Some Topics in Comparative Constructions

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ABSTRACT

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Making a comparison, namely, ordering objects along a certain dimension, is a basic and universal cognitive ability of us, yet the linguistic encoding of comparisons is not simple. To express different kinds of comparisons, there exist a variety of comparative constructions. The same kind of comparison can also be expressed differently cross languages. Through analyzing some specific problems, this thesis aims at addressing some of the basic semantic and syntactic issues, using both English and Chinese data. For example, what is the argument structure of comparatives? Is there a single syntactic structure for all predicate comparatives in English, and cross-linguistically? How do the semantic and syntactic properties interact to make comparisons? In Chapter 1, I introduce a few problems that I will discuss later in the thesis. Although the rest of the thesis can be roughly divided into two parts: a semantic part (chapter 2&3) and a syntactic part (Chapter 4&5), most of my analyses are rooted in a syntax-semantics interaction of comparatives. Chapter 2 talks about quantifier licensing in comparatives and its consequence for the structure of the standard degree argument. I argue that first there should be a distinction between phrasal and clausal comparatives, and second, for clausal comparatives, the surface wide scope interpretations of quantifiers are actually the result of pair-list readings in wh-constructions. Chapter 3 discusses why comparatives are licensing environments for negative polarity items (NPIs). I argue that the basic

component of a comparison, namely, the scale provided by the gradable adjective, plays a crucial role to license NPIs. Chapter 4 argues for the existence of a degree argument in the structure of comparatives, even if this argument is not a constituent on the surface. Chapter 5 proposes a tentative structure for comparatives that incorporates this discontinuous degree argument. Chapter 6 is a conclusion.

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this thesis to my dearest mom, dad, sister and Allan Schenkel, for their love and support that make me who I am now.

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Chapter 1

Introduction

1.0. Setting the stage

Comparatives have been of great interest for linguists who study the semantics of gradable adjectives and the structure of adjectival constructions. Intuitively speaking, a comparative construction consists of the following elements: two degrees that are under comparison, a gradable adjective that provides the dimension of the comparison, a degree morpheme that indicates the ordering relation between the degrees, and a differential degree that measures the difference between the two compared degrees. Consider the example in (1):

(1) John is taller than Bill by three inches.

This sentence compares two degrees: John's degree of height and Bill's degree of height. Bill's degree is often referred to as the *standard degree*, and John's degree the *reference degree*. The comparison scale, i.e., the scale of height, is provided by the gradable adjective *tall*. The comparative morpheme *–er* indicates an ordering that John's height exceeds Bill's height. The differential degree *three inches* measures the difference between John's height and Bill's height. In cases where the differential degree is not specified as a measure phrase, it still can be some implicit amount. For instance, in (2), the differential degree is zero, and it is some unspecified amount (bigger than zero) of

degree in (3) and (4). As shown in (3) and (4), the unspecified differential degree can be intensified by a degree adverb.

(2) John is as tall as Bill.

(3) John is much smarter than Bill.

(4) John is a little less smart than Bill.

There are many different kinds of comparative constructions. The examples we have seen so far are predicate comparatives, where the gradable adjectives predicate the subjects. Adjectives can also be used attributively in comparatives, where the adjectives are part of the NP modifiers. (5) is such an example:

(5) a. John bought a cheaper car than I did.

b. She read more books than I did.

Most comparatives compare two things along the same comparison scale, as we have seen so far. However, in some languages, English for instance, some comparatives seem to contain two different scales on the surface. They are called sub-comparatives. The following are some examples:

(6) a. The table is longer than the door is wide.

b. The Pacific Ocean is deeper than the Rocky Mountains are tall.

This thesis does not attempt to give a comprehensive account for all kinds of comparatives. I will limit myself mostly to the discussion of predicate comparatives. I believe the conclusions drawn in this thesis can be extended to other comparative constructions, although I will leave the exact implementation open. The general research question of this work centers around the semantics and syntax of comparatives as well as their interactions. This thesis can be read in two parts. In the first part, I investigate the following two semantic issues:

- Quantifier licensing in comparatives (Chapter 2)
- Licensing Negative Polarity Items (NPIs) in comparatives (Chapter3)

The second part focuses on the syntax of comparatives. I will discuss:

- The degree argument (Chapter 4)
- The overall structure of comparatives (Chapter 5)

Hopefully, the investigation of these problems can help us to understand some more fundamental issues of comparatives. For instance, what is the argument structure of comparatives? Is there a single syntactic structure for all predicate comparatives in English, and crosslinguistically? How do the semantic and syntactic properties interact to make comparisons? Before we answer these questions, let me first lay out more details of each problem to be discussed.

1.1. Quantifiers in comparatives

The first syntax-semantics interface problem in comparatives is the quantifier problem. This is a good case to demonstrate how syntactic properties interfere with a semantic

issue. On the surface, there is a semantic problem of how to license and interpret quantifiers at the standard degree position. For instance, how is the quantifier *everybody* interpreted in (7)? And why is the negative quantifier *nobody* not licensed in (8a), but is fine in (8b)?

(7) a. John is taller than everybody else is.

b. John is taller than everybody else.

(8) a. *John is taller than no one is.

b. John is taller than no one. Brame (1983)

But I will argue that this is not a purely semantic issue. My analysis to this problem crucially depends on the structure of the standard degree argument. Specifically I will assume that there is a difference between standard degrees that are just DPs and those that are elided CPs. To see clearly what the problem is, let me first introduce some background on the structure of the standard degree.

1.1.1. Clausal and phrasal comparatives

In English comparatives, the standard degree can be expressed either as a clause or a phrase, as shown in (9):

(9) a. John is happier than Bill is.(clausal comparative)

b. John is happier than Bill. (phrasal comparative)

Since Chomsky (1977), most people agree that the clausal comparatives are wh-constructions, with a wh-operator binding a degree variable.

(10) John is taller than [Op_j Bill is t_j]

The comparative clause generates a set of degrees to which Bill is tall. Assuming the maximality operator in Rullmann (1995), the maximal degree that Bill is tall to is picked out as the standard degree, and John's height is compared to that maximal degree. Therefore, (10) is interpreted as (11):

(11) $\exists d_1[d_1 > _{MAX} (\lambda d_2 \text{ tall } (\text{Bill}, d_2))][\text{tall } (\text{John}, d_1)]$

(11) says that there is a degree d1, John is tall to d1, and d1 exceeds the maximal degree d2 that Bill is tall to.

However, there is more controversy about the syntactic structure of phrasal comparatives. Since the two sentences in (9) have the same semantic interpretations, one natural question to ask is whether they are syntactically related too. In this section, I will review some proposals in the literature.

1.1.1.1. The debate in the literature

Following Bresnan (1973), one view assumes that phrasal comparatives are derived from their clausal counterparts through comparative ellipsis/comparative

deletion. Let's call this view the clausal analysis for phrasal comparatives. For example, (9b) is derived from (9a), as shown in (12):

(12) John is happier than [$_{CP}$ Bill ~~is~~]

Under this analysis, the semantic derivation of phrasal comparatives is the same as their clausal counterparts. As Larson (1987) suggests, comparative ellipsis is just a special case for a common ACD (antecedent contained deletion) process. Sentence (13) has the structure in (14), where the comparative site contains an empty I'.

(13) John grew as tall as / taller than his father .

(14) [$_{IP}$ John [$_{I'}$ past[$_{VP}$ grow[$_{AP}$ as tall [$_{CP}$ as his father [$_{I'}$ e]]]]]]

If comparatives are quantifications over degrees, and quantificational elements undergo QR, the AP in (14) *as tall as his father e* will move to adjoin to IP at LF, as shown in (15):

(15) [$_{IP}$[$_{APi}$ as tall [$_{CP}$ as his father [$_{I'}$e]]][$_{IP}$ John [$_{I'}$ past [$_{VP}$ grow [$_{APi}$ e]]]]]

Now the empty I' in the comparative site can be reconstructed from the I' in the main clause, and the desired LF is derived in (16):

(16) $[_{IP}[_{APi}$ as tall $[_{CP}$ as his father $[_{I'}$ Past $[_{VP}$ grow $[_{APi}$ e]]]]]$[_{IP}$ John $[_{I'}$ Past $[_{VP}$ grow $[_{APi}$ e]]]]]

On the other hand, various authors have challenged the clausal hypothesis for reasons I will come back to shortly. Under this view, the DP *Bill* in (9b) is not derived from a clause, instead it is just a simple DP. Let's call this proposal the phrasal analysis for phrasal comparatives. Since in (9b) what is being compared is Bill's degree of happiness, not him as an individual, one problem for the direct analysis is how to derive the meaning of a degree from the meaning of an individual without appealing to copying a predicate, as has been done in (16). Heim (1985) proposed a semantic solution for the problem. For example, the comparison in (17) is comparing two people along the dimension of "happiness". A dimension of comparison is a function from individuals to degrees, so the dimension "happiness" is translated by Heim as a lambda-iota expression like (18). This function can take the two people in (17) as arguments respectively and give two degrees. The meaning of the comparative morpheme *–er* is specified as (19):

(17) John is happier than Bill.

(18) $\lambda x\, \iota y$ [x is y-happy]

(19) "-er<a, b> f" is true iff f(a) > f(b)

Under this analysis, (17) has a semantic interpretation like (20), and (20) is true iff "the happiness of John" exceeds "the happiness of Bill".

(20) -er<John, Bill >λx ιy [x is y-happy]

To summarize, both the clausal analysis and the phrasal analysis have a way to derive the correct semantic interpretation for phrasal comparatives. The former appeals to the general solution for ACD constructions, and the latter appeals to the semantics of functions, i.e. the direct analysis. Next I will turn to some syntactic tests that can distinguish the two structures.

1.1.1.2. Some evidence to support the phrasal analysis

There have been some arguments showing that phrasal comparatives should receive a different syntactic structure from their clausal counterparts (Brame 1983, Napoli 1983, Hankamer 1973, among others). The crucial point behind these arguments is that if the phrasal analysis is correct, phrasal comparatives should reveal a different distribution from their clausal counterparts. Next I will turn to some examples of this sort.

First, the DP after *than* appears with nominative case in clausal comparatives, but accusative case in phrasal comparatives.

(21) a. John is taller than she is.

b. *John is taller than she.

a. *John is taller than her is.

b. John is taller than her.

Second, reflexives only appear in phrasal comparatives, which is consistent with the phrasal analysis.

(22) a. *It is impossible for John to be taller than himself is.

b. It is impossible for John to be taller than himself.

Third, extraction out of a clausal comparative is bad, but fine out of a phrasal comparative.

(23) a. *Who is John taller than is?

b. Who is John taller than?

Fourth, clausal comparatives don't license negative quantifiers, but phrasal comparatives do.

(24) a. *John is taller than no one is.

b. John is taller than no one.

Finally, in certain dialects, an explicit wh-word appears in the comparative clause, but we don't see the same pattern in phrasal comparatives.

(25) a. She did more than what John did.

b. *She did more than what Bill.

There are more tests we can use than I have listed here. But I hope the point is already clear, namely, these tests seem to show that phrasal comparatives should have different structures from clausal ones. However, one point still worth keeping in mind is that not all the tests above necessarily point to the phrasal analysis. Some of them could be accounted for in other ways. For example, Lechner (1999, 2001) pointed out the accusative case test in (21) is still compatible with a clausal analysis if we at the same time adopt the position that comparatives are similar to coordination structures. He noticed that the accusative remnants can be licensed in coordinations that involve gapping, as shown in (26):

(26) a. John is eager to meet them, and me too.

b. *John is eager to meet them, and me is eager to meet them too.

For more details of Lechner's analysis I refer readers to the original papers. Although the alternative analyses Lechner provided could account for some of the data above, I don't think the clausal analysis can account for all the differences. In particular, it is not clear how the clausal analysis could accommodate the quantifier data in (24) and the wh-extraction data in (23). As will become clearer in the next section and in Chapter 2, acknowledging the structural difference between phrasal and clausal comparatives provides us a natural explanation of quantifier licensing in comparatives.

Before I demonstrate the quantifier problem in comparatives, I need to point out that although we see some strong evidence to support the phrasal analysis of phrasal

comparatives, all the cases we have looked at are predicative comparatives, which is also the focus in our discussion of quantifiers. It seems that for some kind of attributive phrasal comparatives, we do need to give them clausal structures. For instance, Lerner and Pinkal (1995) discussed two kinds of attributive comparatives: the one with narrow readings (NRA) and the one with wide readings (WRA).

(27) a. John owns a faster car than this BMW. (NRA)

b. John owns a faster car than Bill. (WRA)

In their analysis, the DP after *than* in the NRA kind, e.g. *this BMW*, is still analyzed as a simple DP. However, the DP after *than* in the WRA kind, e.g. *Bill*, is analyzed as an elided CP. In addition, Lechner (1999, 2001) also discussed the clausal analysis for some other attributive comparatives. In the rest of this thesis I will not have opportunity to talk about phrasal comparatives with clausal structures any more, but it is nevertheless a very interesting issue to keep in mind.

To summarize, in this section we see that at least for some kind of comparatives (e,g. predicative comparatives), the phrasal comparatives have different syntactic structure from their clausal counterparts. This is a crucial point for our discussion next.

1.1.2. Quantifiers in comparatives

Since May (1985), the scope of quantifiers is derived from the syntactic structure at LF. Quantifier raising (QR) operates at LF and establishes a one to one mapping between the syntactic structures and the scope interpretations. Consider (28):

(28) Some student read every book.

a. [some student$_i$ [every book$_k$ [t$_i$ read t$_k$]]]

b. [every book$_k$ [some student$_i$ [t$_i$ read t$_k$]]]

After applying QR to both subject and object quantifiers, depending on the scope relation of the two, (28a) and (28b) are two different LF representations of (28). At LF (28a), *some student* takes scope over *every book*, and the sentence means there is a student x, such that x read every book. On the other hand, *every book* in (28b) takes wide scope over *some student*, so the sentence means that for each book x, there is a student y that read the book x. In this way, semantic properties, scope ambiguities in particular, are encoded transparently in the structure at LF.

It is this mapping between syntactic and semantic representations that raises questions for quantifiers in comparatives. Quantifiers in comparative clauses take wide scope over the comparative clause. For example, (29) only has the interpretation (29a), where the quantifier every student takes wide scope over the wh-operator. It means that for each student x, John is taller than x; the (29b) interpretation, where the quantifier takes narrow scope under the wh-operator, is on the other hand an implausible interpretation, because it means that John is taller than a maximal degree *d* such that every student is *d*-much tall, which will have to force every student to be of the same height.

(29) John is taller than every student is.

a. $\forall$x (x is a student) [John is taller than [$_{MAX}$ Op$_i$ x is d$_i$-much tall]]

b. * John is taller than [$_{MAX}$ Op$_i$ $\forall$x (x is a student and x is d$_i$-much tall)]

The problem we are going to solve is how to derive the wide scope interpretation in (29) and why it is an obligatory interpretation. As I will show in more detail in Chapter two, the wide scope interpretation of (29) is not derivable through QR, as we have done for (28), since the quantifier in (29) is non-extractable. But this doesn't mean that the interpretation in (29a) is not dependent on the syntactic representation any more. Exactly to the contrary, I will argue that the obligatory wide scope interpretations are heavily dependent on comparatives being wh-constructions. The solution I will provide is also extended to explain the facts that negative quantifiers are licensed differently in clausal and phrasal comparatives, as shown in (30):

(30) a. *John is taller than no one is. (clausal comparative)

b. John is taller than no one. (phrasal comparative)

Therefore, the analysis I will advocate crucially draws a line between phrasal and clausal comparatives. Quantifiers in clausal comparatives behave the way they do because they are constrained by wh-movements constraints. The same constraints don't exist in phrasal comparatives.

