

Degree Constructions in Japanese

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University of Connecticut, 2008

Abstract

This dissertation provides a study of a language that adds another dimension to the semantics of degree constructions in natural languages that has long been monopolized by analyses that are based on English and related languages. In doing so, I will be particularly concerned with the Japanese language to provide empirical data.

I will first adopt an unconventional approach that comparisons in Japanese are contextually made rather than compositionally. Among several possibilities of how such contextual comparisons are made, I will pursue an analysis, under which Japanese gradable adjectives emerge out of the lexicon as comparatives. Thus *tall* in Japanese denotes “*x* is *d* much taller than a contextually given degree *c*” instead of “*x* is *d*-tall.” This assumption will be called the lexical analysis.

A set of predictions are made based on the lexical analysis. First, the direct degrees

of gradable adjectives are bound inside the adjectives; thus, they are never overtly filled. Second, the lexical analysis implies that including a comparative morpheme in the syntax is redundant since the comparative semantics is already introduced in the lexical entries of adjectives. This explains the absence of comparative morphemes in Japanese. The lack of degree operator movement in Japanese comparatives directly follows from the lexical analysis. Third, each gradable adjective introduces a comparison under the lexical analysis. This implies that there are as many comparisons as the number of gradable adjectives in one sentence. This is in fact confirmed in multihead comparatives in Japanese.

The lexical analysis affects degree constructions other than comparatives, since the semantics of gradable adjectives is a building block of degree constructions. Thus, the analysis must be tested with various degree constructions in Japanese. I will discuss comparative conditionals and exclamatives. The lexical analysis is assumed to be one of the many parameters that govern large cross-linguistic variations of comparatives. It will be shown that the lexical analysis, coupled with other parameters, accounts for a certain range of Korean and Chinese data.

Degree Constructions in Japanese

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A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2008

UMI Number: 3345201

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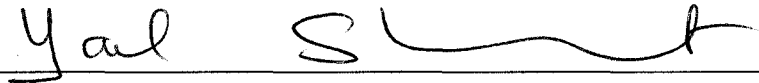
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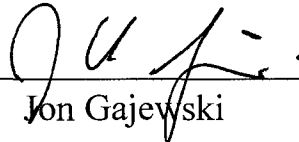
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Acknowledgments

I am grateful to the members of my advisory committee, Sigrid Beck, Yael Sharvit and Jon Gajewski. This dissertation was not made possible without Sigrid who was my major advisor. She has been an inspiring teacher as well as a great role model for me. I thank Yael who acted as my local advisor in Storrs after Sigrid left to the University of Tübingen. My oral defense would not have taken place without her help. I also thank Jon who joined in my advisory committee when he came to UConn. He was always a patient listener and gave me important feedback.

I would like to thank my friends in the department. It was a great experience to take courses with my classmates, Lara Reglero, Inkie Chung, Bosook Kang, Sarah Felber, Keiko Ishii, and Masashi Nomura. I appreciate comments on my semantics work from Tsuyoshi Sawada, Masahiko Aihara, and Takuro Tanaka. I benefitted much from the joint work with Koji Sugisaki. Special thanks to my syntax tutors, Fumikazu Niinuma and Duk-Ho An.

I also would like to thank other members of the faculty, the students, and Catalina Ritton and Judy Marcus, the current and the department secretary.

I thank my informants: Chris I-Ta Hsieh, Pei-Jung Kuo, Jonney Hsu-Te Cheng, Ning Pang, and Liang Chen in Chinese, Simona Herdan in Romanian, Sei-Rang Oh in Korean, and many others.

I was very lucky to be introduced to a group of graduate students at the University of Tübingen who work on cross-linguistic research of comparatives. I had fruitful discussions with them, especially with Sveta Krasikova.

I appreciate the generous support from Tokyo Keizai University, my employer since April 2004. I would like to thank my colleagues, Taira Uchida and Tsuguro Nakamura, who always encouraged me to complete my Ph.D. study.

The introduction to the world of theoretical linguistics was rather accidental for me. I registered for a course by Mamoru Saito at Nanzan University in 1997 by mistake. Though I didn't understand a word of what he was saying, his lecture gave me a strong impression that there was something very special about the field, and I decided to study linguistics. I would like to thank Yasuaki Abe, my academic advisor at Nanzan University and other professors at the University, Masatake Arimoto, Keiko Murasugi, and Hiroshi Aoyagi. I was encouraged to study abroad by Joseph E. Emonds who was a visiting scholar when I was a MA student at Nanzan University.

Finally, I would like to thank my husband, Tomohiro Oda. This dissertation is dedicated to him.

List of Abbreviations

abl	absolute case marker
acc	accusative case marker
nom	nominative case marker
dat	dative case marker
gen	genitive case marker
top	topic marker
past	past tense
pres	present tense
neg	negation
end	end form
adn	adnominal form
passive	passive morpheme
cond	conditional marker
decl	declarative marker
Asp	aspectual marker
Q	question marker
EXC	exclamative marker
CL	classifier
CC	comparative conditional marker
REL	relative pronoun
PN	prenominal marker

Table of Contents

Chapter 1 Variations of Comparatives-----	1
1.1 Issues-----	1
1.2 Overview of the Dissertation-----	10
1.3 Beck et al.'s (2004) Observations -----	14
1.3.1 Basic Data-----	14
1.3.2 Variations in Acceptability-----	16
1.3.3 Lack of Subcomparatives of Degree-----	17
1.3.4 Lack of the Negative Island Effect-----	19
1.4 Standard Analysis-----	20
1.4.1 von Stechow (1984)-----	20
1.4.2 Standard Analysis and Variation in Acceptability-----	25
1.4.3 Standard Analysis and Lack of Subcomparatives of Degree-----	27
1.4.4 Standard Analysis and Lack of the Negative Island Effect-----	28
1.5 Alternative Analysis: Beck et al. (2004)-----	31
1.5.1 <i>Yori(mo)</i> clause as “Compared to”-----	31
1.5.2 Degree Movement in Matrix Clauses-----	34
1.5.3 Explaining Variation in Acceptability-----	38
1.5.4 Explaining Lack of Subcomparatives-----	42
1.5.5 Explaining Lack of the Negative Island Effect-----	45
1.6 Alternative Analysis: Kennedy (2005)-----	48
1.6.1 Individual vs. Degree Comparison-----	48
1.6.2 Explicit vs. Implicit Comparison-----	55
1.7 Summary of Chapter 1-----	60
Chapter 2 Semantics of Japanese Adjectives and Comparatives-----	62
2.1 Japanese Adjectives-----	62
2.1.1 Three Possibilities-----	64
2.1.2 Lack of Non-Gradable Adjectives in Japanese-----	72
2.1.3 Lexical analysis vs. Degree Abstraction Parameter-----	76
2.2 More on Japanese Comparatives-----	85
2.2.1 Returning to Beck et al.'s data-----	85
2.2.2 Overt Degree Arguments-----	89
2.2.3 NPI Licensing-----	97
2.2.4 Negated Adjectives in Japanese-----	108

2.2.5 Comparatives with Bare Nouns -----	113
2.3 Multihead Comparatives-----	116
2.3.1 von Stechow (1984)-----	119
2.3.2 Multihead Comparatives with Sentence-internal Comparisons----	121
2.3.3 Multihead Comparatives with Discourse Comparisons-----	125
2.3.4 Multihead Comparatives with Split Antecedents-----	128
2.3.5 Multihead Comparatives in Japanese-----	132
2.4 Multiple context setters-----	145
2.4.1 Multiple <i>yorimo</i> Clauses-----	146
2.4.2 von Stechow's (2006) Standard Interval-----	148
2.4.3 Standard Interval and Multiple Context Setters-----	152
2.5 Summary of Chapter 2-----	155
Chapter 3 Comparative Conditionals-----	157
3.1 Comparative Conditionals in English and German-----	158
3.2 Comparative Conditionals in Chinese-----	164
3.2.1 Basic Data-----	164
3.2.2 Characteristics of Comparative Conditionals in Chinese-----	167
3.3 Behaviors of Comparative Conditionals in Japanese-----	172
3.3.1 Japanese CCs-----	172
3.3.2 Overt <i>Yorimo</i> Phrases-----	181
3.3.3 CCs with Overt Differential Degrees-----	185
3.3.4 CCs with Nouns-----	187
3.4 Explaining the Behaviors of Japanese Comparative Conditionals-----	192
3.4.1 Japanese CCs with Inherent Comparisons-----	193
3.4.2 Overt Differential Degrees in CCs-----	198
3.4.3 Overt <i>Yorimo</i> Phrases-----	202
3.4.4 Predictions-----	207
3.4.5 CCs with Relative Clauses and "Gradable Nouns"-----	210
3.5 Summary of Chapter 3-----	214
Chapter 4 Exclamatives-----	216
4.1 Syntax of Exclamatives-----	219
4.2 Negative Island Effect in Exclamatives and Comparatives-----	225
4.3 Semantics of English Exclamatives-----	227
4.4 Semantics of Japanese Exclamatives-----	233

4.4.1 Basic data-----	234
4.4.2 Exclamatives in Island Structures-----	235
4.4.3 Exclamatives with Japanese-style adjectives-----	242
4.4.4 Negated Exclamatives in Japanese-----	249
4.4.5 Exclamatives with Bare Nouns-----	254
4.5 Multi-head Constructions-----	256
4.5.1 Multi-head Exclamatives in English-----	257
4.5.2 Multi-head Exclamatives in Japanese-----	261
4.6 Summary of Chapter 4-----	266
Chapter 5 Replies and Perspectives-----	268
5.1 “Island effect” in <i>Yori(mo)</i> Clauses -----	269
5.1.1 Kikuchi (1987)-----	269
5.1.2 Reexamining Kikuchi’s data-----	271
5.2 <i>-Sugiru</i> (exceed) Constructions-----	277
5.2.1 Nakanishi (2004)-----	277
5.2.2 Lexical Analysis Lexical Analysis and <i>V-Sugiru</i> -----	282
5.2.3 Lexical Analysis and Other Comparative Verbs in Japanese---	285
5.3 Cross-linguistic Data-----	290
5.3.1 Korean: Park (2006)-----	291
5.3.2 Chinese: Krasikova (2007)-----	299
5.4 Concluding Remarks-----	302
Bibliography -----	307

Chapter 1 Variations of Comparatives

1.1 Issues

Comparatives and other degree constructions have received considerable attention in the area of semantics. However, most of the studies in literature have been conducted in English and related languages, and the cross-linguistic research of degree constructions still has much room for exploration. Stassen (1985) clarifies this point. He has collected cross linguistic data of comparatives from 110 languages. The purpose of his research is to expand the scope of research on comparatives to a wider range of languages. Stassen mentions the following.

I think it is safe to say that more of the recent research in theoretical linguistics (e.g., the research conducted within the framework of the Extended Standard Theory; see Chomsky 1981) has tried to arrive at the underlying basic principles of human language by means of an in-depth investigation of a very small set of languages; usually, English is the sole language which is taken into consideration. While universalist authors do not deny the validity of this type of 'narrow' approach, they nevertheless feel that a broadening of the scope of linguistics investigation is in order. (Stassen 1985:3)

In this dissertation, I aim to contribute to a comprehensive study of a language that presents another dimension of degree constructions. In doing so, I will be particularly focusing on the Japanese language to provide empirical data.

I will begin with the observation made by Beck et al. (2004). They point out that Japanese comparatives exhibit some unique behaviors that are not accounted for by the

standard analysis proposed for English and other languages (von Stechow 1984 and others): Unlike English, Japanese does not allow subcomparatives, as shown in (1). (2) is grammatical despite the negative element in the *yorimo* clause (*than* clause). Negation in *than* clauses usually results in undefined maximal degrees (Rullmann 1995). The wide-scope reading of the degree operator is missing in (3), which is in contrast with an English equivalent.

Lack of subcomparatives

- (1) *Tana-wa doa-ga hiroi yori(mo) (motto) takai.¹
 shelf-top door-nom wide “than” (“more”) tall
 ‘The shelf is taller than the door is wide.’

Lack of a degree-based negative island effect

- (2) a. John-wa [daremo kawa-naka-tta no yori(mo)]
 John-top anyone buy-neg-past NO “than”
 takai hon-o katta.
 expensive book-acc bought
 b. *John bought a more expensive book than nobody did.

¹ Similar data is presented in the unpublished work of Snyder, Wexler, and Das (WCCFL 13, 1994).

Absence of a wide-scope reading of degree

- (3) (Sono sitagaki-wa 10 peeji desu.)
 (That draft-top 10 pages copula)
 Sono ronbun-wa sore yori(mo) tyoodo 5 peeji
 that paper-top that “than” exactly 5 pages
 nagaku-nakerebanaranai.
 long-be_required
 ‘The paper is required to be exactly 5 pages longer than that.’
 ($\sqrt{\text{be_required} > \text{-er, *-er} > \text{be_required}}$)

The common thread running through the data is the lack of English-like degree operator movement.

At least two types of analyses have been proposed in the literature to account for the Japanese data. One is by Beck et al. (2004), who argue that there is a parameter that governs the presence/absence of degree movement in Japanese.

(4) Degree Abstraction Parameter (DAP)

A language {does/does not} have binding of degree variables in the syntax.

By the negative setting of the parameter, complex standards of comparatives in Japanese cannot contribute sets of degrees; instead, they denote sets of individuals, and standard degrees are contextually inferred from the given sets of individuals. Comparisons with such contextually given degrees are pragmatically made. In short, according to Beck et al.,

Japanese comparatives are quite context dependent.

Another type of analysis has been provided by Kennedy (2005). He acknowledges the unique behaviors of Japanese comparatives pointed out by Beck et al. and attempts to attribute them to the properties of the comparative morpheme. He argues that there are cross-linguistically two types of comparative morphemes that take either individuals or degrees as their standards. According to this classification, Japanese possesses only individual comparisons, while English possesses both individual and degree comparisons.

(5) a. Individual comparison

$$[[\text{MORE}_I]] = \lambda g \lambda y \lambda x. g(x) > g(y)$$

b. Degree comparison

$$[[\text{MORE}_D]] = \lambda g \lambda d \lambda x. g(x) > d$$

The crucial difference between Beck et al. and Kennedy is that for Kennedy, the standards of comparison in individual comparisons are compositionally derived, and comparisons are also compositionally made, while Beck et al. assume that the standards of comparisons are inferred from context, and comparisons are made via pragmatics.

The purpose of this dissertation is to argue for a contextual approach. In doing so, I will present a “lexical analysis” of comparatives, which was originally suggested in Beck et al. (2004); however, it was not pursued. I will argue that the unique behaviors of Japanese comparatives stem from the property of lexical entries of Japanese adjectives. Given below is a format of Japanese adjectives, where *A* stands for an arbitrary gradable adjective. The idea is that the semantics of comparatives is already built in the lexical

entries of gradable adjectives in Japanese. (6)a and (6)b are the same except that the differential degree is implicit and existentially bound in (6)a, and it is bound by a lambda operator in (6)b. c stands for a contextually provided degree. Note that I assume two types of degree arguments throughout the paper. One is a direct degree, which is represented as d in (6). It represents the degree possessed by an individual x . Another one is a differential degree d' . It represents the difference between two degrees. In (6)b, d' denotes the difference between d and a contextually given degree c .

Lexical analysis of Japanese comparatives

- (6) a. $\lambda x.\max(\lambda d.A(d)(x))>c$ ²
 b. $\lambda d'\lambda x.\max(\lambda d.A(d)(x))=c+d'$

The lexical analysis provides an explanation of the DAP and accounts for the absence of degree movement in Japanese: The direct degree d is bound inside the lexical entries of adjectives; thus, it cannot undergo movement.

The proposed format for gradable adjectives is the building block on which all Japanese degree constructions are based. Thus, the domain of the lexical analysis is expected to be the entire degree constructions in Japanese. In this dissertation, I will attempt to demonstrate that the lexical analysis provides a comprehensive analysis covering a wide range of Japanese degree constructions from a simple adjective sentence to various comparative-based degree constructions.

Given below are some of the data that I will discuss in the following chapters. They

² The implicit differential argument can be bound by an existential operator.

(i) $\lambda x.\exists d'[\max(\lambda d.A(d)(x))=c+d']$

provide a sharp contrast to English equivalents and showcase the nature of Japanese adjectives. In (7), the overt degree expression 2 *cm* is understood as a difference degree, and it is never understood as the height of the shelf itself. Although there is no overt comparative morpheme such as *-er*, the sentence necessarily implies a comparison, namely, the shelf is 2 cm taller (than something). This is because the comparative semantics is part of the meaning of the adjective. Multihead comparatives such as (8) are fairly acceptable and possess a sensible interpretation. On the other hand, the grammatical status of an English counterpart is highly controversial. In Japanese, more than one comparison is easily accommodated in a single clause. This is expected since according to the lexical analysis, each gradable adjective introduces a comparison. Therefore, when there are two gradable adjectives in a sentence, the interpretation of the sentence involves two comparisons.

Overt degree as a differential degree

(7) Kono tana-wa 2 cm takai.

This shelf-top 2 cm tall

‘This shelf is taller by 2 cm.’

Multihead comparative

(8) [Neko-ga hatukanezumi-o tabeta yori(mo)], (motto) takusn-no inu-ga
 cat-nom mouse-acc ate than (“more”) many-gen dog-nom
 t_i (motto) takusan-no dobunezumi-o tabeta.
 (more) many-gen rat-acc ate

‘More dogs ate more rats than cats ate mice.’

I will also discuss comparative conditionals. Comparative conditionals are a type of comparative construction. Japanese comparative conditionals can possess differential degrees as in (9) and also “than” clauses as in (10), whereas such sentences are not allowed in their English counterparts. The positions for such a differential degree or a *than*-clause in English correspond to the degree argument positions, and they are already filled by elements that are crucial in deriving English-style larger-than-relations in comparative conditionals (Beck et al. 1997). The grammatical status of the Japanese sentences suggests that a different mechanism is employed.

Comparative conditional with an overt degree

(9) (From the observatory,)

Kyori-ga	hyaku	meetoru	tooi	hodo,
distance-nom	hundred	meter	far	CC
ondo-ga	ni	do	takai.	
temperature-nom.	two	degree	high	

‘*The 100 m further it is (from the observatory), the 2°C higher the temperature is.’

(As it gets 100 m farther (from the observatory), the temperature rises by 2°C.)

Comparative conditional with an overt yori(mo) clause

- (10) [Hans-yori (motto) tukareru] hodo, [Otto-wa
Hans-“than” (more) tired CCs Otto-top
(motto) iradatu].
(motto) get_aggressive

‘*The more tired Otto is **than Hans**, the more aggressive he becomes.’

(As the gap of fatigue between Otto and Hans widens, Hans becomes more upset.)

My discussion will extend to exclamatives. Exclamatives are a version of comparatives. A prototypical example in Japanese is given in (11). The sentence makes a comparison with the speaker’s expectation (Oda 2004a). In Japanese exclamatives, the *yori(mo) clause* (*than clause*) can be easily added as in (12). This is not possible in English, as the translation suggests. The interpretation of (12) is an exclamation on differential degrees, although there is no (at least overt) comparative morpheme. This also stems from the comparative interpretation of Japanese adjectives. Japanese exclamatives can host more than one exclamative wh-phrase in one sentence, as shown in (13). This is possible for basically the same reason that applies to multihead comparatives in Japanese: Each adjective locally introduces a comparison, thus two comparisons can reside in one sentence. Then the exclamative wh-phrase *nante* (what-TE) turn the comparisons into the ones between a linguistically given degree and the speaker’s expectation.

Exclamative

(11) John-wa nan-te kasikoi-ndeshoo!

John-top what-TE smart-EXC

‘How smart John is!’

Exclamative with a yori(mo) clause

(12) John-wa nan-te [Mary yori(mo)] kasikoi-ndeshoo!

John-top what-TE [Mary “than”] smart-EXC

‘*How smart John is than Mary!’

(How much smarter John is than Mary!)

Multihead wh-exclamative

(13) [Nan-te mazusii gakusee]-ga [nan-te takai kuruma]-o

what-TE poor student-nom what-TE expensive car-acc

katta-nodeshoo!

bought-EXC

‘*What a poor student bought what an expensive car!’

The data given above show not only the contrast between English and Japanese degree constructions but also the nature of Japanese degree constructions: They are built upon adjectives that are comparative per se.

1.2. Overview of the Dissertation

In the rest of this chapter, I will first review the behaviors of Japanese comparatives observed in Beck et al. (2004). It will be shown that they are not properly accounted for by the standard analysis of comparatives (von Stechow 1984). Two proposals have been provided in order to deal with Japanese comparatives. One of the proposals is made by Beck et al. (2004) who argue that Japanese comparatives are made without abstraction over degrees. *Yori(mo) clauses* (*than clauses*) contribute only sets of individuals, and thus, the standard degrees of comparison are pragmatically inferred from such a set of individuals. Kennedy (2005) also assumes that the complement of *yori(mo)* can only be an individual. However, he attempts to maintain a compositional manner in accounting for Japanese comparatives. In this dissertation, I will pursue a contextual approach along with Beck et al. and present a set of data that supports the contextual view of Japanese comparatives.

In Chapter 2, I will begin with a discussion on Japanese adjectives. I will first show that there is no significant class of non-gradable adjectives in Japanese, which leads us to suspect that something keeps the language from having non-gradable adjectives. Then, I will adopt the lexical entries of Japanese adjectives originally suggested in Beck et al., according to which Japanese gradable adjectives are comparatives per se. I will refer to this analysis “the lexical analysis.” The lexical analysis will explain a number of facts including the lack of a significant class of non-gradable adjectives in Japanese: Japanese adjectives are already graded in their lexical entries and thus can only be gradable. Then, I will reanalyze Beck et al.’s data under the lexical analysis, under which the direct

degrees of adjectives are bound within adjectives and thus cannot undergo movement. Therefore, the lexical analysis might take over the job of the negative setting of the Degree Abstraction Parameter (DAP). However, I will argue that the lexical analysis and the DAP cover a slightly different range of data; thus, they both need to remain in Japanese grammar. I will also discuss the multihead comparatives in Japanese that I briefly mentioned in (8), which support the lexical analysis, under which each comparison is locally made by an adjective.

Chapter 3 applies the analysis of Japanese comparatives to Comparative Conditionals (CCs henceforth) in Japanese that have not been discussed earlier in the literature. It will be shown that CCs in Japanese behave very differently from English CCs; rather, they share many features with Japanese comparatives. Thus, it is natural to assume that Japanese CCs are based on Japanese comparatives. This line of analysis provides us with a more comprehensive view of the degree constructions in Japanese.

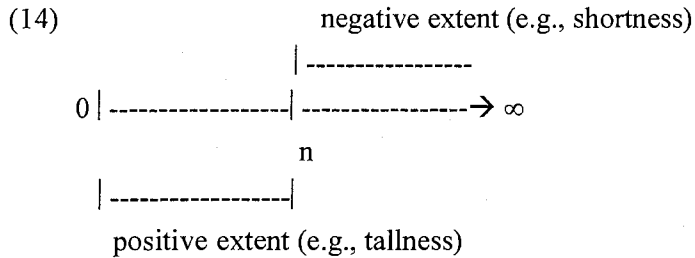
Chapter 4 discusses exclamatives. I will propose that exclamatives are an instance of comparatives that make a comparison between a linguistically provided degree and a speaker's expectation. Exclamatives in English and Japanese exhibit different behaviors; this reflects the properties of comparatives in each language. It will be shown that Japanese exclamatives are also built upon adjectives that are comparative per se. Thus, Japanese exclamatives host *yorimo* clauses (*than* clauses) as in (12), whose meaning corresponds to *How much smarter John is than Mary!* in English. Importantly, the underlying comparisons in Japanese exclamatives are made without involving English-like degree movement. Being free from constraints on movement, Japanese exclamatives have patterns such as multiheaded exclamatives like (13) that are not

possible in English.

In Section 5, I will attempt to reconsider some previous studies on degree constructions in Japanese as well as some cross-linguistic research of comparatives under our framework and present some perspectives for further research. I will first discuss Kikuchi's (1987) data. I will argue that what he considers as the island effect in *yorimo* clauses is rather a contextual flaw. Japanese comparatives are quite context dependent; thus, it is crucial to make a comparison under an appropriate context. I will show that Kikuchi's data can be saved when a better context is provided. Therefore, any data that is presented as evidence for operator movement in *yorimo* clauses following Kikuchi's analysis must be reconsidered with more attention to context. Then, I will refer to *-sugiru* (exceed) constructions discussed in Nakanishi (2004). *-Sugiru* (exceed) is a verb, and *-sugiru* (exceed) constructions correspond to *too...to...* constructions in English. Nakanishi assumes that *-sugiru* (exceed) makes a comparison with a contextually given standard degree. Such comparison with a contextually given standard resembles the lexical analysis we assume for gradable adjectives. Nakanishi's analysis suggests that the lexical analysis can be extended to a certain class of verbs in Japanese that includes *-sugiru* (exceed). The end of Chapter 5 has some cross-linguistic discussion. It will be shown that the lexical analysis is considered as a property set by a parameter that governs types of gradable adjectives allowed in a language. A certain range of Korean and Chinese is accounted for when different setting are assumed in the parameter as well as in the DAP.

A brief description of the ontology is given below. Throughout the dissertation, I will adopt von Stechow's theory of gradable adjectives as a relation between objects and

an extent on a scale. Scales are linear-ordered sets of degrees, and extents are subsets of scales. An extent can be positive or negative. This is shown in a scale below. The positive extent begins with 0 and ends with n . The negative extent begins with n and has no end. On the scale of *tall*, for instance, a positive extent represents tallness, and a negative extent represents shortness.



von Stechow formalizes extents as indexed ordered pairs of the form $\langle_A 0, n \rangle$ and $\langle_A n, \infty \rangle$, where n denotes some real number. The first element defines the starting point of the interval or stretch on the scale, and the second element characterizes the ending point.

- (15) a. The positive extent of an object o on a scale identified by an adjective A : $\langle_A 0, n \rangle$
 b. The negative extent of an object o on a scale identified by an adjective A : $\langle_A n, \infty \rangle$, where φ is a measure function, and $n = \varphi(o)$ and n in the set of positive real numbers plus ∞ .

Positive gradable adjectives are functions that relate to positive extents and objects, and negative gradable adjectives relate to negative extents and objects.

I adopt the following semantics types: Semantic type e for individual entities, t for

truth values, s for possible worlds, and d for negative and positive extents. A gradable adjective is type $\langle d, \langle e, t \rangle \rangle$. They are monotone, as defined below. A sample lexical entry of *tall* in English is also given.

(16) A function f of type $\langle d, \langle e, t \rangle \rangle$ is monotone iff

$$\forall x \forall d \forall d' [f(d)(x)=1 \wedge d' < d \rightarrow f(d')(x)=1]$$

(17) $[[\textit{tall}]] = \lambda d \lambda x. x$ is tall to degree d

Regarding the basic rules of compositional calculation, I will follow Heim and Kratzer (1999).

1.3 Beck et al.'s (2004) Observations

This subsection reviews the basic structure of Japanese comparatives and Beck et al.'s observations. They present facts that are unique to Japanese comparatives: variation in acceptability, lack of subcomparatives, absence of the negative island effect, and absence of wide scope interpretation of comparative morpheme.

1.3.1 Basic Data

Let us first consider the basic structure of Japanese phrasal comparatives and clausal comparatives. (18) and (19) have *yorimo*. The standard translation of *yorimo* is

“than” in English. (I have indicated it in quotes because it will be shown later that it is quite different from *than* in English.) *Yori(mo)* phrases/clauses usually appear before VPs in a linear order. I indicate them by using brackets. Following *yori(mo)* is *motto*, which is normally considered as “more” in English. (Again, I indicate it in quotes, and I will argue in 2.4.1 with Beck et al. that it is not a comparative morpheme.) Being different from *more* in English, *motto* is optional in Japanese. This optional status of *motto* is puzzling since comparatives necessarily involve a comparative morpheme in English and other languages. Therefore, one might assume that Japanese has an invisible comparative morpheme when *motto* is not present. Another possibility is that Japanese comparatives are made possible without syntactic comparative morphemes.

Phrasal comparatives

- (18) a. Mary-wa [John-yori(mo)] (motto) takusan-no
 Mary-top [John-”than”] (“more”) many-gen
 ronbun-o kaita³.
 paper-acc wrote
- b. Mary wrote more papers than John.

*Clausal comparatives*⁴

³ *Mo* that follows *yori* is an optional morpheme. The role of *mo* is not clear at this moment.

⁴ It should be noted that many native speakers find it more appropriate to have a nationalizer *no* between *yori(mo)* and its complement clause.

(i) Mary-wa [John-ga kaita no yori(mo)] (motto)
 Mary-top [John-nom wrote NO “than”] (“more”)
 takusan-no ronbun-o kaita.
 many-gen paper-acc wrote

- (19) a. Mary-wa [John-ga kaita yori(mo)] (motto)
 Mary-top [John-nom wrote “than”] (“more”)
 takusan-no ronbun-o kaita.
 many-gen paper-acc wrote
- b. Mary wrote more papers than John did.

Other than the word order, both sentences appear to be quite similar to their English equivalents. However, a closer look reveals some contrast between the two languages. In what follows, I will review three facts about Japanese comparatives pointed out by Beck et al.

1.3.2 Variation in Acceptability

The following two sentences are minimally different in that they have different adjectives in their matrix clauses, i.e., *takusanno* (many) in (20) and *nagai* (long) in (21). Unexpectedly, (20) sounds good, but (21) does not, as pointed out by Ishii (1991)⁵. The

‘Mary wrote more papers than John did.’

Though *no* is usually optional when *yorimo* clauses are well-formed, there are some exceptional cases. *No* in the *yorimo* clause with an NPI in (2) is obligatory. When the complement of *yorimo* has a verb that takes a complement clause as in the case of (ii), *no* does not appear.

- (ii) Taroo-wa [watasi-ga omotta (*no)] yori(mo) (motto) kasikoi.
 Toaroo-top I-nom thought NO “than” (“more”) smart
 ‘Taro is smarter than I thought.’

⁵ Ishii argues that the contrast originates from the categorical difference between *katta* (bought) and *nagai* (long). He concludes that Japanese does not allow adjectives comparatives. However, this does not appear to be the case, and Japanese allows

contrast is unexpected given the fact that the English equivalents sound equally fine.

Variation in Acceptability

- (20) a. Taroo-wa [Hanako-ga katta yori(mo)] **takusanno**
 Taroo-top [Hanako-nom bought “than”] **many**
 kasa-o katta. (Ishii 1991:124)
 umbrella-acc bought

- b. Taroo bought more umbrellas than Hanako did.

- (21) a. ?(?)Taroo -wa [Hanako-ga katta yori(mo)] **nagai**
 Taroo -top [Hanako-nom bought “than”] **long**
 kasa-o katta. (Ishii 1991:125)
 umbrella-acc bought

- b. Taroo bought a longer umbrella than Hanako did.

There appears to be no logical reason as to why buying a “longer” umbrella makes less sense than buying “more” umbrellas.

1.3.3 Lack of Subcomparatives of Degree

Beck et al.(2004) and Snyder (1995) point out that Japanese lacks the so-called subcomparatives of degree such as the following. The sentences compare the height of

comparatives with adjectives as shown in 2.3.3 when an appropriate context is provided.

the shelf and the width of the door. The Japanese sentence is degraded, whereas the English sentence is well-formed.

Subcomparatives of Degree

- (22) a. *Kono tana-wa [ano doa-ga hiroi yori(mo)]
 this shelf-top [that door-nom wide “than”]
 (motto) takai.
 (more) tall
- b. This shelf is taller than that door is wide.

If English and Japanese comparatives were based on the same mechanism, such a contrast would not appear.

However, whatever the constraint on Japanese comparatives is, it should not be too strict. Interestingly, Japanese does allow subcomparatives of numbers. In (23), two numbers make a comparison: the number of papers John read and the number of newspapers Mary read.

Subcomparatives of Numbers

- (23) a. John-wa [Mary-ga simbun-o yonda yori(mo)] (motto)
 John-top [Mary-nom newspaper-acc read “than”] (“more”)
 takusanno ronbun-o yonda.
 many paper-acc read
- b. John read more papers than Mary read newspapers.

Therefore, the underlying rule in Japanese is that the subcomparatives of degrees must be excluded, and at the same time, the subcomparatives of numbers must be included.

1.3.4 Lack of the Negative Island Effect

The third characteristic of Japanese comparatives pointed out by Beck et al. is the lack of the degree-based negative island effect. In the following example, the Japanese sentence is well formed, whereas the English sentence is not.

Lack of the degree-based negative island effect

- (24) a. John-wa [dare-mo kawa-naka-tta no yori(mo)]
 John-top anyone buy-neg-past NO “than”
 takai hon-o katta.
 expensive book-acc bought
 b. *John bought a more expensive book than nobody did.

The intuitive paraphrase of the Japanese sentence is “there is a particular book that nobody bought, and John bought a more expensive book than that one.” Such meaning is not available in the English sentence, and the English equivalent is ungrammatical to begin with.

We have reviewed three facts regarding Japanese comparatives. The next section reviews the standard analysis of comparatives. Then, I will review the Japanese data and

show that the standard analysis does not capture the contrast between the English and Japanese data.

1.4 The Standard Analysis

It was shown in the previous subsection that Japanese comparatives exhibit some unique behaviors that are not observed in English. This section analyzes Japanese data under the commonly assumed framework. It will be shown that the behaviors of Japanese comparatives are not accounted for by the standard account, which is designed to account for the behaviors of English. Therefore, an alternative framework is called for.

1.4.1 von Stechow (1984)

Comparative constructions have been discussed intensively in the field of syntax and semantics. It is commonly assumed that there is an operator movement in *than* clauses in English. The operator movement is subject to various constraints on movement as the following examples with island effect show.

(25) *John wrote more papers than I met a graduate student who wrote.

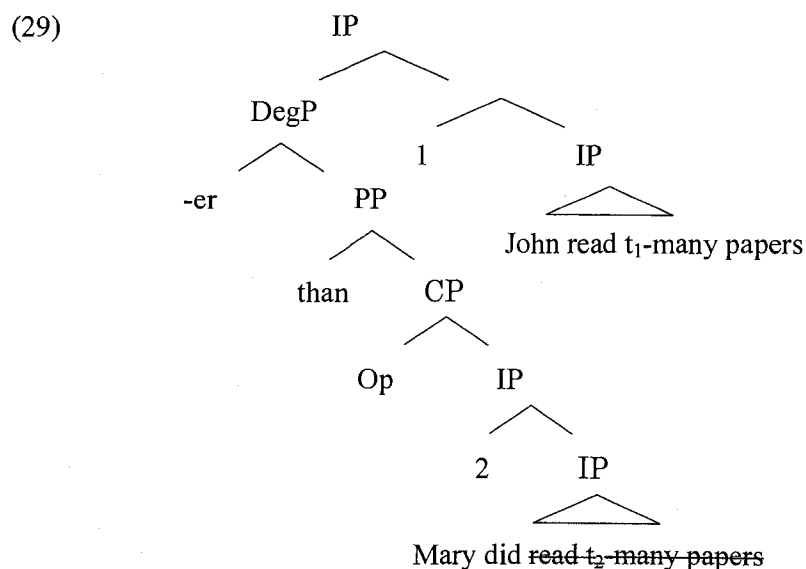
(26) *John got better grade than people wonder how Mary got.

(27) *John donated more money than I left the church after Mary donated.

In the standard analysis of comparatives in semantics, von Stechow (1984) and others consider comparatives as a comparison of two degrees. The version of the standard analysis adopted in this paper is closest to Heim (2000a), where two maximal degrees are compared. (The assumption of maximality operator is common for *than* clauses (von Stechow 1984, Rullmann 1995, and Heim 2000a) but it is not so for the matrix clauses.)

Example (28) is given the LF structure (29). There are two movements involved in the LF. The degree morpheme *-er* in the matrix clause undergoes LF movement and adjoins to IP, taking the entire *than* clause along with it. Another degree movement occurs within the *than* clause. Unpronounced material is indicated by strike-out.

(28) John read more papers than Mary did.



Each movement creates an index, which is a pronoun. I adopt the rule of Predicate Abstraction (PA) by Heim and Kratzer (1999).

(30) PA by Heim and Kratzer (1999:186)

Let α be a branching node with daughters β and γ , where β dominates only a numerical index i . Then, for any variable assignment a , $[[\alpha]]^a = \lambda x \in D. [[\gamma]]^a x/i$.

In the above example, the resulting set will be a set of degrees. Another inventory that is necessary for the calculation is also given below: The comparative morpheme *-er* takes two sets of degrees and maps to a larger-than-relation of two maximal degrees. Maximal degrees are obtained by applying a maximality operator to a set of degrees that picks up the unique maximal degree from the set.

(31) $[[\text{-er}]](D2)(D1) = 1$ iff $\max(D1) > \max(D2)$

(32) Let S be a set ordered by \leq . Then, $\max(S) = \iota s[s \in S \ \& \ \forall s' \in S[s' \leq s]]$

Let us conduct the compositional calculation. The truth conditions of the sentence say “the maximal number of the papers John read is larger than the maximal number of the papers Mary read.”

(33) $[[IP]] = 1$ iff

$[[\text{-er}]]([2 \text{ Mary read } t_2\text{-many papers}])([1 \text{ John read } t_1\text{-many papers}]) = 1$ iff

$[[\text{-er}]](\lambda d. \text{ Mary read } d\text{-many papers})(\lambda d. \text{ John read } d\text{-many papers}) = 1$ iff

$\max(\lambda d. \text{ John read } d\text{-many papers}) > \max(\lambda d. \text{ Mary read } d\text{-many papers})$

Crucially, the above analysis of English comparatives assumes the LF movement of degree quantifiers. Although such an approach is considered as standard, it is not free from controversy. Studies such as Kennedy (1997) argue that degree quantifiers do not move. I would like to briefly review an argument for degree movement in order to defend the movement approach before continuing further.

Heim (2000a) presents empirical data where degree quantifiers undergo movement to take a wide scope. However, as Heim points out, quantifiers should be selected carefully in order to test scope ambiguity, since not all degree quantifiers are suitable for this purpose. Some of the quantifiers that work well are *exactly*-differentials and *less*-comparatives. In the example below, the degree phrase *exactly 5 pp.–er than that* and the intensional verb *is required* show scope interaction, and the sentence is ambiguous.

(34) a. (This draft is 10 pages.) The paper is required to be exactly 5 pages longer than that.

b. required [[exactly 5 pp. –er than that] the paper be t long]

$\forall w \in \text{Acc}: \max\{d: \text{long}_w(p, d)\} = 15\text{pp}$

c. [exactly 5 pp. –er than that][required [the paper be t long]]

$\max\{d: \forall w \in \text{Acc}: \text{long}_w(p, d)\} = 15\text{pp}$ (Heim 2000a:48)

(34)b states that the paper is exactly 15 pages long in every acceptable world. (34)c is the reading obtained by the degree quantifier taking a wide scope over the intensional verb. It states that the paper is exactly 15 pages long in those acceptable worlds where it is shortest. This leaves possibilities where it can be longer than 15 pages. Importantly, the

fact that the reading of (34)c is available supports degree movement in English.

The following example with less-comparatives makes the same point. It is ambiguously interpreted.

(35) a. This paper is required to be less long than that.

b. required [[less than that] the paper be t long]

$\forall w \in \text{Acc}: \max\{d: \text{long}_w(p, d)\} < 10pp$

c. [less than that][required [the paper be t long]]

$\max\{d: \forall w \in \text{Acc}: \text{long}_w(p, d)\} < 10pp$ (Heim 2000a:48)

(35)b states that the paper is less than 10 pages in every acceptable world. The crucial reading is (35)c, which states that it is less than 10 pages in the acceptable worlds where it is shortest. It can be paraphrased as “the paper is not required to be as long as that.” The degree operator movement of *less* properly accounts for the reading.

It should be noted that the choice of quantifiers is important when we examine scope interactions. Even *exactly*-differences are not free from problems. Heim acknowledges the observation by Kennedy (1997) that DegPs are not allowed to cross over quantificational DPs. The following example that shows the point is cited from Heim (2000a).

(36) a. (John is 4' tall.) Every girl is exactly 1" taller than that.

b. $\forall x[\text{girl}(x) \rightarrow \max\{d: \text{tall}(x, d)\} = 4' + 1'']$

c. $\max\{d: \forall x[\text{girl}(x) \rightarrow \text{tall}(x, d)]\} = 4' + 1''$ (Heim 2000a:46)

The sentence has only one meaning (36)b, where all the girls are 4'1" tall. (36)c means that the shortest girl is 4'1". However, the sentence is judged as false in a scenario where one girl is 4'1" and others are taller. This implies that DegP does not take scope over *every girl*. Heim points out that the constraint of degree movement over quantificational DP is reminiscent of the intervention effect in wh-questions studied by Beck (1996). The above mentioned data in (34) and (35) avoid using such problematic quantifiers and adopt modals in the matrix clauses.

In the following subsections, the standard analysis will be applied to Japanese data. The scope data for the degree movement discussed above will be compared with Japanese equivalents as well. It will be shown that the standard account does not explain the Japanese data.

1.4.2 The Standard Analysis and the Variation in Acceptability

Recall the contrast between (20) and (21), repeated below, with different adjectives.

Would the standard analysis predict the contrast?

- (37) a. Taroo-wa [Hanako-ga katta yori(mo)] **takusanno**
 Taroo-top [Hanako-nom bought "than"] **many**
 kasa-o katta.
 umbrella-acc bought
- b. Taroo bought more umbrellas than Hanako did.

- (38) a. ?*Taroo -wa [Hanako-ga katta yori(mo)] **nagai**
 Taroo -top [Hanako-nom bought “than”] **long**
 kasa-o katta.
 umbrella-acc bought
 b. Taroo bought a longer umbrella than Hanako did.

In both the sentences, the comparative morpheme (if there is any) takes two sets of degrees (assuming that the Japanese data involve degree movement as in English) and maps them to a larger-than-relation of two maximal degrees.

- (39) a. Taroo bought more umbrellas than Hanako did.
 b. [[-er [1 [than Hanako did ~~buy t1 many umbrella~~]]]
 [1 [Taroo bought t1 many umbrella]]]
 c. [[-er]] ($\lambda d'.H.$ bought d' -many umbrellas) ($\lambda d.T.$ bought d -many umbrellas)
 d. $\max(\lambda d.T.$ bought d -many umbrellas) $>$ $\max(\lambda d'.H.$ bought d' -many umbrellas)
 e. The number d such that Taroo bought d -many umbrellas exceeds the degree d' such that Hanako bought d' -many umbrellas.
- (40) a. Taroo bought a longer umbrella than Hanako did.
 b. [[-er [1 [than Hanako did ~~buy a t1 long umbrella~~]]]]

[1 [Taroo bought a t1 long umbrella]]]

- c. [[-er]] ($\lambda d'$.H. bought a d' -long umbrella) (λd .T. bought a d -long umbrella)
- d. $\max(\lambda d$.T. bought a d -long umbrella) $>$ $\max(\lambda d'$.H. bought a d' -long umbrella)
- e. The degree d such that Taroo bought a d -long umbrella exceeds the degree d' such that Hanako bought a d' -long umbrella.

The resulting truth conditions do not appear to have any problem. Both sentences should be expected to be well-formed. Thus, the contrast between (37) and (38) casts doubts on applying the standard analysis on Japanese data.

1.4.3 The Standard Analysis and the Lack of Subcomparatives of Degree

The subcomparative case is even simpler than the previous examples. It does not include any phonetically elided part, and there is merely a gap of degree argument in each clause. The contrast between a subcomparative of degrees and a subcomparative of numbers in Japanese is totally unexpected.

Subcomparatives of degrees

- (41) a. *Kono tana-wa [ano doa-ga hiroi yori(mo)]
 this shelf-top [that door-nom wide “than”]

(motto) takai.

(“more”) tall

“This shelf is taller than that door is wide.”

b. $[[[-er [1 [than\ that\ door\ is\ t1\ wide]]] [1 [This\ shelf\ is\ t1\ tall]]]]$

c. $[[[-er]](\lambda d. that\ door\ is\ d-wide) (\lambda d. this\ shelf\ is\ d-tall)]$

d. $\max(\lambda d. this\ shelf\ is\ d-tall) > \max(\lambda d. that\ door\ is\ d-wide)$

Subcomparatives of numbers

(42) a. John-wa [Mary-ga simbun-o yonda yori(mo)] (motto)

John-top [Mary-nom newspaper-acc read “than”] (“more”)

takusanno ronbun-o yonda.

many paper-acc read

‘John read more papers than Mary read newspapers.’

b. $[[[-er [1 [than\ Mary\ read\ t1\ many\ newspapers]]] [1 [John\ read\ t1\ many\ books]]]]$

c. $[[[-er]](\lambda d. Mary\ read\ d-many\ papers) (\lambda d. John\ read\ d-many\ books)]$

d. $\max(\lambda n. John\ read\ d-many\ papers) > \max(\lambda n. Mary\ read\ d-many\ newspapers)$

1.4.4 The Standard Analysis and the Lack of the Negative Island Effect

Recall the grammatical example with *dare-mo...nai*⁶ (nobody) in Japanese. In

⁶ The negation *nai* can be morphologically different depending on the element that follows it. In (43), it is followed by the past morpheme *ta*, and the combination of *nai* (neg) and *ta* (past) makes *naka-tta*.

Japanese, there is no single word that corresponds to *nobody*, and the combination of *daremo* (anyone) and *nai* (Neg) generates an equivalent meaning.

- (43) a. John-wa [**daremo** kawa-**naka-tta** no yori(mo)]
 John-top **anyone** buy-neg-past NO “than”
 takai hon-o katta.
 expensive book-acc bought
- b. *John bought a more expensive book than nobody did.

The English sentence is ungrammatical. On the other hand, the Japanese sentence is well-formed. The intuitive translation of the sentence is “John bought a book that is more expensive than the book that nobody bought.” This implies that there is a particular book in the context that no one bought for some reason, probably because it was too expensive or too boring. Note that there is a nominalizer *no* in the preceding position of *yorimo*. *No* in this position is usually optional (see note 4), but it is obligatory in this example.

English comparatives with *nobody* in *than* clauses are ungrammatical.

- (44) *John bought a more expensive book than **nobody** did.

The effect of negations in comparatives has been extensively discussed in Rullmann (1995). (45) is the LF structure that the standard analysis would predict for both (43)a and (44). According to Rullmann, the problem is that the maximal degree in the negated *than* clause is undefined: There is no maximal degree *d* such that nobody bought a *d*-expensive

book. Such degree is unlimited. The truth conditions will be as in (47), which is paraphrased as (48).

(45) $[[\text{-er } [1 \text{ [than nobody did buy a t1-expensive book]]}]$

$[1 \text{ [John bought a t1 expensive book]]}]$

(46) $[[\text{-er}]](\lambda d. \text{ nobody bought a d-expensive book})(\lambda d. \text{ John bought a d-expensive book})$

(47) $\max(\lambda d. J. \text{ bought a d-expensive book}) > \max(\lambda d. \text{ nobody bought a d-expensive book})$

(48) The degree d such that John bought a d -expensive book exceeds the degree d' such that nobody bought a d' -expensive book.

The problem of undefined maximal degrees is observed with not only negation but also other downward entailing operators that appear in *than* clauses.

(49) *John is smarter than *few* people are.

(50) *John is smarter than Bill *never* was (Rullmann 1995)

Therefore, the standard account with degree movement and maximality operators provides a comprehensive explanation for the negation effect in *than* clauses in English. However, the standard account would predict that the relevant Japanese sentence would be ungrammatical as well, and the contrast between English and Japanese would be left unexplained.

1.5 Alternative Analysis: Beck et al. (2004)

Given the contrast between Japanese and English, Beck et al. propose an alternative account of Japanese comparatives. Their basic claim is that Japanese comparatives are less compositional and more context-dependent in deriving their interpretations. Beck et al.'s assumption comprises two parts: The role of *yor(i)(mo)* clauses is to set a context for comparison, and Japanese comparisons are made via pragmatics. Secondly, pragmatic comparisons are made to the absence of degree movement in Japanese.

1.5.1 *Yori(mo)* clauses as “Compared to”

Beck et al. propose that the role of *yor(i)(mo)* clauses is quite different from that of *than* clauses in English. Recall that under the standard assumption, a *than* clause denotes a set of degrees, which is to be compared with the degree in the matrix clause. In the case of a *yor(i)(mo)* clause, however, Beck et al. propose that it denotes a set of individuals. In this sense, a better paraphrase for *yor(i)(mo)* is *compared to* in English, which takes NP-like elements for its complement.

Let us consider an example. Within the *yor(i)(mo)* clause that is indicated in brackets, there is a gap *e* for the object, i.e., the item John read.

- (51) Mary-wa [John-ga e kaita yori(mo)] (motto) takusanno
 Mary-top John-nom wrote “than” (“more”) many
 ronbun-o kaita.
 paper-acc wrote
 ‘Mary wrote more papers than John.’

When interpreted, the clause is abstracted over the gap of individual as in (52)b. Then, the maximality operator can apply to the set of individuals (c.f. Jacobsen 1995) as in (52)c. The result is semantically equivalent to a free-relative expression *what John wrote* in English (52)d.

- (52) a. *John-ga e kaita*
 b. λx . John wrote x
 c. $\max(\lambda x$. J. wrote x)
 d. what John wrote

Then, how does the *yori(mo)* clause contribute to the truth conditions of the whole sentence? Beck et al. assume that *yori(mo)* clauses simply work as a context-setter, and they are not a part of the truth-conditional calculation. This can be captured by the following paraphrase. At this moment, the matrix adjective can be described either in the comparative form *more* or positive form *many*.

- (53) a. Compared to what John wrote, Mary wrote more papers.

- b. Compared to what John wrote, Mary wrote many papers.

Both paraphrases carry intuitively correct interpretations for the Japanese sentence. Given this, the truth conditions can be either one of the following representations. The matrix degree can be either abstracted over or stay in situ and existentially bound. The comparison items c stands for a contextually provided degree, i.e., the value of which is contextually provided by *yorimo* clauses.

- (54) a. $\max(\lambda d. \text{Mary wrote } d\text{-many papers}) > c$

$c =$ the number made salient by the utterance context

$:=$ the number of papers John wrote

- b. $\exists d[\text{Mary wrote } d\text{-many papers} \ \& \ d > c]$

$c =$ the number made salient by the utterance context

$:=$ the number of papers John wrote

Importantly, the value of c is inferred from the set of individuals denoted by the *yorimo* clause. In this case, c denotes the number of papers John read, which is inferred from the set of items John read. The *yorimo* clause does not directly provide the number of books John read. This is crucially different from English comparatives where comparisons are made by strict compositional calculations.

With regard to the two possibilities for the matrix clause mentioned in (54), the issue is whether or not there is any phonologically null comparative morpheme that would induce degree movement in the matrix clause. If it is, it would be as in (54)a and

very closed to the case of English. If not, it would be as in (54)b. The next subsection discusses degree movement in the matrix clauses of Japanese comparatives.

1.5.2 Degree Movement in Matrix Clauses

Beck et al. (2004b) investigated the scope of the matrix degrees of Japanese comparatives. The result showed the lack of degree movement. Evidence was obtained when relevant data is compared in English and Japanese. First, let us recall the English data (34), repeated as (55) below, where a degree phrase undergoes movement and creates higher scope interpretation of degrees over an intensional verb as in (55)c.

(55) a. (This draft is 10 pages.) The paper is required to be exactly 5 pages longer than that.

b. required [[exactly 5 pp. -er than that] the paper be t long]

$\forall w \in \text{Acc}: \max\{d: \text{long}_w(p, d)\} = 15\text{pp}$

c. [exactly 5 pp. -er than that][required [the paper be t long]]

$\max\{d: \forall w \in \text{Acc}: \text{long}_w(p, d)\} = 15\text{pp}$ (Heim 2000a:48)

Now, let us consider Japanese. Contrary to the case of English, the wide scope of a degree operator is missing in the Japanese equivalent.

(56) (Sono sitagaki-wa 10 peeji desu.)
 (that draft-top 10 page copula)

Sono ronbun-wa sore yori(mo) tyoodo 5 peeji
 that paper-top that "than" exactly 5 pages
 nagaku-nakerebanaranai.

long-be_required (Beck et al. 2004:331)

"The paper is required to be exactly 5 pages longer than that."

The sentence has only one reading where *nakerebanaranai* (to be required) takes wide scope. Thus, the paper needs to be exactly 15 pages long. This corresponds to (55)b. The absence of the other reading indicates that degree movement is missing in Japanese.

Another example that shows the same point is given from *less*-comparatives. The English (57)a allows the reading in (57)b, where *-less* takes wide scope over the modal verb. However, the Japanese equivalent does not allow the reading. Note that Japanese does not have English-like *less*-comparatives; hence, the sentence adopts *sukunai* (small).

(57) a. Laura needs to buy a smaller number of candles than Pete.

b. The minimum number of candles that would satisfy the requirement imposed on
 Laura is smaller than the minimum number of candles that would satisfy the
 requirements imposed on Pete. (Beck et al. 2004:331)

(58) Laura-wa [Pete yori(mo)] sukunai kazu-no roosoku-o

Laura-top Pete "than" small number-gen candle-acc

kawa-nakerebanaranai.

buy-must (Beck et al. 2004:331)

‘Laura is required to buy a smaller number of candles than Pete.’

