marking proposed in Larson (1985) is unavailable in the mid-position of the sentence.

Thus far, we have shown that there are two positions concerning how DPs function as adverbials. One position is that of Larson (1985), which proposes that DP adverbs are inherently Case-marked nominals. Larson shows that DP adverbs can be conjoined with other adverbial categories such as simplex lexical adverbs and adverbial PPs. The other position maintains that DP adverbs are PPs with covert adpositions (Bresnan and Grimshaw (1978), Emonds (1987), and McCawley (1988)). McCawley (1988) and Haumann (2007) observe that DP adverbs cannot occur in those positions where PPs cannot occur. They claim that the parallel distribution of DP adverbs

and adverbial PPs can be explained by the silent PP analysis. Following McCawley (1988), Inada (2013) claims that the adverbial nature of DP adverbs may be attributed to a silent adposition right above the spatio-temporal DP, as illustrated in (271) (cf. Caponigro and Pearl (2009)).

- (271) a. [PP \emptyset_P [DP that day]]
 b. [PP \emptyset_P [DP some place warm and sunny]]

Another piece of evidence for the silent PP analysis is provided by Inada (2013) in an investigation of the relativization of DP adverbs in English and Japanese. The relativization of DP adverbs sometimes strands a phonetically null element to which the adverbial function of the DP adverbs is attributed. This leads us to conclude that DP adverbs have an invisible PP structure with a silent adposition above DP. This invisible PP structure is illustrated in (272).⁶⁹



Although Inada (2013) adopts a Head-Raising approach to restrictive relatives, the claim that DP adverbs have a hidden PP structure makes it possible for our theory of relativization to account for various aspects of adverbial relatives in English and Japanese.

⁶⁹ Collins (2007) proposes that the non-pronunciation of the adposition follows from a general version of the Doubly-filled Comp Filter, which is a principle of UG.

- (i) a. Edge (X) must be phonetically covert.
 b. The condition in (a) applies in a minimal way so that either the head or the specifier, but not both, are spelled-out overtly.

In this respect, the specifier position of the locative P would be filled by the DP.

5.2. Deriving Adverbial Relatives: Hidden Preposition Analysis

5.2.1. Seemingly Gapless Adverbial Relatives in English

Larson (1985) observes that the lexical head N with the feature $[\theta_{ADV}]$ of DP adverbs can be the Head Nominal of a seemingly gapless relative clause, as shown in (273).

- (273) a. the {time $[\theta_{ADV}]$ /moment $[\theta_{ADV}]$ /day $[\theta_{ADV}]$ /...} [(that) he left]
 b. the place $[\theta_{ADV}]$ [(that) he lives]

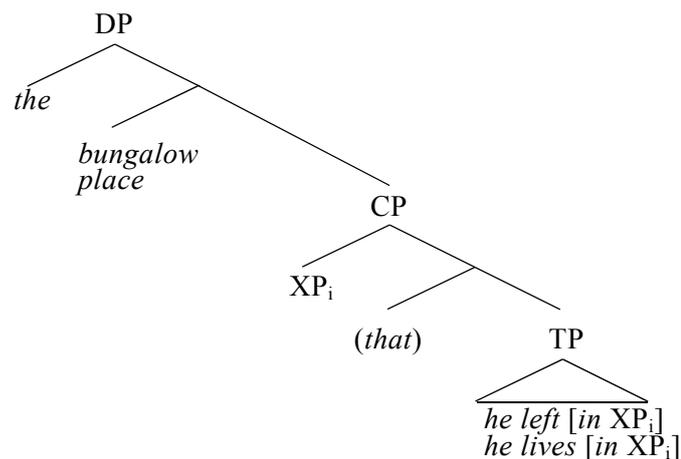
Larson (1985) also observes that a spatio-temporal N without $[\theta_{ADV}]$, which cannot head a DP adverb, cannot be a Head Nominal of such a seemingly gapless clause, as illustrated in (274).

- (274) a. * the interval [(that) he left]
 b. * the bungalow [(that) he lives]

In other words, the spatio-temporal N with $[\theta_{ADV}]$ can be a Head Nominal of an adverbial relative, where spatio-temporal adverbials can be substituted for the gapped position.

Note that if the gapped position is nominal, Ns both with and without $[\theta_{ADV}]$ can be the Head Nominal of relative clauses, as illustrated in (275).

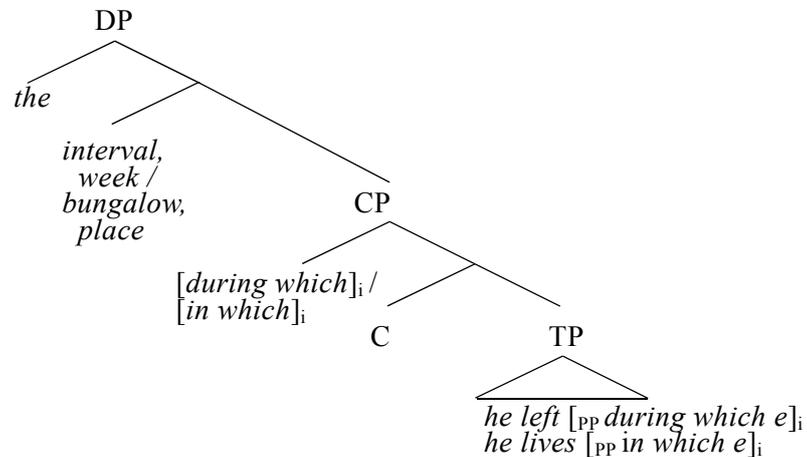
- (275) the {bungalow/place $[\theta_{ADV}]$ }_i [(that) he lives in e_i]



In (275), stranding of the overt adposition *in* yields a relative clause with a gap in the complement position of the adposition. In addition, pied-piping of the overt adposition accompanied by *which* leaves a PP gap, as illustrated in (276), allowing both Ns with $[\theta_{ADV}]$ and Ns without $[\theta_{ADV}]$ to be

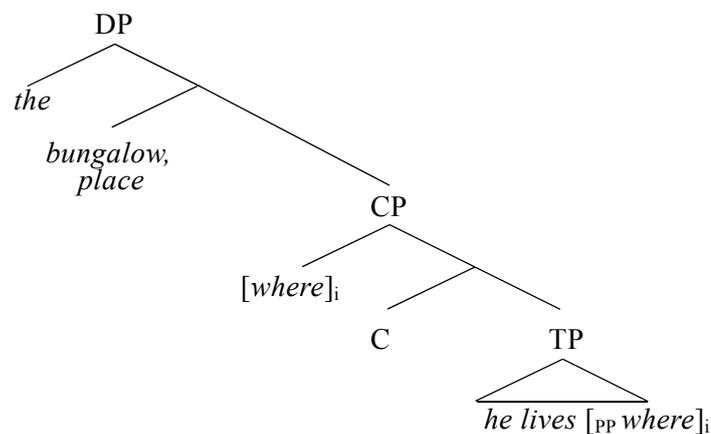
the Head Nominal.

- (276) a. the {interval/week}_i [[during which]_i he left *e_i*]
 b. the {bungalow/place}_i [[in which]_i he lives *e_i*]



As discussed in Chapters 2 and 3, the gapped position is contained in the pied-piped phrase. Furthermore, *in which* in (276b) can be replaced with the R-pronoun *where* as a spatial *wh*-relativizer, as shown in (277).

- (277) the {bungalow/place[θ_{ADV}]}_i [*where*_i he lives]



The Head Nominal of the relative clause in (277) can be Ns either with or without [θ_{ADV}]. This indicates that the relative clause is gapped: the relativizer *where* leaves the gap of PP within the relative clause.

We can observe the correspondence whereby only Ns with [θ_{ADV}], which can be the lexical head of a DP adverb, can also be the Head Nominal of seemingly gapless relative clauses, while

both Ns with [θ_{ADV}] and Ns without [θ_{ADV}] can be the Head Nominal of gapped relative clauses.

5.2.2. Seemingly Gapless Adverbial Relatives in Japanese

Inada (2013) observes that spatio-temporal nominals in Japanese can also be modified by seemingly gapless clauses in a manner similar to that of relative clauses in English that modify lexical head Ns with [θ_{ADV}], as shown in (278).

- (278) a. Taroo-wa [_{DP} [_{TP} Hanako-ga sinda] hi-o] omoidase-nai.
 Taroo-Top Hanako-Nom died day-Acc remember.can-Neg
 ‘Taroo cannot remember the day when Hanako died.’
- b. Taroo-wa [_{DP} [_{TP} Hanako-ga taizaisita] basyo-o] omoidase-nai.
 Taroo-Top Hanako-Nom stayed place-Acc remember.can-Neg
 ‘Taroo cannot remember the place where Hanako stayed.’

The above observation might suggest that the modified nominal expressions *hi* ‘day’ in (278a) and *basyo* ‘place’ in (278b) are Ns with [θ_{ADV}] in Japanese, which can function as the lexical head of DP adverbs. In fact, temporal nouns such as *hi* ‘day’ in (278a) can be used as the lexical head of a DP adverb without a temporal adposition *-ni*, as shown in (279).⁷⁰

⁷⁰ The temporal adposition *-ni* seems to alternate with *-de*.

- (i) Taroo-wa ronbun-o sono kikan{-ni/-de} siageta.
 Taroo-Top paper-Acc that period{-NI/-DE} finish.past
 ‘Taroo finished the paper within that period.’

However, *-ni* marked and *-de* marked phrases can co-occur, as shown in (ii).

- (ii) Taroo-wa ronbun-o sono kikan-ni 1-syuukan-de siageta.
 Taroo-Top paper-Acc that period-NI 1-week-DE finish.past

The *-ni* marked phrase *kikan-ni* expresses the temporal period of the event while the *-de* marked

- (279) a. Hanako-ga [DP sono {toki/hi/tuki/tosi}](*-ni*) sinda.
 Hanako-Nom that.Gen {time/day/month/year}(*-NI*) died
 ‘Hanako died {that time/that day/that month/that year}.’
- b. Hanako-ga [DP {sen-getu/1985-nen}](*-ni*) sinda.
 Hanako-Nom {previous-month/1985-year}(*-NI*) died
 ‘Hanako died {last month/in 1985}.’

A spatial noun in Japanese cannot be the lexical head of DP adverbs. The spatial adposition *-ni* must be overt in the sentence, as shown in (280).

- (280) Hanako-ga [DP sono {basyo/ie/juusyō/tiiki}](*-ni*) taizaisita.
 Hanako-Nom that.Gen {place/house/address/area}(*-NI*) stayed
 ‘Hanako stayed in that {place/house/address/area}.’

Given that spatial nouns in Japanese lack [θ_{ADV}], the question arises as to where the spatial adposition in (278b) has gone. The adposition must be overt within the relative clause in (278b), as we have observed in the relativization of the spatial noun *bungalow* in (275) and (276). Note that in Japanese the overt adposition cannot occur in relative clauses, as shown in (281).⁷¹

- (281) * Taroo-wa [DP [TP Hanako-ga [PP *-ni*] taizaisita] basyo-o]
 Taroo-Top Hanako-Nom *-NI* stayed place-Acc
 omoïdase-nai.
 remember.can-Neg

One might wonder whether the relativization of a *-wa* marked topic would yield a gapless

phrase *I-syūkan-de* expresses the duration of the event, as in *Taroo was in such a hurry that he finished his paper within a week*.

⁷¹ It can be considered that *-ni* is a Case marker whose semantic role depends on the types of the predicates, while *-de* is a genuine adposition.

relative clause in Japanese because bare spatial DPs can be licensed by *-wa*, as shown in (282).

- (282) a. Sono basyo(-ni)-wa [Taroo-ga itta].
 that place(-NI)-Top Taroo-Nom went
- b. Sono basyo(-ni)-wa [Taroo-ga sundeita].
 that place(-NI)-Top Taroo-Nom lived

However, the topic marker cannot always license bare spatial DPs as shown in (283), while relativization is always possible without any overt adposition, as shown in (284).

- (283) Sono basyo*(-de)-wa [Taroo-ga sinda].
 that place(-DE)-Top Taroo-Nom died
- (284) a. [Taroo-ga itta] basyo...
 b. [Taroo-ga sundeita] basyo...
 c. [Taroo-ga sinda] basyo ...

Thus, the question of why spatial adpositions in Japanese are missing in the case of relativization cannot be answered by assuming the relativization to be of topicalized phrases.⁷²

⁷² The missing adposition of the topicalized PP can be uniquely recovered as shown in (i), while the interpretation of the relativized PP is ambiguous, as indicated in (ii).

- (i) a. Sono basyo[?](-ni)-wa [Taroo-ga *t* yattekita].
 that place-to-Top Taroo-Nom come.past
 ‘Taroo came to that place.’
- b. Sono basyo*(-kara)-wa [Taroo-ga *t* yattekita].
 that place-from-Top Taroo-Nom come.past
 ‘Taroo came from that place.’
- (ii) sono [Taroo-ga *t* yattekita] basyo
 ‘the place {from/to} which Taroo came’

Thus far, we have observed that in English, only the lexical head N of DP adverbs that bear the feature [θ_{ADV}] can be Head Nominals of seemingly gapless relative clauses. We have also observed that spatial Ns in Japanese that are considered to lack the feature [θ_{ADV}], such as *basyo* ‘place,’ can be Head Nominals of seemingly gapless relative clauses.

5.2.3. Relativization of DP Adverbs

Now consider Inada’s (2013) derivation of adverbial relatives that involve a gap of DP adverbs. Examine the examples of adverbial relatives shown in (285).

- (285) a. Lily dreaded the time that he had to go.
 b. Lily adores the place that he lives.

First, let us consider the function of the relativized DP adverbs in the superordinate clauses. The function of the Head Nominal *time* or *place* inside the relative clause in (285) does not match that of the relativized head in the superordinate clause.

Under Inada’s (2013) silent PP analysis, the phonetically null adposition, designated \emptyset_P , is right above the adverbial spatio-temporal DP. The relative clauses in (285) are derived via the relativization of DP adverbs, leaving the silent adposition \emptyset_P within TP. Inada (2013) assumes a Head-Raising approach for the relativization, which requires the lexical head N of the DP adverb to be promoted further to the specifier position of ForceP.

- (286) a. [$_{ForceP}$ [$_{time_{[\theta_{ADV}]j}}$] [$_{TopP}$ [$_{DP}$ $D_{[REL]}$] $_{time_{[\theta_{ADV}]i}}$] that $_{[TP}$ he had to go
 $_{[PP}$ \emptyset_P [$_{DP}$ $D_{[REL]}$] $_{time_{[\theta_{ADV}]i}}$]]]]].
 b. [$_{ForceP}$ [$_{place_{[\theta_{ADV}]j}}$] [$_{TopP}$ [$_{DP}$ $D_{[REL]}$] $_{place_{[\theta_{ADV}]i}}$] that $_{[TP}$ he lives
 $_{[PP}$ \emptyset_P [$_{DP}$ $D_{[REL]}$] $_{place_{[\theta_{ADV}]i}}$]]]]].

ForceP merges with the matrix D when the DP as a whole is the argument of the main verb, as illustrated in (287).

- (287) a. Lily dreaded [_{DP} the [_{CP} [time[F]] ...]].
 b. Lily adores [_{DP} the [_{CP} [place[F]] ...]].

By way of comparison, let us consider the possible derivation of the relativization of DP adverbs in (285) under the Head-Raising analysis with Larson's (1985) assumption that Oblique Case assignment is optional in relativization. Following Larson's (1985) analysis, while the DP adverbs in (285) would be properly assigned an Oblique Case within the relative clause by means of the inherent lexical feature [_{θ_{ADV}}] of N, the superordinate DPs would not be assigned an Oblique Case by the same [F] assigned in the relative clause, as illustrated in (288).

- (288) a. Lily dreaded [_{DP} the [time<sub>[θ_{ADV}]]_j] [that he had to go [_{DP} D_{[REL][Oblq]} [time<sub>[θ_{ADV}]]_j]].
 b. Lily adores [_{DP} the [place_{[θ_{ADV}]]_j] [that he lives [_{DP} D_{[REL][Oblq]} [place_{[θ_{ADV}]]_j]].}}</sub></sub>

Larson (1985) observes that there are also cases in which superordinate DPs are considered to be assigned Oblique Case by the feature [_{θ_{ADV}}], as exemplified in (289).

- (289) a. John left that day that you spent at the beach. (Larson (1985: 619))
 b. You have lived the places that I cared for. (Larson (1985: 597))

The examples in (289) would be derived as follows.

- (290) a. John left [_{DP} that D_[Oblq] [day<sub>[θ_{ADV}]]_j] [that you spent [_{DP} D [day<sub>[θ_{ADV}]]_j] ...]].
 b. You have lived [_{DP} the_[Oblq] [places_{[θ_{ADV}]]_j] that I cared for [_{DP} D [places_{[θ_{ADV}]]_j]].}}</sub></sub>

In (290), the feature [_{θ_{ADV}}] would originate in the argument DP within the relative clause and assign Oblique Case to the superordinate DP, which allows these spatio-temporal DPs to be adverbials in the matrix clause. To account for the relativization of both DP adverbs and potential DP adverbs with prepositions, Oblique Case should be assigned to DP optionally by the lexical head N with the feature [_{θ_{ADV}}].

Larson's (1985) Oblique Case assignment analysis does not always exploit the optionality of the Case assignment. Recall that we have observed that DP adverbs cannot occur in the mid-position of the sentence, a position where PPs cannot occur, as repeated below.

(291) * Smith may have [_{DP_{adv}} that day] withdrawn his lawsuit.

(292) a. ?? Smith may have [_{PP} on a subsequent day] withdrawn his lawsuit.

b. * BT will [_{PP} in March] begin to market Europe’s first international videophone ...

We have to say that DP adverbs are ungrammatical when they occur in the positions where PPs cannot occur, regardless of whether Oblique Case is assigned to them optionally. Under Larson’s (1985) analysis, we have to assume that the feature [θ_{ADV}] of the head N cannot assign an Oblique Case to its extended projection DP at this position. In other words, we have to say that Oblique Case is always assigned inherently to DP adverbs by their lexical head N with the feature [θ_{ADV}] in the positions in which PPs are allowed.

Once we adopt the silent PP analysis, we can dispense with the optional Oblique Case assignment mechanism. Inada (2013) considers the possibility of the stranding of the silent adposition in the relativization of DP adverbs, which would provide evidence for an invisible PP structure. The promoted lexical head N with the feature [θ_{ADV}] allows the superordinate DP to be a sister of the superordinate adposition, which can be silent, as illustrated in (293).

(293) a. John left [_{PP} on/ \emptyset_P [_{DP} that [_{ForceP} [_{day}_[θ_{ADV}]] ...]]].

b. You have arrived [_{PP} at/ \emptyset_P [_{DP} the [_{ForceP} [_{places}_[θ_{ADV}]] ...]]].

The silent PP analysis allows the “adverbial function” of DP adverbs to be separated from the Head Nominal of adverbial relatives. The overt adposition can be stranded at the base position of the relativized head, regardless of whether the Head Nominal is N with [θ_{ADV}], such as *place*, or N without [θ_{ADV}], such as *bungalow*, as shown in (294).

(294) a. [_{TopP} [_{DP} D_[REL] {_{place}_{[θ_{ADV}]/bungalow}]_i [_{TP} he lives [_{PP} in [_{DP} ...]_i]]]]}

b. [_{TopP} [_{DP} which_[REL] {_{place}_{[θ_{ADV}]/bungalow}]_i [_{TP} he lives [_{PP} in [_{DP} ...]_i]]]]}

This means that head N with [θ_{ADV}] in (293) can be originated as a lexical head of DP that is a sister of the stranded silent adposition, which can occupy the structure of another silent adposition, as illustrated in (295).

- (295) a. [PP \emptyset_P [DP that [_{ForceP} [day<sub>[θ_{ADV}]]] ... [TP ... [PP \emptyset_P [DP D_[REL] [day<sub>[θ_{ADV}]]]]]]]].
 b. [PP \emptyset_P [DP the [_{ForceP} [place_S_{[θ_{ADV}]]] ... [TP ... [PP \emptyset_P [DP D_[REL] [place_{[θ_{ADV}]]]]]]]].}}</sub></sub>

Moreover, Inada (2013) focuses on the use of the relativizer chosen in each relative. The covert relativizer is used in (294a) and the overt *wh*-relativizer in (294b). With the overt *wh*-relativizer, the overt adposition can be pied-piped, as shown in (296).

- (296) [_{TopP} [PP in [DP which_[REL] {place_{[θ_{ADV}]/bungalow}]]_i [TP he lives [PP ...]_i]]}

In addition, the R-pronoun *where* can also be used as a relativizer regardless of the feature [θ_{ADV}], as shown in (297).

- (297) a. [place<sub>[θ_{ADV}]]_j [_{TopP} [PP where_[REL] [place<sub>[θ_{ADV}]]_j] [TP he lives [PP ...]_i]]]
 b. [bungalow]_j [_{TopP} [PP where_[REL] [bungalow]_j] [TP he lives [PP ...]_i]]]</sub></sub>

The covert relativizer cannot be used in the seemingly gapless relative clause when the Head Nominal is N without [θ_{ADV}], *bungalow* in this case, as shown in (298).

- (298) a. [place<sub>[θ_{ADV}]]_j [_{TopP} [DP D_[REL] [place<sub>[θ_{ADV}]]_j] [TP he lives [...]]]]
 b. * [bungalow]_j [_{TopP} [DP D_[REL] [bungalow]_j] [TP he lives [...]]]]</sub></sub>

Based on these observations, we can conclude that what is left within TP in (298a) is the stranded silent adposition, which is not available in (298b).

Inada (2013) argues that what allows *place/bungalow* to function as adverbials within TP in (297) is the element pied-piped in (296). In (298), however, D_[REL] cannot pied-pipe any elements, so they are all left within TP. The contrast between (297) and (298) indicates that what allows DPs to function as adverbials is not DP-internal, but DP-external elements. Inada (2013) also argues that what undergoes A'-movement in (297) cannot be analyzed as DP accompanied by a silent adposition, the possibility (albeit unacceptable) illustrated in (299a).

- (299) * [PP \emptyset_P [DP where_[REL] bungalow]]

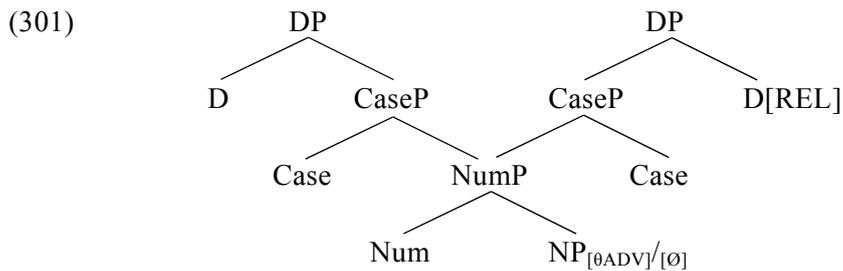
Although the noun *bungalow* cannot be the Head Noun of the complement DP of \emptyset_P since it lacks [θ_{ADV}], the same noun can be the Head Noun of the *where*-relative.

(300) [bungalow]_j [_{TopP} [_{PP} where_[Rel] [bungalow]_j]_i [_{TP} he lives [_{PP} ...]_i]]]

The bare DP analysis of DP adverbs says nothing about the contrast between (297) and (298) because in Larson’s (1985) analysis, the *where* phrase in (300) does not constitute PP but is considered a bare DP.