1.2. NPI licensing in comparatives

The semantic problem of quantifiers is tied closely to the structure of the standard degree, which is a necessary component to make a comparative. Another central component of comparatives is the adjective, which provides a scale of some dimension, for instance, height, intelligence, beauty, etc. The semantics of scalar adjectives themselves have been discussed extensively in the literature, but it is less often discussed what these scales do for comparatives, beyond the basic intuition that comparisons can't be made without them. In Chapter 3, I will show that scales can do more for comparatives. Specifically, they make comparatives a licensing environment of NPIs. In this discussion, we will also find that Chinese data becomes instructive. A cross-linguistic perspective offers us some insight that is not as easily available through only English data.

Generally speaking, negative polarity items (NPIs) are lexical items that have to stay within the scope of some decreasing operator, for instance, a negation, as shown in (31):

(31) a. He didn't see *anybody*.

b. *He saw *anybody*.

c. John won't *ever* do that.

d. *John will *ever* do that.

When we look at the various analyses that have been proposed to characterize the distribution of NPIs, it is immediately clear that both syntax and semantics have contributed to the licensing of them. Progovac (1994) analyzes NPI licensing as syntactic

binding, and suggests that NPIs behave like pronominals and have to be bound by a local A'-binder, which could be a negation or some other functional operator. On the other hand, there have been various proposals on the semantic properties that can license NPIs. Ladusaw (1980) argues that downward entailing environments trigger NPI licensing, Fauconnier (1975), Lee & Horn (1994) and Larihi (1998) all have suggested that NPIs are licensed through scalar implicature, and Giannakidou (1998, 1999, 2001), Zwarts (1995) argues for (non)veridicality as the crucial licensing condition.

Interestingly, English comparatives license NPIs, as shown below:

(32) John is taller than *anybody*.

(33) John is taller than I *ever* imagined.

There is obviously no negative element in (32) and (33) that will trigger NPI licensing. As I will show in Chapter three, it is controversial whether comparatives are downward entailing environments (Schwarzschild & Wilkinson 2002, Zepter 2003) and it is also not completely clear if one can characterize comparatives as (non)veridical environments. More importantly, although many languages do license NPIs directly in comparatives (Haspelmath 1997), some don't. Chinese belongs to the latter kind. As shown in (34), NPIs are not licensed in the two kinds of Chinese comparatives. However, adding the distributive morpheme *dou* to comparatives will turn comparatives into NPI-friendly environments again, but only when certain syntactic conditions are met. As shown in (35), only one kind of comparatives will license an NPI when *dou* is added.

(34) a. *Ta gao shei yidian

he tall who a little

He is taller than anybody.

b. *Ta bi shei gao yidian

he bi who tall a little

He is taller than anybody.

(35) a. *Zhangsan dou gao shei yidian

Zhangsan dou tall who a little

Zhangsan is a little taller than anybody.

b. Zhangsan bi shei dou gao yidian.

Zhangsan than who all tall a little

Zhangsan is a little taller than anybody.

In Chapter 3, I will address the NPI issue in comparatives. Independent investigation of the distributive morpheme *dou* suggests that the core function of *dou* is not distributivity, instead, it should be a maximality operator that picks out the maximal value on a contextually determined scale. Consequently, NPIs in Chinese comparatives are licensed through scalar implicatures. The implication of this analysis for English data is also discussed in Chapter 3. Importantly, although the exact implementation of this scalar implicature can be different from language to language (for instance, Chinese needs the maximality operator *dou*, but English doesn't), comparatives nevertheless automatically provide scales through their gradable adjectives.

1.3.The degree argument and the structure of comparatives

While discussing the two semantic issues raised above, we have already touched upon some syntactic properties of comparatives, for example, the structure of the standard degree. In the second part of this thesis, I will discuss the general structure of comparatives. Again, semantics and syntax interact closely here. The central problem is whether one should acknowledge a degree argument in the argument structure of comparatives. The degree argument is motivated on the semantic fact that gradable adjectives involve quantification over degrees, but it causes a syntactic problem because this argument is not a constituent on the surface syntax. Let's look at the problem in more detail.

1.3.1. The traditional analysis

Gradable adjectives, such as *tall*, *smart*, *beautiful*, are traditionally assumed to map an individual to a degree of some properties (e.g. Cresswell 1976, E. Klein 1991). As shown in (36), an adjective introduces two arguments: an individual argument and a degree argument. (36) is true just in the case that the degree of x on a scale related to ϕ is at least as great as d. So the question is how to define the value of *d*. Let's illustrate it with two examples, one simple degree construction and the other comparative construction.

(36) ϕ (x, d) (ϕ is a gradable adjective such as *tall*)

In simple degree constructions, such as (37), the degree argument *d* is determined by context. The adjective *tall*, *smart* and *beautiful* maps the individual Mary to this contextually determined degree, as shown in (38).

(37) Mary is tall/smart/beautiful.

(38) a. tall (Mary, d)

b. smart (Mary, d)

c. beautiful (Mary, d)

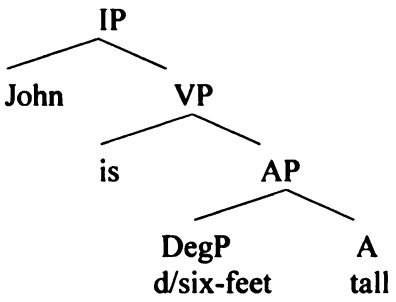
(37) is true if and only if Mary is at least as tall/smart/beautiful as a degree d, which is determined by whatever value that is considered as tall, smart or beautiful in the context. For instance, if 6-feet is commonly assumed to be tall, then for (38a) to be true, Mary must possess the degree of height *d* that is at least 6-feet. The advantage of this analysis is that an implicit degree argument (see (39)) aligns the structure of (39) to those adjectival predicates with explicit measure modifications, such as (40). Specifically, in both (39) and (40), the adjective introduces a degree argument in the [Spec, AP] position, as shown in (41). In (39) this argument is implicit, but in (40) it is expressed by a measure phrase.

(39) Mary is *(d-much)* tall/smart/beautiful.

(40) Mary is *six-feet* tall[1].

[1] For independent reasons, adjectives such as *smart* and *beautiful* can't take measure phrase modification (see Schwarzschild 2002)

(41)



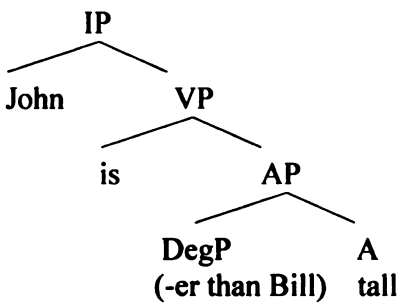
Along the same line, comparatives are traditionally assumed to be quantificational expressions that quantify over a degree argument (Seuren 1973, Hellan 1981, von Stechow 1984, Heim 1985, Lerner & Pinkal 1992, 1995, Hazout 1995, Rullmann 1995). Consider (42) for an example. The adjective *tall* still introduces two arguments: and individual and a degree, as shown in (42b). So (42a) is true just in case that John is at least as tall as a degree argument *d*. The value of *d* itself is restricted by the degree morpheme and the comparative clause, namely, *d* has to exceed Bill's degree of height, as shown by the semantic formula in (42c). Under this analysis, the degree argument still stays in the [Spec, AP] position, just like other degree constructions, as shown in (42d).

(42) a. John is taller than Bill

b. tall (John, d)

c. $\exists d[d > d_{Bill}]$[tall(*John,d*)]

d.



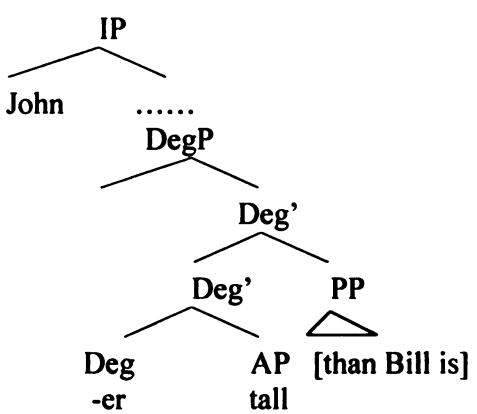
Under this analysis, a comparative construction only has two main arguments, an individual (*John* in (42)), and a degree argument. The degree argument is a complex argument. It consists of a comparative morpheme, a standard degree, and (optionally) a differential degree.

1.3.2. Kennedy (1999)

Different from the traditional analysis, based on how we intuitively make a comparison, it seems appealing to posit three arguments for comparatives: a *standard degree* argument, a *differential degree* argument and a *reference degree* that the subject is true of. This is essentially the line taken in Kennedy (1997, 1999)[2].

Adopting the extended degree phrase structure in Abney (1987), Corver (1990) and Grimshaw (1991), Kennedy constructs the semantics of comparatives from the following structure:

(43) John is taller than Bill is.



Under this analysis, the comparative clause, i.e., the *than*-phrase, generates the standard value of comparison, the adjective *tall* provides a measure function from individuals to

degrees, and the comparative morpheme *–er* (or *less*, *as...as...*). The compositional semantics of comparatives crucially lies on the interpretation of the degree morpheme, which is defined in (44):

(44) $Deg = \lambda G \lambda d \lambda x[\mathbf{R}(G(x))(d)]$

G is the measure function provided by the AP, and *d* is the standard degree value provided by the PP. Depending on what the degree morpheme is (*-er*, *less*, or *as...as..*), R expresses an ordering relation between the standard and the reference values, so R could be either *more*, *less* or *equal to* relations. In this way, the degree phrase DegP expresses some property of an individual. For instance, the DegP in (7) expresses the following property:

(45) DegP: $\lambda x[\mathbf{more}(\text{ tall}(x))(\text{ d}_{\text{standard}})]$

When the DegP combines with the subject, we derive the meaning of the sentence as below:

(46) $||$ more (tall (John)) $(\text{d}_{\text{standard}})$ $||$

What this means is that the reference value, John's height, and the standard value needs to stand in a partial order relation defined by *more*, defined as in (47). (46) is true if and only if (48) holds:

(47) $\|\text{more}(d_{Rerefence})(d_{Standard})\| = 1$ iff $d_{Reference} > d_{Standard}$

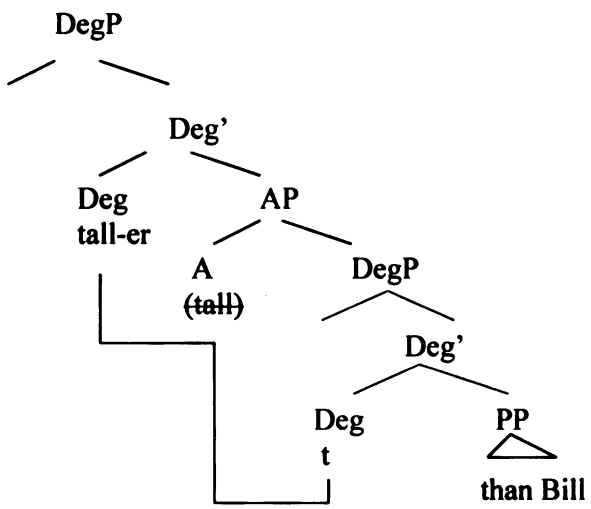
(48) $\|\text{more}(d_{John})(d_{Standard})\| = 1$ iff $d_{John} > d_{Standard}$

1.3.3. Evaluating the two analyses

The difference between these two proposals crucially lies in the degree argument. Kennedy's analysis rejects such an argument, and therefore employs different semantic compositions from the traditional analysis. Therefore, to distinguish the two proposals, we will have to first answer the question if such an argument is necessary. In this thesis, I will argue for the existence of this argument (Chapter4). Drawing on data from the definiteness effect in attributive comparatives, I argue that the LF movement of the degree argument provides a natural account for the data. The degree argument is a constituent at LF, but discontinuous in the surface word order.

The existence of such a degree argument raises an interesting problem of syntax-semantics mismatch, because on the surface the degree morpheme *–er* and the standard degree *than*-phrase don't form a constituent. How can we maintain such an argument in the syntax and at the same time derive the correct word order? In chapter 4 and chapter 5 I will provide a tentative analysis to this problem. To preview, the traditional structure in (42d) will be rejected. Focusing on data from Chinese comparatives, I will argue for a Degree-shell structure for comparatives, as shown in (49).

(49)



Although the Chinese data does suggest that a shell like structure is on the right track, it has to be acknowledged that some of the analyses in Chapter 5 are speculative, and certainly raise many questions for future research.

1.4. The organization of the thesis

The goal of this thesis is to address the syntactic and semantic issues laid out above. In Chapter two I will investigate the quantifier problem in comparatives. Chapter three is a discussion about NPIs in comparatives. Chapter four discusses the issue of the degree argument, chapter five discussed the general structure of comparatives, and Chapter six is the conclusion.

Chaper 2

Quantifiers in Comparative Clauses

2.1.Introduction

As introduced in Chapter one, the structure of phrasal and clausal comparatives has driven some debate. In this chapter, I will show that maintaining a structural difference between the two provides us an opportunity to explain some data about quantifiers in comparatives.

Quantifiers in comparative constructions raise two problems. First, quantifiers in comparatives take obligatory wide scope interpretations. As shown in (1), assuming that comparatives involve quantification over degrees (Cresswell 1976, Hoeksema 1983, von Stechow 1984, Heim 2000), the narrow scope interpretation of the quantifier *everybody* requires that everybody else is of the same height, and this is not a natural reading of (1).

(1) John is taller than everybody else (is).

a. For everybody x, John's height exceeds x's height.

b. *There exists a height h, everybody is h-tall, and John's height exceeds h.

Second, monotone decreasing quantifiers are not licensed in clausal comparatives, but they are fine in phrasal comparatives (2a &2b). This is puzzling given that clausal and phrasal comparatives are almost equal when they license other quantifiers (2c &2d).

(2) a. *John weighs more than nobody/few people/at most five people weighs.

b. John weighs more than nobody/few people/at most five people.

c. John weighs more than everybody else/somebody weighs.

d. John weighs more than everybody else/somebody.

The first problem has attracted lots of attention in the literature (see discussion below). The second problem, however, has not been discussed in the literature as a related problem. At the same time, although (2a) & (2b) are often quoted as an argument for the distinction between phrasal and clausal comparatives, it is not clear why clausal comparatives don't license certain quantifiers.

In this chapter, I will argue for a single analysis that will connect (1) and (2) together. Two points are crucial for the analysis. First, there is a real distinction between phrasal and clausal comparatives, at least for the kind of comparatives in (2) (for a debate on this issue see Bresnan 1973, Brame 1983, Heim 1985, Lerner and Pinkal 1995, Lechner 1999, among others); second, the properties of quantifiers in clausal comparatives fall under the general properties of quantifiers in wh-constructions. In a nutshell, clausal comparatives license quantifiers through their property of being wh-constructions, which poses constraint on what kind of quantifiers can be licensed. On the other hand, phrasal comparatives, at the least the kind we are concerned with here, don't involve wh-constructions, hence are not constrained to reject negative quantifiers. As will be demonstrated later, phrasal comparatives are relatively more straightforward in this case, and I leave them to the end of the discussion. A large amount of the discussion will be devoted to the more puzzling behavior of clausal comparatives.