The above observation indicates that degree operator movement is missing in matrix clauses as well as in *yorimo* clauses in Japanese. A question arises why Japanese does not have such a fundamental mechanism of degree constructions. Beck et al. proposes a parameter that governs the presence/absence of sets of degrees in a language⁷.

(59) Degree Abstraction Parameter (DAP)

A language {does/does not} have binding of degree variables in the syntax.

(Beck et al. 2004:325)

The parameter is set negative in Japanese, which explains the absence of degree movement. This parametric view of Japanese predicts that English-like degree constructions are absent in Japanese. This requires further research, but Beck et al. have some observation of equatives, degree questions and *so...that...* constructions that suggests this line of analysis is on the right track⁸. I will also adopt this view throughout

⁷ If this line of assumption is on the right track, it implies that binding of other types of arguments can also be a subject of parametric variation. Thus the plausibility of the DAP needs to be considered in relation to such possibilities.

⁸ Listed below are examples from Beck et al. (2004:332). Equatives, degree questions, and *so that* constructions in Japanese adopt nouns “degree” to express the intended interpretations.

Equatives:

- (i) John is as clever as Mary is.
- (ii) John-wa Mary to onaji kurai kasikoi.
John-top Mary with same degree smart
“John and Mary are smart to the same degree.”

Degree questions:

- (iii) How smart is John?
- (iv) John-wa dore-kurai kasikoi no?

the dissertation with additional assumption. I will come back to this issue in Chapter 2.

Now, we need to account for the semantics of the matrix clause without having degree movement. How do we do it? One obvious option is to assume a positive form, which brings comparative semantics without having comparative morpheme. However, the following differential comparative sentence suggests that Japanese comparatives are not positive.

- (60) Kono tana-wa 2 cm takai.
 this shelf-top 2 cm tall
 ‘This shelf is taller by 2 cm.’

Beck et al. tentatively assume that there is a phonologically null comparative morpheme *-er_J*, which is combined with adjectives and does not undergo movement. Under the assumption, the matrix clause of (61) is analyzed as (62): The null comparative morpheme takes a contextually given degree *c* and makes a comparison with the degree of the matrix adjective. This calculation makes it possible for us to account for the data without having degree movement or positive semantics of adjectives.

-
- John-top which-degree smart Q
 “To which degree is John smart?”
So..that...:
 (v) John bought too big a book to carry.
 (vi) John-wa hakob-e-nai hodo ookina hon-o katta.
 John-top carry-can-neg degree big book-acc bought
 ‘John bought a book so big that he cannot carry it.’

- (61) Taroo-wa [Hanako-ga katta yori(mo)] takai kasa-o
 Taroo-top [Hanako-nom bought “than”] expensive umbrella-acc
 katta.
 bought
 ‘Compared to what Hanako bought, Taroo bought a more expensive umbrella.’

(62) Matrix clause:

$$[[-er_J(c)]] = \lambda P. \lambda x. \max(\lambda d. P(d)(x)) > c$$

$$[[takai]] = \lambda d. \lambda x. x \text{ is } d\text{-expensive}$$

$$[[-er_J(c)takai]] = \lambda x. \max(\lambda d. \text{expensive}(d)(x)) > c$$

$$[[-er_J(c)takai kasa]] = \lambda x. \text{umbrella}(x) \wedge \max(\lambda d. \text{expensive}(d)(x)) > c$$

$$[[Taro-wa -er_J(c)takai kasa-o katta]]$$

$$= \exists x. \text{umbrella}(x) \wedge \max(\lambda d. \text{expensive}(d)(x)) > c \wedge \text{bought}(x)(\text{Taro})$$

(where c is the contextual standard, i.e., the price of Hanako’s umbrella)

This is certainly a possibility. However, we discuss further before adopting $-er_J$, and the next subsection reviews the Japanese data with the version of (54)a as Beck et al. did in their paper. I will reconsider the issue of comparative morpheme in Japanese in Chapter 2 and provide an alternative analysis.

1.5.3 Explaining the Variation in Acceptability

Let us now revisit the three differences between Japanese and English comparatives,

and consider how Beck et al.'s framework accounts for the facts. Recall the variation in acceptability among the sentences given below.

- (63) a. Taroo-wa [Hanako-ga katta yori(mo)] takusanno
 Taroo-top [Hanako-nom bought "than"] many
 kasa-o katta.
 umbrella-acc bought
 b. Taroo bought more umbrellas than Hanako did.

- (64) a. ?(?)Taroo -wa [Hanako-ga katta yori(mo)] nagai
 Taroo -top [Hanako-nom bought "than"] long
 kasa-o katta.
 umbrella-acc bought
 b. Taroo bought a longer umbrella than Hanako did.

They share the *yori(mo)* clause. It denotes a set of individuals, which amounts to saying *what Hanako bought* in English.

- (65) a. [Hanako-ga e katta]
 b. λx . Hanako bought x
 c. $\max(\lambda x$. Hanako bought x)

The standard degrees are inferred from what Hanako bought and compared with the

matrix degree.

(66) $\max(\lambda d. \text{Taro bought } d\text{-many umbrellas}) > c$

$c =$ the number made salient by the utterance context

$:=$ the number of umbrellas Hanako bought

(67) $\max(\lambda d. \text{Taro bought a } d\text{-long umbrella}) > c$

$c =$ the degree made salient by the utterance context

$:=$ the length of the umbrella Hanako bought

The contrast between the two sentences is visible when the *yori(mo)* clause is paraphrased by *compared to*. There appear to be variations on the judgment of (68)b, which is degraded as compared to (68)a.

(68) a. Compared to what Hanako bought, Taroo bought a lot of umbrellas.

b. ?Compared to what Hanako bought, Taroo bought a long umbrella.

The pragmatic strategy of comparison becomes relevant in order to explain the contrast. When you have a set of items, it appears much easier to infer the number than the length. In order to have the cardinality number you need to view the whole set of items. With regard to length, however, you rather refer to each item, since length is a property that belongs to each item. Variations between speakers are the result of how successful the process of inference is.

This does not imply that length is always excluded from comparatives. It is possible to create a good sentence with the adjective *nagai* (long) with a more plausible context.

- (69) a. Mary-wa [John-ga kaita yori(mo)] nagai ronbun-o kaita.
 Mary-top [John-acc wrote “than”] long paper-acc wrote
 b. Compared to what John wrote, Mary wrote a longer paper.

The sentence is not degraded. In the case of a paper-writing event, the length becomes quite relevant. The length is inferred from the whole item, either singular or a set of papers that John wrote. Let us consider another example, where we retain the embedded verb *katta* (bought) and change the matrix adjective to *takai* (expensive) as in (70). Price is relevant when we discuss a buying event, and inference from the set of items to its price appears to proceed well.

- (70)a. Taroo-wa [Hanako-ga katta yori(mo)] takai kasa-o
 Taroo-top [Hanako-nom bought “than”] expensive umbrella-acc
 katta.
 bought.
 b. Compared to what Hanako bought, Taro bought an expensive umbrella.

This pragmatic account explains the variations in acceptability. If English-like formal comparisons were involved, the choice of adjectives would not affect judgments.

1.5.4 Explaining the Lack of Subcomparatives

The crucial difference between *than* clauses in English and *yorimo* clauses in Japanese is that the former denote sets of degrees, whereas the latter denote sets of individuals. Ungrammatical subcomparative sentences result from the failure to create well-formed sets of individuals in *yorimo* clauses. Recall the relevant example.

- (71)a. *Kono tana-wa [ano doa-ga hiroi (no) yorimo]
 this shelf-top [that door-nom wide NO “than”]
 (motto) takai.
 (more) tall
- b. This shelf is taller than that door is wide.

The *yorimo* clause has no gap of an individual argument. In such a case, the only way for the clause to create a set of individuals is to interpret it as an internally headed relative clause (IHRC henceforth), and there is only one individual argument *doa* (door) within the sentence that could be an internal head. When the maximality operator is applied, the clause would amount to saying “the wide door.”

- (72) a. *doa-ga hiroi*
 b. $\lambda x. \text{door}(x) \wedge x \text{ is wide}$
 c. $\max(\lambda x. \text{door}(x) \wedge x \text{ is wide})$

However, the problem is that the clause does not work well as a context setter. The following paraphrase sounds odd. (This would still be a comparison between the height of the door with that of shelf. However, it cannot be a comparison between the width of the door and the height of the shelf.)

(73) # Compared to the wide door, the shelf is tall.

It is even doubtful that a well-formed IHRC can be created from the given sentence. IHRCs are subject to various restrictions. The given IHRC *doa-ga hiroi* (the door is wide) does not work well as shown in the following IHRC.

(74) *Watasi-wa [doa_i-ga hiroi no_i]-o aketa.
 I-top door-nom wide NO-acc opened
 ‘I opened the door that was wide.’

The next question is why the subcomparatives of numbers are grammatical. Recall the example.

(75) a. John-wa [Mary-ga simbun-o yonda yori(mo)] (motto)
 John-top [Mary-nom newspaper-acc read “than”] (“more”)
 takusanno ronbun-o yonda.
 many paper-acc read
 b. John read more papers than Mary read newspapers.

Being different from the previous case, the *yorimo* clause contains the object *simbun* (newspaper). The *yorimo* clause is interpreted as an IHRC with the internal head of the object “newspaper,” and it denotes “the newspaper Mary read.”

- (76) a. Mary-ga simbun-o yonda
 b. $\lambda x. \text{newspaper}(x) \wedge \text{Mary read}(x)$
 c. $\max(\lambda x. \text{newspaper}(x) \wedge \text{Mary read}(x))$

Such an IHRC serves well as an argument. In the following example, the IHRC is an object of the sentence.

- (77) John-wa [Mary-ga simbun_i-o yonda no]_i-o tatanda.
 John-top [Mary-nom newspaper-acc read NO]_e-acc folded
 ‘John folded the newspaper Mary read.’

This time we have a sensible paraphrase with “compared to.”

- (78) Compared to the newspapers Mary read, John read many papers.

Crucially, the explanation rests on the assumption that *yorimo* clauses contribute a set of individuals instead of a set of degrees. They have a relative clause-like interpretation, and they are well formed as long as they contribute pragmatically plausible sets of individuals

including IHRCs.

1.5.5 Explaining the Lack of the Negative Island Effect

The lack of the negative island effect in *yorimo* clauses is one of the motivations for Beck et al. to assume sets of individuals for *yorimo* clauses. However, a closer look reveals that *yorimo* clauses are not completely free from negation effect. Nevertheless, I will show that their argument of *yorimo* clauses as a set of individuals is valid. Negated *yorimo* clauses and *than* clauses behave similarly, albeit for different reasons.

Recall the example with negated *yorimo* clauses (43), repeated as (79). The Japanese remains grammatical, whereas the English translation is not.

- (79) a. John-wa [daremo kawa-naka-tta no yorimo()]
 John-top [anyone buy-neg-past NO “than”]
 takai hon-o katta.
 expensive book-acc bought
- b. *John bought a more expensive book than nobody did.

When we analyze the English sentence under the standard analysis, it is predicted as ungrammatical because the *than* clause ends up denoting an undefined maximal degree: There is no maximal degree of expensiveness such that nobody bought that expensive a book. It is simply unlimited on the scale of expensiveness.

(80) a. ~~than nobody did buy a d-expensive book~~

b. $\max(\lambda d. \text{nobody bought a d-expensive book})$

“the maximal degree d such that nobody bought a d -expensive book”

However, (79)b is not a precise translation of the Japanese sentence. As Beck et al. mention and I cited in 1.2.4, the Japanese sentence (79)a implies that there is a particular book in the context that no one bought. Thus, the following paraphrase with “the one” is more accurate.

(81) Compared to the one that nobody bought, John bought an expensive book.

The implication of a singular definite item appears to emerge from *no* in the *yorimo* clause. Thus, it is more precise to treat (79)a and (81) together, which are both fine.

Although *no* is usually optional in *yorimo* clauses, it is rather obligatory in (79)a. Without it, the sentence becomes ungrammatical as shown below. Beck et al. acknowledge this fact as well. Without a syntactic head, the *yorimo* clauses can be paraphrased as a free relative. The resulting sentence is as bad as the English translation.

(82) a. ?? John-wa [daremo kawa-naka-tta yori(mo)]

John-top anyone buy-neg-past “than”

takai hon-o katta.

expensive book-acc bought

b. ?? Compared to what nobody bought, John bought an expensive book.

c. $\max(\lambda x. \text{nobody bought } x)$

How do we account for the degraded status? It is not an attractive idea to apply (80), the analysis for ungrammatical English. Although both the English with the negated *than* clause (79)b and the Japanese with the negated *yorimo* clause without *no* (82)a are degraded, the Japanese sentence appears to be better than its English counterpart. The paraphrase with a free relative in (82)b emerges as closer to the Japanese. Thus, it is better to treat (82)a and (82)b together. What would happen when a free relative contains negation? Consider the semantics of the negated *yorimo* clause.

- (83) a. **daremo** e kawa-**naka**-tta
 b. $\lambda x. \text{nobody bought } x$
 c. $\max(\lambda x. \text{nobody bought } x)$
 (what nobody bought)

Rullmann (1995) treats the negative island effect in free relatives as a case of an undefined maximum set. This applies to (83)c as well: There is no largest collection of things bought by nobody.

In summary, it was shown that grammatical *yorimo* clauses with negation are properly accounted for by Beck et al.'s framework. *Yorimo* clauses with *no* are relative clauses and thus no negation effect arises. Without *no*, negated *yorimo* clauses are treated as negated free relatives, and thus, they are subject to the problem of undefined maximal sets.

1.6 Alternative Analysis: Kennedy (2005)

This subsection reviews an analysis of Japanese comparatives by Kennedy (2005). Kennedy acknowledges the contrast between English and Japanese comparatives pointed out by Beck et al. He argues that the difference between English and Japanese can be reduced to the distinction of degree/individual comparatives, which is widely observed across languages. It will be shown that while both Kennedy and Beck et al.'s analyses cover a similar range of data, certain type of data helps us distinguish between the two analyses.

1.6.1 Individual vs. degree comparison

Kennedy summarizes the crucial difference between English and Japanese comparatives in the following manner.

- (84) a. Complex standards in Japanese are (only) type *e*.
 b. Complex standards in English are (potentially) type *d*.

This means that the parametric variation between the two languages is whether they involve individual comparison or degree comparison. It captures Beck et al.'s observation that *yori(mo)* clauses are essentially relative clauses.

Obviously, this line of analysis adopts the “direct” analysis (Hankamer 1973, Napoli 1983) of phrasal comparatives instead of the “reduced” one (Heim 1985, Hazout 1995). Kennedy also presents some evidence for direct analysis. The contrast between a-sentences and b-sentences indicates that the underlying structure of the complement of the a-sentences is simply DP rather than CP⁹.

- (85) a. Noone₁ is taller [_{PP} than [_{DP} himself₁]]
 b. *Noone₁ is taller [_{PP} than [_{CP} himself₁ is]]

- (86) a. Kim doesn’t know who₁ Lee is taller [_{PP} than [_{DP} t₁]]
 b. *Kim doesn’t know who₁ Lee is taller [_{PP} than [_{CP} t₁ is]]

By Kennedy’s generalization, the behaviors of Japanese comparatives can be regarded as phrasal comparatives that are widely observed cross-linguistically. In fact, many languages have a morphological distinction between phrasal and clausal comparatives. The following examples are cited from Hankamer (1973) and Kennedy (2005). The phrasal construction in (87)a employs the preposition *od* and the clausal construction (87)b *nego*. The standard in (88)a is a simple DP, whereas there is an underlying sentence for (88)b.

⁹ It should be noted that some recent works such as Lechner (2004) and Bhatt and Takanashi (2007) argue that the direct analysis is not applicable to English.

(87) Serbo-Croatian

a. On je viši od mene

‘He is taller than me.’

b. On je viši nego ja.

‘He is taller than I.’

(Hankamer 1973:184)

(88) Latin

a. Cato Ciceron-e eloquentior est.

Cato Cicero-abl more-eloquent is

‘Cato is more eloquent than Cicero.’ (fixed case)

b. Cato est eloquentior quam Cicero.

Cato is more-eloquent than Cicero-nom

‘Cato is more eloquent than Cicero.’ (derived case) (Kennedy 2005:17)

Now, we have an alternative parametric view of how to capture variations of comparatives across languages.

(89) The Standard Type Parameter

Languages may differ in whether the comparative morphology selects a standard of type *d* (degree comparison) or type *e* (individual comparison).

Kennedy assumes two types of comparative morphemes, namely MORE_I (individual) and MORE_D (degree) comparatives morphemes following Heim (1985) and Kennedy (1999). Japanese has only MORE_I , and a standard degree is derived by applying the degree predicate g to the standard argument y . English has MORE_D as well, which takes a degree argument.

(90) a. Individual comparison

$$[[\text{MORE}_I]] = \lambda g \lambda y \lambda x. g(x) > g(y)$$

b. Degree comparison

$$[[\text{MORE}_D]] = \lambda g \lambda d \lambda x. g(x) > d$$

Crucially, this proposal takes a different position from that of Beck et al. Unlike Beck et al., Kennedy assumes that Japanese comparatives are not implicit but rather explicit; thus, they are compositionally made. We will review this issue in the next subsection in 1.6.2.

The standard type parameter is another way of stating that a *yorimo* clause takes an individual. The difference between Kennedy and Beck et al. lies wherein they seek the source of the lack of sets of degrees in the complement of a *yorimo* clause. Beck et al. consider it as a consequence of the negative setting of the DAP in Japanese, while Kennedy directly attributes it to the type of standard of comparison allowed in Japanese.

The assumption of the standard type parameter covers the behaviors of *yorimo* clauses. For instance, the negative island effect is not expected in Japanese, since the standard is individual denoting and has the semantics of a relative clause. This can be confirmed in the phrasal comparatives of the English translation.

- (91) John-wa [dare-mo kawa-naka-tta no yori(mo)] takai hon-o
 John-top [anyone buy-neg-past NO “than”] expensive book-acc
 katta.
 bought

‘John bought a book that is more expensive than the book that nobody bought.’

Kennedy also points out that variation in acceptability is also confirmed with relevant phrasal comparatives in English. (92)a with the free relative is not ungrammatical, but slightly less acceptable than perfect and reflects the marginal status of (93)a in Japanese. On the other hand, (92)b and a corresponding example in Japanese (93)b are well-formed¹⁰.

- (92) a. ?Taroo bought an umbrella longer than what Hanako bought.

b. Taro bought an umbrella more expensive than what Hanako bought.

(Kennedy 1995:19)

- (93) a. ?? Taroo-wa [Hanako-ga katta yori(mo)] nagai kasa-o
 Taroo-top [Hanako-nom bought “than”] long umbrella-acc
 katta.
 bought

¹⁰ Note that Kennedy postposed the adjective to avoid interference from presuppositional effects generated by the *Aer N* order.

(i) ??John is a taller man than Mary.

(ii) John is a man taller than Mary.

(Kennedy 2005:19)

‘Taroo bought a longer umbrella than Hanako did’

b. Taroo-wa [Hanako-ga katta yori(mo)] takai kasa-o
 Taroo-top [Hanako-nom bought “than”] expensive umbrella-acc
 katta.
 bought.

‘Taro bought a more expensive umbrella than Hanako did.’

The problem of (92)a and (93)a is that the set of *x* such that Hanako bought *x* can be a set of plural items Hanako bought (unless specified as a singular item). The plural objects cannot be mapped onto a length, since a length is a property of a singular item

(94) $\lambda x.\text{long}(x) > \text{long}(\max(\lambda x. \text{Hanako bought } x))$ (Kennedy 2005:19)

With regard to subcomparative structures, they necessarily involve degree abstraction. Thus, they are not expected to be well-formed because the complement of *yori(mo)* can only be type *e*.

Therefore, the central issue is whether Japanese comparisons are made contextually and compositionally. There are at least two problems of the compositional analysis with the standard type parameter. First, the standard type parameter does not cover the behaviors of matrix clauses. Thus it does not deny degree movement in matrix clauses. This would bring some unwelcome consequences. First, it does not account for the lack of wide scope reading of comparative morpheme over modals in Japanese we observed in

(56) and (58). It would even wrongly predict a wide scope of MORE_J over the modal¹¹.

To see the point, let us first consider a phrasal comparative sentence. With the degree movement of “more than MP,” it would give the following LF structure.

- (95) a. (Motto) takusanno gakusiga [MP yori(mo)] LGB-o yonda.
 (“more”) many student [MP “than”] LGB-acc read
 ‘More student read LBG than MP.’
 b. [LGB [MORE_J than MP] [2 [1 [t₂-many student read t₁]]]]

Once this is possible, nothing would prevent (56), repeated below, which is considered a phrasal comparatives under Kennedy’s analysis, to have wider scope of MORE_J over the matrix modal.

- (96) a. (Sono sitagaki-wa 10 peeji desu.)
 (that draft-top 10 page copula)
 Sono ronbun-wa sore yori(mo) tyoodo 5 peeji
 that paper-top that ”than” exactly 5 pages
 nagaku-nakerebanaranai.
 long-be_required (Beck et al. 2004:331)
 “The paper is required to be exactly 5 pages longer than that.”
 b. [the paper [MORE_J than that] [2 [1 [t₂ is required to be t₁ long]]]]

¹¹ This is pointed out by Sigrid Beck (p.c.).

This would predict the wider scope of MORE_J over modal “be required.” However, such reading is not obtained as we have seen earlier.

The second problem is a set of data that suggests involvement of pragmatic comparisons in Japanese. The next subsection offers the relevant data.

1.6.2 Explicit vs. Implicit comparison

Summarizing the discussion thus far, Beck et al. and Kennedy agree that the complement of a *yorimo* clause is a set of individuals. However, they adopt different positions as to how Japanese comparisons are made. Kennedy argues for compositional comparisons, whereas Beck et al. argue for contextual comparisons.

A question arises with regard to what type of data distinguishes between the two assumptions. I will present three types of data below that favor Beck et al.’s contextual approach, and I will pursue this approach throughout the dissertation. The three types of data are as follows: (1) highly context-dependent comparison, (2) multihead comparatives, and (3) comparative conditionals with bare nouns.

The first type of data is related to comparisons whose interpretations are highly context-dependent. To examine this, let us consider the case of contextual comparison in English. The following is cited from Beck et al.’s (2004) footnote 6. (97) in Japanese as well as its English paraphrase (98)a permit reading (98)c other than (98)b.

(97)	Watashi-no	musuko-wa	[watashi yorimo]	se-ga	takai.
	I-nom	son-top	I	“than”	height-nom tall

‘My son is taller than me.’

- (98) a. Compared to me, my son is tall.
 b. My son’s height exceeds my height.
 c. My son is taller than I was at his age.

As implied in the above English sentence, the corresponding Japanese comparative sentence also permits the reading in (98)c. Thus, the sentence is true even if the son’s height is actually shorter than mine. This is not predicted under the explicit comparative approach in (90)a, where the standard value is compositionally calculated using the identical predicate for both the matrix and the standard degree.

Let us consider another example in (99)¹² where there is a sale at a clothing store, and a coat is now available for \$250 and a dress for \$130. Mathematically speaking, the coat is still more expensive than the dress despite the discount. However, the Japanese sentence is still judged as true. The sentence is understood as “buying the coat gives you a better deal than buying the dress.” This is never expected under an explicit comparison. Obviously, context-depending comparison plays a crucial role.

- (99) (Women’s clothing is on sale. A \$500 coat is now available for \$250, and a \$150 dress is now available \$130.)

¹² I thank Sveta Krasikova (p.c.) for bringing a similar example to my attention. Although this example shows a unique aspect of Japanese comparisons, it somewhat resembles comparisons of deviation discussed in Kennedy (1997): The sentence is concerned with how much cheaper the items are than regular prices. It remains to be seen whether or not Japanese has comparisons of deviation.

Kooto-wa [doresu yori(mo)] yasui.

coat-top dress “than” cheap

“The coat is cheaper than the dress.”

As for the second and the third type of data, I will attempt to show the gist of them below. They will be discussed in further detail in the following chapters. The second type of data comprises multihead comparatives, which will be discussed in detail in Chapter 2. In a nutshell, Hendriks (1992) argues using Dutch examples that multihead comparatives are possible only when they involve “discourse comparisons” (i.e., contextual comparisons in our term). She further argues that sentence-internal multihead comparatives (i.e., compositionally made multihead comparatives) will not be semantically well-formed. In fact, judgments on the example by von Stechow in (101) are quite controversial, and many native speakers do not accept the sentence.

Multihead discourse comparative

(100) John maakte **meer** mensen **mooier** dan ik dacht

John made **more** people **prettier** than I thought

dat hij zou doen.

that he would do

(Hendriks 1992:110)

‘John made more people prettier than I thought that he would do.’

Multihead sentence-internal comparative

(101) More dogs ate more rats than cats ate mice.

(von Stechow 1984)

In contrast, the equivalent of (101) is fairly well-formed in Japanese. This is straightforwardly explained when we consider Japanese comparisons as contextual comparisons. Multihead comparatives will be discussed in Chapter 2. Multihead wh-exclamatives such as (103) in Japanese are also well-formed for similar reasons. Multihead comparatives will be discussed in Chapter 4.

Multihead comparative in Japanese

- (102) [Neko-ga hatukanezumi-o tabeta yori(mo)], (motto) takusn-no inu-ga
 cat-nom. mouse-acc. ate than (“more”) many-gen. dog-nom.
 t_i (motto) takusan-no dobunezumi-o tabeta.
 (more) many-gen. rat-acc. ate
 ‘More dogs ate more rats than cats ate mice.’

Multihead wh-exclamative in Japanese

- (103) [Nan-TE mazusii gakusee]-ga [nan-TE takai kuruma]-o
 what-TE poor student-nom what-TE expensive car-acc
 katta-nodeshoo !
 bought-EXC
 ‘*What a poor student bought what an expensive car!’

The third type of data comes from comparative conditionals, which will be discussed in detail in Chapter 3. The construction corresponds to *the more ... the more...*

construction in English. The interpretation of the sentence can be paraphrased into a conditional sentence with two comparatives.

Comparative conditional in Japanese

(104) Dokusaitekina hodo, riidaa-wa (motto) kodokuda.

dictatorial CC leader-top (“more”) lonely

‘The more a leader is dictatorial, the lonelier he is.’

(105) If a leader x is more dictatorial than a leader y, x is lonelier than y.

Interestingly, Japanese further allows comparative conditionals with bare nouns. The interpretations of (104) and (106) are intuitively the same in relevant respects. What is amazing in (106) is that the bare noun *dokusaisya* (dictator) somehow induces the comparative interpretation of “the more dictatorial a person is” without having any syntactic adjective. This is never possible in English, where comparatives require explicit degree arguments as a subject of movement. Examples such as (106) suggest that comparative conditionals in Japanese are much less governed by syntactic operations, and their semantics are somewhat pragmatically made.

Comparative conditionals with bare nouns in Japanese

(106)_[DP Dokusaisya] hodo (motto) kodokuda.

dictator CC (“more”) lonely

‘The more a person is dictatorial, the lonelier he is.’

The three types of data given above are difficult to explain using rigid compositional calculations. They are better analyzed by using the contextual analysis, where comparisons are less compositional and rely more on pragmatics strategies.

7. Summary of Chapter 1

In this chapter, I presented the issue of cross-linguistic variations of comparatives, and provided an overview of the dissertation. Although comparatives have received considerable attention in the field of semantics, previous research has revealed very little on cross-linguistic variations of comparatives in natural languages. In this dissertation, I will focus on the Japanese language and attempt to reveal a comprehensive mechanism of degree constructions that is different from what has been proposed for English and related languages.

First, I reviewed previous analyses of Japanese comparatives by Beck et al. (2004) and Kennedy (2005). They both acknowledge the unique behaviors of Japanese comparatives that are not accounted for by the standard analysis of comparatives such as von Stechow (1984). However, they adopt different approaches. Beck et al. assume that Japanese comparatives are a product of pragmatic comparisons, where standard degrees are pragmatically provided. On the other hand, Kennedy assumes that Japanese comparatives are still considered as explicit comparison, and standard degrees are compositionally derived.

At the end of the chapter, I have presented three types of data that favor the contextual approach, and I will pursue the contextual approach throughout the dissertation. More specifically, I will attempt to account for Japanese data by what we refer to as the lexical analysis, under which Japanese degree adjectives already have comparative semantics in their lexical entries that make comparisons with a contextually given degree. The assumption must be tested in a wider range of data that includes comparatives and comparative-based degree constructions, and this is what I aim to achieve in the following chapters.

Chapter 2 Semantics of Japanese Adjectives and Comparatives

In this chapter, I will pursue the line of contextual analysis of Japanese comparatives proposed by Beck et al. (2004). In doing so, I will present what I call “the lexical analysis,” which is a central proposal of this dissertation. The lexical analysis assumes that a larger-than-relationship of comparison in Japanese is made by gradable adjectives (not by comparative operators) that already have comparative semantics in their lexical entries. Many of the behaviours of Japanese comparatives observed in Chapter 1 follow from this assumption.

The organization of this chapter is as follows. I will first present the lexical analyses and provide compositional calculations of Japanese comparatives under the analysis. Beck et al.’s assumption of *yorimo* as a context setter as well as the negative setting of the DAP will be carried over to the new framework, and I will present additional data to support their analysis. More specifically, I will discuss *yorimo* clauses (*than* clauses) with overt measure phrases, and absence of NPIs in *yorimo* clauses, which support *yorimo* clauses as sets of individuals. *Yorimo* comparatives with bare nouns showcase the contextual nature of Japanese comparatives. I will further discuss multiheaded comparatives and comparisons with multiple *yorimo* clauses that are unique to Japanese.

2.1 Japanese Adjectives

One important issue left open in Beck et al. (2004) is how exactly comparisons are

made in Japanese. I will propose that the semantics of comparatives is already built in the lexical entries of Japanese adjectives. In other words, Japanese adjectives are comparatives per se. I will call the analysis “the lexical analysis.” Although this approach was originally mentioned by Beck et al., it was not pursued in their paper.

Lexical Analysis of Japanese comparatives

- (1) a. $[[takai]] = \lambda d'. \lambda x. \max(\lambda d. \text{tall}(d)(x)) = c + d'$
 b. $[[takai]] = \lambda x. \max(\lambda d. \text{tall}(d)(x)) > c$ (Beck et al. 2004:342)

In this section, I would like to reclaim this analysis with an additional observation, namely, the lack of a significant class of non-gradable adjectives in Japanese.

The lexical analysis raises a question about how we should deal with the DAP, since the lexical analysis predicts a range of data in Japanese that bears a close resemblance to the data predicted by the negative setting of the DAP.

- (2) Degree Abstraction Parameter (DAP) (Beck et al. 2004:325):

A language {does/does not} have binding of degree variables in the syntax.

Any degree movement in Japanese would be ruled out by the negative setting of the parameter. Turning to the lexical analysis in (1), the direct degrees are bound inside the adjective; thus, they cannot undergo movement. Therefore, both assumptions rule out the movement of direct degrees for different reasons.

I will argue that we need to maintain the DAP in addition to the lexical analysis in

order to account for Japanese data. The main evidence arises from the behaviours of differential degrees, whose movements are ruled out only by -DAP.

2.1.1 Three Possibilities

How exactly are comparisons made in Japanese? As shown in Chapter 1, Japanese does not have any morphologically realized comparative morpheme like *-er* in English. Even *motto*, which seems to be the best candidate for *-er*, does not seem to qualify as an equivalent of *-er*. It is an optional item, and the presence or absence of *motto* does not affect the truth conditional interpretation of its host sentences.

There are three possibilities suggested by Beck et al: (1) Japanese adjectives are positive; (2) Japanese has an invisible comparative morpheme that does not undergo movement; and (3) Japanese adjectives are comparatives per se—a possibility we refer to as the lexical analysis. I find the third approach rather promising; however, let us first consider each option.

First of all, it is highly unlikely that Japanese adjectives are the positive. Two pieces of evidence from Kennedy (2005) will be helpful to see the point. The first one involves “crisp judgments.” In the positive, the standard of comparison must exceed the matrix degree by “significant degree.” This is why crisp judgments cannot be made with positive sentences when the difference between two degrees is very subtle.

(3) *Comparative*

Context: A 600 word essay and a 200 word essay

- a. This essay is longer than that one.
- b. Compared to that essay, this one is long.

(4) *Positive*

Context: A 600 word essay and a 590 word essay

- a. This essay is longer than that one.
- b. ??Compared to that essay, this one is long.

(Kennedy 2005:11)

Contrary to the case above, we have a crisp judgment on the Japanese equivalent. This implies that it is not an instance of positive.

(5) Context: A 600 word essay and a 590 word essay

Kono peepaa-wa ano peepaa yori nagai.

this paper-top that paper “than” long

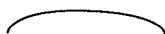
‘This paper is longer than that one.’

(Kennedy 2005:12)

Another piece of evidence comes from data with absolute gradable adjectives. Standards of absolute gradable adjectives in positive forms such as *wet*, *open*, *bent*, *dry*, *closed*, or *straight* are not context-dependent. They are rather fixed to endpoints of relevant scales. Thus, manipulating context setters has no use¹.

¹ It is worth noting the fact that many of the equivalents of the absolute gradable adjectives listed here are not adjectives in Japanese. The Japanese equivalents of *wet*, *bent*, *dry* are derived from verbs, and the one of *straight* is classified as a verbal adjective. As for *open* and *closed*, see 2.1.2. (The subscript *v* indicates “verb.”)

(6) Rod A:



Rod B:



- (7) a. B is more bent than A.
b. ??Compared to A, B is bent.

The Japanese example given below is well-formed. Thus it is different from the positive

(7)b.

- (8) Ano sao-wa kono sao yori motto magat-teiru.

that rod-top this rod “than” “more” bent-be

‘That rod is more bent than this rod.’

(Kennedy 2005:13)

Given the above discussions, Japanese adjectives are unlikely to be positive.

The second option would be to assume the phonetically null comparative operator

- (i) nure_v-teiru
get_wet-TEIRU
‘wet’
- (ii) magat_v-teiru
bend-TEIRU
‘bent’
- (iii) kawai_v-teiru
dry-TEIRU
‘dry’
- (iv) massuguna_{verbal adjective}
‘straight’

Kuno (1973) states that the bound morpheme TEIRU expresses the meaning of “to be in the state of.” The use of verb-based expression in Japanese may support our analysis: Japanese adjectives make contextual comparison, thus their interpretations must be always context-dependent.

$-er_J$ in Japanese that does not undergo degree movement. This is what Beck et al. tentatively assumed at the end of their paper. Under the analysis, the null comparative operator $-er_J$ directly combines with an adjective

$$(9) \quad [[-er_J]] = \lambda P. \lambda x. \max(\lambda d. P(d)(x)) > c$$

(where P is of type $\langle d, \langle e, t \rangle \rangle$, an adjective meaning) (Beck et al. 2004:329)

- (10) Taroo-wa [Hanako-ga katta yori(mo)] $[[[-er_J(c)]takai]$ kasa-o katta.
 Taroo-top Hanako-nom bought “than” expensive umbrella-acc bought
 ‘Compared to what Hanako bought, Toro bought an expensive umbrella.’

$$(11) \quad [[takai]] = \lambda d. \lambda x. x \text{ is } d\text{-expensive}$$

$$[[[-er_J(c)]takai]] = \lambda x. \max(\lambda d. \text{expensive}(d)(x)) > c$$

$$[[[-er_J(c)]takai kasa]] = \lambda x. \text{umbrella}(x) \wedge \max(\lambda d. \text{expensive}(d)(x)) > c$$

$$[[[\text{Taro-wa } -er_J(c) takai kasa-o katta]]] = 1 \text{ iff}$$

$$\exists x. \text{umbrella}(x) \wedge \max(\lambda d. \text{expensive}(d)(x)) > c \wedge \text{bought}(x)(T)$$

(where c is the contextual standard i.e., the price of Hanako’s umbrella.)

A potential problem of this analysis is the fact that measure phrases in Japanese are always understood as differential degrees. The following example in Japanese cannot mean that the shelf is 2cm tall. (That would be too small to put any book.) It rather means that the shelf is 2cm taller than something, for instance, another shelf. This is not expected under the analysis, which assumes that a gradable adjective is type $\langle d, \langle e, t \rangle \rangle$.

Takai (takai) would denote $\lambda d \lambda x. \text{tall}(d)(x)$, and nothing seems to prevent the sentence (12) to mean “the shelf is 2cm tall.”

(12) Kono tana-wa 2 cm takai.

This shelf-top 2 cm tall

‘This shelf is taller by 2 cm.’

I will point out another potential problem of this analysis at the end of 2.1.2.

The third option is what we call the lexical analysis, which Beck et al. mentioned in their footnote: Japanese adjectives are neither like English positives nor English comparatives. Instead, comparative semantics is built into the lexical entries of adjectives. Let us consider an example of *takai* (tall). Its direct degree is bound inside. The difference degree can be alternatively bound by a lambda operator as in (13)b.

(13) a. $[[\textit{takai}]] = \lambda x. \max(\lambda d. \text{tall}(d)(x)) > c$

b. $[[\textit{takai}]] = \lambda d' \lambda x. \max(\lambda d. \text{tall}(d)(x)) = c + d'$ (Beck et al. 2004:342)

Under this assumption, the direct degree d cannot undergo movement. Therefore, it predicts almost the same range of data as the negative setting of the DAP and provides an alternative explanation of why there is no degree movement in Japanese comparatives.

There are many advantages of assuming the lexical analysis. The abovementioned Japanese differential comparative is straightforwardly accounted for by plugging a differential degree into the position of d' in (13)a, as shown below.

$$(14) \quad [[takai]] = \lambda d' \lambda x. \max(\lambda d. \text{tall}(d)(x)) = c + d'$$

$$[[2cm\ takai]] = \lambda x. \max(\lambda d. \text{tall}(d)(x)) = c + 2\ cm$$

$$[[kono\ tana-wa\ 2cm\ takai]] = 1 \text{ iff } \max(\lambda d. \text{tall}(d)(\text{this_shelf})) = c + 2\ cm$$

The value of the standard degree c is contextually provided, and the height of the shelf itself does not appear overtly because it is bound within the lexical entries of *takai* (tall).

Degree questions also show that the lexical analysis works well. Japanese does not have an equivalent of *how long*. (See footnote 2.) Among several options of how to ask for a length, the most straightforward way would be to say *what cm* as shown below.

(15) Kono bou-wa nan senti nagai no?

this stick-top what cm long Q

Lit. 'This stick is what cm long?'

The question can ask only for a differential length. Suppose you are taking a flight with a 1.2m stick. However, no item that is more than 1 m in length is allowed on board. In other words, your stick is 0.2 m longer than the permitted length. In this situation, only (16)b is the legitimate answer to the question in (15).

(16) a. 1.2m desu.

1.2m copula

'It is 1.2 m.'

b. 0.2m desu.

0.2m copula

‘It is 0.2 cm.’

If we want to ask for how long the stick itself is, we need to avoid using the adjective and adopt other options. Some of them are listed below.

(17) a. Kono bou-wa nan senti desu ka?

this stick-top what cm copula Q

Lit. ‘What centimetre is this stick?’

b. Kono bou-no nagasa-wa dore-kurai desu ka?

this stick-gen length-top which-degree copula Q?

Lit. ‘Which degree is the length of this stick?’

Having seen the above two cases of overtly filled degree elements, it is reasonable to conclude that the degree argument positions of Japanese adjectives are the ones for differential degrees.

Many other behaviors of Japanese comparatives follow from (13). It explains why Japanese does not have any comparative operator: The insertion of a comparative operator in syntax would be redundant when comparative semantics is already introduced in the lexical entry of adjectives. If there is no element that would corresponds to *-er*, we

would not expect Japanese to have *less* either, and this is in fact the case. The lack of scope interaction also naturally follows if there is no comparative operator. To begin with, the direct degree is bound inside the adjectives; thus no operator would occupy the direct degree positions. Thus we expect that Japanese does not have degree constructions such as equatives, degree questions, and *so..that...*, whose operators apply to the direct degree positions. This is in fact observed by Beck et al.².

The lexical analysis looks promising so far. The next subsection provides additional evidence for Japanese adjectives that are comparative per se.

² Listed below are examples from Beck et al. (2004). (They are also given in footnote 7 in Chapter 1.) Equatives, degree questions, and *so that* constructions in Japanese adopt completely different structures from those of English.

Equatives:

- (i) John is as clever as Mary is.
 (ii) John-wa Mary to onaji kurai kasikoi.
 John-top Mary with same degree smart
 “John and Mary are smart to the same degree.”

Degree questions:

- (iii) How smart is John?
 (iv) John-wa dore-kurai kasikoi no?
 John-top which-degree smart Q
 “To which degree is John smart?”

So..that...:

- (v) John bought too big a book to carry.
 (vi) John-wa hakob-e-nai hodo ookina hon-o katta.
 John-top carry-can-neg degree big book-acc bought
 ‘John bought a book so big that he cannot carry it.’

An exceptional case would be superlatives. Aihara (2006) claims that *ichiban* (most), the literal translation of which is ‘number one’, is a superlative operator in Japanese. I will briefly discuss superlatives in Chapter 5.

- (vii) John-ga ichiban takai yama-ni nobotta.
 John-nom most high mountain-to climbed
 “John climbed the highest mountain.”

2.1.2 Lack of Non-gradable Adjectives in Japanese

There exists a striking fact that is little known: Japanese does not seem to have a significant class of non-gradable adjectives. If that is indeed the case, it is explained by assuming that lexical entries shown in (13) are the only format of adjectives in Japanese. In other words, Japanese adjectives are already graded at the level of lexical entry, and thus, there is no room for them to denote a non-gradable status. Given below is a discussion from Oda (2004b).

Normally, adjectives can be categorized as gradable or non-gradable, depending on their gradability. A good way to test the gradability of adjectives in English, for instance, is to modify them with *very*. Non-gradable adjectives do not have any scale of degree in their meanings. Thus, they cannot be modified with *very*. Consider the examples of non-gradable adjectives in English given below. The subscript “A” stands for the category of adjective.

- (18) a. open_A / closed_A (*very open / *very closed)
 b. alive_A / dead_A (*very alive / *very dead)
 c. single_A / married_A (*very single / *very married)

However, when we examine Japanese equivalents, we soon notice that non-gradable adjectives are rarely found in Japanese. All non-gradable states expressed by the non-gradable adjectives in English in (18) turn out to be expressed either by verbs or nouns in Japanese, as shown in (19). The subscripts “V” and “N” stand for verb and noun,

respectively.

(19) a. ai-teiru/simat-teiru

open_V-TEIRU³ / close_V-TEIRU

“open”/“closed”

b. iki-teiru/sin-deiru

live_V-TEIRU / die_V-TEIRU

“alive” / “dead”

c. dokusin-da/kekkon-si-teiru

single_N-copula/marriage_N-do_V-TEIRU

“single” / “married”

In order to confirm their non-gradable status, let us modify sin_V-deiru (dead) with *motto* (more), *totemo* (very), *sugoku* (extremely), and *sugiru* (too).

(20) *motto sin_V-deiru / *totemo sin_V-deiru / *sugoku sin_V-deiru / *sin_V-dei-sugiru

As far as I know, there seem to be only a handful of exceptional non-gradable adjectives in Japanese as shown below.

(21) a. *onaji*_A (same) (*motto *onaji* / *totemo *onaji* / *sugoku *onaji* / **onaji*-sugiru)

³ Kuno (1973) states that the bound morpheme TEIRU expresses the following meaning: “to be in the state of.” A similar verb-ending morpheme TEARU, which implies an agent of a verb, seems to play the same role.

- b. *nai*_A (no) (?*motto nai*/**totemo nai*/**sugoku nai*?*na-sa-sugiru*)

Moreover, it is even doubtful that they are normal non-gradable adjectives. The behaviour of *onaji* (same) is somewhat different from that of regular verbal adjectives. As shown in the following example, the adnominal form of *onaji* (same) is *onaji* itself. This is somewhat irregular. If it followed the regular pattern of verbal adjectives, the adnominal form would be *onajina*, as in *kireina*, the adnominal form of *kirei* (beautiful). However, (22)a is correct and (22)b is not. Therefore, it is possible that *onaji* (same) is a marked case.

(22) Adnominal form of *onaji* (same):

- a. *onaji hon* (the same book)
- b. **onajina hon* (the same book)
- cf. *kireina hon* (beautiful book)

As for *nai* (no), it is somewhat gradable, as shown in ?*motto nai* (less) ?*na-sa-sugiru* (too little).

The lack of a significant class of non-gradable adjectives is explained if we assume the lexical analysis for all Japanese adjectives. In other words, all Japanese adjectives are graded in their lexical entries.

(23) Japanese adjectives: (*A* is an arbitrary adjective.)

- a. $[[A]] = \lambda x. \max(\lambda d. A(d)(x)) > c$

$$b. [[A]] = \lambda d' \lambda x. \max(\lambda d. A(d)(x)) = c + d'$$

If this is the only option, there is no room for Japanese to have non-gradable adjectives such as “dead”: It simply does not fit the format.

The lack of a significant class of non-gradable adjectives seems to favour the lexical analysis over the assumption of the invisible comparative morpheme as seen in (9). If one would like to assume the invisible comparative morpheme $-er_J$, he/she needs to answer at least two questions. One is why Japanese does not have a significant class of non-gradable adjectives. Another is why Japanese adjectives take differential degrees but not direct degrees as their arguments. These are difficult questions to answer if one assumes $-er_J$. In contrast, the lexical analysis provides straightforward answers to these questions.

The lexical analysis and its relation to the lack of non-gradable adjectives implies that there can be a parameter on what type of format is allowed for adjectives in a language. In other words, there are at least two options of gradable adjectives to choose from, namely, the English type or the Japanese type⁴.

(24) Possible parameter of gradable adjectives: (A is an arbitrary adjective.)

English type: $[[A]] = \lambda d \lambda x. A(d)(x)$

Japanese type: $[[A]] = \lambda d' \lambda x. \max(\lambda d. A(d)(x)) = c + d'$

If this is the case, it will be a source of cross-linguistic variations of comparatives. I will

⁴ Note that (24) does not tell us anything about non-gradable adjectives. Thus the availability of non-gradable adjectives needs to be independently discussed.

attempt to apply the idea to some cross-linguistic data in Chapter 5.

2.1.3 Lexical Analysis vs. Degree Abstraction Parameter

The lexical analysis provides an alternative reason why degree arguments of Japanese adjectives do not undergo movement: They are bound inside the adjectives. Moreover, it covers a range of data that is similar to the data predicted by the negative setting of the DAP.

(25) Degree Abstraction Parameter (DAP) (Beck et al. 2004b:325):

A language {does/does not} have binding of degree variables in the syntax.

Thus, the question is whether or not it is redundant to assume the DAP in addition to the lexical analysis.

I should consider the matter from two perspectives. One is from the cross-linguistic view and the other is from the Japanese perspective. As for the cross-linguistic perspective, sufficient research has not been conducted until now; thus, it is too early to draw any conclusion. However, it is quite possible that the DAP is relevant in some languages other than Japanese. I will have a brief discussion on Chinese and Korean in Chapter 5 in order to examine these possibilities.

Within Japanese, having both the DAP and the lexical approach sounds theoretically redundant; however, this seems to be a safe option at this moment. There are three minor cases that are not covered by the lexical analysis. They are as follows: (1) scope

interactions between differential degrees and modals, (2) scope interactions between cardinal numbers and modals, and (3) comparisons of differential degrees. Unlike direct degrees of gradable adjectives, differential degrees and cardinal numbers can appear overtly. Consequently, they could be abstracted over by degree movement. However, there seems to be no evidence for the degree movement of those degree arguments. If that is correct, the negative setting of the DAP is the most plausible explanation available.

Let us first consider the case of scope interactions between differential degrees and modals. When the lexical analysis is assumed, nothing seems to prevent them from being abstracted over. Thus we may have representations such as (26), where the differential degree d' of *nagai* (long) is abstracted over. If it is not possible, the negative setting of the DAP should be considered responsible.

$$(26) \quad \max(\lambda d'. \dots \max(\lambda d. \text{nagai}(d)(x)) \ \& \ d = c + d')$$

What can be a concrete sentence for (26)? Consider two scenarios and two sentences. First one: Suppose someone asks you to bring a stick that is exactly 1.2-m long, while you have one that is only 1-m long. Then, someone utters (27), i.e., “This stick must be exactly 0.2 m longer.” This is judged true because it is understood as (28)a, where *nakerebanaranai* (must) takes wide scope over *tyoodo 0.2 m* (exactly 0.2 m). Then, modify the scenario a little to create a second one: Now, someone asks you to bring a stick that is at least 1.2 m in length in order to reach out for something, and you only have a 1-m long stick. In this case, (27) sounds odd because the sentence implies something stronger than what is intended by the scenario. According to the scenario, a 1.2-m stick

would be good, but a longer one should be acceptable as well. However, the sentence implies that a 1.2-m stick is the only one allowed, and it does not allow any longer one. This implies that the reading in (28)b is missing, where the degree takes wide scope over *nakerebanaranai* (must)⁵.

(27) Kono bou-wa tyoodo 0.2m nagaku-nakerebanaranai.

this stick-top exactly 0.2m long-must

‘This stick must be exactly 0.2 m longer.’

(28) a. $\forall w \in \text{Acc. } \max(\lambda d'. \max(\lambda d. \text{long}_w(d)(\text{the_stick})) = c + d') = 0.2 \text{ m}$

(It must be the case that the stick is exactly 1.2 m.)

b. $\max(\lambda d'. \forall w \in \text{Acc. } \max(\lambda d. \text{long}_w(d)(\text{the_stick})) = c + d') = 0.2 \text{ m}$

(The minimum length of the stick is 1.2 m.)

Since (28)b is excluded, it indicates that the differential degree *tyoodo 0.2m* (exactly 0.2m) does not undergo movement. The negative setting of the DAP explains the unambiguous reading⁶.

⁵ The measure phrase *tyoodo 0.2m* (exactly 0.2m) can be scrambled to the sentence initial position. However, it does not affect scope. The wide scope of *tyoodo 0.2m* (exactly 0.2m) is missing in (i) as well.

(i) [Tyoodo 0.2m]_i kono bou-wa t_i nagaku-nakerebanaranai.
 exactly 0.2m this stick-top long-must
 ‘This stick must be exactly 0.2 m longer.’

⁶ The following example with *sukunai* (less) shows the same result. Intuitively, (i) means only (ii)a, where *nakerebanaranai* (must) takes wide scope over *sukunai* (less). The interpretation of (ii)b with the inverse scope order is not available.

(i) John-wa tyoodo ni-satu sukunai hon-o kawa-nakerebanaranai.
 book-top exactly two-CL less book-acc buy-must

Cardinal numbers followed by classifiers that are not followed by any adjective can also be directly filled in. In (29), *satu* is a classifier that is used to count book-like items.

- (29) John-wa hon-o 5-satu yonda.
 John-top book-acc 5-CL read
 ‘John read 5 books.’

I assume the lexical entry of CL in general as follows. Classifiers take two propositions and denote the cardinal number of union of the two propositions.

$$(30) \quad [[CL]] = \lambda d \lambda p_{\langle e, t \rangle} \lambda q_{\langle e, t \rangle}. |\lambda x. p(x) \wedge q(x)| = d$$

Now consider (31), which contains the quantifier *tyodo 5-satu* (exactly 5 volumes) and the modal *nakerebanaranai* (must). Sentence (31) has only one reading, (32)a, where *nakerebanaranai* (must) takes wide scope over *5 satu* (5 volumes). The absence of (32)b can be attributed to the negative setting of the DAP in Japanese⁷.

‘John must buy exactly two less books.’

- (ii) a. $\forall w \in \text{Acc. } \max(|\lambda x. \text{book}(x) \wedge \text{buy}_w(x)(J)| = c-d') = 2$
 (It must be the case that John buys 2 less books.)
 b. $\max(\lambda d'. \forall w \in \text{Acc. } |\lambda x. \text{book}(x) \wedge \text{buy}_w(x)(J)| = c-d') = 2$
 (The minimum number of books that John needs to buy less is 2.)

⁷ Scrambling of *tyodo 5 satu* (exactly 5 volumes) to the sentence initial position does not affect the interpretation. (i) is unambiguous and has only the reading of (32)a.

- (i) Tyodo 5-satu John-wa hon-o yoma-nakerebanaranai.
 exactly 5-CL John-top book-acc read-must
 ‘John must read exactly 5 books.’

- (31) John-wa hon-o tyoodo 5-satu yoma-nakerebanaranai.
 John-top book-acc exactly 5-CL read-must
 ‘John must read exactly 5 books.’

- (32) a. $\forall w \in \text{Acc. } |\lambda x. \text{book}(x) \wedge \text{read}_w(x)(\text{John})| = 5$
 (It must be the case that John reads exactly 5 books.)
 b. $|\lambda x. \text{book}(x) \wedge \forall w \in \text{Acc. } \text{read}_w(x)(\text{John})| = 5$
 (The minimum number of books John must read is 5.)

Another case to be considered is a comparison of differential degrees. If there was a comparative morpheme that applied to differential degrees, it would enable a comparison of differential degrees. This is shown in the schema below. A possible comparative operator is (33), which takes a set of differential degrees and maps to a larger-than relation. The matrix degree is derived by abstracting over the differential degree d' . The standard degree c' comes from the context, for which a *yori(mo)* clause sets a context.