5.3. Adverbial Relatives and NumP Sharing Structure

The theory of restrictive relative structures proposed in this thesis is consistent with the data and analysis presented above. A restrictive relative structure has a shared NumP whose complement NP can manifest as an adverbial element. This shared NumP projects two DPs, both of which can potentially be utilized as a DP adverb when the core NP bears the feature [θ_{ADV}], as illustrated in (301).

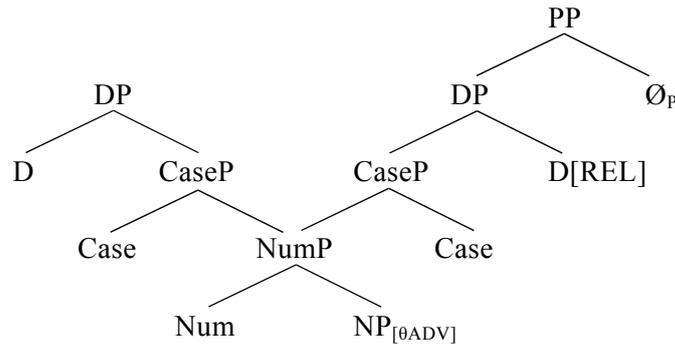


The choice between a (nominal) DP and a DP adverb is optional since the overt preposition can accompany the class of Ns that can bear the feature as shown in (302).

(302) John arrived (on) that day.

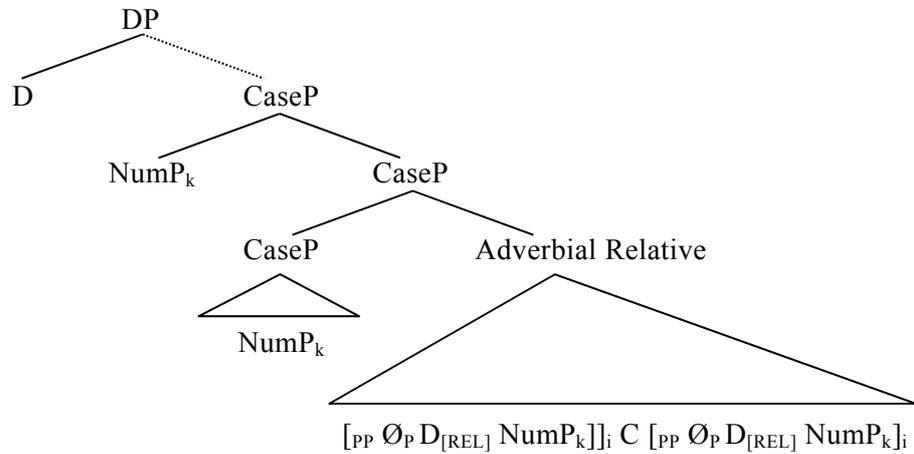
What is important here is that the choice depends on each D head, so that the potentially adverbial core NP can indeed be used as the core of a DP adverb on the one hand and as a “nominal DP” on the other in the same derivation.

(303)

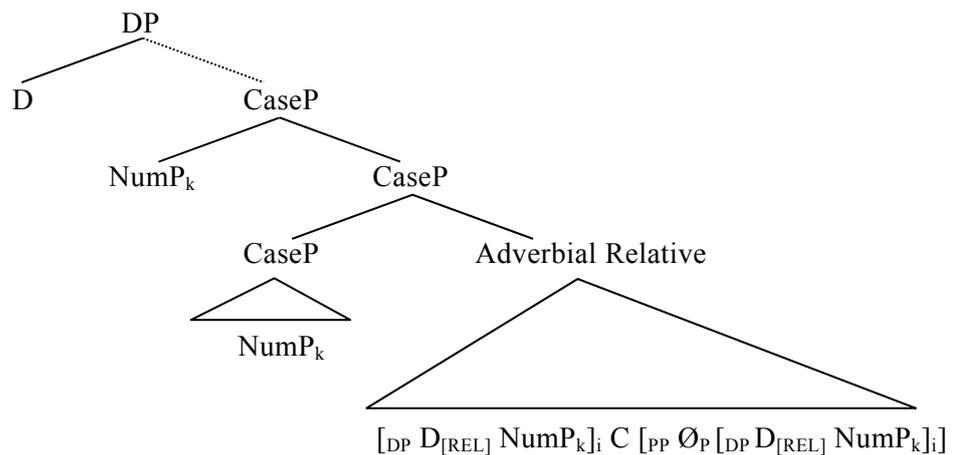


When an adverbial with a silent preposition is an element of a relative clause, the relative clause is regarded as an adverbial relative clause, although the real gapped position is a shared NumP. This is illustrated below.

(304) a.



b.



In (304a), the relativizer of the relative clause may be *where*, *which*, or *that*, and in (304b), the relativizer may be *which* or *that*. Furthermore, the question of the choice of relativizers with the relativization of spatio-temporal Ns without the feature $[\theta_{ADV}]$ does not arise.

- (305) a. * the interval [(that) he left] [= (274a)]
 b. * the bungalow [(that) he lives] [= (274b)]

With the adverbial gaps in the relative clauses, overt prepositions must be pied-piped by the $D_{[REL]S}$ in (305). Therefore, prepositions always accompany the relativizers in (305), which requires relative pronouns to be overt or requires adverbial relativizers such as *when* and *where* to appear.

5.4. Hidden PP Structure of Spatio-Temporal R-Pronouns

5.4.1. Spatio-Temporal R-Pronouns and the Structure of PP

Inada (2013) argues that all R-pronouns are PPs. Unlike other DP adverbs, R-pronouns such as *now*, *then*, *here*, and *there* cannot occur in the position of the subject or direct object of a verb, as observed in Larson (1985). Observe the contrasts shown in (306).

- (306) a. { *Then/That hour } elapsed quickly.
 b. I am spending { *now/*then } at the beach.
 b'. I was spending that day at the beach.
 c. Penguins inhabit { *here/*there/few places }.

The R-pronouns *when* and *where* cannot originate in these positions, as shown in (307).

- (307) a. { *When/Which hour } elapsed quickly?
 b. { *When/Which day } did you spend at the beach?
 c. { *Where/Which places } do penguins inhabit? (Larson (1985: 612))

R-pronouns and PPs cannot occur in the specifier position of DP, whereas spatio-temporal DPs can, as shown in (308).

- (308) a. [every morning]'s lecture
 b. * [then/there]'s lecture
 c. * [in the room]'s lecture

DP adverbs can be substituted for DPs because they are in fact DPs, without a silent adposition.

R-pronouns cannot be treated as DP in this sense anyhow.

In contrast to Inada's (2013) analysis, spatio-temporal R-pronouns such as *here*, *there*, and *then* are regarded as DPs in Larson (1985). Following Larson (1985), Caponigro and Pearl (2009) claim that spatio-temporal *wh*-relativizers such as *when* and *where* are genuine DPs, not PPs. Caponigro and Pearl's (2009) argument for the hypothesis that R-pronouns are DPs is that the overt stranding of a certain class of adpositions is possible around the gap of the adverbial *wh*-relativizers, as shown in (309).

- (309) a. Jack disliked [\langle where \rangle we just ran [_{PP} past \langle where \rangle]] – it smelled funny.
b. Lily lives [(near) [\langle where \rangle we have to fly [_{PP} through [\langle where \rangle]] on our way to Vancouver]].
c. Lily's schedule can't accommodate [\langle when \rangle Jack needs the car [_{PP} by [\langle when \rangle]]]. (Caponigro and Pearl (2009: 159))

The above examples indicate that the R-pronouns *where/when* can be extracted from within a PP structure, which suggests that they might be DPs.

Observe, however, that stranding of the spatial adposition *in* at the gap position of *where* is impossible, as shown in (310).

- (310) * Jack disliked [\langle where \rangle he lives [in \langle where \rangle]].

We expect that any spatial preposition can co-occur with the R-pronoun *where* if it is DP. Caponigro and Pearl (2009: 160) note that “the overt P *in* never occurs as the sister of the trace of *where*, *when*, and *how*,” assuming that “*in* is incompatible” with them.

The contrast between (309) and (310) is explained if we claim that a certain class of adpositions, such as *in* in (310), are part of the PP structure of R-pronouns, as argued in Inada (2013), and that adpositions such as *past*, *through*, and *by* in (309) are not. This leads us to think of the layered complex PP structure. Building on Koopman (2000), den Dikken (2010) in fact proposes a split PP structure mainly consisting of two parts, as illustrated in (311).

(311) [P_{dirP} P_{dir} [P_{locP} P_{loc} [DP ...]]]

This structure has the locative part at the bottom and the directional part at the top.

The idea that *where* is derived from *at which place* dates back to Katz and Postal (1964). Following Katz and Postal's idea, Inada (2013) suggests regarding the split PP structure presented above such that the lower adposition of location/place, such as *at*, *in*, and *on*, is (at least) a part of the PP structure of the R-pronoun. For the morpho-phonological realization of the locative *wh*-pronoun *where*, following the framework of the Distributed Morphology (Halle and Marantz (1993)), it is possible to consider that one R-pronoun is associated with several heads, i.e., *AT-wh-there*, and is lexicalized into a simple word.⁷³

⁷³ Kayne (2005) follows and refines this analysis, claiming that locative *there* consists of an unpronounced counterpart of the noun *place* and an unpronounced determiner equivalent to *that*.

- (i) a. It's been there for a long time.
- b. It's been in that there place for a long time. (Kayne (2005: 67))

The word *there* in (ia) is analyzed as the demonstrative of a locational DP with an unpronounced noun *PLACE* and determiner, as illustrated in (ii).

- (ii) John came out from *PLACE* behind the tree.

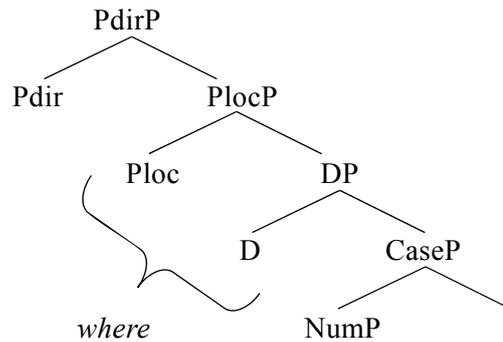
The DP [*there PLACE*] cannot function as a locative nominal argument similar to the other locational DPs whereas DP [*that place*] can.

- (iii) a. John loves Paris and Bill loves {that place/*there}, too.
- b. John loves it in Paris and Bill loves it {in that place/there}, too.

(Kayne (2005: 70))

Kayne (2005) claims that movement of *there* accompanying the unpronounced noun *PLACE* is forced because *PLACE* must be licensed by a locative adposition that is also unpronounced.

(312)



Inada (2013) also suggests that the higher adposition of direction/path, such as *past*, *through*, and *by*, whose stranding is observed by Caponigro and Pearl (2009) in the examples (309), is not contained in the structure of the R-pronoun. Because R-pronouns always project PlocP structure, they can be substituted for DP adverbs, which consist of a silent adposition plus a spatio-temporal DP, although they cannot be substituted for genuine DPs in the argument position. In other words, DP adverbs are not inherently adverbial, but they are DPs unless merged with a silent adposition.

Given the above discussion, it is reasonable to claim that the spatio-temporal adverbial relatives that involve the overt *wh*-relativizer *when* or *where* are also the ordinary restrictive relatives derived via pied-piping of the (lower) spatio-temporal adposition.

5.4.2. Adverbial Relatives in Japanese

Recall that none of the spatial nouns in Japanese is compatible with a silent adposition, but they can be Head Nominals of seemingly gapless relative clauses. Consider the examples repeated in (313) and (314).

-
- (iv) a. [PlocP in [that [there place]]]
b. [PlocP (in) [there PLACE]_i [THAT [there PLACE]_i]]

Notice that if the unpronounced noun is *THING*, the movement of the demonstrative *there* + silent noun is not forced.

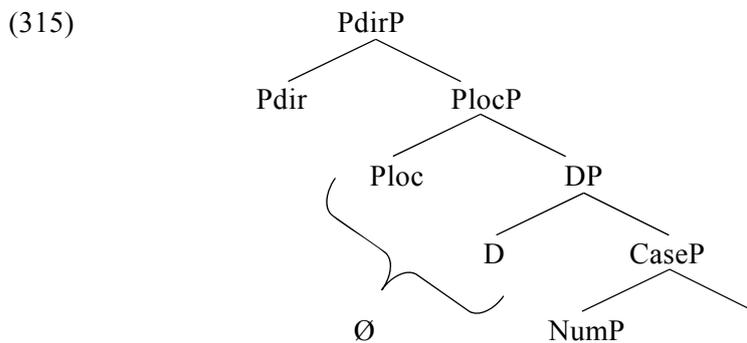
- (v) that there (possible if non-locative: that thing there) (Kayne (2005: 68))

(313) [= (278b)] Hanako-ga [DP sono {basyo/ie/juusyotiiki}*(-ni)] taizaisita.
 Hanako-Nom that.Gen {place/house/address/area}(-NI) stayed
 ‘Hanako stayed in that {place/house/address/area}.’

(314) [= (280)] Taroo-wa [DP [TP Hanako-ga taizaisita] basyo-o] omoide-nai.
 Taroo-Top Hanako-Nom stayed place-Acc remember.can-Neg
 ‘Taroo cannot remember the place Hanako stayed.’

The fact that TP in (314) does not involve an overt adposition indicates that the relative clause is derived via A'-movement of PP to the specifier position of TopP, leaving the PP gap within TP. The moved PP in (314) cannot be headed by the silent adposition since the noun *basyo* ‘place’ in Japanese is incompatible with the silent adposition.

We may thus conclude that the Japanese covert relativizer in (314) is a silent counterpart of the English spatial *wh*-relativizer *where*.



The covert relativizer can relativize the English noun *bungalow* without any overt preposition stranded or pied-piped.

(316) * [CP [PlocP Ø_P [DP Ø_[REL] basyo]]_i [TP Hanako-ga [PlocP ...]_i taizaisita]]

(317) a. [CP [PlocP Ø_[REL] basyo]_i [TP Hanako-ga [PlocP ...]_i taizaisita]]

b. [CP [PlocP where_[REL] bungalow]_i [TP Hanako lived [PlocP ...]_i]]

The overt adposition is absent in spatial relative clauses in Japanese because the covert spatial relativizer in Japanese itself has a PP structure, which includes the spatial adposition.

5.5. Summary

This chapter has shown that the relativization of DP adverbs is best analyzed under the unified account of restrictive relative structures presented in this thesis in conjunction with the silent PP analysis of DP adverbs in Inada (2013). It has been shown that the relativization of Ns with the feature $[\theta_{ADV}]$ sometimes yields seemingly gapless relative clauses in which the silent adposition is stranded. Since Ns with $[\theta_{ADV}]$ are potential lexical heads of DP adverbs, this provides evidence for the silent PP analysis of DP adverbs. It has also been shown that R-pronouns such as *where* are considered to be neither bare DPs, as suggested in Larson (1985), nor DPs in the complement position of the silent adposition, as suggested in Caponigro and Pearl (2009). These R-pronouns incorporate some overt adpositions that occupy the head of PlocP of the split PP structure. The PlocP structure of the R-pronouns accounts for why overt spatial adpositions in Japanese are missing in the case of relativization.

Our analysis also sheds light on the apparently controversial name of the constructions, “adverbial relatives,” since relativization implies attribution. That is, they are considered genuine attributive clauses modifying nominals via sharing of N with $[\theta_{ADV}]$ under the NumP sharing structure of restrictive relativization. By adjoining the relative clause of one subtree to the layered DP structure of another, DPs with an $N_{[\theta_{ADV}]}$ core can be complements of silent adpositions.

Chapter 6

Relativization of Semi-Lexical Nominal Elements in English and Japanese

6.1. Amount/Degree Reading of Head Nominals

Carlson (1977) claims that relative clauses can denote not only a property of an individual entity but also its amount. This means that a relative clause is potentially ambiguous between two readings: a restrictive relative (RR) reading and an amount relative (AR) reading, as shown by the example (31), which is repeated below.

(318) It would take days to drink [_{DP} the champagne they spilled that evening].

(Heim (1987: 38))

In the RR reading, the matrix DP *the champagne* denotes the same entity as the Head Nominal, which would have been base-generated and interpreted inside the relative clause in our analysis. In the AR reading, the Head Nominal is interpreted as denoting degrees of amounts, not individual entities. That is, someone does not have to drink the champagne spilled down on the floor in the AR reading, but a person would drink the champagne on the floor in the RR reading.

Questions arise as to the source of the AR reading of relative structures and as to whether such an interpretation is always available for this purpose. These amount/degree relatives can be seen as instances of restrictive relatives with the AR-reading. However, if a Head Nominal is interpreted as denoting only a degree of an amount, as argued in Carlson (1977), it is possible to consider that amount/degree relatives might undergo a derivation different from that of restrictive relative structures to yield the degree abstraction semantics.

The reference to and abstraction of degrees have long been involved in the semantics of comparatives, starting with Russell (1905) and including Cresswell (1976), Hoeksema (1983), and

von Stechow (1984a). Consider example (319).

(319) John is taller than Bill is.

What is compared in (319) is the degree to which *John is tall* and the degree to which *Bill is tall*.

Following Chomsky (1977), Browning (1987) assumes that the *operator-variable* chain in comparative clauses such as (319) is created by an instance of null operator movement, as shown in (320a), and in comparative clauses the gap is translated as a variable over degrees d that is bound by an implicit operator Op in Spec,CP, as shown in (320b).^{74,75}

(320) a. John is taller than [_{CP} Op_i [_{TP} Bill is [_{AdjP} Op_i -tall]]].

b. [_{CP} Op_i [_{TP} Bill is [_{AdjP} d_i -tall]]]

In this account, the most straightforward way of mapping comparative clauses into degree-denoting expressions is by translating Op as an t -operator that binds the degree variable d .

(321) John is taller than t_d [Bill is d -tall].

Von Stechow (1984) claims that use of the t -operator actually yields the wrong result.

Consider the examples in (322).

(322) a. John swam faster than Bill could run.

b. John swam faster than t_d [Bill could run d -fast].

Von Stechow (1984) argues that the sentence is true if and only if “John swam at a speed exceeding the maximal speed at which Bill could run.” Thus, he proposes that the comparative clause refers

⁷⁴ Here, the type of degree is called d . Since degrees can be construed as equivalence sets of entities, d can be taken as an abbreviation of the type $\langle e, t \rangle$. In logical representations, I use d as a variable ranging over degrees.

⁷⁵ This movement of the operator Op_i counts as an illicit extraction from AP (cf. Corver (1990, 1992), Merchant (2001)) if the gapped position is located as illustrated in (320), and deletion of the AP yields the legitimate comparative deletion constructions.

to a maximal value of the compared degree. This can be implemented by means of an operator *max*:

$$(323) \quad \text{max}(\text{DEG}) = \lambda d [d \in \text{DEG} \wedge \forall d' \in \text{DEG} [d' \leq d]]$$

(Let DEG be a set of degrees ordered by the relation \leq) (Rullman (1995: 55))

Using the operator *max*, we can now prescribe a rough sketch of the interpretation of (322a) shown below.

$$(324) \quad \text{John swam faster than } \text{max} (\lambda d [\text{Bill could run } d\text{-fast}]).$$

The representation in (324) predicts the truth condition of the sentence correctly.

The semantic analysis of comparatives discussed above predicts that nominal expressions of the type *d* (type $\langle e, t \rangle$) can be modified by a relative clause, which is unavailable, as shown in (325).

- (325) a. John is taller than {6 feet/the height}.
- b. * John is taller than 6 feet [Op_i that Bill is (Op_i -tall)].
- c. * John is taller than the height [Op_i that Bill is (Op_i -tall)].

Nominal standards of comparisons such as *6 feet* or *the height* in (325a) cannot be the Head Nominals of the relative clauses, as demonstrated in the ill-formedness of (325b-c).

Grosu and Landman (1998) point out that relativization out of existentials, which is often referred to as an instance of the amount/degree relativization, requires not only the identity of quantity but also the identity of individuals, as shown in (326).

- (326) a. I took with me every book that there was on the table.
- b. I read all the books there were on the table.

#‘When there were five books on the table and I read five books, but not those that were on the table.’ (Grosu and Landman (1998: 133))

The relative clauses in (326) should be interpreted as below.

(327) {as many books as there were books /*as many books as there were} on the table

It is not the case that for any non-empty subset of {a, b, c, d, e}, the cardinality of that subset is in the denotation of the relative clause; the relative clause in (328) would only denote {1, 2, 3, 4, 5}.

(328) a. (books) that there were __ on the table
b. (books) that there were (*d*-many books) on the table
=as many books as there were on the table

In contrast, the sentence (326a) is true, for example, if the matrix subject *I* took books A, B, C, D and E. There is no way that we can assign such an interpretation to (326) if the relative structure *books that there were on the table* guarantees the identity only of amounts/degrees.

Moreover, Grosu and Landman (1998) observe that a sortal identity (i.e., identity of kind) is not required in comparative constructions but is necessary for relative constructions, as shown in the following examples.

(329) a. *It will take us the rest of our lives to drink the champagne [that they spilled beer that evening].
b. It will take us the rest of our lives to drink as much champagne [as they spilled beer that evening].

In (329a), the independent sortal of the amount of the Head Nominal in the relative clause (i.e., *beer*) is not permitted, whereas in (329b), it is available in the equative clause.

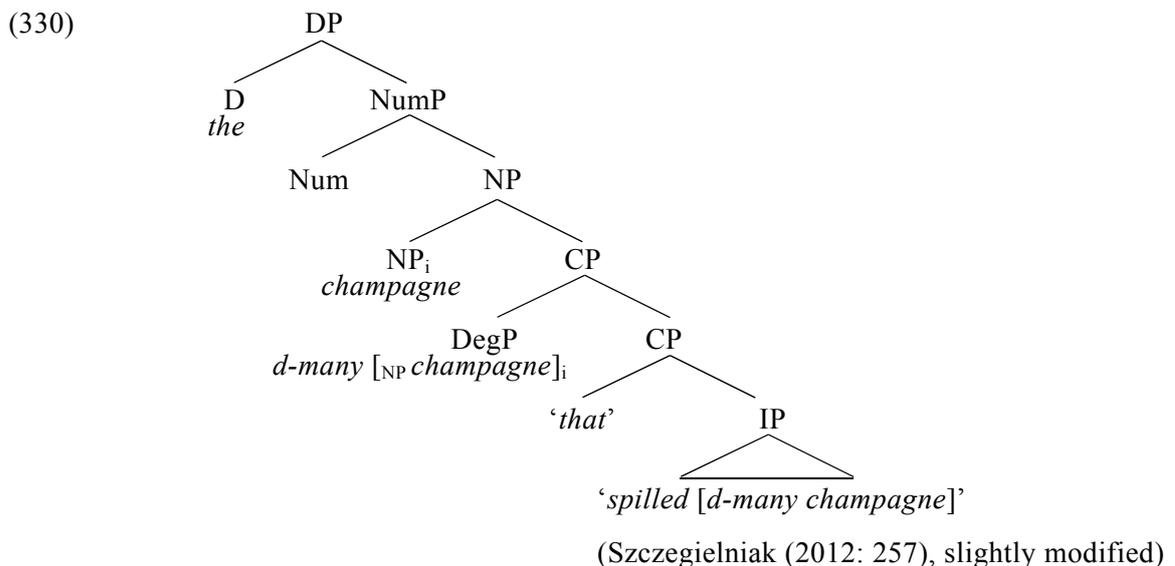
It is worth noticing that McNally (2008) incorrectly suggests that the relative clause in (326) cannot be assigned the structure of restrictive relatives because if the relativized head *every book* were reconstructed, it would violate the so-called definiteness effect.⁷⁶ As we discussed in Chapter

⁷⁶ McNally (2008) adopts some version of the Head-Raising analysis for restrictive relative structures.