The organization of this chapter is the following: in section two, I will lay out in more details what the problem is and point out some problems for a previous analysis. In section three, I will introduce the general analysis I adopt for the pair-list readings in wh-constructions, and my analysis of the problem. More evidence for the current analysis is provided in section four. Section five is devoted to quantifiers in phrasal comparatives, and section six is a conclusion.

2.2. The problem of quantifiers

It is not a simple question how quantifiers such as *everybody* in (1) can be licensed in clausal comparatives. The problem is that the quantifier in comparative clauses takes obligatory wide scope over the comparative clause (Larson 1988), which is in conflict with some standard assumptions about scope interpretations. By common assumptions, the scope relation between two quantificational elements is established through the c-command relation between the two at the LF structure (May 1985). To put it in an informal way, let's take (3) as our assumption:

(3) For α to take scope over β, α and β are quantificational elements, α needs to c-command β at LF.

Let's illustrate the problem with the example in (4). At LF, the quantifier *everybody* can either move to a higher position to scope over the maximality operator (Rullmann 1995), or it can stay within the scope of the maximality operator. In other

words, (4) could be ambiguous because of the scope ambiguity between *everybody* and the comparative clause. The two interpretations are shown in (4a) and (4b).

(4) John is taller than [$_{MAX}$ everybody else is].

a. $\exists d'$ ($\forall x$(person(x)) & $_{MAX}$ (λd tall (x, d)) $\rightarrow$ (d' >d & tall (John, d')))

b. $\exists d'$($_{MAX}$ λd $\forall x$(person(x) & tall (x, d) $\rightarrow$ (d' >d & tall (John, d')

(4a) and (4b) have different truth conditions. (4a) is true if for each person, John is taller than the maximal height of that person. This is obviously a possible reading of (4). On the other hand, the truth condition of (4b) is less straightforward. What (4b) says is that there is a set of degrees of height and we pick the maximal one, and each person in the context is that tall. In other words, for (4b) to be true, we have to force everybody to be the same height. It is not obvious if (4) has this interpretation. The problem is that when (4a) is true, it could possibly entail (4b) in the circumstances that everybody else just happens to be the same height, although it is not an obligatory context for (4a) to be true. Therefore, it is hard to decide whether (4b) is a genuine interpretation. We need a case where the entailments of one interpretation don't interfere with the other interpretation. Let's consider such an example in Wilkinson (1998), where by using non-monotonic quantifiers the two readings are logically independent of each other.

(5) Hubert is taller than exactly 5 of the others are.

a. Find the largest height h, where exactly 5 individuals other than Hubert are h tall, and Hubert is taller than h. (narrow scope)

b. There are exactly 5 individuals that are shorter than Hubert. (wide scope)

If (5a) were the available interpretation, (5) could be true in a context as in (6), where Hubert is 5′8″, there are 5 people that are 5′7″, and some other people are 5′5″, 5′3″, 5′1″ etc, because we do find a unique maximal height, namely 5′7″, that exactly 5 people are of that height, and they are shorter than Hubert.

(6)

5′8″	Hubert
5′7″	T, Q, P, A, C
5′5″	W, B, V
5′3″	Y
5′1″	O

However, native speakers' intuition is that (5) is false in a situation like (6), exactly because the quantifier has to take wide scope over the maximality operator. Therefore there could be only five people that are shorter than Hubert.

After establishing the wide scope interpretation fact, the question is how this interpretation is derived. Unfortunately the wide scope interpretation in (4a) can't be derived by QR *everybody* out of the *than*-clause, as pointed out in Schwarzschild & Wilkinson (2002). One problem for QR is that comparative clauses are generally considered as wh-constructions (Chomsky 1977), as shown in (7), so it should form an extraction island that blocks QR. We can find the parallel illicit extraction in wh-questions and QR, as shown in (8).

(7) John is taller than [everybody$_i$ [Op$_j$ MAX [x$_i$ is d_j-*much tall*]]

(8) a. *Who$_i$ is John taller than t_i is?

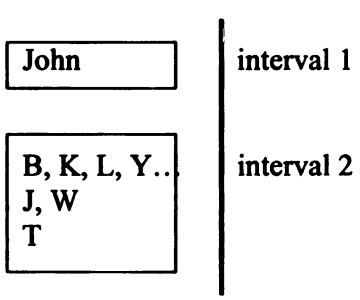
b. Someone said that everyone left. √∃∀

*∀∃

2.2.1. The interval based semantics for degree

Schwarzschild & Wilkinson (2002) (henceforth S&W) proposes an analysis which solves the problem by using an interval based semantics for degrees. Traditionally, degrees are assumed to be points on a scale (Cresswell 1976, Hoeksema 1983, von Stechow 1984, Heim 2000, among others.) S & W argue that if we revise this assumption to another one which represents degrees as an interval on a scale, we would be able to derive the correct interpretation of (4) without appealing to QR. More specifically, under this analysis (4) is true as long as we can find an interval on a height scale containing the height of everyone but John, and above that interval there is an interval of John's height, as shown in (9). This is certainly possible and we do not have to force everybody to be the same height. At the same time, no QR is needed.

(9) John is taller than everybody else is.



This analysis elegantly derives the correct semantics for (4) and avoids the problem of QR. However, it faces an empirical problem, i.e. being a pure semantic analysis, it is blind to the syntactic difference between clausal comparatives and phrasal comparatives. Assuming the semantics of degrees is constant for both clausal and phrasal comparatives, one would predict that clausal and phrasal comparatives would behave the same way with respect to quantifiers. We already know that is not the case, data repeated below:

(10) a. *John weighs more than nobody/few people/at most five people weigh.

b. John weighs more than nobody/few people/at most five people.

One could argue that the analysis in S & W (2002) is only designed to address the wide scope interpretation issue of *everybody*, and does not intend to address the general licensing of quantifiers in comparatives. As a matter of fact, negative quantifiers are not discussed in S&W's proposal. Therefore, one possibility is to maintain the analysis for the interpretation of *everybody*, but pursue another analysis for negative quantifiers. The point is well taken. However, we still need to ask, is there an analysis that actually unites the two kinds of quantifiers in comparatives? In this chapter, I will pursue an analysis that does this job.

2.2.2. A summary

To summarize, we have two problems that need an account. First, for clausal comparatives, quantifiers such as *everybody* take obligatory wide scope over the *than*-

clause, and negative quantifiers are not licensed; second, for phrasal comparatives, quantifiers such as *everybody* behave the same, but negative quantifiers are also licensed.

The analysis I will develop in this chapter crucially takes the advantage of the fact that clausal comparatives involve wh-constructions, whereas phrasal comparatives don't. Drawing parallels between comparative clauses and other wh-constructions, I argue that the wide scope interpretation in (4) is actually a pair-list reading. Independent constraints on pair-list readings will rule out monotone decreasing quantifiers in clausal comparatives. On the other hand, quantifiers in phrasal comparatives can easily take wide scope through QR, and there is no obvious constraint on monotone decreasing quantifiers in phrasal comparatives.

2.3. The pair-list reading in wh-constructions

In this section I will introduce the analysis of pair-list readings in wh-question and relative clauses. My analysis of comparatives will be built upon the assumptions from this section.

2.3.1. Pair-list readings in wh-questions

Wh-questions with quantifiers are usually ambiguous between having a functional answer, a pair-list answer and an individual answer. For example, the question in (11) can have three different answers.

(11) Who does everybody love?

a. His Mom. (functional)

b. Mary loves Bill, John loves Alice, Jason loves Jane... (pair-list)

c. Mary. (individual)

(11a) provides a function that maps an individual to his mom. This is clearly different from the individual answer in (11c), which only provides an individual as the answer. However, it seems reasonable to think that the pair-list reading in (11b), which provides pairs of lovers, is a special case of the functional reading because the pair-list answer is in the extension of the functional answer (Engdahl 1986, Chierchia 1993). To derive a pair-list answer, we only need to apply the function, e.g. a function mapping a person to his lover, to each individual in the relevant domain of the function, e.g. Mary, John, Jason, etc. There are some differences between a functional reading and a pair-list reading, but since they are not crucial for this chapter, I will leave them aside for the moment.

Chierchia (1993) proposes the syntactic structures in (12) and (13) to derive the pair-list reading.

(12) who_i [$everybody_j$ [t_j loves t_i^j]]

(13) [[who_i $everybody_j$] [t_j loves t_i^j]]

(14) $\lambda P \exists A$ [W (everybody, A) $\wedge$ P (λp [$\exists f \in$ [A $\rightarrow$people] $\exists x \in A$[p = ^loves(x, f(x))])]

In (12), the wh-operator leaves a functional trace behind, which consists of a domain part and a range part. A process called Absorption happens to form a complex operator by adjoining *who* and *everybody*, as shown in (13). The exact syntactic process of absorption is left open. Chierchia temporarily suggests that it could be an adjunction of the DP *everybody* to the Spec of CP. What is important is that after the absorption, we have a

complex operator, the *who*-part binds the range of the functional trace, and the *everybody*-part binds the domain. As shown by its logical form in (14), (13) amounts to saying that there is a function *f* that maps people to their lovers. The domain of *f* is fixed by extracting a minimal witness set from the quantifier *everybody*. For every x in the domain of *f*, x loves f(x). One can easily derive the pair-list reading by feeding the arguments to the function *f*.

Under this analysis, the individual answer is derived if the wh-operator leaves an individual type trace behind, as shown below:

(15) who_i [$everybody_j$ [t_j loves t_i]]

(16) $\lambda P\ P\ (\lambda p\ [\exists x\ person\ (x) \wedge p = \hat{}\forall y\ [person\ (y) \rightarrow love\ (x, y)]])$

2.3.2. Pair-list readings in relative clauses

Sharvit (1999) argued that pair-list readings exist in relative clauses like (17) and (18).

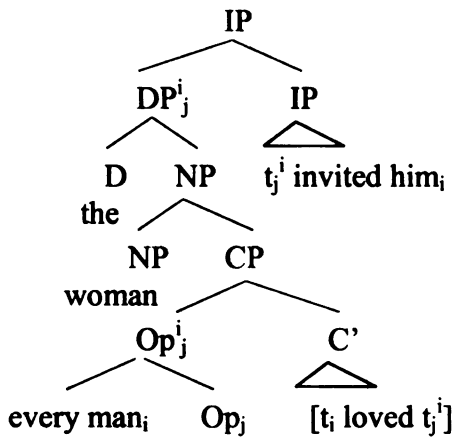
(17) The woman every man_i loves invited him_i.

(18) The picture of $himself_i$ which every $student_i$ hated annoyed his_i friends.

Notice that the quantifiers above face the same problems as the quantifiers in comparatives. For example, *every man* in (17) needs to scope out the relative clause and bind the pronoun *his*, but direct binding through QR is impossible because the relative clause forms an extraction island. Sharvit argues that the binding between the quantifier

and the pronoun is indirect, and brought out by a pair-list reading, as shown in (19). In (19), the relative operator leaves a functional trace behind; the quantifier *every man* adjoins to the relative operator and leaves a trace that binds the argument variable of the functional trace. The relative clause is interpreted as a function *f* that maps men to women they love. The domain of *f* is fixed by extracting a minimal witness set from the quantifier *everybody*. For every x in the domain of *f*, f(x) invited x.

(19)



Sharvit's solution to the indirect binding problem in relative clauses leads us to think that quantifiers in comparative clauses can be treated along the same line. Intuitively there are two reasons to draw this parallel. First, the problem for relative clauses is similar to the problem of comparative clauses; second, Sharvit's solution is crucially based on the fact that relative clauses are wh-constructions, which is also true for comparative clauses. In addition, as I will show in the next two sections, this approach also finds some empirical support.

2.3.3. Pair-list readings and comparative clauses

The goal of this section is to lay out an explicit analysis of quantifiers in comparative clauses. I will show that the previous analyses of pair-list readings in other wh-constructions can be applied to comparative clauses as well.

Following Larson (1987), I assume that the predicate in the ellipsis site of the comparative clause is treated essentially the same as the antecedent contained deletion (ACD) scenarios. Therefore the example in (20) undergoes the following operations. First, the degree argument moves to a higher position, as shown in (21); second, the predicate in the main clause is copied into the ellipsis site within the comparative clause, as shown in (22).

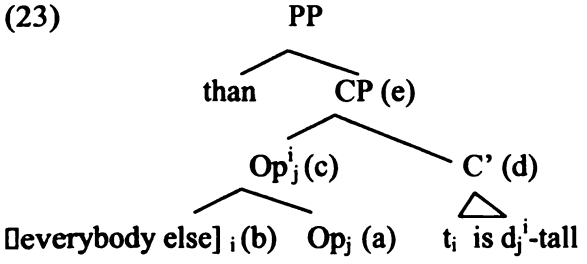
The task at this point is to explain how the quantifier *everybody* in (22) gets wide scope interpretation over the *than*-clause. To simplify the description, I will focus only on the *than*-clause in the analysis in (23). Each node on the tree is labeled to show the compositional derivation of the semantics.

(20) John is taller than everybody else is.

(21) [-er than everybody else is e]$_i$ John is [d$_i$ -tall]

(22) [-er than everybody else is **d-tall**]$_i$ John is [**d$_i$ -tall**]

(23)



a. $\lambda P \lambda f [\iota D [Dom (f) = P \& [\forall d (d \in D \rightarrow \exists x(x \in Dom(f) \& f(x, d)))] \&$
$[\forall x(x \in Dom(f) \rightarrow \exists d(d \in D \& f(x, d)))]]]$
(The operator Op generates a set of degrees. f is a function that maps individuals to degrees, and P is the domain of f)

b. $\iota R (R=W(\lambda P[\forall x(people(x) \rightarrow P(x))]))$
(The minimal witness set of the quantifier *everybody else* provides the domain P for the function f. This gives us a set of people in the context as the domain.)

c. $\lambda f [\iota D [Dom (f) = People \& [\forall d (d \in D \rightarrow \exists x(x \in Dom(f) \& f(x, d)))] \&$
$[\forall x(x \in Dom(f) \rightarrow \exists d(d \in D \& f(x, d)))]]]$
(The combination of *everybody else* and *Op* gives us a complex operator)

d. $\lambda x \lambda d [d=tall(x)]$
(This supplies a function that maps an individual to his degree of height)

e. $[\iota D [Dom (f) = People \& [\forall d (d \in D \rightarrow \exists x(x \in Dom(f) \& [d=tall(x)]))] \&$
$[\forall x(x \in Dom(f) \rightarrow \exists d(d \in D \& [d=tall(x)]))]]]$
(Feeding the function generated in (d) into the complex operator, we derive a set of degrees by mapping every individual in the domain P to their height)

The degree operator in (23) binds a functional trace, which consists of a domain and a range. The basic semantics of this degree operator (23a) is to generate a set of degrees. To achieve that, we need to set up the value of two variables: P sets up the values for the domain of the function, and f gives us the relation between the members in the domain and the members in the range. By absorption the quantifier *everybody else* adjoins to the degree operator and leaves a trace that binds the domain variable of the functional trace. The minimal witness set of this quantifier provides a value for P (23b),

namely, the domain of the function is the relevant people (23c) in the context. By adjoining the quantifier and the degree operator, we derive a complex operator whose domain is set, but we still need to find a relation to satisfy f (23d). The comparative clause supplies this function (23e). The comparative clause is interpreted as a function *f* that maps people to their height. Combining (23d) and (23e), at the top of the comparative clause (23f), we derive a set of degrees of height by matching each person in the context to their height.