- (33) $[[\text{ER}_{\text{differential}}]] = \lambda D_{\langle d, t \rangle}. \max(D) > c'$

With an arbitrary adjective A , the truth conditions of a differential comparison would be as follows. The comparative morpheme makes a comparison between the maximal differential degree in the matrix clause and a contextually given differential degree.

$$(34) \max(\lambda d'. \max(\lambda d. A(d)(x)) = c + d') > c'$$

c = contextually given standard degree

c' = contextually given differential degree

However, when applied to concrete examples, it turns out that sentences with such interpretations are not possible. Given below is a scenario, where two differential degrees are compared. Imagine that John and Mary have been visiting a doctor. The doctor has given them a prescription and told them that they are allowed to consume up to 5 tablets a day, but not more than that. However, John and Mary are excessively concerned about their conditions and consumed more tablets. To be more precise, John took 10 tablets a day and Mary consumed 8. In other words, John took 5 tablets more and Mary consumed 3 more than they were told to.

- (35) Scenario: A doctor says that people are allowed to consume up to 5 tablets a day. However, John consumed 10 and Mary consumed 8. (John consumed 5 + 5 tablets; Mary consumed 5 + 3 tablets, and 5 is larger than 3.)

In order to compose a comparison of differentials, we need to construct a sentence with a matrix clause that denotes the excessive amount of tablets that John consumed and a *yori(mo)* clause that denotes a set of individuals from which we infer the excessive amount of tablets that Mary consumed.

We will start by creating a *yori(mo)* clause. To begin with, we should be able to have a set of individuals that denotes the excessive amount of medicine Mary consumed.

In the following sentence, the noun phrase with a head noun *ryou* (amount) denotes the excessive amount of medicine Mary consumed (namely, three doses).

- (36) [Mary-ga [sijis-are-ta yori(mo)] takusan nonda **ryou**]-wa
 [Mary-nom [instruct-passive-past “than”] much took **amount**]-top
 san jyou desu.
 three tablet copula

‘The amount that Mary took that exceeds the instruction is 3 tablets.’

For some reason, the relative clause must have the head noun *ryou* (amount) in order to denote the excessive doses. When the head noun is replaced with the nominalizer *no*, the noun phrase seems to denote only the total doses that Mary consumed. The following sentence is minimally different from (36) in that the head of the relative clause is *no*. The noun phrase denotes the direct degree, i.e., the total number of tablets that Mary consumed. (The sentence is false under the scenario.)

- (37) [Mary-ga [sijis-are-ta yori(mo)] takusan nonda **no**]-wa
 [Mary-nom [instruct-passive-past “than”] much took **NO**]-top
 san jyou desu.
 three tablet copula

“The amount that Mary took that exceeds the instruction is 3 tablets.”

Next, let us place the noun phrase in (36) in the complement of *yorimo*. In the

following comparative sentences (38) and (39), the *yorimo* clauses are scrambled to the sentence initial positions in order to make the sentences easier to comprehend. (38) and (39) are slightly different in terms of different word order in their matrix clauses. Note that both sentences end up having three *yorimo*. One is for a matrix comparison, and the other two are for the subordinate comparisons. Though (38) sounds much better than (39), neither of them sounds quite perfect, probably due to their complex structures and meanings.

- (38) ?[Mary-ga iwareta yorimo) e takusanno nonda ryou yorimo)]
 [Mary-nom told “than” much took amount “than”]
 John-ga takusanno kusuri-o [iwareta yorimo)] nonda.
 John-nom much medicine-acc told “than” took
 Lit. ‘John took more medicine than Mary took more than (she was) told.’

- (39) ?*[Mary-ga iwareta-yorimo) e takusanno nonda ryou yorimo)]
 [Mary-nom told-“than” much took amount “than”]
 John-ga [iwareta yorimo)] takusanno kusuri-o nonda.
 John-nom instructed “than” many medicine-acc took
 Lit. ‘John took more medicine than Mary took more than (she was) told.’

I will not discuss the details of why they are not well-formed. What I am more interested in here is the possible interpretation of (38) (and possibly for (39) as well). If there was an operator such as (33), the sentences would denote a comparison of differentials, which would be as follows.

$$(40) \quad \max(\lambda d'. \mid \lambda x. \text{tablet}(x) \wedge \text{took}(x)(J) \mid = c + d') > c'$$

where, $c := 5$ (the maximum number of tablets allowed)

$c' := 3$ (the excessive number of tablets Mary consumed)

However, native speakers do not understand the sentences in this manner.⁸ The opinions of native speakers vary, but the most common answer is that the sentences result in two comparisons: One between the amount of tablets that John consumed and the amount his doctor instructed him to take, and another between the amount of tablets John consumed and the excessive amount of tablets that Mary consumed.

(41) (Most likely) interpretation of (38):

$$\mid \lambda x. \text{tablet}(x) \wedge \text{took}(x)(J) \mid > c \wedge \mid \lambda x. \text{tablet}(x) \wedge \text{took}(x)(J) \mid > c'$$

where, $c :=$ the maximum number of tablets allowed

$c' :=$ the excessive number of tablets Mary consumed

Importantly, the possible excessive amount of tablets John took than he was instructed is not involved in any of the comparisons. This implies that the abstraction over differential degree is not taking place in the matrix clause. If so, the negative setting of the DAP is

⁸ In order to construct differential comparisons, an additional device is required. The following sentence has an adverbial expression *younni* (excessively) in both the matrix and the *yori(mo)* clause.

(i) John-ga [Mary-ga e **younni** nonda ryou yori(mo)]
 John-nom. [Mary-nom. **excessively** took amount “than”]
 ookuno kusuri-o **younni** nonda.
 many medicine-acc. **excessively** took
 ‘John took more excessive medicine than Mary did.’”

the most plausible reason available.

Given the three cases presented above, I will maintain the DAP as well as the lexical analysis. The lack of degree movement of differential degrees and cardinal numbers is not covered by the lexical analysis. Thus, the negative setting of the DAP is needed independently from the lexical analysis.

2.2 More on Japanese Comparatives

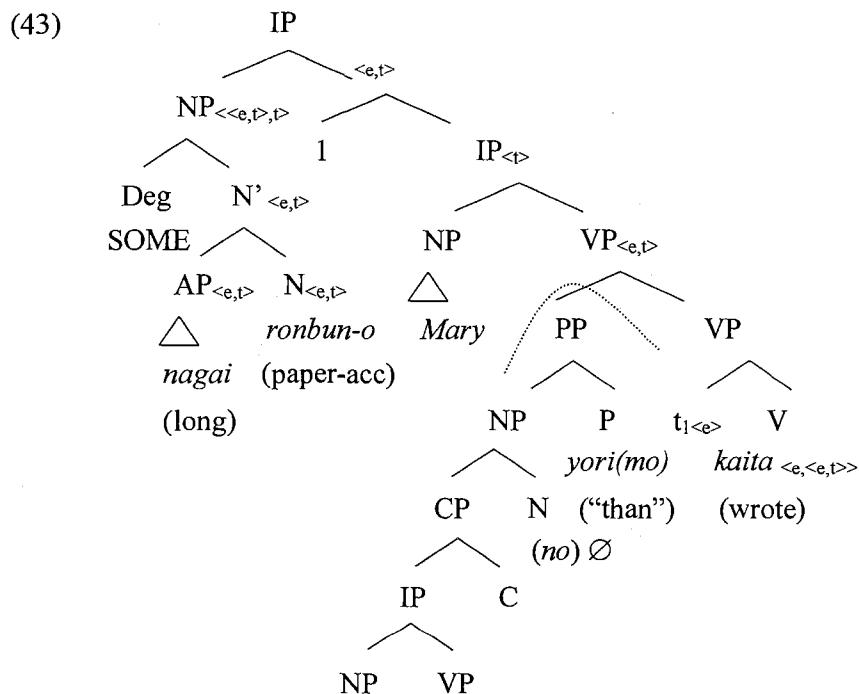
In this section, I will reconsider the data of Beck et al. with the lexical analysis and provide compositional calculations. I will also cover small issues that will be useful in analyzing comparatives and other degree constructions in Japanese. They are as follows: (1) overt cardinal numbers in *yorimo* clauses, (2) absence of negative polarity items (NPIs henceforth) in *yorimo* clauses, and (3) negated adjectives as antonyms.

2.2.1 Returning to Beck et al.'s data

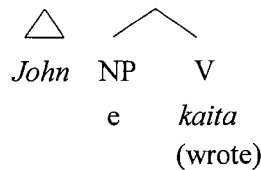
Let us compositionally calculate a prototypical example of Japanese comparatives. Consider an example in (42), its LF representation in (43), and the truth conditions in (44). In the LF structure, I treat the *yorimo* clause simply as an adjunct that adjoins to VP. The *yorimo* clause is, as discussed by Beck et al., excluded from the truth conditional calculation of the matrix clause. (This is indicated by the dotted line.) The object NP undergoes movement because of type mismatch. As for the optional *no*, I

tentatively assume that it is semantically vacuous⁹. Crucially, the lexical entry of *nagai* (long) already carries the meaning of “longer.”

- (42) Mary-wa [John-ga kaita (no) yori(mo)] (motto)
 Mary-top [John-nom wrote (NO) “than”] (“more”)
nagai ronbun-o kaita.
 many-gen paper-acc wrote
 ‘Mary wrote a longer paper than John did.’
 (Compared to what John wrote, Mary wrote a longer paper.)



⁹ *No* may play a role in syntax as the head N. Semantically, it seems to bring some presupposition of singular items. Thus, the best translation of *no* would be “the one” in English. Many times, *no* is simply optional; however, the presence/absence of *no* sometimes affects judgments. See footnote 3 in Chapter 1.



(44) Main clause:

$$[[nagai(long)]] = \lambda x. \max(\lambda d. long(d)(x)) > c$$

$$[[nagai ronbun]] = \lambda x. paper(x) \wedge \max(\lambda d. long(d)(x)) > c$$

$$[[SOME nagai ronbun]] = \lambda q \in D_{\langle e, t \rangle}. \exists x [paper(x) \wedge \max(\lambda d. long(d)(x)) > c \wedge q(x)]$$

$$[[1 IP]] = \lambda x. wrote(x)(M)$$

$$[[IP]] = 1 \text{ iff } \exists x [paper(x) \wedge \max(\lambda d. long(d)(x)) > c \wedge wrote(x)(M)]$$

(where c is the length of the paper John wrote)

Yori(mo) clause:

$$[[IP]] = \lambda x. wrote(x)(J)$$

With the lexical entry of *nagai* (long), which is already a comparative per se, the truth conditions correctly capture the intuition. The comparison is made without assuming degree movement in the matrix clause, as suggested in the observation of Beck et al. The standard degree c is pragmatically provided based on the information in the *yori(mo)* clause.

Crucially, the *yori(mo)* clause is independently calculated, and it is excluded from the truth conditional calculation of the matrix clause¹⁰. This unconventional process may

¹⁰ There are pros and cons of this line of analysis. It will be shown in 2.2.3 that the separation of *yorimo* clauses from the matrix clause accounts for the lack of NPIs in Japanese. Cases such as (i) would be problematic, where a matrix QP binds a variable in

require some clarifications. A couple of conditions that support such exclusion seem to be met. Obviously, the matrix clause must be truth conditionally well formed without the excluded *yorimo* clause. Second, there seems to be some device for linking the interpretation of the excluded phrase to the matrix clause. In the above case of comparatives, the contextually provided standard *c* carries this role: The semantics of *yorimo* clauses are linked to the interpretation of the main clause by providing salient information for the standard degree *c*. Another example of such a linking device would be an index, as in (45). *John* is not part of the truth conditions of the sentence, but it is linked to the matrix clause by being coindexed with *he*.

(45) $John_i$, he_i is a genius.

It was shown that the lexical analysis works well in accounting for basic data of Japanese comparatives. It should be noted that the lexical analysis is still based on the basic assumptions made by Beck et al.: The standard of comparison comes from the context and *yorimo* clauses serve as a context setter. In what follows, I would like to provide more evidence for these assumptions in the following subsections.

its *yorimo* clause. It is not clear how the semantic relation is maintained if the *yorimo* clause is calculated separately from the matrix clause.

- (i) Daremo_i-ga [jibun_i-no hahaoya-ga yonda yori(mo)] takusanno
 everyone-nom self-gen mother-nom read “than” many
 hon-o yonda.
 Book-acc read
 ‘Everyone_i read more books than his_i mother did.’

2.2.2 Overt Degree Arguments

In the following three subsections, I will present additional data that support the framework of Beck et al. The first two are as follows: (1) overt degree arguments in *yorimo* clauses and (2) absence of NPIs in *yorimo* clauses. They both show the absence of degree movements in *yorimo* clauses. The third one concerns comparatives with multiple *yorimo* clauses, which showcases the contextual nature of Japanese comparatives.

Let us begin by considering overt degree arguments in *yorimo* clauses. In the following example, *san-bon* (three-CL) is the number of the books Mary read¹¹. The sentence is grammatical and judged true in scenario (47).

- (46) John-wa [Mary-ga e **san-bon** yonda (no) yorimo] ookuno
 John-top [Mary-nom (paper) **three-CL** read (NO) “than”] many
 ronbun-o yonda. (Oda 2006a)
 papers-acc read

Lit. ‘John read more papers than Mary did **three**.’

¹¹ Note that the host object of *san bon* (three CL), *ronbun* (paper), is *pro* in (46). It is possible to pronounce it overtly as in (i); however, it sounds better with a phonologically null object, probably because an overt object is redundant. It is more common not to have an overt object in a *yorimo* clause where the object is understood from the context.

- (i) John-wa [Mary-ga ronbun-o **san-bon** yonda yorimo] ookuno
 John-top [Mary-nom paper-Acc **three-CL** read “than”] many
 ronbun-o yonda. (Oda 2006a)
 papers-acc read

Lit. ‘John read more papers than Mary did **three**.’

(Compared to the three papers Mary read, John read many papers.)

(Compared to the three papers Mary read, John read many papers.)

(47) Scenario: John read 5 papers, and Mary read 3 papers.

The equivalent English sentence is ungrammatical as in (48), because the degree argument in the *than* clause undergoes movement, and the trace is bound by the degree operator. Thus, the degree argument position cannot be overtly filled.

(48) *John read more papers than Mary did **three**.

(49) a. John read more papers than Mary did.

b. John read more papers than [_{CP} Op [_I [Mary did ~~read t_i many papers~~]]]

c. [[[_I [Mary did ~~read t_i many papers~~]]] = λd. Mary read d-many books

In the case of Japanese, it is no longer surprising that *yori(mo) clauses* allow overt degree arguments. *Yori(mo) clauses* are well formed as long as they denote legitimate sets of individuals. The *yori(mo) clause* with the overt degree is an instance of the Internally Headed Relative Clause (IHRC). In order to see the point, consider the following case, where the IHRC is the object of the verb *matometa* (summarized)¹².

¹² The overt degree can appear in front of the object as well.

(i) Mary-wa [_{NP} [_{IP} (pro) [**san-bon-no** ronbun-o]_i yonda] no_i]-o matometa.
 Mary-top three-CL-gen paper-acc read NO-acc summarized
 ‘Mary summarized the **three** papers she read.’

- (50) Mary-wa [_{NP} [_{IP}(pro) [_{NP} ronbun-o **san-bon**]_i yonda] no_i]-o
 Mary-top paper-acc **three-CL** read NO-acc
 matometa.
 summarized
 ‘Mary summarized the **three** papers she read.’

If we follow the analysis of Beck et al. (2004b), it is predicted that the IHR *ronbun-o san-bon yonda* (the three papers she read) can appear in *yorimo* clauses. This is what we have already seen in (46). The *yorimo* clause denotes “the three books Mary read.”

The semantics of the *yorimo* clauses is given below. It is the set of three books that Mary read. The definite description follows from either a pragmatically provided maximality operator or the optional nominalizer *no*, the translation of which is “the one.”

- (51) *yorimo* clause of (46):

$\max(\lambda x. \text{paper}(x) \wedge \text{three}(x) \wedge \text{read}(x)(M))$

(the set of *x* s.t. *x* are papers; there are three Atoms in *x*, and Mary read *x*)

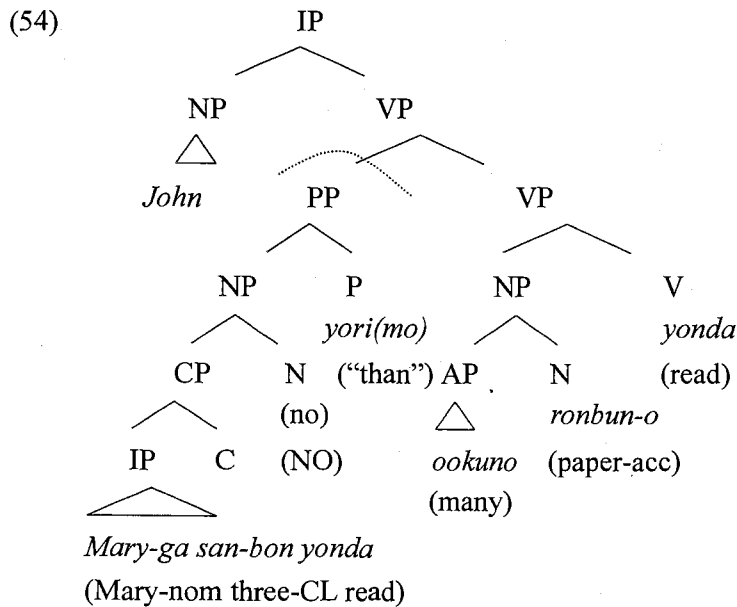
Now, let us calculate the whole sentence. The adjective in the matrix clause of (46) is *ookuno* (many), which is an adnominal form of the adjective *ooi* (many). Following the previous discussion, I assume that the semantics of comparatives is part of the lexical entry of gradable adjectives. When *ooi* (many) has an overt degree argument, it is understood as a differential degree, as in the case of other gradable adjectives. In (52), *ni-ko* (two-CL) is the number of extra apples. The lexical entry of *ooi* (many) denotes a

comparison, where the cardinality of the union of two sets is greater than a contextually given number.

- (52) Ringo-ga **ni-ko** ooi.
 apple-nom two-CL many
 ‘There are two extra apples.’

- (53) a. $[[ookuno]] = \lambda p_{\langle e, t \rangle} \lambda q_{\langle e, t \rangle} . |\lambda x. p(x) \wedge q(x)| > c$
 b. $[[ookuno]] = \lambda d' \lambda p_{\langle e, t \rangle} \lambda q_{\langle e, t \rangle} . |\lambda x. p(x) \wedge q(x)| = c + d'$

The LF structure and the truth conditional calculation of (46) are given below. The value of the standard degree c is inferred from the *than* clause. (Again, PP is not integrated into the compositional calculation, as indicated by the dotted line.)



$$(55) \text{ [[ookuno]]} = \lambda p_{\langle e, t \rangle} \lambda q_{\langle e, t \rangle}. |\lambda x. p(x) \wedge q(x)| > c$$

$$\text{[[ookuno ronbun]]} = \lambda q_{\langle e, t \rangle}. |\lambda x. \text{paper}(x) \wedge q(x)| > c$$

$$\text{[[John-wa ookuno ronbun-o yonda]]} = 1 \text{ iff } |\lambda x. \text{paper}(x) \wedge \text{read}(x)(J)| > c$$

c : = the number of papers Mary read, i.e., 3

Note that overt degree arguments are not limited to *yorimo* clauses. Japanese comparatives also allow differential degrees, as we have already observed. English also allows differential degrees; however, they serve as an argument of the comparative morpheme—*more* (*-er*) (c.f. Heim 2000a).

(56) John read **two** more papers than Mary did.

$$(57) \text{ [[-er]]} (d)(D2)(D1) = 1 \text{ iff } \max(D1) = \max(D2) + d$$

Overt differential degrees in Japanese are possible for a different reason. In (58), the difference degree *ni-hon* (two-CL) is an argument of *ookuno* (more)¹³. In other words, differential degrees in English and Japanese are an argument of different items.

(58) John-wa [Mary-ga e yonda yorimo] **ni-hon**
 John-top Mary-nom (paper) read “than” **two-CL**

¹³ *Ookuno* (more) is an adnominal form of *ooi* (more).

ookuno ronbun-o yonda.

more paper-acc read

‘John read two more papers than Mary did.’

(Compared to the papers Mary read, John read two more papers.)

$$(59) \quad [[ookuno]] = \lambda d' \lambda p_{\langle e,t \rangle} \lambda q_{\langle e,t \rangle} . | \lambda x . p(x) \wedge q(x) | = c + d'$$

$$[[ni-hon ookuno]] = \lambda p_{\langle e,t \rangle} \lambda q_{\langle e,t \rangle} . | \lambda x . p(x) \wedge q(x) | = c + 2$$

$$[[ni-hon ookuno ronbun]] = \lambda q_{\langle e,t \rangle} . | \lambda x . paper(x) \wedge q(x) | = c + 2$$

$$[[John-wa ni-hon ookuno ronbun-o yonda]] = | \lambda x . paper(x) \wedge read(x)(J) | = c + 2$$

(where c is the number of papers Mary read)

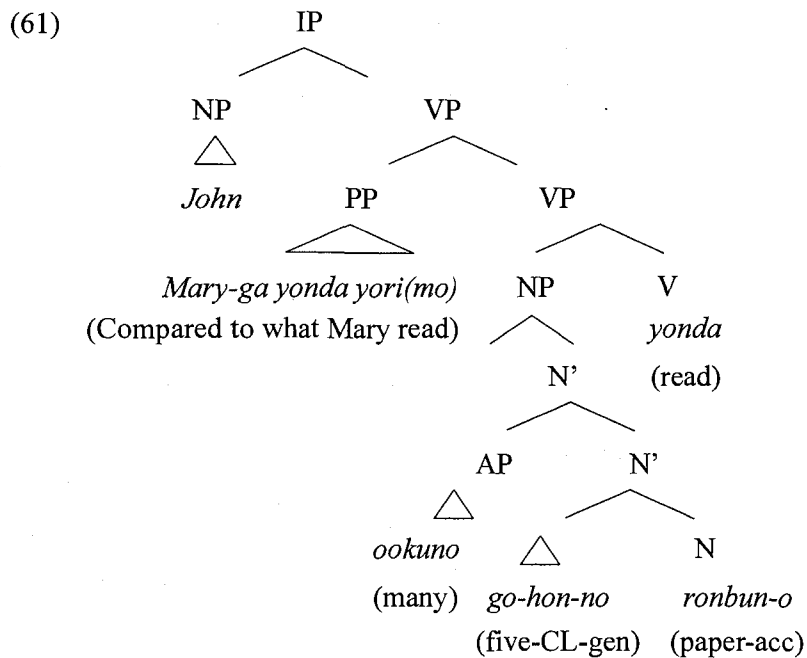
Interestingly, the degree argument in the matrix clauses can be overt as shown in (60). This is not expected because the lexical entry of *ookuno* (many) predicts that the direct degree is bound inside the adjective; thus, it cannot be overt. In this sentence, *go-hon* (five-CL) is not an argument of *ookuno* (many). Rather, it is a predicate that is independent from *ookuno* (many). The position of *go-hon* (five-CL) confirms the point: It must follow the adjective. Therefore, (60) seems to consist of two propositions: John read more papers than Mary did, and John read 5 papers.

- (60) John-wa [Mary-ga e yonda yori(mo)] ookuno
 John-top Mary-nom (paper) read “than” more
 go-hon-no ronbun-o yonda.
 five-CL-gen paper-acc read

Lit. 'John read more five papers than Mary did.'

(Compared to what Mary read, John read 5 papers, which is more than what Mary did).

It is not clear how the sentence is derived syntactically. It can be derived either by adjunctions, by a conjunction followed by a deletion, or by other means. The following is an example an adjunction.



The most likely truth conditions of the sentences are given below. They capture the intuitive interpretation that John read 5 papers, which is more than what Mary read.

$$(62) \quad |\lambda x. \text{paper}(x) \wedge \text{wrote}(x)(J)| > c \wedge |\lambda x. \text{paper}(x) \wedge \text{wrote}(x)(J)| = 5$$

c : = the number of papers Mary read

Finally, nothing seems to prevent the three types of overt degrees that appear at the same time, and this prediction is borne out. In (63), Mary read three papers and John read five papers, which is two more than Mary. An equivalent expression in English is never possible.

- (63) John-wa [Mary-ga e **san-bon** yonda yori(mo)] **ni-hon** ookuno
 John-top Mary-nom (paper) **three-CL** read “than” **two-CL** more
go-hon-no ronbun-o yonda.
five-CL-gen paper-acc read
 ‘John read **five** papers, which is **two** more papers than Mary did **three**.’

- (64) $|\lambda x.\text{paper}(x) \wedge \text{read}(x)(J)| = 5 \wedge |\lambda x.\text{paper}(x) \wedge \text{read}(x)(J)| = c + 2$
 c : = the number of papers Mary read, i.e., 3

In summary, the overt degrees in Japanese comparative sentences show that the mechanism of Japanese comparatives is fundamentally different from that of English comparatives. The crucial case is (46), where the *yori(mo)* clause hosts the overt degree. Unlike English, the *yori(mo)* clause does not denote a set of degrees. The degree argument position of the adjective is not abstracted over and can be overtly filled.

2.2.3 NPI Licensing

Another piece of evidence for the non-degree nature of *yorimo* clauses is provided from data with NPIs. English comparatives are known to host NPIs in *than* clauses. In contrast, Japanese *yorimo* clauses do not host NPIs. The ungrammatical Japanese example (66) contains *minna-ga-minna* (everyone), which shows similar distribution to that of *any*.

(65) I read more books than **anyone** did.

(66) *Watashi-wa [mina-gamina yonda yorimo]
 I-top everyone-nom-everyone read “than”
 takusanno hon-o yonda.
 many book-acc read
 ‘I read more books than anyone did.’

I argue that Japanese *yorimo* comparatives are not downward entailing. According to the classical Fauconnier (1975)–Ladusaw (1979) analysis, NPIs are licensed in a downward-entailing environment.

(67) Downward-entailing Function:

A function f is *downward entailing* iff for all X, Y in the domain of f :

If $X \subseteq Y$, then $f(Y) \subseteq f(X)$.

More than comparatives are downward entailing. Suppose X is the set of foreign students and Y is the set of regular students. Then, X is a subset of Y. In other words, X entails Y.

(68) foreign student \Rightarrow student

The following valid inference shows that *more than* comparatives are downward entailing.

(69) Seymore is richer than a student can be \Rightarrow

Seymore is richer than a foreign student can be

Rullman (1995) points out that the downward-entailing nature of *more than* comparatives is correctly predicted by von Stechow's semantics of comparatives.

(70) a. Seymore is richer than **max**(λd [a student can be d-rich])

b. $\exists d[\text{rich}(w)(s,d) \wedge d > \text{max}(\lambda d'[\exists w'\exists x[\text{student}(w')(x) \wedge \text{rich}(w')(x,d')]])]$

(71) a. Seymore is richer than **max**(λd [a foreign student can be d-rich])

b. $\exists d[\text{rich}(w)(s,d) \wedge d > \text{max}(\lambda d'[\exists w'\exists x[\text{student}(w')(x) \wedge \text{foreign}(w')(x) \wedge \text{rich}(w')(x,d')]])]$

The modal *can* is reduced as an existential quantifier over possible worlds. Putting aside

details of the intensional semantics, the translation of the sentences implies that if Seymore is richer than a student can be, he will also be richer than a foreign student can be, because $\max(\lambda d[a \text{ foreign student can be } d\text{-rich}])$ is smaller than or equal to $\max(\lambda d[a \text{ student can be } d\text{-rich}])$. More generally, if a set of degree D is expanded, then the maximum degree $\max(D)$ also increases, and consequently, the set of objects that are larger than $\max(D)$ will shrink.

(72) If $D \subseteq D'$, then

$$\{x: x \text{ is more } Adj \text{ than } \max(D')\} \subseteq \{x: x \text{ is more } Adj \text{ than } \max(D)\}.$$

Let us turn to Japanese. Unlike *than* clauses in English, *yorimo* clauses in Japanese do not host NPIs. However, before we examine the details, I first need to discuss Japanese NPIs. In what follows, I will introduce relatively little-known Japanese NPIs. Although NPI licensing is a popular topic in semantics, it is not very easy to investigate the NPI licensing environments in Japanese. The most well-known NPI phrases in Japanese are *sika...nai* (only) and *wh-mo* (any)^{14,15}. However, these NPIs are licensed by

¹⁴ An example of *shika...nai* is cited from Aoyagi and Ishii (1994). *-Sika* attaches to a maximal projection and the combination of *XP-sika* and negation is interpreted as “only XP.” It becomes ungrammatical without negation, even in *yorimo* clauses.

(i) John-**sika** ringo-o kabe-*(**na**)-katta.
John-SIKA apple-acc eat-neg-past
'Only John ate apples.'

(ii) *Mary-wa [John-**sika** kaita yori(mo)] nagai ronbun-o kaita.
Mary-top [John-SIKA wrote 'than'] long paper-acc wrote
'Mary wrote a longer paper than only John did.'

¹⁵ Another Japanese NPI *wh-mo* (any) also cannot be hosted in *yorimo* clauses without negation, as shown in (i) in (ii). However, when *mo* is relocated to the position that follows *yorimo*, as in (iii), the sentence turns out to be grammatical. (Note that the *mo*, glossed as MO, is different from the bound morpheme *-mo* as in *yorimo*.) The *yorimo*

close-mate negation (cf. McGloin 1976, Muraki 1978). Thus they are not useful in testing the downward entailmentness of *yorimo* clauses. Better candidates for our purpose are a double universal quantifier (DUQ¹⁶) *mina-ga-mina* (everyone) discussed in Aihara

clause carries the interpretation of “than anyone did.”

- (i) *John-wa [**dare-mo** katta (no) yori] takai hon-o kaita
 John-top [**who-MO** bought (NO) “than”] expensive book-acc wrote
 ‘John bought a more expensive book than anyone did.’
- (ii) John-wa [**dare-mo** kawa-naka-tta no yori] takai hon-o kaita
 John-top [**who-MO** buy-neg-past NO “than”] expensive book-acc wrote
 ‘John bought a more expensive book than the one nobody bought.’
- (iii) John-wa [**dare-ga** katta (no) yori]-**mo** takai hon-o kaita
 John-top [**who-nom** bought (NO) “than”]-**MO** expensive book-acc wrote
 ‘John bought a more expensive book than anyone did.’

A question arises whether or not *dare...mo* in (iii) is a case of an NPI accommodated in the *yorimo* clause.

I assume that (iii) is rather a case of an indeterminate pronoun in Japanese. Consider an example of an indeterminate pronoun from Kratzer and Shimoyama (2002):

- (iv) [[**Dono** hon-o yonda] kodomo]-**mo** yoku nemutta.
 [[**which** book-acc read] child]-**MO** well slept
 ‘For every book x, the child who read x slept well.’

Kratzer and Shimoyama analyze the universal quantifier *mo* as a regular generalized quantifier. The above example is sketched as below.

- (iv) All members of A slept well: A = {the child who read book a, the child who read book b, the child who read book c, ...}

I assume that (iii) is analyzed in a similar manner and *dare* (who) in the *yorimo* clause receives a universal interpretation rather than an existential interpretation. Therefore, it is not an equivalent of the NPI—*any*.

¹⁶ Double universal quantifiers (DUQ) are a combination of a universal Q and a case maker or a postposition. Possible DUQs listed in Aihara (2006) are cited below.

- (i) Double Universal Quantifiers (DUQ):
 Universal Q + CASE/POSTPOSITION + universal Q
- (ii) a. minna-ga-minna
 everyone-nom-everyone
 b. minna-o-minna

(2006) and minimizers such as *yubi-ippon-ugokasu* (move a finger) discussed in Oda (2005).

Aihara (2006) shows that the DUQ *minna-ga-minna* (everyone) shows almost parallel distribution to *anyone* in English¹⁷. In what follows, a-sentences have *anyone* in English, and b-sentences have *minna-ga-minna* (everyone).

Yes/no question:

(73) a. Do you like **anyone**?

b. **Minna-ga-minna** paatyii-ni ki-masi-ta ka?
 everyone-nom-everyone party-to come-polite-past Q
 ‘Did anyone come to the party?’

If clauses:

(74) a. If I see **anyone**, I will let you know.

 everyone-acc-everyone
 c. minna-to-minna
 everyone-with-everyone
 (iii) a. zenbu-ga-zenbu
 all-nom-all
 b. zenbu-o-zenbu
 all-acc-all
 c. zenbu-ni-zenbu
 all-to-all

¹⁷ Some differences between *any* and DUO remain. Unlike *any*, object DUOs are not licensed by a clause-mate negation.

- (i) a. Taro didn't see *anyone* at school.
 b. *Taro-ga gakkou-deminna-o-minna
 Taro-nom school-at everyone-acc-everyone
 mi-nak-atta (koto).
 see-neg-past
 ‘Taro did not see everyone at school.’

- b. [Minna-ga-minna (moshi) paatyii-ni iku-nara]
 everyone-nom-everyone (if) party-to go-cond
 watashi-mo iku-darou
 I-also go-will
 'If anyone goes to the party, I will go there too.'

Complement of an adversative predicate:

- (75) a. I doubt that Mary insulted **anymore**.

- b. [Minna-ga-minna Nintendo DS-o mot-teiru no]-wa
 everyone-nom-everyone Nintendo DS-acc have-be NO]-top
 utagawashii
 doubt
 '(I) doubt that anyone has a Nintendo DS game console.'

Complement of verbs that express a speaker's unexpectedness:

- (76) a. I was surprised that **anyone** went to such a place.

- b. [Sonna basho-ni minna-ga-minna iku nante]
 such place-to everyone-nom-everyone go that
 odoroi-ta.
 surprising-past
 'I was surprised that everyone went to such a place.'

However, when we apply *minna-ga-minna* (everyone) to comparatives, it does not give us grammatical sentences, as we already observed at the beginning of this subsection.

Comparatives:

(77) a. I read more books than **anyone** did.

b. **Watashi-wa [mina-ga-minna yonda yori(mo)]*

I-top everyone-nom-everyone read “than”

takusanno hon-o yonda.

many book-acc read

‘I read more books than anyone did.’

Another testable NPI is the minimizer *yubi-ip-pon ugokasu* (move a finger)¹⁸. In the following data, a-sentences contain the English minimizer *lift a finger* and b-sentences have *yubi-ip-pon ugokasu* (move a finger).

Negation:

(78) a. John didn’t (even) **lift a finger** for us.

b. John-wa **yubi ip-pon** (*sae*) **ugokasa-na-katta.**

¹⁸ Other examples of minimizers in Japanese are given below.

(i) *kaminoke-ip-pon*
hair-one-CL
“a thread of hair”

(ii) *is-sen-mo*
one-penny-MO
“even a penny”

Further research will find out whether these minimizers can be used in testing NPI licensing conditions in Japanese.

John-top finger one-CL (even) move-neg-past

‘John didn’t move a finger.’

Without negation:

(79) a. #John (even) **lifted a finger** for us.

b. #John-wa **yubi ip-pon** (*sae*) **gokasi-ta**.

John-top finger one-CL (even) move-past

‘John moved a finger.’

Question:

(80) a. Did John (even) **lift a finger** for us?

b. John-ga **yubi-ip-pon** (*demo*) **ugokasi-ta** no?

John-nom finger-one-CL (even) move-past Q

‘Did John (even) move a finger?’

If clause:

(81) a. If you (even) **lift a finger** to help, you will be sorry.

b. [**Yubi ip-pon** (*demo*) **ugokasi-tara**] koukaisuru-darou.

finger one-CL (even) move-if regret-will

‘If you move (even) a finger, you will be sorry.’

As for the English data, it has been pointed out by Ladusaw (1979) and others that questions with minimizers such as (80)a are understood as rhetorical questions and they

are negatively biased. Guerzoni (2002) also points out that minimizers come with an optional *even* without changing the intuitive interpretation. The same observation applies to the corresponding Japanese data. The question sentence (80)b is negatively biased, and the Japanese minimizer *yubi-ippon-ugokasu* (move a finger) comes with an optional *demo* (even) or *sae* (even) as shown in (78)–(81). This shows that the semantic properties of *yubi-ip-pon ugokasu* (move a finger) are very similar to those of minimizers in English.

However, when *yubi-ip-pon ugokasu* (move a finger) appears in comparatives, the sentence is ungrammatical¹⁹.

- (82) *Usi-wa [kare-ga Louise-o tasukeru tameni **yubi-ip-pon**
 cow-top [he-nom Louise-acc help in_order_to finger-one-CL
ugokasu yori(mo)] (motto) hinpanni sora-o tobu.
 move “than” (“more”) often sky-acc fly
 ‘Cows fly more often than he lifts a finger to help Louise.’

This creates a sharp contrast to English. Let us consider an example from Linebarger (1987) with *lift a finger* in the than clause, which compares the number of times cows fly with the number of times he provides help.

¹⁹ Some might think that the ungrammatical status of the sentence is due to the odd meaning of the sentence. However, the following sentence, which has a similar meaning with a different structure, is quite well formed.

- (i) Louise-o tasukeru tameni yubi-ip-pon ugokasu hito-ga
 Louise-acc help in_order_to finger-one-CL move person-nom
 i-tara, ushi-ga sora-o ton-demo okasiku-nai.
 exist-if cow-nom sky-acc fly-even strange-neg
 ‘If there was anyone who would lift a finger to help Louise, it wouldn’t be odd that cows (even) fly in the sky.’

(83) Cows fly more often than he **lifts a finger** to help Louise. (Linebarger 1987:377)

Given the contrast between the two languages, I conclude that *yorimo* clauses in Japanese do not host NPIs.

Does the semantics of *yorimo* clauses predict the absence of NPI licensing? It is predicted when we assume *yorimo* clauses as sets of individuals that are detached from the compositional calculation of the matrix clause. A set of individuals is not downward entailing. Let us take two sets, for instance, a student and a graduate student. Being a graduate student entails being a student. However, (84)b does not entail (84)c.

(84)a. a graduate student \Rightarrow a student

b. λx . a student wrote x

c. λx . a graduate student wrote x

The abstraction over the individual argument of a sentence does not reverse the entailment relation. This implies that *yorimo* clauses are not downward entailing. This explains the absence of NPIs in Japanese, as in (77) and (82): *yorimo* clauses are not downward entailing.

The point is confirmed in English data as well. In fact, Jacobsen (1995) points out that free relatives (sets of individuals) do not host NPIs, as shown in the example below²⁰.

²⁰ Jacobsen does not discuss why NPIs are prohibited in free relatives. However, the

- (85) *I can read whatever (books) Bill *ever* read.

The explanation is appropriate; however, the facts are a little confusing. The following Japanese data is an equivalent of (68) and (69) in English. The inference holds well intuitively as in the case of English.

- (86) gakusei => gaikokujingakusei
 student foreign student

- (87) Seymore-wa [gakusei-ga na-reru yori(mo)] motto kanemotida.
 Seymore-top student-nom become-can “than” “more” rich
 => Seymore-wa [gaikokujin gakusei-ga na-reru yori(mo)]
 Seymore-top foreign student-nom become-can “than”
 motto kanemotida.
 “more” rich
 “Seymore is richer than students can be. =>

following observation by her might be of interest to us. Jacobsen points out that free relatives often have natural paraphrases with NPs headed by *the thing*.

- (ii) a. I ordered *what* he ordered for desert.
 b. I ordered *the thing* he ordered for desert. (Jacobsen 1995: 454)

Guerzoni and Shavit's (to appear) show that the restrictor of plural definite hosts NPIs, whereas the restrictor of singular definite does not. The former is Strawson downward entailing and non-Strawson upward entailing; however, the latter is both Strawson downward and upward entailing.

- (iv) a. **The students** who have **any** books on NPIs are selling them.
 b. ***The student** who has **any** books on NPIs are selling them.

It remains to be seen whether the absence of NPIs in *yori* clauses, free relatives, and singular NPs is somehow correlated.

Seymore is richer than foreign students can be.”

However, this should not imply that *yorimo* clauses provide a formal downward-entailing environment. I assume this is due to the pragmatic process involved in the comparison. I assume that our intuition accepts the inference in (87) as valid when the plausible context suggests it. If so, we are able to explain the seemingly contradictory facts: *Yorimo* clauses do not host NPIs because formal semantic conditions are not met. However, our context-dependent intuitions treat Japanese comparatives as a downward licensing inference pragmatically.

2.2.4 Negated Adjectives in Japanese

It will be worth discussing negated adjectives in Japanese before concluding Section 2.2. The absence of the negative island effect in Japanese comparatives is one of the reasons for Beck et al. to deny sets of degrees in *yorimo* clauses. I would like to clarify one point: There is an additional reason why negated *yorimo* clauses do not exhibit the negative island effect. Negated adjectives in Japanese denote their antonyms.

In fact, Beck et al. briefly mentioned the point. Their example is cited below in (88). The equivalent sentence in English is “*This book is not more interesting than that book,*” where *not* is a sentential negation and the sentence leaves a possibility where *this book* is as interesting as *that book*. However, the Japanese sentence in (88) denotes something stronger: The book is un-interesting, and thus it must be less interesting than that book.

- (88) Kono hon-wa [ano hon yori(mo)] omosiroku-**nai**.
 this book-top [that book “than”] interesting-**neg**
 ‘This book is not more interesting than that book.’

(89) The interpretation of (88):

- a. $\neg \exists d[\text{this book is } d\text{-interesting} \wedge d \geq c]$
 c: = the degree of how interesting that book is
 b. Compared to that book, this book is un-interesting. (Beck et al. 2004:335)

The negation serves as a morphological negation in this case rather than a sentential negation. Beck et al. stated the above observation and left details for further research. In this subsection, I will argue that negated adjectives in Japanese result in their antonyms.

First, consider other examples of negated gradable adjectives in Japanese in order to confirm the observation of Beck et al. Their negated adjectives are all intuitively understood as their antonyms.

- (90) John-wa [otooto yori(mo)] kasikoku-**nai**.
 John-top [brother “than”] smart-**neg**
 ‘John is un-smarter than his brother./John is less smart than his brother.’

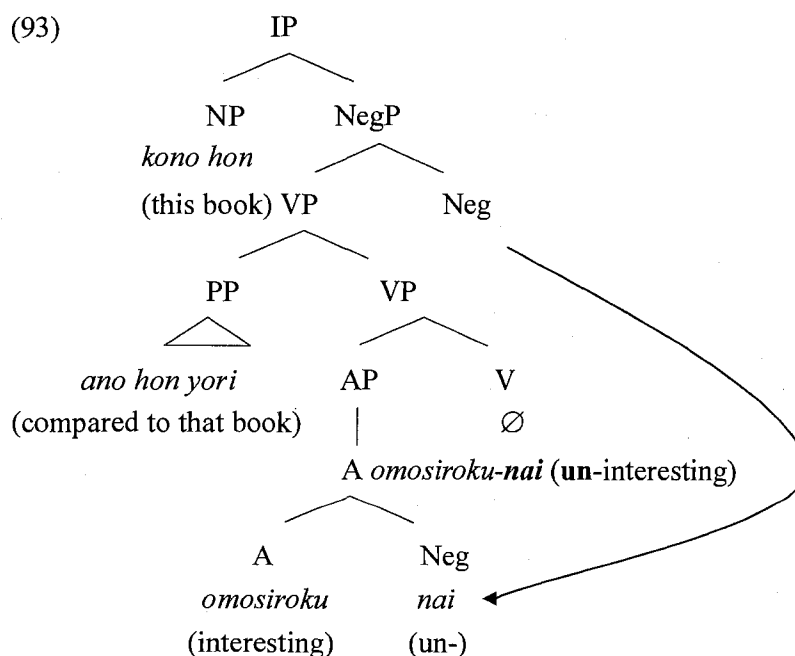
- (91) Kono mondai-wa [ano mondai yori(mo)] muzukasiku-**nai**.
 this problem-top [that problem “than”] difficult-**neg**

‘This problem is less difficult than that problem.’

- (92) Kono heya-wa [ano heya yori(mo)] kirei-ja-**nai**.
 this room-top [that room “than”] clean-copula-**neg**

‘This room is un-cleaner than that room./This room is less clean than that room.’

An interesting case is (92), where *nai* (neg) follows the copula verb *ja* (copula) under V. This means that *nai* (neg) is generated in NegP, which is higher than VP. If so, some kind of lowering needs to be involved in order to create an antonym. Consider the following tree, where *nai* (neg) is lowered and combined with a gradable adjective *omosiroi* (interesting), which results in the antonym *omosiroku-nai* (un-interesting).



With the antonym *omosiroku-nai* (un-interesting), the truth conditional calculation

correctly captures the intuitive interpretation.

(94) $[[[omosiroku\ nai\ (interesting\ neg)]]] = \lambda x.\max(\lambda d.\text{un-interesting}(d)(x)) > c$

$[[[(88)]]] = 1$ iff

$\max(\lambda d.\text{un-interesting}(d)(\text{this_book})) > c$

$c :=$ the degree of un-interestingness of that book

Therefore, the following generalization seems to hold.

(95) A negated gradable adjective in Japanese makes an antonym.

However, there are cases where the lowering of the negation is banned. When there is an NPI *daremo* (anyone) in the subject position, *nai* (neg) serves as a licenser of the NPI; thus, no antonym is created. In (96), the combination of *daremo* (anyone) and *nai* (neg) results in “noone.” The interpretation of the adjective *kasikoi* (smart) remains as it is, and no antonym is created.

(96) **Daremo kasikoku-nai.**

anyone smart-neg

‘No one is smart.’

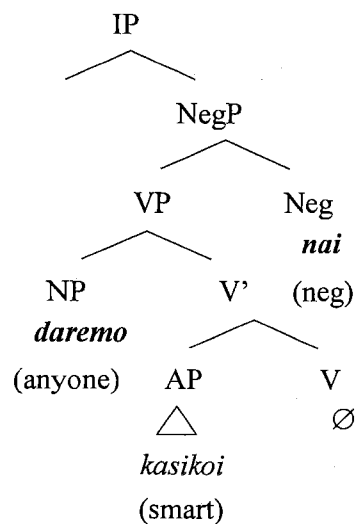
The contrast between the two comparative sentences (97)a and (97)b proves the point: An antonym is formed only in the latter.

- (97) a. **Daremo** [John yori(mo)] kasikoku-**nai**.
anyone [John “than”] smart-**neg**
 ‘Compared to John, no one is smart.’

- b. Mary-wa [John yori(mo)] kasikoku-**nai**.
 Mary-top [John “than”] smart-**neg**
 ‘Compared to John, Mary is un-smart.’”

In the above cases, *daremo* (anyone) needs a licensing negation. Thus, the lowering of *nai* (neg) would leave *daremo* (anyone) unlicensed. Therefore, *nai* (neg) remains high and lowering does not take place.

- (98) For (96):



In summary, I observed that negated gradable adjectives in Japanese result in antonyms

unless there is some blocking effect. This observation will be useful when we discuss the construction of exclamatives in Chapter 4. This behaviour of negation and adjectives is rather interesting and seems to have a lot of implications on the mechanism of degree constructions in Japanese. Therefore, further investigation is required.

2.2.5 Comparatives with Bare Nouns

At the end of this subsection I would like to have a brief discussion on what I call comparatives with bare nouns such as the following. Interestingly, the sentences do not have any gradable adjective. They have bare nouns *dokusaisya* (dictator) and *gizensya* (hypocrite). However, they have adjective-like interpretations. (99) intuitively means *Taro is more dictatorial than Hanako* and (100) means *Taro is more hypocritical than Hanako*.

- (99) Taro-wa [Hanako yori(mo)] (motto) **dokusaisya**-da
 Taro-top Hanako “than” (“more”) dictator-copula

Lit. ‘Compared to Hanako, Taro is a dictator.’

(Taro is more dictatorial than Hanako.)

- (100) Taro-wa [Hanako yori(mo)] (motto) **gizensya**-da
 Taro-top Hanako “than” (“more”) hypocrite-copula

Lit. ‘Compared to Hanako, Taro is a hypocrite.’

(Taro is more hypocritical than Hanako.)

Their adjective-like interpretations can be confirmed with the following sentence, which have corresponding syntactic adjectives *dokusaiteki* (dictatorial) and *gizenteki* (hypocritical). Their interpretations are intuitively the same as the above comparisons with nouns.

- (101) Taro-wa [Hanako yori(mo)] (motto) **dokusaiteki-da**
 Taro-top Hanako “than” (“more”) dictatorial-copula
 ‘Taro is more dictatorial than Hanako.’

- (102) Taro-wa [Hanako yori(mo)] (motto) **gizenteki-da**
 Taro-top Hanako “than” (“more”) hypocritical-copula
 ‘Taro is more hypocritical than Hanako.’

The question is why adjective-like interpretations are available in the sentences with bare nouns.

I assume that a pragmatic strategy is involved. To be more specific, it may not be so odd to assume that speakers use maximal use of pragmatics and reinterpret the nouns as the corresponding adjectives. I will call the process “reinterpretation.”

- (103) a. $\lambda x.\text{dictator}(x)$ ----- reinterpretation $\rightarrow \lambda x.\text{max}(\lambda d.\text{dictatorial}(d)(x)) > c$
 b. $\lambda x.\text{hypocrite}(x)$ ---- reinteroretation $\rightarrow \lambda x.\text{max}(\lambda d.\text{hypocritical}(d)(x)) > c$

Once reinterpretation from a noun to an adjective takes place, comparative interpretation

is available, because comparative semantics is part of an adjective. In other words, the process of reinterpretation is a plausible option under the lexical analysis of comparatives.

It is worth confirming the syntactic category of *dokusaisya* ‘dictator’ and *gizensya* (hypocrite) as nouns, since the distinction between nouns and verbal adjectives are sometimes unclear in Japanese. A good way to see the difference between the two is to let them modify nouns. Verbal adjectives have a distinct morpheme *-na* when they modify nouns, as shown in (104)a and (105)a. If the nouns in question were verbal adjectives, the morpheme *-na* would appear. However, this is not the case. The nouns follow a general rule for a sequence of noun + noun, and *no* (of) is inserted between the two nouns, as shown in (104)c and (105)c.

- (104)a. dokusaitekina sihai
 dictatorial rule
 ‘dictatorial rule’
- b. *dokusaisyana sihai
 dictator sihai
 (intended) ‘dictatorial rule’
- c. dokusaisya no sihai
 dictator of rule
 ‘rule of a dictator’

(105)a. *gizentekina* *okonai*

hypocritical act

‘hypocritical act’

b. **gizensyana* *okonai*

hypocrite act

(intended) ‘hypocritical act’

c. *gizensya* no *okonai*

hypocrite of act

‘act of a hypocrite’

The above data shows that *dokusaisya* (dictator) and *gizensya* (hypocrite) are syntactically categorized as a noun.

I will show another case of reinterpretation in 3.3.4 in Chapter 3, where bare nouns produce comparison interpretations in comparative conditionals in Japanese. I will also show a limit of the pragmatic reinterpretation in 4.4.5 in Chapter 4 with exclamatives constructions. It will be shown that reinterpretation does not work when a degree argument position of an adjective is syntactically required.

2.3 Multihead Comparatives

This section discusses multihead comparatives. Multihead comparatives are a type

of comparative construction that contain more than one comparative head *-er* (or *more*) in one sentence.

- (106) **More** dogs ate **more** rats than cats ate mice. (Stechow 1984)

As far as I know, there is not much discussion on this construction in the literature. This is partly due to the marginal status of such sentences. Some accept (106), while many claim that it is not sensible. von Stechow states that the above sentence is a combination of two comparisons. However, Hendriks (1992) points out that the interpretations of the multiple comparisons involved in the sentence are mutually independent; thus, the sentence cannot have proper truth conditions.

Unlike English, an equivalent sentence in Japanese is much less controversial and has a sensible interpretation. Interestingly, the *yori(mo)* (than) clause in Japanese can include concrete numbers, making it easier for native speakers to provide grammatical judgments.

- (107) [san-biki-no neko-ga yon-hiki-no hatukanezumi-o
 three-CL-gen cat-nom four-CL-gen mouse-acc
 tabeta yori(mo)] (motto) takusanno inu-ga (motto) takusanno
 ate “than” (“more”) many dog-nom (“more”) many
 dobunezumi-o tabeta.
 rat-acc ate
 ‘More dogs ate more rats than **three** cats ate **four** mice.’

In this section, I will show that Japanese multihead comparatives such as (107) are semantically well formed. Our lexical analysis of Japanese comparisons is the key to understanding multihead comparatives in Japanese. Recall the lexical entry of *nagai* (long). It denotes that x has a length that exceeds the contextually given length c . In other words, “long” in Japanese actually means “longer.”

$$(108) \quad [[nagai]] = \lambda x. \max (\lambda d. \text{long} (d)(x)) > c$$

Importantly, such lexical entries of gradable adjectives imply that each adjective results in one comparison. If so, there should be multiple comparisons when a sentence contains multiple gradable adjectives. This is the case in (107): There are two instances of *takusanno* (many) in (107), and each one results in a comparison as it denotes “more.” Thus, there are two comparisons accommodated simultaneously in the sentence. In other words, multihead comparatives such as (107) are evidence for the lexical analysis of Japanese comparatives.