3, however, strong determiners such as *every* are never reconstructed syntactically, even in ordinary restrictive relative clauses. We argued that they are not contained in the shared NumP of restrictive relative structures, and hence are simply not present in the gap position. The apparent inverse scope of the quantified head is obtained when the lower quantifiers are the class undergoing the choice function procedure, which makes possible the clause-unbound wide-scope interpretation of the quantifiers.

6.2. Amount/Degree Relative Structures

The requirement of sortal identity would lead us to conclude that amount relatives are restrictive relatives with the particular interpretation assigned at the interface. Grosu and Landman (1998) in fact propose a certain kind of Head-Raising analysis for amount relatives. In their analysis, the Head Nominal NP is further raised to the matrix out of the larger noun phrase involving the degree variable. According to Szczegielniak (2012), this can be illustrated as shown below.



In principle, the Head-Raising analysis can account for sortal identity.⁷⁷

⁷⁷ Szczegielniak (2012) observes that amount relatives do not observe reconstruction effects of the

The theory of restrictive relative structures proposed in this thesis predicts the amount/degree interpretation and sortal identity requirement of restrictive relative structures. Recall that our restrictive relative structure includes a shared NumP whose complement NP manifests as a uniquely shared sortal expression. In addition, the number information of NP is shared between the

Head Nominals, as shown by the possible interpretations of example (i).

- (i) It would take us all year to paint the portraits of himself_i that John_i burned in a fit of paranoia.

A. type of portrait

B. painting the actual burned canvas

C. paint the amount of portraits (Szczegielniak (2012: 258))

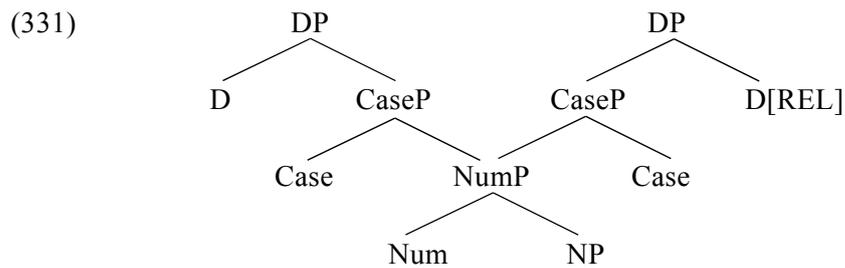
Thus, he proposes that amount relatives are derived not through Head-Raising but through DegP raising from the specifier position of the internal Head NP in (330). In addition, he assumes the Matching procedure and deletion of the internal Head under identity with the external Head, which will yield the reconstruction effect of the internal one, claiming that direct raising of only DegP might account for the absence of the “reconstruction” in (i). It is, however, observed that the ACD relatives with the amount interpretation show the reconstruction effects of Head Nominals, as discussed in this section.

Szczegielniak (2012) also argues that attributive DegPs can be extracted from the specifier position of NP because the internal Head of the relative clause is deleted. The deletion allows the alleviation of the Left-Branch Condition, which is described below (cf. Merchant (2001)).

- (ii) No NP which is the leftmost constituent of a larger NP can be reordered out of this NP by a transformational rule. (Ross (1967: 4.181))

This is exactly the mechanism that this thesis offers for attributive comparatives in Japanese, as originally claimed in Inada (2009, 2010, 2011 and 2012). See the discussions in Chapter 7.

matrix and relative clauses. This is illustrated in (331).



The shared NumP projects two DPs and can be given their Case, specificity, and definiteness independently. This allows the different referential information under amount/degree readings.

It is also worth noticing that amount/degree relatives such as that in (332) involve deletion.

(332) Marv took everything [(that) he could <>].

The deletion is regarded as Antecedent-Contained Deletion (henceforth “ACD”), which is often argued to be a special case of VP ellipsis. As it stands, the antecedent of the elided VP in (332) seems to involve the ellipsis site itself, which results in the so-called infinite regress problem. Fox’s (2003) analysis might provide a solution: in his analysis, the relative clauses involving VP deletion are adjoined to Head Nominals undergoing QR, as shown in (333).

- (333) a. $[_{VP} \text{Marv likes } [_{\text{everything}}]_i] [_{\text{everything}}]_i \text{ QR}$
 b. $[_{VP} \text{Marv likes } [_{\text{everything}}]_i] [[_{\text{everything}}]_i [_{CP} \text{John does } < >]] \text{ Adjunction}$

Fox claims that the elided VP in the late-merged relative clause in (333b) is base-generated there and does not contain any quantifier.

Chomsky (2004) points out a number of problems with the covert QR analysis that Fox (2003) proposes to dissolve the regress problem, and Chomsky instead offers an analysis that assumes adjunction to the covert “afterthought” element. That is, adjuncts can be adjoined to parentheses at the end of sentences as shown in (334).

- (334) a. We saw [a painting] yesterday, (that is,) a painting (one) [from the museum].
 b. John likes every boy (that is, more accurately, ...) every boy Mary likes.

(Chomsky (2004: 121-122))

In the ACD relative in (334b), one of the two Head Nominals is absent. In the afterthought analysis, it would be necessary to assume the deletion of either the afterthought or the matrix element in addition to VP ellipsis within the relative clause.

Given that amount relatives can license ellipsis within the relative clauses by means of QR operation or the afterthought analysis of Head Nominals, the anti-reconstruction effects of Head Nominals is accounted for automatically. That is, they can be attributed to the site where the scope interpretation of the Head Nominals is assigned. This is shown by possibilities of the elided VPs, as in examples such as (335).

- (335) a. I $\langle \forall [\text{he}_i] \rangle$ expected John_i to buy $\langle \text{everything} [\text{that he}_i \text{ thought I did } \langle \rangle] \rangle$.
bought / expected him to buy
- b. I $\langle \forall [\text{John}_i] \rangle$ expected him_i to buy $\langle \text{everything} [\text{that John}_i \text{ thought I did } \langle \rangle] \rangle$.
**bought / expected him to buy* (Fox (1999: 185-187))

The sentence (335a) is ambiguous. In (335a) the elided VP in the relative clause is either the embedded infinitive VP or the matrix VP. On the other hand, the sentence (335b) is unambiguous, and the elided VP is the matrix one. The unambiguity in (335b) is caused by an obviation of a Condition C violation via QR for the ACD resolution, raising the Head Nominal and keeping the relative clause intact, eventually including the proper name *John*.

The claim that quantified Head Nominals must be interpreted at the fronted, or QRed, site seems to obligatorily indicate that they are not interpreted inside the relative clause in these cases. However, Wold (1995) observes that when occurring in the QRed positions, Head Nominals can be interpreted, i.e., reconstructed, in relative clauses, as shown in (336).

- (336) Sue likes every picture of himself_i [that [every boy]_i hoped that she would $\langle \rangle$].
 (Takahashi (2006: 105) from Wold (1995))

Notice that the element shared between the matrix and relative clauses in (336) is the NumP *picture of himself*, which excludes the universal quantifier *every*. Thus, as a matrix element, the universal

quantifier *every* undergoes QR with the Head Nominal, but it does not intervene with the reconstructed interpretation of variable binding in the relative clause. This is illustrated below.

(337) QR: [every <picture of himself_i>_k [that [every boy]_i hoped that she would <>_k]]

Also, Head Nominals can be interpreted in relative clauses in examples such as those repeated in (338), which is noted in footnote 63 in Chapter 3.

- (338) a. * It would have taken us all year to read the letters for John_i [he_i expected there would be].
- b. It would have taken us all year to read the letters for him_i [John_i expected there would be]. (Sauerland 1998:72)

We can argue that the example (338a) is unacceptable because the Head Nominal is reconstructed and interpreted inside the amount relative clause and that the example (338b) is acceptable because the Head Nominal is reconstructed in this case as well. There might well be no reason not to regard amount/degree relatives as a type of restrictive relative structure.⁷⁸

⁷⁸ In Chapter 3, we argued that the shared NumP in restrictive relative structures can be interpreted in anywhere one of their copies occurs. Based on this idea, the reason for the unacceptability of (338a) must be given some account since it does not respect the anywhere interpretation principle of Head Nominals. It may be argued that this is because of the speaker's strong preference for the reconstructed reading under the existential *there* constructions. As noted in footnote 63 in Chapter 3, Head Nominals cannot be reconstructed when the matrix existential construction forces the reconstruction site of the shared NumP to be otherwise, as shown in (i).

- (i) * On the table, there's {a/one} picture of herself_i [every girl_i sent *e*].

In contrast to (338a), the forced anti-reconstruction by the existential construction in the matrix clause yields the unescapable ill-formedness in (i).

Note that Szczgielniak's (2012) observation in footnote 77 of this chapter suggests that Head

6.3. Semi-Lexical Head Nominals in Japanese

Thus far, we have observed that the identity of amounts is always required between matrix and embedded clauses in comparative clauses, amount/degree relatives, and restrictive relatives. Moreover, the identity of the sortals of amounts is also necessarily established in two of these types of relatives, while it is not required for comparatives. This can be summarized as follows.

(339) *Comparatives (max-operator)*:

- a. Identity of Quantity

(340) *Amount/Degree Relatives (max-operator or λ -operator)*

- a. Identity of Quantity
- b. Identity of Sort (Kind)

(341) *Restrictive Relatives (λ -operator)*:

- a. Identity of Quantity
- b. Identity of Sort (Kind)

The question is whether the variation in (339)-(341) is syntactic or semantic. The next section considers properties of some subordinate CPs in Japanese that appear to fall between amount/degree relatives and comparatives in English.

6.3.1. *Half-Relatives*

Let us consider *Half-relatives* in Ishii (1991), which are observed in Japanese in examples such as (342).

Nominals of amount/degree relatives cannot be reconstructed. Such an analysis needs further investigation and will be a topic for future research.

(342) a. John-wa [_{DP}[_{CP} Bob-ga yatin-ni tukau]hanbun]-o gyanburu-ni tukau.
 John-TOP Bob-NOM rent-for uses half-ACC gambling-for uses

‘John uses for gambling half as much money as Bob uses for the rent.’

b. Mary-wa [_{DP}[_{CP} teisyu-ga hitotuki-ni kasegu] bai]-o
 Mary-TOP husband-NOM one.month-in earns double-ACC
 hantuki-de kasegu.

half.month-in earns

‘In half a month Mary earns twice as much as her husband earns in one month.’

(Ishii (1991: 222))

The amount/degree expressions *hanbun* ‘half’ and *bai* ‘double’ in (344) are nominal elements in Japanese. Thus, Ishii (1991) claims that the subordinate CPs that “modify” them can be treated as an instance of relative clauses. Notice that the interpretations assigned to them are similar to those of equative clauses, as is shown in the English translations.⁷⁹

The comparative-like interpretation of the *Half*-relatives calls to mind amount/degree

⁷⁹ Bowers (1975) observes the following examples, which can be regarded as *Half*-relatives of English.

- (i) a. Bill is 10 times the idiot [that Harry is *e*].
- b. Harry isn’t one half the player [that Bill is *e*].
- c. This book is three times the length [that one is *e*].
- d. My car is one half the size [that yours is *e*]. (Bowers (1975: 539))

In (i) the measure phrases in the pre-article specifier positions of Head Nominals are not reconstructed inside the relative clauses. Our theory of relativization correctly predicts the anti-reconstruction of these pre-article specifiers since the reconstruction of Head Nominals involves shared NumPs only.

relatives in English. They are in fact ambiguous between the AR and RR readings, as well. As illustrated in (343), for example, the bills that John uses for gambling might be different from Bob's, or the same bills might be referred to in the two situations.

(343) John-wa [_{DP} Bob-ga yatin-ni tukau hanbun]-o gyanburu-ni tukau.

AR reading:

to use for gambling half as much money as Bob pays for the rent

RR reading:

to use for gambling the half of Bob's money that will be used to pay for the rent

(Inada (2009: 85))

It seems that *Half*-relatives and amount/degree relatives have the same structure, which induces an AR reading, and in fact, the nominals like *hanbun* are sometimes treated as “heads” of the attributive clauses (Okutsu (1974), Inoue (1976), Ishii (1991), Kuroda (1999), Hasegawa (2002)).⁸⁰

Inada (2009, 2011a) claims that Head Nominals of *Half*-relatives are only invisible. *Half*-relatives do not express the Head Nominals overtly because, as indicated in the AR reading above, the *amount of money Bob uses for rent* is not “*half as much money*” but the standard amount on which “*half as much money*” is calculated. The invisible “covert noun” in *Half*-relatives is referred to as AMOUNT, which is an unpronounced lexical item lacking phonetic content. Such a Head Nominal often belongs to the class of “small nouns,” which are considered to be semi-lexical items with only functional meaning and are often covert in various languages.⁸¹

Recall that amount/degree relatives obey the requirement of the identity of sort. This is shown

⁸⁰ What the term “head” refers to here is, of course, slightly different from its use in the term Head Nominal in that it expresses only a “modified” element, not the “relativized” one. This chapter argues that Head Nominals of *Half*-relatives are not these “heads” but covert elements.

⁸¹ See Corver and Riemsdijk (2001) and Kayne (2005) for further discussion.

by the contrast in (344).

- (344) a. It will take us the rest of our lives to drink the champagne [that they spilled that evening]. [= (329b)]
- b. * It will take us the rest of our lives to drink the champagne [that they spilled beer that evening]. [= (329a)]

The contrast is observed because what amount/degree relatives in English denote is not only the property of amounts/degrees. The Head Nominal *champagne* in (344) must be interpreted internally to the relative clause and provide sortal information on the degree.

The identity-of-sort requirement is not imposed on the *Half*-relatives shown below.

- (345) Taro-wa [[Jiro-ga biiru-o nonda] hanbun] sake-o nonda.
Taro-TOP Jiro-NOM beer-ACC drank half sake-ACC drank
'Taro drank sake half as much as Jiro drank beer.' (Inada (2009a: 100))
- (346) John-wa [[Mary-ga mado-o aketa] bai] doa-o aketa.
John-TOP Mary-NOM window-ACC opened double door-ACC opened
'John opened twice as many doors as Mary opened windows.' (Ishii (1991: 236))

The relative clause in (345a) includes the nominal *biiru* 'beer,' which is an expression for a different sortal of the compared amount than the *sake* 'sake' in the matrix. The relative clause in (345b) includes the nominal *mado* 'window,' which is different from *doa* 'door' in the matrix.

6.3.2. Sortal on the Degrees/Amounts

Such amount/degree expressions as *hanbun* and *bai* have been given the name "*Soutai Meishi*" (Okutsu (1974)), which is rendered as Relational Nouns or R-Nouns in this thesis. In addition to the R-Nouns of relative amounts or degrees, Okutsu (1974) suggests that nouns such as *mae* 'front' or *ato/usiro* 'back' are also considered to belong to the class of R-Nouns. Consider the examples shown in (347).

- (347) a. Haha-wa [[_{CP} sensou-ga owaru] 3kka mae/ato]-ni sinda.
 mother-TOP war-NOM ended 3.days front/back-at died
 ‘My mother had died 3 days before/after the war ended.’
- b. Hato-ga [[_{CP} roujin-ga suwatteiru] mae/usiro]-de mame-o
 pigeons-NOM old.man-NOM is.sitting front/back-at beans-ACC
 tabeteiru.
 are.eating
 ‘Pigeons are eating beans in front of/behind the place where the old man is
 sitting.’

If these R-Nouns could function as the Head Nominals, we would expect them to be shared between the matrix and relative clauses. However, the “reconstructed” sentences of (342a) and (347a), which are shown in (348) and (349), respectively, do not convey the events denoted by the embedded clauses in (342a) and (347a).

- (348) Bob-ga hanbun yatin-ni tukau.
 Bob-NOM half rent-for uses
 ‘Bob uses half (the amount of the money) for the rent.’
- (349) Sensou-ga 3kka mae-ni owatta.
 war-NOM 3.days front-at ended
 ‘The war ended 3 days ago.’

For example, the embedded clause in (347a) does not mean “the war ended three days ago,” which is exactly the meaning that sentence (349) expresses. In contrast, what it actually means is “three days before the war ended,” which indicates that what is shared between the matrix and relative clauses is only a specific time point. A question arises here as to whether such a relative clause headed by an R-Noun can truly be treated as a kind of relative clause construction. Moreover, if this is the case, what does such a relative clause modify?

6.3.3. Relativization of Semi-Lexical Nouns

6.3.3.1. Semi-Lexical Nouns as Head Nominals

Attributive clauses headed by R-Nouns are sometimes expressed with overt semi-lexical nouns such as *gaku* ‘amount (of price)’ or *toki* ‘(a point of) time/moment/instance,’ as shown in (350) and (351).

- (350) [DP [[Taroo-ga kasegu] gaku]-no hanbun-o] ...
 Taroo-NOM earns AMOUNT-GEN half-ACC ...
 ‘half as much money as Taroo earns’

- (351) [PP[[kyuuryou-o uketoru] toki]-no mae-ni] ...
 salary-ACC receives TIME-GEN front-at ...
 ‘before one receives his salary’

With this in mind, Inada (2009) claims that the attributive clauses that apparently modify R-Nouns are indeed relative clauses but that these R-Nouns do not count as the Head Nominals. Instead, the Head Nominals are semi-lexical nouns, as in (350) and (351).

The two schemata of semi-lexically headed relative structures are illustrated in (352).

- (352) a. [DP [DP [RelativeClause ... e_1 ...] [semi-lexical head]_i D]-GEN R-Noun D]
 b. [PP[DP [RelativeClause ... e_1 ...] [semi-lexical head]_i D] R-Noun P]

Covert semi-lexical Head Nominals of relative clauses are used here. DPs that involve covert Head Nominals become the internal argument of R-Nouns, serving, for instance, as the covert reference point of *hanbun* ‘half’ or *mae* ‘front.’ What are reconstructed into and interpreted inside the relative clauses are not the R-Nouns but the covert reference points.

There are several pieces of crosslinguistic support for the analysis of *Half*-relatives presented here. Geis (1970) and Larson (1990) propose that temporal adverbial clauses in languages such as English are derived by the movement of the operator to the left-periphery. Consider the examples below.

(353) I saw Mary in New York [_{PP} before [_{CP1} she claimed [_{CP2} that she would arrive]]].

In this sentence, the temporal PP is ambiguous. That is, it may mean that “I saw Mary in NY before she made the claim” or that [I saw her] prior to “some time t that she alleged would be the time of her arrival” (Larson (1990: 170)). Larson claims that the ambiguity in (353) patterns with that of adverbial clauses involving the A'-movement of *when*, as illustrated in (354).

(354) a. [_{CP1} when_i [_{TP} she claimed [_{CP2} she would arrive] e_i]]

b. [_{CP1} when_i [_{TP} she claimed [_{CP2} she would arrive e_i]]]

The ambiguity comes from the structural difference in the position of the variable in (354a) and (354b). Larson takes (355) to be the LF of (353), where the moved element is the empty operator generated in the adjunct position.⁸²

(355) [_{PP} before [_{CP1} Op_i she claimed [_{CP2} t_i' that she would arrive t_i]]]].

It is worth noting that Larson's (1990) analysis is based on the Case-assigning property of P. Larson claims that null operators of the temporal adjunct clauses must be Case-marked, assuming that the specifier positions are the selection domain of Ps. This analysis is based on the selectional property of Ps observed in Larson (1990). The contrast in (356)-(357) indicates that the lower reading is available when the temporal P is able to select DP.

(356) a. {before/after/since/until} [John arrived]

b. {before/after/since/until} [that day]

(357) a. while [John slept]

b. * while [that day]

⁸² Note that the observed ambiguity does not depend on whether the relevant PP is a temporal PP or not. The temporal PP headed by *while* does not show this ambiguity.

(i) I didn't see Mary in New York [_{PP} while [_{CP1} she said [_{CP2} she was there]]].

(Larson (1990: 174))

Based on our discussion in Chapter 5, the Case condition that Larson assumes is analogous to that which holds in adverbial relatives, as exemplified in (358).⁸³

(358) [DP the [day]_i [RelativeClause [*Op* day]_i [TP I left [PP \emptyset_P [*Op* day]_i]]]]

Following Larson, Inada (2009) claims that the clausal complements of *before* are reanalyzed as DPs in which the Head Nominals expressing covert reference points are modified by relative clauses. The complements of *while*, on the other hand, cannot involve such a relativization because it does not select DPs. The analysis accounts for the impossibility of hypothesizing any operator movement that could provide the low-reading of *while*.

(359) a. [PP before [DP \emptyset_{TIMEi} [RelativeClause [TP I left e_i]]]]

b. * [PP while [DP \emptyset_{TIMEi} [RelativeClause [TP I left e_i]]]]

Further cross-linguistic support comes from Dutch (Demirdache and Uribe-Exebarria (2004), Haegeman (2009)). In Dutch, for example, *toen* ‘then’ is argued to originate within TP and move to the left-periphery, as shown in (360).

(360) a. Hij woonde toen in Londen.

he lived then in London

‘At the time he lived in London.’

b. Toen hij in Londen woonde, ...

then he in London lived

‘When he lived in London ...’

(Haegeman (2009: 387))

Furthermore, temporal adjunct clauses in Hungarian contain a relative pronoun, as illustrated below.

⁸³ The trace of the DP-internal raising of [day]_i is omitted for expository purposes.

(361) a. (A)mikor Peter nincs otthon
REL-what-at Peter is.not home

‘when Peter is not at home’

b. A nap [amikor Anna megjött]
the day REL-what-at Anna arrived

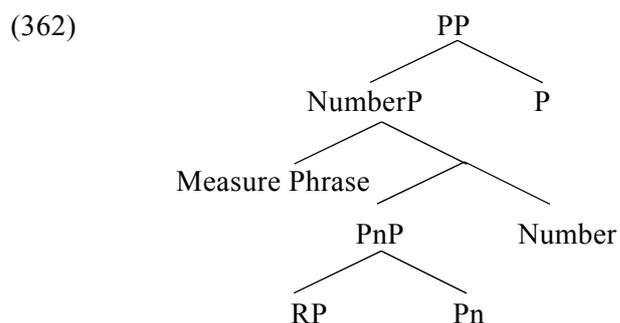
‘the day when Anna arrived’

(Lipták (2005: 142))

Based on these observations, it may be concluded that the missing relativized Head Nominals in *Half*-relatives in Japanese are covert instances of the nominal expressions of reference points.