The set of degrees derived from the comparative clause is operated upon by the maximality operator, as shown in (24):

(24) Max [ιD [Dom (f) = People & [∀d (d∈D→∃x(x∈Dom(f) & [d=tall(x)]))] &
[∀x(x∈Dom(f)→∃d(d∈D& [d=tall(x)]))]]]

The *Max* operator will pick out the tallest height from the set. This is a welcome result because we have achieved the correct semantics and avoided the QR of the quantifier at the same time.

A question that immediately arises is that in Chierchia's original analysis, the wh-operator does not have to leave a functional trace; it can leave an individual trace and correspondingly have an individual answer. This means that one possible alternative structure for (23) is (25), in which the degree operator only leaves an individual trace behind.

(25) John is taller than $[_{CP}\, Op_j$ [everybody else is d_j-*much tall*]]

With the pair-list reading unavailable in (25), and the QR process non-applicable, (25) gives rise to the incorrect narrow scope reading of *everybody else*, i.e. everybody else is the same height. Since this reading is not the natural reading of (1), we are forced to the conclusion that, different from other wh-constructions, in (23) the degree operator has to leave a functional trace. A closer look at the semantics of gradable adjectives supports this conclusion.

Gradable adjectives are generally argued to denote functions from individual to degrees along certain dimensions (Seuren 1973, Cresswell 1976, Kennedy 1997, among others). Take an adjective *R*, it provides a function that maps an individual to a degree on a scale that R specifies, as in (26). For example, if the adjective is *tall*, it provides a function from individuals to degrees on a scale of height, as in (27).

(26) R (x, d)

(27) tall (x, d)

So a degree cannot be an individual type entity, because its identity is always dependent on a certain individual and a certain scale. It is also well known that the comparative scale is a relative scale within certain comparison class (Klein 1982). For example, the scale of height for human might be different from the scale of the height for giraffes, so a *tall man* is probably still shorter than a *short giraffe*. In other words, there is no individual degree of gradable adjectives in the world, there are only degrees of individuals along certain dimensions. So, the trace left by a degree operator can not be an individual trace either. It has to be a functional trace and its interpretation is fixed by applying a measure function to the individuals in the domain of that function. This explains why the sentence

John is taller than everybody else is has an obligatory pair-list reading, hence obligatory wide scope reading of the quantifier on the surface.

2. 4. More evidence for the pair-list readings in comparative clauses

In the previous section, I demonstrated that applying the analysis of pair-list readings in Chierchia (1993), we can account for the wide scope interpretations of quantifiers in comparative clauses. In this section, I will show that this analysis not only derives the correct interpretation of quantifiers, it also gives a unified analysis of a range of different phenomena, including the subject-object asymmetry of quantifiers, the behavior of monotone decreasing quantifiers at subject position, and the negative island effect in comparative clauses. The latter two phenomena have been discussed in Rullmann (1995) and given a semantic account based on maximality, I will show that the present account is more adequate to cover the relevant facts.

2.4.1. Subject-Object Asymmetry

The idea that the unexpected wide scope interpretation of quantifiers in comparative clauses is induced from its wh-construction properties is not new. Moltmann (1992) already tried to draw a parallel between quantifiers in comparatives and quantifiers in wh-constructions. She noticed that, like wh-questions, quantifiers in comparatives demonstrate subject-object asymmetries. For example, if we compare (1), repeated in (28), where the quantifier is in the subject position of the *than*-clause, with (29) where the quantifiers occupy the object positions of the *than*-clause, different scope interpretations arise.

(28) John is taller than **everybody else** is.

(29) a. More students read a book than read **every** newspaper.

b. More students read only this book than read **many** articles.

c. Fewer students read this book than read **most** articles.

As discussed earlier, *everybody* in (28) is interpreted as having wide scope interpretation over the than-clause. (28) is interpreted as for every x, John is taller than x is. On the other hand, the quantifiers in (29) seems to be interpreted as having narrow scope with respect to the *than*-clause. Consider (29a). The wide scope and the narrow scope interpretations of *every newspaper* are true under the following scenarios respectively:

Scenario A: (wide scope interpretation)

The relevant newspapers are: New York Times, Wall Street Journal and Washington Post. For each of them, the number of students that have read a book exceeds the number of students that have read that newspaper.

Scenario B: (narrow scope interpretation)

The relevant newspapers are: New York Times, Wall Street Journal and Washington Post. The number of students that have read a book exceeds the number of students that have read every newspaper.

Native speakers' intuition seems to accept scenario B, but reject scenario A. For (29b) and (29c), although less straightforward, native speakers still only get the narrow scope interpretation of the quantifier.

This patterns the same as the subject-object asymmetry observed in wh-questions. A universal quantifier in subject position can induce a pair-list reading, but quantifiers in object position can not, as shown in (30).

(30) a. --Who does everybody like?

--John likes Edgar, Bill likes Kary...

b. --Who likes everybody?

-- *John likes Edgar, Bill likes Kary...

Similarly, as shown by Sharvit (1999), in relative clauses, only quantifiers in subject position can license indirect binding; quantifiers in object position can not, as shown in (31).

(31) a. The woman who everybody$_i$ loves invited him$_i$.

b. *The woman who loves everybody$_i$ invited him$_i$.

Chierchia (1993) explains the absence of the pair-list reading in (30b) as a Weak Crossover (WCO) effect. To have a pair-list reading the wh-operator in both (30a) and (30b) needs to leave a functional trace behind, as shown in (32a) and (32b). For (32a), in order to bind the domain part of the functional trace, the subject quantifier *everybody*

needs to undergo absorption to adjoin to the wh-operator to form a complex operator, as shown in (32b). (32b) can be interpreted as a function *f* that maps people to people they like, and the domain of *f* is fixed by *everybody*. Exactly the same process needs to be applied to (33a) in order to derive the pair-list reading. However, when *everybody* moves from the object position to adjoin to the wh-operator, it crosses over its bindee, i.e. the domain part of the functional trace. This is reminiscent of a typical WCO violation, as shown in (34). Since (33b) is an illegitimate representation, a pair-list reading is unavailable because the domain of the function can't be fixed by *everybody*.

(32) a. Who_i everybody_j like t_i^j

b. [[Who_i everybody_j] [t_j like t_i^j]]

(33) a. Who_i t_i^j likes everybody_j

b. [[Who_i everybody_j] [t_i^j like t_j]]

(34) * Who_j does his_j mother love t_j

The same reasoning can be applied to quantifiers in comparatives (29), examples repeated as (35).

(35) a. More students read a book than read **every** newspaper.

b. More students read only this book than read **many** articles.

c. Fewer students read this book than read **most** articles.

Consider (35a) again. If (35a) were to have a pair-list reading, it would mean that for each newspaper, the number of students who read that newspaper is less than the number of students who read a book. That is to say, we can find pairs of newspapers and the corresponding number of readers, and (35a) is true if for each pair we find, there are more students who read a book. To derive this reading, (35a) should roughly have a structure like (36), in which there is a functional trace left by the degree operator, and the domain of the function is fixed by *every newspaper*.

(36) More students read a book than $[_{CP}\ Op_i\ d_i^j$-many students read [every newspaper]$_j$]

For (36) to make sense, we face exactly the same problem as (33), i.e. when every newspaper obligatorily undergoes movement in order to bind the domain part of the functional trace, it inevitably commits a WCO violation.

Therefore, to avoid the WCO violation, the only legitimate representation of (35a) is for the degree operator to leave an individual trace, as shown in (37):

(37) More students read a book than $[_{CP}\ Op_i\ d_i$-many students read every newspaper]

The quantifier *every newspaper* in (35a) cannot get wide scope interpretation through the pair-list reading, therefore it is interpreted as having a narrow scope within the *than*-clause. It is worth pointing out that in my earlier discussion in section 3, I claimed that degrees of gradable adjectives are not of individual type, and that is why pair-list readings (hence wide scope interpretations) are the only available interpretations for

quantifiers in the *than*-clause. However, as shown in (37), the degree of cardinality can leave individual type trace, and therefore the quantifiers in the *than*-clause could have narrow scope interpretations. At this point, the contrast between adjective degrees and cardinality degrees is only motivated based on empirical data from comparatives. This contrast will become relevant again for the discussion of negative islands in section 2.3, and there I will demonstrate that the contrast between the two kinds of degrees with respect to their semantic types can be supported on independent grounds[1].

2.4.2. Monotone Decreasing Quantifiers in Subject Position

Further evidence for the present analysis comes from the fact that monotone decreasing quantifiers in the subject position make comparatives ungrammatical.

(38) a. *John weighs more than nobody weighs.

b. *John weighs more than few people weigh.

c. *John weighs more than less than five people weigh.

d. *John weighs more than at most five people weigh.

Rullmann (1995) explained (38) in terms of maximality. Recall that the maximality operator operates on the set of degrees generated from the comparative clause, and picks out the maximal one. Therefore for (38a) to be true, John needs to weigh more

[1] The proposed distinction between adjectival degrees and cardinal degrees suggests that the sentence below should be ambiguous, which the cardinality degree takes either the wide or the narrow scope. However, it is not obvious that the example below has the narrow scope reading that everybody else read the same number of books. Unfortunately, I have no further suggestion for this problem.

(1) John read more books than everybody else did.

than the maximal degree that nobody weighs. Obviously this does not make sense because we cannot construct a maximal degree out of a set of degrees that nobody weighs, since that set does not have an upper bound. The other examples in (38) are ruled out for the same reason, i.e. when a monotone decreasing quantifier is in the subject position, we can't construct a maximal degree out of the comparative clause.

This is an elegant solution, but it cannot be completely correct, because it cannot cover cases from phrasal comparatives. In contrast with clausal comparatives in (38), monotone decreasing quantifiers in phrasal comparatives are fine, or at least much more improved, as shown in (39).

(39) a. John weighs more than nobody.

b. John weighs more than few people.

c. John weighs more than less than five people.

d. John weighs more than at most five people.

If, as Rullmann argues, monotone decreasing quantifiers cannot satisfy the maximality requirement, it is a puzzle why such quantifiers are fine in (39). To the extent that (38) and (39) should have almost the same semantic interpretations, the contrast between them is very likely a result of their syntactic difference, i.e. the standard degree in (38) is instantiated by a wh-clause, but in (39) it is instantiated by a phrase.

Under the current analysis, it is easy to explain how negative quantifiers are ruled out by the wh-clauses they are in. It is known that wh-constructions in general pose certain constraints on negative quantifiers. For example, in (40) and (41), when the

subject is *nobody* or *at most two people*, we cannot answer the question with a pair-list answer.

(40) a. Who did nobody like?

*John didn't like his teacher, Bill didn't like his boss...

b.. Who did at most two people love?

*John loves his teacher, Bill loves his boss...

In Chierchia's (1993) analysis, a domain that is extracted from the subject quantifier is crucial to derive the pair-list reading, because a pair-list answer (i.e. a set of ordered pairs) can only be derived by applying a function to each member of the domain. For quantifiers like *nobody* and *at most two people*, the minimal witness set of them only contains an empty set. If there is no member in the domain, pair-list readings are unavailable. Now if as I suggested, the clausal comparatives in (38) involve pair-list readings, as shown in (41), Chierchia's solution will rule out the data in (38) correctly.

(41) *John weighs more than [Op_j $nobody_i$ weighs d_i^j]

As for phrasal comparatives (39), since there is no clause in the comparative site, functional traces and pair-list readings become irrelevant and hence pose no constraints on the quantifiers.

2.4.3.Negative Islands

2.4.3.1. The negative islands effect in comparatives

The last piece of evidence to support the pair-list reading in comparatives comes from the negative island effect in comparatives. Negative islands refer to negations contained within the comparative site, which usually yield ungrammaticality, as shown in (42):

(42) a. *John weighs more than Bill *doesn't* weigh.

b. *John weighs more than Bill *never* weighed.

Rullmann (1995) again appeals to maximality to explain (42). Since the set of degrees which Bill does not weigh has no upper bound, we cannot find a maximal degree of that set either, so (42a) has to be ruled out, and (42b) is ruled out for the same reason.

The proposal I sketched is consistent with (42) too. The negative island effect is reminiscent of the *weak island* effect known for wh-extractions. Weak islands refer to islands that block some, but not all wh-extractions. Negation in wh-questions is a typical weak island. As shown in (43), extracting a *who*-argument out of negation is fine, but not a *how*-adjunct.

(43) a. Who didn't you invite?

b. *How didn't you behave?

Szabolcsi and Zwarts (1993, 1997) argues that wh-phrases that range over individuals, e.g. *who*, are immune to weak islands, but wh-phrases that range over partially ordered domains, e.g. properties, amounts and manners, are sensitive to weak islands. In other words, this implies an extraction of non-individual types is subject to the weak island

effect, whereas an extraction of an individual type is not (also see Hornstein 1995, Munn 2000). This predicts that a wh-question that contains a weak island cannot have pair-list answers, since pair-list answers crucially hinge upon the existence of functional traces, whereas a legitimate extraction out of a weak island has to leave an individual type trace behind. This prediction turns out to be true, as shown in (44):

(44) Who didn't everybody like?

a. Mary

b. *John didn't like his boss, Bill didn't like his student...

The lack of the pair-list answer in (44) provides an explanation for (42). As I proposed earlier, the examples in (42) have the structures given in (45):

(45) a. John weighs more than [Op_i $Bill_j$ doesn't weigh d_i^j]

b. John weighs more than [Op_i $Bill_j$ never weighed d_i^j]

The trace bound by the degree operator is not an individual type trace, instead, it is a functional trace. Also following the traditional assumption that degrees are points on a scale, and a scale is a partially ordered domain, so (42) can be fully explained as a weak island effect.

Now both Rullmann's proposal based on maximality and the current analysis based on pair-list readings can account for the negative island effects in comparatives. Is

there a way to distinguish the two? In the next section, I will turn to a possible distinction between the two.

2.4.3.2. A diagnosis from cardinality degrees

So far both the present account and the maximality account derive the same result for the negative island data. Building on the analysis in Szabolcsi and Zwarts (1997), for the present proposal, what is at stake is the semantic type of the variable left within the negative island. The examples in (42) are ungrammatical because the variables within the negative island are not *e* type variables, which are expected from the property of gradable adjectives. On the other hand, what is important for the maximality account is whether we can pragmatically construct a maximal degree from the context. The following examples offer some empirical support for the former proposal.

Lechner (2002) noticed some systematic exceptions to negative island effect in comparatives. For example, (46) is fine.

(46) Mary read more books than she didn't read.

Although it seems like the match between the subject of the comparative clause and the matrix subject is relevant for the grammaticality of (46), the following examples provided by Lechner shows that is not correct.

(47) a. *Mary is taller than she isn't.

b. *Mary read a longer book than she didn't read.

c. *Mary read more poetry than didn't read.

The descriptive generalization Lechner reached is that the negative island effect is alleviated only if the comparison relation operates on degrees that keep track of cardinality (as in d-many books), but not if these degrees cannot be mapped to the individual count domain (d-tall in (47a) and d-long in (47b) or mass amounts d-much poetry in (47c)).

Lechner's observation immediately poses a problem for Rullmann's proposal, in which the maximality operator is not sensitive to the type of degrees generated from the comparative clause. I will come back to the challenge that the maximality account has to face. Now let's consider first why the cardinality degree in (46) could survive the negative island.