Section 2.3 is organized as follows. I will first review previous discussions on multihead comparatives in English and Dutch. Hendriks (1992) classifies multihead comparatives into two groups, namely, multihead comparatives with sentence-internal comparisons and multihead comparatives with discourse comparisons. She argues that the former cannot have well-formed truth conditions, while the latter have sensible interpretations. On the other hand, Meier (2001) argues that what Hendriks calls sentence-internal comparisons do have proper semantics. The argument has not yet been

resolved, and in this paper, I will support neither side. However, the arguments by Hendriks and Meier provide insight into what makes multihead comparatives possible/impossible. I will show that the grammatical status of multihead comparatives in Japanese is expected under our lexical analysis: Japanese adjectives are comparatives *per se*. Thus, there should be as many comparisons as the number of adjectives in a sentence. This is in fact the case. I will further show that multihead comparatives in Japanese are considered as multihead comparatives with discourse comparisons in Hendriks' classification.

2.3.1 von Stechow (1984)

I will first summarize von Stechow's (1984) analysis of his example that is repeated below. Importantly, the comparative morpheme *more* occurs twice in the sentence. There has been some disagreement with regard to the acceptability of this sentence. Some speakers have no problems with the sentence, whereas others find it ungrammatical.

(109) **More** dogs ate **more** rats than cats ate mice. (von Stechow 1984)

Suppose it is grammatical. If so, what is the intuitive interpretation of the sentence? von Stechow shows the truth conditions of the sentence (in its most easily available reading) as follows. It is a coordination of two comparisons.

- (110) The number of dogs that ate rats is greater than the number of cats that ate mice,
and the number of rats that were eaten by dogs is greater than the number of mice
that were eaten by cats.

The above intuitive paraphrase can be a little more formally represented as follows. I follow von Stechow (1984), Heim (2000), and others and assume that a comparative operator takes two sets of degrees and maps them to a larger-than relation. The maximality operator applies to a set of degrees and selects the largest degree of the set. The sentence is a combination of two comparisons that are made using the comparative operator *more* twice.

$$(111) \quad [[-er]] = \lambda D_{\langle d,t \rangle} \lambda D'_{\langle d,t \rangle} . \max(D') > \max(D)$$

$$(112) \quad \text{Let } S \text{ be a set ordered by } \leq. \text{ Then, } \max(S) = \text{is } [s \in S \ \& \ \forall s' \in S \ [s' \leq s]]$$

$$(113) \quad \max(\lambda d. d\text{-many dogs ate rats}) > \max(\lambda d. d\text{-many cats ate mice}) \wedge \\ \max(\lambda d. \text{dogs ate } d\text{-many rats}) > \max(\lambda d. \text{cats ate } d\text{-many mice})$$

von Stechow also points out that (109) does not have the reading in (114). This reading would be satisfied if there were more rat-eating dogs than mouse-eating cats. However, this comparison is too weak when we consider a model where there are three dogs and they eat the same rat (they share it), and one cat eats two mice. (114) would

predict that the sentence is true; however, it is intuitively false.

- (114) The number of those $\langle x, y \rangle$ such that x is a dog and y is a rat and x ate y is greater than the number of those $\langle z, w \rangle$ such that z is a cat and w is a mouse and z ate w .

In summary, von Stechow basically argues that a multihead comparative sentence is simply a combination of two comparative sentences and can be analyzed on a par with normal comparatives.

2.3.2 Multihead Comparatives with Sentence-Internal Comparisons

Hendriks (1992) investigates the matter in more detail and proposes to divide multihead comparatives into two types. She argues that multihead comparatives of one of the two types do not have truth conditions, while those of the other type have proper meanings.

She discusses an example similar to (106) in Dutch. (115) contains two comparative operators, *meer* (more) and the suffix *-er*. Hendriks claims that the sentence is uninterpretable. Thus, it does not have the conjunction reading in (116), contrary to what von Stechow would claim.

- (115) (uninterpretable)

?Meer	deuren	zijn	hoger	dan	ramen	breed	zijn.
more	doors	are	higher	than	windows	wide	are

(Hendriks 1992:109)

- (116) The number of doors that are high is greater than the number of windows that are wide, and the height of doors is greater than the width of windows.

(Hendriks 1992:109)

Hendriks points out that the sentence becomes acceptable and interpretable if one of the comparative operators is omitted. This suggests that only one comparison is allowed in a comparative sentence.

Based on the observation in Dutch, Hendriks claims that von Stechow's descriptions in (110) are not correct truth conditions of the sentence. She further argues that it involves "infinite regress"; thus, no semantics is available. The same explanation holds for the Dutch example in (115).

The problem of infinite regress is described as follows. In (106), the number of dogs is compared to the number of cats. The dogs and cats in the example are not just dogs and cats in general; rather, they are a subset of dogs and cats. The dogs must eat more rats than mice that are eaten by particular cats, not just cats in general. Then, we need to know the set of cats in order to define the set of dogs. Further, the particular cats have the ability to eat fewer mice than rats that are eaten by particular dogs, not just dogs in general. Then, we need to know the set of particular dogs in order to define the set of cats. Therefore, the interpretations of the dogs and cats end up being mutually dependent²¹.

²¹ As Hendriks herself notes, the mutual dependency of the nouns bears some similarity to the crossing coreference in so-called Bach-Peterson sentences:

- (117) The number of [dogs that ate more rats than the cats_j ate mice]_i is greater than the number of [cats that ate fewer mice than the dogs_j ate rats]_j.

(Hendriks 1992:117)

The Dutch example runs into the same problem. Hendriks provides the most likely interpretation of the sentence as follows. (The brackets and indices are added by the author.)

- (118) The number of [doors that are higher than the windows_j are wide]_i is greater than the number of [windows that are less wide than the doors_j are high]_j.

Hendriks refers to the problem of mutual dependency of this sentence as follows: “The doors in this comparison have the property of being higher (not high!)....The height of the doors is compared to the width of the windows....These windows also distinguish themselves through a certain property. They are less wide than the doors are high. However, these doors are not doors in general but the subset of doors mentioned in the first part of the truth conditions. Similarly, the windows that are mentioned in the first part of the truth conditions refer to the subset of windows as defined in the second part of

-
- (i) [Every pilot who shot at it]_j hit [some MIG that chased him]_i

However, (i) is grammatical. In order to explain the contrast between (i) and the marginal status of the multihead comparative sentence, Hendriks adopts the analysis of Jacobsen (1979), which argues that sentences like (i) involve one instance of binding and one instance of quantification, rather than two instances of binding. Therefore, there is no crossing coreference in (i).

the truth conditions, and not windows in general” (Hendriks 1992:115). Owing to this mutual dependency, a precise semantics of this construction would involve infinite regress.

The problem of mutual dependency of two comparisons is also confirmed in multihead comparatives with nonidentical comparative morphemes. (119) has two different comparative operators, *fewer* and *more*, and it sounds even more awkward than (106).

(119) ??Fewer dogs ate more rats than cats ate mice.

Hendriks calls these multi-head comparatives “multiple sentence-internal comparison.” This term is derived from the nature of the comparisons, where the standard of comparison is found within the sentence. Normal *more-than* comparatives such as *John is taller than Mary* fall under this category. Since multiple sentence-internal comparatives are uninterpretable, the following generalization must hold.

(120) Comparatives may contain at most one instance of sentence-internal comparison.

(Hendriks 1992:113)

This is tested by investigating the possibility of Comparative Deletion (Hendriks 1994). A compared item in a *than* clause can be optionally deleted. In the following examples, the blanks indicate the deleted elements.

(121)a. Mary has written more books than John has read ____.

b. More students steal bikes than __ buy bikes.

When there are two comparative operators in a sentence, its *than* clause cannot have two Comparative Deletions.

(122)a. *More people have read more books than __ have written ____

b. *More students steal more bikes than __ buy ____.

In summary, we have reviewed Hendriks' claim that a sentence-internal comparative sentence allows only one instance of comparison. The next subsection discusses another type of multihead comparatives that are not a subject of the generalization.

2.3.3 Multihead Comparatives with Discourse Comparisons

Hendriks points out that there is another type of multihead comparison, which involves "discourse comparisons." A brief definition of the discourse comparative is mentioned in Rayner and Banks (1990).

(123) (Discourse comparisons are the ones) where the associated comparative complement (in English normally introduced by "than" or "as") is completely absent, and must be inferred from the context. (Rayner and Banks 1990:101)

They also point out that the missing *than* clause is likely to be understood as “than previously,” “than the one just mentioned,” “than in the case,” and the like. An example of single discourse comparison is provided below.

- (124) Het begon **harder** te regenen. [Dutch]
 it started **harder** to rain (Hendriks 1992:111)

The comparison is made between the present state and a previous state. The missing *than* clause is likely to be interpreted as “than previously.” Hendriks argues that discourse comparisons are involved when multi-head comparatives are well formed. (Notice that this is precisely the *-er_J* that Beck et al. argued Japanese to have, a comparative morpheme that makes a comparison with a contextually available degree *c*. We integrated the idea into the lexical analysis.)

Let us consider some examples. The first example in (125) has two comparative operators, *meer* (**more**) and the suffix *-er* in *mooier* (**prettier**). At least one of them must be an instance of discourse comparison, if we follow Hendriks’s abovementioned generalization that a comparative sentence may contain at most one instance of sentence-internal comparison.

- (125) John maakte **meer** mensen **mooier** dan ik dacht
 John made **more** people **prettier** than I thought
 dat hij zou doen.
 that he would do (Hendriks 1992:110)

Hendriks argues that *mooier* (**prettier**) is an instance of discourse comparison. This can be seen in the more spelled out *dan* clause in (126), where *mooier* (**prettier**) appears overtly. (126) has the same meaning as (125), and this is surprising because the *mooier* (**prettier**) in the *dan* clause is again modified by the same comparative suffix *-er* as the one in the matrix clause. This implies that *mooier* (**prettier**) is not a structurally compared item. The *dan* clause is used for *meer* (**more**) because it requires the presence of this clause.

- (126) John maakte meer mensen mooier dan ik dacht
 John made more people prettier than I thought
 dat hij mensen **mooier** zou maken.
 that he people **prettier** would make (Hendriks 1992:110)

The difference between the two comparisons can be further confirmed in the following set of sentences. They are made using the matrix clause in (125). Rather unusually, (127)a with the adjective *mooier* (**prettier**) is acceptable. It is a discourse comparison, and it can be uttered without the *dan* clause. On the other hand, (127)b sounds awkward because it requires a *dan* clause.

- (127)a. John maakt mensen **mooier**.
 John makes people **prettier**
 b. ?John maakt **meer** mensen mooi.

John makes **more** people pretty (Hendriks 1992:112)

Let us consider another example of a multihead comparative provided below, where the two comparisons are both discourse comparisons. It has two comparative morphemes, *minder* (less) and *meer* (more), and it is grammatically correct without any *dan* clause.

(128) Steeds **minder** land levert steeds **meer** mais op.
 ever **less** land produces ever **more** corn pres
 (Hendriks 1992:113)

The comparisons are made with discourse. The most likely interpretations would be comparisons with previous years.

In summary, the behaviors of discourse comparisons differ from sentence-internal comparisons. They do not require overt “than” clauses (*dan* clauses in Dutch). A standard of comparison is provided from a given discourse.

2.3.4 Multihead Comparatives with Split Antecedents

Hendriks considers the fact that the grammatical status of the sentence for (106) is very marginal and denies the earlier mentioned truth conditions that are repeated below. For Hendriks, there is no well-formed semantics for the sentence because of the problem of infinite regress, as discussed in the previous subsection.

- (129) The number of dogs that ate rats is greater than the number of cats that ate mice,
and the number of rats that were eaten by dogs is greater than the number of mice
that were eaten by cats.

Meier (2001), however, considers the fact that some people do accept the sentence, and for those people the above truth conditions are valid. This subsection reviews Meier (2001) and discusses how the (possible) truth conditions in (106) are derived.

Meier cites Chomsky's (1981) example in (130), which he calls a case of "split antecedent": The extraposed *than* clause is associated with both the bracketed expressions.

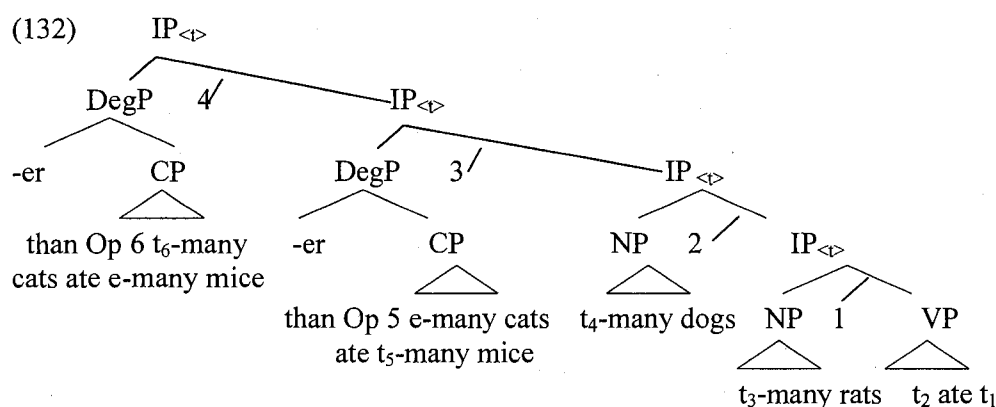
- (130) [More silly lectures] have been given by [more boring professors] than I would
have expected. (Chomsky 1981:81)

This implies that there is a duplication of the *than* clause in semantics, and each *than* clause is associated with one comparative morpheme. Meier assumes that the process of the reconstruction of the extraposed *than* clause can be captured as an instance of syntactic lowering.

Applied to von Stechow's example, each comparative morpheme has a *than* clause in LF.

- (131) More dogs [than cats ate mice] ate more rats [than cats ate mice].

The LF structure is given below (slightly modified)²²: The subject and the NPs undergo movement for type mismatch and adjoin to type $\langle \triangleright \rangle$ nodes. DegPs undergo degree movement, and each comparative morpheme *-er* has a *than* clause in its complement. Two comparisons reside within one tree. The larger comparison compares the number of cats and the number of dogs. The smaller comparison compares the number of mice and the number of rats, and the smaller comparison is included inside the second argument of the larger comparison.



Each comparative morpheme takes two sets of degrees as shown below. Importantly, the degree arguments in the reconstructed *than* clauses are existentially bound unless they are bound by a lambda operator. In other words, the number of mice and cats are somewhat contextually determined when they are not being compared (indicated in bold below). This is how the problem of infinite regress is avoided.

²² Meier's original notation is provided below. She lets the DegPs and NPs adjoin to the CP.

(i) [CP [DegP2 -er [CP than₄ e₄ many cats ate e many mice]]₄ [CP [DegP1 -er [CP than₃ e many cats ate e₃ many mice]]₃ [CP1 [NP2 t₄ many dogs]₂ [CP [NP1 t₃ many rats]₁... [VP t₂ ate t₁]]]]]

(133)-er $(\lambda d_6. \exists d [d_6\text{-many cats ate } \mathbf{d}\text{-many mice}]) (\lambda d_4. \text{--er } (\lambda d_5. \exists d [\mathbf{d}\text{-many cats ate } d_5\text{-many mice}]) (\lambda d_3. d_4\text{-many dogs ate } d_3\text{-many rats}))$

The following truth conditions are derived from the above structure (slightly modified)²³.

(134) $\max (\lambda d_4. \max (\lambda d_3. d_4\text{-many dogs ate } d_3\text{-many rats}) > d_5) > d_6$,

where:

d_5 = the maximal d_5 : $\exists d [d\text{-many cats ate } d_5\text{-many mice}]$ and

d_6 = the maximal d_6 : $\exists d [d_6\text{-many cats ate } d\text{-many mice}]$

In a familiar larger-than relationship with two maximal degrees, the truth conditions can be stated as follows.

(135) $\max (\lambda d_4. \max (\lambda d_3. d_4\text{-many dogs ate } d_3\text{-many rats}) > \max (\lambda d_5. \exists d [d\text{-many cats ate } d_5\text{-many mice}])) > \max (\lambda d_6. \exists d [d_6\text{-many cats ate } d\text{-many mice}])$

On summarizing the discussion on von Stechow's example, the situation remains unclear. Hendriks argues that the relevant reading is not possible, whereas Meier argues it

²³ Meier's original notation is provided below.

(i) [the max n : [the max m : n -many dogs ate m -many rats $> m^*$] $> n^*$],

where:

m^* = the maximal m^* : $\exists d [d\text{-many cats ate } m^*\text{-many mice}]$ and

n^* = the maximal n^* : $\exists d [n^*\text{-many cats ate } d\text{-many mice}]$.

is possible²⁴. This confusion reflects the controversial grammatical status of multihead comparatives. It is not easy to argue for any side unless we have more clear grammatical judgments. However, Meier's truth conditions suggest something very important: the problem of infinite regress can be avoided when certain standard degrees are existentially fixed. Bearing this in mind, in the next section, let us turn to multihead comparatives in Japanese where grammatical judgments are more solid than in English.

2.3.5 Multihead Comparatives in Japanese

This section discusses multihead comparatives in Japanese. I will show that multihead constructions are well formed in Japanese. The fact is understood naturally if we follow our assumption: Japanese comparisons are discourse (contextual) comparisons, and multihead discourse comparisons are possible, as Hendriks argues. A common thread between Japanese comparisons and discourse comparisons in Dutch is that they both lack compositionally provided standards of comparison. In other words, they do not come with obligatory "than" clauses. Their standards of comparisons arise from a given

²⁴ Hendriks and Meier discuss why von Stechow's example is sometimes grammatical or ungrammatical, contrary to their arguments. However, neither of their discussions sounds plausible enough.

Hendriks (1994) assumes two possible reasons why (106) can sometimes be judged to be grammatical: (1) The sentence can be understood as a comparison of a rat-eating event by dogs and a mouse-eating event by cats. However, Hendriks herself admits that this would provide a wrong prediction (see the rat-sharing case by dogs in Section 1). (2) The second occurrence of *more* is vacuous. However, this would imply that (106) means the same as *More dogs ate rats than cats ate mice*. This is intuitively not very convincing.

Meier admits the fact that the grammatical status of the sentence is controversial; however, it is as grammatical as other multihead comparative sentences. Moreover, Meier points out that Hendriks' *fewer-more* example in (119) is marginal because of contextual flow. She presents a similar sentence that is much more acceptable and argues that multihead comparative sentences are possible.

(i) Last time, fewer boys ate more pizzas than girls ate candies.

discourse (context).

I would like to begin the discussion with the equivalent of (106) in Japanese, which is given in (136). This is grammatical, and its grammatical status seems much less controversial than (106). Note that the *yorimo* clause is scrambled to the sentence-initial position, since it is much easier to comprehend the sentence in this manner. Without the scrambling of the *yorimo* clause, the sentence is a little difficult to comprehend and its grammatical status could be as marginal as its English counterpart. This is shown in (137).

- (136) [Neko-ga hatukanezumi-o tabeta yorimo]_i (motto) takusan-no inu-ga
 cat-nom mouse-acc ate than (“more”) many-gen dog-nom
 t_i (motto) takusan-no dobunezumi-o tabeta.
 (more) many-gen rat-acc ate
 ‘More dogs ate more rats than cats ate mice.’

- (137)?(Motto) takusan-no inu-ga [neko-ga hatukanezumi-o tabeta yorimo]
 (“more”) many-gen dog-nom cat-nom mouse-acc ate than
 (motto) takusan-no dobunezumi-o tabeta.
 (“more”) many-gen rat-acc ate
 “More dogs ate more rats than cats ate mice.”

What is the intuitive meaning of (136)? Let us first test the truth conditions by von Stechow for the English equivalent that are denied by Hendriks.

- (138) The number of dogs that ate rats is greater than the number of cats that ate mice, and the number of rats that were eaten by dogs is greater than the number of mice that were eaten by cats.

It would be fair to say that the sentence sounds true; however, the conditions are not adequately precise. The comparison between dogs and cats seems to be solid: We counted the number of dogs that participated in rat-eating events and the number of cats that were involved in mouse-eating events. However, the comparison between rats and mice sounds ambiguous: It at least needs to be clarified whether we are counting the number of rats that are eaten by a single dog or the total number of rats eaten by any of the dogs.

Let us now consider the reading that von Stechow claims is missing in the English sentence by repeating the semantics. This reading would be satisfied if we have more rat-eating dogs than mouse-eating cats.

- (139) The number of those $\langle x, y \rangle$ such that x is a dog and y is a rat and x ate y is greater than the number of those $\langle z, w \rangle$ such that z is a cat and w is a mouse and z ate w .

These are not the correct truth conditions either. The problem is the same as we saw in the case of English. The conditions are too weak: If there are three dogs sharing one rat and one cat eats two mice, it satisfies the conditions; however, the sentence is intuitively false.

What can we do to deal with the unclear interpretation of the sentence?

Fortunately, there is a unique way of making it easier for native speakers to understand the meaning of the sentence in Japanese: Overt cardinal numbers can be added in the *yorimo* clause, as we saw in Section 3.2. With the overt numbers in the *yorimo* clause, the sentence can be paraphrased in English as “compared to three cats eating four mice, more dogs ate more rats.” The *yorimo* clause is scrambled to the sentence initial position, which also makes it easier to comprehend the sentence.

(140)[*san-biki-no* *neko-ga* *yon-hiki-no* *hatukanezumi-o*
 three-CL-gen cat-nom **four-CL-gen** mouse-acc
tabeta *yorimo*]_i (*motto*) *takusanno inu-ga* *t_i* (*motto*) *takusanno*
 ate “than” (“more”) many dog-nom (“more”) many
dobunezumi-o *tabeta*.
 rat-acc ate

Lit. ‘More dogs ate more rats than **three** cats ate **four** mice.’

(Compared to three cats eating four mice, more dogs ate more rats.)

The number of cats and rats are now fixed. In this case, the sentence implies that there are more than three dogs and more than four rats. However, this is still ambiguous at least in two ways—namely, distributive and cumulative.

In order to disambiguate the sentence, *sorezore* (each) can be added in the *yorimo* clause and in the matrix clause. This eliminates the possibility of a cumulative reading, and the sentence only has a distributive reading. A paraphrase in English “compared to three cats eating four mice each, more dogs ate more cats each” would

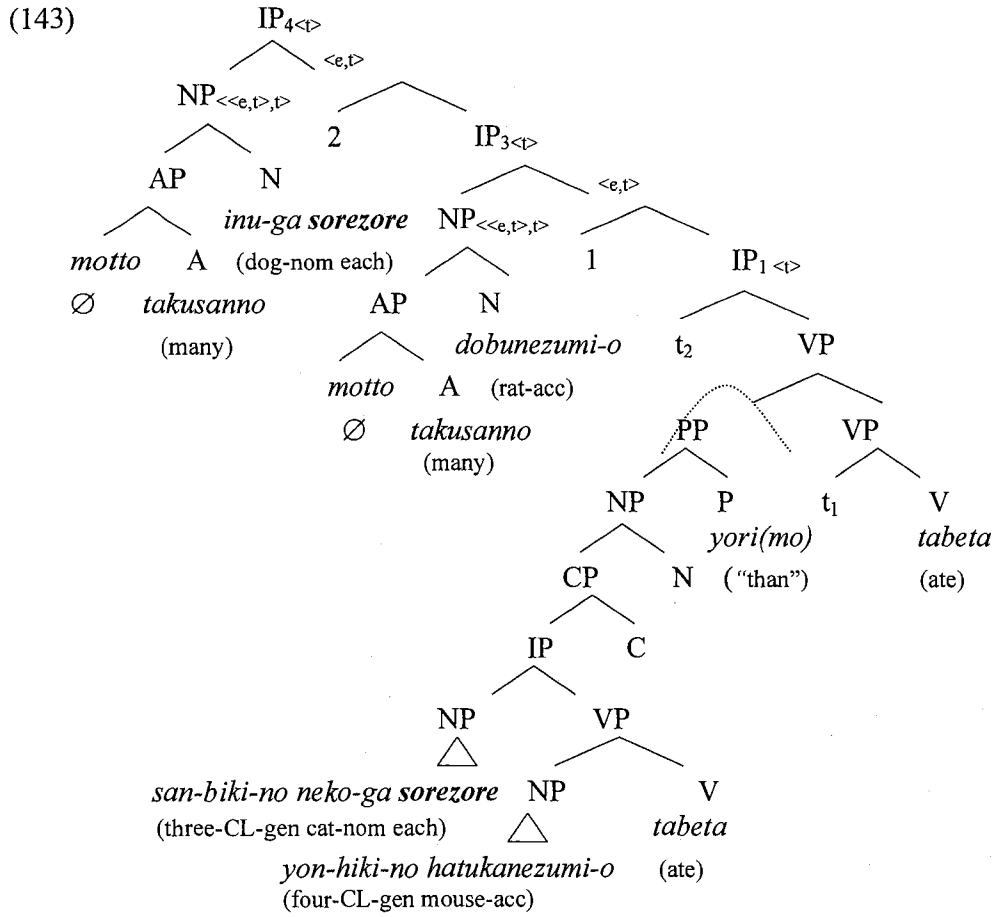
reflect the intuitive meaning.

- (141) [San-biki-no neko-ga **sorezore** yon-hiki-no hatukanezumi-o
three-CL-gen cat-nom **each** **four-CL-gen** mouse-acc
 tabeta yori(mo)]_i (motto) takusanno inu-ga **sorezore** *t_i* (motto)
 ate “than” (“more”) many dog-nom **each** (“more”) *t_i*
 takusanno dobunezumi-o tabeta.
 many rat-acc ate
 Lit. ‘More dogs ate more rats **each** than **three** cats ate **four** mice **each**.’
 (Compared to three cats eating four mice each, more dogs ate more cats.)

Now, we are ready to present an intuitive paraphrase of the sentence.

- (142) There are three cats and each of them ate four mice. There are more than three
 dogs and each of them ate more than four rats.

The LF structure of (141) is provided below. The *yori(mo)* clause is adjoined to VP, and it is excluded from the truth conditional calculation (as indicated by a dotted line). The two arguments of *tabeta* (ate) are type $\langle\langle e, t \rangle, t \rangle$, and they undergo QR and adjoin to IP.



Let us compositionally calculate the truth conditions. Crucially, the lexical entry of *takusanno* (many) denotes a comparison: It implies that a cardinal of the intersection of two properties is more than a contextually given number, c . *Takusanno* (many) appears twice in the sentence, and thus, there are two contextually given standard numbers. The *yorimo* clause provides them concrete values—namely, three for the number of cats, and four for the number of mice.

$$(144) \quad [[takusanno \text{ (many)}]] = \lambda p_{\langle e,t \rangle} \lambda q_{\langle e,t \rangle} \cdot |\lambda x. p(x) \wedge q(x)| > c$$

(145) Main clause :

$$[[\text{tabeta}(\text{ate})]] = \lambda y \lambda x. \text{ate}(y)(x)$$

$$[[\text{IP}_1]] = \text{ate}(g(1))(g(2))$$

$$[[1 \text{ IP}_1]] = \lambda y. \text{ate}(y)(g(2))$$

$$[[\text{takusanno}(\text{many})]] = \lambda p \lambda q. |\lambda x. p(x) \wedge q(x)| > c$$

$$[[\text{takusanno} \text{ dobunezumi}(\text{many rats})]] = \lambda q. |\lambda y. \text{rat}(y) \wedge q(y)| > c_{\text{mice}}$$

$$[[\text{IP}_3]] = |\lambda y. \text{rat}(y) \wedge \text{ate}(y)(g(2))| > c_{\text{mice}}$$

$$[[2 \text{ IP}_3]] = \lambda x. |\lambda y. \text{rat}(y) \wedge \text{ate}(y)(x)| > c_{\text{mice}}$$

$$[[\text{takusanno} \text{ inu}(\text{many dogs})]] = \lambda q. |\lambda x. \text{dog}(x) \wedge q(x)| > c_{\text{cats}}$$

$$[[\text{IP}_4]] = 1 \text{ iff } |\lambda x. \text{dog}(x) \wedge |\lambda y. \text{rat}(y) \wedge \text{ate}(y)(x)| > c_{\text{mice}}| > c_{\text{cats}}$$

$$c_{\text{cats}} := 3$$

$$c_{\text{mice}} := 4$$

“The cardinal of x s.t. x is a dog and x ate more than four y s.t. y is a rat exceeds 3.”

Notice that the problem of infinite regress never occurs in Japanese since the degree of matrix clauses and standard degrees are not mutually dependent. The values of the standard degrees are fixed and they are independent from the semantics of the matrix clause. This independence from the matrix clause is the key to have a well-formed interpretation. The same argument applies to Hendriks’s discourse comparisons. Similar argument also applies to Meier’s analysis: Some degree values in *than*-clauses must be existentially bound.

What is the denotation of the *yori(mo)* clause? The problem is that there is only

one *Yori(mo)* clause in the sentence; however, we need to infer two degrees from the single *Yori(mo)* clause. This problem can be solved by assuming that the *Yori(mo)* clause can be interpreted ambiguously, either as a set of cats or a set of mice, depending on the context. (146)a is a set of cats that ate mice, and (146)b is a set of mice that are eaten by cats²⁵. Each feeds the value of the relevant contextually determined degree *c*. They are shown as c_{cats} and c_{mice} in the truth conditions in (145).

(146) *Yori(mo)* clause

- a. $\lambda x. x$ are cats & $\text{card}(\text{Atomic part of } x)=3$ & $\forall x' [x' \leq x: x' \text{ ate four mice}]$
- b. $\lambda y. y$ are mice & $\text{card}(\text{Atomic part of } y)=4$ & $\forall y' [y' \leq y: y' \text{ ate eaten by a cat}]$

The following sentences show that it is indeed the case that an IHRC can be interpreted ambiguously. They have identical IHRC, but it is interpreted differently. In (147)a, the IHRC is understood as a cat, where as it is understood as fish in (147)b.

²⁵ Marques (2006) has a similar idea for dealing with multihead comparative sentences in Portuguese. There are two *mais* (more) in (i), whereas there is only one clausal clause to be compared. Marques assumes that two compared items can be derived from one clause by assuming that the relative pronoun *que* (what) links two variables as in (ii), so that the *than* clause identifies the number of countries that sent soldiers to Iraq and also the number of soldiers that were sent.

- (i) Este ano, **mais** países enviaram **mais** soldados para
 this year more countries sent more soldiers to
 o Iraque do que em qualquer outra altura.
 the Iraq of-the what at any other time
 “This year, more countries sent more soldiers to Iraq than any other time.”
- (ii) ~~que_{ij} x_i países enviaram y_j soldados para o~~
~~what x_i countries sent y_j soldiers to the~~
 Iraque em qualquer outra altura.
 Iraq at any other time

(147)a. [Neko_i-ga sakana-o tabeta no_i]-o sikatta.

cat-nom fish-acc ate NO]-acc yell_at

‘I yelled at the cats that ate the fish.’

b. [Neko-ga sakana_i-o tabeta no_i]-o kinaosita.

cat-nom fish-acc ate NO]-acc bought_again

‘I bought again the fish that the cats ate.’

Regarding the contextually inferred number of cats and that of mice, one thing should be noted. There is no formal mechanism that guarantees the correlation between the set of dogs and the contextually determined number of cats. The same thing applies to the relationship between the set of rats and the contextually determined number of mice. I assume that the contextually plausible comparisons in the sentence are between the two kinds of eaters (dogs and cats) and between the two kinds of eatees (rats and mice), because that would make the comparisons parallel. In other words, the matching between a set of individuals and *c* are moderated by the context. This means that no formal semantics forbid other combinations, for instance a comparison between dogs and mice, and the one between rats and cats. It is expected that a comparison becomes ambiguous when a context is unclear. This is in fact the case. The following example is syntactically well-formed, but its interpretation is unclear.

- (148) [John-ga mizu-o orenji jyuusu-ni sosoida yori(mo)]
 John-nom water-acc orange juice-to poured “than”
 Mary-ga (motto) takusanno kootya to koohii-o kakimazeta.
 Mary-nom(“more”) much tea with coffee-acc stired
 Lit. ‘Mary stired more tea and coffee than John poured water into orange juice.’

Intuitively, it is hard to tell what is compared to which amount. It may sound like the amount of the water is compared to the amount of either tea or coffee. But some would say that the total amount of the water and the orange juice is compared with that of the tea and the coffee²⁶. There might be some other possibilities as well.

Now let us confirm the truth conditions of (145) under three models. In all of them, the number of cats and mice are fixed to three and four, respectively. Consider Model 1. There are four dogs and each of them ate more than four rats (in other words, at least five). The truth conditions are satisfied, and the sentence is judged true under the model.

²⁶ *No* in IHRCs can be identified with more than one element in a sentence. Kuroda’s (1975-77) example shows the point.

- (i) [[Keikan_i-ga doroboo_j-o oikakete-ita] no_{ij}] -ga hutaritomo kawa-ni otita.
 Policeman-nom thief-acc chase-be NO-nom both river-to fell
 ‘The policeman was chasing the thief, both of whom fell into the river.’
 (Kuroda 1975-77)

The *no* in (i) is neither the *policeman* or the *thief* alone but the set of the two.

(149) Model 1: (141) is **true**.

Cat₁- 4 mice Dog₁- 5 rats

Cat₂- 4 mice Dog₂- 6 rats

Cat₃- 4 mice Dog₃- 7 rats

Dog₄- 8 rats

Consider Model 2. There are four dogs, but one of them did not eat a single rat. The truth conditions are not satisfied because they only include dogs that ate mice. Only three dogs satisfied the requirement. Since we need at least four dogs that ate rats, the sentence is expected to be judged false, and it is intuitively false.

(150) Model 2: (141) is **false**

Cat₁- 4 mice **Dog₁- 0 rats**

Cat₂- 4 mice Dog₂- 5 rats

Cat₃- 4 mice Dog₃- 6 rats

Dog₄- 7 rats

Consider Model 3. There are four dogs; one of them ate only two rats, and the rest of the dogs ate more than four rats. Since the truth condition requires each dog to eat more than four rats, the sentence is expected to be judged false, and it is intuitively false.

(151) Model 3: (141) is **false**.

Cat₁- 4 mice Dog₁- 2 rats

Cat₂- 4 mice Dog₂- 5 rats

Cat₃- 4 mice Dog₃- 6 rats

Dog₄- 7 rats

In summary, all of the three models discussed above confirm the truth conditions of (141) that are presented at the end of (145).

We have observed that what appears to be an expression similar to (106) in Japanese is interpretable. Multihead comparatives in Japanese are not what Hendriks calls multiple sentence-internal comparisons. Rather, they are similar to multihead discourse comparisons that can occur more than once in a sentence. Hence, multihead comparatives in Japanese are free from the problem of infinite regress that makes the English sentence in (106) uninterpretable. This is because the denotation of the *yorimo* clause does not depend on the semantics of the matrix clause. It is determined independently from the matrix clause. This becomes rather clear when the *yorimo* clauses have concrete degrees, as shown in (141).

In order to confirm our argument, let us consider one more example of multihead comparatives in Japanese. We predict that a sentence similar to (125) in Japanese should allow both “more people” and “prettier” in its *yorimo* clause, because Japanese comparisons are not sentence-internal comparisons and are basically discourse comparisons. This is borne out. The following example has a *yorimo* clause, where *ookuno* (many) and *utukusiku* (pretty) appear overtly. They do not have any visible

comparative morpheme, but they denote “more” and “prettier” by their lexical entries. Note that the *yorimo* clause is scrambled to the sentence-initial position. Further, the complement clause of *omotteita* (was thinking) is scrambled within the *yorimo* clause. The sentence is easy to comprehend with this word order.

- (152) [[Kare-ga **ookuno** **hito-o** **utukusiku-sita-daroo-to**]_j
 [[he-nom **mamy** **people-acc** **pretty-made-would-that**]
 watasi-ga _{t_j} omotteita yori(mo)]_i John-ga _{t_i}
 I-nom was_thinking “than”] John-nom
 motto ookuno hito-o motto utukusiku-sita.
 “more” many people “more” pretty-made
 Lit. ‘John made more people prettier than I was thinking that he would make more
 people prettier.’

The denotations for the adjectives “many” and “prettier” would make the point clearer.

- (153)a. $[[ookuno \text{ (many)}]] = \lambda p \lambda q. |\lambda x. p(x) \wedge q(x)| > c$
 b. $[[utukusiku \text{ (pretty)}]] = \lambda x. \max (\lambda d. pretty(d)(x)) > c$

I conclude that the Japanese versions of (106) are interpretable and that their semantics is accounted for with Japanese-style adjectives that have comparative semantics. The parallel behaviors between the Japanese data and what Hendriks calls discourse comparisons support our analysis that Japanese comparisons are made

contextually rather than compositionally. Importantly, such contextual comparison is brought by each adjective. Thus, when there are two adjectives in a sentence, there reside two comparisons in the sentence.

In summary, multihead comparatives in Japanese are evidence for our lexical approach of Japanese comparatives. Japanese adjectives are inherently comparatives and make a comparison with a contextually given degree. Therefore, multihead comparatives in Japanese are clarified as what Hendriks (1992) calls multihead discourse comparisons. This implies that multihead comparatives in Japanese are not a subject of the infinite regress that multihead sentence-internal comparatives in English and Dutch involve. Nevertheless, multihead comparatives are complicated; thus, native speakers may or may not be able to understand them very easily. Overt degrees in *yorimo* clauses assist in their comprehension. When there are no overt numbers, *yorimo* clauses will be understood with “some” numbers.

2.4 Multiple context setters

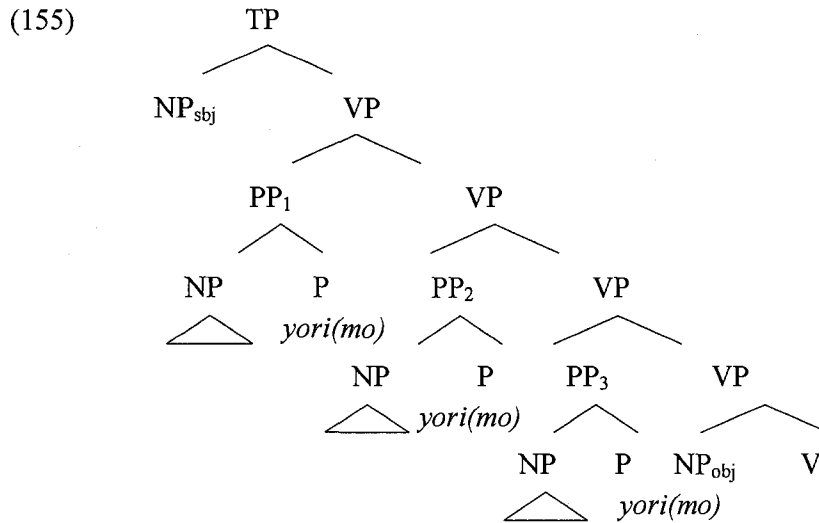
In this subsection, I will present the data of comparatives with multiple standards of comparison. They support Beck et al.’s analysis of contextual comparison. The data also provides us with an insight into the more detailed mechanism of contextual comparison in Japanese. Technically, I will make use of the notion of standard intervals proposed by von Stechow (2006).

2.4.1 Multiple *yorimo* clauses

Beck et al. argue that unlike *than* clauses, *yorimo* clauses are adjuncts. If so, *yorimo* clauses are expected to be recursive, and the following sentence proves that this is the case. In (154), there are three *yorimo* clauses hosted in one sentence. There is no conjunction (at least any overt one) between the *yorimo* clauses.

- (154) John-wa [Mary-ga yonda (no) ori(mo)]
 John-top [Mary-nom read (NO) “than”]
 [Bill-ga yonda (no) yori(mo)] [Sue-ga yonda (no) yori(mo)]
 [Bill-nom read (NO) “than”][Sue-nom read (NO) “than”]
 (motto) nagai hon-o
 (“more”) long book-acc
 yonda.
 read
 Lit. ‘John read a longer book [than Mary did][than Bill did][than Sue did].’
 (John read a longer book than any of Mary, Bill and Sue did.)

As for the structure of the sentence, I simply assume that all the *yorimo* clauses are adjoined to VP.



The issue is the interpretation of the sentence and its derivation. Intuitively, the sentence means that the length of the book that John read is greater than any of the number of books read by Mary, Bill, and Sue. However, the order among Mary, Bill, and Sue is unknown.

In order to figure out the truth conditions of the sentence, let us start with a naive analysis given below, where there are three possibilities for the contextually given standard degree c . The idea is that the larger-than-relation must hold for all the choices, namely, C_M , C_B , and C_S .

$$(156) \exists x. \text{paepr}(x) \wedge \text{read}(x)(J) \wedge \max(\lambda d. \text{long}(x)(d)) > c$$

three possibilities for c :

C_M = the number of books read by Mary

C_B = the number of books read by Bill

C_S = the number of books read by Sue

In other words, the following must hold.

$$(157) \quad d > C_M \wedge d > C_B \wedge d > C_S$$

This may be a reasonable choice. However, it is not clear how the three comparisons are made. One alternative analysis would be to assume that the sentence is made of three conjoined sentences with deletions of matrix clauses. The underlying sentences would be *John read a longer book than Mary did and John read a longer book than Bill did and John read a longer book than Sue did*. This appears to be quite possible. However, it does not imply that the VP adjoined structure (155) is prohibited. We would still like to figure out how the intuitive interpretation can be derived from (155).

2.4.2 von Stechow's (2006) Standard Interval

I would like to adopt von Stechow's (2006) view on the degree scale. This scale was originally proposed for the positive. Stechow assumes a degree scale S , such as the one for *tall*, which is divided into three parts—a “short” part, “tall” part, and a “neutral” part that belongs to neither the short nor tall part. The positive operator Pos is dependent on two parameters, the contextually relevant tallness scale S and a contextually given function N that provides the neutral segment of a scale.

$$(158) \quad S \mid \text{-----} [\text{-----}] \text{-----} \rightarrow$$

Short Neutral Tall

$$(159) \quad [[\text{Pos}_{N,S}]]^g = \lambda A_{dt}.(\forall d \in N(S))A(d)$$

The positive form of *tall* indicates that a degree is located above the neutral area of the tallness scale. When you say *Ede is tall*, Ede is taller than the contextually determined interval of “norm.”

(160)a. Ede is tall.

$$b. [[\text{Pos}_{N,S} \lambda d.tall_S(d)(Ede)]]^g \text{ iff } (\forall d \in N(S)) \text{HEIGHT}(Ede) \geq d$$

$$c. |-----[------]-----E----->$$

The advantage of having the neutral area is that it facilitates a uniform treatment of the positive form of both poles of antonym pairs such as *tall/short* and their negated cases. By saying *Ede is not tall*, you mean that Ede’s height does not fall above the norm; thus, it is either within the norm or below it. Similarly, *Ede is not short* means that his height does not fall below the norm; thus, his height is either normal or taller than the norm. Therefore, *Ede is neither short nor tall* means his height is a normal one that falls in the neutral area.

(161)a. Ede is not tall.

$$b. [[\neg \text{Pos}_{N,S} \lambda d.tall_S(d)(Ede)]]^g \text{ iff } \neg (\forall d \in N(S)) \text{HEIGHT}(Ede) \geq d$$

$$c. |-----[------E-----]----->$$

or

$$|-----E-----[------]----->$$

(162)a. Ede is not short.

b. $[[\neg \text{Pos}_{N,S} \lambda d. \text{short}_S(d)(\text{Ede})]]^g \text{ iff } \neg (\forall d \in N(S)) \text{HEIGHT}(\text{Ede}) < d$

c. |-----[-----E-----]----->

or

|-----[-----]-----E----->

(163)a. Ede is neither short nor tall.

b. $[[\neg \text{Pos}_{N,S} \lambda d. \text{short}_S(d)(\text{Ede}) \ \& \ \neg \text{Pos}_{N,S} \lambda d. \text{tall}_S(d)(\text{Ede})]]^g \text{ iff}$

$\neg (\forall d \in N(S)) \text{HEIGHT}(\text{Ede}) < d \ \& \ \neg (\forall d \in N(S)) \text{HEIGHT}(\text{Ede}) \geq d$

c. |-----[-----E-----]----->

The concept of standard interval can be naturally extended to cover Japanese comparatives. Recall that Beck et al. say that Japanese comparisons are made with a contextually provided standard c . Then, the standard c can be an interval instead of a point.

Consider (164), a concrete example. The originally proposed lexical entry of the adjective *nagai* (long) in (165)a is now revised as in (166), where we have a standard interval on a scale I instead of a point c . When there is no context setter such as a *yori(mo)* clause, the standard interval is understood as a “norm,” as in the case of an English positive. Thus, the truth conditions say that the paper is longer than the normal length in the given context.

(164) Kono ronbun-wa nagai.

this paper-top long

‘This paper is long.’

(165)a. $[[long]] = \lambda x. \max(\lambda d. \text{long}(d)(x)) > c$

b. $[[kono ronbun-wa nagai(\text{this paper is long})]] = 1$ iff

$\max(\lambda d. \text{tall}(d)(\text{this_paper})) > c$

(166) Revised:

a. $[[long]] = \lambda x. \max(\lambda d. \text{long}(d)(x)) > I$

b. $[[kono ronbun-wa nagai(\text{this paper is long})]] = 1$ iff

$\max(\lambda d. \text{long}(d)(\text{this_paper})) > I$

When a context setter is present, the value of I is specified by the given context. In (167), *kitei yori* (than the regulation size) sets the standard value. The standard interval contains the regulation length in a given context, C_R . I will use C to imply that the degree is contextually provided. The subscript R in this case stands for the regulation. The length of the paper, P , is located above the standard interval on the scale, as shown in (168). The truth conditions in (169) say that the length of the paper falls above the standard interval, which is determined by the *yori(mo)* clause. $I = [C_R]$ means that the standard interval I includes C_R .

- (167) Kono ronbun-wa [kitei yori(mo)] nagai.
 this paper-top [regulation “than”] long
 ‘This paper is longer than the regulation size.’

- (168) |-----[--C_R--]-----P-----→
 Standard interval

- (169) $[[long]] = \lambda x. \max(\lambda d. long(d)(x)) > I$
 $[[kono ronbun-wa nagai]] = 1$ iff $\max(\lambda d. long(d)(this_paper)) > I$
 $I = [C_R]$

2.4.3 Standard Interval and Multiple Context Setters

Let us revisit the case of comparatives with multiple *yori(mo)* clauses in (154), repeated as (170). Now, a standard of comparison can be an interval. This implies that the range of a standard can be wide enough to accommodate multiple degrees. If so, it can be simply assumed that the multiple *yori(mo)* clauses in (154) all contribute degrees to specify the range of the standard interval. In (171), the contextually provided length of the paper read by Mary, Bill, and Sue, i.e., C_M , C_B , and C_S , are located in the standard interval. I describe this as $I = [C_M \ C_B \ C_S]$ (the order among C_M , C_B , and C_S is arbitrary) to imply that the standard interval includes C_M , C_B , and C_S . The length of the paper John read is indicated as J , which falls above the standard interval.

- (170) John-wa [Mary-ga yonda(no) yori(mo)] [Bill-ga yonda (no) yori(mo)]
 John-top [Mary-nom read (NO) “than”] [Bill-nom read (NO) “than”]
 [Sue-ga yonda (no) yori(mo)] (motto) nagai hon-o
 [Sue-nom read (NO) “than”] (“more”) long book-acc
 yonda.
 read
 Lit. “John read a longer book [than Mary did][than Bill did][than Sue did].”
 (John read a longer book than any of Mary, Bill and Sue did.)

- (171) |[..C_M, C_B, C_S ..]......J →

The truth conditions are as in (172): John read a paper whose length is greater than a contextually determined range that includes the lengths of the papers read by Mary, Bill, and Sue.

- (172) $\exists x. \text{paepr}(x) \wedge \text{read}(x)(J) \wedge \max(\lambda d. \text{long}(x)(d)) > I$
 where $I = [C_M, C_B, C_S]$

Importantly, such comparatives with multiple *yori(mo)* clauses show that the mechanism of Japanese comparatives is flexible enough to accommodate all the contextual information. This is rather evident when the mechanism is compared with that of English. In English, it is not possible to have multiple *than* clauses in a single sentence to begin with (unless they are combined with the overt *and*, which implies that it is

derived from multiple underlying sentences.) By the lexical entries of the comparative morpheme *-er*, there cannot be more than one standard degree in a comparison. A standard degree is compositionally calculated; thus, it has to be a singular degree.

$$(173) \quad [[-er]] = \lambda D' \lambda D. \max(D) > \max(D')$$

In contrast, Japanese standard degree is contextually determined. This enables us to manipulate the value of the standard relatively freely. All the *yorimo* clauses in (154) add information about the range of the standard interval *I*. The order among the three lengths is unknown, because there is no formal relationship between them. They are simply combined in the standard interval, and this is done non-compositionally.

This line of argument is combined with the discussion of negated adjectives as antonym in 2.2.4 and makes a prediction. (174) has three standards of comparison and the matrix adjective is negated. It is predicted that the negated adjective makes an antonym, and all the standards are accommodated in the standard interval on the scale of antonym. This is correct.

- (174) Kono hon-wa [A yori(mo)] [B yori(mo)] [C yori(mo)] omoshiroku-nai.
 this book-top A “than” B “than” C “than” interesting-neg
 ‘This book is more un-interesting than any of A, B, or C.’

As shown below, the degree in-interestingness of “this book” falls above the upper boundary of the standard interval.

(175) a. |[..C_A, C_B, C_C ..].....this book → uninteresting

b. $\max(\lambda d.\text{uninteresting}(d)(\text{this_book})) > I$

where, $I = [C_A, C_B, C_C]$

For the rest of the dissertation, I will use the standard interval I when it is relevant.

Otherwise, I will simply use c for the standard degree for the sake of simplicity.

2.5 Summary of Chapter 2

In this chapter, I reanalyzed Japanese comparatives with what we call the lexical analysis, under which Japanese adjectives have comparative semantics in their lexical entries.

(176) Lexical Analysis of Japanese Comparatives (A is an arbitrary adjective):

a. $[[A]] = \lambda d'. \lambda x. \max(\lambda d. A(d)(x)) = c + d'$

b. $[[A]] = \lambda x. \max(\lambda d. A(d)(x)) > c$

With such lexical entries, it is already predicted that direct degrees of adjectives do not undergo movement because they are bound within the adjectives. It raises a question of whether or not the Degree Abstraction Parameter is needed. I proposed to keep the DAP

in addition to the comparative adjectives in order to cover some additional cases in Japanese and also for the sake of cross-linguistic research.

Otherwise, I basically adopted the analysis of Beck et al. and provided additional evidence for their analysis. Degree arguments in *yorimo* clauses can appear overtly, which indicates that there is no abstraction over degrees in *yorimo* clauses. Contrary to the case of *than* clauses in English, NPIs are not hosted in *yorimo* clauses because they are essentially relative clauses.

I have shown that unlike English, Japanese allows multihead comparatives. This is natural when the lexical analysis is adopted: Each adjective in Japanese results in a comparison; thus, more than one comparison resides in one sentence when it has more than one adjective. A comparative sentence with multiple *yorimo* clauses supports the analysis of *yorimo* clauses as adjuncts as well as the pragmatic nature of Japanese comparatives. I proposed to adopt a standard interval in the spirit of von Stechow (2006). Contextually provided multiple standard degrees are all accommodated in a standard interval and help determine the range of such a standard interval.

Chapter 3 Comparative Conditionals

The unique mechanism of gradable adjectives and comparatives in Japanese that is proposed in Chapter 2 must be confirmed in other degree constructions as well. This chapter investigates a version of the comparative construction, which is called the comparative conditional (henceforth, CC) in Japanese. An example of this construction is provided below.

- (1) [Tenki-ga yoi] hodo, [Otto-wa (motto) uresii]
weather-nom good CC Otto-top (“more”) happy
‘The better the weather is, the happier Otto is.’

Syntactically, the sentence appears to be a little different from its English counterpart. However, I will argue that this type of construction shares basic semantics with English CCs and thus, should be considered as CCs in Japanese. I will propose a semantics of Japanese CCs on the basis of the semantics of Japanese comparatives that was discussed in Chapter 2. Most importantly, I will adopt the lexical analysis, under which Japanese adjectives have comparative semantics in their lexical entries. This will account for the basic properties as well as some unique behaviors of CCs in Japanese. It will be shown that two types of comparisons are observed in Japanese CCs: one that compares direct degrees and the other that compares differential degrees. This supports our view that Japanese degree adjectives come with two kinds of degree arguments, direct degree *d* and differential degree *d'*.

Lexical analysis of Japanese comparatives

- (2) a. $\lambda x.\max(\lambda d.A(d)(x))>c$
 b. $\lambda d'\lambda x.\max(\lambda d.A(d)(x)) = c+d'$

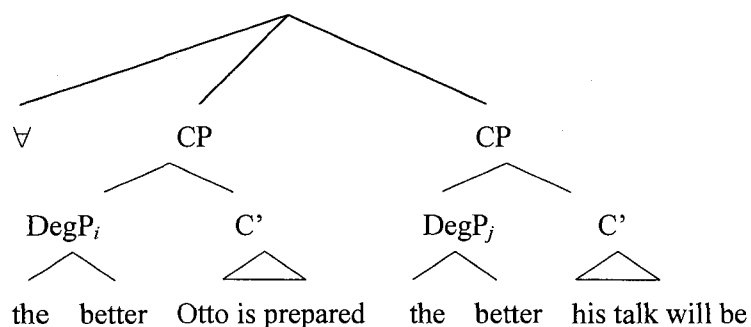
This chapter is organized as follows. I will first review a previous study by Beck (1997) on English and German CCs. Basically, English and German CCs have conditional semantics with comparatives in the antecedent and consequent clauses. I will also review Lin (2007) for Chinese CCs. Chinese CCs behave somewhat differently from English/German CCs. Interestingly, some of the behaviors of Chinese CCs are also observed in Japanese CCs. However, Japanese CCs further exhibit unique behaviors that are observed neither in Chinese CCs nor in English CCs. Therefore, I will propose the semantics of Japanese CCs independently from those languages.