6.3.3.2. Layered PP Structure and Vector Space Semantics

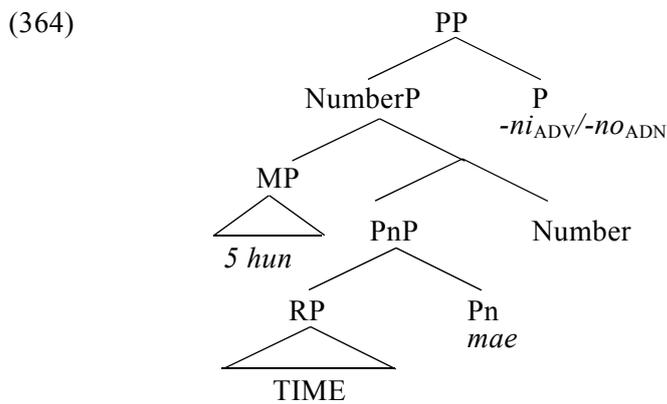
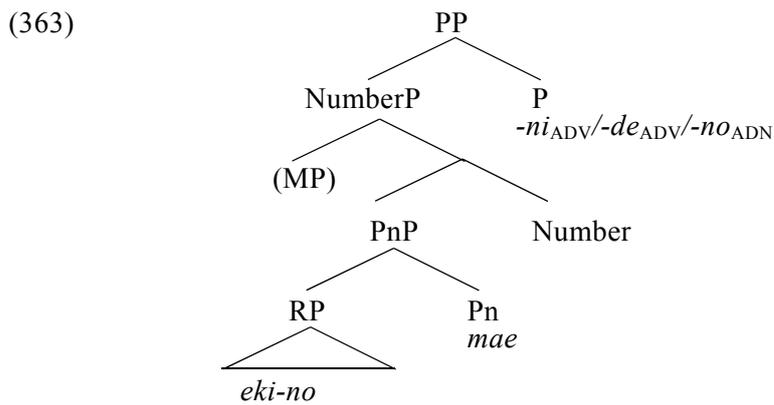
To investigate the structure of the temporal/locative PP, Nomura (2008) and Watanabe (2009) consider the semantic roles that functional categories of PP bear within the cartographic approach. Based on the vector-space semantics of the interpretation of temporal/locative PPs (Zwarts (1997)), Watanabe claims that each piece of the atomic information (semantic roles) of the vector-space semantics corresponds to the function of one of the functional heads of the temporal/locative PP, as illustrated in (362).



The topmost PP layer is the locus of a vector. NumberP represents the length of the vector, and PnP is its direction. RP is a reference object of the vector. Measure Phrases (MPs) may further specify the degree of the vector with a specific direction numerically. The MPs are located in

Spec,NumberP.⁸⁴

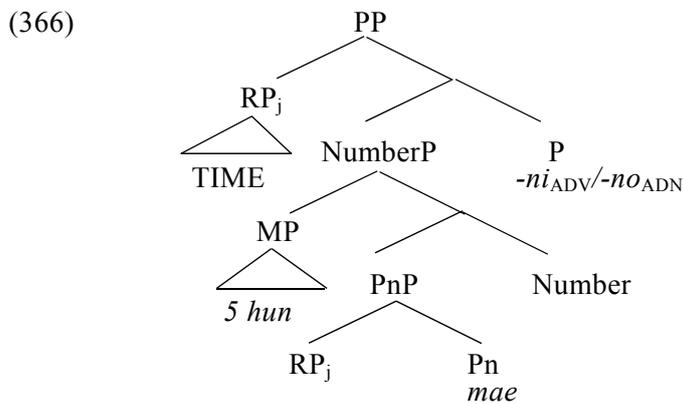
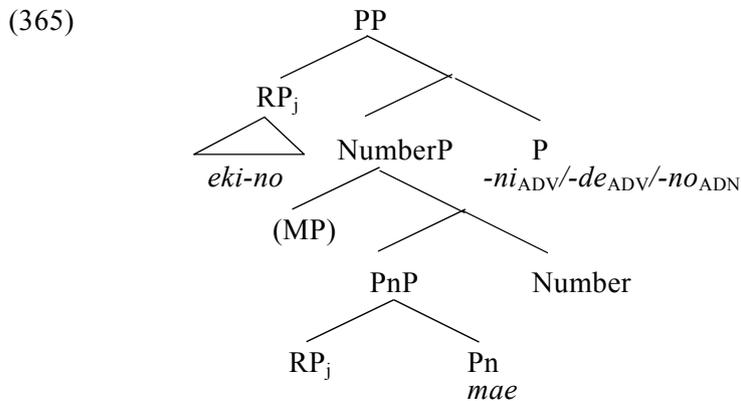
Let us consider some examples. Both Nomura and Watanabe decompose a morphologically complex postposition such as *no-mae-ni* ‘in-front-of’ in Japanese into two parts, Pn and P. For instance, R-Nouns such as *mae* ‘front’ are a head of PnP, which determines the type of dimension/direction of the entire PP. In addition, the head of NumberP, which is the functional projection above PnP, specifies the degree of Pn.



What is important here is that the reference point of the R-Noun is signified by the complement of PnP, i.e., it is RP, which immediately dominates DP and functions as the source of the temporal/locative vector. Even if RP is phonetically missing, the complement position must be

⁸⁴ Note that NumberP in the layered PP structure is a different functional projection from that in DP, which this thesis refers to as NumP in PART I. It is undoubtable that number specification is ubiquitous in the various functional layers, which requires further cross-categorical research on what the common structure of the functional layers should be.

occupied by a covert noun such as PLACE or TIME, as illustrated in (364), for the appropriate temporal/locative interpretation. Furthermore, Nomura (2008) and Watanabe (2009) assume that RPs undergo movement to Spec,PP as shown in (365) and (366).



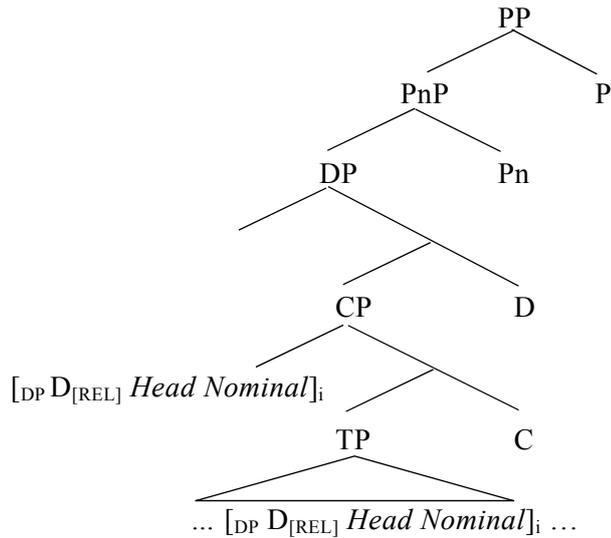
Given the fine structure of PP, the PP structures of temporal/locative attributive clauses headed by R-Nouns must be analyzed in the same way, and English temporal PPs with subordinate complement clauses must be as well.

6.4. Relativization of Covert Nouns and NumP Sharing Structure

6.4.1. Relativization of Covert Semi-Lexical Head Nominals

According to Nomura (2008) and Watanabe (2009), we have DP in the most deeply embedded complement position of PP in order to complement the reference point. Inada (2009, 2011a) claims that this DP can be a Head Nominal. In a temporal/locative subordinate clause, there is a covert Head Nominal that signifies the reference point of PP, as roughly illustrated in (367).

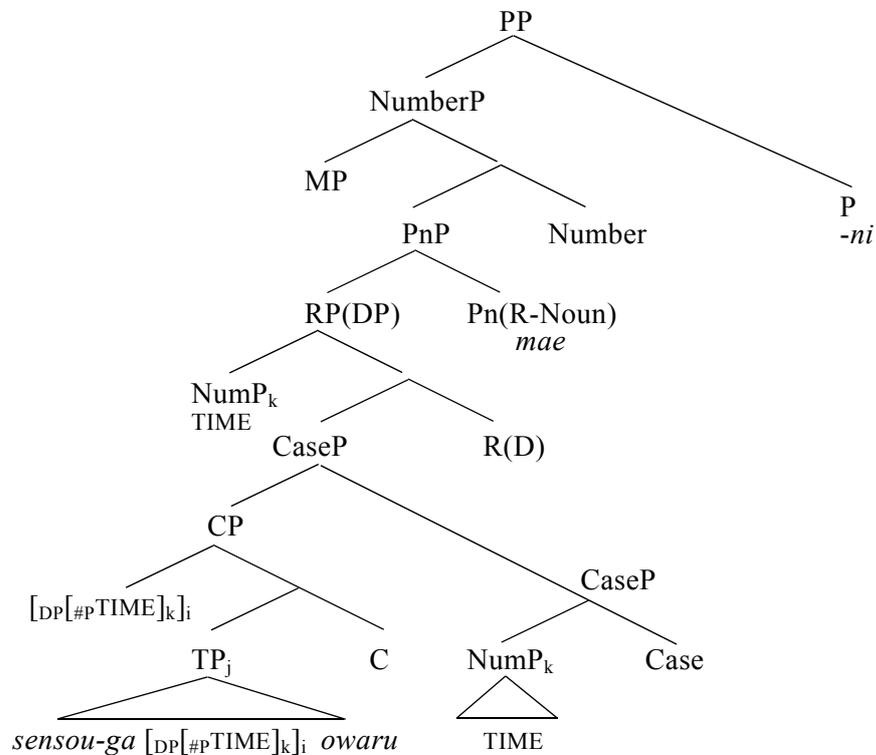
(367)



As argued in PART I, the relativization involves (i) sharing of a Head Nominal NumP, (ii) DP-internal raising of the NumP, and (iii) generalized conjunction through the adjunction of the relative clause. For example, the subordinate CP in (368a) involves the relativization of the covert semi-lexical noun TIME, as shown in (368b).

(368) a. [CP sensou-ga owaru] mae-ni

b.

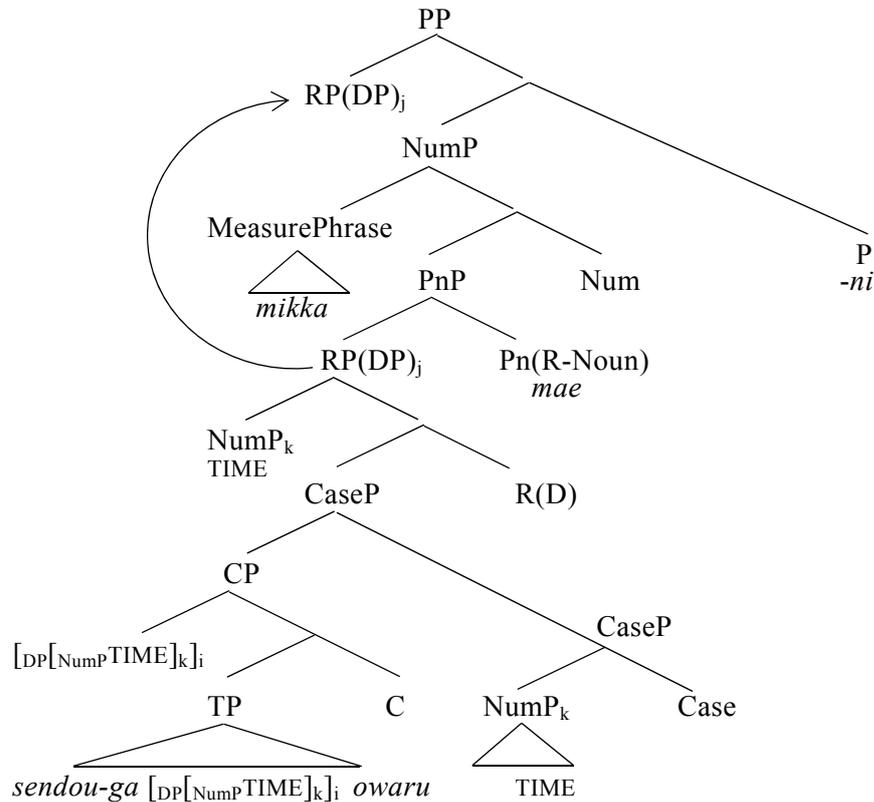


The R-Noun *mae* in (368), which is not a Head Nominal of the relative clause, is merged externally to this DP, constituting another external DP. With this covert noun, the subordinate CP is analyzed

as a relative clause. Following Nomura's (2008) and Watanabe's (2009) analyses of PP-internal syntax given in (365) and (366), Inada (2009, 2011) assumes that the RP(DP) of the temporal/locative PP structure must move up to the position Spec,PP. This is illustrated in (369).

(369) a. *sendou-ga owaru mikka mae*

b.



Through this movement, which is independently motivated for Case checking in the PP syntax proposed in Nomura (2008) and Watanabe (2009), the well-formed order is obtained as a result.

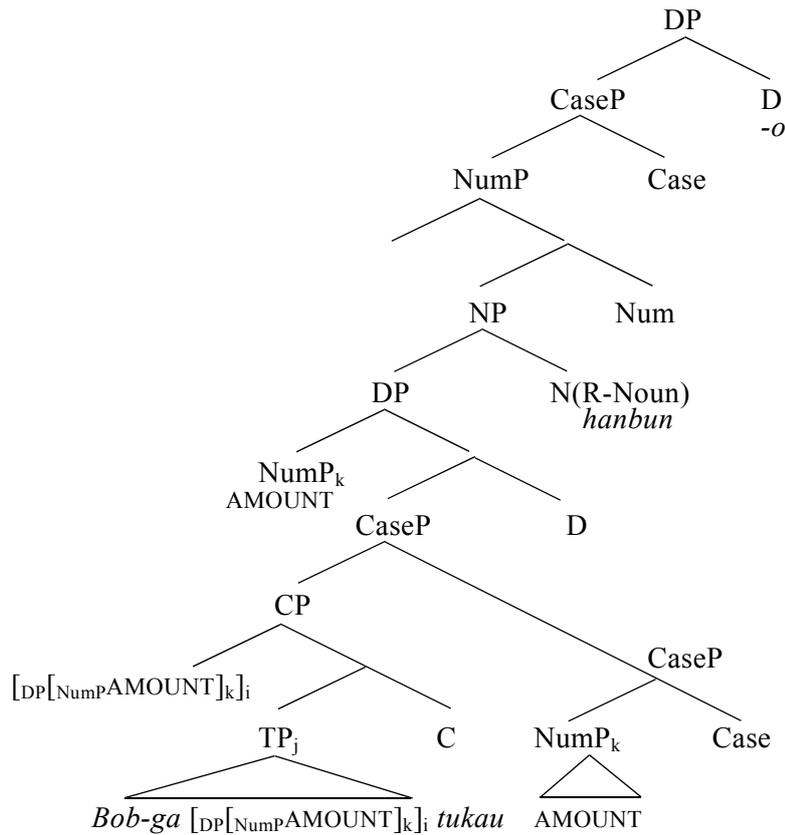
6.4.2. Covert Semi-Lexical Head Nominals of *Half-Relatives*

Applying the analysis of temporal/locative clauses to *Half-relatives*, Inada (2009, 2011a) assumes that there is also a covert Head Nominal in the amount version, as shown in (370).⁸⁵

⁸⁵ Under the Head-Raising analysis of the derivation for restrictive relativization, Inada (2009) argues that the Head Nominal raises to the position Spec,CP within the relative clause in (370). Then, D merges with CP, projecting DP. Inada further assumes that TP raises to Spec,DP in

(370) a. [CP Bob-ga tukau] hanbun-o

b.



The subordinate CP in (370a) involves the relativization of the covert semi-lexical noun AMOUNT, as illustrated in (370b).

Inada's (2009, 2011a) analysis of semi-lexical Head Nominals sheds light on relative constructions that show the "Nonidentity Effect" discussed at the beginning of this chapter. Remember that in amount/degree relatives in English, the so-called identity condition is imposed on Head Nominals as demonstrated by the contrast repeated below.

(371) a. It will take us the rest of our lives to drink the champagne [that they spilled that evening]. [= (329b)]

b. * It will take us_i the rest of our lives to drink the champagne [that they spilled beer that evening]. [= (329a)]

The Head Nominal *champagne* must be interpreted internally in some sense and provides a sortal

languages such as Japanese with the relative clause-Head Nominal order (cf. Murasugi (1990)).

on the degree. We have also observed that the requirement is not observed in the case of *Half*-relatives, as repeated below.

- (372) a. Taro-wa [[Jiro-ga biiru-o nonda] hanbun] sake-o nonda. [= (345a)]
 ‘Taro drank sake half as much as Jiro drank beer.’
- b. John-wa [[Mary-ga mado-o aketa] bai]doa-o aketa. [= (345b)]
 ‘John opened twice as many doors as Mary opened windows.’

The analysis presented in this thesis accounts for the presence of an independent sortal different from an overt R-Noun such as *hanbun* or *bai*. That is, these *Half*-relatives have covert Head Nominals, as shown in (373).

- (373) a. [DP [DP [Jiro-ga [AMOUNT_i biiru-o] nonda] AMOUNT_i]] hanbun] ...
- b. [DP [DP [Mary-ga [AMOUNT_i mado-o] aketa] AMOUNT_i]] bai] ...

Inada (2009, 2011a) postulates a covert Head Nominal AMOUNT in (373) because in these examples, the relative clause in (373a) expresses not the amount of beer but only the amount, and that in (373b) expresses only the number of entities. Note that the covert head AMOUNT manifests differently in the overt forms. Observe the examples shown in (374).

- (374) a. [DP [DP [Jiro-ga [biiru-o] nonda] ryoo/*kazu]]-no hanbun] ...
- b. [DP [DP [Mary-ga [mado-o] aketa] *ryoo/kazu]]-no bai] ...

It is now clear why this problem concerning the lack of identity requirement does not arise for *Half*-relatives.

- (375) a. [DP [DP [Jiro-ga [AMOUNT_i biiru-o] nonda] AMOUNT_i]] hanbun(-no)
 sake]-o...
- b. [DP [DP [Mary-ga [AMOUNT_i mado-o] aketa] AMOUNT_i]] bai(-no) doa]-o ...

The Head Nominals of relative clauses comprise only semi-lexical covert nouns, which denote only amounts/degrees, and the sortals of the amounts/degrees are not part of Head Nominals, although they sometimes accompany Head Nominals via pied-piping.

This analysis implies that a DP containing an R-Noun (*half* or *bai*) and a relative clause headed by a semi-lexical noun as a whole involves the partitive structure, as shown in (376).

- (376) [DP [DP {AMOUNT/NUMBER/ryoo/kazu}]-no hanbun/bai]
 AMOUNT/NUMBER/amount/number-GEN half/twice

Next, consider the examples of the partitive structure below. In partitive structures, it is expected that the first genitive DP cannot be replaced with a proper name, and we observe the same effect in *Half*-relatives, as shown in (377).

- (377) a. # Jiroo-wa [[[Taroo-ga kyou-situ-de atta] [Hanako]]-no hanbun](-ni)
 Jiro-TOP Taroo-NOM classroom-in saw Hanako-GEN half-DAT
 koutei-de atta.
 playground saw
- b. # Jiroo-wa [[[Taroo-ga [Hanako]-ni kyou-situ-de atta]] hanbun](-ni)
 koutei-de atta.

The examples in (377) are infelicitous because we cannot “meet” some proper part of *Hanako* in the actual world.⁸⁶ The infelicity is relaxed if we use the common noun *gakusei* ‘student’ in the place of the proper noun *Hanako* in the examples in (377).

⁸⁶ Notice that the relativization of the proper name itself is possible in Japanese.

- (i) Jiro-wa [[Taro-ga kyou-situ-de sakki atta] Hanako]-ni
 Jiro-TOP Taro-NOM classroom-at a.little.ago saw Hanako-DAT
 ima koutei-de atta.
 now playground-at saw
 ‘Jiro saw Hanako at the playground just now, who Taro saw at the classroom a little while ago.’

(378) a. Jiroo-wa [[[Taroo-ga kyousitu-de atta] [gakusei]]-no hanbun](-ni)
 Jiro-TOP Taroo-NOM classroom-at saw student-GEN half-DAT
 koutei-de atta.
 playground-at saw

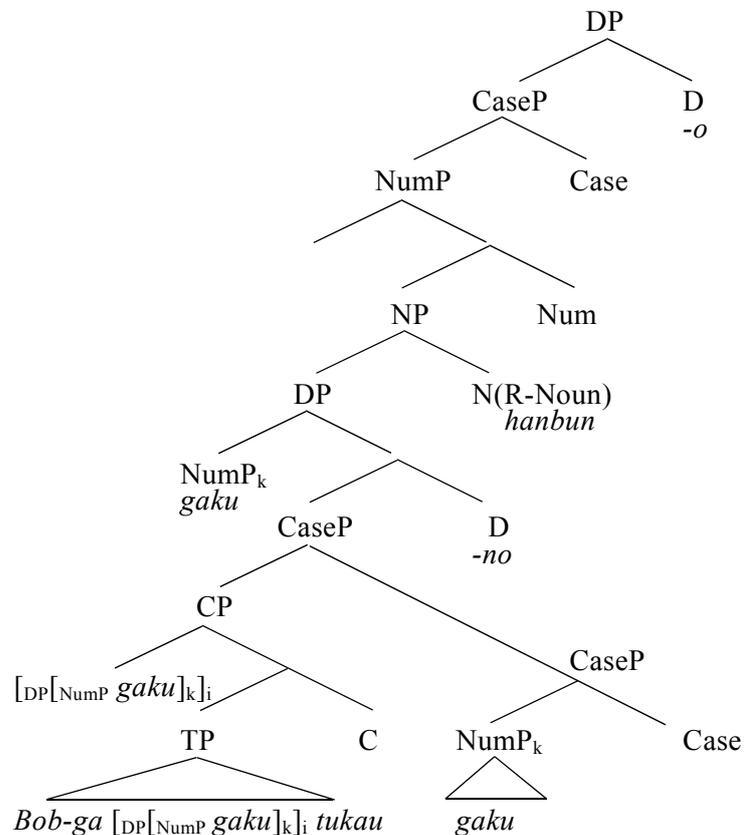
b. ? Jiroo-wa [[[Taroo-ga [gakusei]-ni kyousitu-de atta]] hanbun](-ni)
 Jiro-TOP Taroo-NOM student-DAT classroom-at saw half-DAT
 koutei-de atta.
 playground-at saw

‘Jiroo saw at the playground half the number of students that Taroo saw in the classroom.’

It is worth noting that *Half*-relatives can be headed overtly. Inada observes that AMOUNT can replace the overt semi-lexical noun *gaku* ‘price,’ as shown in (379).

(379) a. Bob-ga tukau gaku-no hanbun-o

b.



Furthermore, Measure Phrases can replace semi-lexical Head Nominals, as shown in (380), and they occur internally within the relative clauses, as shown in (381).

(380) [DP [[Taroo-ga t_i kaseida] [100 man yen]_i]-no hanbun]

Taroo-NOM earned a.million yen-GEN half

(381) [DP [Taroo-ga [100 man yen] kaseida](*-no) hanbun]

Taroo-NOM a.million yen earned -GEN half

‘(Lit.) half of a million yen that Taroo earned (a million yen)’

Given the hidden relative clause structure headed by a semi-lexical noun, these overt Head Nominals of *Half*-relatives are possible outcomes. Notice that the Measure Phrases in (380) and (381) are not manifestations of relativized Head Nominals like the noun *gaku* in (379). The noun *gaku* can co-occur with a Measure Phrase, as shown in (382).

(382) Syakkin-ga (sono)(gaku) 100man yen-ni tassita.

debt-NOM that amount a.millionyen-to reached

‘The debt has amounted to a million yen.’

The example above shows that the semi-lexical overt noun *gaku* and the numerical expression *100 man yen* together constitute one DP. Because the expression *100 man yen* is not a core of DP but the element specifying the degree of *gaku* numerically, the noun *gaku* is the core and the numerical expression *100man yen* is a Measure Phrase. Given this analysis, the apparent internal Head in (381) is considered a remnant of A'-movement of the semi-lexical Head Nominal *gaku*, as shown in (383).

(383) a. [DP [Taroo-ga [e_i 100 man yen] kaseida] [gaku]_i-no hanbun]

Taroo-NOM a.million yen earned amount-GEN half

b. [DP [Taroo-ga [e_i 100 man yen] kaseida] [AMOUNT]_i hanbun]

Taroo-NOM a.million yen earned amount half

‘(Lit.) half of a million yen that Taroo earned (a million yen)’

The relative clause in (380), which is apparently headed by a Measure Phrase overtly, is derived via relativization of the covert noun AMOUNT accompanied by the Measure Phrase *100 man yen*, as illustrated in (384).