It has been observed that *how-many* questions can be ambiguous sometimes (e.g. Heycock 1995):

(48) How many people did Mary decide to hire this year?

a. What is the cardinality n such that Mary decided to hire n-many people?

b. What is the cardinality n such that there is a set of n-many people that Mary decided to hire?

The (a) interpretation refers to the situation where Mary has a number n in mind, maybe as the plan of the year, and she needs to hire n-many people. She could have decided the number n even before interviewing anybody. The (b) interpretation refers to the situation

where after the interview, Mary decided on a set of qualified applicants, and the speaker asked about the cardinality of that set.

However, when embedded within a weak island, only (b) interpretation survives. (see Heycock 1995, Cresti 1995, Munn 2000, among others).

(49) How many people did Mary wonder whether to hire this year?

a. *What is the cardinality n such that Mary wondered whether to hire n-many people?

b. What is the cardinality n such that there is a set of n-many people that Mary wondered whether to hire?

(48) has both interpretations, whereas the weak island in (49) blocks the first interpretation.

Different from *how-many* questions, which sometimes survive weak-islands as shown in (48b), *how-much* questions and degree questions in general do not survive weak-islands.

(50) *How much wine do you wonder whether I drank?

(51) *How difficult did you wonder whether she was?

Following Frampton (1990), Dobrovie-Sorin (1992), Szabolcsi & Zwarts (1993, 1997) and Cresti (1995), I will assume that an extraction survives weak-islands only if the trace variable ranges over individuals. Under these proposals, the *how-many*

questions could leave either higher type traces or individual type traces, causing the ambiguity in (48). Only the interpretation with the individual type trace, i.e. (49b), survives in the environment of weak islands. On the other hand, how-much questions and degree questions do not leave individual type traces, and consequently do not survive the weak islands.

From the above discussion, cardinality degrees are different from degrees of mass amount and gradable adjectives with respect to their ability to escape weak islands. Since this seems to be true in general cases, it is not surprising that we can extend the same reasoning to comparatives. Lechner's puzzle is therefore explained in a way that is consistent with the present analysis of quantifiers in comparatives.

How would the maximality account deal with Lechner's puzzle? It is true that for the grammatical case (46), native speakers share the intuition that the sentence presupposes a set of salient books in the context. This means that when we partition the set of books into two groups, one is the set of books that Mary has read, and the other is the set of books that she has not, there is an upper bound on the number of books she has not read. In this sense, the maximality account can successfully rule in (46). The problem with this account is that it predicts whenever there is a presupposed set in the context, which makes it possible to construct a maximal degree from the comparative clause, we can avoid the negative island effect in comparatives. This is not entirely consistent with our data. Consider (47) again, data repeated in (52).

(52) a. *Mary is taller than she isn't.

b. *Mary read a longer book than she didn't read.

c. *Mary read more poetry than she didn't read.

It is difficult to construct a scenario for (52a) where a set of heights is presupposed. But it is not difficult to presuppose the relevant sets for (52b) and (52c). Consider the following scenario. Every week Mary's professor assigns a list of five books for the class to read. Each student can pick any one out of the five books to read and do a book review. Last week Mary read book A. This week the assignment is the list of books {B, C, D, E, F}, and Mary read book B. It happens to be the case that book A is longer than C, D, E or F. Under this scenario, since the books that Mary didn't read this week are {C, D, E, F}, it is possible to construct a maximal degree of length from this set, namely, the longest book in the set. Therefore the maximality constraint is satisfied. There is also nothing unnatural in the pragmatics that can rule out our hypothesized scenario. However, it is still impossible to utter (53), which is slightly modified from (52b) to suit our scenario:

(53) *Mary read a longer book last week than she didn't read this week.

We can create a similar scenario for (52c) as well. Suppose Mary's interest is 20th century American poetry, since we approximately know how much 20th century American poetry work there is, it is possible to construct an upper bound for the amount of poetry that Mary did not read. It is clear that even under this reasonable scenario, (52c) is still not an acceptable utterance. These examples suggest that although maximality could be relevant for quantifiers to avoid negative island effect in comparatives, it is not sufficient to explain all the data.

Parallel to the maximality account for comparatives, those wh-NPs that are easily extractable from weak islands, such as *which person, who, what*, can be argued to be D-linking (discourse linked) DPs. However, as pointed out in Szabolcsi and Zwarts (1993, 1997), D-linking is relevant only insofar as it facilitates individuation by providing contextually salient items, but ranging over individuals, rather than ranging over contextually salient items, is the critical factor in extraction. Quoting Romanian data from Dobrovie-Sorin (1992), they illustrate that *how-many* questions can escape weak islands even if they range over non-D-linked individuals, which are not morphologically marked by clitic doubling. They also give another piece of evidence with *wh-the-hell* phrases. Given an appropriate context where individualization is available, the clearly non-D-linked *wh-the-hell* phrases can escape weak islands too. For example, (54) can be uttered in a context where someone was seen "madly searching through the dictionary" (p.262):

(54) What the hell do you still not know how to spell?

For (54) to be felicitous, there does not have to be a discourse linked set of entities in the context. What is important is the understanding that the person is searching for a particular item among a set of individual entities.

In conclusion, we have seen that the maximality account is not an adequate account to explain the negative islands effect in comparatives, whereas the present analysis based on pair-list readings can capture all the patterns.

2.4.3.3.Summary

To summarize, by treating the wide scope interpretation of quantifiers in comparatives as a special case of the general properties of quantifiers in wh-constructions, we can explain the wide scope interpretations easily. Since for gradable adjectives, the degree variables are obligatorily functional, which means the pair-list reading is obligatory, we also account for the obligatory wide scope interpretation for free. In addition, this analysis connects together a few seemingly different phenomena, including the subject-object asymmetry problem, the negative quantifier and the weak island problems. In the next section, I will show that the contrast between the clausal and phrasal comparatives with respect to quantifiers also naturally follows from the present proposal.

2.5. A few words about phrasal comparatives

I have shown that by analyzing the wide scope reading of *everybody* in clausal comparatives as pair-list readings, we can naturally account for a few previously separated problems, among which is the constraint on monotone decreasing quantifiers. Now let us turn to the other half of the problem we laid out in the beginning of the chapter—phrasal comparatives.

Recall that *everybody* in phrasal comparatives gets wide scope interpretation, just as in clausal comparatives; however, phrasal comparatives license monotone decreasing quantifiers that are disallowed in clausal comparatives. The relevant data are repeated below.

(55) a. John is taller than everybody.

b. John is taller than nobody/few people/at most five people.

Since under the current analysis pair-list readings depend on wh-constructions, and phrasal comparatives do not involve wh-constructions, it is obvious that the wide scope interpretation of *everybody* in phrasal comparatives has to be derived in a different way, i.e. it is not derived from pair-list readings. If that is the case, it is not surprising that monotone decreasing quantifiers are licensed in (55), because in this analysis, pair-list readings and the constraint on monotone decreasing quantifiers are two effects of the same mechanism.

The straightforward solution for (55) is QR. Wh-exaction from a phrasal comparative construction is fine, as shown in (56). This suggests that QR movement of the quantifier in principle should be allowed to derive the wide scope interpretation, as shown in (57)[2].

(56) Who is John taller than?

(57) [everybody else$_i$ [John is taller than t_i]]

2.6. Conclusion

In this chapter, I argue that the unexpected wide scope interpretations of quantifiers in comparative clauses are actually pair-list readings. This supports the idea in Moltmann (1992) that quantifiers in comparative clauses behave the way they do because

comparative clauses are wh-constructions. I also show that my solution has advantages over the interval degree approach in Schwarzschild & Wilkinson (2002) because the current approach can tie a few different phenomena together including some contrast between phrasal and clausal comparatives. It is worth noting, however, although the current chapter argues for an alternative approach to the interval degree semantics, it is only to address the problem of quantifiers in comparatives. Some recent research in other domains has shown that an analysis of degrees as intervals could be motivated on independent grounds (for example, Kennedy 1999, 2001). If the current analysis is on the right track, we have more evidence to believe that the structural distinction between phrasal and clausal comparatives should be maintained.

[2] One potential problem for the QR approach is that one has to force the obligatory QR in (57), since similar to clausal comparatives in (1), the quantifier in (57) takes obligatory wide scope interpretation over the than-phrase.

Chapter 3

NPI in Comparatives

3.0. Introduction

As discussed in the Introduction, intuitively a comparative construction consists of four elements: a reference degree, a standard degree, a comparative relation provided by the comparative morpheme, and a scale of comparison provided by the gradable adjective. In this chapter I will focus on the function of the scale that is introduced by gradable adjectives. All comparatives need at least one gradable adjective. This makes the use of a scale easily available to comparatives, since gradable adjectives introduce scales for free. However, the semantic consequence of an inherently built scale has not been fully explored in the literature. In this chapter I will make use of the scalar property of comparatives to explain the licensing condition of negative polarity items (NPIs) in comparatives. In a nutshell, I will argue that NPIs are licensed in comparatives through scalar implicature.

NPIs are lexical items whose distributions are constrained by certain licensing conditions. *Any* is the typical example of an NPI in English. Since negation is the classical environment that licenses these lexical items, they are usually called negative polarity items. For example, as shown in (1a) and (1b), affirmative statements don't license *any*, but negative statements do. Negation is not the only environment that licenses NPIs. For instance, questions and conditionals, among many others environments, also license NPIs, as shown in (1c) and (1d) (see Haspelmath 1997 for a cross-linguistic survey).

(1) a. *He saw anybody.

b. He didn't see anybody

c. Did you see anybody?

d. If you saw anybody, let me know.

On the surface NPIs are ambiguous between existential indefinite and universal interpretations. For instance, in the above examples, *anybody* is interpreted existentially. In (2), it is interpreted as universal quantifier, and in (3), it is ambiguous between the two.

(2) a. *Anybody* knows that.

b. *Anything* will work.

c. *Anybody* can solve that problem.

(3) Would you do *anything* to help me?

Comparatives constitute another environment that license NPIs, as shown in (4a). Moreover, the NPIs in comparatives are unambiguously interpreted as universal. For instance, (4a) is best characterized as (4b), not (4c).

(4) a. John is taller than anybody else.

b. John is taller everybody else.

c. John is taller than somebody.

In this chapter, we will look at how NPIs are licensed in comparatives. The fact that NPIs are licensed in comparatives is a problem because as we will see next, comparatives don't have the general properties that are commonly assumed to be necessary to license NPIs. Therefore to explore how NPIs are licensed in comparatives certainly will add to our understanding of NPIs in general. Besides the licensing issue, our story also needs to explain how and why the existential indefinites are interpreted as universals in comparatives.

One clarification before we proceed. It's known that items like *anybody* can be interpreted existentially, as in (1), or universally in some contexts, as shown in (2). Under the universal interpretations, these items are often called free choice items (FCI). Free choice items on the surface look like universal quantifiers, hence it seems reasonable for them to be treated as fundamentally different from NPI indefinites. So could it be the case that *anybody* in (5) is actually a FCI, not a NPI, and we therefore are asking a wrong research question here? Following Giannakidou (2001) and Lee & Horn (1994), I will assume that the categorical distinction between so called NPIs and FCIs in terms of their quantificational force (NPIs are existential and FCIs are universal) is not the correct distinction in the first place. Rather, both share the same source as existential indefinites. The surface distributional and interpretational difference arises from different kinds of operators in the context that bind the indefinites. Moreover, quoting data from Rullmann (1995), Zepter (2003) argues that since comparatives also license other NPIs that are not

confounded as possible FCIs, as shown in (5), we still have the same problem that why comparatives should license any NPI at all.

(5) a. He told me more jokes than I **cared to** write down.

b. He said the sky would sooner fall than he would **budge an inch**.

Therefore, through out my discussion, I will treat *anybody* in (4) as a real NPI. The problem we face then is to explain how they are licensed in comparatives and why they have universal interpretations.

The organization of this chapter is as follows. In section 1 I will lay out what problems comparatives pose for previous analyses of NPI licensing, and introduce some basics about Chinese NPIs. Since the analysis I will give is closely related to *dou*, a Chinese functional morpheme, I will give an analysis of *dou* in section 2. On completely independent grounds, *dou* is shown to be an operator that picks out the maximal point on a context dependent scale. Section 3 is our analysis of NPI licensing in comparatives, both in Chinese and in English. I will argue that at least for comparatives, NPIs are licensed through scalar implicature. Chinese *dou* explicitly spells out this licensing condition for NPIs. Section 4 is the conclusion.

3.1. The problems with NPI

3.1.1. Comparatives as non-DE environments

In Ladusaw (1979) (see also Hoeksema (1983), Van der Wouden (1994), among others,) NPIs are characterized as being licensed in downward entailing (DE) environments.

(6) Downward entailing function:

A function *f* is downward entailing iff for every arbitrary element X and Y, it holds that $X \subseteq Y \rightarrow f(Y) \subseteq f(X)$

According to this definition, the downward entailment function reverses entailment relations. Consider negation as an example. In an affirmative statement (7), since *car* is a superset of *red car*, the entailment in (7a) is valid, but not vice versa. When we add negation to it, the entailment is reversed, as in (8).

(7) a. John bought a red car. $\rightarrow$ John bought a car.

b. John bought a car. $\not\rightarrow$ John bought a red car.

(8) a. John didn't buy a red car. $\not\downarrow$ John didn't buy a car.

b. John didn't buy a car. $\rightarrow$ John didn't buy a red car.

Rullmann (1995) and Hoeksema (1983) have argued that comparatives are indeed DE environments, and that is why they license NPIs. However, as Schwarzschild & Wilkinson (2002) point out, comparatives are not qualified as DE environments according to the definition in (6). If comparative clauses were downward entailing, we should see a general pattern of reversing entailment relations, since that is the basic characterization of downward entailing environment. That means that given the

entailment relation in (9), the reversed entailments in (10) should be true, contrary to fact. On the other hand, in a real downward entailing environment like negation, the reversed entailments are fine, as shown in (11).

(9) a. Exactly 7 of my relatives are rich. → At least 4 of my relatives are rich.

b. (Given that there are elephants in this room) Almost every elephant in this room is heavy. → Some elephant in this room is heavy.

b. Most of the high tech stocks were overvalued. → At least 2% of the high tech stocks were overvalued.

(10) a. John is richer than at least 4 of my relatives were. ↛ John is richer than exactly 7 of my relatives were.

b. My car is heavier than some elephant in this room is. ↛ my car is heavier than almost every elephant in this room is.

c. Nissan is currently more overvalued than at least 2% of the high tech stocks were. ↛ Nissan is currently more overvalued than most of the high tech stocks were.

(11) a. It isn't true that at least 4 of your relatives are rich. → it isn't true that exactly 7 of your relatives are rich.

b. It is impossible that some elephant in this room is drunk. → It is impossible that almost every elephant in this room is drunk.

c. He never admitted that at least 2% of the tech stocks were overvalued. → He never admitted that most of the tech stocks were overvalued.

Cross-linguistic data also suggests that the DE fails to capture the correct licensing condition for NPIs in comparatives. Since the property of being a DE environment is a semantic property, if comparatives are qualified as DE environments, we expect them to be DE environments as well in languages other than English. This prediction isn't borne out. For example, Chinese comparatives don't license NPIs, as shown in (12):

(12) a. *Ta gao shei yidian
he tall who a little
He is taller than anybody.

b. *Ta bi shei gao yidian
he bi who tall a little
He is taller than anybody.