3.1 Comparative Conditionals in English and German

Sentences such as (3) are called comparative conditionals. They feature preposed comparative forms of adjectives. Consider an example and its structure from Beck (1997).

- (3) Je besser Otto vorbereitet ist, desto besser wird sein Referat werden.
 ‘The better Otto will be prepared, the better his talk will be.’

(4)



According to Fillmore (1987), McCawley (1988), Beck (1997), and others, CCs involve conditional semantics with comparatives in antecedent and consequent clauses.

- (5) $\forall w_1 w_2 [[\text{Otto is better prepared in } w_1 \text{ than he is in } w_2] \rightarrow [\text{Otto's talk is better in } w_1 \text{ than it is in } w_2]]$

‘If Otto is better prepared in one occasion than in another, his talk is better at the first occasion than in the second one.’

The two world variables w_1 and w_2 are bound by the universal quantifier, which is implicitly given in the sentence. This is based on Heim’s (1982) analysis of the tripartite structure of conditionals (built on Lewis (1975)). As in the case of traditional conditionals, universal quantification is a default in CCs. However, an overt adverb of quantification can overwrite it, as the following example with *oft* (often) shows.

- (6) **Oft** ist ein Mathebuch umso langweiliger,
 often is a math_book the boring-er

je sårker er ist.

the fatter it is

‘A math book is frequently the more boring, the fatter it is.’ (Beck 1997:238)

- (7) **MOST** x,y [math book(x) \wedge math book(y) \wedge x is fatter than y] \rightarrow [x is more boring than y]

Quantifiers in CCs can bind different types of variables as adverbs of quantification in regular conditionals can. In the abovementioned example, which is repeated in (8), the universal quantifier binds world variables. In (9), it binds individual variables, as the sentence compares two attorneys. In (10), the sentence compares situations in two time periods in the past.

- (8) a. The better Otto is prepared, the better his talk will be.
 b. $\forall w_1, w_2$ [Otto is better prepared in w_1 than in w_2] \rightarrow [Otto’s talk is better in w_1 than in w_2]
- (9) a. The slimmer an attorney looks, the more successful he is.
 b. $\forall x,y$ [attorney(x) \wedge attorney(y) \wedge x looks slimmer than y] \rightarrow [x is more successful than y]
- (10) a. The hotter it got, the more tired Uli grew.
 b. $\forall t_1, t_2$ [it was hotter at t_1 than it was at t_2] \rightarrow [Uli was more tired at t_1 than he was at

$t_2]$

Beck (1997) points out an interesting behavior of German CCs. In the paraphrase in (5) repeated below, a *than* clause appears in each comparison even though the original sentence (3) does not include these clauses. *Than* clauses (or *als* clauses in German) are not merely phonologically elided in (3). The inclusion of any overt *than* clauses makes the sentence unacceptable.

- (11) $\forall w_1 w_2$ [[Otto is better prepared in w_1 than he is in w_2] \rightarrow [Otto's talk is better in w_1 than it is in w_2]]

“If Otto is better prepared in one occasion than in another, his talk is better at the first occasion than in the second one.”

- (12) *Je müder Otto ist als Hans, desto aggressiver
 the tired-er Otto is than Hans the aggressive -er
 ist er.
 is he

‘*The more tired Otto is than Hans, the more aggressive he is.’

Thus, the question of how the *than* clauses are introduced in semantics is a challenge for any possible analysis.

Beck (1997) assumes that in German, *je/desto* takes a clause and uses it twice to make a comparison. In other words, they introduce implicit *than* clauses in semantics. A

similar analysis applies to *the* in English.

$$(13) \quad [[je]](w_1, w_2)([[er]])(D_{\langle s, \langle d, t \rangle \rangle}) \text{ iff } \exists d[d > 0 \ \& \ [[er]](D(w_1))(d)(D(w_2))]$$

Given (13) and the lexical entry of the comparative operator in (14), the truth conditions of (3) are given in (15): If there is a positive difference between the maximal degree to which Otto is prepared in w_1 and in w_2 , then there is a positive difference between how good Otto's talk is in w_1 and w_2 .

$$(14) \quad [[er]](D_1)(d)(D_2)=1 \text{ iff the max } d_2 D_2(d_2) = d + \text{ the max } d_1 D_1(d_1)$$

$$(15) \quad \forall w_1 w_2 [\exists d[d > 0 \ \& \ \text{the max } d_1 [\text{well}(d_1, \lambda x[\text{prepared}_{w_1}(x)])(\text{Otto})] = \\ d + \text{ the max } d_2 [\text{well}(d_2, \lambda x[\text{prepared}_{w_2}(x)])(\text{Otto})]] \rightarrow \\ \exists d [d > 0 \ \& \ \text{the max } d_1 [\text{good}_{w_1}(d_1, \text{Otto's talk})] = \\ d + \text{ the max } d_2 [\text{good}_{w_2}(d_2, \text{Otto's talk})]]]$$

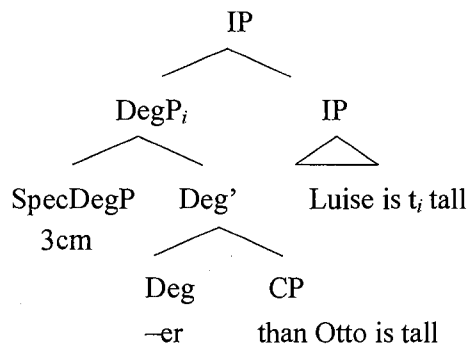
The ungrammatical status of (12) is now accounted for. *Je* introduces an implicit standard of comparison in semantics. Thus, it prohibits the use of any overt than clause because the comparative morpheme only takes one standard degree. Hence, any overt than clause is simply redundant.

Another characteristic of English/German CCs is the ban on differential degrees, which follows from the abovementioned analysis. In German and English, *je* and *the* occupy SpecDegP. (Refer to the structure in (4). The comparative morpheme occupies the

head position of Deg, and *the* occupies SpecDP.) SpecDegP is also the position for a differential degree, as the following example with an overt differential degree shows.

(16)a. Luise is 3 cm taller than Otto.

b.



Therefore, it is not possible to have an overt difference degree and *the/je* at the same time, as they compete for the same position.

(17) *je (um) eine Stundespäter es wurde, desto (um) drei
 the by one hour later it got the by three
 Grad heißer wurde es.
 degrees hotter got it

‘For each hour later it got, the temperature rose by three degrees.’

In summary, CCs involve a conditional semantics with comparatives in antecedent and consequent clauses in German/English. *Than* clauses cannot be overtly hosted in CCs because the standard of comparison is semantically introduced by *je/the*. Differential degrees cannot appear because the position is occupied by *je/the*.

3.2 Comparative Conditionals in Chinese

There is not much cross-linguistic research on CCs in the literature at this point. One exception is Lin's (2007) study on Chinese CCs¹. This subsection reviews his discussion. Lin's observation on Chinese CCs becomes relevant when we discuss Japanese data in 3.3. According to Lin, Chinese CCs share the basic properties of CCs with English and German. At the same time, Lin points out the characteristics of Chinese CCs that are not observed in English or German: Most importantly, Chinese CCs allow overt *jiu* (than) clauses. Moreover, Chinese CCs can take a relative clause instead of an antecedent clause. For these reasons, Lin proposes distinct semantics for Chinese CCs.

3.2.1 Basic data

Let us begin with an example of prototypical data in (18). As in the case of English CCs, it is a combination of two sentences; however, no inversion is involved in its word order. *Yue* (more) is an adverb that uniquely appears in Chinese CCs. Unlike the case of comparative morphemes in English and German that are relocated to the Spec of CP, *yue* (more) is in the base generate position. The sentence intuitively carries the same semantics as its English counterpart, as the translation suggests.

¹ Lin calls the structure "comparative correlatives."

- (18) ni **yue** shengqi ta (jiu) **yue** gaoxing
 You **more** angry he JIU **more** happy
 ‘The angrier you are, the happier he is.’ (Lin 2007: 169)

How is the semantics of such Chinese CCs derived? Lin does not adopt Beck’s analyses for Chinese for several reasons. First, unlike English/German, there is no element that would be an equivalent of *the/je* in English/German. Second, it is unclear whether or not *yue* (more) is the Chinese counterpart of *-er* in English. Regular comparatives in Chinese adopt different morphemes such as *bi* or *bijiao*.

- (19) a. Zhangsan **bi** Lisi gao.
 Zhangsan compare Lisi tall
 ‘Zhangsan is taller than Lisi.’

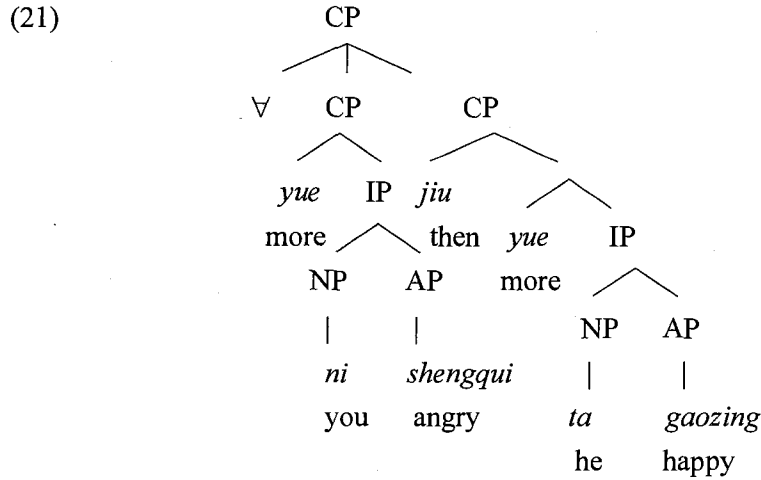
 b. Zhangsan **bijiao** gao.
 Zhangsan compare tall
 ‘Zhangsan is taller.’

In Lin’s proposal, *yue* (more) plays a central part in deriving the semantics of CCs in Chinese. It is responsible for what *the* and *-er* together do in English: It semantically introduces a complex standard of comparison by making a copy of a proposition *p* that is to serve as a *than* clause. It also creates a larger-than-relationship between two degrees.

$$(20) \quad [[yue]] = \lambda p_{\langle d, \langle s, t \rangle \rangle} \lambda d_1 \lambda d_2 \lambda w_1 \lambda w_2. p(d_1)(w_1) \wedge p(d_2)(w_2) \wedge d_2 > d_1$$

(slightly revised from Lin 2007: 189)²

The compositional calculation of sentence (18), which is based on the LF structure in (21), is given in (22). Lin assumes that the degree adverb *yue* (more) in each clause adjoins to the restriction and to the nuclear scope. The truth conditions say that if you are angrier in one world than in another world, there is a case where he will be happier in the former than in the latter.



$$(22) \quad a. \quad [[[_{AP} shengqi]]] = \lambda x \lambda d \lambda w. angry(x)(d)(w)$$

$$b. \quad [[[_{IP} ni shengqi]]] = \lambda d \lambda w. angry(you)(d)(w)$$

² Lin's original notation is given below.

(i) $[[yue]] = \lambda P_{\langle d, \langle s, t \rangle \rangle} \lambda g_1 \lambda g_2 \lambda s_1 \lambda s_2 [P(g_1)(s_1) \wedge P(g_2)(s_2) \wedge g_2 > g_1]$
(Lin 2007: 189)

- c. $[[[_{CP} yue\ ni\ shengqi]]] = [\lambda p_{<d, <s, t>>} \lambda d_1 \lambda d_2 \lambda w_1 \lambda w_2. p(d_1)(w_1) \wedge p(d_2)(w_2) \wedge d_2 > d_1](\lambda d \lambda w. angry(you)(d)(w))$
- $= \lambda d_1 \lambda d_2 \lambda w_1 \lambda w_2. angry(you)(d_1)(w_1) \wedge angry(you)(d_2)(w_2) \wedge d_2 > d_1$
- d. $[[[_{CP} yue\ ta\ gaoxing]]] = \lambda d_3 \lambda d_4 \lambda w_3 \lambda w_4. happy(he)(d_3)(w_3) \wedge happy(he)(d_4)(w_4) \wedge d_4 > d_3$
- e. $[[\forall yue\ ni\ shengqi\ jiu\ yue\ ta\ gaoxing]] = 1$ iff
- $\forall d_1, d_2, w_1, w_2 [[angry(you)(d_1)(w_1) \wedge angry(you)(d_2)(w_2) \wedge d_2 > d_1] \rightarrow$
- $\exists d_3, d_4 [happy(he)(d_3)(w_1) \wedge happy(he)(d_4)(w_2) \wedge d_4 > d_3]]$
- (slightly revised from Lin 2007:193)^{3, 4}

“If you are angrier in one world than in another world, there is a case where he will be happier in the former than in the latter.”

3.2.2 Characteristics of Comparative Conditionals in Chinese

Lin points out two characteristics of CCs in Chinese. First, Chinese CCs allow overt *bi* (than) phrases. Second, Chinese CCs can take relative clauses in the position of antecedent clauses.

³ The truth conditions in Lin’s original notations are given below. The causal relation *R* is omitted in (22) for the sake of simplicity.

(i) $\forall g_1, g_2, s_1, s_2 [angry'(you')(g_1)(s_1) \wedge angry'(you')(g_2)(s_2) \wedge g_2 > g_1] \rightarrow$

$\exists g_3, g_4, s_3, s_4 [s_1 \leq s_3 \wedge s_2 \leq s_4 \wedge R(<g_1, s_1>, <g_3, s_3>) \wedge R(<g_2, s_2>, <g_4, s_4>) \wedge happy'(he')(g_3)(s_3) \wedge happy'(he')(g_4)(s_4) \wedge g_4 > g_3]$

⁴ The truth conditions seem too weak. Unless maximal degrees are chosen for d_3 and d_4 , there are always degrees that makes $d_4 > d_3$ true even if his happiness does not grow. (Pointed out by Sigrid Beck by p.c.)

Given below is an example of Chinese CC with a *bi* phrase. This is surprising given the fact that overt *than* clauses are forbidden in English/German CCs.

- (23) Ni yue **bi** ta kuaile, ta jiu yue tongku.
 you more **compare** he happy he then more painful
 ‘*The happier you are than he, the more painful he is.’
 (The more your happiness exceeds his, the more painful it is for him.)

(Lin 2007: 185)

The truth conditions of the sentence are given in (24). Basically, the sentence involves an English/German-like interpretation of CCs. When paraphrased in plain English, the truth conditions roughly state that if you are happier in one case than in another, he has more pain in the former case than in the latter. The overt *bi* (than) phrase provides additional interpretation that you are always happier than he is. This is denoted as “ $d_5 > d_1$ ” and “ $d_6 > d_2$.” (Note that the paraphrase in English in (24) is provided by the author.)

- (24) $[[\forall yue\ ni\ bi\ ta\ kuaile\ jiu\ yue\ ta\ tongku]] = 1$ iff
 $\forall d_5, d_6, w_5, w_6 [\exists d_1 [\text{happy}(\text{he})(d_1)(w_5) \wedge \text{happy}(\text{you})(d_5)(w_5) \wedge d_5 > d_1] \wedge$
 $\exists d_2 [\text{happy}(\text{he})(d_2)(w_6) \wedge \text{happy}(\text{you})(d_6)(w_6) \wedge d_6 > d_2 \wedge d_6 > d_5]$
 $\rightarrow \exists d_3, d_4 [\text{painful}(\text{he})(d_3)(w_1) \wedge \text{painful}(\text{he})(d_4)(w_2) \wedge d_4 > d_3]]$
 (slightly revised from Lin 2007: 207)⁵

⁵ The truth conditions in Lin’s original notations are given below.

(i) $\forall g_5, g_6, s_5, s_6 [\exists g_1 [\text{happy}'(\text{he})(g_1)(s_5) \wedge \text{happy}'(\text{you}')(g_5)(s_5) \wedge g_5 > g_1] \wedge$
 $\exists g_2 [\text{happy}'(\text{he})(g_2)(s_6) \wedge \text{happy}'(\text{you}')(g_6)(s_6) \wedge g_6 > g_2 \wedge g_6 > g_5]]$
 $\rightarrow \exists g_3, g_4, s_3, s_4 [s_5 \leq s_3 \wedge s_6 \leq s_4 \wedge R(<g_5, s_5>, <g_3, s_3>) \wedge R(<g_6, s_6>, <g_4, s_4>)]$

“If you are happier in one case than in another while being happier than he is, then he has more pain in the former case than in the latter.”

A question arises as to why a *bi* (than) phrase can appear in Chinese CCs without harming the grammatical status of its host sentence. The key to solve the puzzle is in the semantics of *yue* (more) that governs the semantics of CCs in Chinese. *Yue* (more) can take an argument that already contains a comparison. In order to understand this, let us consider a part of the calculation given below. *Yue* (more) takes a set of degree as its argument (indicated in bold). Notice that the argument already contains a comparison “ $d_2 > d_1$.” This comparison comes from the sentence *ni bi ta kuaile* (you are happier than he). The comparison introduced by *yue* (more) is “ $d_6 > d_5$ ” in the last line.

$$\begin{aligned}
 (25) \quad & [[yue(\text{more})]]([ni\ be\ ta\ kuaile(\text{you are happier than he})]) \\
 &= [\lambda p_{\langle d, \langle s, t \rangle \rangle} \lambda d_5 \lambda d_6 \lambda w_5 \lambda w_6. p(d_5)(w_5) \wedge p(d_6)(w_6) \wedge d_6 > d_5] \\
 &\quad (\lambda d_2 \lambda w \exists d_1 [\text{happy}(\text{he})(d_1)(w) \wedge \text{happy}(\text{you})(d_2)(w) \wedge d_2 > d_1]) \\
 &= \lambda d_5 \lambda d_6 \lambda w_5 \lambda w_6. \exists d_1 [\text{happy}(\text{he})(d_1)(w_5) \wedge \text{happy}(\text{you})(d_5)(w_5) \wedge d_5 > d_1] \\
 &\quad \wedge \exists d_2 [\text{happy}(\text{he})(d_2)(w_6) \wedge \text{happy}(\text{you})(d_6)(w_6) \wedge d_6 > d_2 \wedge d_6 > d_5] \\
 &\quad \text{(slightly revised from Lin 2007: 206)}
 \end{aligned}$$

Thus, an overt *bi* (than) clause is possible in Chinese CCs owing to the semantics of *yue* (more), which can take a comparison as its argument. However, it is unclear how this is

$$\text{painful}'(\text{he}')(g_3)(s_3) \wedge \text{painful}'(\text{he}')(g_4)(s_4) \wedge g_4 > g_3]$$

syntactically possible, as Lin does not provide a relevant LF structure.

One thing needs to be pointed out. There is a mismatch between the paraphrase of (23) and the truth conditions in (24). According to the paraphrase “the more your happiness exceeds his” implies that the gap between your happiness and his happiness grows. However, the truth conditions do not guarantee such interpretation. They just require your happiness to be larger than his. The sentence would be true even if the gap between your happiness and his remains the same. I will come back to this point in 3.3.2 when we consider similar sentences in Japanese.

Another characteristic of Chinese CCs is that they allow a DP to be modified by a relative clause instead of an antecedent clause. (26) is a comparison of two different students.

- (26) [DP [_i yue jinzhang de] xuesheng_i] (jiu) yue rongyi
 more nervous REL student then more easy
 kao de bu hao
 take-exam DE not good

Lit. ‘Students who are more nervous are more likely to do badly in their exams.’

(Lin 2007: 203)

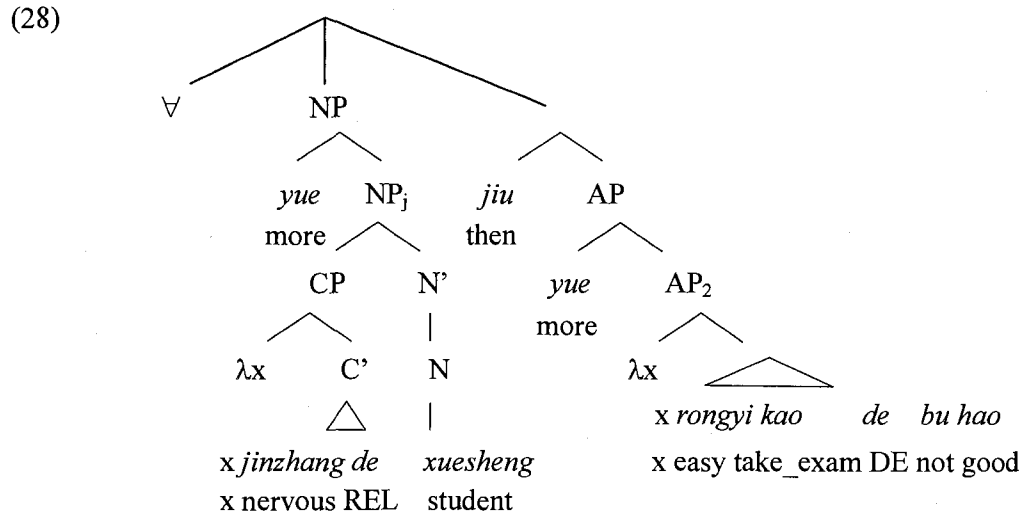
- (27) $\forall x, y [\text{student}(x) \wedge \text{student}(y) \wedge x \text{ is more nervous than } y] [x \text{’s performance is worse than } y]$

(Lin 2007:173)

Comparisons of different individuals are available in other languages as well, as we have already seen English example (9). The characteristic of Chinese lies in the syntactic

structures that bring the interpretation of CCs. How is the semantics of (26) derived?

Lin assumes the following LF structure. The subject NP is mapped to the restriction of the quantifier, and the VP to the nuclear scope. Since the subject NP is raised from the VP-internal position, there is a lambda operator that binds the original subject position. The truth conditions capture the intuitive interpretation.



(29) $[[[(28)]]]=1$ iff

$$\begin{aligned} & \forall x, y, d_1, d_2, w_1, w_2 [[\text{nervous}(x)(d_1)(w_1) \wedge \text{student}(x) \wedge \text{nervous}(y)(d_2)(w_2) \wedge \\ & \text{student}(y) \wedge d_2 > d_1] \rightarrow \exists d_3, d_4 [\text{easy-to-bad-in-exam}(x)(d_3)(w_1) \wedge \\ & \text{easy-to-bad-in-exam}(y)(d_4)(w_2) \wedge d_4 > d_3]] \end{aligned}$$

(slightly revised from Ling 2007:205)⁶

⁶ Lin's original notations are given below.

(i) $\forall x, y, g_1, g_2, s_1, s_2 [[\text{nervous}'(x)(g_1)(s_1) \wedge \text{student}'(x) \wedge \text{nervous}'(y)(g_2)(s_2) \wedge \text{student}'(y) \wedge g_2 > g_1] \rightarrow \exists g_3, g_4, s_3, s_4 [s_1 \leq s_3 \wedge s_2 \leq s_4 \wedge R(<g_1, s_1>, <g_3, s_3>) \wedge R(<g_2, s_2>, <g_4, s_4>) \wedge \text{easy-to-bad-in-exam}'(x)(g_2)(s_3) \wedge \text{easy-to-bad-in-exam}(y)(g_4)(w_4) \wedge g_4 > g_3]]$

In summary, Chinese CCs exhibit behaviors that are not observed in English/German CCs. They allow overt *bi* (than) phrases, and they also allow relative clauses in the position of antecedent clauses. Interestingly, the two characteristics discussed in this subsection are also observed in Japanese CCs in the next subsection.

3.3 Behaviors of Comparative Conditionals in Japanese

This section reviews behaviors of Japanese CCs. Japanese CCs share basic semantics with English, German, and Chinese CCs despite some syntactic differences. It will be shown that they allow overt *yorimo* phrases (*than* phrases), and they can take relative clauses instead of normal antecedent clauses. These two characteristics are observed in Chinese CCs as well. However, differences between Japanese and Chinese are apparent. Unlike Chinese CCs with *bi* phrases, Japanese CCs with overt *yorimo* phrases necessarily induce “gap-widening readings.” Moreover, Japanese CCs allow overt differential degrees, and the antecedent clauses of Japanese CCs can be replaced by bare nouns.

3.3.1 Japanese CCs

As far as I know, no (or very little) considerable work has been done on Japanese CCs in the literature. Therefore, we must first define CCs in Japanese. There are several

candidates that can be regarded as CCs in Japanese. The following three sentences with *-hodo*, *-niturete*, and *-nisitagatte* intuitively have the same interpretation. The literal translation of *hodo* would be “degree” or “extent,” and *-niturete*, *-nisitagatte* are formed from verbs that have a similar meaning as “to follow.” The closest translation of these two items in English would be “as” with temporal interpretation. They are all glossed as “CC” (comparative conditional connective). Following the case of normal comparatives, there is no comparative morpheme like *-er* in Japanese CCs. *Motto* (“more”) is optional; thus, its presence or absence does not affect the truth conditional meaning⁷. We have observed this optional status of *motto* (“more”) in Japanese comparatives in Chapter 1 and have reached our conclusions by following Beck et al. (2004), namely, by not considering *motto* as a real comparative morpheme. I assume that the same analysis can be extended to CCs. Thus, I will place the translation “more” in quotes.

- (30) [Tenki-ga yoi] **hodo**, [Otto-wa (motto) uresii]
 weather-nom good CC Otto-top (“more”) happy
 ‘The better the weather is, the happier Otto is.’

- (31) [Tenki-ga yoku-naru] **niturete**, [Otto-wa (motto)
 weather-nom good-become CC Otto-top (“more”)

⁷ In (21)-(31), *motto* (“more”) is hosted only in the consequent clauses, and the antecedent clauses do not have it. *Motto* in the antecedent clauses leads to a somewhat unnatural sentence. (i) is grammatical, but it brings a very strong implication that “the weather is EVEN better.”

- (i) [Tenki-ga **motto** yoi] **hodo**, [Otto-wa (motto) uresii]
 Weather-nom “more”good CC Otto-top (“more”) happy
 ‘As the weather becomes even better, Otto becomes happier.’

uresiku-natta]

happy-become

‘The better the weather became, the happier Otto became.’

- (32) [Tenki-ga yoku-naru] **nisitagatte**, [Otto-wa (motto)
 weather-nom good-become CC Otto-top (“more”)
 uresiku-natta]

happy-become

‘The better the weather became, the happier Otto became.’

Another possible type of CCs is the one with *–to tomoni*. The following example is cited from Hiraiwa (2002).

- (33) John-wa [toki-ga/no tatu **to tomoni]**
 John-nom time-nom/gen pass-pres-adn with as
 Mary-no koto-o wasurete-itta.
 Mary-gen thing-acc forget-go-past

‘Mary slipped out of John’s memory as time went by.’

Among these types of expressions, I will focus on (30), which uses *hodo*, because it is morphologically less complicated and sounds more natural and colloquial than the others. The precise syntactic category of *hodo* is unclear. I will regard it as a comparative conditional connective and gloss it as CC.

With regard to the basic structure of CCs, it appears to be a simple combination of two clauses with *hodo* in between. However, the predicate for the first clause must be in adnominal form (*rentaikai* in traditional Japanese grammar). The adjective *yoi* (good) that precedes *hodo* in (30) is also in the adnominal form. However, it is difficult to identify it since the end form and the adnominal form of an adjective are morphologically identical to each other. A good way to identify the adnominal forms is to use verbal adjectives (*keiyoudousi* in traditional Japanese grammar) or copula verbs in that position. When used in that position, the verbal adjectives or copula verbs retain a distinct morphology for adnominal forms and have *na* at the end. Let us first see examples of adnominal forms. The verbal adjectives *kirei-da* (clean-pres-end) that precede a noun in the following examples are in the adnominal form, *kirei-na* (clean-pres-adn).

(34) Adnominal form:

- a. John-ga kirei-na fuku-o kita.
 John-nom clean-**pres-adn** clothes-acc put_on
 ‘John put on clean clothes.’

End form:

- b. John-no heya-ga kirei-da.
 John-gen room-nom clean-**pres-end**
 ‘John’s room is clean.’

Now let us have the verbal adjective in Japanese CCs. The following example has the

verbal adjective *kirei-da* (clean-pres-end), and it must be in the adnominal form, *kirei-na* (clean-pres-adn).

- (35) [Mizu-ga kirei-na/*kirei-da] hodo [hotaru-ga
 water-nom clean-pres-adn/ clean-pres-end CC light_bug-nom
 takusan-iru.]
 many-exist
 ‘The cleaner water is, the more light bugs there are.’

A question arises as to whether or not the syntactic structure of the antecedent clauses in Japanese CCs involves nominalization. In fact, the antecedent clauses of Japanese CCs allow the so-called *ga/no* conversion (nominative/genitive-case conversion) that normally occurs in relative clauses and nominal complements.

- (36) [Mizu-ga/no kirei-na] hodo hotaru-ga takusan-iru.
 water-nom/gen clean-pres-adn CC light_bug-nom many-exist
 ‘The cleaner water is, the more light bugs there are.’

However, I assume that the structure does not involve nominalization⁸. Instead, I will adopt Hiraiwa’s (2002) analysis. Hiraiwa points out that the so-called *ga/no* conversion is possible in many structures with the adnominal form of predicates that do not have a head.

⁸ One might assume that *hodo* serves as the head noun of a complex noun. (In fact, the literal translation of *hodo* can be a noun such as “degree.”) However, this explanation does not hold as *hodo* can take a noun instead of a clause. See Section 3.3.4 for relevant examples.

(33) with *–to tomoni* is one of his examples. His observation is novel given the traditional view that *ga/no* conversion is restricted only to relative clauses and nominal complements (i.e., structures with an external D-head). Another example of the relevant structures is in (37), which uses *–made* (extent/until). *Ga/no* conversion is possible in *–made* clauses that do not have a head noun.

- (37) John-wa [ame-**ga/no** yamu *made*] office ni ita.
 John-top rain-**nom/gen** stop-pres-adn until office at be-pres
 ‘John was at his office until the rain stopped.’

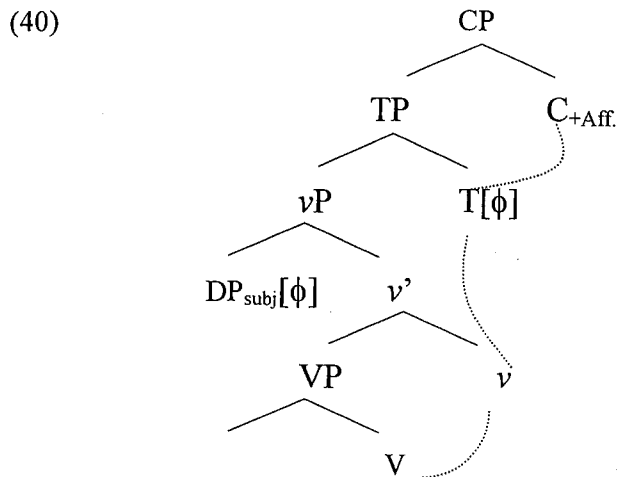
Hiraiwa proposes the following new generalization of *ga/no* conversion. It covers the case of CCs such as (36) as well.

- (38) A New Descriptive Generalization of Nominative-Genitive Conversion (*ga/no* conversion):

Nominative-Genitive Conversion (*ga/no* conversion) in Japanese is licensed by the special verbal inflection (the predicate adnominal form; the *P-A* form)

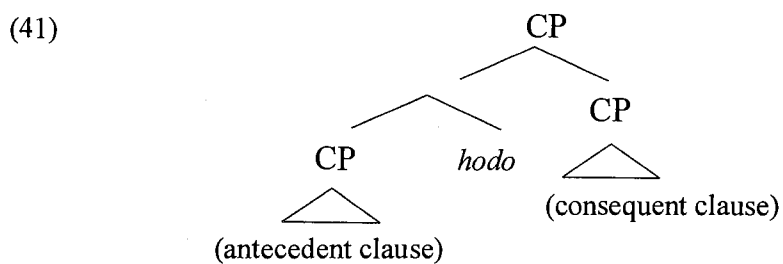
Hiraiwa proposes the following structure and the mechanism of Nominative/Genitive Conversion. The *P-A* form in Japanese involves a zero C, and this C is affixal ([+Aff.]) and requires a C-T-v-V head amalgamate (head movement) via AGREE. The agreement results in the verbal inflection of the *P-A* form. When [+Aff.] is absent in C, the verb is realized as the end form.

- (39) A syntactic C-T-v-V head amalgamate, which is formed via AGREE, corresponds to the special verbal inflection (the *P-A* form).



For our purpose, it suffices to say that the *P-A* form appears in the CP structure.

Thus I assume the following structure for Japanese CCs.



Given such a simple structure, it seems quite natural to assume that the CC morpheme *hodo* plays a central role in the semantics of Japanese CCs, as there is no other item that is unique to this construction. The role of *hodo* can be confirmed in the

following sentence, where *hodo* is replaced with *to* (if), a regular conditional marker. The sentence no longer has the semantics of CCs. It is just a simple conditional sentence.

- (42) [Tenki-ga yoi] to, [Otto-wa (motto) uresii]
 weather-nom good if Otto-top (“more”) happy
 ‘Otto is happy if the weather is good.’

Finally, I would like to mention that Japanese CCs can have an optional phrase with *-reba*. *-Reba* is a conditional marker that literally means “if.” It usually appears in conditional sentences such as the following.

- (43) Yasuke-**reba** kaimasu.
 cheap-if buy
 ‘I will buy it if it is cheap.’

In CCs, *-reba* phrases appear in the format of *X-reba-X*⁹. The antecedent clause of (30) can have *yoke-reba-yoi* (“good-if-good”). The sentence remains grammatical and it may

⁹ Korean also has the pattern of X-conditional-X. The following example is cited from Beck (1997). *Myon* corresponds to *reba* in Japanese and it appears as *tou-myon-tou* (hot-conditional-hot). However, *Tou-myon* (hot-conditional) can be omitted without affecting the truth conditional meaning. This is the same as the case of *reba* in Japan. Moreover, *lsurok* corresponds to *hodo* in Japanese. Thus, Korean CCs share the same syntactic structure as Japanese CCs in relevant respects.

- (i) Nalssi-ka tou-myon tou-lsurok Uli-num to
 weather-nom hot-cond hot-(marker) Uli-top more
 p’ikonha-oss-ta.
 tired-Imp-decl
 ‘Uli was more tired, the hotter it was.’

sound even more appropriate to many speakers.

- (44) [Tenki-ga **yoke-reba-yoi**] hodo, [Otto-wa (motto) uresii]
 weather-nom good-if-good CC Otto-top (“more”) happy
 ‘The better the weather is, the happier Otto is.’

However, as far as I have observed, there is no difference in the truth conditional meaning between (30) and (44). Therefore, I will disregard *X-reba-X* throughout the paper for the sake of simplicity.

Following normal conditional sentences, universal quantifiers are the default. However, overt quantifiers can rewrite them.

- (45) Suugaku-no hon-wa atui hodo taikutuna koto-ga
 math-gen book-top thick CC boring case-nom
 hotondo-da.
 most-copula
 ‘It is mostly the case that the thicker a math book is, the more boring it is.’

In this section, we have observed the basic properties of Japanese CCs. The semantics of Japanese CCs is intuitively the same as that of English/German CCs: They have conditional semantics with a comparison in the antecedent and in the consequent clause. However, the syntactic structure of Japanese CCs is different from that of English/German. Japanese CCs consist of two clauses with a CC connective between

them. There is no overt movement in these clauses. The following subsections further discuss some unique behaviors of Japanese CCs that are not observed in English/German.

3.3.2 Overt *Yori(mo)* Phrases

We have seen that Chinese CCs allow overt *bi* phrase (*than* phrase), unlike English or German. Japanese CCs also allow *yori(mo)* phrases.

- (46) [Hans-yori (motto) tuyoi] hodo, [Otto-wa
Hans-“than” (“more”) strong CC Otto-top
 (motto) uresii].
 (“more”) happy
 Lit. ‘The stronger Otto is **than Hans**, the happier he is.’

When it is intuitively paraphrased, the antecedent clause makes a comparison of a gap in two occasions.

- (47) As the gap between the degree of strength of Otto and that of Hans widens,
 the degree of happiness of Otto increases.

The sentence is judged to be true in a situation such as (48). When we see the degrees of strength, the gap between Otto and Hans is larger in w_2 than w_1 . In other words, d_2 is larger than d_1 . When it comes to the degree of happiness, Otto’s degree in w_2 is larger

than that in w_1 . Thus, d'_2 is larger than d'_1 .

(48) Degrees of strength: $d_2 > d_1$

w_2	Otto	*****
	Hans	***** $\leftarrow\leftarrow d_2 \rightarrow\rightarrow$
w_1	Otto	*****
	Hans	**** $\leftarrow d_1 \rightarrow$

Degree of happiness: $d'_2 > d'_1$

w_2	Otto	*****
		$\leftarrow\leftarrow d'_2 \rightarrow\rightarrow$
w_1	Otto	*****
		$\leftarrow d'_1 \rightarrow$

Despite the overt *yori(mo)* phrase, (46) retains the basic mechanism of CCs: The standard of comparison is semantically introduced as in the case of English/German. To clarify the point, let us consider the following paraphrase. There are two *than* clauses in the antecedent clause. One is overtly introduced by the *yori(mo)* phrase and the other by the semantics of CCs.

(49) If Otto is stronger than Hans by a larger degree in w_2 than in w_1 ,

\uparrow overt *yori(mo)* phrase

\uparrow semantically introduced

then Otto is happier in w_1 than in w_2

“Than Hans” is overtly introduced. This is unique to Japanese (and Chinese). On the other hand, “than in w_2 ” is introduced in semantics. This is a common phenomenon in Japanese, Chinese, English, and German.

Now, a question arises whether or not Japanese CCs with overt *yori(mo)* clauses resemble Chinese CCs with overt *bi* (than) phrases. Although they appear to be quite similar to each other, there seems to be a slight difference in their interpretations. As I have described above, Japanese CCs with overt *yori(mo)* phrases always have gap-widening readings. (“As the gap widens....”). However, Lin’s proposal in (24) is weak and does not guarantee such a gap-widening reading. Moreover, such gap-widening reading does not seem to be available. I do not have a conclusive observation at this point; however, according to some native speakers that I consulted, a gap-widening reading is possible in Chinese in the case of (23) with *be ta* (than he)—only when the sentence has strong context support (which is expected from Lin’s proposal). In contrast, in Japanese, a gap-widening interpretation is obligatory. The following is the Japanese equivalent of Chinese CC (23), and it has a gap-widening reading.

- (50) [Anata-ga kare yori siawasena] hodo, [kare-ni-wa turai].
 you-nom he “than” happy-adn CC he-for-top painful
 Lit. ‘The happier you are than he, the more it is painful for him.’
 (As the gap of happiness between you and he widens, he has more pain.)

In order to clarify the difference between Japanese and Chinese, let us consider

another example where gaps are in concrete numbers. In the following scenario, what matters for Taro is the extent to which he outscores Hanako. Even if his score is worse than before, he is happy as long as he beats Hanako.

(51) Scenario:

Taro and Hanako are rivals at school. Last time Taro's SAT score was 2300 and Hanako's 2200. Taro was relieved because he managed to outscore Hanako. This time Taro's SAT score was 2200 and Hanako's 1900. He is very happy because he did far better than Hanako.

(52) Jibun-no tennsuu-ga [Hanako-no yori(mo)] yoi hodo,
 self-gen score-nom [Hanako-gen "than"] good CC
 Toro-wa (motto) uresii.
 Taro-top ("more") happy

Lit. 'The better (his) score is than Hanako's, the happier Taro is.'

(The more Taro outscores Hanako, the happier he is.)

The sentence is judged true under the scenario. However, this case is not covered by Lin's proposal. His proposal would require Taro's score to be better than before. (Refer to the truth conditions of a similar case in (24).) Thus, the scenario would make the sentence false. The following example is a Chinese equivalent of (52). Unfortunately, the judgments by native speakers vary. Thus, there is no conclusive evidence for a

Japanese-like gap-widening reading¹⁰.

- (53) Taro yue [bi Hanako] gao fen,
 Toro more compare Hanako high score
 Taro/ta jiu yue gaoxing
 Taro/he then more happy

Lit. 'The higher Taro's score is than Hanako, the happier he is.'

I conclude that Lin's analysis does not cover the gap-widening reading in Japanese.

Therefore, an independent analysis is called for. As for the Chinese data, we are not sure at this moment whether or not Lin's semantics should be revised.

3.3.3 CCs with overt differential degrees

Our analysis predicts that Japanese CCs host differential degrees unlike English/German CCs. Recall the ungrammatical example in German (17) that is repeated below.

- (54) *je (um) **eine** **Stundespäter** es wurde, desto (um) **drei**
 the by one hour later it got the by three

¹⁰ Among the three native speakers that I consulted, the first informant immediately rejected the sentence saying that Taro's score must be better if he is happier. The second informant did not have a clear answer. The third informant accepted the sentence under the scenario without any problem.

Grad heißer wurde es.

degrees hotter got it

‘For each hour later it got, the temperature rose by three degrees.’

Japanese CCs do not have any item like *the* that would occupy SpecDegP. Thus, the position of SpecDegP should be vacant in Japanese CCs. They are expected to have overt degree arguments. This prediction is borne out. The equivalent of the above example is grammatical in Japanese.

(55) **Iti jikan** osoi hodo, kion-ga

one hour late CC temperature-nom

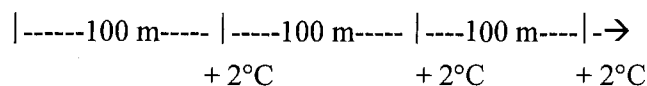
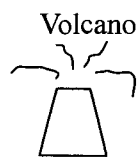
san-do takaku-natta.

three-degree high-became

‘For each hour later it got, the temperature rose by three degrees.’

Another example below shows the same point. Suppose there is an observatory that stands near a volcano. The temperature naturally rises as you walk toward the volcano. In this particular situation, the temperature rises by 2°C as you walk away from the observatory and toward the volcano. Sentence (57) is grammatical and judged true under the scenario.

(56) Observatory



(57) (From the observatory,)

Kyori-ga	hyaku	meetoru	tooi	hodo,
distance-nom	hundred	meter	far	CC
ondo-ga	ni	do	takai.	
temperature-nom	two	degree	high	

‘As it gets 100 m farther from the observatory, the temperature raises by 2°C.’

It is easy enough to account for this if nothing occupies the SpecDegP position in Japanese CCs, unlike in English/German.

3.3.4 CCs with Nouns

We have seen that Chinese CCs can have a relative clause instead of an antecedent clause. Interestingly, Japanese CCs behave in the same manner as shown below. (58)a with a normal antecedent clause and (58)b with a relative clause intuitively carry the same meaning, and so do (59)a and (59)b.

- (58) a. [_{CP} *pro*_i atarasii] hodo, [_{CP} sakana_t-wa (motto) oisii]
 (fish) fresh CC fish-top (“more”) tasty
 ‘The fresher fish are, the better they taste.’

- b. [_{NP} [_{AP} Atarasii] sakana_i] hodo, [_{CP} *pro*_i (motto) oisii]
 fresh fish CC (fish) (“more”) tasty
 ‘Fresher fish taste better.’

- (59) a. [_{CP} *pro*_i takusan benkyooo-suru] hodo,
 (one) much study-do CC
 [_{CP} kodomo_t-wa (motto) kasikoi]
 kid-top (“more”) smart
 ‘The more kids study, the smarter they are.’

- b. [_{NP} [_{IP} *e*_i takusan benkyoo-suru] kodomo_i] hodo,
 much study-do kid CC
 [_{CP} *pro*_i (motto) kasikoi]
 (kid) (“more”) smart
 ‘Kids who study more are smarter.’

In addition to the above examples, Japanese CCs can also have a bare noun for the first argument of *hodo*. Such CCs are possible when the nouns are somewhat “gradable” in an intuitive sense. They become less acceptable when the nouns are “less-gradable,” as

the following examples present. The one with *tensai* (genius) is well formed, whereas the one with *shoogakusei* (elementary school student) is degraded, and the one with *sono tensai* (that genius) is completely ungrammatical. The contrast between the first and the third example explains the point: Degrees of genius can vary and be “gradable”; however, being “that genius” is not gradable. In the following examples, I adopt the paraphrase “be more of” in order to convey intuitive interpretations.

(60) [NP **Tensai**] hodo (motto) neru.

Genius CC (“more”) sleep

‘A genius sleeps more.’

(As someone is more of a genius, he/she sleeps more.)

(61) ?* [NP **Shoogakusi**] hodo (motto) neru.

Secondary_school_student CC (“more”) sleep

‘Elementary school students sleep more.’

(As a person is more of an elementary school student, he/she sleeps more.)

(62) *[NP **Sono tensai**] hodo (motto) neru.

that genius CC (“more”) sleep

‘The genius sleeps more.’

Such gradability of certain nouns is not surprising. We have already seen in Chapter 2 that *yorimo* comparisons can be made out of bare nouns. In order to see the

point, consider the following pairs. *a*-sentences are *yorimo* comparatives with bare nouns that are repeated from Chapter 2, and *b*-sentences are CCs with bare nouns. They are all well formed with *dokusaisya* (dictator) and *gizensya* (hypocrite). These nouns are “gradable,” because some people can be more dictatorial or hypocritical than others.

- (63) a. Taro-wa [Hanako yori(mo)] (motto) **dokusaisya**-da
 Taro-top Hanako “than” (“more”) dictator-copula
 Lit. ‘Compared to Hanako, Toro is a dictator.’
 (Taro is more dictatorial than Hanako.)

- b. [_{NP} **Dokusaisya**] hodo (motto) kodokuda.
dictator CC (“more”) lonely
 ‘As someone is more of a dictator, he/she is lonelier.’

- (64) a. Taro-wa [Hanako yori(mo)] (motto) **gizensya**-da
 Taro-top Hanako “than” (“more”) hypocrite-copula
 Lit. ‘Compared to Hanako, Toro is a hypocrite.’
 (Taro is more hypocritical than Hanako.)

- b. [_{NP} **Gizensya**] hodo (motto) jyoozetu-da.
hypocrite CC (“more”) eloquent-copula
 ‘As someone is more of a hypocrite he/she is more eloquent.’

Ungrammatical pairs given below confirm the point. In (65), for instance, *syusyo* (prime minister) cannot be “gradable,” since people are categorized as either being a *syusyo* (prime minister) or not. Thus, it does not provide a sense of the order among people. A similar explanation applies to *oobosya* (applicant) in (66).

- (65) a. *Taro-wa [Hanako yori(mo)] (motto) **syusyoo-da**
 Taro-top Hanako “than” (“more”) primie_minister-copula
 Lit. ‘Compared to Hanako, Toro is a prime minister.’

- b. *_[NP Syusyou] hodo yasumi-o tori-nikui.
 prime_minisiter CC day_off-acc have-hard
 ‘As a person is more of a prime minister, it is harder for him/her to take a day off.’

- (66) a. *Taro-wa [Hanako yori(mo)] (motto) **oobosya-da**
 Taro-top Hanako “than” (“more”) applicant-copula
 Lit. ‘Compared to Hanako, Toro is an applicant.’

- b. *_[NP Oobosya] hodo tikoku_suru.
 applicant CC come_late
 ‘As a person is more of an applicant, he/she is more likely to come late.’

The parallel behavior between comparatives and CCs in Japanese suggests that CCs are

built on Japanese comparatives. On the other hand, the data pose a challenge to the previous accounts of CCs. In English, for instance, such structural possibility does not exist. English nouns are not syntactically gradable.

Let us summarize our observation of Japanese CCs in section 3.3. Japanese CCs are syntactically a combination of two sentences joined by *hodo*. There is at least no overt movement, no real comparative morpheme, or *the*-like item within each sentence. The basic semantic properties of Japanese CCs are similar to those of English/German CCs: They are conditional sentences with a comparison in the antecedent and in the consequent clause. However, unlike English/German CCs, Japanese CCs allow overt *yori(mo)* phrases, which induce “gap-widening” interpretations. Japanese CCs also allow overt differential degrees. The antecedent clause of Japanese CCs can be replaced by a relative clause. Japanese CCs further allow just a bare noun for the first argument of *hodo*.

Given the above observation of Japanese CCs that are neither like English/German CCs nor Chinese CCs, I conclude that Japanese CCs requires a unique treatment. In the next section, I will propose the semantics of Japanese CCs on the basis of the semantics of Japanese comparatives that I proposed in Chapter 2. The application of the lexical analysis to Japanese CCs would provide a more comprehensive view of Japanese degree constructions.

3.4 Explaining the Behaviors of Japanese Comparative Conditionals

In this section, I will first propose the semantics of Japanese CCs. In doing so, I will adopt the lexical analysis of Japanese comparatives proposed in Chapter 2. It will be

shown that the unique behaviors of Japanese CCs that we observed in the previous subsection are accounted for by the lexical analysis of Japanese comparatives.

3.4.1 Japanese CCs with Inherent Comparisons

Let us first recall our tool, namely Japanese comparatives from Chapter 2. Importantly, the semantics of comparatives is introduced by gradable adjectives such as *nagai* (long) in the following example. The standard degree of comparison is not directly provided. Rather, it is inferred from the set of individuals denoted by the *yorimo* clause.

- (67) Mary-wa [John-ga kaita (no) yorimo] (motto)
 Mary-top [John-nom wrote (NO) “than”] (“more”)
nagai ronbun-o kaita.
 many-gen paper-acc wrote
 ‘Mary wrote a longer paper than John did.’
 (Compared to what John wrote, Mary wrote a longer paper.)

- (68) Main clause:

$$[[nagai(long)]] = \lambda x. \max(\lambda d. long(d)(x)) > c$$

$$[[nagai ronbun (long paper)]] = \lambda x. paper(x) \wedge \max(\lambda d. long(d)(x)) > c$$

$$[[SOME nagai ronbun]] = \lambda q_{<e,t>}. \exists x [paper(x) \wedge \max(\lambda d. long(d)(x)) > c \wedge q(x)]$$

$$[[[1 [Mary-ga t_1 kaita (Mary wrote t_1)]]]] = \lambda x. wrote(x)(M)$$

$$[[[SOME nagai ronbun [1 [Mary-ga t_1 kaita]]]]] = 1 \text{ iff}$$

$$\exists x[\text{paper}(x) \wedge \max(\lambda d. \text{long}(d)(x)) > c \wedge \text{wrote}(x)(M)]$$

$c :=$ the length of the paper John wrote

Yori(mo) clause:

$$[[\text{CP}]] = \lambda x. \text{wrote}(x)(J)$$

Now, let us see what happens when we apply this semantics of comparatives to CCs. Consider the example in (69). The intuitive interpretation of the sentence is the same as that of English equivalent. It is a conditional sentence with a comparison in the antecedent clause and the consequent clause.

- (69) [Tenki-ga yoi] hodo, [Otto-wa (motto) uresii]
 weather-nom good CC Otto-top (“more”) happy
 ‘The better the weather is, the happier Otto is.’

- (70) $\forall w_1 w_2 [[\text{the weather is better in } w_2 \text{ than in } w_1] \rightarrow [\text{Otto is happier in } w_2 \text{ than in } w_1]]$

Our task is to bring about the interpretation using Japanese-style comparisons.

The antecedent clause and the consequent clause contain the adjectives *yoi* (good) and *uresii* (happy), respectively. They are both expected to introduce a comparison. However, the standards of comparison in CCs come with a restriction: The standard degree is the maximal degree of a clause that is identical to the matrix clause but has a

different world argument. In order to have such standard of comparison, the two gradable adjectives come with a complex contextual variable $f(w_1)$, where f is a contextually given function that takes w_1 and gives the relevant maximal degree in w_1 ¹¹. The complex variable serves as a contextually provided standard. As a result, we obtain a comparison of two maximal degrees of the same predicate in w_1 and in w_2 for each adjective.

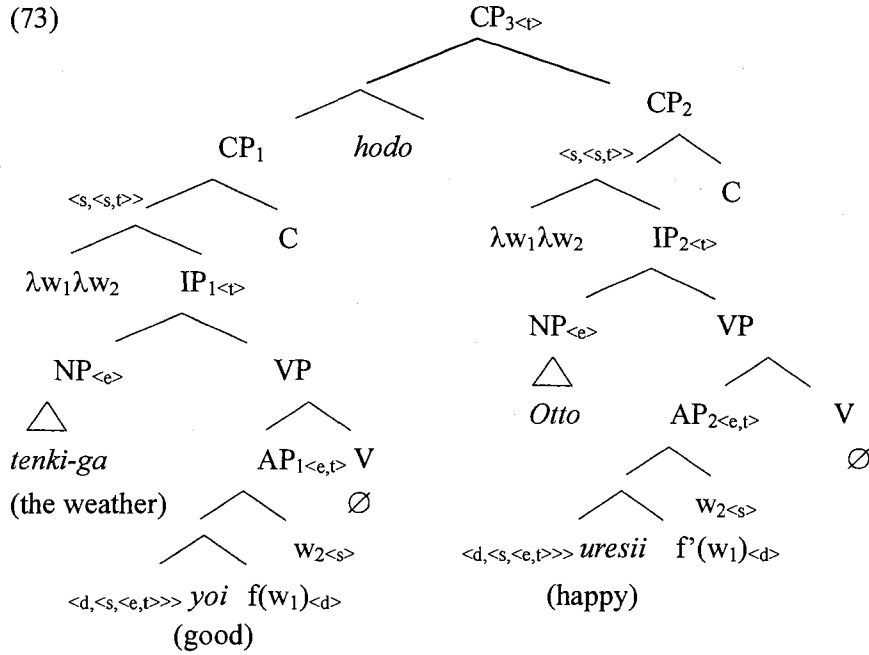
- (71) a. $[[yoi_{f(w_1)}(\text{good})]]^{gc} = \lambda w_2 \lambda x. \max(\lambda d. \text{good}_{w_2}(d)(x)) > f(w_1)$
 b. $[[uresii_{f(w_1)}(\text{happy})]]^{gc} = \lambda w_2 \lambda x. \max(\lambda d. \text{happy}_{w_2}(d)(x)) > f'(w_1)$

This is just a slightly different version of normal Japanese adjectives. Japanese adjectives always come with a contextual variable c (though we haven't described it precisely so far), which is to be the standard of comparison. In CC, the contextual variable is given a functional interpretation.