- (384) [DP [[Taroo-ga e_i kaseida] [AMOUNT 100 man yen]_i]-no hanbun]
 Taroo-NOM earned amount a.million yen-GEN half

Based on Inada's (2009, 2011a) analysis of AMOUNT relativization, we can conclude that at times relativization involves the A'-movement of only AMOUNT and at other times the pied-piping of Measure Phrases.

6.5. Summary

In this chapter, it has been shown that the headed-relative analysis of *Half*-relatives in Japanese accounts for their comparative-like interpretation. Recall that according to Carlson (1977), such an interpretation, i.e., AR reading, is assumed to be obtained not by a restrictive relativization, but by relativization of a degree operator. The observations in this chapter demonstrate that *Half*-relatives in Japanese, which are derived via the relativization of AMOUNT, can serve as attributive clausal modifiers of nominal elements.

We have also observed that they can serve as clausal modifiers of amount expressions as if they were comparative clauses. In Japanese, the covert semi-lexical degree word AMOUNT is a nominal. Thus, the relativization of this semi-lexical noun can be regarded as an example of an amount/degree relative construction in Japanese since what undergoes A'-movement denotes a nominal expression, as illustrated in (385a). At the same time, it is considered to be an example of a comparative construction in Japanese because what undergoes A'-movement is semantically parallel with comparatives, as illustrated in (385b).

- (385) a. [CP [AMOUNT] [TP ...[DP DP-no <AMOUNT>]...]]
 b. [CP *d-Op* than [TP ...[<*d-many-x*> Adj.]...]]

The clausal modifier that involves the A'-movement of AMOUNT results in the structure of a relative clause and the comparative-like interpretation.

Notice that between these is the amount/degree relative in English, as illustrated in (386).

(386) [CP [*d*-many N] that [TP ...<*d*-many N>...]]

As pointed out by Inada (2011b, 2012) and Szczegielniak (2012), A'-extraction of only a degree operator or a DegP including the operator violates the Left-Branch Condition, which prohibits the extraction of the leftmost element of DP. This indicates that amount/degree relatives in English involve pied-piping of NumP by the amount expression, which is a case of pied-piping by the specifier that we have discussed in Section 2.1.4.

The three outcomes of A'-movement forming *operator-variable* chains in (385)-(386) are thus interpreted alike, although they are referred to as three different constructions in English and Japanese. The differences are not in the availability of (some of) the specific relative constructions but in the lexical repertoire of what can be relativized as a Head Nominal of a restrictive relative structure.

Chapter 7

Relativization of Covert Nominal Standards in Japanese

7.1. Attributive Comparative Clauses in English and Japanese

There is another type of apparently attributive adjunct clauses involving A'-movement. Let us consider the examples in (387).

- (387) a. John is taller [than Bill is].
b. John bought a {longer/more expensive} umbrella [than Mary did].
c. John bought more umbrellas [than Mary did].

As discussed in Section 6.1 of the preceding chapter, the standard of comparison is sometimes expressed by a comparative clause marked by a “standard marker” such as English *than*. (387a) is an English example of “predicative” comparatives in which the comparative clause modifies a predicate, and (387b, c) are “attributive” comparatives in which the comparative clause modifies a noun phrase. The predicative comparative (387a) and the attributive comparative (387b) express a comparison of gradability. The attributive comparative in (387c) expresses a comparison of quantity. This Chapter considers the syntax and semantics of attributive comparatives in English and Japanese.

Note that the comparison of gradability, or the comparison of degrees of some quality, is not always possible. As described in Chapter 1, a contrast can be observed in English between the two types of comparison exemplified in (387). Consider the contrast repeated in (388).

- (388) a. Michael Jordan has more scoring titles [than Denis Rodman has tattoos].
b. * Pico wrote a more interesting novel [than Brio wrote a play].
c. * Anna read a longer article [than Roxani read a book].

In these comparative clauses, the sorts of the amounts/degrees compared between the matrix and embedded clauses are not identical. In these cases, a comparison of degrees of quantity or of amount, as exemplified in (388a), is available, whereas a comparison of degrees of some quality, as exemplified in (388b) and (388c), is not. This leads us to conclude that the comparison of degrees of quantity is always available irrespective of what is overtly expressed, whereas the comparison of degrees of some quality is not always available. This restriction tells us that the comparison of quantity and that of quality cannot be treated in the same way.

Beck et al. (2004) claim that the analysis of comparatives in English cannot be adopted for Japanese. In fact, it is observed that the level of acceptability of attributive comparatives varies in Japanese, as shown by the variability of the judgments in examples like (389).

(389) *?????**Taroo-wa [[Hanako-ga katta] yori] nagai kasa-o katta.

Taroo-TOP Hanako-NOM bought YORI long umbrella-ACC bought

‘Taroo bought a longer umbrella than Hanako did.’

(Ishii (1991), Beck et al. (2004: 290))

However, as is also reported in Beck et al. (2004), attributive comparatives comparing degrees of quantity are possible in Japanese as shown in (390).

(390) Taroo-wa [[Hanako-ga katta] yori] takusan kasa-o katta.

Taroo-TOP Hanako-NOM bought YORI many umbrella-ACC bought

‘Taroo bought more umbrellas than Hanako did.’

Furthermore, the contrast between the quantity and quality in Japanese is exactly the same as we observe in the English attributive comparatives in (388). It shows that the comparison of quantity and that of quality cannot be treated in the same way in both English and Japanese.

7.2. Comparative Deletion Construction in English

Bresnan (1973) has shown that comparative clauses must contain a gap corresponding to a

degree-denoting expression. In fact, these degree-denoting expressions cannot be overt in comparative clauses, as shown in (391).

- (391) a. This desk is wider than it is __ high.
 b. * This desk is wider than it is four feet high.

Browning (1987) assumes that this gap is created by an instance of the “null operator” movement. As pointed out in Section 6.1 of the previous chapter, the gap is translated as a variable over degrees d that is bound by an implicit operator Op in Spec,CP of the comparative clause, as illustrated in (392).

- (392) John is taller than [_{CP} Op_i [_{TP} Bill is [_{AdjP} Op_i -tall]]]. [= (320a)]

Note that the null operator Op in comparative clauses and that postulated for relative clauses are two different lexical items even though their phonetic content is the same—both of them are phonetically null. The copies left behind within the embedded clauses are categorically and interpretatively different. The gap of the implicit comparative operator Op in comparative clauses is translated as a variable over degrees d . The *operator-variable* chains in comparative clauses are illustrated in (393).

- (393) a. John is taller [than[Op_i [I am [_{AP} d_i -tall]]]].
 b. John bought a longer umbrella [than[Op_i [Mary did buy [_{DP} [d_i -long] umbrella]]]].
 c. John bought more umbrellas [than[Op_i [Mary did buy [_{DP} [d_i -many] umbrellas]]]].

Because the constituents including the gapped position in (393) must be elided, the entire construction is sometimes called Comparative Deletion. What is deleted in the comparative clauses is shown explicitly by strikethrough in (394).

- (394) a. John is taller [than[Op_i [I am [_{AP} ~~*d*~~-tall]]]].
 b. John bought a longer umbrella[than[Op_i [Mary did buy [_{DP} [~~*d*~~-long]-umbrella]]]].
 c. John bought more umbrellas [than[Op_i [Mary did buy [_{DP} [~~*d*~~-many]-umbrellas]]]].

Kennedy and Merchant (2000) and Merchant (2001) argue that the deletion operation is necessary because it enables an operator movement to circumvent an island constraint by deleting an entire DP, which is an island including a copy of the operator created by the illicit movement. Consider the examples in (395).

- (395) a. * [How easily]_k did he take [_{DP} [_{DegP} *e_k* obtainable] drugs]?
 b. * [How well]_k have you examined [_{DP} a [_{DegP} *e_k* prepared] student]?

(Merchant (2001))

The ill-formedness in (395) shows that the movement of comparative operators counts as an illicit extraction from attributive adjective phrases, i.e., “attributive DegP islands” in Corver (1995).

7.3. Comparative Deletion Construction in Japanese

7.3.1. Differences between English and Japanese

The standard of comparison is provided in Japanese by phrases marked by the locative/temporal reference-point tracking postposition *yorimo*.⁸⁷ The examples shown in (396)

⁸⁷ It is worth noticing that we have two types of *yorimo* in Japanese. Consider example (i).

- (i) Taroo-wa [[Hanako] *yorimo*] {*zutto/motto/yorimo*(**mo*)} se-ga takai.
 Taroo-TOP Hanako THAN by.far height-NOM be.tall

The form with the emphasizing suffix *-mo* is considered to be a standard marker, whereas the one that is incompatible with *-mo* is to be an intensifier. Hereafter I use *yorimo* as the standard marker

are Japanese examples of clausal comparatives.

(396) a. ? Taroo-wa [[kare-no titi-ga se-ga takakatta] yorimo] (zutto)
Taroo-TOP he-GEN father-NOM height-NOM be.tall.PAST THAN (by.far)

se-ga takai.

height-NOM be.tall

‘(Lit.) Taroo is taller than his father was tall’

b. Taroo-wa [[Hanako-ga [~~{nagai/takai} kasa-o}~~ katta] yorimo]
Taroo-TOP Hanako-NOM {long/expensive} umbrella-ACC bought THAN

{nagai/takai} kasa-o katta.

{long/expensive} umbrella-ACC bought

‘Taroo bought a {longer/more expensive} umbrella than Hanako did.’

(cf. Beck et al. (2004: 302))

c. Taroo-wa [[Hanako-ga [~~kasa-o}~~ katta] yorimo] (takusan)
Taroo-TOP Hanako-NOM umbrellas-ACC bought THAN (many)

kasa-o katta.

umbrellas-ACC bought

‘Taroo bought more umbrellas than Hanako did’ (cf. Beck et al. (2004: 290))

(396a) is a predicative comparative clause of gradability, (396b) is an attributive comparative clause of gradability, and (396c) is an attributive comparative clause of quantity.

Kikuchi (1987) argues that the derivation and structure of the Japanese clausal comparatives are analyzed on a par with English clausal comparatives. He argues that the Japanese clausal comparatives involve A'-movement of the degree operator as well, yielding the degree-abstraction structure because they observe island effects. Consider the examples illustrated below.

in Japanese.

- (397) a. [*Op_i* [[John-ga *t_i* yonda to] iwareteiru to] minna-ga omotteiru]]
 John-NOM read C be.said C everyone-NOMthink
 yorimo Mary-wa takusan hon yondeiru.
 THAN Mary-TOP many books-ACC has.read
 ‘Mary has read more books than everyone thinks that it is said that John read.’
 (Kikuchi (1987: 4))
- b. * [*Op_i* [sono tukue-de *t_i* yondeita hito]-o John-ga nagutta]
 that table-at be.reading.PAST person-ACC John-NOM hi
 yorimo Paul-wa takusan hon-o yondeita.
 THAN Paul-TOP many books-ACC has.read
 ‘(Lit.) Paul has read more books than John hit the person who read at that table.’
 (Kikuchi (1987: 4))

The A'-movement involved in the Japanese clausal comparatives is considered unbounded, as shown in (397a), and it is sensitive to the Complex-NP island, as shown in (397b).

There are some differences between the Comparative Deletion constructions in English and Japanese. English predicative comparatives and attributive comparatives constitute analytic “direct” comparatives, which express a comparison of the degree to which the target of comparison possesses some property (e.g., tallness in (396a)). In this respect, Japanese attributive comparatives, such as those shown in (396b, c), are also considered direct comparatives. However, what is compared in (396a) is not only the degree of tallness but also the degree of deviation from a standard of comparison. This type of comparative is called “indirect” (Bartsch and Vennemann (1972)). Rett (2008: 112) explains that “[sentence (396a)] would be true if and only if the degrees to which [Taroo] exceeds a relevant standard of tallness are more numerous than the degrees to which [his father] exceeds a relevant standard.”

There is another difference between comparative clauses in English and Japanese.

(398) John bought more umbrellas than Mary bought (*[many umbrellas]).

In English, the deletion in comparative clauses is applied obligatorily when the sortal expression of the compared amount/degree is identical as claimed in Lechner (2001, 2004), whereas in Japanese the deletion seems to be optional, at least in the case of attributive comparatives expressing the comparison of quantity.

(399) Taroo-wa [[Hanako-ga ([takusan-no kasa-o) katta] yorimo]
Taroo-TOP Hanako-NOM many-GEN umbrellas-ACCbought THAN
(takusan) kasa-o katta.
(many) umbrellas-ACC bought
'Taroo bought more umbrellas than Hanako did'

Next, consider the examples of comparisons of quality in English and Japanese shown below.

(400) a. John bought a longer umbrella than Mary bought (*[the long umbrella]).
b. Taroo-wa [[Hanako-ga (?*[nagai) kasa-o) katta] yorimo] nagai
Taroo-TOP Hanako-NOM long umbrella-ACC bought THAN long
kasa-o katta.
umbrella-ACC bought
'Taroo bought a longer umbrella than Hanako did.'

When attributive comparatives express the comparison of gradability, the sentence without deletion is virtually unacceptable in Japanese as well as in English.⁸⁸

⁸⁸ Whether the deletion sites involve attributive adjectives or quantifiers is one of the important issues in Japanese clausal comparatives. One thing we notice is that the attributive comparative clause of “quantity” need not involve the matrix quantifier in Japanese.

-
- (i) Taroo-wa [[Hanako-ga kinoo ~~ringo-o~~ kattekita] yorimo] ringo-o
 Taroo-TOP Hanako-NOM yesterday apples-ACC bought.come THAN apples-ACC
 kattekita.
 bought.come
 ‘Taroo bought more apples than Hanako bought yesterday.’

What is important is that (i) cannot express the comparison of some gradable property that *the apples* possess but expresses only a comparison of quantity.

Some speakers report that the predicative comparative seems slightly awkward in Japanese when the embedded predicate is in the present tense.

- (ii) ??Taroo-wa [_{pp}[kare-no titi-ga] se-ga takai yorimo] se-ga takai.
 Taroo-TOP he-GEN father-NOM height-NOM be.tall THAN height-NOM be.tall
 ‘Taroo is taller than me.’

This would be worse than (i) because the clausal comparison is incompatible with the individual-level predicate in Japanese, as originally argued in Ishii (1991).

The acceptability improves when the predicate is in the past form as in (i). The acceptability also improves when the “-*ki* type” adjective *takai* (*taka-(k)i*) ‘high’ is replaced with the “-*da* type” adjective *noppo-da* ‘high’ (cf. Nishiyama (1999)), as shown in (iii).

- (iii) Hanako-wa [[Kanojo-no haha-ga noppo-na] yorimo] noppo-da.
 Hanako-TOP she-GEN mother-NOM be.tall THAN be.tall
 ‘Hanako is taller than her mother is (tall).’

The level of acceptability also rises when the clause involving a variable is embedded under the bridge verb, as shown in (iv).

7.3.2. The Setting of the Degree Abstraction Parameter

Beck et al. (2004) claim that the analysis of comparatives in English cannot be adopted for Japanese comparatives. First, they argue that in contrast to English, Japanese does not support the comparative subdeletion configuration, as shown in (401).

- (401) * Kono tana-wa [ano doa-ga hiroi yori(mo)] (motto) takai.
 this shelf-TOP that door-NOM be.wide YORI (mo) (more) be.tall.
 ‘This shelf is taller than that door is wide.’ (Beck et al. (2004: 290))

Second, the acceptability differs in terms of the lexical properties of gradable adjectives and depending on the context, as shown by the variability of judgments shown in (402).

- (402) Taroo-wa [[Hanako-ga katta] yori] {^{ok}takai/{[?]?/?/?*}nagai} kasa-o
 Taroo-TOP Hanako-NOM bought YORI expensive/long umbrella-ACC
 katta.
 bought
 ‘Taroo bought a {more expensive/longer} umbrella than Hanako did.’

Addressing languages such as Japanese that have semantically gradable adjectives as shown in the examples above, Beck et al. (2004) claim that they do not have binding of degree variables in their syntax and propose the Degree Abstraction Parameter shown below.

-
- (iv) Taroo_i-wa [[_{CP} kimi-ga [_{CP} *pro*_i se-ga takai to] omotteru] yorimo] (zutto)
 Taroo-TOP you-NOM height-NOM be.tall C be.thinking THAN by.far
 se-ga takai.
 height-NOM be.tall
 ‘(Lit.) Taroo is taller than you claim that he is tall.’

I assume that one reason the sentence seems a little awkward at first sight is simply that it sounds redundant.

(403) *Degree Abstraction Parameter* (Beck et al. (2004: 325)):

A language {does, does not} have binding of degree variables in the syntax.

Japanese gradable adjectives, in fact, cannot host Measure Phrases in either the predicative or the attributive use, as shown in (404).

(404) a. Kono biru-wa [(*[_{MP} 20 meeteru]) takai].

this building-TOP 20.meter be.tall

‘This building is (*20 meters) tall.’

b. Kono [(*[_{MP} 20 meeteru]) takai] biru

this 20.meter be.tall building

‘this (*20 meter-)tall building’

This is possible only when deadjectival nominals are used instead, as shown in (405).

(405) a. Kono biru-wa [[_{MP}20 meeteru-no] taka-sa] da.

this building-TOP 20.meter-GEN tall-N COP

‘This building is 20 meters high.’

b. Kono [[_{MP}20 meeteru-no] taka-sa]-no biru

this 20.meter-GEN tall-N-GEN building

‘This 20 meter-high building’

Moreover, Beck et al. (2004) claim that Japanese attributive comparative clauses involve individual-type gaps within *yor*i-marked clauses. The nominal expression *no*, which is regarded as one-anaphora in Japanese, can be realized overtly in Japanese attributive comparatives, as shown in (406).⁸⁹

⁸⁹ Snyder et al. (1995) claim that AdjPs in Japanese are impoverished. They lack the position to host a degree variable, as illustrated in (i).

- (406) a. Taroo-wa [[Hanako-ga *e* katta] (no) yori] takai kasa-o katta.
 Taroo-TOP Hanako-NOM bought NO YORI expensive umbrella-ACC bought
 ‘Taroo bought a more expensive umbrella than Hanako did.’
- b. Taroo-wa [[Hanako-ga *e* kaita] (no) yori] nagai ronbun-o kaita.
 Taroo-TOP Hanako-NOM wrote NO YORI long paper-ACC wrote
 ‘Taroo wrote a longer paper than Hanako did.’

(from Beck et al. (2004: 301-302), with slight modification)

Note that they can also involve the so-called “nominalizer” *no* at the right edge of the clause. Thus, Beck et al. (2004) and Kennedy (2007) argue that *yori*-marked clauses in Japanese do not denote some degree (or predicates of degrees) but that individuals (or properties of individuals) and involve a corresponding matching operator. Their analysis indicates that the clausal complements of *yori* in (406) are (free) relatives that denote the maximality of the individual entity.

7.3.3. Relativization Analysis for Comparative Deletion Construction in Japanese

Given the Degree Abstraction Parameter in (403), Beck et al. (2004) and Kennedy (2007) claim that the A'-movement involved in Japanese clausal comparatives is relativization. According to the relativization analysis of the complement of *yori* (*mo*), all comparatives in Japanese are

(i) a. English: [AdjP ____ [Adj' A]]

b. Japanese: [AdjP A]

Both analyses stem from the observation that *-ki* type adjectives in Japanese cannot co-occur with measure phrases expressing absolute value. Both Snyder et al.’s (1995) and Beck et al.’s (2004) analyses entail that no *operator-variable* chain with respect to degree is established in the syntax of Japanese.

- (409) a. Taroo-wa [[[Hanako-ga e_i katta] (kasa_i)] yorimo] takai kasa-o
 Taroo-TOP Hanako-NOM bought THAN expensive umbrella-ACC
 katta.
 bought
- b. (?) Taroo-wa [[[Hanako-ga e_i katta] (kasa_i)] yorimo] nagai kasa-o
 Taroo-TOP Hanako-NOM bought THAN long umbrella-ACC
 katta.
 bought
- c. Taroo-wa [[[Hanako-ga e_i kaita] (ronbun_i)] yorimo] nagai ronbun-o kaita.
 Taroo-TOP Hanako-NOM wrote THAN long paper-ACC wrote

Note that Shimoyama (2011) claims that clausal comparatives in Japanese have the degree abstraction structure, just as English clausal comparatives do. Shimoyama (2011, 2012) observes that predicative clausal comparatives are sometimes ungrammatical in both English and Japanese, as shown in (410) and (411).

- (410) a. * Hanako-wa [Taroo-ga yatotta] yori kasikoi.
 Hanako-TOP Taroo-NOM hired THAN be.smart
- b. * Hanako is smarter than Taro hired.
- cf. Hanako is smarter than the one(s) Taro hired.
- (411) a. * Kono hon-wa [Hanako-ga katta] yori takai.
 this book-TOP Hanako-NOM bought THAN be.expensive
- b. * This book is more expensive than Hanako bought.
- cf. This book is more expensive than what Hanako bought.

As noted by Shimoyama, this is unexpected if the Japanese clausal comparatives in (410a) and (411a) are covertly headed relatives or free relatives because, as paraphrased in (410) and (411) in English, free relatives must be acceptable. Thus, the Japanese comparatives cannot be free relatives

with covert Head Nominals.

If we assume the deletion of the Head Nominals under identity following the overt relativization procedure in Japanese attributive comparatives, the ungrammaticality in (410a) and (411a) can be accounted for by the lack of identical nominal antecedent in the matrix. That is, relativized Head Nominals can be deleted under identity in attributive comparatives such as (412), whereas they cannot be deleted in predicative comparatives such as (413).

(412) a. Taroo-wa [[[Hanako-ga e_i katta] ~~kasa~~] yorimo] takai kasa-o
 Taroo-TOP Hanako-NOM bought THAN expensive umbrella-ACC
 katta.

bought

b. Taroo-wa [[[Hanako-ga e_i kaita] ~~ronbun~~] yorimo] nagai ronbun-o kaita.
 Taroo-TOP Hanako-NOM wrote THAN long paper-ACC wrote

(413) a. * Hanako-wa [[Taroo-ga e_i yatotta] ~~hito~~] yori kasikoi.
 Hanako-TOP Taroo-NOM hired person THAN be.smart

b. * Kono hon-wa [[Hanako-ga e_i katta] ~~ronbun~~] yori takai.
 this book-TOP Hanako-NOM bought paper THAN be.expensive

7.3.4. Problems with Relativization Analysis: Optionality of Individual Gaps

Most studies concerning clausal comparatives in Japanese focus on examples that already involve deletion within the embedded clause because the authors have in mind the obligatory deletion of embedded nominal sortals of degree in English attributive comparatives. Thus, Beck et al. (2004) and Kennedy (2007) argue that the impossibility of adjectival subdeletion in their Japanese examples indicates that standards of comparison cannot be degree abstraction structures in that language, while the possibility of subdeletion in English indicates that they can be. See Kennedy's (2007) generalizations in (414).

- (414) a. Complex standards in Japanese are (only) type *e*.
 b. Complex standards in English are (potentially) type *d*.

However, Inada (2010) observes that individual gaps are not necessarily involved in embedded clauses marked by *yorimo* in Japanese. This can be made clear when we do not apply Comparative Deletion, as shown in (415).