3.1.2. Comparatives are not non-veridical

Based on Greek data, Giannakidou (1998, 1999, 2001) proposed (non)veridicality sensitivity as the licensing environment for polarity items (also see Zwart 1995, and Lin 1996 for a similar idea based on Chinese data). As a subset of polarity items, the

distribution of NPIs are argued to be sensitive to (non)veridicality too. The approximate definition of (non)veridicality is given as below (Giannakidou 1999 p384):

(13) The definition of (non)veridicality:

Let Op be a monadic propositional operator. The following statements hold:

(i) Op is veridical just in case Op p → p is logically valid. Otherwise, Op is nonveridical.

(ii) A nonveridical operator is antiveridical just in case Op p → ¬p is logically valid.

According to this definition, normal affirmative statements are obviously veridical. If *John went to school* is true, then we know *John went to school.* Therefore, assuming there is an implicit veridical operator, the following logical representation is valid. This is also why affirmative statements never license NPIs cross-linguistically.

(14) Op p → p

John went to school. → John went to school.

On the other hand, negation is the typical antiveridical environment, as shown below:

(15) not P → ¬P

John didn't go to school. → ¬ John went to school.

Negative environments in general license NPIs, as shown in (16):

(16) John didn't see anybody.

English NPI *any* can also be licensed in a looser environment, the non-veridical environment. For instance, conditionals.

(17) if P $\not\rightarrow$ P

if John went to school .... → John went to school.

By saying *if John went to school*, one can't guarantee the statement *John went to school* is true or false, hence conditionals are non-veridical, which license English *any* in conditionals:

(18) If John goes to any place, he will call me before he leaves.

English *any* can be licensed in other non-veridical environments too, such as restrictions of universal quantifiers, imperatives, polar questions, etc. Therefore we can say that the licensing condition for English *any* is non-veridicality.

Just like the DE story, although (non)- veridicality can capture a good amount of the NPI data, it doesn't seem to work for comparatives. As shown earlier, English comparatives license NPIs, but it is not obvious that comparatives are non-veridical.

Assuming an implicit veridical operator, the following logical statement is true for comparatives, and it actually suggests comparatives are veridical.

(19) Op p → p

Op John is taller than Bill/anybody. → John is taller than Bill/anybody.

To summarize, since Chinese comparatives don't license NPIs, we have reason to believe that there is something else more than the semantic property of comparatives that works here. Before I pursue this line further, let me first introduce some basics on Chinese NPIs.

3.1.3. Existential Polarity Wh-phrases (EPW) in Chinese Comparatives

The closest Chinese counterparts to English *any* are existential polarity wh-phrases (EPWs, borrowing the term from Lin (1996)). As the name suggests, these polarity items are wh-words in Chinese. Their distribution overlaps with the English NPI *any* in some environments, but also overlaps with the English PPI *some* in some other environments. So strictly speaking, they are polarity items, instead of negative polarity items. Also as shown by the name EPW, when used as polarity items, these wh-words are interpreted as existential indefinites. As far as I know, Lin (1996) gvies the best survey of EPWs up to now. In this section I will just briefly report his discussion.

EPWs are polarity items because they are sensitive to the environment in which they can occur. They can't occur in simple affirmative sentences, as shown below:

(20) a. *shei/shenme ren xihuan Mali.

who/what person like Mary

Somebody/anybody likes Mary.

b. *wo xihuan shei/shenme ren.

I like who/what person

I like somebody/anybody.

EPWs are licensed in typical environments that license the NPI *any* (e.g., negations, conditionals, yes-no questions)

Negation

(21) Wo mei zuo shenme.

I not do what

I didn't do anything.

Similar to English *any*, the EPW isn't licensed if it is out of the scope of negation.

(22) *Shei mei qu xuexiao.

Who not go school

Somebody/anybody didn't go to school.

If-conditionals

(23) Ruguo ni you shenme wenti, wo hui bang ni.

If you have what problem I will help you

If you have any problems, I will help you.

Yes-no questions

(24) Shei qifu ni le ma?

Who bully you perf. Q

Did anybody bully you?

(25) Ni xie-guo shenme ma?

You write-perf. what Q

Have you written anything?

On the other hand, EPWs can also be licensed in environments that don't allow *any*, but allow *some*.

Imperatives

(26) a. Nimen shei qu bang ta yixia.

You who go help him once

Somebody/*anybody lend a hand to him.

b. Ni fangjia de shihou qu na-er wanwan ba.

You vacation de time go where play PAR.

Go somewhere/*anywhere (to relax) when you have vacation time.

Uncertainty modality (possible, perhaps, must have)

(27) a. Keneng shi nage lingdao lai-le.

Possibly is which official come-perf.

Possibly some/*any official came. (otherwise the traffic wouldn't be that bad)

b. Yexu ni yinggao qu xue xian shenme shouyi.

Perhaps you should go learn little what skill

Perhaps you should go to learn something/*anything.

c. Ta yiding shi zai shenme difang chu-le cuo.

He must is at what place appear-perf. mistake

He must have made a mistake somewhere/*anywhere.

Other conditionals (unless, as long as)

(28) a. Chufei shei lai jiu ni, buran ni si ding le.

Unless who come save you, otherwise you die sure perf.

Unless somebody/*anybody comes to save you, otherwise you are finished.

b. Zhiyao shei ling-ge-tou, women jiu dou qu.

As-long-as who lead we then all go

As long as somebody/*anybody goes first, then we will all go.

I have only given a much simplified picture of the facts discussed in Lin (1996). But the facts above are enough to show that EPWs are indefinite polarity items in Mandarin Chinese. Although their distributions don't overlap with English NPIs completely, the mismatch doesn't concern us too much with respect to comparatives. For simplicity of the discussion, in the rest of this chapter, I will loosely call Chinese EPWs NPIs.

3.1.4. The interaction between *dou* and NPIs in Chinese comparatives

As shown earlier, neither bare-comparatives nor *bi*-comparatives license EPWs, data repeated below:

(29) a. *Ta gao shei yidian

he tall who a little

He is taller than anybody.

b. *Ta bi shei gao yidian

he bi who tall a little

He is taller than anybody.

Both examples above could have an interpretation as the wh-question *who is he taller than?*, but neither is grammatical under the polarity item interpretation. This suggests that comparatives are not intrinsically DE environments.

Without changing the truth conditions, we can license the NPIs in comparatives by adding a functional morpheme *dou*. However, as shown in (30), this only rescues NPIs in bi-comparatives, but not in bare-comparatives.

(30) a. Zhangsan bi shei dou gao yidian.

Zhangsan than who all tall a little

Zhangsan is a little taller than anybody.

b. *Zhangsan dou gao shei yidian

Zhangsan dou tall who a little

Zhangsan is a little taller than anybody.

(30a) is equivalent to its English counterpart, as shown by the English translation. The existential indefinite wh-phrase *who* is interpreted as if it was a universal quantifier. The bare comparative (30b), on the other hand, is unacceptable[1].

NPIs in Chinese comparatives are interesting for two reasons. First, they clearly show that comparatives themselves don't share the DE property with other NPI licensing environments, such as negation and conditionals. An immediate question is how NPIs are licensed in English comparatives then. Chinese comparatives could shed some light on this issue because there is an explicit morpheme we can work on, the morpheme *dou*. Here is our working strategy. I will assume that whatever mechanism *dou* employs to license NPIs in Chinese comparatives is the same mechanism that works in English comparatives. The only difference is that in Chinese the licensing condition is spelled out through *dou*, but in English, it is implicit.

3.1.5. Summary and outline

To summarize, the problem we need to solve in this chapter is this: how to license NPIs in comparatives such that the existential indefinite gets a universal interpretation. The approach I am going to take is to start from the Chinese data, and then extend the analysis to English. Since an understanding of *dou* is crucial to solve the problem, I have to make a digression and spend quite some time in the next section to give a detailed analysis of *dou*. After that, I will apply the analysis of *dou* to NPI licensing in comparatives.

3.2. An analysis of Chinese Dou

[1] (30b) is acceptable if it is interpreted as a wh-question.

3.2.1. An introduction

Dou is a very productive functional morpheme in Chinese. In general it has three usages: as a distributor, as *even*, and as *already*. The distributor interpretation has been widely discussed, whereas the already use seems to not attract much attention. In this section I will introduce the basic data of each usage.

3.2.1.1. Dou — the distributor

As shown in (31), *dou* obligatorily distributes the predicate over the subject argument. This is in contrast with (32), which is ambiguous between a distributive and a non-distributive (collective) reading.

(31) Tamen dou chi-le yi- ge- pingguo pai

They Dis. eat-perf. one-CL-apple pie

They each ate an apple pie.

(32) Tamen chi-le yi- ge- pingguo pai

They eat-perf. one-CL-apple pie

a. They each ate an apple pie.

b. They ate an apple pie (together)

Since *dou* is used as a distributor, the argument it distributes over has to be distributable. This explains the ungrammaticality of (33).

(33) *Ta dou chi-le yi- ge- pingguo pai

he Dou eat-perf. one-CL-apple pie

he each ate an apple pie.

Following Lin (1998), I will temporarily give *dou* the following semantic representation, which is similar to the English *all*.

(34) dou $\Rightarrow \lambda P \lambda X \forall y[y \in X \rightarrow P(y)]$ where X is a variable over plural individuals and y is a variable over singular atomic individuals.

According to (34), *dou* distributes the property P to each member of the plurality object X. For example, in (31), *dou* operates on the property of eating an apple pie. This property is distributed over each member of the relevant group, and we get an interpretation and each of them ate an apple pie.

Although *dou* is similar to English *all* in meaning, it doesn't behave exactly like *all*. One significant difference between them is that *dou* can distribute over anything that is distributable, including DPs that are explicitly marked by universal quantifications; but as a universal quantifier, *all* can't operate on DPs that are already universal. This contrast is shown by the following examples.

(35) a. **Suoyoude** ren **dou** lai-le.

all people dou come-perf.

All the people came.

b. ***All** the people **all** came.

(36) a. Tamen **quan** **dou** lai-le.

They all/completely dou come-perf.

They all came.

b. * They all all came.

Dou also doesn't behave exactly like the English distributor *each*. As shown in (37) and (38), *each* can't distribute collective predicates, presumably because *each* distributes down to the atomic individual members of the plural DP, but the collective predicate on the other hand can't be true for a single individual. *Dou*, however, is compatible with collective predicates.

(37) a. Tamen **dou** shi pengyou.

they dou be friend

They are friends.

b. *they **each** are friends.

(38) a. Tamen **dou** jian-guo-mian

they dou meet-perf.-face

They all met before.

b. *They **each** met before.

Two more properties of *dou* we need to keep in mind is that first, *dou* has to stay to the left of the predicate, as shown in (39):

(39) a. Tamen dou lai-le.

They dou Come-perf.

They all came.

b. *Tamen lai-le dou.

They come-perf. dou

They all came.

Second, *dou* can only distribute an argument to its left. Therefore if it is the object that is being distributed over, the object has to be scrambled. This is usually called the Leftness Condition.

(40) a. *Ta dou yao-le mei-ge-pingguo yi-kou

he Dou bite-perf. every-CL-apple one-bite

He took a bite on each apple.

b. Ta mei-ge-pingguo dou yao-le yi-kou

he every-CL-apple dou bite-perf. one-bite

He took a bite on each apple.

c. Mei-ge-pingguo, ta dou yao-le yi-kou

every-CL-apple, he dou bite-perf. one-bite

He took a bite on each apple.

3.2.1.2. Dou — even

The *even* use of *dou* is most clearly shown in the *(lian)...dou* construction. The morpheme *lian* is optional, but it has been suggested that *lian*, or *lian...dou* together, marks focus (Shyu 2004, Paris 1998).

(41) a. (Lian) shagua dou zhidao zhege.
(Focus) idiot dou know this
Even idiots know this.

b. (Lian) Zhangsan dou qu-le.
(Focus) Zhangsan dou go-perf.
Even Zhangsan went.

c. Ta (lian) zhoumo dou zai gongzuo.
he (focus) weekend focus prog. Work
He even works on weekends.

As shown by their English translations, these examples all contain a certain scalar implicature induced by the focus *even*. (41a) implies that the issue under discussion is an easy one. Informally this implicature is derived in the following way. There is a contextually determined scale that orders different people along certain dimensions. There are probably different dimensions we can choose to elaborate upon, and I will choose a scale that orders our expectations of different people to solve the problem. If John is the smartest person in the group, it is expected that he knows how to solve the problem. If Bill is less smart, it is less expected that he would know how to solve the

problem. In this way, we can order people from least expected to the most expected. By common sense, idiots would be the least expected to solve the problem and they stay at the bottom of the scale. Notice that we can also say idiots are ordered on the top of the scale if the ordering is from the least unexpected to the most unexpected. The choice of the exact scale might be arbitrary, but in either way, *idiots* is on the end of the scale. The other two examples have the same end of the scale implicature. (41b) implies that it is very unexpected that Zhangsan went, and (41c) implies that it is very unexpected that somebody would work on weekends.

3.2.1.3. Dou — already

This use of *dou* as *already* is the least discussed in the literature, although it is very productive. The following are some examples.

(42) Dou ji dian ne? (ni zenme hai mei shui.)
dou what time Q you how still not sleep
What time is it already? (How come you haven't gone to bed yet!)

(43) (Yizhuanyan,) haizi dou da le.
in a blink, children dou grown perf.
(time flies!) In a blink of time, the children have already grown up.

(44) Liuyue dou guo wan le. (Zenme hai zheme leng.)
June dou pass finish perf. How still this cold
It is the end of June already. (How come it is still this cold!)

Although it seems to be translated as *already*, *dou* in this usage shouldn't just mean *already* for two reasons. First, in all the examples above, one can add an explicit *already* to it. One example is given in (45). If *dou* already means *already*, it is not clear why an extra *already* is allowed.

(45) Dou **yijing** ji dian ne? ni zengme hai mei shui.
dou **already** what time Q you how still not sleep
What time is it already? How come you haven't been to bed yet!

Second, all the examples above need to occur in particular contexts, which don't constrain *already* as much. For example, based on the translation *what time is it already*, the speaker of (42) seems to ask a simple question, and expect an answer of a certain time. But this is not what (42) means. It is true that the hearer could answer *2 o'clock in the morning*, however, asking a question is not the point for the speaker. It might well be the case that the speaker knows exactly what time it is, or he doesn't care about the exact answer. The message that the speaker tries to convey is simply that *it is very late now, you should have gone to bed. It is very unexpected at this time to see you awake.* Because of this implication of unexpectedness, the first part of (42), namely, the question part, has to be uttered in a context that the speaker has a certain expectation of the timeline of some event, and in (42), it is the timeline of going to bed. Without the context, an utterance out of the blue like this would be very awkward. For (43), if we just say that *the children have already grown up*, it could be a simple statement of the fact. By adding *dou* to the sentence, the speaker expresses certain emotion about time and life. Here is a

scenario that (43) would be uttered. Thirty years ago, a group of young people in their early twenties graduated from university, and they had a reunion thirty years later. It is amazing and emotional to everybody how thirty years have gone by without notice. What are the things that can reflect the fast time change? You could have changed a couple of jobs, or married a couple of times, or traveled all over the world. If there is a scale that can order all your different experiences together, for most people a grown up next generation is probably the best witness for the time change. Our last example (44) also expresses the "end of the scale" kind of implication. Normally we expect after March, the weather starts getting warm, and at the end of May, it starts getting hot. So on a scale of expectation of cold weather, the end of June is relatively at the end. Since the relevant scale is context dependent, one can utter (44) in other environments too. For example, if John is writing his dissertation, and the plan for June is to finish one chapter, but at the end of June, he hasn't written a word yet, then he could say (46):

(46) Liuyue dou guo-wan le. (wo hai mei kaishi xie)
June dou pass-finish perf. I still not start write
It is the end of June now. (But I haven't start writing)

From this discussion, it is clear that *dou* in its third use is closer to *even* than to *already*, because sentences with *dou* are not just simple statements, they convey end of scale implications. Note that under some analyses, *already* also expresses certain scalar implicatures (Michaelis 1996, van der Auwera 1993), and this might be why sometime

dou can be translated as *already*. A detailed discussion of the semantics of *already* is beyond the scope of this thesis, and I will leave it for some other occasion.