- (72) a. $[[yoi_c(\text{good})]] = \lambda w \lambda x. \max(\lambda d. \text{good}_w(d)(x)) > c$
 b. $[[uresii_c(\text{happy})]] = \lambda w \lambda x. \max(\lambda d. \text{happy}_w(d)(x)) > c$

The LF structure of the sentence clarifies how such complex contextual variable works. $f(w_1)$ is located adjacent to each adjective. The functor variable f is free. The world variable w_1 as well as w_2 are bound by the lambda operators on top of each sentence. Note that the adjectives are given their semantic type of $\langle d, \langle s, \langle e, t \rangle \rangle \rangle$ because their complex variable $f(w)$ is type $\langle d \rangle$.

¹¹ I follow von Stechow (1994) for the treatment of complex context variable, $f(x)$.



The lexical entry of *hodo* is defined as follows. It introduces a conditional semantics. In Japanese CCs, therefore, the job is divided between gradable adjectives and *hodo*. The former introduces comparisons and the latter the conditional semantics.

$$(74) \quad [[hodo]] = \lambda p_{\langle s, \langle s, t \rangle \rangle} \lambda q_{\langle s, \langle s, t \rangle \rangle} \forall w_1 w_2 [p(w_1)(w_2) \rightarrow q(w_1)(w_2)]$$

With the lexical entries of the adjectives and *hodo*, the truth conditional calculation is given below. Note that the functor variable f is assigned by the context g_C a function, for instance, a function that maps a world w to the maximal degree of goodness that the weather has in w .

$$\begin{aligned}
(75) \quad & [[f(w_1)]]^{gc} = g_c(f)(w_1) \\
& = [\lambda w. \max(\lambda d. \text{good}_w(d)(\text{the_weather}))](w_1) \\
& = \max(\lambda d. \text{good}_{w_1}(d)(\text{the_weather})) \\
& [[\text{yoi}_{f(w_1)}(\text{good})]]^{gc} = \lambda w_2 \lambda x. \max(\lambda d. \text{good}_{w_2}(d)(x)) \\
& \quad > \max(\lambda d. \text{good}_{w_1}(d)(\text{the_weather})) \\
& [[IP_1]]^{gc} = \max(\lambda d. \text{good}_{w_2}(d)(\text{the_weather})) > \max(\lambda d. \text{good}_{w_1}(d)(\text{the_weather})) \\
& [[CP_1]]^{gc} = \lambda w_1 \lambda w_2 \max(\lambda d. \text{good}_{w_2}(d)(\text{the_weather})) > \\
& \quad \max(\lambda d. \text{good}_{w_1}(d)(\text{the_weather})) \\
& [[f'(w_1)]]^{gc} = g_c(f')(w_1) \\
& = [\lambda w. \max(\lambda d. \text{happy}_w(d)(\text{Otto}))](w_1) \\
& = \max(\lambda d. \text{happy}_{w_1}(d)(\text{Otto})) \\
& [[CP_2]]^{gc} = \lambda w_1 \lambda w_2 \max(\lambda d. \text{happy}_{w_2}(d)(\text{Otto})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Otto})) \\
& [[CP_3]]^{gc} = 1 \text{ iff} \\
& \quad \forall w_1 w_2 [\max(\lambda d. \text{good}_{w_2}(d)(\text{the_weather})) > \max(\lambda d. \text{good}_{w_1}(d)(\text{the_weather})) \rightarrow \\
& \quad \max(\lambda d. \text{happy}_{w_2}(d)(\text{Otto})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Otto}))]
\end{aligned}$$

The truth conditions say that if the weather is better in w_2 than in w_1 , Otto is happier in w_2 than in w_1 . We successfully obtain the same truth conditions as the ones for the equivalent English CC while using Japanese-style adjectives.

In summary, the basic interpretation of Japanese CCs is derived by Japanese-style adjectives that are comparative per se. Comparisons in two worlds are made possible by having a complex contextual variable $f(w_1)$ for the standard of comparison. Conditional semantics is introduced by *hodo*.

The next subsections will show how, despite the same basic CC semantics, Japanese CCs behave differently from English CCs because the semantics arises through different compositional means.

3.4.2 Overt Differential Degrees in CCs

Unlike English or German CCs, Japanese CCs allow differential degrees, as we have seen in Section 3.3.3. Recall example (57), which is repeated below. The semantics of the sentence is straightforwardly accounted for by the analysis presented in the previous subsection. The only difference is that the differential degrees are overtly filled this time.

(76) (From the observatory,)

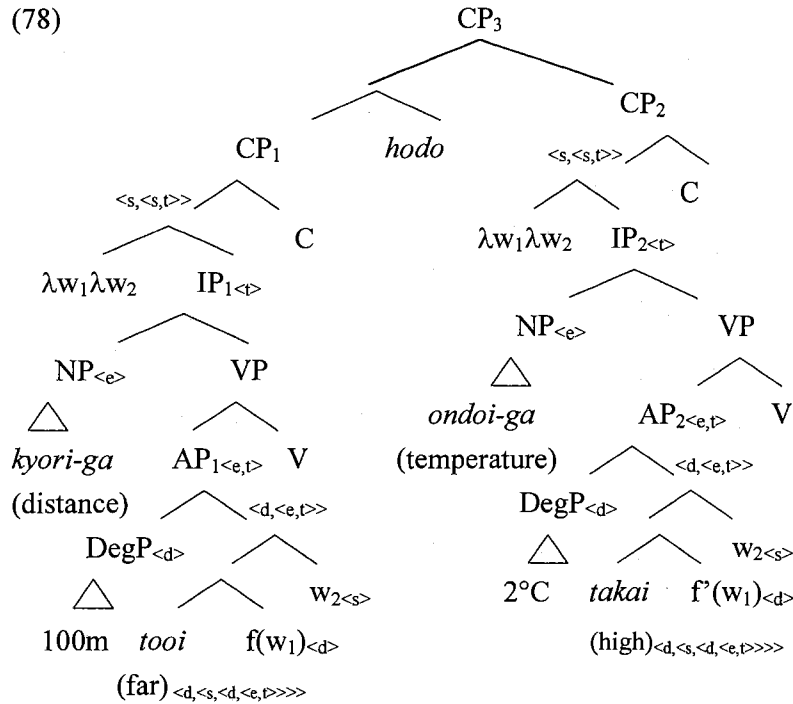
Kyori-ga	hyaku	meetoru	tooi	hodo,
distance-nom	hundred	meter	far	CC
ondo-ga	ni	do	takai.	
temperature-nom	two	degree	high	

‘As it gets 100 m farther from the observatory, the temperature raises by 2°C.’

Let us begin with the lexical entries of adjectives. Following the discussion in the previous subsection, *tooi* (far) and *takai* (high) take a complex contextual variable $f(w_1)$ for their standard of comparison. Furthermore, they take differential degree argument d' .

- (77) a. $[[tooi_{f(w_1)}(far)]]^{gc} = \lambda w_2 \lambda d' \lambda x. \max(\lambda d. far_{w_2}(d)(x)) = f(w_1) + d'$
 b. $[[takai_{f'(w_1)}(high)]]^{gc} = \lambda w_2 \lambda d' \lambda x. \max(\lambda d. high_{w_2}(d)(x)) = f'(w_1) + d'$

The LF structure of the sentence is given below. Note that the adjectives are given their type $\langle d, \langle s, \langle d, \langle e, t \rangle \rangle \rangle \rangle$, because their contextual variables $f(w)$ are type $\langle d \rangle$.



The semantics of *hodo* remains the same. With the lexical entries of *hodo* and the two adjectives, the truth conditional calculation is given below.

- (79) $[[hodo]] = \lambda p_{\langle s, \langle s, t \rangle \rangle} \lambda q_{\langle s, \langle s, t \rangle \rangle} \forall w_1 w_2 [p(w_1)(w_2) \rightarrow q(w_1)(w_2)]$

$$\begin{aligned}
(80) \quad & [[f(w_1)]]^{gc} = [[f]]^{gc}(w_1) \\
& = [\lambda w. \max(\lambda d. far_w(d)(the_distance))](w_1) \\
& = \max(\lambda d. far_{w_1}(d)(the_distance)) \\
& [[tooi_{f(w_1)}(far)]]^{gc} = \lambda w_2 \lambda d' \lambda x. \max(\lambda d. far_{w_2}(d)(x)) = \\
& \quad \max(\lambda d. far_{w_1}(d)(the_distance)) + d' \\
& [[AP_1]]^{gc} = \lambda x. \max(\lambda d. far_{w_2}(d)(x)) = \max(\lambda d. far_{w_1}(d)(the_distance)) + 100m \\
& [[IP_1]]^{gc} = \max(\lambda d. far_{w_2}(d)(the_distance)) = \max(\lambda d. far_{w_1}(d)(the_distance)) + 100m \\
& [[CP_1]]^{gc} = \lambda w_1 \lambda w_2. \max(\lambda d. far_{w_2}(d)(the_distance)) = \\
& \quad \max(\lambda d. far_{w_1}(d)(the_distance)) + 100m \\
& [[f'(w_1)]]^{gc} = [[f']]^{gc}(w_1) \\
& = [\lambda w. \max(\lambda d. high_w(d)(the_temperature))](w_1) \\
& = \max(\lambda d. high_{w_1}(d)(the_temperature)) \\
& [[takai_{f'(w_1)}(high)]]^{gc} = \lambda w_2 \lambda d' \lambda x. \max(\lambda d. high_{w_2}(d)(x)) = \\
& \quad \max(\lambda d. high_{w_1}(d)(the_temperature)) + d' \\
& [[AP_2]]^{gc} = \lambda x. \max(\lambda d. high_{w_2}(d)(x)) = \max(\lambda d. high_{w_1}(d)(the_temperature)) + 2^\circ C \\
& [[IP_2]]^{gc} = \max(\lambda d. high_{w_2}(d)(the_temperature)) = \\
& \quad \max(\lambda d. high_{w_1}(d)(the_temperature)) + 2^\circ C \\
& [[CP_2]]^{gc} = \lambda w_1 \lambda w_2. \max(\lambda d. high_{w_2}(d)(the_temperature)) = \\
& \quad \max(\lambda d. high_{w_1}(d)(the_temperature)) + 2^\circ C \\
& [[CP_3]]^{gc} = [[hodo]]([CP_1]^{gc})([CP_2]^{gc}) = 1 \text{ iff} \\
& \forall w_1 w_2 [\max(\lambda d. far_{w_2}(d)(the_distance)) = \max(\lambda d. far_{w_1}(d)(the_distance)) + 100m \rightarrow \\
& \max(\lambda d. high_{w_2}(d)(the_temperature)) = \max(\lambda d. high_{w_1}(d)(the_temperature)) + 2^\circ C]
\end{aligned}$$

The truth conditions say that if the distance from the observatory in w_2 is greater than that in w_1 by 100 m, the temperature in w_2 is higher than that in w_1 by 2°C.

In summary, Japanese CCs with overt differential degrees are accounted for on a par with the normal cases of CCs. The only difference is that the differential degrees are overtly filled. Thus CCs with differential degrees are a little more informative than normal cases. This can be confirmed in the following sequence of sentences.

- (81) Kyori-ga tooi hodo, ondo-ga takai.
 distance-nom far CC temperature-nom high
 Kuwasiku iuto, hyaku meetoru tooi hodo,
 specifically say hundred meter far CC
 ni do takai.
 two degree high

‘The farther it gets, the higher the temperature is. When specifically said, the temperature raises by 2°C as it gets 100m farther.’

So far we have discussed cases where direct degrees are a subject of comparison in CCs. Under the lexical analysis, gradable adjectives have another type of degree argument, namely differential degrees. The next subsection discusses cases where differential degrees are a subject of comparison in CCs.

3.4.3 Overt *Yori(mo)* Clauses/Phrases

Unlike English or German CCs, Japanese CCs host overt *yorimo* phrases, as we have seen in 3.3.2. At the same time, we have observed that Japanese CCs with overt *yorimo* phrases necessarily result in gap-widening readings (“as the gap widens....”). The semantics that Lin proposes for similar Chinese data is weak and does not guarantee such gap-widening readings. Therefore, I propose an independent account for Japanese CCs.

Recall scenario (51) and sentence (52) repeated below. The sentence has a gap-widening reading: Taro is happier as the gap between Taro’s score and Hanako’s grows. Importantly, what matters for Taro is the extent to which he outscores Hanako. Although Taro’s score is worse than before, it is not a problem for him.

(82) Scenario:

Taro and Hanako are rivals at school. Last time Taro’s SAT score was 2300 and Hanako’s 2200. Taro was relieved because he managed to outscore Hanako. This time Taro’s SAT score was 2200 and Hanako’s 1900. He was very happy because he did far better than Hanako.

- (83) Jibun-no tennsuu-ga [Hanako-no yori(mo)] yoi hodo,
 self-gen score-nom [Hanako-gen “than”] good CC
 Toro-wa (motto) uresii.
 Taro-top (“more”) happy

Lit. 'The better (his) score is than Hanako, the happier Taro is.'

(The more Taro outscores Hanako, the happier he is.)

The semantics of the antecedent clause is the issue. How is the comparison of gaps derived?

In order to derive the intuitive interpretation, we need to make use of the antecedent clause twice in order to have two differential degrees, one in w_1 and the other in w_2 . The following diagram may clarify the point. We must have Taro's score and Hanako's both in w_1 and w_2 so that a differential degree is provided in w_1 as well as in w_2 .

(84) Comparisons in the antecedent clause of (83)

Taro's score in w_1 : 2300

Hanako's score in w_1 : 2200

∴ Gap between the two scores in w_1 : 100

Taro's score in w_2 : 2200

Hanako's score in w_2 : 1900

∴ Gap between the two scores in w_2 : 300

Therefore, the following two comparisons should be included in the semantics of the antecedent clause. Importantly, the standard of comparison c is fixed as Hanako's score

because of the overt *yorimo* phrase¹². This time, it is the differential degree that is to be compared. Thus, the differential degree argument is given a functional interpretation, $f(w)$.

(85) a. Comparison in w_1

$$\lambda w_1. \max(\lambda d. \text{good}_{w_1}(d)(T's \text{ score})) = c + f(w_1)$$

c = Hanako's score

$f = \lambda w$. the maximal difference between Toro's score and Hanako's in w

b. Comparison in w_2

$$\lambda w_2. \max(\lambda d. \text{good}_{w_2}(d)(T's \text{ score})) = c + f(w_2)$$

c = Hanako's score

$f = \lambda w$. the maximal difference between Toro's score and Hanako's in w

The two differential degrees, $f(w_1)$ and $f(w_2)$, must be in a larger-than relation. I assume that it is done by *hodo*. Thus the lexical entry of *hodo* must be altered as follows¹³. *Hodo*

¹² The contextually provided Hanako's score c can be given a functional interpretation such as $f'(w)$ in order to have Hanako's score in each world. I will state it as c for the purpose of simplicity. The choice between c and $f'(x)$ does not affect the truth conditional calculation.

¹³ This line of analysis implies that there are up to four types of *hodo*. (The consequent clause can also have a *yorimo* phrase and induces gap-widening readings.) Obviously, it is not an optimal choice to assume several lexical entries for a single item. Unfortunately, I need to leave this issue for further research.

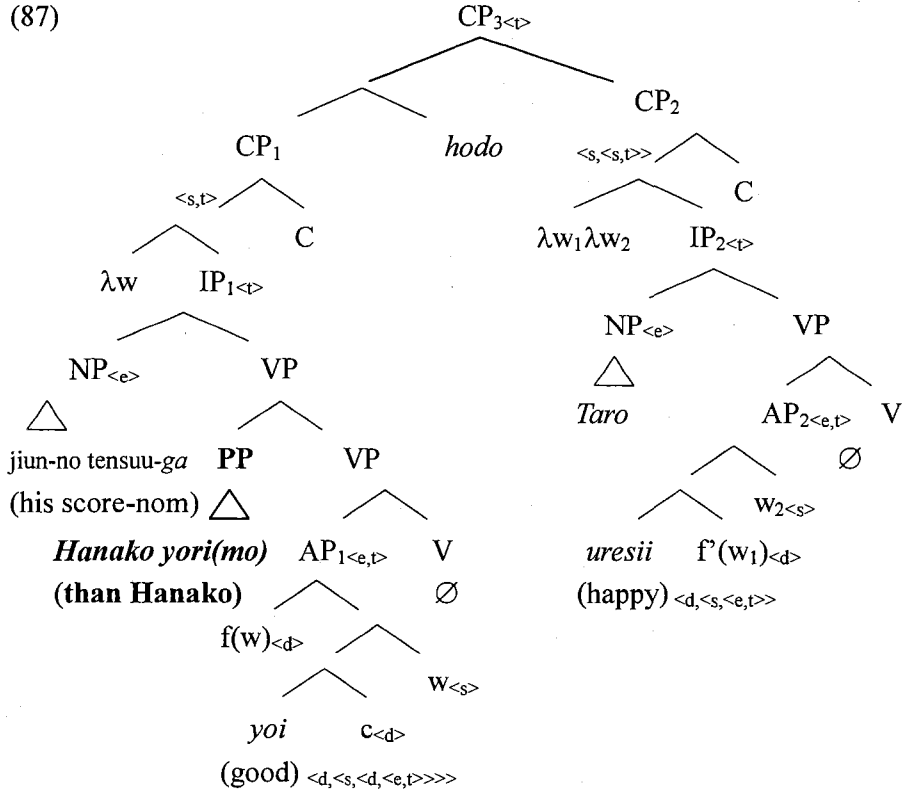
The consequent clause in the following example has an overt *yorimo* phrase. Imagine a situation wherein Taro and Hanako are both marathon runners. Hanako does not like to run in hot weather. Thus Taro can easily beat Hanako when the temperature is high.

uses the proposition p of type $\langle s, t \rangle$ twice and plugs in w_1 and w_2 so that differential degrees are obtained in two worlds. Then *hodo* makes a larger-than relation of the two differential degrees. Note that the contextually given function f for the differential argument in (85) and f for *hodo* in (86) are identical, because it is shared in a particular utterance context. This guarantees that the differential degrees $f(w_1)$ in the adjective and the one in the lexical entry of *hodo* in (86) are identical. The same explanation holds for $f(w_2)$.

$$(86) \quad [[hodo]] = \lambda p_{\langle s, t \rangle} \lambda q_{\langle s, \langle s, t \rangle \rangle} \forall w_1 w_2. p(w_1) \wedge p(w_2) \wedge f(w_2) > f(w_1) \rightarrow q(w_1)(w_2)$$

Now the LF structure and the truth conditional calculation are given below. In the antecedent clause, the adjective *yoi*(good) comes with a contextual variable c and a differential degree with a functional interpretation, i.e. $f(w)$.

-
- (i) Kion-ga takai hodo, Taro'-no taimu-ga [Hanko yori(mo)]yoi.
temperature-nom highCC Taro-gen time-nom Hanko "than" good
"The higher the temperature is, the more Taro's time exceeds Hanko's."
- (ii) For all w_1 and w_2 , if the temperature is higher in w_2 than in w_1 , Taro's score exceeds Hanako's by a larger degree in w_2 than in w_1 .



(88) $[[c]]^{gc} = \text{Hanako's score} = c_{\text{Hanako}}$

$[[yoi_c(\text{good})]]^{gc} = \lambda w \lambda d' \lambda x. \max(\lambda d. \text{good}_w(d)(x)) = c_{\text{Hanako}} + d'$

$[[f(w)]]^{gc} = [[f]]^{gc}(w)$

$= [\lambda w. \text{the maximal difference between Toro's score and Hanako's in } w](w)$

$= \text{the maximal difference between Toro's score and Hanako's in } w$

$= d_{\text{Taro-Hanako in } w}$

$[[IP_1]]^{gc} = \max(\lambda d. \text{good}_w(d)(T's_score)) = c_{\text{Hanako}} + d_{\text{Taro-Hanako in } w}$

$[[CP_1]]^{gc} = \lambda w. \max(\lambda d. \text{good}_w(d)(T's_score)) = c_{\text{Hanako}} + d_{\text{Taro-Hanako in } w}$

$[[f'(w_1)]]^{gc} = [[f']]^{gc}(w_1)$

$$\begin{aligned}
&= [\lambda w. \max(\lambda d. \text{happy}_w(d)(\text{Taro}))](w_1) \\
&= \max(\lambda d. \text{happy}_{w_1}(d)(\text{Taro})) \\
[[\text{uresii}(\text{happy})]]^{\text{gc}} &= \lambda w_2 \lambda x. \max(\lambda d. \text{happy}_{w_2}(d)(x)) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Taro})) \\
[[\text{IP}_2]]^{\text{gc}} &= \max(\lambda d. \text{happy}_{w_2}(d)(\text{Taro})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Taro})) \\
[[\text{CP}_2]]^{\text{gc}} &= \lambda w_1 \lambda w_2. \max(\lambda d. \text{happy}_{w_2}(d)(\text{Taro})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Taro})) \\
[[\text{hodo}]]^{\text{gc}} &= \lambda p_{\langle s, t \rangle} \lambda q_{\langle s, t \rangle} \forall w_1 w_2. p(w_1) \wedge p(w_2) \wedge f(w_2) > f(w_1) \rightarrow q(w_1)(w_2) \\
[[\text{hodo}]]([[\text{CP}_1]]^{\text{gc}})([[\text{CP}_2]]^{\text{gc}}) &= 1 \text{ iff} \\
\forall w_1 w_2. \max(\lambda d. \text{good}_{w_1}(d)(\text{T}'s_score)) &= c_{\text{Hanako}} + d_{\text{Taro-Hanako in } w_1} \wedge \\
\max(\lambda d. \text{good}_{w_2}(d)(\text{T}'s_score)) &= c_{\text{Hanako}} + d_{\text{Taro-Hanako in } w_2} \wedge \\
d_{\text{Taro-Hanako in } w_2} > d_{\text{Taro-Hanako in } w_1} &\rightarrow \\
\max(\lambda d. \text{happy}_{w_2}(d)(\text{Taro})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Taro}))
\end{aligned}$$

The truth conditions say that if the difference between Taro's score and Hanako's in w_2 is greater than the one in w_1 , Taro is happier in w_2 than in w_1 .

In summary, Japanese CCs with overt *yorimo* phrases necessarily induce a comparison of differential degrees. This is naturally understood given the lexical analysis of Japanese comparatives. A *yorimo* phrase determines the value of the contextually given standard degree c . However, the sentence remains grammatical, because a comparison can switch to that of differential degrees.

3.4.4 Predictions

Two predictions are made from the analysis so far. The first one is the availability

of multihead CCs. Japanese CCs involve Japanese-style comparisons that are locally made by each gradable adjective. We have already seen in Chapter 2 that multihead comparatives in Japanese are well formed due to such locally made comparisons. Given our analysis that Japanese CCs are made out of Japanese style comparisons, such multihead comparatives are expected to appear in CCs as well. The prediction is borne out. In the example below, the antecedent clause has an adjective *sinsenna* (fresh) and an adverb *yasuku* (cheaply). Thus two comparisons are involved in the antecedent clause. An intuitive interpretation is given in (90).

- (89) Sono mise-ga **sinsenna** sakana-o **yasuku**
 that store-nom fresh fish-acc cheaply
 uru hodo Hanako-wa uresii.
 sell CC Hanako-top happy

Lit. 'The store sells the fresher fish with the lower price, the happier Hanako is.'

- (90) $\forall w_1 w_2 [\exists x [\text{the store sells fish } x \text{ that is fresher in } w_2 \text{ than in } w_1 \text{ more cheaply in } w_2 \text{ than in } w_1] \rightarrow [\text{Hanako is happier in } w_2 \text{ than in } w_1]]$

Japanese-style comparatives account for the intuitive interpretation without any problem¹⁴.

¹⁴ It is worth noting that an equivalent multihead CC in Chinese is possible, and it has three *yue*, one for each adjective.

- (i) Shangdian yi **yue** dide jiage mai **yue** xinxiande yu,
 stores use yue low price sell more fresh fish

- (91) $\forall w_1 w_2 [\exists x [\text{fish}(x) \wedge \max(\lambda d. \text{fresh}_{w_2}(d)(x)) > \max(\lambda d. \text{fresh}_{w_1}(d)(x)) \wedge$
 $\max(\lambda d. \text{sell_cheaply}_{w_2}(d)(x)(\text{the_store})) > \max(\lambda d. \text{sell_cheaply}_{w_1}(d)(x)(\text{the_store}))]$
 $\rightarrow [\max(\lambda d. \text{happy}_{w_2}(d)(\text{Hanako})) > \max(\lambda d. \text{happy}_{w_1}(d)(\text{Hanako}))]]$

The truth conditions says that if the store sells fresher fish in w_2 than in w_1 more cheaply in w_2 than in w_1 , Hanako is happier in w_2 than in w_1 .

Second, it is predicted that a clause in Japanese CCs cannot have both a *yori(mo)* phrase and a differential degree at the same time. The prediction is made by the following reason. Japanese adjectives have two kinds of degree arguments, direct degrees and differential degrees. In normal CCs, standard direct degrees (usually presented as *c*) are given functional interpretations, and a differential degree can be either implicit or overtly filled. In CCs with overt *yori(mo)* clauses, differential degrees are given functional interpretations, because the value of the standard direct degree *c* is fix by *yori(mo)* phrases. Then, having both an overt differential degree and an overt *yori(mo)* phrase should not be possible, because the values of a standard direct degree *c* and differential degrees will be both fixed, and no degree can have a functional interpretation The prediction is borne out.

mali jiu **yue** gaolxing.
 Mary then yue happy
 'If the store sells fresher fish with lower price, Mary is happier.'

The data suggests that comparisons in Chinese are locally made by *yue*.

- (92) *Jibun-no ten-ga [Hanako yori(mo)] ni-ten yoi hodo,
 self-gen score-nom Hanko “than” two-point good CC
 Taro-wa uresii.
 Taro-top happy

Lit. ‘The 2 point higher his score is than Hanako’s, the happier Taro is.’

Only the semantics of CCs with Japanese-style comparatives can predict these two phenomena.

3.4.5 CCs with Relative Clauses and “Gradable Nouns”

Let us turn to CCs with relative clauses and ones with “gradable nouns.” Relevant examples are repeated below in (93). (93)a with a normal clause and (93)b with a relative clause have intuitively the same interpretation. This is not surprising. Notice that the denotation of the antecedent clause of (93)a, *sakana-ga atarasii* (fish are fresh), and the denotation of the antecedent DP in (93)b, *atarasii sakana* (fresh fish), are the same as shown in (94): They are a set of fish that are fresh.

- (93) a. [_{CP} *pro_i* atarasii] hodo, [_{CP} sakana_i-wa (motto) oisii].
 (fish) fresh CC fish-top (“more”) tasty

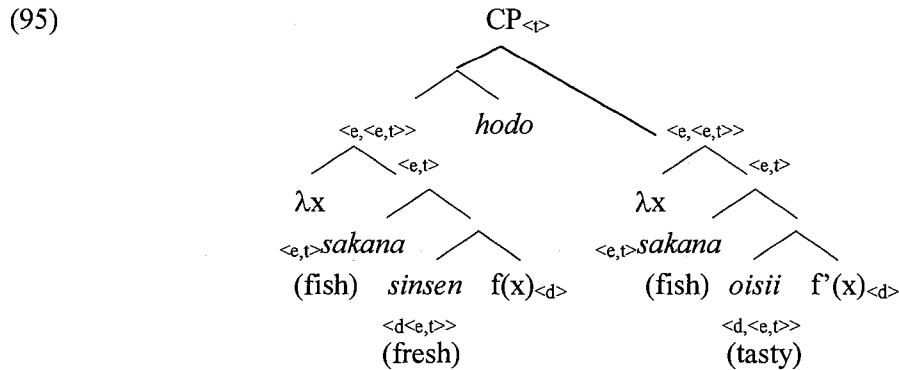
‘The fresher fish are, the better they taste.’

- b. [_{NP} [_{AP} Atarasii] sakana_i] hodo, [_{CP} *pro*_i (motto) oisii].
 fresh fish CC (fish) ("more") tasty
 'Fresher fish taste better.'

(94) antecedent clause of (93)a and antecedent NP of (93)b:

$$\lambda y. \text{fish}(y) \wedge \max(\lambda d. \text{fresh}(d)(y)) > c$$

Let us consider a rough LF structure for (93)a-b. Their word orders and syntactic categories are different. However, relevant semantic components are the same for both sentences. The antecedent clause/NP and the consequent clause denote a set of individuals. Complex contextual variable this time is $f(x)$, where f is a contextually given function that takes an individual x and gives the relevant maximal degree. A lambda operator λx is added in order to bind x .



Truth conditional calculation is given below. *Hodo* now takes two propositions of type $\langle e, \langle e, t \rangle \rangle$ and maps to a conditional sentence. Following the standard case of Japanese CCs, the semantics of gradable adjectives come with a complex contextual variable. This time it is $f(x)$, where f is a contextually provided function that takes an individual and

maps to a relevant maximal degree.

$$\begin{aligned}
 (96) \quad & [[f(x)]]^{gc} = [[f]]^{gc}(x) \\
 & = [\lambda y. \max(\lambda d. \text{fresh}(d)(y))](x) \\
 & = \max(\lambda d. \text{fresh}(d)(x)) \\
 & [[\text{sinsenna}_{f(x)}]]^{gc} = \lambda y. \max(\lambda d. \text{fresh}(d)(y)) > \max(\lambda d. \text{fresh}(d)(x)) \\
 & [[\text{sinsenna}_{f(x)} \text{ sakana } (\text{fresh fish})]] = \lambda x \lambda y. \text{fish}(y) \wedge \text{fish}(x) \\
 & \quad \wedge \max(\lambda d. \text{fresh}(d)(y)) > \max(\lambda d. \text{fresh}(d)(x)) \\
 & [[f'(x)]]^{gc} = [[f']]^{gc}(x) \\
 & = [\lambda y. \max(\lambda d. \text{tasty}(d)(y))](x) \\
 & = \max(\lambda d. \text{tasty}(d)(x)) \\
 & [[\text{oisii}_{f(x)}]]^{gc} = \lambda y. \max(\lambda d. \text{tasty}(d)(y)) > \max(\lambda d. \text{tasty}(d)(x)) \\
 & [[\text{sakana-ga oisii}_{f(x)} (\text{fish are tasty})]] = \lambda x \lambda y. \text{fish}(y) \wedge \text{fish}(x) \\
 & \quad \wedge \max(\lambda d. \text{tasty}(d)(y)) > \max(\lambda d. \text{tasty}(d)(x)) \\
 & [[hodo]] = \lambda p_{\langle e, \langle e, t \rangle} \lambda q_{\langle e, \langle e, t \rangle} \forall xy. p(x)(y) \rightarrow q(x)(y) \\
 & [[(95)]] = 1 \text{ iff} \\
 & \forall xy [[\text{fish}(y) \wedge \text{fish}(x) \wedge \max(\lambda d. \text{fresh}(d)(y)) > \max(\lambda d. \text{fresh}(d)(x))] \rightarrow \\
 & \quad [\max(\lambda d. \text{tasty}(d)(y)) > \max(\lambda d. \text{tasty}(d)(x))]]
 \end{aligned}$$

The truth conditions say if fish y is fresher than fish x , then y tastes better than x . Our analysis naturally explains the fact that two sentences with different syntactic structures provide the same truth conditions.

Let us now turn to the case of CCs with “gradable nouns.” This type of CCs are

unique in Japanese, and they are predicted given the fact that Japanese comparatives can be made out of bare nouns as we have seen in Chapter 2. We accounted for the data by assuming that speakers make maximum use of pragmatics and reinterpret a noun as a corresponding gradable expression such as “x-like” or “more of x”¹⁵. We apply the same strategy to CCs.

- (97) [DP **Tensai**] hodo (motto) neru.
 genius CC (“more”) sleep

‘A genius sleeps more.’

(As someone is more of a genius, the more he/she sleeps.)

- (98) $\lambda y.\text{genius}(y)$ ---- reinterpretation ---- $\rightarrow \lambda y.\text{max}(\lambda d.\text{genius-like}(d)(y)) > f(x)$

The truth conditions of the sentence with the reinterpreted adjective (98) are given below.

- (99) $\forall x, y [[\text{person}(y) \wedge \text{person}(x) \wedge \text{max}(\lambda d.\text{genius-like}(d)(y)) >$
 $\text{max}(\lambda d.\text{genius-like}(d)(x))] \rightarrow [\text{max}(\lambda d.\text{sleep}(d)(y)) > \text{max}(\lambda d.\text{genius-like}(d)(x))]]$

¹⁵ This strategy of reinterpretation is not available in Chinese.

- (i) *Du cai zhe, yue jimo.
 dictator person more lonely
 ‘A dictator is lonelier.’
 (As someone is more of a dictator, he/she is lonelier.)

The ungrammatical status suggests that Chinese CCs require syntactically visible adjectival predicate and comparisons are structurally derived by *yue* (more). Chapter 5 has a preliminary discussion about gradable adjectives in Chinese. Some empirical data suggests that the semantics of gradable adjectives in Chinese is similar to the one in English.

“If one person is more genius-like than another person, then the former sleeps more than the latter does.”

I have shown how Japanese CCs with gradable nouns can generate the interpretation of CCs without having any syntactically visible gradable adjectives. The pragmatic reinterpretation strategy plays a central role in deriving comparative semantics out of nouns. The data would pose a problem if one would attempt to provide an English-style formal calculation of comparisons. In Japanese, CCs with gradable nouns reflect the characteristics of the Japanese comparatives that are much less syntactically governed.

3.5 Summary of Chapter 3

The discussion in this chapter basically confirms the proposal made in the previous research: CCs have conditional semantics with comparatives in the antecedent and consequent clauses. Japanese CCs have these properties, and I analyzed them under the lexical analysis of Japanese comparatives. The comparative semantics are introduced by gradable adjectives and the conditional semantics is introduced by *hodo*.

In prototypical CCs in Japanese, two direct degrees are compared. In such cases, differential degrees can be overtly filled in Japanese, unlike English/German. Furthermore, Japanese CCs allow the use of *yori(mo)* phrases. In such cases, comparisons are switched to those of differential degrees. This is not surprising under the lexical analysis, where gradable adjectives in Japanese have two types of degree arguments,

namely direct degrees and differential degrees. Both are a subject of comparison in CCs. Japanese CCs also allow nouns modified by relative clauses or simply by bare nouns for the position of an antecedent clause. It is striking that comparisons are made out of bare nouns without syntactically visible adjectives. Japanese-style contextual comparison plays a key role in accounting for such data.

This line of analysis will provide us a more comprehensive view of how degree constructions are created in Japanese. The next chapter investigates another degree construction in Japanese, namely, exclamatives, which is also in the scope of our framework. If our assumption of the lexical analysis is on the right track, it should apply to all degree constructions in Japanese, as gradable adjectives are the building blocks for all degree constructions.

Chapter 4 Exclamatives

This chapter is concerned with another type of construction that supports our line of analysis of degree constructions in Japanese. The following sentences are called exclamatives.

- (1) What a tall boy John is!
- (2) John-wa nan-te se-ga takai-ndeshoo!
John-to what-TE height-nom tall-EXC
'How tall John is!'

Exclamative sentences express the speaker's surprise. Much of the semantics of exclamatives, however, remains unknown since there has not been much research on exclamatives. Cross-linguistic research on exclamatives is even more limited. Some of these studies are Elliot (1974) on English, Obenauer (1994) on French, Portner and Zanuttini (2000) on Paduan, and Ono (2006) on Japanese. Moreover, at present, there seems to be no comprehensive research on exclamatives, and each author is working on his own framework. This chapter is no exception, and I will heavily rely on my own work. However, I will try to refer to others' work in order to draw connections among other studies and this one.

Exclamative constructions in Japanese demonstrate an important consequence of the assumption about Japanese adjectives that we made in Chapter 2. The format of lexical entries of Japanese gradable adjectives has been repeated in (3): it can be stated as in (3)a or as in (3)b. Importantly, the direct degree argument d is already bound by the

maximality operator, and thus, it cannot be overtly filled or undergo movement. It is an “untouchable” degree. On the other hand, the differential degree d' can be filled. Thus, a sentence with a measure phrase such as (4) necessarily becomes a differential comparison.

(3) Lexical Analysis of Japanese Comparatives (A : an arbitrary gradable adjective)

$$a. [[A]] = \lambda x. \max(\lambda d. A(d)(x)) > c$$

$$b. [[A]] = \lambda d'. \lambda x. \max(\lambda d. A(d)(x)) = c + d'$$

(4) Kono kasa-wa 2cm nagai.

this umbrella-top 2cm long.

‘This umbrella is 2 cm longer (than something).’

The following exclamative sentence in Japanese also showcases the comparative nature of Japanese adjectives. Unlike English counterpart, Japanese exclamatives can host overt *yorimo* clauses (“than” clauses) as in (6). In the absence of any comparative morpheme, the sentence necessarily means “How much smarter John is than Mary!” This suggests that the underlying proposition is basically a comparative sentence, and the exclamation makes a comparison of differential degrees.

(5) *How smart Mary is than John!

(6) John-wa nan-te [Mary yori(mo)] kasikoi-ndeshoo!

John-top what-TE [Mary “than”] smart-EXC

‘How much smarter John is than Mary!’

Japanese also allows multi-head exclamatives as in (8), where there is more than one exclamative wh-phrase in one sentence. The English example is ungrammatical. This is due to a property of exclamative operators in English, by which all exclamative wh-phrases obligatorily undergo overt movement. On the other hand, exclamatives wh-phrases in Japanese remain in situ in overt syntax. The grammatical status of the Japanese data is naturally explained if we assume the negative setting of the DAP: all the wh-exclamative phrases remain in situ and no syntactic problem arises.

(7) *What a poor student bought what a nice car!

(8) [Nan-te mazusii gakusee]-ga [nan-te takai kuruma]-o

what-TE poor student-nom what-TE expensive car-acc

katta-ndeshoo!

bought-EXC

lit. ‘What a poor student bought what an expensive car!’

With regard to the interpretation of the Japanese sentence, it is very similar to the interpretation of multihead comparatives that we discussed in Chapter 2. It is basically a combination of two comparatives. There are two gradable adjectives in the sentence:

mazusii (poor) and *takai* (expensive). Each one brings a comparison, which is to be modified by exclamative wh-phrases.

The organization of this chapter is as follows. I will start by analyzing the syntactic and semantics of exclamatives in English in order to provide a basis for our discussion. I will argue that exclamatives are basically an instance of comparatives, where a comparison is made between a linguistically provided degree and the speaker's expectation. The same analysis applies to Japanese exclamatives. To be more precise, however, exclamatives in Japanese crucially refer to differential degrees. Thus, Japanese exclamatives compare a linguistically given differential degree and a contextually provided differential degree that the speaker expects. I will also discuss the multihead exclamatives that I mentioned earlier. The syntactic and semantics properties of the multihead Japanese exclamative sentence are accounted for by the negative setting of the DAP and the lexical analysis of Japanese comparatives.

4.1 Syntax of Exclamatives

Let us begin with the definition of exclamatives. There are several types of exclamatives. Some of them are listed below (1)–(4)¹.

¹ The classification terms (wh-exclamatives, such-exclamatives, interrogative exclamatives) are my own.

Wh-exclamatives

(9) What a nice dress she bought!

(10) How nice her dress is!

Such-exclamatives

(11) She bought such a nice dress!

Interrogative exclamatives

(12) Is he tall!

Despite their syntactic differences, these examples have something in common: By exclaiming such as in (9)–(12), speakers indicate that they are surprised by something. Thus, the definition of exclamative should be given by the semantics of the sentences rather than their syntactic structures. Let us define exclamatives as follows:

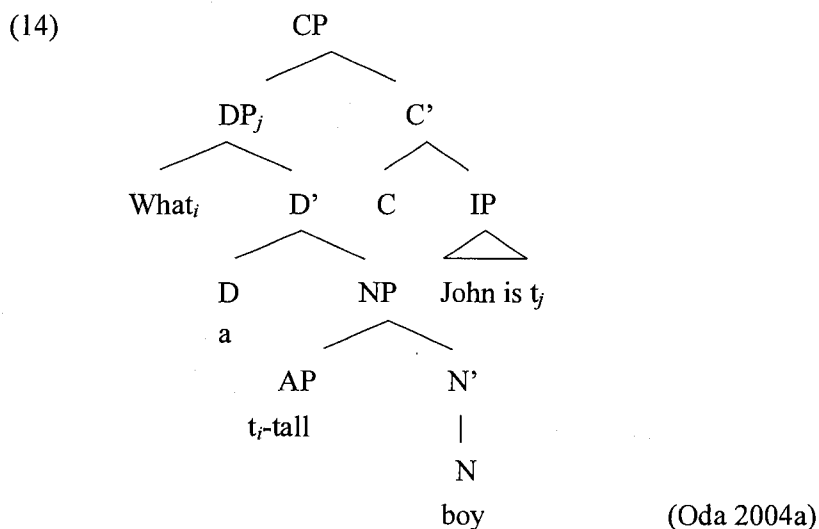
(13) Exclamatives:

Exclamatives express speakers' view that something is surprising, amazing, or outstanding.

Put differently, exclamatives are uttered when a given degree exceeds the speaker's expectation. This is where comparative semantics is involved: Exclamatives are a comparison between a degree denoted by the sentence and another degree of the speaker's expectation in a given situation. Therefore, it intuitively makes sense to say that exclamatives are a type of comparison.

Among the different types of exclamatives, in this chapter, I will focus on

wh-exclamatives with wh-operators *what* and a gradable adjective because the parallelism between exclamatives and comparatives is most visible in this type of exclamative. The surface structure of *What a tall boy John is!* is given below.



An immediate question concerns where the wh-operator comes from. Intuitively, this sentence implies that the speaker is surprised at John's "tallness." This suggests that the wh-phrase *what* is a degree operator that moves from the degree argument position of *tall* to SpecDP. Subsequently, the wh-phrase pied-pipes the entire DP to SpecCP.²

The above structure is confirmed by overtly filling the gap of the degree argument. Suppose John is 7 ft tall. In the following sentence, *7ft* occupies the degree argument position of *tall*:

² The structure can be more complicated. Zanuttini and Portner (2003) assume a layered CP in Paduan and English exclamatives, and they claim that exclamative wh-phrases are hosted in a higher SpecCP than interrogative wh-phrases.

(15) John is a 7 ft tall boy.

When the corresponding wh-exclamative remark is made, however, “7ft” cannot be understood as being surprised at John’s tallness.³

(16) #What a 7ft tall boy John is!

Since they have degree operators, exclamatives can be considered to be a type of degree construction, like the following sentences are:

(17) [How tall]_i is John t_i?

(18) John is taller than [Op_i Mary is t_i ~~tall~~].

(19) John is as tall as [Op_i Mary is t_i ~~tall~~].

In these degree constructions, the degree operators can be phonetically overt as in (17) or invisible as in (18) or (19). Exclamatives resemble (17) in that they have phonetically overt degree operators.

Going back to the structure in (14), it is worth discussing the landing site of the wh-phrase. Unlike wh-questions, exclamatives in English normally do not involve subject-auxiliary inversion as shown in (20) below. Thus, it may not be easy to examine whether the wh-phrase is in SpecCP or not. A question that arises is how to eliminate the possibility of the exclamative wh-phrase being in the Spec of an adjoined IP.

³ Note that the sentence is grammatical in a different reading, i.e., “There is something amazing about John as a 7ft tall boy.” However, we are not concerned with this reading.

(20) *What an expensive car did John buy!

Interestingly, Kondo (1995) reports that archaic English adopts auxiliary inversion in exclamatives.

(21) How strange is his appearance! (Kondo 1995)

Also, Niinuma and Park (2003) point out that exclamatives allow subject-auxiliary inversion in limited circumstances⁴.

- (22) a. What a nice person is HE!
 b. *What a nice person is he!
 c. What a nice person he is! (Niinuma and Park 2003)

They argue that the subject-auxiliary inversion interacts with sentence stress assignment. Following Reinhart (1997) and Reinhart and Neeleman (1998), they propose that English has an option of moving a head element at PF when it makes a structural context for the application of the unmarked stress assignment rule. The data in (22) show that the head

⁴ Niinuma and Park (2003) also discuss subject-auxiliary inversion in comparatives, which was first pointed out by Merchant (2001). In the following data with subject-auxiliary inversion, neutral sentential stress must be assigned to the subject at the end of the sentence.

- (i) a. *Abby can play more sonatas than can he.
 b. Abby can play more sonatas than can HE.

movement makes it possible for the subject NP *he* to receive unmarked neutral stress.

(22)a indicates that the wh-phrase is SpecCP.

Furthermore, C-heads appear overtly in the exclamatives of some languages. (23) is in Brazilian Portuguese, (24) is in a dialect of southern Germany, and (25) is in Paudan, a dialect of Italian.

(23) Que pessoa legal que o João é !

what person nice comp the Joao is

‘What a nice person Joao is!’

(24) Wie dumm daß ich bin!

How stupid that I am

‘How stupid I am!’

(Toman 1982)

(25) Che roba che l magna!

what stuff that he eats

‘The things he eats!’

(Zanuttini and Portner 2003)

Given these examples, there seems to be sufficient evidence to argue that the landing site of a wh-exclamative phrase is in SpecCP.

4.2 Negative Island Effect in Exclamatives and Comparatives

In the previous subsection, I have argued that exclamatives are intuitively paraphrased as comparatives. More concrete evidence for the idea of exclamatives as comparatives is obtained from the negative island effect that appears in exclamative sentences.

- (26) a. What a tall boy John is!
 b. *What a tall boy John isn't!

- (27) a. How tall John is!
 b. *How tall John isn't!

The exclamative sentences become ungrammatical when they are negated. This negation effect resembles the so called negative island effect observed in comparatives.

- (28) a. John is taller than Mary.
 b. *John is taller than Mary isn't. (c.f. Rullmann 1995)

Those exclamatives and comparatives are intuitively similar: they are both concerned with “tallness” and the negation makes them ungrammatical. Thus, it would be reasonable to assume that their ungrammatical status stems from the same source.

With regard to the negative island effect of comparatives, I will follow Rullmann's

(1995) analysis, which I have briefly mentioned in 1.4 in Chapter 1. Rullmann argues that maximal degrees are undefined in a downward entailing context including negation. The downward entailing function reverses the entailment relation, and the negation *not* is a downward entailing function.

(29) Downward entailing function:

A function f is *downward entailing* iff for all X, Y in the domain of f :

If $X \subseteq Y$, then $f(Y) \subseteq f(X)$. (c.f. Ladusaw 1979)

(30) a. John is dancing. \Rightarrow John is moving.

b. John *isn't* moving. \Rightarrow John *isn't* dancing.

According to Rullmann, the negation in the *than*-clause renders its maximal degree undefined. In the case of (31), the maximal degree of Mary's not being tall cannot be defined⁵.

(31) *John is taller than $\max(\lambda d. \text{Mary isn't } d\text{-tall})$

⁵ Note that it is not necessary that each case of negation in exclamatives results in undefined maximal degrees. In exclamatives with cardinal numbers, for instance, the problem of undefined maximal degree does not arise. (i) is grammatical in terms of intuitive reading, as seen in (ii). The semantics of the sentence is in (iii). (Refer to 4.3 for the semantics of exclamatives in English.)

(i) How many books John didn't read!

(ii) There are many books that John didn't read, and the number is larger than what the speaker expected.

(iii) $\max(\lambda d. \exists x. \text{book}(x) \wedge |x| = d \wedge \neg \text{read}(x)(J)) >$
 $\max(\lambda d. \exists w \in \text{Dox}_{\text{the speaker}} \exists x. \text{book}(x) \wedge |x| = d \wedge \neg \text{read}(x)(J))$

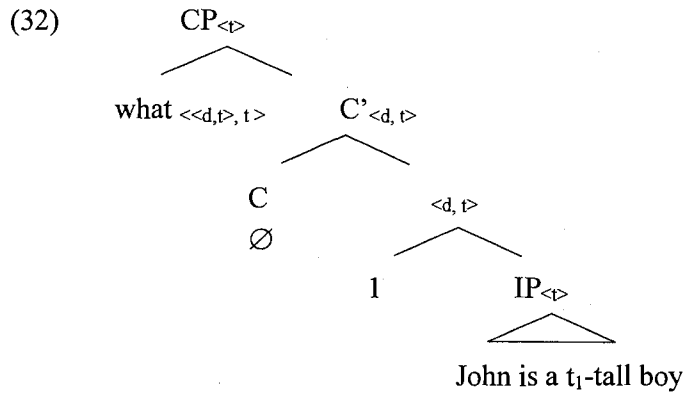
In the next section, I will show that the same rationale applies to exclamatives.

4.3 Semantics of English Exclamatives

A similar negation effect suggests that exclamatives also refer to maximal degrees.

Consider the following LF structure and compositional calculation from Oda (2004a).

The wh-phrases remains in SpecCP and the rest of the DP is reconstructed.



$$(33) \llbracket [tall] \rrbracket = \lambda d \lambda x. tall(d)(x)$$

$$\llbracket [John \text{ is } t_1 \text{ tall boy}] \rrbracket = tall(g(1))(x)$$

$$\llbracket [1 \text{ John is } t_1 \text{ tall boy}] \rrbracket = \lambda d. boy(J) \wedge tall(d)(J)$$

$$\llbracket [what] \rrbracket = \lambda p \in D_{\langle \delta, t \rangle}. max(p) > c$$

$$\llbracket [CP] \rrbracket = 1 \text{ iff } max(\lambda d. boy(J) \wedge tall(d)(J)) > c$$

c := the height of John that the speaker expected in the given context.

“The maximal degree of John’s tallness exceeds the speaker’s expectation of how tall he would be.”

The exclamative operator is a function that takes a property of type $\langle d, t \rangle$ and maps to a sentence such that the maximal degree given in the sentence is larger than the speaker's expectation. In a sentence, this can be expressed as "John is taller than I thought."

In the above calculation, the speaker's expectation in the context is expressed as c . This c can be more formally defined. It would be fair to say that the speaker's expectation on John's height refers to the maximal degree of John's tallness in the speaker's belief.

(34) Revised from (33):

$$[[what]] = \lambda p \in D_{\langle s, \langle d, t \rangle \rangle}. \max(p(@)) > \max(\lambda d. \exists w \in D_{\text{the speaker}}: p(d))$$

$$[[CP]] = 1 \text{ iff } \max(\lambda d. \text{boy}(J) \wedge \text{tall}_{@}(d)(J)) > \max(\lambda d. \exists w \in D_{\text{the speaker}}: \text{boy}(J) \wedge \text{tall}_w(d)(J))$$

We are now ready to account for the negative island effect in exclamatives. The truth conditions of the negated exclamatives sentence are given below: The maximal degree of John's not being a tall boy is undefined.

$$(35) \quad \max(\lambda d. \text{boy}(J) \wedge \neg \text{tall}_{@}(d)(J)) > \max(\lambda d. \exists w \in D_{\text{the speaker}}: \text{boy}(J) \wedge \neg \text{tall}_w(d)(J))$$

Readers would notice that the undefined maximal degree would be avoided by having the wide scope of negation.

$$(36) \quad \neg \max(\lambda d. \text{boy}(J) \wedge \text{tall}_{@}(d)(J)) > \max(\lambda d. \exists w \in D_{\text{the speaker}}: \text{boy}(J) \wedge \text{tall}_w(d)(J))$$

This amounts to saying “it is not the case that John is taller than I expected.” The ungrammatical status of the sentence indicates that this reading is not available. I do not have any logical explanation as to why (36) is not available, but the following discussion by Zanuttini and Portner (2003) will offer an intuitive explanation. They cite Elliot’s (1974) data and point out that exclamatives cannot be embedded under *it isn’t amazing*.

- (37) a. *It isn’t amazing how very cute he is!
 b. It is amazing how very cute he is!

They state an intuitive reason why (37)a is ungrammatical: it denies the amazement of his cuteness, which contradicts the scalar implicature of exclamatives. The same explanation holds for the lack of wide-scope negation shown in (36) and the lack of exclamative reading in the following negated *such*-exclamative sentence as well.

- (38) John isn’t such a tall boy.

Without negation, *John is such a tall boy!* is an exclamative sentence. As soon as the negation is added, however, it cannot be understood as an exclamative sentence any more.

The negative island effect caused by downward entailing functions other than negation is also observed both in comparatives and exclamatives. In what follows, the sentences remain grammatical with the upward entailing functions *every* and *always*, and

they are ungrammatical with the downward entailing functions *none* and *never*.