- (415) a. ? Taroo-wa [[kare-no titi-ga se-ga takakatta] yorimo]
 Taroo-TOP he-GEN father-NOM height-NOM be.tall.PAST THAN
 (zutto) se-ga takai.
 (by.far) height-NOM be.tall
 ‘(Lit.) Taroo is taller than his father was tall.’
- b. Taroo-wa [[Hanako-ga kasa-o katta] yorimo] takusan
 Taroo-TOP Hanako-NOM umbrellas-ACC bought THAN many
 kasa-o katta.
 umbrellas-ACC bought
 “(Lit.) Taroo bought more umbrellas than Hanako bought umbrellas.”

If these Japanese clausal comparatives involve relativization, the question arises as to how the well-formedness of the examples in (415), which include no individual gaps in the standard, is accounted for.

Alternatively, it may be argued that there must be another hidden Head Nominal in the relative clause. That is, the hidden Head Nominal must be relativized, apart from the type *e* standard, such as *kasa* ‘umbrella,’ which is overt in (415b). With this in mind, the possibility of Comparative Subdeletion constructions in Japanese must be reconsidered. Let us examine English examples of Comparative Subdeletion.

- (416) a. This table is longer than it is wide. (Kennedy (2007: 142))
 b. That dinner was more expensive than it was tasty. (Rett (2008: 4))

As we have noted in Section 7.3.2, Beck et al. (2004) and Kennedy (2007) observe that sub-comparatives as in English example (416a) are not allowed in Japanese. They argue that Japanese lacks syntactic binding of the degree (*d*-type) variable, which results in the unacceptability of the following.

- (417) *Kono tana-wa ano doa-ga hiroi yori takai.
 this shelf-TOP that door-NOM wide YORI tall
 ‘This shelf is taller than that door is wide.’ (Kennedy (2007: (7)))

Kennedy claims that if an *operator-variable* chain with respect to degree is established in syntax, sub-comparatives can be allowed in principle, which yields the interpretation of the comparison of deviation of the two degrees, as shown in (418).

- (418) This shelf is taller [*wh* than that door is *t* wide].
 $\|more\|(\| [wh \text{ than that door is } t \text{ wide}] \|)(\|tall\|)$
 $\lambda x. max\{d' \mid tall(x) \geq d'\} > max\{d'' \mid wide(that \ door) > d''\}$
 (Kennedy (2007: (19)))

Notice, incidentally, that example (417) is problematic in itself. The gradable adjective *wide* in English does not correspond exactly to the Japanese adjective *hiro*, which expresses the concept of something being ‘large, spacious, or broad.’ This can be shown by the infelicity of its predicative use, as exemplified in (419).

- (419) Kono doa-wa #(haba-ga) hiroi.
 this door-TOP width-NOM large.
 ‘This door is wide.’

Without the support of the nominal *haba* ‘width,’ the sentence is interpreted as talking about the square measure of the door (although the width would often be great in consequence). The derived nominal *hiro-sa*, which stems from the same adjective *hiro*, is incompatible with a Measure Phrase expressing concrete length, as illustrated in (420).

- (420) Kono heya-no hiro-sa-wa {*5-meetoru/20-heihoo-meetoru}-da.
 This room-GEN large-ness-TOP 5-meter/20-meter²-COP.
 ‘(Lit.) This room’s largeness is {*5 meters/20 meters²}.’

If we supply the appropriate functional nominals in the examples, the parallel examples are in fact also observed in Japanese, as shown in (421).⁹⁰

- (421) ? Kono terebi-wa [[*protate-ni* nagai] yorimo] (zutto) haba-ga
 This TV-TOP vertical-in be.long THAN (by.far) width-NOM
 yoko-ni hiroi.
 horizontal-in be.wide
 ‘This TV display is wider than it is tall.’ (Inada (2010: 19))

We can conclude that in both English and Japanese, the Comparative Subdeletion construction may be used to express comparisons of deviation.

One thing we notice is that clausal comparatives in Japanese cannot be considered instances of the head internal relatives (cf. Kuroda (1999)).⁹¹ Consider the examples in (422).

⁹⁰ The acceptability of the Comparative Subdeletion construction in Japanese improves when the standard marker is replaced with *izyooni* ‘than,’ which is a specialized marker for comparisons of deviation. See the discussion in Hayashishita (2009).

⁹¹ A functional noun such as *se* ‘height’ in (ia) may not serve as a possible DP considered as a head-in-situ because it cannot be overtly relativized, as shown indirectly by the unacceptability of (ib).

- (i) a. [[DP [CP Hanako-ga se-ga takakatta] no] yori] (zutto) se-ga takai
 b. * [[DP [CP *Op_i* Hanako-ga *e_i* takakatta] se] yori] (zutto) se-ga takai

(422) a. * Ichiroo-wa [[Hideo-ga ronbun-o kakeru] no]-o yonda.
 Ichiroo-TOP Hideo-NOM papers-ACC write.can NO-ACC read
 ‘Ichiroo read papers that Hideo can write.’

b. Ichiroo-wa [[Hideo-ga ronbun-o kakeru] (no) yori]
 Ichiroo-TOP Hideo-NOM papers-ACC write.can (NO) YORI
 takusan hon-o kakeru.
 many books-ACC write.can
 ‘Ichiroo can write more books than Hideo can write papers.’

(Inada (2010) from Kawahara (2008: 19))

With the individual-level predicate *kakeru* ‘able to write,’ the phrases involving the head-in-situ cannot be counted as a DP in (422a), but this can be allowed for the complement of *yor*, as in (422b).

Furthermore, what is most problematic in the relativization analysis of Japanese clausal comparatives, or the parametric variation between English and Japanese proposed thereby, is that the comparison of gradability is not always possible in both English and Japanese, as we observed in Section 7.1. Examples of the two types of comparison in English and Japanese are repeated in (423) and (424), respectively.

(423) a. Michael Jordan has more scoring titles [than Denis Rodman has tattoos].

b. * Anna read a longer article [than Roxani read a book].

(424) a. Taroo-wa [[Hanako-ga katta] yori] takusan kasa-o katta.
 Taroo-TOP Hanako-NOM bought YORI many umbrella-ACC bought
 ‘Taroo bought more umbrellas than Hanako did.’

b.(?*) Taroo-wa [[Hanako-ga katta] yori] nagai kasa-o katta
 Taroo-TOP Hanako-NOM bought YORI long umbrella-ACC bought
 ‘Taroo bought a longer umbrella than Hanako did.’

Beck et al. (2004) and Kennedy (2007) propose their parametric analysis of comparatives in English and Japanese based on the ill-formedness of (424b). However, the contrast between comparisons of quantity and quality in Japanese in (424) is considered the same as we observe in the English attributive comparatives in (423), which involve fewer deleted elements. The discussion in this section would lead us to abandon the assumption of a minus setting of the degree-abstraction parameter in Japanese proposed in Beck et al. (2004).

We observed a number of examples in Chapter 6 that involve relativization of functional, semi-lexical nominals in Japanese, and noted that these are sometimes covert. The availability of covert semi-lexical Head Nominals allows us to hypothesize the occurrence of the still-hidden relative clause structure. However, we must note that there is an asymmetry between the comparison of gradability and that of quantity both in English and in Japanese.

7.4. Asymmetry between Number Abstraction and Degree Abstraction

7.4.1. Number versus Degree in the Structure of DP

It is well known that there are two types of attributive numeral expressions in Japanese: one form is “numeral+classifier,” as in (425a), and the other form is “numeral+unit” as in (425b).⁹²

- (425) a. Hanako-wa [DP 5-hon-no kasa-o] nakusi-ta.
 Hanako-Top 5-CL-NO umbrellas-Acc lose-Past
 ‘Hanako lost 5 umbrellas.’
- b. Hanako-wa [DP 70-sentimeetoru-no kasa-o] nakusi-ta.
 Hanako-Top 70-centimetrer-NO umbrella-Acc lose-Past
 ‘Hanako lost a 70-centimeter-long umbrella.’

⁹² In this thesis, the form of the *rentaikei* (adnominal) ending of the numeral modifier *-no* is referred to simply as the “adnominal marker” (Backhouse (2004)).

In (425a), the number of entities denoted by the noun *kasa* ‘umbrella’ is specified by the numeral modifier *5 hon* ‘5-classifier(CL).’ In (425b), the degree of some individual-level property of the modified noun is expressed by the numeral modifier *70 sentimeetoru* ‘70 centimeter,’ which is the length of the umbrella in this case. Inada (2010, 2011b, 2012) calls the former numeral modifier NUM(BER)Mod, and the latter DEG(REE)Mod.⁹³

In (425), the two numeral modifiers appear to have the same surface pattern:

(426) Numeral Modifier + Adnominal Marker *-no* + Noun

This configuration is that of “pseudo-partitives.”

Inada (2010, 2011b, 2012) observes that the distributions of the two types of attributive numeral expressions are different especially when they depart from the pseudo-partitive structure.

⁹³ Schwarzschild (2002, 2006) argues that the numeral expressions in pseudo-partitives are interpreted in terms of a measurement system and that the basis for this measurement is “monotonicity.” For example, in the case of the countable noun *umbrella*, its number is considered monotonic while its length is considered non-monotonic because a singular count noun never provides a non-trivial part-whole relation.

In this view, the amount of a mass noun is also considered monotonic. The “amount modifier” behaves in much the same way as NUMMods, as shown in (i).

- | | | | | | |
|-----|----|------------|--------------------------------|-----------------------------|------------|
| (i) | a. | Hanako-wa | {1.5-rittoru(-no)/20-do*(-no)} | mizu-o | non-da. |
| | b. | Hanako-wa | mizu-o | {1.5-rittoru/*20-do} | non-da. |
| | c. | Hanako-wa | mizu | {1.5-rittoru/*20-do}-o | non-da. |
| | | Hanako-Top | water | 1.5-liters/20-degrees.C-Acc | drink-Past |

As we will discuss, the contrast is also observed in English.

- | | | |
|------|----|--|
| (ii) | a. | 1.5 liters of water. |
| | b. | *20 degrees C of water (water at 20 degrees C) |

NUMMods can occur (i) in the prenominal position, (ii) in the postnominal position following the Case-marker, and (iii) in the postnominal position between the noun and the Case-marker. On the other hand, DEGMods can occur in none of these positions. This is illustrated in the examples in (427) (cf. Kamio (1977), Watanabe (2008)).

- (427) a. Hanako-wa {5-hon/*70-sentimeetoru} kasa -o nakusi-ta.
 b. Hanako-wa kasa-o {5-hon/*70-sentimeetoru} nakusi-ta.
 c. Hanako-wa kasa {5-hon/*70-sentimeetoru}-o nakusi-ta.
 Hanako-Top umbrellas 5-CL/70-centimeter -Acc lose-Past

Furthermore, NUMMods and DEGMods can co-occur, as shown in (428a), and their linear order is fixed within DP, as shown by the acceptability of (428b).⁹⁴

- (428) a. Hanako-wa [_{DP} 5-hon-no 70-sentimeetoru-no kasa-o] nakusi-ta.
 b. *Hanako-wa [_{DP} 70-sentimeetoru-no 5-hon-no kasa-o] nakusi-ta.
 Hanako-Top 70-centimeterer-NO 5-CL-NO umbrellas-ACC lose-Past

Since Japanese is a head-final language, the word-order restriction indicates that the two modifiers in (428a), both of which precede the head N *kasa* ‘umbrellas’ within DP, are considered to be specifiers of two different functional projections within DP.

In this regard, Inada (2010, 2011b, 2012) follows a general assumption that the structural positions of NUMMods and DEGMods are different. NUMMods occupy the specifier position of a certain functional projection between DP and NP, namely, Num(ber)P, expressing the cardinality of the entire DP (Li (1998, 1999), Cheng and Sybesma (1999), Watanabe (2006, 2008)). DEGMods

⁹⁴ A reviewer reports that (428b) is not problematic at all. This judgment might be obtained because of the focalization of the relative clause *70-sentimeetoru-no* ‘whose length is 70 cm,’ which would require a phonological prominence of the expression with some special prosody (e.g., cancelation of the so-called “down step” of the intonation) of the attributive modifiers and head N.

occupy the specifier position of (attributive) Deg(ree)P, which is considered to be the maximal extended projection of A(djective) (Corver (1990), Svenonius (1994)).

Before introducing the positions of the two types of attributive modifiers proposed in Inada (2011a, 2011b, 2012), let us consider the following English examples of DEGMods.

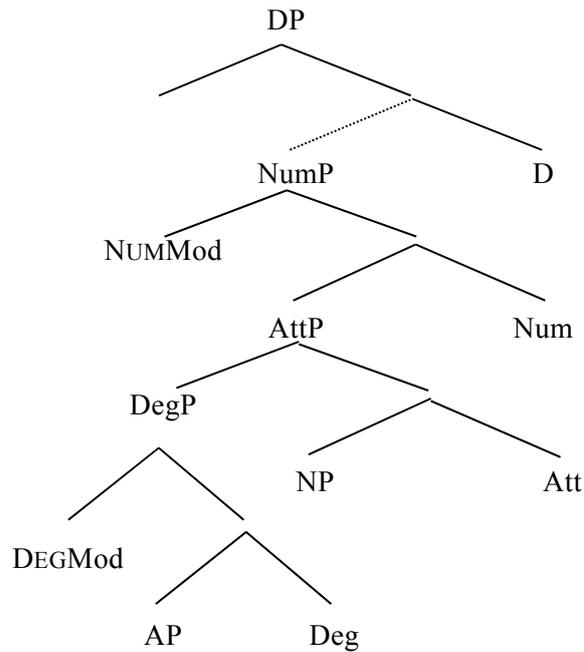
- (429) a. * the 70 centimeter of umbrella(s)
 b. * the 70 centimeter umbrella
 c. the 70-centimeter-long umbrella

In English, DEGMods are unacceptable in the pseudo-partitive in (429a) and in the prenominal position in (429b). They can occur only in compounding with attributive adjectives, as in (429c) (Schwarzchild (2002, 2006)). Suppose that the adjectives necessarily determine the dimension of the numerical value that DEGMods express. It follows that while the attributive adjectives accompanying DEGMods are obligatorily overt in English, they occupy the same positions in the Japanese examples even though they are covert. In fact, Watanabe (2012) observes that attributive adjectival expressions are sometimes overt in Japanese, as shown in (430).

- (430) a. [DP [NumP [AttrP [DegP 70-centimeter- [AP*(long)]] [NP umbrellas]]]]
 b. [DP [NumP [AttrP [DegP 70-sentimeetoru-no [AP (nagasa-no)]] [NP kasa]]]]
 70-centimeter-NO length-NO umbrellas

Thus, Inada (2011a, 2011b, 2012) proposes the structure of DP (linear order irrelevant) accompanied by NUMMod and DEGMod, which is illustrated in (431).

(431)



In the layered DP structure in (431), NUMMods and DEGMods occupy different positions. NUMMods occupy Spec,NumP: namely, they are Measure Phrases. DEGMods are specifiers of the attributive DegP, which is in Spec,Att(ributive)P (Cinque (2010), Morita (2011)).⁹⁵

7.4.2. Number Abstraction versus Degree Abstraction in Comparative Deletion Construction

As we observed for Comparative Deletion constructions, there is a clear contrast between the attributive Comparative Subdeletion constructions for comparisons of number and degree. Bhatt and Takahashi (2008, 2011) and Shimoyama (2011, 2012) show the contrast between the two constructions exemplified in (432a) and (432b).

⁹⁵ As we argued in Chapter 3, another functional layer called CaseP has its place between DP and NumP. As was also discussed in Chapter 3, the classifier of NUMMod is considered the head of NumP and the massive phrasal movements within DP yield a word order like *5-hon-no kasa* in the analysis of DP-internal syntax in Watanabe (2008). The categorial status of the numeral modifiers themselves is left open for future research.

- (432) a. Taroo-wa Hanako-ga [_{DP} boorupen-o] nakusi-ta yorimo takusan-no
 Taroo-Top Hanako-Nom pen-Acc lose-Past than many-Gen
 enpitu-o nakusi-ta.
 pencil-Acc lose-Past
 ‘(lit.) Taroo lost more pencils than Hanako lost pens.’
- b. * Taroo-wa Hanako-ga [_{DP} boorupen-o] nakusi-ta yorimo
 Taroo-Top Hanako-Nom pen-Acc lose-Past than
 {naga/omo/taka}-i enpitu-o nakusi-ta.
 long/heavy/expensive-Att pencil-Acc lose-Past
 ‘(lit.) Taroo lost a {longer/heavier/more expensive} pencil than Hanako lost a
 pen.’

Another contrast is that “excessiveness” of the number can be expressed by affixing *-sugi(r)*- ‘too much’ to the verb, whereas excessiveness of the degree indicated by attributive adjectives cannot be, as shown in (433) (see also Kageyama and Yumoto (1997), Nakanishi (2010)).

- (433) a. Hanako-wa [_{DP} (takusan-no) kasa-o] nakusi-sugi-ta.
 Hanako-Top many-GEN umbrellas-Acc lose-too.much-Past
 ‘Hanako has lost too many umbrellas.’
- b. Hanako-wa [_{DP} {naga/omo/taka}-i kasa-o] nakusi-sugi-ta.
 {long/heavy/expensive}-Att umbrella-Acc lose-too.much-Past
 #‘Hanako has lost too {long/heavy/expensive} an umbrella.’
 ‘Hanako has lost too many {long/heavy/expensive} umbrellas.’

Note that although the example in (433b) itself sounds acceptable, it does not mean that Hanako has lost too {long/heavy/expensive} an umbrella. Rather, what exceeds the expected standard in the possible interpretation of (433b) must be only the number of *kasa*.

In addition, Inada (2010) observes the contrast between the relativizations of numeral types

and degree types of “degree nominals” (Sudo (2009)). Concerning the amount/degree relatives with semi-lexical relativization in Japanese discussed in Chapter 6, Sudo (2009) claims that comparative clauses in Japanese can be headed by degree nominals (in general), as shown below.

- (434) [Hanako-ga [DP kasa-o] nakusi-ta] kazu
 Hanako-Nom umbrella-Acc lose-Past number
 ‘(lit.) the number that Hanako lost the umbrella’

In (434), the nominal expression *kazu* ‘number’ is an instance of a degree nominal. Inada (2010, 2011b, 2012) observes that the relativization of degree nominals is also sensitive to the distinction between number and degree. That is, such a relativization is possible only in the case of “number abstraction.” Consider the following examples.⁹⁶

⁹⁶ It should also be noted that some data seem to involve binding of the attributive degree variable and floating of the DEGMods. Consider the examples in (i).

- (i) a. ?Taroo-wa Hanako-ga [ronbun-o] kai-ta yorimo naga-i.
 Taroo-Top Hanako-Nom paper-Acc write-Past than long-Att
 syoosetu-o kai-ta
 novel-Acc write-Past
 ‘(lit.)Taroo wrote a longer novel than Hanako wrote a paper.’ (Inada (2010))
- b. Hanako-wa [naga-i ronbun-o] kaki-sugi-ta.
 Hanako-Top long-Att paper-Acc write-too.much-Past
 ‘Hanako wrote too many long papers.’
 ‘Hanako wrote too-long a paper.’ (Kageyama & Yumoto (1997))
- c. [Hanako-ga [DP ronbun-o] kai-ta] naga-sa
 Hanako-Nom paper-Acc write-Past long-degree
 ‘(lit.) the length that Hanako wrote a paper’ (Sudo (2009))

- (435) a. [Hanako-ga [_{DP} kasa-o] nakusi-ta] kazu [= (434)]
 Hanako-Nom umbrella-Acc lose-Past number
 ‘(lit.) the number that Hanako lost the umbrella’
- b. * [Hanako-ga [_{DP} kasa-o] nakusi-ta] {nagasa/omosa/takasa}
 Hanako-Nom umbrella-Acc lose-Past {length/weight/expensiveness}
 ‘(lit.) the {length/weight/price} that Hanako lost the umbrella’

Without considering the distinction between number and degree, it follows that all of the contrasts observed in the examples of (432)-(433) are derived via the same semantics of type-*d* variable binding as in Carlson’s (1977) treatment discussed in Chapter 6. That is, all of the type-*d* variables are contained within DP and bound by the degree operator *Op* outside DP, yielding the identical degree abstraction structures.

One-way type-*d* variable binding semantics cannot explain the contrasts in (436)-(438) that have been observed thus far.

- (436) a. ... [_{CP} *Op*_i Hanako-ga [_{DP} *d*_i-takusan-no boorupen-o] nakusi-ta] (yorimo ...)
 b. * ... [_{CP} *Op*_i Hanako-ga [_{DP} *d*_i-naga-i boorupen-o] nakusi-ta] (yorimo ...)

-
- d. Hanako-wa [ronbun-o] [200-peeji] kai-ta.

‘Hanako is writing a paper, and *its length (in progress)* has become 200-pages long.’ (Inada (2010))

However, these are not potential counterexamples to the analysis presented here. They are cases in which the syntactic island is circumvented, allowing the (otherwise illicit) extraction out of DP (Davies and Dubinsky (2003)). The fact that they are acceptable conversely indicates that the movement of the degree operator in fact violates the island condition. We discuss circumvention effects in Section 7.4.4.

(437) a. ..._{[vP Op_i [DP d_i-takusan-no kasa-o] nakusi-sugi] (-ta)}

b. * ..._{[vP Op_i [DP d_i-naga-i kasa-o] nakusi-sugi] (-ta)}

(438) a. ..._{[DP [CP Op_i Hanako-ga [DP d_i kasa-o] nakusi-ta] kazu_i]}

b. * ..._{[DP [CP Op_i Hanako-ga [DP d_i kasa-o] nakusi-ta] {nagasa/omosa/takasa}_i]}

The observations above suggest that a binding relation cannot be established when the type-*d* variable concerns the degree of the modified noun. Inada's (2011b, 2012) generalization therefrom is given to the first approximation in (439).

(439) a. [_{CP/vP Op_{NUMBER} ... [DP d_{NUMBER} noun]]}

b. * [_{CP/vP Op_{DEGREE} ... [DP d_{DEGREE} noun]]}

On the other side of the coin, we can say that Japanese allows degree abstractions concerning only number. Recall that Beck et al. (2004) and Kennedy (2007) claim that whether a language has binding of the type-*d* variable or not is parameterized, as discussed in Section 7.4.2, without making a distinction between number and degree. However, as we have just observed in (432)-(433), type-*d* variable binding is possible in Japanese if it concerns the number of entities of the compared noun. This indicates that Japanese does allow standards of type-*d* in the semantics.⁹⁷

More importantly, the asymmetry between number and degree is also observed in the English Comparative Subdeletion construction, as repeated in (440).

(440) a. Michael Jordan has more scoring titles than Denis Rodman has tattoos.

b. * Pico wrote a more interesting novel than Brio wrote a play.

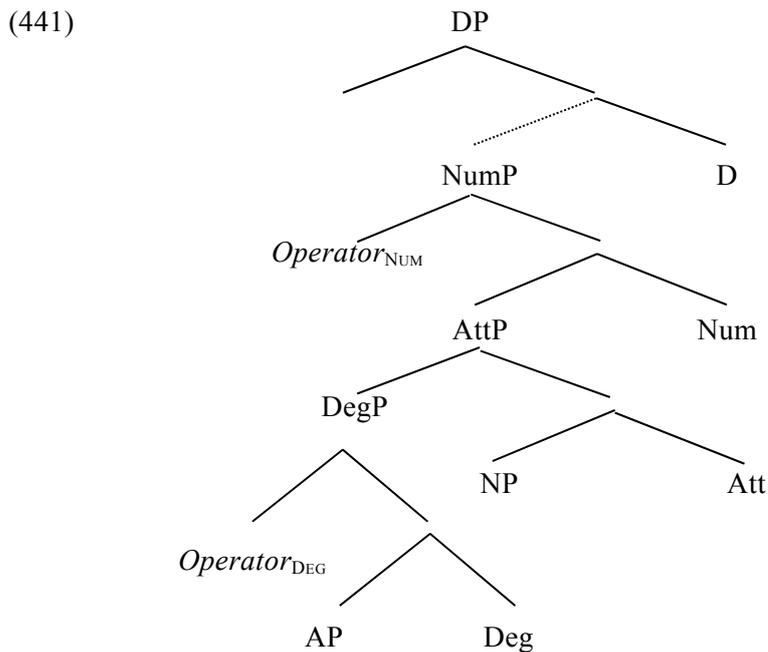
c. * Anna read a longer article than Roxani read a book.