3.2.2. The analysis

After surveying the three main uses of *dou* in the last section, in this section I will lay out a unified semantics of *dou* that covers all three uses.

(47) The following are the main ingredients of the analysis:

- Dou operates on events
- Dou
  - (i) Presupposes: a set of alternative events which are ordered on a contextually determined scale
  - (ii) Asserts: the event on the top of the scale is true

By positing that *dou* operates on events, we naturally explain the syntactic constraint on the position of *dou*, i.e. *dou* has to stay to the immediate left of the predicate. In the literature, *dou* has been analyzed as the VP level adverb (Cheng 1995), or a functional head that takes VP as its complement (Wu 1999). Since the difference between the two is not crucial for our discussion here, I will adopt the analysis in Cheng (1995) without further justification.

The scalar part of the analysis makes *dou* similar in meaning to English *even*. It is worth reviewing the basic assumptions with regards to the meaning of *even*. The main contribution of the focus marker *even* is to introduce a presupposition. It presupposes that

there is a set of alternatives, which are introduced by the focused element (Rooth 1985, 1992), that are compared with the *even*-associated argument along a likelihood scale, and the *even*-associated argument is the least likely on the scale. Let's illustrate this idea with a concrete example.

(48) a. Even $[John]_f$ was invited.

Presuppose: among all the guests (Mary, Bill, Chris...), John was the least likely to be invited.

Assert: John was invited.

b. John even invited $[Bill]_f$.

Presuppose: among all the guests (Mary, Bill, Chris...) that John invited, it is the least likely that he would invite Bill.

Assert: John invited Bill.

c. John even $[brought\ a\ present]_f$ to Bill.

Presuppose: among all the things John can do for Bill, bringing a present for Bill is the least likely to happen.

Assert: John brought a present to Bill.

The focused element in (48) is marked by a subscripted f. In (48a), the theme argument *John* is focused. An alternative argument is the argument we can use to substitute *John* and still make the sentence true. Suppose Mary, Bill and Chris are the alternatives provided by the context. The focus marker *even* presupposes a likelihood scale that orders John and other alternatives, as shown in (49), and John is at the bottom of the scale,

namely, John is the least likely to be invited. In (48b) it is still the theme argument, but in the object position, and in (48c) it is the predicate that is focused, but the presuppositions are derived in similar ways.

(49) Mary
Bill
Chris
.....
John

decreasing likelihood to be invited

Although similar to *even* in the sense that both *dou* and *even* involve scales in their meaning, *dou* is different from *even* in at least two respects. First of all, *dou* operates on events, and its syntactic position is relatively restricted. English *even*, on the other hand, assumes a flexible syntactic position when it associates to different focuses of a sentence, as shown in (48). Secondly, *even* is often associated with the likelihood scale, but as I will show later, the scale related to *dou* is unspecified and is largely determined by the particular context. In addition to these distinctions, there seems to be some difference between the two in terms of their semantic contributions, but I will not go into more detailed discussion here. As mentioned earlier, *even* only contributes to the presupposition part, but not the truth condition, of the sentence. This is clearly shown in (48). For all the examples there, the presence of absence of *even* does change the presuppositions, but doesn't change the truth conditions. In contrast to this, the presence or absence of *dou* sometimes changes the truth conditions. This is mostly clearly shown by the distributor use of *dou*, as we will see next, where an originally ambiguous sentence can be disambiguated towards the distributive interpretation by *dou*.

3.2.2.1. *Dou* — distributivity as the end of a quantity scale

My analysis of *dou* will draw heavily on the previous research of pluralities in both the nominal and the event domains (see Link 1983, Bach 1986, Lasersohn 1995, Schwarzschild 1996 among others). Let me briefly sketch the main system that will be crucial for the analysis.

It is often observed that distributivity and cumulativity are connected. The utterance in (50) is ambiguous between a distributive reading and a cumulative reading. Under the distributive reading, each person bought a house. Following the analysis of plural nouns in Link (1983, 1998), this event can be taken as a plural event (Bach 1986) because it contains plurality of sub-events in it (Lasersohn 1995), namely, the sub-events of Mary's buying of a house, John's buying of a house and Bill's buying of a house. Each of the sub-events can't be divided any further, because there couldn't be an event of half of Mary bought a house or Mary bought half of a house. Therefore, each sub-event is an atomic event and under the distributive reading, (50) expresses three atomic events. The cumulative reading, on the other hand, only contains one atomic event, namely, the buying of a house that involves three agents at the same time.

(50) Mary, John and Bill bought a house.

a. Mary, John and Bill each bought a house. (distributive)

b. Mary, John and Bill bought a house together. (cumulative)

Interestingly there exist intermediate readings that are not completely distributive or completely cumulative. (51) is a classical example from Gillon (1987).

(51) The men wrote musicals.

Suppose the DP *the men* denotes the set containing Rodgers, Hammerstein, and Hart. There is at least one reading that (51) is true if Rodgers and Hammerstein wrote musicals together, and Rodgers and Hart collaborated together. That is to say, the plural event expressed in (51) contains two atomic events e1 and e2. e1 is an event of musical writing that involves Rodgers and Hammerstein, and e2 is an event of musical writing that involves Rodgers and Hart. Under this interpretation, there is no strict distributivity that each of the three people wrote musicals independently, and there is also no strict cumulativity that three people collaborated to write musicals.

Gillon (1987), Higginbotham (1981) and Schwarzschild (1996) discuss the idea of a cover to account for all three readings above. A cover is a partition of the plurality P if and only if the following criteria are met (Schwarzschild 1996, p64):

(52) C is a cover of P if and only if:

(i) C is a set of subsets of P

(ii) Every member of P belongs to some set in C.

(iii) ∅ is not in C

For example, if P is a set that contains four members: John, Matt, Bill and Chris, we could have different ways to partition this set into smaller subsets. In other words, we could have different covers. The following are some possibilities:

(53) C1: { {J, M, B, C}}
C2: {{J, M}, {B, C}}
C3: {{J}, {M, B, C}}
.....
Cn: {{J}, {M}, {B}, {C}}

Moreover, Schwarzschild proposed the following interpretive principle (revised from Gillon 1987, Higginbotham 1981):

(54) [$_S$ NP_{plural} VP] is true iff there is a cover C of the plurality P denoted by NP such that VP is true for every element in C. (p64)

According to (54), how we interpret the sentence *the men wrote musicals* depends on how we choose the cover C. If we choose C1, that is we are taking the group of men as one plural object, since there is only one element in C1, by applying (54), the predicate *wrote musicals* is true for this plural object. The sentence would mean that John, Matt, Bill and Chris collaborated to write musicals. This is the collective reading. On the other hand, if we choose Cn as our cover, there are four elements in Cn, and the predicate *wrote musicals* is true for each of the four elements, we end up having a distributive reading that each person wrote musicals independently. The intermediate readings arise if we choose intermediate covers. As shown in (53), there are many possibilities of intermediate readings because there are different ways to partition the set of four men. If we choose C2 as our cover, the sentence is true if John and Matt are collaborating, and Bill and Chris are collaborating. If we choose C3, the sentence is true if John is working by himself, and Matt, Bill and Chris are collaborating, and so on and so forth. Notice that

under this analysis, all these interpretations involve universal quantification, which is restricted to the contextually determined cover over the domain instead of the domain itself. To give a more general analysis to all these interpretations, we can adopt the generalized D-operator proposed by Schwarzschild. Suppose that α is a variable over predicates, D is a distributive operator, x and y are variables over the relevant domain in the discourse, the claim in (54) suggests the following analysis:

(55) $x \in || D(Cov)(\alpha) ||$ iff

$||Cov||$ is a cover of $x \wedge \forall y [y \in ||Cov|| \rightarrow y \in ||\alpha||]$

The cover $||Cov||$ is a set of sets, and its value is assigned by contextual (including non-linguistic) factors. The generalized distributor D doesn't operate directly on the atomic individuals in the domain, instead it operates on the members of the cover set.

Now let's turn to our analysis of *dou*. Lin (1998) analyzed *dou* as a generalized distributor because in the context of collective predicates, *dou* doesn't distribute down to the atomic individuals in the domain. One example is given below:

(56) Naxie ren dou shi fuqi

those people dou be husband-and-wife

Those people are all couples.

Suppose now the set *those people* has a denotation of Mary, Bill, Ann and Chris. Because the predicate *being a couple* can only be true for a pair of people, it can't be distributed

over each single member of the set. The set has to be partitioned first, i.e., we need a cover to work on. Suppose our cover contains pairs {M, B} and {A, C}, *dou* as a generalized distributor can distribute the predicate *being a couple* into each member of the cover. In this respect, *dou* is different from the real distributor *each* in English. *Each* is incompatible with collective predicates, because its inherent distributive property makes it operate upon atomic members of the set, not the covers. Although this analysis gives the correct interpretation of (56), I suspect it at most lends additional empirical support for the idea of a context-dependent cover, because in this case obviously the lexical property of the predicate excludes any cover that doesn't partition the set into member-paired sets, but it doesn't suggest that *dou* is the explicitly marked generalized distributor D. For *dou* to be the generalized-D, it has to be able to operate on different covers, as long as no other factors can rule out those covers (e.g. contextual factors). Lin uses the following example to prove this to be the case.

(57) Xiaoming, Xiaohua han Dabao dou shi tongxue
Xiaoming Xiaohua and Dabao Dou be classmate
Xiaoming, Xiaohua and Dabao are all classmates.

The predicate being classmates again can't be true for an atomic individual argument, but it is true if the three people is taken to be a plural object. That is to say we can have a cover that contains one member in it, as shown in (58a). Under this interpretation, the three people are classmates at the same time. Lin noticed that there is another possible plurality cover, as in (58b), which contains three pairs. If the predicate *being classmates*

is true for each pair in (58b), we should have a reading that X.m and X.h are classmates, X.h and D.b are classmates, and D.b and X.m are classmates. Crucially, there is no obvious reason to force the three classes to be the same. The interesting question is if there is an interpretation that the three pairs are in different classes. This interpretation is arguably present. Therefore, Lin (1998) took the two interpretations in (58) as showing that *dou* can distribute over members of different plurality covers, therefore it is a generalized distributor.

(58) a. C1: {{Xiaoming, Xiaohua, Dabao}}

b. C2: {{Xiaoming, Xiaohua}, {Xiaohua, Dabao}, {Dabao, Xiaoming}}

There are two problems with this argument. First, I don't think the ambiguity in (58) is real. It is possible that the interpretation under C2 would entail the interpretation under C1. With a plurality cover C2, I agree with Lin that it is unspecified if the three classes should be at the same time or not. But if they are, the reading under which is pragmatically equivalent to that under C1, because if a and b are classmates of class A, and b and c are also classmates of class A, then it is true that a, b and c are all classmates to each other. Second, there exist other possible covers for this case, but the interpretations under those covers don't seem to be available. For example, we can partition the set of three people into two pairs, as shown in (59):

(59) C3: {{Xiaoming, Xiaohua}, {Xiaoming, Daobao}}

If *dou* can operate on this cover as a generalized distributor, we should have a reading that Xiaoming and Xiaohua are classmates, Xiaoming and Daobao are classmates. If the two classes are different, it is possible that Xiaohua and Daobao are never classmates. However the original sentence (57) would definitely be false under this context.

To analyze *dou* as a generalized distributor also fails to explain the commonly observed distinction between sentences with *dou* and those without it. The following is such an example. With *dou* present, (60) only has a distributive reading, which says each person bought a car. Without *dou*, (61) is ambiguous between a distributive and a collective reading. According to (55), it is the cover, which in turn is determined by contextual factors, not the generalized distributor itself that determines the available interpretations. Since (60) and (61) are not different with respect to the context in which they occur, we are led to the conclusion that *dou* is not the explicitly marked generalized distributor in Chinese, because *dou* has to do something to contribute to the semantic difference between the two.

(60) Zhangsan he Lisi dou mai-le yi-liang-che.
Z. and L. dou buy-perf. one-CL-car
Zhangsan and Lisi each bought a car.

(61) Zhangsan he Lisi mai-le yi-liang-che.
Z. and L. buy-perf. one-CL-car
a. Zhangsan and Lisi each bought a car.
b. Zhangsan and Lisi bought a car together.

In agreement with Lin (1998), I reject the analysis that *dou* is a simple distributor, as English *each*. I instead suggest that *dou* is a scalar operator that operates on events ordered on a quantity scale. To entertain this analysis, we need to take a closer look at the idea of cover again. As mentioned earlier, a cover is a set of sets derived from partitions. Using our earlier example, a set with four members John, Matt, Bill and Chris, can be partitioned in different ways. In other words, we can have different covers for the plural argument *John, Matt, Bill and Chris*.

(62) C1: { {J, M, B, C}}
C2: {{J, M}, {B, C}}
C3: {{J}, {M, B, C}}
.....
Cn: {{J}, {M}, {B}, {C}}

Some of these covers will be excluded on the basis of contextual concerns. For descriptive simplicity, I will just assume that all these covers are possible under certain contexts. According to (54), we can make the following assumption.

(63) [$_{CP}$ John, Matt, Bill and Chris VP] is true iff there is a cover C of the plurality argument denoted by the subject such that VP is true for every element in C

Let's assume VP is not a collective predicate for the moment, for example, *buy a car*. Since *buying a car* could be true for one individual argument, an atomic event of buying a car should contain just one individual argument. If we choose C1 in (62) as our cover, we derive one event of *buying a car*. Let's call this event E1. E1 is a singular event because the only sub-event it contains is E1 itself. Crucially for our purpose, E1 doesn't

contain any atomic sub-events, since the only sub-event it contains involves four individuals as its argument. If we choose C2 as our cover, since the VP needs to apply to each member of C2, we will end up having a plural event E2, which contains two sub-events e1 and e2. The first sub-event e1 has the set {J, M} as its agent, and the second sub-event e2 has the set {B, C} as its agent. Again, there isn't any atomic sub-event. Under the cover C3, however, there is an atomic sub-event, the sub-event that has the individual {J} as its argument. Repeating this process, it is not hard to see that with different covers, we could derive different events, with respect to how many atomic sub-events they have. When we move on to the cover Cn, we are going to have a plural event with four atomic sub-events, which is the largest number of atomic sub-events possible. In (62), the cover C1 gives us the collective reading, and Cn gives the distributive reading, because under the former cover, the predicate is true for everybody together as a whole, and under the latter cover, the predicate is distributed down to each individual member. There has always been an intuition that collective and distributive readings are the two ends of a scale from the least distributive to the most distributive readings, and intermediate readings are in the middle part of the scale (van der Does & Verkuyl 1996). Along this distributivity scale, the presence of *dou* forces the top of the scale reading, i.e. the most distributive reading. Different from Lin (1998), *dou* is not the implicit D in (4), instead, *dou* operates on the representation in (4), and picks out the cover that will yield the most distributive event. I will informally call this kind of cover a distributive cover, e.g. the cover Cn in (62). Adding *dou* to (55), we can have the following representation:

(64) $x \in \| \textbf{\textit{Dou}}\ D(Cov)(\alpha) \|$ iff

||Cov|| is a distributive cover of x $\wedge\forall$y [y$\in$||Cov|| $\rightarrow$ y$\in$||α||]

Let's now turn to the situations where the predicate in (63) is collective, for example, *being classmates*, or *meet each other*, data repeated in (65).