(39) a. John is smarter than *every* one of us is.

b. What a smart person *every* one of us is!

c. How smart *every* one of us is!

(40) a. *John is smarter than *none* of us is.

b. *What smart people *none* of us is!

c. *How smart *none* of us is!

(41) a. John is smarter than Bill *always* was.

b. What a smart person Bill *always* was!

c. How smart Bill *always* was!

(42) a. *John is smarter than Bill *never* was.

b. *What a smart person Bill *never* was!

c. *How smart Bill *never* was!

The parallelism between comparatives and exclamatives supports our assumption that they share maximal degrees in their semantics.

So far, we have seen that exclamatives are basically an instance of comparatives. However, comparisons of exclamatives have a unique property, i.e., the comparisons are exclusively made with a contextually determined speaker's expectation. This is why the

following exclamative sentence with a *than*-phrase has been ruled out.

(43) *How smart John is than Mary!

Syntactically speaking, a *than* phrase needs to appear as a complement of *-er*. Semantically speaking, the standard of comparison is semantically provided already. Thus, the linguistically provided *than*-phrase simply becomes redundant. The ungrammatical status of (43) seems too self-evident, but it will be important when the data is compared with a Japanese equivalent.

I would like to briefly mention an alternative approach of the semantics of exclamatives before we conclude this subsection. Our analysis of exclamatives as comparisons of two degrees applies only to particular types of exclamatives that concern degrees. In order to cover a wider range of data, other proposals such as the one by Zanuttini and Portner (2003) should also be considered. They propose that exclamatives involve the notion of “widening”.

(44) Widening:

Exclamatives widen the domain of quantification for the WH-operator, which gives rise to the set of alternative propositions denoted by the sentence.

For example, the following example in Paduan is uttered when someone eats an unexpectedly hot spice, habanero.

(45) Che roba che l magna!

what stuff that he eats

'The things he eats!'

Habanero was not in the set of peppers that the speaker had in mind. In other words, it was not part of the speaker's expectation. Thus, the exclamative sentence (45) broadens the set of peppers he eats into a larger set that includes habanero⁶. In other words, the fact that he ate such a hot spice is newly introduced to the speaker's knowledge. Exclamatives without any degree predicate such as (46) given below would be better analyzed by Zanuttini and Portner's approach. It does not directly refer to degrees. Nevertheless, it is understood as an exclamative sentence. The speaker is surprised by a certain unexpected characteristic of the car John bought.

(46) What a car John bought!

Our analysis of exclamatives as a degree construction fits Zanuttini and Portner's large schema: Exclamatives refer to a large degree that was not in the speaker's mind in the first place. Though I agree with Zanuttini and Portner's spirit, I will adopt my own

⁶ A formal definition of widening is as follows.

- (i) Widening: For any clauses S containing R_{widening} , widen the initial domain of quantification for R_{widening} , $D1$ to a new domain $D2$ such that
 - i. $[[S]]_{w, D2} < -[[S]]_{w, D1} < 0$ and
 - ii. $\forall x \forall y [(x \in D1 \ \& \ y \in (D2 - D1)) \rightarrow x < y]$

According to this definition, the difference between the two domains for a proposition should contain a new item. In the example we consider here, habanero corresponds to y . It is hotter and less likely to be eaten than any other pepper x .

comparative based approach in this dissertation, since it makes it easier for us to see the relationship between exclamatives and other degree constructions in Japanese. The question of how the degree based exclamatives are accommodated into a bigger picture of exclamatives will be left for further research.

In this section, I have proposed that exclamatives in English are an instance of comparatives. In the next section, I will show that the basic observation also applies to Japanese exclamatives.

4.4 Semantics of Japanese Exclamatives

This section proposes a semantics of Japanese exclamatives. Following the case of English, I will argue that Japanese exclamatives are a comparison of a linguistically given degree and the speaker's expectation. Unlike English exclamatives, however, Japanese exclamatives apply to differential degrees. This is because of the lexical entries of gradable adjectives, where direct degrees are already bound inside the adjectives, and thus cannot be a subject of syntactic operation. Only an element in the differential degree position can appear overtly. Following the negative setting of the DAP that was proposed in Chapter 2, it is expected that *wh*-exclamative operators do not undergo movement. This is, in fact, the case. Being free from constraints of movement, Japanese exclamatives permit patterns of sentences that are not possible in English.

4.4.1 Basic data

Consider some prototypical examples of Japanese exclamatives. (47) is a degree exclamative, and (48) is a cardinality exclamative.

(47) John-wa nan-te kasikoi-ndeshoo!

John-top what-TE smart-EXC

‘How smart John is!’

(48) John-wa nan-te takusanno hon-o yonda-nodeshoo!

John-to what-TE many book-acc read-EXC

‘How many books John read!’

Japanese is a wh-in-situ language and the exclamative wh-phrase *nan-te* (what-TE) appears in situ⁷. An exclamative morpheme, namely, *-ndeshoo*, comes at the end of the

⁷ *Nan* (what) in exclamatives always comes with a bound morpheme *-te*. Unfortunately, the exact meaning of *-te* is not clear at this point. *Te* can be alternatively uttered as *-to*, which sounds a little archaic. Interestingly, *nan* (what) followed by *-to* can be a very short utterance, which roughly corresponds to “oh my!” For some reason, this is not possible with *-te*.

(i) Nan-to/*te!
 what-TO/TE
 ‘Oh my!’

Obviously, this is not possible in English. Exclamative wh-phrases in English cannot stand alone and are followed either by a noun or an adjective. Currently, it is unclear where the contrast comes from.

(ii) *What! / *How

sentence. In fact, *-ndeshoo* is one of the many variations of exclamation morphemes. Other versions such as *-no*, *-noda*, *-nokasira*, *-nodaroo* intuitively carry the same meaning as *-ndeshoo*.

(49) John-wa **nan-te** kasikoi-*ndeshoo/no/noda/nokasira/nodaroo*!

John-top **what-TE** smart-EXC

‘How smart John is!’

Despite some syntactic differences from English, the basic intuition of the Japanese sentence is the same as the corresponding English sentence: The speaker is surprised by John’s degree of smartness in (47) and by the number of books John read in (48).

4.4.2 Syntax of Japanese Exclamatives

A question arises as to what position the exclamative wh-phrase *nan-te* (what-TE) occupies. It is best analyzed as the position of a differential degree. Unlike English, it should not be the position of a direct degree. We have seen in Chapter 2 that the direct degree position cannot be overtly filled. Thus, examples like (50) are necessarily understood as a differential comparison. We have proposed the lexical entry of an adjective, *nagai* (long) for instance, as in (51), where the direct degree argument is bound inside the adjective thus it cannot be overtly realized, whereas the differential position can be overtly filled.

(iii) What a man!/How large!

- (50) Kono bou-ga **ni-senti** nagai.
 this stick-nom **two-cm** long
 ‘This stick is 2 cm longer (than something).’

- (51) $[[nagai(long)]] = \lambda d' \lambda x. \max(\lambda d. long(d)(x)) = c+d'$

In fact, when *nan-te*(WH-te) occurs with a differential degree, an ungrammatical sentence results. This is because they end up competing for the same position.

- (52) *Kono bou-wa **nan-te** **ni-senti** nagai-ndeshoo!
 this stick-top **what-TE** **two-cm** long-EXC
 Lit. “How 2cm longer this stick is!”

There is another parallel behavior between differentials and *nan-te*(WH-te): They can undergo scrambling. This is not surprising given the standard assumption that, in Japanese, arguments can undergo scrambling (Saito 1985 and others). In Japanese, differential degree arguments are assumed to be arguments of gradable adjectives. In the following examples, *a*-sentences are in canonical orders. *b*-sentences have scrambled elements in the sentence initial positions.

(53) a. Kono bou-ga **ni-senti** nagai.

this stick-nom **two-cm** long

'This stick is 2cm longer (than something).'

b. **Ni-senti** kono bou-ga **t_i** nagai.

two-cm this stick-nom long

'This stick is 2cm longer (than something).'

(54) a. John-wa **nan-te** kasikoi-na-ndeshoo!

John-top what-TE smart-copula-EXC

'How smart John is!'

b. **Nan-te_i** John-wa **t_i** kasikoi-na-ndeshoo!

John-top what-TE smart-copula-EXC

'How smart John is!'

(55) a. John-wa **nan-te** takusanno hon-o yonda-ndeshoo!

John-top what-TE many book-acc read-EXC

'How many books John read!'

b. **Nan-te_i** John-wa **t_i** takusanno hon-o yonda-ndeshoo!

what-TE John-top many book-acc read-EXC

'How many books John read!'

The following sentence in (56) also shows that exclamatives refer to differential degrees. They have an overt *yorimo* phrase and the sentence is grammatical. This creates a contrast with the ungrammatical English example we have seen in (43). The Japanese sentence in (56) means that John outsmarts Mary by a surprisingly large degree. In other words, the speaker is surprised because the gap between John and Mary is unexpectedly large. The sentence corresponds to say *How much smarter John is than Mary!* in English.

(56) John-wa nan-te [Mary yori(mo)] kasikoi-ndeshoo!

John-top what-TE [Mary “than”] smart-EXC

‘How much smarter John is than Mary!’

In other words, the *yorimo* clause helps us detect the differential nature of exclamatives in Japanese.

The interpretation of “unexpectedly large gap” resulting from the exclamative phrase is seen in the following two scenarios. In Scenario 1, the gap between John and Mary is considerably large. On the other hand, it is very narrow in Scenario 2. The sentence (56) sounds alright under Scenario 1 but not under Scenario 2.

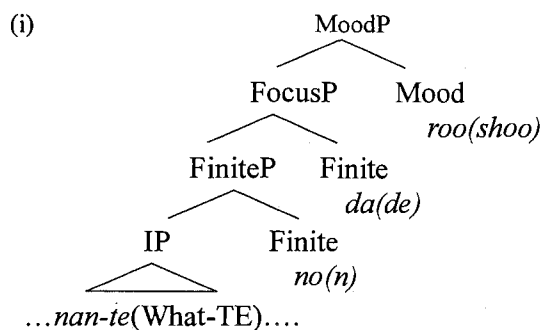
(57) Scenario 1: John’s SAT score was 2500, and Mary’s was 1500.

(58) Scenario 2: John’s SAT score was 2200, and Mary’s was 2150.

Given the observations above, I assume the surface structure of (47) as in (59). The

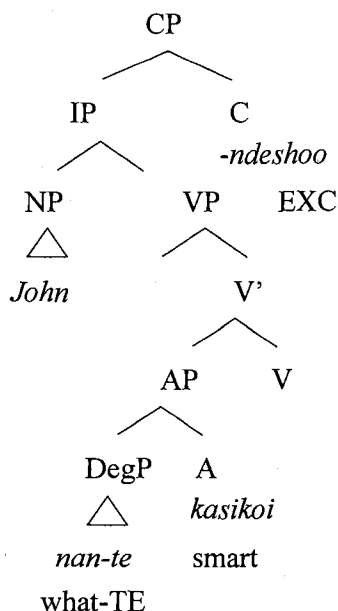
wh-phrase appears in a differential degree position, and the exclamatives morpheme *-deshoo* is located in C. It is very plausible that *-deshoo* is decomposed into several morphemes and is located under different heads. In this paper, however, I will treat it as a chunk and leave the detailed analysis aside. Interested readers can refer to works such as Ono (2006)⁸. Throughout the paper, I also ignore the fact that subjects of exclamatives are often marked by topic marker *-wa*. Thus, the subject DP in (59) is likely to be located higher. The structure for (48) will be the same in the relevant respects.

⁸ Ono (2006) analyzes *-nodaroo* (a version of *ndeshoo*) as a combination of *no* (Finite head), *da* (Focus head), and *roo* (Mood head).



Unfortunately the meaning of each head is not clear. However, the combination of *no+da* is often referred as an equivalent of *it is that* in English. It implies strong sense of commitment of the speaker. *Roo* seems to express some kind of speaker's attitude.

(59) S-structure of (47):



Then, what would be the LF structure of the data? The issue is whether or not the wh-phrases in situ undergo LF movement. The data in (60) and (61) given below suggest that they do not undergo covert wh-movement. They have adjunct *nan-te* (wh-TE) phrases in adjunct islands, and they remain grammatical. Since the data is a little complicated, they will be better understood with a story. As for (60), suppose that John is a car dealer, and a customer is about to buy a Porsche. Now, assume that the customer speaks ill of John's girlfriend, who happened to be there. John gets upset and punches the customer in his face. His co-worker would utter (60) thinking that the customer will no longer be interested in buying the car. The adverb exclamative wh-phrase *nante takaku* (how expensively) is embedded in the *maeni*(before)-clause. With respect to (61), imagine a situation where a college student who lives in a dormitory comes to a dining hall in the morning. However, that morning, he oversleeps and his class is about to begin. In such a situation, most people would usually grab a piece of banana and rush to the

class. But the student orders a hard boiled egg. You would blame the student and say (61). The exclamative wh-phrase *nante osoku* (how late) is embedded in the *atode*(after)-clause, which is further embedded in the relative clause. The sentence is still grammatically correct.

- (60) John-wa [PP [Adv **nan-te** takaku] kuruma-ga ureru maeni]
 John-top what-TE expensively car-nom sell before
 kyaku-o nagutta-ndeshoo!
 customer hit-EXC

Lit. '[How expensively]_i John hit a customer [before the car was sold t_i]!'

- (61) [CP[TP[DP[PP[Adv **Nan-te** osoku] okita atode] syokudoo-ni
 what-TE late woke_up after dining_hall-to
 kita hito]-ga yudetamago-o tyuumonnsiteiru]-nodeshoo]!
 came person-nom hardboiled_egg-acc ordering-EXC

Lit. '[How late]_i [a person who came to the dinning hall [after waking up t_i]] is ordering a hard boiled egg!'

The lack of LF wh-movement is compatible with what we have assumed in Chapter 2, namely, the negative setting of the DAP. Recall the definition of the parameter.

- (62) Degree Abstraction Parameter (DAP) (Beck et al. 2004b:325):

A language {does/does not} have binding of degree variables in the syntax.

Since the creation of sets of degrees is banned by the negative setting of the DAP in Japanese, wh-exclamative operators remain in situ even in LF.

4.4.3 Exclamatives with Japanese-style adjectives

This subsection provides the compositional semantics of Japanese exclamatives. The task of wh-exclamative operator *nan-te*(what-TE) in situ is to result in an interpretation where a differential degree is larger than the speaker's expectation. I propose the lexical entry of *nan-te*(WH-te) as in (63). It takes a gradable adjective and maps to a larger-than relation, where the actual differential degree of the adjective is greater than what the speaker expects.

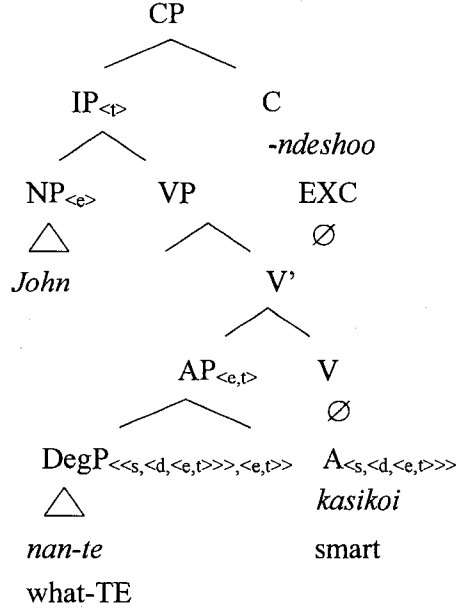
$$(63) \llbracket nan-te \rrbracket = \lambda p_{\langle s, \langle d, \langle e, t \rangle \rangle \rangle} \lambda x. \exists d'. p(@)(d')(x) \wedge \\ d' > \max(\lambda d'. \exists w \in D_{\text{the speaker}} : p(w)(d')(x))$$

Let us now consider basic data of Japanese exclamatives. The LF structure of (47) is given below, which is exactly the same as the S-structure that we have discussed in (59). Semantics types are added on relevant nodes. Note that the exclamatives morpheme *ndeshoo* (EXC) is treated as semantically vacuous⁹.

⁹ -*Ndeshoo* seems to play a role in syntactic and licenses exclamative wh-phrase, as the sentence becomes ungrammatical without it.

- (i) *John-wa nan-te sunao-da!
 John-top what-TE honest-copula
 "How honest John is!"

(64) LF structure of (47):



The compositional calculation is given below. The sentence basically states that John's smartness exceeds a standard by a surprisingly large degree.

$$(65) [[kasikoi(\text{smart})]] = \lambda w \lambda d' \lambda x. \max(\lambda d. \text{smart}_w(d)(x)) = c + d'$$

$$[[nan-te]] = \lambda p_{<s,<d,<e,t>>>} \lambda x. \exists d'. p(@)(d')(x) \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : p(w)(d')(x))$$

$$[[nan-te kasikoi(\text{how smart})]] = \lambda x. \exists d'. \max(\lambda d. \text{smart}_{@}(d)(x)) = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : \max(\lambda d. \text{smart}_w(d)(x)) = c + d')$$

$$[[(64)]] = 1 \text{ iff}$$

$$\exists d'. \max(\lambda d. \text{smart}_{@}(d)(J)) = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : \max(\lambda d. \text{smart}_w(d)(J)) = c + d')$$

c := the standard degree of smartness in the given context

“There is a degree d' s.t. John’s smartness exceeds a standard by d' , and the excessive smartness d' is greater than what the speaker expected.”

The truth conditions amount to saying *How much smarter John is (than I expected)!* in English. Importantly, the speaker’s expectation refers to the gap between John’s smartness and the standard. Thus, the precise semantics of the sentence is different from that for *How smart John is!* where the speaker’s expectation refers to the direct degree, i.e., the smartness of John itself. I assume that Japanese speakers practically use (47) to mean *How smart John is!* This is simply because there is no way to utter the exact equivalent of *How smart John is!* in Japanese, and (47) is similar enough to mean that.

The exclamative sentence with overt *yorimo* phrase (56) that is repeated below is now easily accounted for. The truth conditions are the same as those in (65) except that the value of c is more concretely determined by the *yorimo* phrase.

(66) John-wa nan-te [Mary yorimo] kasikoi-ndeshoo!

John-top what-TE [Mary “than” smart-EXC

‘How much smarter John is than Mary!’

(67) $[[(66)]] = 1$ iff $\exists d'. \max(\lambda d. \text{smart}_{@}(d)(J)) = c + d' \wedge$

$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : \max(\lambda d. \text{smart}_w(d)(J)) = c + d')$

$c := \text{Mary's smartness}$

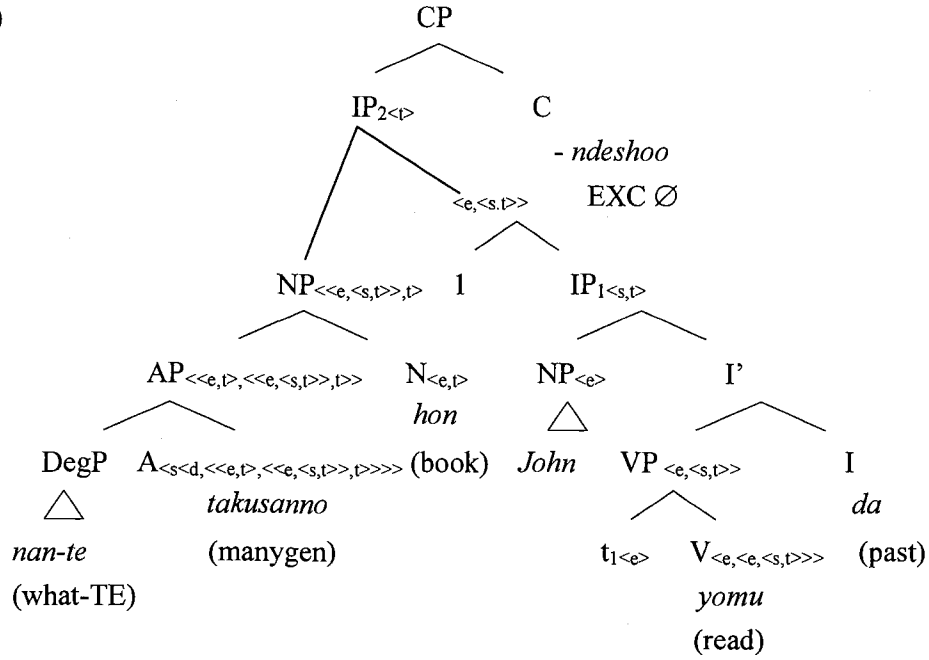
Importantly, there are two comparisons that reside within the exclamative sentence as spelled out in (68). (68)a is brought by the adjective; (68)b, by the exclamative operator.

- (68) a. John is smarter than Mary.
 b. The gap between John's smartness and Mary's is larger than the speaker expected.

Let us turn to the exclamative of cardinality (48) repeated below. Its LF structure is given below. I assume that the constituent of the NP *nan-te takusan-no hon* (how many books) is a generalized quantifier of type $\langle\langle e, t \rangle, t \rangle$, and undergoes movement due to type mismatch, leaving a trace of type $\langle e \rangle$ in the object position of the verb.

- (69) John-wa nan-te takusan(no) hon-o yonda-ndeshoo!
 John-to what-TE many book-acc read-EXC
 'How many books John read!'

(70)



Takusanno (many), in this case, derives the cardinality of the predicate it applies. Importantly, it is in the format of Japanese adjectives: *Takusanno* (many) means that the intersection of two propositions is larger than a contextually salient number by a differential number d' .

$$(71) [[takusanno(many)]] = \lambda w \lambda d' \lambda p_{\langle e,t \rangle} \lambda q_{\langle e,s,t \rangle} . | \lambda x . p(x) \wedge q(x)(w) | = c + d'$$

What about the lexical entries of the wh-exclamative operator *nan-te* (what-TE)? Note that it is no longer type $\langle \langle s, \langle d, \langle e, t \rangle \rangle \rangle, \langle e, t \rangle \rangle$. It takes the adjective *takusanno* (many) of type $\langle s, \langle d, \langle \langle e, t \rangle, \langle \langle e, \langle s, t \rangle \rangle, t \rangle \rangle \rangle$ and map to type $\langle \langle e, t \rangle, \langle \langle e, \langle s, t \rangle \rangle, t \rangle \rangle$. Thus the semantic type of *nan-te* (what-TE) is to be $\langle s, \langle d, \langle \langle e, t \rangle, \langle \langle e, \langle s, t \rangle \rangle, t \rangle \rangle \rangle$, $\langle \langle e, t \rangle, \langle \langle e, \langle s, t \rangle \rangle, t \rangle \rangle$. In other words, *nan-te* (what-TE) takes a proposition of type $\langle s, \langle d, \alpha \rangle \rangle$ and maps to type $\langle \alpha \rangle$.

Let us now compositionally calculate the sentence. The truth conditions basically state that the excessive number of books John reads is surprisingly large.

$$(72) [[[1 IP_1]]] = \lambda x \lambda w. \text{read}_w(J)(w)$$

$$[[takusanno(\text{many})]] = \lambda w \lambda d' \lambda p_{\langle e, t \rangle} \lambda q_{\langle s, \langle e, t \rangle \rangle} . | \lambda x. p(x) \wedge q(x)(w) | = c + d'$$

$$[[nan-te]] = \lambda p_{\langle s, \langle d, \langle \langle e, t \rangle, \langle \langle e, \langle s, t \rangle \rangle, t \rangle \rangle \rangle} \lambda q_{\langle e, t \rangle} \lambda \phi_{\langle e, \langle s, t \rangle \rangle} \exists d'. p(@)(d')(q)(\phi) \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : p(w)(d')(q)(\phi))$$

$$[[AP]] = \lambda q_{\langle e, t \rangle} \lambda \phi_{\langle e, \langle s, t \rangle \rangle} \exists d'. | \lambda x. q(x) \wedge \phi(x)(@) | = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : | \lambda x. q(x) \wedge \phi(x)(w) | = c + d')$$

$$[[hon(\text{book})]] = \lambda x. \text{book}(x)$$

$$[[NP]] = \lambda \phi_{\langle e, \langle s, t \rangle \rangle} \exists d'. | \lambda x. \text{book}(x) \wedge \phi(x)(@) | = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : | \lambda x. \text{book}(x) \wedge \phi(x)(w) | = c + d')$$

$$[[IP_2]] = \exists d'. | \lambda x. \text{book}(x) \wedge \text{read}(x)(J)(@) | = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : | \lambda x. \text{book}(x) \wedge \text{read}'(x)(J)(w) | = c + d')$$

$$[[CP]] = 1 \text{ iff } \exists d'. | \lambda x. \text{book}(x) \wedge \text{read}_{@}(x)(J) | = c + d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : | \lambda x. \text{book}(x) \wedge \text{read}_w(x)(J) | = c + d')$$

$c :=$ the standard number of books given in the context

“There are a certain number of books that John read that exceeds the standard number of books in the given context, and the excessive number is larger than the speaker’s expectation.”

The truth conditions make a comparison of differential degrees, as in the case of the (65).

Again, I assume that Japanese speakers use the sentence (69) to mean *How many books John read!* simply because there is no way to denote the interpretation directly, and the truth conditions given in the end of (72) are close enough to mean it.

It is of course possible for the sentence to have an overt *yorimo* phrase. In such cases, the value of the standard degree is inferred from *yorimo* phrases.

- (73) John-wa [sensei-ni iwareta yori(mo)] nan-te takusanno
 John-to [teacher-by told “than”] what-TE many
 hon-o yonda-ndeshoo!
 book-acc read-EXC

‘How many more books John read than (he was) told by the teacher!’

- (74) Truth conditions of (73):

$$\begin{aligned} \exists d'. |\lambda x. \text{book}(x) \wedge \text{read}_{@}(x)(J)| = c + d' \wedge \\ d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}} : |\lambda x. q(x) \wedge \text{read}_w(x)(J)| = c + d') \\ c := \text{the number of books the teacher told John to read} \end{aligned}$$

There are two comparisons that reside within the sentence as stated in (75). (75)a results from the adjective; (75)b, from the exclamative operator.

- (75) a. John read more books than the teacher told him to read.
 b. The gap between the number of books John read and the instructed number is greater than the speaker expected.

In summary, the semantics of Japanese exclamatives is basically the same as that in English: They make a comparison between a linguistically given degree and the speaker's expectation. Japanese exclamatives are unique in that they always make a comparison of differential degrees. This is because the nature of Japanese gradable adjectives is such that direct degrees are bound inside the adjectives and thus cannot be syntactically operated.

4.4.4 Negated Exclamatives in Japanese

It is worth discussing negated exclamatives in Japanese. As we have seen above, the negative island effect observed in negated exclamatives in English was strong evidence for the comparative-like semantics of exclamatives. What about Japanese exclamatives? When I discussed negated comparatives in 2.2.4 in Chapter 2, I observed that Japanese negation is sometimes understood as a morphological negation, and it creates an antonym when combined with a gradable adjective. This phenomenon carries over to exclamatives.

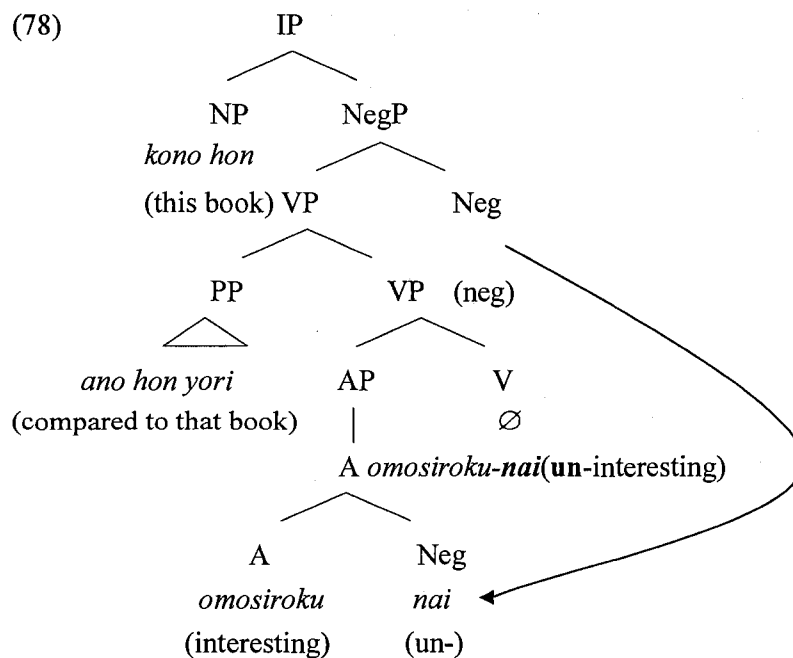
Let us first recall the behaviors of the negated comparative sentence (76) that we have discussed in Chapter 2. The equivalent sentence in English is *This book is not more interesting than that book*, where *not* is a sentential negation and the sentence leaves a possibility where *this book* is as interesting as *that book*. In the case of the Japanese sentence (76), however, it denotes something stronger: the book is uninteresting and must therefore be less interesting than that book. In other words, the negation serves as a morphological negation rather than a sentential negation.

- (76) Kono hon-wa [ano hon yori(mo)] omosiroku-**nai**.
 this book-top [that book “than”] interesting-**neg**
 ‘This book is not more interesting than that book.’

(77) The interpretation of (76):

- a. $\exists d[\text{this book is } d\text{-interesting} \wedge d < c]$
 $c := \text{the degree of how interesting that book is}$
 b. Compared to that book, this book is un-interesting.

I tentatively assumed in Chapter 2 that *nai*(neg) is base-generated under Neg, and then somehow lowers to be combined with the adjective *omosiroi* (interesting) and creates an antonym *omosiroku-nai* (un-interesting).



With the antonym *omosiroku-nai* (uninteresting), the truth conditional calculation correctly captures the intuitive interpretation.

(79) a. $[[[\textit{omosiroku nai}]]] = \lambda x. \max(\lambda d. \text{un-interesting}(d)(x)) > c$

b. $[[(76)]] = 1$ iff

$\max(\lambda d. \text{un-interesting}(d)(\text{this_book})) > c$

$c :=$ the degree of uninterestingness of that book

Thus, the tentative generalization is stated as follows.

(80) A negated gradable adjective in Japanese makes an antonym.

Let us now turn to negated exclamatives in Japanese. The negated exclamatives in Japanese (81) given below are grammatical, while their equivalent in English are ungrammatical as shown in the translation. The Japanese sentence intuitively refers to the unexpectedly large degree of this book being uninteresting. Thus, *nai*(neg) serves as a morphological negation, and the negated adjective creates the antonym, just like the case of the negated adjective comparative sentence we have observed above.

(81) Kono hon-wa nan-te omosiroku-**nai**-ndeshoo !

this book-top what-TE interesting-**neg**-EXC

Lit ‘How interesting this book isn’t!’

(How uninteresting this book is!)

With the newly created antonym *omosiroku-nai*(uninteresting), the truth conditions correctly represent the intuitive reading of the sentence.

(82) $[[(81)]] = 1$ iff

$$\exists d'. \max(\lambda d. \text{un-interesting}(d)(\text{this_book})) = c + d' \wedge$$

$$d' > \max(\lambda d. \exists w \in \text{Dox}_{\text{the speaker}}: \text{un-interesting}_w(d)(\text{this_book}))$$

What would happen to exclamatives with an NPI *daremo*(anyone)? In Chapter 2, we have observed that in a sentence with an NPI *daremo*(anyone), the negation *nai* serves as a licenser of the NPI; thus, no antonym is created.

(83) Dare-mo kasikoku-**nai**.

anyone smart-**neg.**

‘No one is smart.’

Nai(neg) does not even create an antonym in comparatives with NPI. This is because the negation remains high enough to license the NPI. The contrast between (84)a and (84)b gets this point across: an antonym is created only in the latter.

(84) a. Dare-mo [John yori(mo)] kasikoku-**nai**.

anyone [John “than”] smart-**neg.**

‘Compared to John, no one is smart.’

b. Mary-wa [John yori(mo)] kasikoku-**nai**.

Mary-top [John “than”] smart-**neg**.

‘Compared to John, Mary is un-smart.’

Given the above observation, it is natural that exclamatives with the NPI *daremo*(anyone) such as the following are ungrammatical: The negation would work in two ways—It takes a wide scope and serves as a licenser of the NPI or it takes a narrow scope and serves as a morphological negation. However, the sentence encounters a problem in either choice.

(85) *Dare-mo nan-te kasikoku-**nai**-ndeshoo!

anyone what-TE smart-**neg**-EXC

Lit. ‘How smart no one is!’

(86) a. Wide scope of negation:

$$\neg \exists x \exists d'. \text{person}(x) \wedge \max(\lambda d. \text{smart}_{@}(d)(x)) = c+d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}}: \max(\lambda d. \text{smart}_w(d)(x)) = c+d')$$

b. Narrow scope of negation:

$$\exists x \exists d'. \text{person}(x) \wedge \max(\lambda d. \text{un-smart}_{@}(d)(x)) = c+d' \wedge$$

$$d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{the speaker}}: \max(\lambda d. \text{un-smart}_w(d)(x)) = c+d')$$

When the negation serves as a licenser of *daremo* (anyone), it would create an

interpretation of “no one.” However, “no one” is not compatible with the basic properties of exclamationatives. (Recall that exclamationatives embedded under negation makes an ungrammatical sentence as in (37). When the negation is lowered and serves as a morphological negation, it would create an antonym *kasikoku-nai* (un-smart). However, the NPI would be left without being c-commanded.

In summary, negated exclamationatives in Japanese often remain grammatical, unlike those in English. This is because negated gradable adjectives in Japanese turn out to be their antonyms, and the exclamationatives are made on unexpected degrees of the antonyms.

4.4.5 Exclamationatives with Bare Nouns

I would like to have a brief discussion of exclamationatives with bare nouns in Japanese at the end of this subsection. We have seen in Chapter 2 that *yorimo* comparatives can be made out of bare nouns without any syntactically visible adjectives. Similarly, Japanese comparative conditionals (CCs) allow bare nouns for the first argument of *hodo* (CC connective), and such bare nouns produces interpretations of comparison. Recall the relevant examples.

(87) a. Taro-wa [Hanako yorimo] (motto) **dokusaiteki-da**

Taro-top Hanako “than” (“more”) dictatorial-copula

Lit. ‘Compared to Hanako, Toro is a dictator.’

(Taro is more dictatorial than Hanako.)

- (88) [NP **Dokusaisya**] hodo (motto) kodokuda.
 dictator CC (“more”) lonely
 ‘As someone is more of a dictator, he/she is lonelier.’

In order to explain why comparisons can be made out of the noun *dokusaisya* (dictator), I assumed that the speaker makes maximum use of pragmatics and interpret it as *dokusaiteki* (dictatorial). I called such pragmatic process “reinterpretation.”

- (89) $\lambda x.\text{dictator}(x)$ ---- reinterpretation---- $\rightarrow \lambda x.\text{max}(\lambda d.\text{dictatorial}(d)(x))>c$

Comparative semantics is introduced as long as nouns are reinterpreted, because the comparative semantics is built in adjectives. However, this does not mean that anything can be possible by pragmatics. There is a limit of what pragmatics can do.

Exclamatives with bare nouns are not possible in a relevant sense, which shows the limit of reinterpretation.

- (90) John-wa nan-te dokusaisya-na-ndeshoo!
 John-top what-TE dictator-copula-EXC
 ‘What a dictator John is!’

The sentence is grammatical, but it does not have the intended interpretation. It can be understood as *What a dictator John is!*, which means that there is something surprising about John as a dictator. It cannot be understood as *How dictatorial John is!*, which refers

to the unexpected degree of John's being dictatorial. In short, *dokusaisya* (dictator) in (90) is not reinterpreted as *dokusaiteki* (dictatorial).

Why is the process of reinterpretation not available in exclamatives? I assume this is because of *nan-te* (what-TE), which needs to occupy the differential degree position. Exclamatives require syntactically visible adjectives that host *nan-te* (what-TE) in their differential degree positions. Pragmatic process cannot provide such syntactic positions.

4.5 Multihead Exclamatives

This section discusses multi-head exclamatives. Multihead exclamatives refer to sentences with more than one exclamative wh-phrase. They are ungrammatical in English, whereas they are considered grammatical in Japanese. The contrast comes from the different properties of degree constructions in these two languages. In other words, English wh-exclamative phrases must undergo degree movement, whereas those in Japanese remain in situ due to the negative setting of the DAP.

(91) *What a poor student bought what an expensive car! (Oda 2003)

(92) [Nan-te mazusii gakusee]-ga [nan-te takai kuruma]-o
 what-TE poor student-nom what-TE expensive car-acc
 katta-nodeshoo!
 bought-EXC

Lit. 'What a poor student bought what an expensive car!'

The interpretation of the Japanese multihead exclamative sentence also showcases the characteristics of Japanese degree constructions. Similar to the case of multihead comparatives in Japanese, multihead exclamatives in Japanese can also accommodate two comparisons in one sentence. The lexical analysis of Japanese comparatives accounts for the interpretation: Each gradable adjective results in a comparison; thus, more than one comparisons are accommodated in one sentence when there are more than one gradable adjectives in one sentence.

4.5.1 Multihead exclamatives in English

I will begin with the syntactic problems of multihead exclamatives in English. Their ungrammatical status appears to be puzzling given the fact that multiple wh-interrogative sentences are well-formed.

(93) *What a poor student bought what an expensive car! (Oda 2003)

(94) Which student bought what car?

The contrast comes from the different “strength” of the wh-phrase. In multiple wh-interrogative sentences, wh-phrases can stay in situ as long as SpecCP is filled with a wh-phrase. In contrast, English exclamative phrases do not have a choice of remaining in situ, and they obligatorily undergo overt movement. Evidence can be found in French.

Wh-phrases in French are fronted, as in (95), and French also allows wh-interrogatives in situ as shown in (96):

- (95) Qui as-tu vu?
 who have you seen
 ‘Who did you see?’

- (96) Tu as vu qui?
 you have seen who
 ‘Who did you see?’ (Bošković 2000)

In order to account for the wh-in-situ in (96), Bošković (2000) assumes that the attracting C can be inserted in LF. For Bošković (2000), the complementizer C is absent in the overt syntax structure of (96). This implies that there is no attracting head in the structure that would trigger the overt movement of the wh-phrase. The phonologically null complementizer C is inserted later in LF, so that wh-movement is postponed until covert syntax. Interestingly, the analysis cannot be extended to wh-exclamatives. Wh-exclamative (97) involving wh-fronting is grammatical. However, (98) involving wh-in-situ is ungrammatical. (98) contrasts with the well-formed wh-question (96).

- (97) Quelles belles maisons il a achet  !
 What pretty houses he bought
 ‘What pretty houses he bought!’ (Elliott, 1974)

(98) *Il a acheté quelles belles maisons!

he has bought what pretty houses

‘What pretty houses he bought!’

The movement of the exclamative cannot be postponed until covert syntax.

This means that the ungrammatical status of multiple wh-exclamatives in English in (93) and wh-exclamative in situ in French in (98) can be accounted for by assuming a mechanism that forces wh-exclamative phrases to move overtly, for instance, +strong-feature on them (Oda 2003). If this applies to English as well, multiple exclamative phrases are not possible in one sentence in English, because the second exclamative phrase cannot stay in situ nor can it move to SpecCP, which is already filled with the first exclamative phrase. This point is made clearer with languages that have layers of CPs. For example, Romanian is a multiple wh-fronting language, and it allows multiple wh-exclamatives with all the wh-phrases fronted. The following multiple wh-exclamatives in Romanian is somewhat awkward but far better than the English equivalent.

(99) ?Ce fata frumoasă cu ce bărbat urât s-a căsătorit!

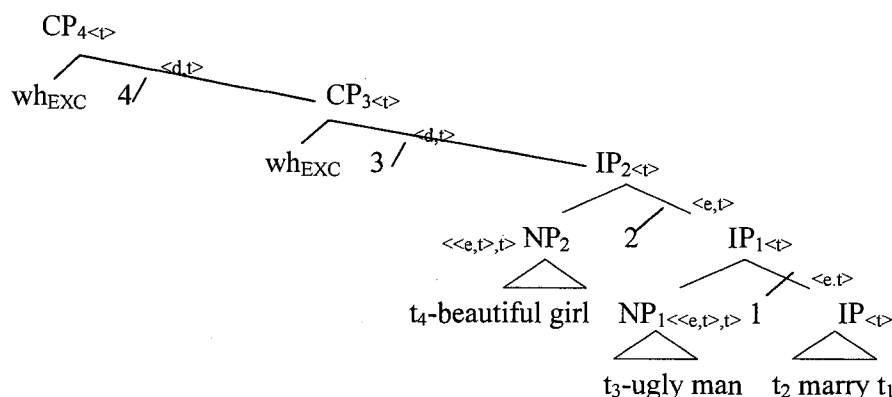
What girl beautiful with what man ugly recip.-has married

Lit. ‘What a beautiful girl married what an ugly man!’

This is because the two wh-exclamative phrases are hosted in the layered CPs in the initial position of the sentence.

However, the sentence is not perfect. I assume that the remaining problem comes from semantics. What would be the semantics of the sentence? Putting aside how exactly the derivation goes, the resulting LF structure would be as in (100) below. The subject and the object undergo movement because of type mismatch. The wh-operators undergo wh-movement and hosted in the layered SpecCP.

(100) LF structure of (99)



Notice that this is very similar to the structure of the multi-head comparatives in English that we have discussed in Chapter 2. The resulting interpretation is expected to be very similar to that of multihead comparatives by Meier (2001): There will be two comparisons, and one will be embedded in the other. The larger comparison would compare the actual beauty of the girl and the maximum beauty in the speaker's belief. The embedded comparison would compare between the ugliness of the man and the maximum ugliness in the speaker's belief. Whether or not such interpretation is possible can be as controversial as the issue of how acceptable sentence-internal multihead comparatives are in English. (Recall that judgments on multihead comparatives are quite marginal.) I simply conclude that multihead exclamatives in English-like languages face

challenge in deriving their interpretations.

4.5.2 Multi-head exclamatives in Japanese

Now, let us turn to multi-head Japanese exclamatives. As I briefly mentioned at the beginning of this chapter, the following sentence has two exclamative wh-phrases in situ, and the sentence is grammatical.

- (101) [Nan-te mazusii gakusee]-ga [nan-te takai kuruma]-o
 what-TE poor student-nom what-TE expensive car-acc
 katta-nodeshoo !
 bought-EXC
 lit. ‘What a poor student bought what an expensive car!’

Intuitively, the sentence is basically a combination of two comparisons: The speaker is surprised at both the poorness of the student and the price of the car¹⁰.

¹⁰ In addition to the intuition described, the sentence (101) has an implication that the speaker is surprised by the combination of the two wh-phrases. In what follows, I will state some observations.

In the case of (101), the contrast between the poor student and the expensive car is what makes the speaker utter the sentence. In other words, the speaker is saying “what a pair!” In this sense, multihead exclamatives sound most natural when two items being compared form an antonymous pair (e.g. poor/rich, pretty/ugly, big/small, etc.)

- (i) Nan-te se-ga takai hito-ga nan-te tiisana
 what-TE height-nom tall person-nom what-TE small

syatu-o kiteiru-ndeshoo !

shirt-acc be_waring-EXC

Lit 'What a tall boy is wearing what a small T-shirt!'

(I never thought a man of that height can wear that small a T-shirt.)

- (ii) Nan-te kireina hito-ga nan-te busaikuna okoko-to
 what-TE pretty girl-nom what-TE ugly man-with
 tukiatteiru-ndeshoo!

be_seeing-EXC

Lit 'What a pretty girl is seeing what an ugly guy!'

(I didn't expect that beautiful girl to go out with that ugly man.)

However, a comparison of antonymous pairs is not a necessity, and it is possible to have a pair of exclamative wh-phrases from positive/negative extent of the same (or similar) scale(s) (e.g., *good* and *excellent*; *hard* and *unfortunate*).

- (iii) Nan-te ii toki-ni nan-te subarasii hito-ga
 what-TE good timing-at what-TE excellent person-nom
 oobositekita-ndeshoo!

applied-EXC

Lit. 'What an excellent applicant filed his/her application at what a nice timing!'

(That's perfect.)

- (iv) Nan-te fukouna jiken-ga nan-te taihenna
 What-TE unfortunate incident-nom what-TE hard
 toki-ni okita-ndeshoo !
 time-in occurred-EXC

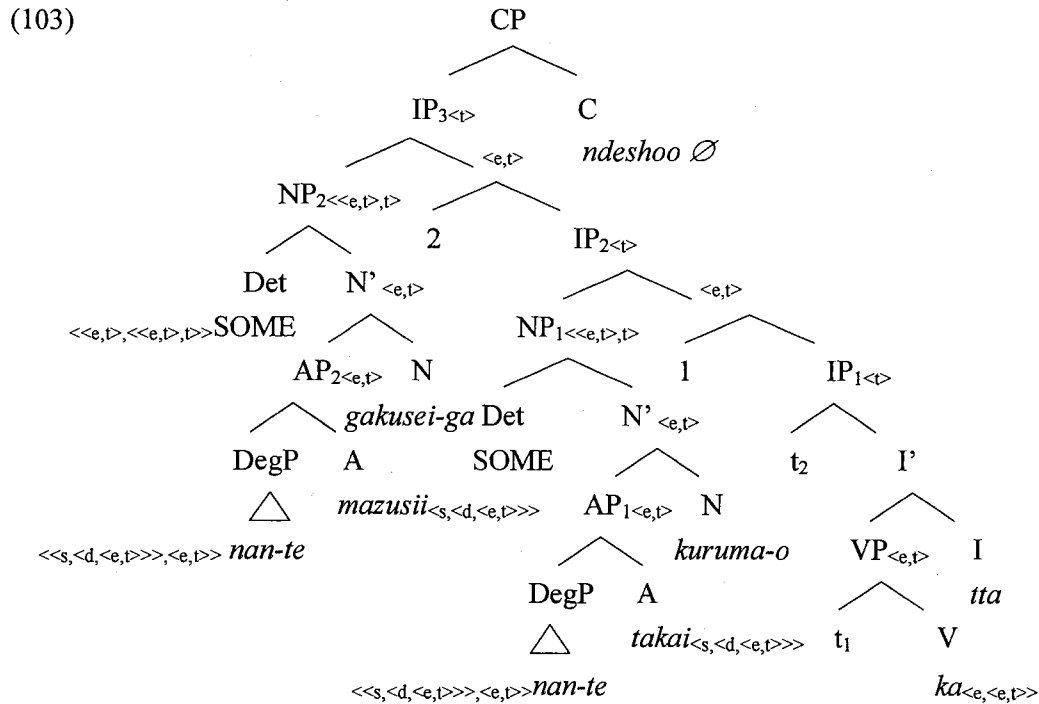
Lit. 'What an unfortunate incident occurred in what a hard time!'

When two exclamatives refer to two kinds of scales that are not related to each other (e.g., *large* and *difficult*), a sentence is not ungrammatical but sounds awkward. Intuitively, it is unclear what the speaker is impressed with.

- (v) (?)Nan-te kimuzukasii hito-ga nan-te ookina uchi-ni
 what-TE difficult peron-nom what-TE large house-in

- (102) The student who bought an expensive car is poorer than I thought and the car that the student bought is more expensive than I thought.

Next, consider the LF structure of the multi-head exclamatives and its truth conditions. In (103), the subject and the object are type $\langle\langle e, t \rangle, t \rangle$ and undergo movement due to type mismatch. *Nan-te*(what-TE) in each noun phrase remains in situ,



sundeiru-ndeshoo!

be_living-EXC

Lit. 'What difficult person lives in what a large house!'

Thus, the following generalization seems to hold.

- (vi) In multi-head exclamatives with gradable adjectives, the two (or more) exclamative phrases refer to two opposite sides of a scale or one side of the same (or similar) scale.

Turning to the compositional calculation, two comparisons brought by *nan-te*(what-TE) are accommodated without any problem as in the case of multihead comparatives in Japanese.

$$\begin{aligned}
 (104) \quad & [[IP_1]] = \text{bought}(g(1))(g(2)) \\
 & [[1 IP_1]] = \lambda y . \text{bought}(y)(g(2)) \\
 & [[takai(\text{expensive})]] = \lambda w \lambda d' \lambda y . \max(\lambda d . \text{expensive}_w(d)(y)) = c + d' \\
 & [[nan-te]] = \lambda p_{\langle s, \langle d, \langle e, t \rangle \rangle \rangle} \lambda y . \exists d' . p(@)(d')(y) \wedge \\
 & \quad d' > \max(\lambda d' . \exists w \in \text{Dox}_{\text{thespeaker}} : p(w)(d')(y)) \\
 & [[AP_1]] = \lambda y . \exists d_1 . \max(\lambda d . \text{expensive}_@ (d)(y)) = c + d_1 \wedge \\
 & \quad d_1 > \max(\lambda d' . \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d . \text{expensive}_w(d)(y)) = c + d') \\
 & [[NP_1]] = \lambda q . \exists y \exists d_1 . \max(\lambda d . \text{expensive}_@ (d)(y)) = c + d_1 \wedge \\
 & \quad d_1 > \max(\lambda d' . \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d . \text{expensive}_w(d)(y)) = c + d') \\
 & \quad \wedge \text{car}(y) \wedge q(y) \\
 & [[IP_2]] = \exists y \exists d_1 . \max(\lambda d . \text{expensive}_@ (d)(y)) = c + d_1 \wedge \\
 & \quad d_1 > \max(\lambda d' . \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d . \text{expensive}_w(d)(y)) = c + d') \\
 & \quad \wedge \text{car}(y) \wedge \text{bought}_@ (y)(g(2)) \\
 & [[2 IP_2]] = \lambda x . \exists y \exists d_1 . \max(\lambda d . \text{expensive}_@ (d)(y)) = c + d_1 \wedge \\
 & \quad d_1 > \max(\lambda d' . \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d . \text{expensive}_w(d)(y)) = c + d') \\
 & \quad \wedge \text{car}(y) \wedge \text{bought}_@ (y)(x) \\
 & [[mazusii(\text{poor})]] = \lambda w \lambda d' \lambda x . \max(\lambda d . \text{poor}_w(d)(x)) = c + d'
 \end{aligned}$$

$$[[AP_2]] = \lambda x. \exists d_2. \max(\lambda d. \text{poor}_{@}(d)(x)) = c + d_2 \wedge$$

$$d_2 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{poor}_w(d)(x)) = c + d')$$

$$[[NP_1]] = \lambda q. \exists x \exists d_2. \max(\lambda d. \text{poor}_{@}(d)(x)) = c + d_2 \wedge$$

$$d_2 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{poor}_w(d)(x)) = c + d')$$

$$\wedge \text{student}(x) \wedge q(x)$$

$$[[IP_3]] = \exists x \exists y \exists d_2 \exists d_1. \max(\lambda d. \text{poor}_{@}(d)(x)) = c + d_1 \wedge$$

$$d_1 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{poor}_w(d)(x)) = c + d')$$

$$\wedge \text{student}(x) \wedge$$

$$\max(\lambda d. \text{expensive}_{@}(d)(y)) = c + d_2 \wedge$$

$$d_2 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{expensive}_w(d)(y)) = c + d')$$

$$\wedge \text{car}(y) \wedge \text{bought}_{@}(y)(x)$$

$$[[CP]] = 1 \text{ iff}$$

$$\exists x \exists y \exists d_2 \exists d_1. \text{student}(x) \wedge \max(\lambda d. \text{poor}_{@}(d)(x)) = c + d_1 \wedge$$

$$d_1 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{poor}_w(d)(y)) = c + d')$$

$$\wedge \text{car}(y) \wedge \max(\lambda d. \text{expensive}_{@}(d)(y)) = c + d_2 \wedge$$

$$d_2 > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : \max(\lambda d. \text{expensive}_w(d)(y)) = c + d')$$

$$\wedge \text{bought}_{@}(y)(x)$$

“There are two individuals x and y and two degrees d_2 and d_1 such that x is a student who is d_1 -degree poorer than the standard, which is surprising for the speaker, and y is a car that is d_2 -degree more expensive than the standard, which is surprising for the speaker, and x bought y .”

In summary, the well-formed multihead exclamatives in Japanese support our line of analysis. The grammatical status of the data confirms our assumption of the negative setting of the DAP in Japanese. Exclamatives wh-phrases do not undergo degree movement and remain in situ, unlike the ones in English. Being free from constraints on movement, multiple instances of exclamatives wh-phrases cause no syntactic problem. As for the interpretation of the data, the lexical analysis of Japanese comparatives accounts for the multiple comparisons that reside in one sentence.

4.6 Summary of Chapter 4

In this chapter, I have shown a consequence of the lexical analysis that we have proposed in Chapter 2: Japanese gradable adjectives are comparatives per se. Unlike the direct degree that is bound inside adjectives, differential degrees are open and they are a subject of syntactic operation.