⁹⁷ Beck et al's (2004) analysis of Internally-Headed relative structure for the comparative subdeletion construction also fails to account for the asymmetry between number and degree, because the "internal head" to be relativized is the same noun *boorupen*, 'pen(s),' in both the acceptable and unacceptable examples.

- (440') a. ... than [_{CP} *Op*_i Denis Rodman has [_{DP} *d*_i-many tattoos]].
- b. * ... than [_{CP} *Op*_i Brio wrote [_{DP} a *d*_i-interesting play]].
- c. * ... than [_{CP} *Op*_i Roxani read [_{DP} a *d*_i-long book]].

This leads us to conclude that in both Japanese and English, the type-*d* variable within DP cannot be bound by an operator outside DP when the abstraction is of the degree of some individual-level property denoted by the attributive adjective.

The DP structure given in (431) involves two different types of attributive numeral modifiers: NUMMods and DEGMods. Inada (2011a, 2011b, 2012) argues that in the case of number abstraction, the variables occupy the specifier position of NumP, whereas in the case of degree abstraction the variables occupy the specifier position of the attributive DegP, which is more deeply embedded within the DP structure.



The impossibility of the degree abstraction is thus accounted for, because the attributive DegP, which dominates the degree variable d_{DEGREE} , constitutes an island for A'-extraction out of the DP that dominates it, as shown in (442) (Corver (1990), Merchant (2001)).

- (442) a. * How easily did he take [_{DP} [_{DegP} *e* obtainable] drugs]?
- b. * How well have you examined [_{DP} a [_{DegP} *e* prepared] student]?

These examples would be acceptable if the entire DP undergoes A'-movement to the operator position, accompanying the *wh*-phrase contained in the attributive DegP.

- (443) a. [DP How easily obtainable drugs] did he take *e* ?
 b. [DP How well prepared student] have you examined *e* ?

While the sentence with the *wh*-phrase in-situ seems to be marginally acceptable in Japanese, as shown in (444a), the acceptability of the sentence deteriorates if it involves the overt extraction of the specifier of DegP, as shown in (444b).

- (444) a. Taroo-wa [DP[DegP dorekurai youini nyuusyukanou-na] yakuzai-o]
 Taroo-Top how easily obtainable-Att drugs-Acc
 hukuyousi-ta no?
 take-Past Q
- b. * [Dorekurai youini] Taroo-wa [DP [DegP *e* nyuusyukanou-na] yakuzai-o]
 how easily Taroo-Top obtainable-Att drugs-Acc
 hukuyousi-ta no?
 take-Past Q

The in-situ “*wh*-phrase” in (444a) can be the entire DP *dorekurai youini nyuusyukanou-na yakuzai-o* ‘how easily obtainable drugs,’ and hence the sentence can be considered as not involving illicit covert extraction from within DegP. Since binding of the degree variable can be established only via the illicit A'-movement of the degree operator, which is base-generated within the attributive DegP island, such a binding is impossible in both English and Japanese.

As with CPs of the Complex-NP islands, DegPs *per se* are not counted as an island. The predicative DegPs do not constitute an island in English (Corver (1990), Merchant (2001)) or in Japanese.

- (445) a. How easily are these drugs [DegP *e* obtainable]?
 b. How well was she [DegP *e* prepared]?

- (446) a. Sono yakuzai-wa [_{DegP} dorekurai youini nyuusyukanou] na no?
 that drugs-Top how easily obtainable Cop Q
- b. Dorekurai youini sono yakuzai-wa [_{DegP} e nyuusyukanou] na no?
 how easily that drugs-Top obtainable Cop Q

DegPs are counted as an island only when they modify nouns. This islandhood of the attributive DegPs is accounted for if we assume that they are relative clauses. The idea that the attributive DegPs are equivalent to relative clauses has been proposed for English and other languages (Smith (1961, 1964), Ross (1967), Sproat and Shih (1991), Kayne (1994), Alexiadou (2001), Cinque (2010)).^{98,99}

7.4.3. Comparative Deletion and Extraction from an Attributive DegP Island

Thus far we have considered Inada's (2010, 2011b, 2012) observations on the contrast between the syntactic behaviors of NUMMods and DEGMods. Specifically, Inada (2010, 2011b, 2012) observes the contrast between the binding of DP-internal number and degree variables from

⁹⁸ The prenominal and postnominal adjectival modifiers could be derived from the underlying structure (i) by way of WHIZ deletion (Ross (1967)) and movement of the reduced relative clause (Cinque (2010)).

- (i) The [which are visible] stars [which are visible] include Capella.

Japanese fits into the group of languages that lack direct modification by adjectival expressions, and this is in fact a widely accepted view of Japanese adjectival modification (Kuno (1973), Shibatani (1978), Whitman (1981), Dixon (1982), Miyagawa (1984), Urushibara (1993), Nishiyama (1999, 2005), Baker (2003)).

⁹⁹ See the discussions in Yamakido (2000) for the opposite analysis, where some attributive adjectival modifications in Japanese cannot be relativizations.

outside DP. That is, binding is allowed in both English and Japanese only with regard to the number of entities denoted by the noun. Inada (2010, 2011b, 2012) assumes that NUMMods and DEGMods originate from different syntactic positions within DP. Given that the position that DEGMods occupy is inside a syntactic island, namely, the attributive DegP, the reason why syntactic binding of the degree variable is impossible in both English and Japanese is that the degree operator, which would otherwise bind the degree variable, is base-generated within the island and must remain there.

Inada (2010, 2011b, 2012) also discusses various environments in which the attributive DegP island is circumvented, where degree abstraction with respect to the degree of the attributive adjective is possible. Consider the comparative deletion constructions shown below.

- (447) a. Taroo bought a longer umbrella than Hanako did/bought.
 b. Taroo bought more umbrellas than Hanako did/bought.
- (447') a. ... bought a longer umbrella than [*Op* Hanako did <buy [a *d*-long umbrella]>]
 b. ... bought more umbrellas than [*Op* Hanako did <buy [*d*-many umbrellas]>]

Comparative deletion is also derived via A'-movement of the operator that binds the type-*d* variable, even though the DP containing the variable deletes under the identity condition. We have observed that in Japanese, the acceptability of comparative deletion seems to vary among speakers when degrees are compared, as originally observed in Ishii (1991) and discussed further in Beck et al. (2004) and Kennedy (2007). It has been argued in Beck et al. (2004) and Kennedy (2007) that Japanese lacks “syntactic” binding of type-*d* variables. However, we have already observed that there is no problem when number is compared. Thus, Inada (2010, 2011b, 2012) concludes that (i) number abstraction is always available in English and Japanese, and (ii) degree abstraction is unavailable in English unless the entire DP is deleted, including the degree variable, whereas it is still degraded to some extent in Japanese even if deletion applies. The difference between English and Japanese is not in the availability of the degree abstraction, but in the acceptability of the

degree abstraction structure after comparative deletion applies.

Comparative Deletion in English, which deletes an entire DP, circumvents the island violation while the variation in acceptability in Japanese indicates that it depends on certain factors. Why does such a contrast emerge between English and Japanese? The analysis presented in this thesis claims that the type-*d* variable in (447a) is located in the attributive DegP island, whereas that in (447) is not. The question should rather be why the Comparative Deletion of degree, as in (447b), which we should remember is impossible in the case of Comparative Subdeletion (both in English and in Japanese), is possible in English. One possible line of investigation is that, as argued in Shimoyama (2011), it is only in Japanese that an ellipsis site precedes its antecedent in the PF representation, which causes some processing difficulty, as demonstrated by the contrast between (448) and (449).

- (448) John bought [_{DP} a [**longer**] umbrella] *(Antecedent DP)*
 [than [_{Op_i} [Mary bought [_{DP} a [*d_i*-long] umbrella]]]]. *(Elided DP)*
- (449) ?-?* Taroo-wa [_{Op_i} [Hanako-ga [_{DP} [*d_i*-no] kasa-o] katta] yori] *(Elided DP)*
 [_{DP} [**nagai**] kasa-o] katta. *(Antecedent DP)*

It may be considered that the parser has difficulty in recovering the elided DP only in Japanese because the antecedent appears later.

Finally, admitting that some nominals belong to more than one class, physical or metaphysical, Inada (2010, 2011b, 2012) argues that it is this ambiguity that accounts for why extraction out of the attributive DegP island is sometimes permitted in examples such as (450).

- (450) Taroo-wa [[Hanako-ga kaita] (no) yori] naga-i ronbun-o kaita.
 Taroo-TOP Hanako-NOM wrote NO YORI long paper-ACC wrote
 ‘Taroo wrote a longer paper than Hanako did.’ (cf. Beck et al. (2004: 301-302))

Kennedy (2007) points out, incidentally, that the full acceptability of example (450) can be

accounted for in terms of the contribution of the incremental THEME verb *write*.¹⁰⁰ Incremental THEMES are “applied to the argument of certain predicates involved in defining a homomorphism from its own spatial extent to the temporal progress of the event it participates in” (Dowty (1991)).

Inada (2010, 2011b, 2012) observes that when the compared degree is of the incremental THEME object of creation verbs, comparative subdeletion and a long-distance “excessive” reading become possible even if the examples seem to involve extraction from the attributive DegP island.

- (451) a. Taroo-wa Hanako-ga [syoosetu-o] {kai/*toukousi}-ta yorimo naga-i
 Taroo-TOP Hanako-NOM novel-ACC write/submit-Past than long-Att
 si-o tukur-ta.
 poem-ACC compose-Past
 ‘(lit.) Taroo wrote a longer poem than Hanako {wrote/*submitted} a novel.’
- b. Taroo-wa Hanako-ga [ido-o] {hor/*mituke}-ta yorimo fuka-i
 Taroo-TOP Hanako-NOM well-ACC dig/find-Past than deep-Att
 otosiana-o hor-ta.
 pit-Acc dig-Past
 ‘(lit.) Taroo dug a deeper pit than Hanako {dug/*found} a water well.’

¹⁰⁰ Remember that following Beck et al.’s (2004) degree abstraction parameter setting of Japanese, Kennedy argues that Japanese lacks syntactic binding of type-*d* variables.

- (452) a. Hanako-wa [naga-i ronbun-o] {kaki/*toukousi}-sugi-ta.
 Hanako-TOP long-Att paper-ACC write/submit-too-Past
 ‘Hanako {wrote/submitted} too many long papers.’
 ‘(lit.) Hanako {wrote/*submitted} too-long a paper.’
- b. Hanako-wa [fuka-i ido-o] {hori/*mituke}-sugi-ta.
 Hanako-TOP deep-Att well-ACC dig/*find-too-Past
 ‘Hanako {dug/found} too many water wells.’
 ‘(lit.) Hanako {dug/*found} too-deep a water well.’

Furthermore, DEGMods can undergo floating, as shown in (453).

- (453) a. Hanako-wa [ronbun-o] [20-peeji] {kai/*toukousi}-ta.
 ‘Hanako wrote 20 pages of the paper.’
- b. Hanako-wa [ido-o] [3-meetoru] {hot/*mituke}-ta.
 ‘Hanako dug 3 meters of the well.’

Inada (2010, 2011b, 2012) points out that the numerals in (453) do not express “the length of the paper” or “the depth of the well”; they express “how many pages of the paper were written” and “how many meters the well was dug,” respectively. In fact, the nouns with the postposed DEGMods are number defective.

- (454) a. ?* Hanako-wa [_{DP} 5-hon-noronbun-o] [20-peeji] kai-ta.
 5-CL-NO
- b. ?* Hanako-wa [_{DP} 5-tu-no ido-o] [3-meetoru] hor-ta.
 5-CL-NO

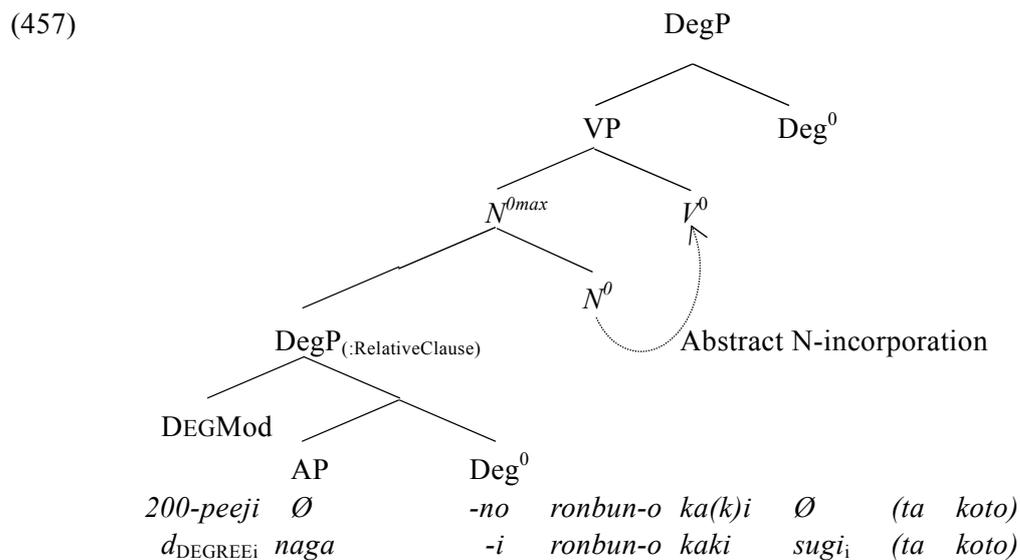
The number deficiency indicates that the incremental THEME object of creation verbs only denotes properties and thus only projects NP. Such NPs are called “bare nominals,” which describes objects that typically are participants in the event described by a verb, as argued in Dayal (2003), as do incremental THEMES in Japanese.

As observed in Ross (1967) and in Davies and Dubinsky (2003), the incremental THEME object of a creation verb does not constitute an island in English, as shown in (455) and (456).

- (455) a. * What did Sharon sell/copy-edit [her article about *e*]?
 b. What did Sharon write [her article about *e*]?
- (456) a. * Who did Kerry hear [the rumor [that Kelsey is fond of *e*]]?
 b. Who did Kerry start [the rumor [that Kelsey is fond of *e*]]?

In (455b), we can observe that so-called “definiteness effect” disappears, and in (456b) A'-extraction is allowed even from within a Complex-NP.

Following Davies and Dubinsky (2003), Inada (2010, 2011b, 2012) argues that the seemingly attributive DEGMods modifying the incremental THEME objects in Japanese function as verbal modifiers through an abstract N-incorporation.



Once the abstract N-incorporation is applied, the DEGMod and the degree variable can no longer be considered inside the attributive DegP island because the lower DegP is not dominated by DP. Thus, extraction out of DegP turns out to be possible, and it can create a degree-abstraction structure with respect to DEGMod.

In this subsection, we have observed that binding of the DP-internal degree variable is sometimes impossible in Japanese, not because the language is not allowed to constitute

degree-abstraction structure but because the derivation involves illicit A'-extraction from within a syntactic island. Furthermore, two well-known environments for circumventing islands have been examined. The fact that binding of the degree variable is allowed in these environments indicates that the movement of the degree operator in fact occurs and can violate the island condition.

7.5. Hidden Relativization Analysis

7.5.1. Nominal Standard of Type-*d* in Japanese

Let us reconsider the variability of the judgment of examples such as (458), which we have argued shows conversely that clausal comparatives in Japanese do not lack any interpretative possibilities that those in English can yield.

- (458) Taroo-wa [[Hanako-ga katta] yori] {^{ok}takai/{[?]??/??*}nagai} kasa-o
 Taroo-TOP Hanako-NOM bought YORI expensive/long umbrella-ACC
 katta.
 bought
 ‘Taroo bought a {more expensive/longer} umbrella than Hanako did.’

Kennedy (2007) claims that the DP *Hanako-ga katta yori nagai kasa* ‘a longer umbrella than Hanako bought’ refers to a plurality of long umbrellas, but it cannot refer to a long line of umbrellas ordered end-to-end.

- (459) $\lambda x. \max\{d' \mid \text{long}(x) \geq d'\} > \max\{d'' \mid \text{long}(\max\{y \mid \text{Hanako bought } y\}) \geq d''\}$

Beck et al. (2004) also reported that they have not been able to replicate the strong “??” judgment for the sentence with *nagai* ‘long’ in (458). The sentence sits in the range of “? (not quite straightforward, but not bad)” to “?? (questionable).” Recall that in Japanese an ellipsis site of Comparative Deletion precedes its antecedent. This results in the mild unacceptability of this example, although the deletion itself helps circumvent the violation of restrictions on extraction from within attributive DegP islands in both English and Japanese.

Kennedy (2007) also claims that one way to obtain this interpretation is to ensure that the complement of *yori* is singular, which can be achieved through the definiteness effect of the nominalizer *no*. However, the occurrence of the nominalizer *no* is not necessary for the definite individual interpretation, as illustrated in (460).

- (460) a. [DP [[DP [Hanako-ga (kinoo) nakusita] (sono)kasa/no/Ø] yorimo]
 Hanako-NOM yesterday lost (that) umbrella/NO/Ø THAN
 takai kasa]
 more.expensive umbrella
 ‘a more expensive umbrella than (the umbrella that) Hanako lost yesterday’
- b. [DP [[DP [Hanako-ga (kinoo) nakusita] (sono)kasa/no/Ø] yorimo]
 Hanako-NOM yesterday lost (that) umbrella/NO/Ø THAN
 nagai kasa]
 longer umbrella
 ‘a longer umbrella than (the umbrella that) Hanako lost yesterday’
- c. [DP [[DP [Hanako-ga (kinoo) nakusita] (sono)ronbun/no/Ø] yorimo]
 Hanako-NOM yesterday lost (that) paper/NO/Ø THAN
 nagai ronbun]
 longer paper
 ‘a longer paper than (the paper that) Hanako lost yesterday’

In (460), all three examples are well-formed, either with overt Head Nominals, including nominalizers, or without an overt Head Nominal.

Moreover, Inada (2010) claims that the maximality interpretation of the example in (458) is also possible (as a joke, as Kennedy himself notes), as illustrated in (461). Notice that the examples in (461) are two-way ambiguous, with (i) the distributive interpretation and (ii) the maximality interpretation, as shown below.

- (461) a. [DP [[DP[Hanako-ga (koremadeni) katta] no/kasa] yorimo] takai kasa]
 Hanako-NOM ever bought NO/umbrellas THAN
 (i) ‘a more expensive umbrella than any other umbrellas that Hanako ever bought’
 (ii) ‘a more expensive umbrella than (the total price of) all the umbrellas that Hanako ever bought in total’
- b. [DP [[DP[Hanako-ga (koremadeni) katta] no/kasa] yorimo] nagai kasa]
 (i) ‘a longer umbrella than any other umbrellas that Hanako ever bought’
 (ii) ‘a longer umbrella than (the total length of) all the umbrellas that Hanako ever bought in total’
- c. [DP [[DP[Hanako-ga (koremadeni) kaita] no/ronbun] yorimo] nagai ronbun]
 (i) ‘a longer paper than any other papers that Hanako ever wrote’
 (ii) ‘a longer paper than (the total length of) all the papers that Hanako ever wrote in total’

The maximality interpretation is infelicitous in some contexts, but it can be regarded as possible.

The same ambiguity is observed even in sentences without an overt Head Nominal.

- (462) a. [DP [[DP[Hanako-ga (koremadeni) katta] Ø] yorimo] takai kasa]
 Hanako-NOM ever bought Ø THAN
- b. [DP [[DP[Hanako-ga (koremadeni) katta] Ø] yorimo] nagai kasa]
- c. [DP [[DP[Hanako-ga (koremadeni) kaita] Ø] yorimo] nagai ronbun]

We can now safely conclude that the variability of acceptability is a matter of pragmatics or of parsing. That is, Japanese clausal comparatives can be three-way ambiguous as shown in (463).

- (463) [DP [[DP[Hanako-ga katta] Ø]yorimo] takai kasa]
 ‘a more expensive umbrella than (the umbrella that) Hanako bought before’
 ‘a more expensive umbrella than any other umbrellas that Hanako ever bought’
 ‘a more expensive umbrella than the total price of all the umbrellas that Hanako
 ever bought’

It is worth noticing here that there appear to be some cases where the maximality interpretation is obligatory. Consider the examples of the attributive clausal comparison of quantity shown in (464).

- (464) a. Taroo-wa [[DP[Hanako-ga katta] Ø/??no] yorimo] takusan(-no)
 Taroo-TOP Hanako-NOM bought THAN many(-GEN)
 kasa-o katta.
 umbrellas-ACC bought
 ‘Taroo bought more umbrellas than Hanako (bought umbrellas).’
- b. Taroo-wa [[DP[Hanako-ga (koremadeni) katta] kasa] yorimo] takusan(-no)
 kasa-o katta.
 ‘(Lit.) Taroo bought more umbrellas than the umbrellas that Hanako ever bought
 in total.’
- c. Taroo-wa [[DP[Hanako-ga (kinou) nakusita] (*sono) kasa] yorimo]
 takusan(-no) kasa-o katta.
 ‘(Lit.) Taroo bought more umbrellas than the umbrella that Hanako lost
 yesterday.’
 # ‘Hanako lost that umbrella yesterday, and Taroo bought more than one
 umbrella.’

In the attributive clausal comparison of quantity, what is compared is always the maximum number of umbrellas that Hanako and Taroo each bought during the period assumed in each context. Given the analysis of the derivation for relativization presented in this thesis, this may be

straightforwardly accounted for. When the construction is derived via relativization, it is NumP that is shared between the matrix DP and the subordinate clause involving an *operator-variable* chain. Since NumP includes the information of the quantity of head N, the “maximum number” reading is forced.

7.5.2. Hidden Relativization Analysis for Comparative Deletion Construction in Japanese

We have observed that from the perspective of the relativization analysis, the Japanese clausal comparatives can be “gapless.” The examples are repeated below.

- (465) a. ? Taroo-wa [[kare-no titi-ga se-ga takakatta] yorimo] (zutto)
 Taroo-TOP he-GEN father-NOM height-NOM be.tall.PAST THAN (by.far)
 se-ga takai.
 height-NOM be.tall
 ‘(Lit.) Taroo is taller than his father was tall’
- b. Taroo-wa [[Hanako-ga kasa-o katta] yorimo] (takusan)
 Taroo-TOP Hanako-NOM umbrellas-ACC bought THAN (many)
 kasa-o katta.
 umbrellas-ACC bought
 “(Lit.) Taroo bought more umbrellas than Hanako bought umbrellas.”

The question thus arises as to how the well-formedness of the examples above, which should include no individual gap in the clausal standard, may be accounted for if Japanese clausal comparatives involve relativization.¹⁰¹

¹⁰¹ As discussed in Chapter 6, the fact that gaps are nominal in Japanese does not mean that gaps are individual types. Japanese amount/degree relatives involve the relativization of semi-lexical nominals that are nominal and belong to type-*d*.

The lack of individual gap in Japanese comparative clauses such as (465) does not imply that there is no nominal gap in those clauses. Ueyama (2004) argues that clausal comparatives in Japanese can be (re)analyzed as “NP comparatives” by postulating (covert) *Keishiki Meishi* ‘Formal Nouns’ at the right edge of the clause. For instance, Formal Nouns such as *toki* ‘time,’ *baai* ‘case,’ and *sassuu* ‘number (of the books)’ are used in Japanese. Ueyama (2004) observes that relative clauses exhibit island sensitivity when we place an overt semi-lexical Head Nominal at the right edge of the embedded clause.

- (466) a. [[[[John-ga *e* yonda to] iwareteiru to] minna-ga omotteiru] kazu]
 John-NOM read C be.said C everyone-NOM think number
 yorimo Mary-wa takusan hon-o yondeiru.
 THAN Mary-TOP many books-ACC has.read
 ‘(Lit.) Mary has read more books than the number that everyone thinks that it is
 said that John read.’ (Ueyama (2004: 54) with slight modification)
- b. *[[[sono tukue-de *e* yondeita hito]-o John-ga nagutta] kazu]
 that table-at be.reading.PAST person-ACC John-NOM hit number
 yorimo Paul-wa takusan hon-o yondeita.
 THAN Paul-TOP many books-ACC has.read
 ‘(Lit.) Paul has read more books than the number that John hit the person who
 read at that table.’ (Ueyama (2004: 55) with slight modification)

The unacceptability of (466b) indicates that Japanese clausal comparatives with overt semi-lexical Head Nominals involve the relativization procedure.¹⁰²

¹⁰² Ueyama (2004) argues only for the relativization of the three types of Formal Nouns, although Sudo (2009) also claims that they involve relativization. He assumes that hidden “degree nominals,” such as *teido* ‘degree,’ *ryoo* ‘amount,’ *nagasa* ‘length,’ and *takasa* ‘height/price,’ are deleted under

Let us consider the syntax of the extraction of semi-lexical nominal Heads of attributive comparatives, that is, NUMMods and DEGMods. The overt extraction of NUMMods or DEGMods is possible within Japanese clausal comparatives under the Chain Uniformity Condition (Chomsky (1995)), which is discussed in Biberauer and Richards (2008). A chain must be uniform with regard to phrase structure status. Thus, only [+maximal] projections are able to raise to specifier (= nonprojecting) positions. Note that Biberauer and Richards (2008) argue that the prerequisite of (Left-Branch) extraction is that the extracted *wh*-words are phrasal by themselves. Consider the examples below. The extraction of *wh*-words is possible in Russian since they are phrasal (e.g., QP) by themselves.

- (467) a. [Č’ju knigu] ty čital?
 whose book you read
 ‘Whose book did you read?’
- b. Č’ju ty čital [e knigu]?
 ‘*Whose did you read book?’ (Biberauer and Richards (2008: (28)))

an aboutness relation. However, as discussed in Section 7.4, the possibility of relativization of “degree nominals” is considered in relation to the distinction between number and degree. Such relativization is possible only in the case of “number abstraction,” as shown in (i).

- (i) a. [Hanako-ga [DP kasa-o] nakusi-ta] kazu
 Hanako-NOM umbrella-ACC lose-Past number
 ‘(lit.) the number that Hanako lost the umbrella’
- b. * [Hanako-ga [DP kasa-o] nakusi-ta] {nagasa/omosa/takasa}
 Hanako-NOM umbrella-ACC lose-Past {length/weight/price}
 ‘(lit.) the {length/weight/price} that Hanako lost the umbrella’

In conclusion, the “degree nominals” do not form a consistent class.

observed unacceptability of Japanese clausal comparatives is due precisely to illicit extraction from within attributive DegP islands. Consider the examples in (472).

- (472) a. * [[DP [Hanako-ga [DP [e_i] kasa-o] nakusita] [DEGMod/nagasa]_i] yorimo]
 nagai kasa-o Taroo-wa nakusita.
- b. * [[DP [Hanako-ga [DP [e_i] ronbun-o] nakusita] [DEGMod/nagasa]_i] yorimo]
 nagai ronbun-o Taroo-wa nakusita.
- c. [[DP [Hanako-ga [DP e_i kasa-o] nakusita] [NUMMod/kazu]_i] yorimo]
 (takusan) kasa-o Taroo-wa nakusita.

In addition, when the relativization procedure cannot serve appropriately as a standard of comparison, relativization of the entire DP *kasa-o* “umbrella-ACC” is still available. Relativization of the entire DP results in a structure that can provide the standard of comparison, as in (473).

- (473) a. [[DP [Hanako-ga e_i nakusita] [NumP [NP(kasa)]_j]_i] yorimo] takai kasa_j-o
- b. [[DP [Hanako-ga e_i nakusita] [NumP [NP(kasa)]_j]_i] yorimo] nagai kasa_j-o
- c. [[DP [Hanako-ga e_i nakusita] [NumP [NP(ronbun)]_j]_i] yorimo] nagai ronbun_j-o
- d. [[DP [Hanako-ga e_i nakusita] [NumP [NP(kasa)]_j]_i] yorimo] (takusan) kasa_j-o

To serve as the standard of comparison, the entire DP can be pied-piped, enabling it to undergo relativization. The appropriate standard is semantically provided as a consequence of any interpretation of phrasal comparatives.

7.5.3. DP Adverbs and Adverbial Relatives Revisited

In this section, we consider the relativization of another semi-lexical nominal, *teido* ‘degree (of deviation),’ for the source of a standard of comparison. Relativization of the semi-lexical noun *teido* is considered available if there is appropriate room for the DP adverb *teido* in the relative clause. This implies that comparison of deviation is almost always possible since an adverb denoting a degree of deviation can occur in virtually every sentence. As argued in Hayashishita

(2009), “the standard of comparison in *yor*i-comparatives is contextually inferred from the denotation of the complement of *yor*i” (Hayashishita (2009: 87)), as shown below.

(474) John-wa [[Mary-ga [[(sore-o) katta] otoko]-ni (teineini)aisatusita] yori]
 John-TOP Mary-NOM it-ACC bought man-DAT politely greeted THAN
 takai kuruma-o katta.
 expensive car-ACC bought

‘(Lit.) John bought a [more] expensive car than Mary (politely) greeted the customer who bought (it).’ (Hayashishita (2009: 88-89), slightly modified)

[Context: Mary is very patient and does not normally complain about what others do.]

ok [Context: Mary is an unfriendly car saleswoman and rarely greets customers unless they buy an extremely expensive car.]

Within the apparent gapless clausal standard of comparison, *teido* functions as a DP adverb when reconstructed.

(475) a. Hanako-wa (se-ga) [aru teido] takai.
 Hanako-TOP (height-NOM) a.certain degree be.tall
 ‘Hanako is tall to a certain degree (above the average).’

The DP involving *teido* ‘degree’ denotes the definite description of the degree “to the extent (Hanako is tall).” It can provide the standard of the comparison when occurring in the complement position of *yor*imo. With regard to the nominal properties of *teido*, it can also function as a predicative noun, a subject DP, and an object DP, as illustrated in (476a), (476b), and (476c), respectively.

- (476) a. Hanako-no se-no takasa-wa [aru teido] da.
 Hanako-GEN height-GEN tallness-TOP certain degree COP
 ‘Hanako’s height is to a certain degree (above average).’ <Predicative>
- b. ? [Hanako-no se-no takai teido]-wa yosou-izyoo datta.
 Hanako-GEN height-GEN be.tall degree-NOM expectation-above COP.PAST
 ‘The degree of the Hanako’s height has exceeded my expectation.’ <Subject>
- c. ? Taroo-wa [Hanako-no se-no takai teido]-o mikubitteita.
 Taroo-TOP Hanako-GEN height-GEN be.tall degree-ACC underestimated
 ‘Taroo has underestimated the (extent of) Hanako’s height.’ <Object>

Since they are nominal, they are inherently Case-marked, even in the case of (475), and are allowed to undergo A'-movement. They provide the standard of the comparison when occurring in the complement position of *yorimo* via relativization.

This analysis predicts the opposite of what Beck et al. (2004) and Kennedy (2007) have claimed. When the relativization of various semi-lexical nominals is utilized, it is predicted that two sets of ‘degree (of deviation)’ can also be compared in Japanese, which yields Comparative Subdeletion in the same way as in English. The well-formedness of the examples in (477) demonstrates that this prediction is borne out.

- (477) Kono terebi-wa [[*pro* tate-ni nagai] yorimo] (zutto) haba-ga hiroi.
 This TV-TOP vertical-in be.long THAN (by.far) width-NOM be.wide
 ‘This TV display is wider than it is tall.’

The sub-comparative constructions are obtained via relativization of the semi-lexical nominal *teido*, yielding the comparison of deviation.¹⁰³

¹⁰³ Kennedy also notes that languages such as Japanese sometimes allow sub-comparatives with deadjectival nominals such as *taka-sa* ‘height,’ as shown in (i).

Notice that adjectives in the complement of *yorimo* in examples such as (477) are in the adnominal form (cf. Miyagawa (1993), Maki and Uchibori (2008), Sudo (2009)). Japanese utilizes two types of adjectives with different morphological endings.

- (478) a. Hanako-wa (se-ga) taka-i. <Sentence-final form>
 Hanako-TOP height-NOM be.tall-FNL
 ‘Hanako is tall.’
- b. [DP (se-ga) taka-i otoko] <Adnominal form>
 height-NOM be.tall-AND man
 ‘a tall man’
- (479) a. Hanako-wa noppo-da. <Sentence-final form>
 Hanako-TOP be.tall-FNL
 ‘Hanako is tall’
- b. [DP noppo-na otoko] <Adnominal form>
 be.tall-ADN man
 ‘a tall man’

Although the adnominal form is not detectable with *ki*-type adjectives as in (477), it can be observed explicitly with *da*-type adjectives as in (480).

-
- (i) Kono tana-no taka-sa-wa ano doa-no haba yori ookii.
 this shelf-GEN height-SA-TOP that door-GEN width YORI great
 ‘The shelf’s height is greater than the door’s width.’ (Kennedy (2007: 143))

The evaluative reading is not forced, and thus, it is not considered as a comparison of deviation.

- (480) Taroo-wa [[DP [Hanako-ga noppo {-na/*-da}] (teido)] yorimo] zutto
 Taroo-TOP Hanako-NOM tall-AND/*FNL degree THAN by.far
 se-ga taka-i.
 height-NOM tall-FNL.

With the (covert) semi-lexical Head Nominal *teido* of the relative clause, the complement of *yorimo* is (re)analyzed as DP. As their adnominal forms show, the adjectives *takai* or *noppo* in (477) and (480) are followed by nominal elements. That is, it is semi-lexical nominals that are sometimes invisible.

The existence of Head Nominals in the comparison of deviation can be predicted by Case-assignment in the comparative clause. The subjects of the clausal standard can be assigned genitive Case, as shown in (481).

- (481) a. [[DP [TP Hanako {-ga/-no} katta] Ø/kasa] yorimo] takai kasa-o Taroo-wa katta.
 -NOM/-GEN
 b. [[DP [TP Hanako {-ga/-no} noppo-na] Ø/teido] yorimo] zutto Taroo-wa noppo-da.
 -NOM/-GEN

In (481), the genitive-marking is possible within the apparent gapless clausal standard even without any overt Head Nominal. Maki and Uchibori (2008) argue that genitive Case is licensed if a noun phrase is contained in a clause that modifies nominal elements. By postulating a relativized semi-lexical nominal as a modified Head Nominal in (481), this is accounted for straightforwardly.

7.6. Summary

The discussion in this chapter has shown that the variables in the base position of the semi-lexical nouns are not of type-*e*. They denote only a degree or quantity; nevertheless, they are nominals in Japanese. The analysis of attributive comparatives in Japanese presented in this chapter casts doubt on the parametric analysis based on the type-theoretic notion of the standard of

comparison. Languages such as Japanese, which are argued to lack degree projection within AdjP, do not necessarily lack binding of the type-*d* variable, since Japanese is endowed with the relativization of semi-lexical nouns, which leaves a gap that is interpreted as a type-*d* variable.

The predicative clausal comparatives do not involve the relativization of DP, which expresses the individual sortal expression of the degree (although, semantically, the subject would be interpreted as the sortal). Thus, only the relativization of the semi-lexical word *teido* ‘degree (of deviation)’ provides the standard and thereby contributes to the comparison of deviation from some standard. In the case of attributive clausal comparatives, relativization of the entire DP is one way to provide the standard, in the same way as in phrasal comparatives. Relativization of the semi-lexical noun *kazu* ‘number’ is another way to provide the standard. In addition, the relativization of degree nominals such as *nagasa* ‘length’ can also provide the standard of comparison but only when the remnant DP is deleted in the relative clause. Note that without deletion, it fails to provide the appropriate standard in the case of the comparison of gradability in both English and Japanese.

The apparent clausal standard of Japanese clausal comparatives is therefore two-sided: either it is either a headed relative clause, which is interpreted as a phrasal standard as a whole, or it is a headed relative clause that modifies a semi-lexical nominal, which is interpreted as a genuine comparative clause modifying only degree. There is no conflict involved in derivation through either relativization or comparative clause formation. The former involves A'-movement of DP to form an open predicate modifying a nominal element, while the latter involves A'-movement of a degree operator, which can also be a nominal in languages such as Japanese.

Chapter 8

Conclusion

This thesis has investigated the syntax and semantics of restrictive relative structures in English and Japanese under the Minimalist Program for linguistic theory developed in Chomsky (1995, 2000, 2001, 2004, and 2008). This thesis consists of the introduction (Chapter 1), two main parts PART I (Chapter 2-3) and PART II (Chapter 4-7), and the conclusion (Chapter 8). In PART I, we have dealt with empirical and theoretical issues concerning restrictive relative structures and proposed the shared NumP movement analysis. In PART II, we have considered the three attributive constructions in English and Japanese based on the discussions developed in PART I. The following is an outline of our discussion and the conclusions that we have reached in this thesis.

In Chapter 1, the following two questions have been addressed:

- (482) i. How is a close relation between relative clauses and Head Nominals established?
- ii. Why are relative clauses combined loosely with fronted Head Nominals?

Restrictive relative structures show the reconstruction effects, which imply a close relation between relative clauses and Head Nominals. Nevertheless, we have observed the reconstruction effects of the fronted Head Nominals inside the relative clauses loosely combined with them. Thus, we have concluded that the two questions in (482i) and (482ii) must be resolved by postulating a single derivation of restrictive relative structures. This conclusion has led us to investigate the way that a Head Nominal, which is a matrix element, is interpreted inside a relative clause, which is adjoined to the matrix clause.

In PART I, Chapter 2 has investigated three basic properties of restrictive relative structures: (i) types of relativizers, (ii) A'-movement of relative operators and pied-piping by them, and (iii) the various possibilities of the reconstruction of Head Nominals. Concerning (i), we have argued that among relativizers, a relative operator (i.e., relative pronouns and null-operators) is a relative pronoun DP with a full-fledged internal structure. In the structure of the relative pronoun DP, the bottom part (e.g., FP layer and NP layer) is covert. By considering (ii), we have argued that a gap of Head Nominals is not a gap of fronted relative operators, and that there is another gap position FP in the internal structure of relative pronoun DPs. For (iii), it has been shown that Head Nominals are reconstructed inside relative clauses that can undergo “late-merger” (Lebeaux (1988)), which is an operation available only for adjunction. Therefore, “Head-Raising” relatives are adjuncts. Considering the previous studies in this regard, Chapter 2 has come to the following interim conclusions:

- (483) i. A'-movement of relative operator DPs involves pied-piping.
- ii. Head Nominals are FPs.
- iii.. Restrictive relative structures have an adjunction structure.

Based on the interim conclusions in (483), in Chapter 3, we have pursued a unified analysis of restrictive relative structures: Head-Raising of a shared Head Nominal FP from inside an adjoined relative clause.

In Chapter 3, a unified syntactic analysis of restrictive relative structures has been proposed. We have pointed out that the Merge-based computation in Narrow Syntax has the potential to form multiple intersecting sets and proposed Share Merge, which is a simultaneous application of multiple External Merges. We have argued that when these intersecting sets are integrated as a single syntactic object by Pair Merge, the shared element must undergo movement in order to dissolve the unlinearizable structure that is constructed by sharing.

Examining the layered DP-internal structure and its internal phrasal movement, we have

argued that a NumP movement to Spec,CaseP serves to explain many aspects of restrictive relative structures. NumP movement, which applies inside DPs, can be regarded as a Head-Raising of a shared Head Nominal in restrictive relative structures. The close examination of the reconstruction effects have revealed that the reconstruction of quantified Head Nominals is available only with the class of determiners contained in NumP. We have also argued that the adjunction site of restrictive relative clauses is determined uniquely in accordance with the application of NumP movement: NumP moves to Spec,CaseP, and relative clauses are pair-merged at the position immediately below the raised NumP. This is exactly what is expected to dissolve the unlinearizable structure. The autonomous Head-Raising of the shared NumP can explain the reconstruction effects of Head Nominals and the adjunct properties of relative clauses because there are copies of the shared NumP in the relative clause even though it is an adjunct in the matrix DP.

As a final remark in PART I, it has been pointed out that our unified analysis can predict a difference between *wh*-phrases and Head Nominals in the possibility of the reconstruction, because in our analysis the *wh*-phrases (DPs) undergo A'-movement whereas Head-Nominals (NumPs) undergo sharing. This prediction is verified by the fact that the reconstruction of fronted *wh*-phrases is obligatory whereas that of Head Nominals is optional. The difference will be given a principled explanation in our future study by considering the difference between A'-movement (or Internal Merge) and sharing (or External Merge).

In PART II, we have investigated three constructions in English and Japanese. The three constructions are adverbial relatives discussed in Chapter 5, amount/degree relatives discussed in Chapter 6, and Comparative Deletion constructions discussed in Chapter 7. All three constructions involve attributive modifications by an operator-variable or filler-gap dependency as restrictive relative structures. However, in the previous studies, the account given to each of the three constructions has been slightly different from that of restrictive relatives because they have shown different interpretative properties. In this regard we have considered the following two questions:

- (484) i. How is the connection between Head Nominals and non-nominal gaps established with respect to the three constructions?
- ii. To what are the differences between English and Japanese attributed with respect to the three constructions?

Considering (484i), we have shown that these three constructions have a restrictive relative structure, as proposed in PART I, although the Head Nominals and/or gaps are sometimes hidden. For (484ii), we have argued that the cross-linguistic differences have only a lexical basis and shown that the differences are not based on the availability of the type of syntactic operations.

Chapter 5 has claimed that adverbial relatives involve relativizing nominal complements of silent adpositions, and that various aspects of the adverbial relativization in English and Japanese are accounted for by our unified analysis of restrictive relative structures and the availability of the silent adposition to each language. Chapter 6 has shown that in languages such as Japanese, relativization of semi-lexical nominals yields an interpretation similar to the amount/degree relatives in English. We have thus claimed that in the amount/degree relatives in English, the relativization of the lexical Head Nominals is considered to be a case of pied-piping by the (silent) degree words. The relativization of the degree words alone is not an option in English because they are not sufficiently nominal in the Lexicon. Chapter 7 has argued that attributive comparative clauses in Japanese sometimes involve relativization. Throughout the course of the discussion, we have also argued that the alleged parametric variation observed in Comparative Deletion constructions between English and Japanese can be accounted for under the unified analysis by implementing the circumvention mechanism of island effects.

In PART II, we have reached the conclusion that the range of differences in the various relative constructions in English and Japanese is within a prediction of our unified analysis: the differences among these constructions are grounded only on the Lexicon and morpho-syntactic features of the relativized elements.

Finally, we would like to point out three of the remaining questions concerning the sharing structure. The following two types of sharing structures have been discussed in this thesis.

- (485) a. $\{\{\mathbf{XP}\}, \{\mathbf{W}, \{\mathbf{Y}, \{\mathbf{XP}\}\}\}\}$
 b. $\{\mathbf{W}, \{\mathbf{XP}\}\} \quad \{\mathbf{Y}, \{\mathbf{XP}\}\}$

The set in (485a) is formed by Internal Merge where probing of the phase head with EF finds one of the superpositioned copies of the XP, whereas the sets in (485b) are formed by External Merge where each of the two syntactic objects with EF finds one of the superpositioned copies of the XP. We have argued in Chapter 3 that the computation in Narrow Syntax provides us with an automatic solution to integrate the intersecting sets in (485b) into a single set by applying Pair Merge and Internal Merge in (485a) so that we can externalize it as a single syntactic object. This is shown below.

- (486) $\{\{\mathbf{XP}\}, \langle \{\mathbf{W}, \{\mathbf{XP}\}\}, \{\mathbf{Y}, \{\mathbf{XP}\}\} \rangle\}$

One might wonder if there appear more than two intersecting sets in the computation in Narrow Syntax. One of the possible candidates of more than two intersecting sets is a stacking of restrictive relative clauses as shown below.

- (487) The man_k [that e_k fixed the sink] [whom John told us about e_k] is here.

Share Merge can form three intersecting sets sharing one syntactic object as in (488). Since Merge applies to two syntactic objects by definition, the derivation of the stacking of restrictive relative clauses must proceed step by step as in (489a), but not as in (489b).

- (488) $\{\text{Case1}, \{\mathbf{NumP}\}_k\} \quad \{\text{Case2}, \{\mathbf{NumP}\}_k\} \quad \{\text{Case3}, \{\mathbf{NumP}\}_k\}$

- (489) a. $\{\{\mathbf{XP}\}, \langle \{\mathbf{Z}, \{\mathbf{XP}\}\}, \langle \{\mathbf{W}, \{\mathbf{XP}\}\}, \{\mathbf{Y}, \{\mathbf{XP}\}\} \rangle \rangle\}$
 b. $\{\{\mathbf{XP}\}, \langle \{\mathbf{Z}, \{\mathbf{XP}\}\}, \{\mathbf{W}, \{\mathbf{XP}\}\}, \{\mathbf{Y}, \{\mathbf{XP}\}\} \rangle\}$

We have not fully considered the extraposition of restrictive relative clauses such as (490) (See the note 28).

- (490) Mary saw the picture of John_i yesterday [that he_i likes e].

We have assumed that restrictive relative clauses are always adjoined to the position below a copy of the raised NumP in the position Spec,CaseP and that this adjunction structure makes possible the proper semantic composition at the C-I interface. Under this assumption, an extraposed restrictive relative structure cannot be derived in the computation of Narrow Syntax. Thus, one possible way to obtain (490) is to derive “extraposed” structure by the computation in the SM system.

Our discussion in this thesis has been focused on restrictive relative structures. There arises a question as to whether so-called non-restrictive relatives such as those exemplified in (491) can be derived via sharing.

- (491) a. John, [who passed the exam], was elated.
b. John has two brothers, [who are both linguists].
c. John luckily escaped, [which I unluckily didn't].

At this point, we can only say that what is shared is not only NumP but also DP, or some larger phrase. To extend the notion of sharing is problematic for the following reasons. First, it would require a more elaborate structure of the noun phrase since the shared DP in (491a-b) requires movement to the higher position in order to dissolve the unlinearizable structure at the SM interface. Second, it remains unclear what the sharing of DP in (491a-b), or that of some larger phrase in (491c), means in the interpretation of the superpositioned copies at the two interfaces.

Although the puzzling properties of restrictive relative structures are accounted for by the application of Share Merge, which is one of the possible options for creating intersecting sets, further theoretical and cross-linguistic explorations are required for the theory of Share Merge in our future research.

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