(105) Lexical Analysis of Japanese Comparatives: (*A* is an arbitrary adjective)

$$\lambda d' \lambda x. \max(\lambda d. A(d)(x)) = c + d'$$

Exclamative wh-phrase *nan-te*(what-TE) is a function that applies to the differential degree position: It takes a gradable adjective and maps to a sentence that denotes that a differential degree is surprisingly large. Informally speaking, Japanese exclamatives

denote “how much *A*-er!” (*A* is an arbitrary adjective).

$$(106) \quad [[nan-te]] = \lambda p_{\langle s, \langle d, \langle e, t \rangle \rangle \rangle} \lambda x. \exists d'. p(@)(d')(x) \wedge \\ d' > \max(\lambda d'. \exists w \in \text{Dox}_{\text{thespeaker}} : p(w)(d')(x))$$

The interpretation becomes obvious when an exclamative sentence comes with *yorimo*-phrase. Without any additional comparative morpheme, the sentence is grammatical and necessarily means “how much *A-er* than *x*!” This clearly shows that the adjectives have comparative semantics and of the resulting exclamatives refer to differential degrees. Another consequence of the lexical analysis is observed in multihead exclamatives in Japanese. According to our lexical analysis, each adjective brings a comparison. Thus, it is expected that there are more than one comparison in a sentence when there are more than one adjective. The prediction was confirmed. The interpretation of multi-head exclamatives involves multiple comparisons. We have also confirmed that our assumption of the negative setting of the DAP in Japanese is on the right track: Exclamatives *wh*-phrases do not undergo movement, which makes it possible for the Japanese language to have syntactically well-formed multihead exclamatives.

Chapter 5 Replies and Perspectives

The purpose of this chapter is to consider some previous studies on degree constructions in Japanese as well as some cross-linguistic research of comparatives under our framework and present some perspectives for further research.

Regarding studies on degree constructions in Japanese, I will review Kikuchi (1987) and Nakanishi (2004). Kikuchi (1987) argues that Japanese comparatives exhibit island effect due to overt operator movement in *yorimo* clauses. His argument has been accepted in other influential works such as Watanabe (1992). I will attempt to show that the degraded status of Kikuchi's examples is due to pragmatic reasons rather than syntactic ones. Therefore, any data that is presented as evidence for operator movement in *yorimo* clauses following Kikuchi's analysis must be reconsidered with more attention to context. Nakanishi (2004) discusses *-sugiru* (exceed) construction with verbs. *-Sugiru* takes measure phrases that denote excessive degrees. I will show that the concept of the lexical analysis can be extended to cover certain class of verbs that includes *-sugiru* (exceed). Further research will provide a more comprehensive picture of Japanese comparatives that includes more than conventional adjective comparatives.

At the end of this chapter, I will have a preliminary discussion on cross-linguistic data of comparatives. In the previous chapters I have adopted both the lexical analysis and the Degree Abstraction Parameter (DAP) in order to account for the Japanese data, although having both is redundant in many cases when we deal with Japanese data. Cross-linguistic data will be useful in examining whether they can divide their jobs or one can be reduced to the other. It will be shown that the lexical analysis is considered as

a property set by a parameter that governs types of gradable adjectives available in a language. A certain range of Korean and Chinese data is accounted for when different settings are assumed in the parameter as well as in the DAP.

5.1 “Island effect” in *Yori(mo)* Clauses

Kikuchi (1987) argues that *yori(mo)* clauses involve overt A-movement of null-operators and exhibit island effect. On the other hand, we have assumed that *yori(mo)* clauses are essentially relative clause-like. Hence, we expect that *yori(mo)* clauses are free from the island effect, following the standard observation that Japanese relative clauses do not exhibit the island effect (Kuno 1973, Murasugi 1991, and others). In this subsection, I will try to reexamine data collected by Kikuchi and show that what he refers to as the island effect in *yori(mo)* clauses is actually much weaker than the violation of the Empty Category Principle (ECP). Thus, the remaining oddness can be reduced to a contextual problem.

5.1.1 Kikuchi (1987)

Let us first review Kikuchi’s data (1) that has a relative clause island and (2) an adjunct island.

- (1) *[[sono tukue-de e_i e yonde ita] hito-o_i John-ga
 [[that table-on (subj.) (obj.) read Asp] person John-nom
 nagutta yori(mo)] Paul-wa takusan hon-o yonde ita.
 hit “than”] Paul-top many book-acc read Asp
 Lit. “Paul read more books [than John hit a person [who was reading _ at that
 table]].”
- (2) *[[John-ga e yonde ita toki-ni] zisin-ga oki-ta
 [[John-nom (obj.)read Asp time-at] earthquake-nom occurred
 yori(mo)] Paul-wa harukani takusan-no hon-o yonde ita.
 “than” Paul-top far many-gen book-acc read Asp
 Lit. ‘Paul read more books [than an earthquake occurred [when John was reading
 _]].’

Since these examples are fairly odd, Kikuchi concludes that these are conventional island effects due to the overt movement of null operators.

Would his examples pose a challenge to our approach? It must be pointed out here that neither Kikuchi’s data nor his analysis would pose a serious challenge to our analysis. Notice that Kikuchi’s analysis does not hinge on the degree operator movement. Although Kikuchi does not discuss the nature of the operators in his examples, it is obvious that “operator movements” in his examples leave individual variables in object positions. Thus, the movements (if there is any) are likely to be those of individual arguments. They cannot be considered as evidence either for or against degree movement

in Japanese. The negative setting of the DAP as well as the lexical analysis in Japanese do not contradict Kikuchi's analysis as long as the degree arguments are kept intact.

However, given Beck et al.'s proposal that *yori(mo)* clauses are essentially relative clauses, a question remains as to why Kikuchi's examples are subject to the island effect. If we follow the standard observation of relative clauses made by Kuno (1973), Murasugi (1991), and others, we would not expect the island effect in *yori(mo)* clauses.

In the next subsection, I will reexamine the data collected by Kikuchi and suggest that the apparent island effect is rather something different. More specifically, I will show that the problem lies in the poor context setting and that the data can be improved by setting a more plausible context.

5.1.2 Reexamining Kikuchi's data

The contextual setting plays a crucial role in reexamining Kikuchi's data. Recall our assumption following Beck et al. (2004) whereby comparisons are made via pragmatics in Japanese. Then, any example with a *yori(mo)* clause must be composed in a pragmatically plausible manner. In this respect, Kikuchi's examples are not contextually appealing. (Hitting a person or having an earthquake seems to be rather unrelated to a book-reading event.)

In fact, it is possible to modify Kikuchi's data by setting a more appropriate context while preserving the island structures. First, recall his example (1), restated as (3) below.

- (3) *[[sono tukue-de e_i e yonde ita] hito-o $_i$ John-ga nagutta yori(mo)]
 [[that table-on read Asp] person-acc John-nom hit “than”]
 Paul-wa takusan hon-o yonde ita.
 Paul-top many book-acc read Asp
 Lit. ‘Paul read more books [than John hit a person [who was reading _ at that table]].’

First, I will show that there is no violation of the ECP in the *yorimo* clause. Consider the same relative clause with a head noun *hon* (book). This is well-formed, which suggests that the degraded status of (3) should not be attributed to an island effect.

- (4) [[sono tukue-de e_i e_j yonde ita] hito-o $_i$ John-ga nagutta hon $_j$]
 [[that table-on read Asp] person-acc John-nom hit book]
 Lit. ‘the book that John hit the person who _ was reading _ on the desk’
 (the book x s.t. John hit the person who was reading x on the desk)

The problem in the example is that the event of hitting a person at a particular desk described in the *yorimo* clause does not seem to set a suitable context for the comparison of the number of books. Notice that from (4) onward, it is much easier to imagine a situation where the person was reading one particular book, rather than plural books (assuming that people usually read books one by one). In order to compare numbers, however, it is necessary that the *yorimo* clause provide an interpretation of plural items.

A better relative clause for a comparison of cardinality is given below. Imagine a situation where John and Paul are college students. One day they discover an article on the campus newspaper that ridicules them. They are very angry and try to stop the distribution of the copies. The following relative clause intuitively refers to a situation where a person had many copies of the newspaper when he was distributing them.

- (5) [John-ga [e_i e_j kubatte-ita] hito_i-o nagutta] simbun_j
 John-nom (subj.) (obj.) distribute-was_doing person-acc hit paper
 Lit. ‘the newspaper John hit a person who was distributing _’
 (a set of newspaper x s.t. John hit a person who was distributing x)

Let us substitute this example in a *yorimo* clause and construct a comparative sentence. The following sentence is far better than (1).

- (6) [John-ga [e_i e kubatte-ita] hito_i-o nagutta yori(mo)]
 John-nom (subj.) (obj.) distribute-was_doing person-acc hit “than”
 Paul-wa motto takusan-no sinbun-o insatujo-kara kaisyuusita.
 Paul-top “more” many-gen paper-acc print_shop-from collected
 Lit. ‘Paul collected more papers from the printing shop than John hit a person who _
 was distributing_’
 (Paul collected more copies from the print shop than a set of newspaper copies x s.t.
 John hit a person who was distributing x.)

It is relatively easy to compare the number of copies John collected from the print shop with the number of copies the person had when he was hit by John. Importantly, the example does not exhibit the island effect. Thus, comparatives can be well-formed even with island structures in *yorimo* clauses as long as they set a suitable context for comparison.

The argument is confirmed in the other example of Kikuchi with an adjunct island

(2). Recall the sentence.

- (7) *[[John-ga e yonde ita toki-ni] zisin-ga oki-ta
 [[John-nom read Asp time-at] earthquake-nom occurred
yorimo]] Paul-wa harukani takusanno hon-o yonde ita.
 “than” Paul-top far many book-acc read Asp
 Lit. ‘Paul read more books [than an earthquake occurred [when John was reading
 _]].’

Again, the problem is the poor context set by the *yorimo* clause. A corresponding relative clause with a head noun *hon* (book) is given below. It is well-formed, but it has the same problem as the other example provided by Kikuchi. It intuitively refers to one particular book that John was reading. Thus, the *yorimo* clause is not a suitable candidate for a number comparison.

- (8) [[John-ga e yonde ita toki-ni] zisin-ga oki-ta hon]
 [[John-nom read Asp time-at] earthquake-nom occurred book]
 Lit. ‘the book an earthquake occurred when John was reading _’
 (The book x s.t. an earthquake occurred when John was reading x)

In contrast, the following sentence with revised *yorimo* clause makes much more sense than (2). The *yorimo* clause intuitively refers to the multiple books John was reshelving.

- (9) [[John-ga e haika-site ita toki-ni] zisin-ga okita
 [[John-nom reshelve-do Asp time-at] earthquake-nom occurred
 yorimo]] Paul-wa harukani takusanno hon-o
 “than” Paul-top far many book-acc
 kaidan-kara otosita.
 stairs-from dropped
 Lit. ‘Paul dropped more books from stairs [than an earthquake occurred [when John was reshelving _]].’

It is easy to imagine a situation where John was reshelving an armful of books and he dropped them when the earthquake occurred. Paul dropped even more books when he was carrying them upstairs.

For those who are still not satisfied with the revised sentences above, the following example would serve the purpose. It is far better than Kikuchi’s example with the same number of boundaries. (The example is cited from Beck et al. (2004))

- (10) [[e_i e_j ankisita ee-tango_j]-ga mattaku siken-ni
 [[[subj.)(obj.) memorized English-vocabulary]-nom at_all exam-in
 de-naka-tta] yori(mo) motto kawaiouna gakusee-ga ita.
 appear-neg-past “than” “more” unfortunate student-nom existed
 (Tonarino hito-ga sikentyuuni kusyami-o siteita
 next person-nom during_the_exam sneeze-acc was_doing
 gakusee desu.)

student copula

‘There were more unfortunate students than the ones such that [the English vocabulary that they memorized] did not appear in the exam at all. (It was a student whose neighbor was sneezing during the exam.)’

The abovementioned examples confirm the context-dependent nature of Japanese comparatives. Every *yori(mo)* clause should set an appropriate context for comparison. However, on some occasions, it is difficult to construct a pragmatically plausible example when *yori(mo)* clauses are long enough to involve syntactic islands.

In this section, I have attempted to argue, contra Kikuchi (1987), that *yori(mo)* clauses of Japanese comparatives do not involve movement (at least not degree operator movement) and the seeming island effect is rather contextual problem. In Japanese comparatives, *yori(mo)* clauses need to be well-formed grammatically and contextually, because *yori(mo)* clauses serve as context setters to specify the value of standard degrees.

Kikuchi’s analysis is adopted in many studies. However, it is beyond the scope of

this dissertation to check all of them. If there is any data of *yorimo* comparatives that is presented as evidence for operator movement in *yorimo* clauses, it must be reconsidered from the viewpoint of context.

5.2 *Sugiru* (exceed) constructions

One previous research that is of interest to us is Nakanishi (2004), which discusses *-sugiru* (exceed) constructions. Nakanishi's analysis of *-sugiru* (exceed) suggests that the lexical analysis can be extended to a certain class of verbs including *-sugiru* (exceed). I will show that "exceed"-type of verbs and degree achievement verbs (Dowty 1979) have similar properties as *-sugiru* (exceed).

5.2.1 Nakanishi (2004)

Nakanishi is mainly concerned about *-sugiru* (exceed) sentences with verbs. She argues that *-sugiru* (exceed) is a comparative quantifier that makes a comparison with a contextually given degree. In order to compare degrees of eventive predicates, she proposes a measure function μ that takes an event and gives a degree of the event

-Sugiru (exceed) is categorized as a verb that can be attached to an adjective or a verb to express excessiveness. This implies that *-sugiru* introduces a comparative semantics.

- (11) John-ga kaimono-ni iki-sugi-ta.
 John-non shopping-to go-exceed-past
 ‘John went shopping too many times.’ (Nakanishi 2004:233)

- (12) Kono sukaato-ga naga-sugi-ru.
 this skirt-nom long-exceed-pres
 ‘This skirt is too long.’ (Nakanishi 2004:230)

When these *–sugiru* sentences take measure phrases, they denote excessive degree. The measure phrase of V-*sugiru* sentence (13)a is an argument of *–sugiru*. This is confirmed in (13)b without *–sugiru*. It simply means that John went shopping three times in total.

- (13) a. John-ga konsyuu kaimono-ni san-kai iki-sugi-ta.
 John-non this_week shopping-to three-time go-exceed-past
 ‘John went shopping three times too many this week.’ (Nakanishi 2004:273)

- b. John-ga konsyuu kaimono-ni san-kai it-ta.
 John-non this_week shopping-to three-time go-past
 ‘John went shopping three times this week.’

On the other hand, the measure phrase of A-*sugiru* sentence (14)a is an argument of the adjective¹. This is confirmed in (14)b, where *–sugiru* is omitted. The measure phrase still

¹ Nakanishi reports that the judgments on adjective sentence (19)a vary, and she put “?/??” If so, it is due to the redundancy in its interpretation. A comparison is introduced

denotes the excessive length of the skirt.

- (14) a. Kono sukaato-ga **san-inti** naga-sugi-ru.
 this skirt-nom three-inch long-exceed-pres
 ‘This skirt is three inches too long.’
- b. Kono sukaato-ga **san-inti** nagai.
 this skirt-nom three-inch long
 ‘This skirt is three inches longer.’

The difference between (14)a and (14)b is that (14)a has some kind of negative implication that comes from *-sugiru*. By having *-sugiru*, the speaker intends to mean that the described situation is not welcome. (14)a means that the skirt is three inches longer than what it is supposed to be, which is not good. On the other hand, (14)b is a neutral description. Therefore, the role of *-sugiru* is to make a comparison with some kind of desired degree. This means that (14)a has two comparison-inducing items, the gradable adjective *nagai* (long) and *-sugiru* (exceed). In fact, the sentence sounds redundant for some speakers (see note 2).

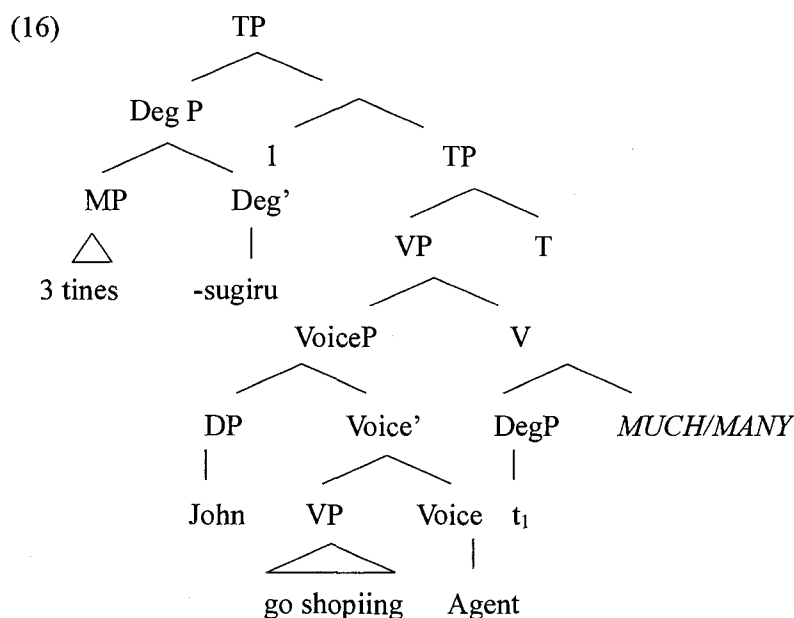
From the observation above, it is clear that V-*sugiru* involves comparative semantics. This is confirmed by the following paraphrase of (13)a with a *more-than* comparative.

- (15) The number of times John went shopping is three more than he was expected to go.

by *-sugiru* as well as by the adjective. However, I could not confirm the same judgment.

How is the comparison made without having any gradable adjective? How is the number of times he went shopping obtained?

Now let us consider Nakanishi's (2004) analysis of (13)a. Consider the LF structure below. Syntactically, Nakanishi follows Koizumi 1988 and others and assumes that *-sugiru* in *V-sugiru* is a raising verb that takes a sentential complement. Semantically, she assumes that the verb *-sugiru* (exceed) is composed of two parts, *-sugiru* and MUCH/MANY. *-Sugiru* is the head of the DegP, which is a complement of MUCH/MANY, and it undergoes degree movement. The measure phrase is an argument of *-sugiru*.



In order to derive the reading where the excessive shopping time is three, Nakanishi makes use of a measure function μ that takes an event and gives the cardinal number of the event. μ is part of the lexical entry of MUCH/MANY. *-Sugiru* takes the measure

phrase and the degree given by μ , and denotes that the measure phrase represents the gap between the cardinal of the event and a contextually given standard degree. Note that the measure phrase in this case is treated as a predicate of degree².

$$(17) \quad [[\text{MUCH/MANY}_e]] = \lambda d. \lambda P_{\langle v, t \rangle} : \text{MON}(\mu, P). \lambda e_v. P(e) \wedge \mu(e) = d$$

$$(18) \quad [[\text{sugiru}]] = \lambda D'_{\langle d, t \rangle}. \lambda D_{\langle d, t \rangle}. \exists d [D(d) \wedge D'(d-c)]$$

$$(19) \quad [[\text{MP}]] = \lambda d. \text{mp}(d)$$

The truth conditions of the sentence are given below³. The mapping from event to degree successfully provides degree semantics into the V-*sugiru* construction.

$$(20) \quad [[\text{TP}]]^g = 1 \text{ iff}$$

$$\exists d [\exists e [\text{Agent}(e) = j \wedge * \text{go.shopping}(e) \wedge \mu(e) = d] \wedge \text{three-units}([d-c])]$$

Presupposition: ‘ μ : cardinality-of-events must be monotonic to $[[\text{VoiceP}]]$.’

Assertion: ‘There is a degree d on the cardinality-of-events scale and there is a plural

John’s-going-shopping event e such that d obtains by applying μ :

cardinality-of-events to e . There is another context-sensitive degree c on the same

² Nakanishi’s original notations adopt interval semantics.

(i) $[[\text{MUCH/MANY}_e]] = \lambda I_e. \lambda P_{\langle v, t \rangle} : \text{MON}(\mu, P). \lambda e_v. P(e) \wedge \mu(e) = I$

(ii) $[[\text{sugiru}]] = \lambda D'_{\langle d, t \rangle}. \lambda D_{\langle d, t \rangle}. \exists I [D(d) \wedge D'(I-C)]$

(iii) $[[\text{MP}]] = \lambda I. \text{mp}(I)$

³ Nakanishi’s original notations are given below.

(i) $\exists d [\exists e [\text{Agent}(e) = j \wedge * \text{go.shopping}(e) \wedge \mu(e) = I] \wedge \text{three-units}([I-C])]$

Presupposition: ‘ μ : cardinality-of-events must be monotonic to $[[\text{VoiceP}]]$.’

Assertion: ‘There is an interval I on the cardinality-of-events scale and there is a plural John’s-going-shopping event e such that I obtains by applying μ : cardinality-of-events to e . There is another context-sensitive interval C on the same scale, and d differs from c by three units.’ (Nakanishi 2004:237)

scale, and d differs from c by three units.’

The contextually given standard *c* can be further specified by overt *yorimo* phrases/clauses.

- (21) a. John-ga konsyuu [iwa-re-ta yori(mo)] kaimono-ni
 John-non this_week tell-passive-past “than” shopping-to
 san-kai iki-*sugi*-ta.
 three-time go-exceed-past
 ‘John went shopping this week three more times than he was told.’

The parallelism between *V-sugiru* and gradable adjectives in Japanese is apparent: They both introduce the comparative semantics. They both take differential degrees. The comparisons are made with a contextually given standard degrees, whose value can be specified by *yorimo* phrases/clauses.

5.2.2 Lexical Analysis and *V-Sugiru*

We have proposed in Chapter 2 that the comparative semantics is built into the lexical entries of adjectives. Nakanishi’s analysis implies that this unconventional analysis is not limited to adjectives, as parallel behaviors are observed between adjectives and *V-sugiru*. This suggests a more comprehensive mechanism of comparison in Japanese. In fact, Nakanishi’s lexical entry of *-sugiru* can be restated as follows in our

familiar notation. Note that the measure phrase is now simplified as a degree d' . The first argument of $-sugiru$ is a differential degree that represents the gap between the matrix degree d and a contextually given degree c .

$$(22) [[-sugiru]] = \lambda d' \lambda D_{\langle d, t \rangle} \exists d [D(d) \wedge d = c + d']$$

This is practically the same as we assume for gradable adjectives in Japanese in relevant respects. The parallelism is striking.

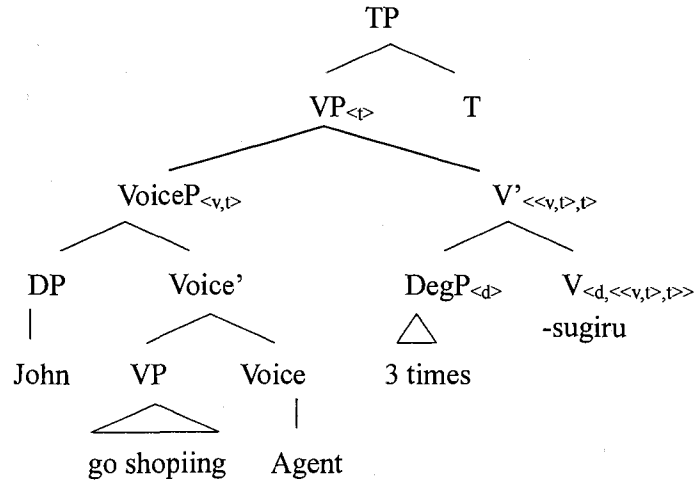
A remaining concern is the fact that Nakanishi assumes degree movement of $-sugiru$. This is against our assumption of the negative setting of the DAP. Is it possible to reconcile her analysis with our framework? As far as I see, degree movement does not play a central role in Nakanishi's analysis. For instance, the same truth conditions can be derived by using the following revised lexical entry of $-sugiru$. The semantics of MUCH/MANY is integrated in that of $-sugiru$. The differential degree can be implicit as in (23)a or explicit as in (23)b. Importantly, a larger-than relation is directly combined with the cardinal of the event brought by μ .

$$(23) \text{ a. } [[-sugiru]] = \lambda p_{\langle v, t \rangle} : \text{MON}(\mu, p). \exists e \exists d. p(e) \wedge \mu(e) > c$$

$$\text{ b. } [[-sugiru]] = \lambda d' . \lambda p_{\langle v, t \rangle} : \text{MON}(\mu, p). \exists e \exists d. p(e) \wedge \mu(e) = c + d'$$

With these lexical entries, degree movement is not needed. The relevant LF structure and truth conditional calculation are given below.

(24)



(25)

$$[[\text{VoiceP}]] = \lambda e[\text{Agent}(e)=j \wedge *go.shopping(e)]$$

$$[[\text{-sugiru}]] = \lambda d'. \lambda p_{\langle v,t \rangle}. \text{MON}(\mu, p). \exists e \exists d. p(e) \wedge \mu(e) = c + d'$$

$$[[V']] = \lambda p_{\langle v,t \rangle}. \text{MON}(\mu, p). \exists e. p(e) \wedge \mu(e) = c + 3 \text{ times}$$

$$[[TP]]^E = 1 \text{ iff}$$

$$\exists e[\text{Agent}(e)=j \wedge *go.shopping(e) \wedge \mu(e) = c + 3 \text{ times}]$$

Presupposition: ‘ μ : cardinality-of-events must be monotonic to $[[\text{VoiceP}]]$.’

Assertion: ‘There is a plural John’s-going-shopping event e such that cardinality-of-events e is obtained by applying μ to e . The cardinality-of-events e differs from a context-sensitive degree c on the same scale by three times.’

Nakanishi’s central concern of the mapping from event to degree is kept intact.

5.2.3 Lexical Analysis and Other Comparative Verbs in Japanese

A question arises whether or not there is any other verb that behaves like *-sugiru*. Unfortunately there does not seem to be any other raising verb that behaves like *-sugiru*. However, if we expand our scope to regular verbs, there are several types of verbs that possess comparative interpretation. In what follows I will present “exceed”-type of verbs and degree achievement verbs (Dowty 1979) in Japanese.

“Exceed”-type of verbs and their antonyms, for instance *masaru* (exceed) – *otoru* (fall short) and *uwamawaru* (outperform) – *sitamawaru* (underperform), take measure phrases that denote differential degrees.

- (26) John-no ten-ga **san** **ten** **masa-tta/oto-tta**
 John-gen score-nom **three** **point** **exceed-past/fall_short-past**
 ‘John’s score exceeded (a standard)/fell short (of a standard) by three points.’

- (27) John-no ten-ga **san** **ten** **uwamawa-tta/**
 John-gen score-nom **three** **point** **outperform-past/**
 sitamawa-tta.
 underperform -past
 ‘John’s score exceeded (a standard)/fell short (of a standard) by three points.’

The measure phrases denote the gap between John’s score and a contextual given standard. The value of such standard degree can be overtly specified by *yorimo*

phrases/clauses. Intuitive meanings of the following sentences with *yorimo* phrases are captured when the translations are stated with “compared to.”

- (28) John-no ten-wa [heikin yori(mo)] san ten
 John-gen score-top [average “than”] three point
 masa-tta/oto-tta
 exceed-past/fall_short-past

‘Compared to the average score, John’s score was three points above/short.’

- (29) John-no ten-wa san ten [heikin yori(mo)]
 John-gen score-top three point [average “than”]
 uwamawa-tta/sitamawa-tta.
 outperform-past/ underperform -past

‘Compared to the average score, John’s score was three points above/short.’

Another class of verbs that exhibit similar behaviors to the abovementioned “exceed”-type of verbs are degree achievement verbs (Dowty 1979) such as *hirogeru* (widen), *nobasu* (lengthen), *tijimeru* (shorten)⁴. They directly take measure phrases that denote differential degrees, and they accommodate *yorimo* phrases/clauses. This is not surprising given the standard assumption that degree achievement verbs are mostly

⁴ Note that Nakanishi assumes that the comparative semantics in sentences with those degree achievement verbs comes from *-sugiru* that follows them. This is different from our assumption, where the comparative semantics is directly attributed to those verbs.

(i) Mary-ga sono sukkato-o mijikakusi-sugi-ta.
 Mary-nom that skirt-acc shorten-exceed-past
 ‘Mary shortened that skirt too much.’ (Nakanishi 2004:257)

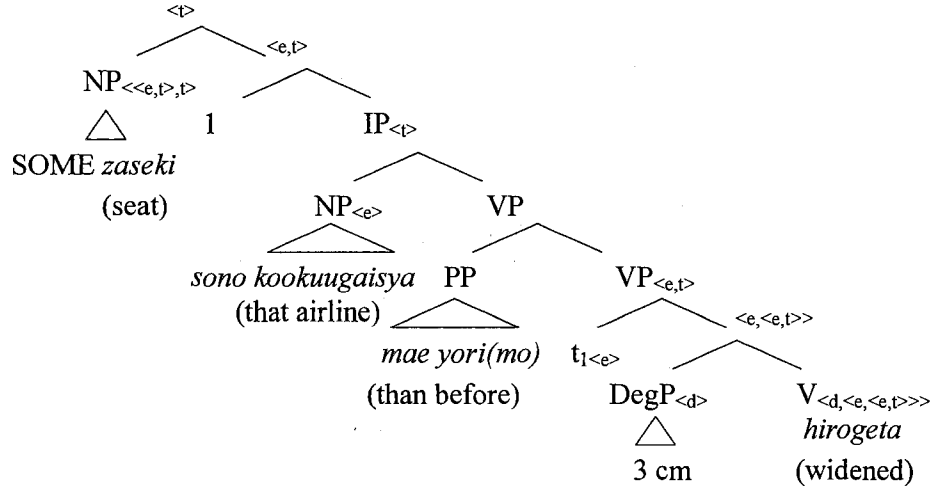
derived from their underlying gradable adjectives. If degree achievement verbs in Japanese are derived from gradable adjectives in Japanese, their parallel behaviors are naturally understood.

- (30) Sosno kookuugaisya-ga zaseki -o [mae yori(mo)]
 that airline-nom seat-acc before “than”
 san senti hiroge-ta.
 three cm widen-past
 ‘The airline widened their seats by 3cm compared to previous ones.’

- (31) John-ga ronbun-o [mae-no genkoo yori(mo)]
 John-nom paper-acc previous-gen draft “than”
 san peeji nobasi-ta/tijime-ta.
 three page lengthen-past/shorten-past
 ‘John lengthen/shorten the paper by three 3 pages compared to the previous draft.’

The semantic of the two types of verbs share an important aspect with that of gradable adjectives and V-*sugiru*. They make a comparison with a standard degree. They require a little different treatment from *-sugiru* (exceed) because they do not take sentential complement. However, analyzing these verbs with the lexical analysis seems promising. Let us try (30), for instance. In the LF structure below, the verb *hirogeta* (widened) takes the measure phrase as its argument. The object *zaseki* (seat) undergoes movement due to type mismatch.

(32)



The verb *hirogeta* (widened) denotes that the width of a seat is 3cm greater than a contextually given length (the previous length). In order to obtain the width of a seat, let us assume a function f that takes an individual x and gives the length of x .

(33) $[[hirogeta(widened)]] = \lambda d' \lambda x \lambda y \exists d \exists e. Agent(e)=y \wedge *widen(e)=x \wedge f(x)=d \wedge d=c+d'$

$[[3cm \ hirogeta(widened \ by \ 3cm)]] = \lambda x \lambda y \exists d \exists e. Agent(e)=y \wedge *widen(e)=x \wedge$

$f(x)=d \wedge d=c+3cm$

$[[VP]] = \lambda y \exists d \exists e. Agent(e)=y \wedge *widen(e)=g(1) \wedge f(g(1))=d \wedge d=c+3cm$

$[[IP]] = \exists d \exists e. Agent(e)=the \ airline \wedge *widen(e)=g(1) \wedge f(g(1))=d \wedge d=c+3cm$

$[[1 \ IP]] = \lambda x \exists d \exists e. Agent(e)=the \ airline \wedge *widen(e)=x \wedge f(x)=d \wedge d=c+3cm$

$[[SOME \ zaseki \ (some \ seats)]] = \lambda p_{\langle e,t \rangle} \exists x. seat(x) \wedge p(x)$

$[[(32)]]$ = 1 iff

$\exists x \exists d \exists e. seat(x) \wedge Agent(e)=the \ airline \wedge widen(e)=x \wedge f(x)=d \wedge d=c+3cm$

$c :=$ the width of the seats in previous years

The truth conditions say that the airline widened their seats, and the width of their seats is 3cm greater than a contextually given standard. The *yorimo* phrase sets the standard value of the standard as the width of the seats in previous years.

If this line of analysis is on the right track, the lexical analysis will provide more comprehensive view of Japanese comparatives. In other words, there is a possibility that all comparisons in Japanese are derived from lexical items, namely adjectives and verbs. I will leave detailed analysis for further research.

In this subsection, I reviewed Nakanishi's analysis of *V-sugiru* (exceed) construction with measure phrases. It was observed that the semantics of *V-sugiru* (exceed) constructions is similar to that of gradable adjectives in Japanese: *-sugiru* (exceed) in *V-sugiru* construction takes a differential degree as its argument that denotes a gap from a contextually salient degree. In other words, the semantics of comparison is built in the lexical entry of *sugiru*. This implies that the lexical analysis can be extended to *-sugiru*. "Exceed"-type of verbs and degree achievement have similar interpretations to that of *-sugiru*. This line of analysis suggests a more comprehensive view of comparatives in Japanese. Unlike English and other languages, comparisons in Japanese are never made by any comparative morpheme. Instead, comparative semantics are built in the lexical entries of adjectives and verbs. More investigation is called for in order to examine this line of analysis.

5.3 Cross-linguistic data

This subsection discusses some cross-linguistic data in order to have some perspectives for future research. I have argued in this dissertation that gradable adjectives in Japanese have comparative semantics.

Lexical analysis of Japanese comparatives

(34) Japanese gradable adjectives

$$a. \lambda x. \max(\lambda d. A(d)(x)) > c$$

$$b. \lambda d' \lambda x. \max(\lambda d. A(d)(x)) = c + d'$$

I also assume the negative setting of the DAP in Japanese, following Beck et al. (2004) as well as the lexical analysis.

(35) Degree Abstraction Parameter (DAP)

A language {does/does not} have binding of degree variables in the syntax.

The lexical analysis and the DAP cover a similar range of empirical data although they are theoretically independent of each other. We need to investigate whether or not having both is redundant. Cross-linguistic data will give us more insight on this issue.

The purpose of this section is to argue that the lexical analysis and the DAP are independent parameters. In order to see how the lexical analysis and the DAP divide their jobs, I will refer to two languages, namely, Korean (Park 2006) and Chinese (Krasikova

2007). Interestingly, comparatives in these two languages behave like those in Japanese on some occasions and like those in English on other occasions. More specifically, I will show that some Korean data is accounted for when we assumed Japanese-like adjectives and +DAP. In contrast, some Chinese data is accounted for when we assume English-like adjectives and -DAP.

5.3.1 Korean: Park (2006)

Beck et al. (2004) suspect that Korean lacks degree movement because of the following similarities between Japanese and Korean. First, Korean has equivalents of clausal comparatives, but subcomparatives of degree are unacceptable. This suggests the lack of sets of degrees in the standard clause.

- (36) Mary-nun John-i ilk-un kes-bota (tu) mahn-un chaek-ul
 Mary-top John-nom read-PN one-than (more) many-PN book-acc
 ilk-ess-tta.
 read-past-decl
 'Mary read more books than the ones that John read.'

- (37) *i-chaekjang-un ce-moon-i nelp-un kes bota (tu)
 this-bookshelf-top that-door-Nom wide-PN one than (more)
 nop-ta.
 tall-decl

‘This shelf is taller than one that door is wide.’

Moreover, adjectives with measure phrases in Korean behave in a manner similar to those in Japanese. In the following sentences with a measure phrase, “2 cm” denotes a differential. The measure phrase is not plugged into the slot of direct degrees. The Japanese-style lexical entry of adjectives will explain the data in a straightforward manner.

- (38) John-un 2cm kuta.
 John-top 2cm tall
 ‘John is taller by 2cm.’

Park (2006) presents further data and argues that Korean comparatives involve degree movement. She tested negation effect in “than” clauses and scope interaction. The results were completely opposite to the Japanese data: Korean comparatives exhibit the negative island effect when “than”-clauses are negated, and they show scope interaction between an intentional verb and the comparative operator. Thus, they behave more like English comparatives.

Let us see the case of the negative island effect. In (39) and (40), the *pota*(than) clauses are negated and the sentences are ungrammatical. Assuming a degree operator, (39) and (40) are ruled out on par with English equivalents.

- (39) *John-un [amwuto sa-ci anhun kes]-pota te pissan chayk-ul sa-ss-ta.

John-top anybody buy-neg como-than more expensive book-acc buy-past-decl

Lit. 'John bought a more expensive book than nobody bought.'

- (40) *Mary-nun [John-i sayngkakha-ci moshan-kes]-pota te kipalhan

Mary-top John-nom think-neg-comp-than more excellent

pwunsek-ul sayngkakhaynay-ess-ta.

analysis-acc thing-past-decl

'*Mary came up with a more excellent analysis than John couldn't.'

The second case involves scope interaction. Unlike its Japanese equivalent, a Korean comparative sentence with an intentional verb *yaman* (be required) is ambiguous, and provides a reading where the comparative morpheme takes a wide scope⁵.

- (41) John-un Mary-pota yangcho-ul tel sa-yaman ha-n-ta.

John-top Mary-than candle-acc less buy-required-past-decl

'John is required to buy candle less than Mary.'

⁵ Park translate *tel* as "less." However, *tel* may not be a negative comparative morpheme. According to my informant, *tel* is rather an adverb that can mean 'not sufficiently/not completely.'

- (i) Tel cara-ass-ta
tel grow_up-past-dec
'(it is) not fully grown up'

(42) a. Reading 1: *be-required* > *-er*

It is required in every world that the number of candles John buys is smaller than the number of candles Mary buys.

b. Reading 2: *-er* > *be-required*

The minimum number of candles that would satisfy the requirements imposed on John is smaller than the minimum number of candles that would satisfy the requirements imposed on Mary.

Given the contrast between Japanese and Korean, Park concludes that Korean comparatives involve degree movement as English comparatives. Note that Park does not discuss subcomparatives. Thus the lack of subcomparative (37) remains unsolved under her analysis.

A summary of Japanese, Korean, and English would be useful to have a better understanding of the situation. Consider table (43). All three languages have clausal comparatives (a). However, subcomparatives (b) are available only in English, which support abstraction over degrees in the language. Moreover, Korean measure phrases behave in a manner similar to Japanese (c)⁶. The distinction seems to be made between

⁶ Note that Park (2006) proposes three types of comparatives in Korean. The third type (iii) takes a measure phrase as a complement of *pota*(than) as in (i). This is different from what Beck et al. observed in Japanese as in (iv). Thus *yorimo* and *pota*(than) allow different types of complement.

(i) Clausal comparative with CP in the complement of *pota*(than)

Na-num [Mary-ka [e] ssun kes]-pota te kin nonmwun-ul ssessta.

I-top Mary-nom wrote comp-than -er long paper-acc wrote

‘I wrote a longer paper than Mary did.’

Japanese and Korean on one hand and English on the other hand. However, (d) and (e) suggest different schema. The negation effect in “than”-clauses (d) and wide scope readings of comparative morpheme (e) are evidence for degree operator movement. The distinction is now made between Japanese on one hand and Korean and English on the other.

(43) Overview of Japanese, Korean and English

	Japanese	Korean	English
a. clausal comparatives	√	√	√
b. subcomparatives	*	*	√
c. interpretation of MP	differential	differential	standard degree
d. negated “than”-clauses	√	*	*
e. wide scope of “-er”	*	√	√

A question arises as to why Korean comparatives behave like Japanese on some

(ii) Non-case marked comparatives with small clause in the complement of *pota*(than)

Na-num [Mary]-pota Sue-lul te salanghanta.

I-top Mary-than Sue-acc -er love

‘I love Sue more than Mary.’ / ‘I love Sue more than Mary does.’

(iii) Measure phrase comparatives with DegP in the complement of *pota*(than)

Na-num 170cm-pota te khuta.

I-top 170cm-than er tall

‘I am taller than 170cm.’

(Park 2006)

(iv) ??Mary-wa 7-satu-yori motto takusan-nohon-o katta.

Mary-top 7-CL-YORI MOTTO many-gen book-acc bought

‘Mary bought more books than 7 volumes.’ (Beck et al. 2004:334)

occasions and not on others. The simple distinction of \pm DAP would not be very helpful. One idea is to introduce another parameter, according to which a language has a gradable adjective of either English type or Japanese type. The following is repeated from Chapter 2.

(44) Parameter on gradable adjectives: (A is an arbitrary gradable adjective.)

a. English type: $\lambda d.\lambda x. A(d)(x)$

b. Japanese type: $\lambda d'\lambda x.\max(\lambda d.\max(d)(x)) = c+d'$

What if Korean has gradable adjectives of Japanese type but Korean is set +DAP? With this in mind, let us go back to the table. Under the idea, the lack of subcomparatives in Korean is accounted for by the lexical analysis, where direct degrees are bound inside adjectives and thus are never abstracted over. The differential interpretation of measure phrases is expected by Japanese type of adjectives. The differential degrees of Japanese-type adjectives can undergo movement if the DAP is set as positive. The negative island effect and the wide scope of comparative morpheme in Korean might be the result of abstraction over differential degrees, the result of which induces similar interpretation as the abstraction over direct degrees. Detailed investigation is called for to confirm this line of research. Other degree constructions in Korean also will help to have a better view of Korean degree constructions.

5.3.2 Chinese: Krasikova (2007)

Chinese is another language in which Beck et al. (2004) suspect the negative setting of the DAP. Chinese has equivalents of clausal comparatives⁷. *Bi* marks the standard clause. It can be translated as “compare” or “than.” In contrast, subcomparatives are ungrammatical. This suggests the lack of degree movement in the standard clause, as in the case of Japanese.

- (45) Mary bi John xie de wenzhang duo.
 Mary BI John write DE paper more
 ‘Mary wrote more than the papers John wrote.’

- (46) *Zhe ge jiazi bi na ge men hen kuan (yao) gao.
 this CL shelf BI that CL door very wide (YAO) tall
 ‘This shelf is taller than the door is wide.’

Beck et al. point out that a difference between Japanese and Chinese appears in the interpretation of measure phrase. In the following sentence, “2 cm” denotes direct degree. (Thus, John is likely to be a small fairy.) In this respect Chinese behaves like English.

- (47) John gao 2cm.
 John tall 2cm

⁷ Krasikova considers prototypical clausal comparatives such as (45) free relative clauses. DE, in this case, is considered a relative pronoun.

‘John is 2cm tall.’

Krasikova (2007) further investigates Chinese data and observes that Chinese does not display the negative island effect in comparatives. This is similar to the case of Japanese.

(48) Lisi mai de shu bi [Zhangsan **mei** mai de] gui.

Lisi buy DE book BI [Zhangsan **neg** buy DE] expensive

‘Lisi bought a book that is more expensive than the book that Zhangsan didn’t buy.’

Interestingly, Krasikova proposes essentially the same analysis as our lexical analysis, although technical details are different. She also assumes that direct degrees are bound inside gradable adjectives and cannot be abstracted over by a syntactic operation. Krasikova attributes the absence of English-like sets of degrees to such lexical entries of Chinese adjectives and attempts to abandon the notion of the DAP. This is different from our analysis on Japanese in this dissertation, where I maintained the DAP as well as the lexical analysis.

Let us consider an example using Krasikova’s framework. The lexical entry of *gao*(tall) is given below. This means that there is a positive difference between *x*’s height and a standard. Note that Krasikova adopts Schwarzschild’s (2005) interval analysis of degree.

$$(49) \text{ a. } [[gao_s(tall)]]^g = \lambda D_{\langle\langle d,t \rangle, t \rangle} \lambda I_{\langle d,t \rangle} \subseteq S. \lambda x_{\langle e \rangle}. D(\text{Height}(x) - \max(I)),$$

where ‘-’ is defined as in b.

$$\text{b. } \forall d, d' (d - d') = \{d'' \mid d > d'' > d'\}$$

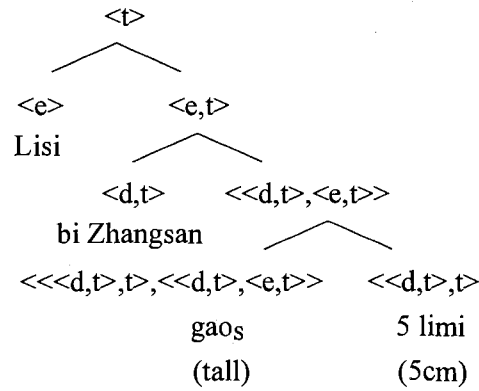
With this lexical entry, the truth conditions of (50) say that the height difference between Lisi and Zhangsan is 5cm.

(50) Lisi be Zhangsan gao 5 limi.

Lisi BI Zhangsan tall 5 cm

‘Lisi is 5cm taller than Zhangsan.’

(51)



$$(52) \quad [[bi\ Zhangsan]]^g = (g(f))(Zhangsan) = \{d \mid \text{Height}(Zhangsan) \geq d\},$$

where f is a variable of the type $\langle e, \langle d, t \rangle \rangle$ mapping an individual x to a contextually salient interval associated with x .

$$[[5li\ mi]]^g = \lambda I_{\langle d, t \rangle}. \text{Length}(I) = 5 \wedge I \in S_{cm}$$

$$[[gao\ 5\ li\ mi]]^g ([[bi\ Zhangsan]]^g) ([[Lisi]]^g) =$$

$$\text{Length}(\text{Height}(\text{Lisi}) - \text{Height}(\text{Zhangsan})) = 5 \wedge I \in S_{cm}$$

The above analysis would predict that direct degrees do not appear overtly. However, this is not the case as we saw in (47). Krasikova also points out example (53). She analyzes such data as differential comparatives. The standard interval in this case is set to the initial part of a scale, and a measure phrase represents a difference from zero. The truth conditions state that the gap between the weight of a suitcase and zero is 5kg.

(53) Zhe xiangzi you 5kg zhong.

This suitcase have 5kg heavy

‘The suitcase weighs 5kg.’

(54) $[[\text{gaos } 5\text{kg}]]^g(g(I))([\text{zhe ge xiangzi}]]^g) =$

$$\text{Length}(\text{Weight}(\text{this suitcase}) - \max(g(I))) = 5 \wedge I \in S_{kg},$$

$$\text{where } g(I) = \{d \mid d \in S_{kg} \wedge d \geq 0\}$$

Given the above discussion, an overview of Japanese, Chinese, and English is presented as follows. As for the wide scope of the comparative morpheme, Beck et al. (2008) reports that the wider scope interpretation of comparative operator is not available in Chinese⁸.

⁸ The data is cited from Beck et al. (2008).

- (i) Yi zhi beijixiong keyi bi yi zhi daxiong geng da.
 a CL polar_bear can compare a CL grizzly_bear even big
 ‘Polar bears can be bigger than grizzly bears.’

(55) Overview of Japanese, Chinese, and English

	Japanese	Chinese	English
a. clausal comparatives	√	√	√
b. subcomparatives	*	*	√
c. interpretation of MP	differential	direct degree	direct degree
d. negated “than”-clauses	√	√	*
e. wide scope of “-er”	*	*	√

What can we say about the overview from our own perspective? In our framework, the patterns of Chinese data might be captured as a combination of -DAP and English-like adjectives in Chinese. The direct measure phrase is naturally interpreted if we assume English-like lexical entries for Chinese adjectives. The lack of subcomparatives and the absence negative island effect, and the lack of wide scope of -er are all accounted for by -DAP. Further research is called for in order to confirm this line of analysis. Investigation on degree constructions other than comparatives will be also helpful.

In summary, I have reviewed in this subsection some cross-linguistic data in order to see whether or not the functions of the lexical analysis and the DAP can be divided. It was shown that some empirical data from Korean and Chinese are explained by having both. The data shows that these two languages are located somewhere between English and Japanese on the matrix of cross-linguistic variations of comparatives. It was suggested that the lexical analysis is regarded as a property given by a parameter, according to which a language has gradable adjectives of either English type of Japanese

(The maximal height reached by polar bears exceeds the maximal height reached by grizzly bears.)

type. Further cross-linguistic research will shed light on this issue.

In this chapter, I addressed some issues for further research. I argued that the so-called island effect in Kikuchi's (1987) data of Japanese comparatives can be reduced to a contextual problem. Thus, it is not induced from degree movement. Any data that is presented as evidence for operator movement in *yorimo* clauses must be reconsidered with the viewpoint of context. *-Sugiru* (exceed) constructions in Japanese suggest a possibility that the lexical analysis can be extended to a certain class of verbs. This will provide a more comprehensive view of Japanese. It can be the case that comparative semantics in Japanese is totally built in lexical items, either in adjectives or verbs. Finally, I attempted to test the explanatory power of having both the lexical analysis and the DAP using cross-linguistic data. It was shown that the lexical analysis can be regarded a property given by a parameter that govern the type of gradable adjectives, and the combination of two parameters, the DAP and the parameter on gradable adjectives, account for a certain range of data in Korean and Chinese.

5.4 Concluding Remarks

In this dissertation, I argued with Beck et al. that Japanese degree constructions are built on a less compositional and more context-dependent mechanism than traditionally assumed. Among several possibilities of how such contextual comparisons are made, I have pursued an analysis that Japanese gradable adjectives have comparative semantics,

which I refer to as the lexical analysis.

Lexical analysis of Japanese comparatives

(56) a. $\lambda x.\max(\lambda d.A(d)(x))>c$

b. $\lambda d'\lambda x.\max(\lambda d.A(d)(x)) = c+d'$

I have shown that the proposal covers a wide range of empirical data of comparatives.

One of the most important predictions of the proposal is the absence of direct degree movement in Japanese. They are bound inside adjectives, and thus do not undergo degree movement. This predicts many behaviors of Japanese degree constructions, such as the lack of subcomparatives, the lack of genuine degree questions, the absence of scope interaction, and the absence of the negative island effect.

Such restriction on the movement of direct degrees does not mean that Japanese degree constructions have fewer varieties than English. The contextual comparison built in the adjectives allows Japanese to accommodate context rather freely. This brings patterns of sentences that are never possible in English, such as highly context dependent comparison and comparisons with bare nouns without syntactic adjectives. Furthermore, due to the locally introduced comparison by gradable adjectives, Japanese easily allows mulihead comparatives.

The semantics of gradable adjectives is a building block in constructing degree sentences. Thus, the proposed format of Japanese adjectives provides an alternative dimension to the semantics of degree constructions, which has long been monopolized by analyses that are based on English and related languages. In this dissertation, I have

proposed a semantics of Comparative Conditionals (CCs) and exclamatives in Japanese, which have not been discussed in the literature. It was shown that the application of the lexical analysis to those degree constructions in Japanese captures many unique behaviors of these constructions.

The lack of direct degree movement, which was originally covered by the negative setting of the DAP, is now predicted by the lexical analysis. Thus, one might want to abandon the DAP.

(57) Degree Abstraction Parameter (DAP)

A language {does/does not} have binding of degree variables in the syntax.

In this dissertation, however, I employed the DAP as well as the lexical analysis. The lexical analysis and the DAP cover slightly different data. More specifically, the lexical analysis does not predict anything about the possible degree movement of differential degrees. My investigation did not find any degree movement of differential degrees. Therefore, I maintained the negative setting of the DAP to set ban on degree movement of differential degrees.

The cross-linguistic discussion at the end of the dissertation shows that the lexical analysis and the DAP should be treated separately. I tentatively propose a parameter that governs the type of gradable adjectives available in each language. The lexical analysis is treated as a property set by the parameter.

(58) Parameter on gradable adjectives: (A is an arbitrary gradable adjective.)

a. English type: $\lambda d.\lambda x. A(d)(x)$

b. Japanese type: $\lambda d'\lambda x.\max(\lambda d.\max(d)(x)) = c+d'$

It was shown that a certain set of Korean data can be accounted for by the combination of +DAP and Japanese type adjectives, and Chinese data by –DAP and English type adjectives.

Going Back to the large cross-linguistic variations of comparisons shown in Stassen (1985) that we mentioned at the beginning of this dissertation, it is obvious that having just the lexical analysis and the DAP is far from enough. More parameters need to be proposed in order to have a better understanding of degree constructions of natural languages. In the future research, the study of this dissertation needs to be discussed with other works on cross-linguistic variations of comparatives such as Bhatt and Takahashi (2007) in Hindi-Urdu, Beck et al. (2008) in 14 languages, and others^{9,10}.

⁹ Bhatt and Takahashi (2007) argue that the reduction analysis of phrasal comparatives is not an option for Hindi-Urdu, while the reduction analysis is need for phrasal comparatives in English. This suggest a parametric difference of whether or not a language posses a 3-place degree operator (Direct Analysis). Hindi has it, but English does not.

(i) $[[\text{-er}]] = \lambda x\lambda P_{\langle d, \langle e, t \rangle \rangle} \lambda y. \exists d [P(y, d) \wedge \neg P(x, d)]$

¹⁰ Beck et al. (2008) investigate 14 languages and propose three parameters that are related to each other. The Degree Semantics Parameter (DSP) determines whether or not a language has degree predicates. Languages with +DSP are a subject of the Degree Abstraction Parameter (DAP). Languages with +DAP have either the positive or the negative setting of the Degree Phrase Parameter (DegPP). According to their analysis, Japanese has the parameter setting of +DSP, -DAP, and –DegPP.

(i) Degree Semantics Parameter (DSP)
A language {does/does not have} gradable predicates (type $\langle d, \langle e, t \rangle \rangle$ and related),

i.e. lexical items that introduce degree arguments.

- (ii) Degree Abstraction Parameter (DAP)(Beck et al. 2007)
A language {does/ does not} have binding of degree variables in the syntax.
- (iii) Degree Phrase Parameter (DegPP)
The degree argument position of an unmarked gradable predicate {may/may not} be occupied by a syntactically visible element at a pre-LF level of syntax.

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