(65) a. Tamen dou shi tongxue

they dou be classmate

They are classmates

b. Tamen zuotian jian-le-mian.

They yesterday meet-perf.-face

They met yesterday.

Since a cover is always constrained by contextual factors, it is not surprising that the lexical properties of collective predicates impose certain requirements on the cover. For example, *being classmates*, or *meet each other*, requires that each atomic event involves two individuals, and an event with only one individual as its argument can't be true. As a result, if the relevant set has three members John, Mary and Bill, among the following covers, covers like C2, C3, and C4 are ruled out since they contain sub-events that have only one individual as the argument. Among the rest of the covers, Cn contains the largest number of atomic events possible. *dou* picks the cover Cn, and (65a) means that John and Mary are classmates, Mary and Bill are classmates, and John and Bill are classmates, and (65b) means that John met Mary yesterday, Mary met Bill yesterday and

John met Bill yesterday. Importantly, since the cover Cn does not impose a time interval on each event, so (65a) could be true in a situation where the three *being classmates* events occurs at a different time, i.e., John and Mary's class is different from Mary and Bill's class or John and Bill's class. Similarly, the three *meeting each other* event in (65b) could occur at different time too.

(66) C1: { {J, M, B, }}
C2: {{J, M}, {B,}}
C3: {{J}, {M, B,}}
C4: {{J}, {M}, {B}}
.....
Cn-1: {{J, M}, {J, B}}
Cn: {{J, M}, {M, B}, {J, B}}

My analysis of *dou* bears some resemblance to Huang (1996), who analyzed *dou* as a sum operator on events, as shown in (67):

(67) DOU (e, Pred) = $\cup$ { e_{PRED1}, e_{PRED2}, e_{PRED3}...}

e is an event of minimum size consistent with the semantics of the PRED.

The events of minimal size are also called minimal events in Huang (1996), which refer to events that involve minimal number of arguments requirement by the predicate. For example, *dance* only requires minimally one member for its argument, but a collective predicate such as *meet* will require minimally two members for its argument. It is clear that the intuition Huang had is close to the current analysis. In her analysis, distributivity is achieved by letting *dou* operate on the predicate and yield a plural event that contains all the minimal events. Although both analyses account for the distributive reading of

dou, by employing the idea of a scale, the current analysis can be extended to the *even* use and the *already* use of *dou* as well, which I will turn to next.

It is worth noting that although we have some evidence to show that *dou* and *all* are not exactly the same (section 3.2.1.1.), the current analysis of *dou* does share some similarities with a particular analysis of *all*, namely the analysis in Brisson (1998)[2]. In a nutshell, Brisson argues that *all* is not a universal quantifier, contrary to the most common assumptions, and she claims *all* is a modifier, an adverb specifically, which modifies the generalized D operator (in the sense of Schwarzschild 1996) and strengthens the distributivity. Assuming this analysis, both *all* and *dou* are non-quantifiers, and both are adverbs that strengthen distributivity on the predicate. The strengthening effect of *all* in Brisson (1998) is a little different from our analysis of *dou*. *All* strengthens distributivity by excluding non-maximal interpretations, whereas *dou* achieves the strongest distributivity through the end of scale effect. A detailed comparison between the two analyses is beyond the scope or our discussion here and I will leave it open for future work.

3.2.2.2. The analysis of the *even* use of *Dou*

For the *even* use of *dou*, I will largely adopt the analysis in Portner (2002) with some modifications. For the *(lian)...dou* construction, Portner's basic idea is that *dou* quantifies over a presupposed set of alternatives to the focused element. This proposal is formalized as below:

[2] This is brought to my attention by Alan Munn.

(68) D [lian X [pred...dou...]], D is an implicit topical set of alternatives to X and X at the extreme end of a contextually given scale on D:

(i) asserts PRED (x)

(ii) implicates $\forall x \in D$ [Pred (x)]

Portner's original analysis assumes *dou* is associated with the focused argument X. Since we assume that *dou* operates on events, we need a slight modification on (68) to make it suit the new assumption, as shown in (69):

(69) [lian X [pred...dou...]], D is an implicit topical set of alternatives to X and X at the extreme end of a contextually given scale on D:

(i) asserts PRED (X)

(ii) implicates $\forall y(y \in D) \rightarrow \exists e$ [Pred (e, y)]

(iii) D_e is the set of events derived in (ii) and the event PRED (X) is at the extreme end of a likelihood scale on D_e

Let's illustrate this analysis with an example.

(70) (Lian) shagua dou hui zuo zhe-dao-ti.

lian idiot dou can do this-CL-problem

Even idiots know how to solve this problem.

In (70), the argument marked by *lian* is in the focus position. Following standard assumptions, focused elements introduce a set of alternatives (Rooth 1985, 1992). The word *idiot* in (70) introduces a set of alternative people in the context, for example, John, Bill, Mary, etc. This set of people can be ordered along a scale of intelligence, and the idiot by common sense is the least intelligent one, so it would stand at one end of the intelligence scale. Applying the predicate *knowing this problem* to the set of people, we derive a set of events. They are all events of knowing the problem, with different agents. If we order these events on a likelihood scale, since the idiot is the least intelligent one, by common sense his knowing of the problem is the most unlikely, or we can say, the least likely event. In either way, the event that (70) expresses is on one end of the likelihood scale.

3.2.2.3. The analysis of the *already* use of *Dou*

As discussed in section 3.2.1.3, although *dou* seems to be translated as *already* sometimes, it is not equivalent to *already*. I have provided two pieces of arguments for that. First, *dou* and *already* can co-occur, and second, to be translated as *already*, *dou* has to occur in a specific kind of context. The following data further supports the distinction between *dou* and *already*. Let's consider (71) in a scenario that we need 10 students to open a graduate class, but there are only six people enrolled so far[3].

(71) #a. You liu-ge xuesheng **dou** xuan-le zhe-men-ke,
there six-CL student **dou** enroll-perf. this-CL-class
dan hai yuanyuan bu go
but still far-far not enough
Six students have already enrolled for this class, but it is far from enough.

[3] Data modified from Chen (2004).

b. You liu-ge xuesheng yijing xuan-le zhe-men-ke
there six-CL student **already** enroll-perf. this-CL-class
dan hai yuanyuan bu go
but still far-far not enough
Six students have already enrolled for this class, but it is far from enough.

In this scenario, with certain expectation being unsatisfied, *dou* is not acceptable in (71a), but *already* is acceptable in (71b). Interestingly, *dou* becomes acceptable if the number of enrolled students exceeds 10.

(72) You shiwu-ge xuesheng dou xuan-le zhe-men-ke,
there fifteen-CL student **dou** enroll-perf. this-CL-class
ba jiaoshi zuo man-le
BA classroom sit full-perf.
Fifteen students have enrolled and the classroom is full.

This suggests that the use of *dou* is related to certain expectation standard. Along this line, I will propose that *Dou* is used to express the speaker's subjective emotion, opinion or expectations. Crucially, in the context when the utterance is made, the speaker could have chosen from an alternative set of events to describe, but the event he/she finally utters, is the one that at the point could best describe the speaker's feeling or expectation.

This idea may sound vague so far. Let's illustrate it with the high school reunion example we discussed earlier. The data is repeated below:

(73) Shijian guode zheng kuai ya! Yizhuanyan, haizi dou da le.
time pass really fast a blink, children dou grown perf.
Time flies! In a blink of time, the children already grown up.

Recall that this sentence is uttered in a reunion party thirty years after the graduation. It could be a very emotional occasion seeing that time has changed the teenage boys and girls into middle aged men and women. To express one's impression towards the changing of time, i.e. e1 under our terminology, the e2 that the speaker has chosen to evaluate e1, is that the next generation has grown up. During that last thirty years, many events have happened, but the growing up of a new generation is probably the most powerful one to serve the speaker's purpose here, namely, it speaks most convincingly about the change of time and life. In this sense, the e2 stands on the end of an evaluation scale that orders the set of alternative events that the speaker could have chosen. There could be different ways to state this proposal. The following is one way to do it.

(74) For the discourse [$_{\text{discourse}}$ e1… D dou e2], D is an implicit set of alternative events to e2, there is a scale on D that orders the events based on their effect to evaluate e1, the purpose of the evaluation is determined by the context. E2 is on the end of the scale, namely, it achieves the best evaluation effect.

We can also use the following ordered scale to express the same intuition.

(75) [Some changes have happened in our lives], time really flies.

Beyond expectation →	**e1: The next generation has grown up**	
	e2: The speaker has married twice	expectaion
	e3: The speaker changed different jobs	scale
	.....	

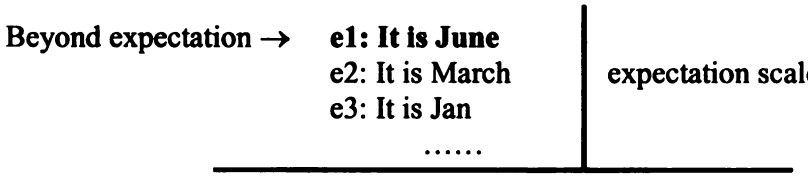
Let's take a look at another example (76). The two events under discussion are e1: *I haven't started writing*; and e2: *June has passed.* Recall that the background is that the

plan of the month of June is to finish one chapter. Suppose that it was only May, e1 would be judged as an expected event; if it was early June, e1 can be judged as acceptable too. But the closer to the end of June, the more likely e1 will be judged as unacceptable. To pick e2 as *the passing of the end of June*, the speaker has chosen the strongest case that reflects the unexpectedness of e1 and possibly the disappointment of the speaker. In this sense, the event that *June has gone* stands on the end of a scale that orders the time passing events according to their effect to evaluate the expectedness of the other event.

(76) Liuyue dou guo-wan le. (wo hai mei kaishi xie)
June dou pass-finish perf. I still not start write
It is the end of June now. (But I haven't start writing)

Again, the following expectation scale can capture native speakers' intuition:

(77) [It is time t at the speaking time], and I haven't started writing my thesis.



The property of *dou* to mark the end of the scale event is also illustrated by the degree constructions as below. The following sentences express meanings similar to English *so...that...* constructions.

(78) a. Mali qi de **dou** ku le

Mary upset de dou cry perf.

Mary was so upset that she broke into tears.

b. Zhangsan deyi de **dou** wang le ziji jiao shenme

Zhangsan happy de dou forget perf. Self call what

Zhangsan is so happy that he forgot his own name.

c. Wo deng de taiyang **dou** xiashan le. ta ye mei chuxian.

I wait de sun dou go down perf. he still not show up

I have waited for so long that the sun went down, but he still didn't show up.

All these examples describe two events. The second event expresses a high degree along a contextually determined dimension that applies to the first event. The morpheme *de* marks the degree construction. For example, in (78a), the crying event measures a very high degree of Mary's anger; in (78b), the forgetting his own name event measures the extreme happiness of Zhangsan; and in (78c), the event that the sun has gone down measures extreme inappropriate long time he has let me wait.

Finally let's reconsider the graduate course scenario. We can also explain the data using the following scale:

(79) [There are n students enrolled], and we need 10 to open a graduate class[4]

(√Dou) Beyond expectation	n=20 n=15 …..
(?Dou) Expected	n=10
(*Dou) Under the expectation	n=9 n=8 ……

[4] See Chen (2004) for a more detailed analysis on the issue of presupposition of dou and distributivity.

When the expectation standard is explicitly set, as in this case, anything event that expectation satisfies the requirement of *dou*.

To summarize, I have unified the three uses of *dou* through a scalar analysis. The basic meaning of *dou* is immediately related to the end of a contextually determined scale, which could either be a scale of quantity (i.e. the number of atomic events), or a scale of expectation of some kind. This analysis not only captures our intuition about the semantics of *dou*, it also shed some light on the syntactic condition *dou* poses on its argument, which I will turn to in the next section.

3.2.2.4. The Leftness Condition

The leftness condition refers to the syntactic requirement that one argument in the *dou*-construction needs to stay to the left of *dou*, although not necessarily adjacent to *dou*. For example, in its distributor use, the DP that is being distributed over stays to the left of *dou*. If the relevant DP is originally an object, it has to move to the left of *dou*.

(80) a. *Ta dou yao-**le** **mei-ge-pingguo** yi-kou
he dou bite-perf. every-CL-apple one-bite
He took a bite on each apple.

b. Ta **mei-ge-pingguo** dou yao-le yi-kou
he every-CL-apple dou bite-perf. one-bite
He took a bite on each apple.

c. **Mei-ge-pingguo**, ta dou yao-le yi-kou
every-CL-apple, he dou bite-perf. one-bite
He took a bite on each apple.

In the *even* use of *dou*, the focused DP is the argument that is constrained by the leftness condition. Again, if the focused argument is the object, it needs to move to the left of *dou*.

(81) a. *Ta dou bu langfei **yifenqian**

he dou not waste a penny

He doesn't waste even a penny.

b. Ta **yifenqian** dou bu langfei.

he a penny dou not waste

He doesn't waste even a penny

c. **Yifenqian** ta dou bu langfei.

a penny he dou not waste

He doesn't waste even a penny

In the *already* use of *dou*, the leftness condition doesn't seem to apply. Imagine John and Bill are in a game to compete drinking beer, and John drinks much faster than Bill. Both examples below are grammatical:

(82) a. John dou he-wan **yi tong** le, Bill cai he dao dier bei.

John dou drink-finish one bucket perf. Bill only drink to second glass

John already finished a whole bucket, but Bill is only at his second glass.

b. John **yi tong** dou he-wan le, Bill cai he dao dier bei.

John one bucket dou drink-finish perf. Bill only drink to second glass

John already finished a whole bucket, but Bill is only at his second glass.

As shown above, although the object argument could be fronted, probably for focus reasons, the presence of *dou* doesn't force the fronting. For the moment, I will put aside the case of this *dou*, and only focus on the first two uses of *dou*. As will be clear later, once the nature of the leftness constraint is clear, it naturally follows why it doesn't apply to the *already* use of *dou*.

Under our scalar analysis of *dou*, the distributive and the *even* use of *dou* are different outputs of the same core, which is that *dou* marks the top of a contextually determined scale. Note that under the present analysis, *dou* itself is not quantificational[5] (contra Cheng 1995). But the output of *dou* could be. For example, the distributive reading could have a quantificational analysis, as reviewed earlier from Schwarzschild (1996), and the basic analysis is repeated in (83).

(83) $x \in \| \textbf{\textit{dou}}\ D(Cov)(\alpha)\|$ iff

$\|Cov\|$ is a distributive cover of $x \wedge \forall y\ [y \in \|Cov\| \rightarrow y \in \|\alpha\|]$

Recall that α is a variable over predicates, D is the generalized distributive operator, x and y are variables over the relevant domain in the discourse, and the function of *dou* is to pick out the cover that will give the distributive reading, because that is the reading that contains the largest number of sub-events along a quantity scale. I will propose that

[5] Careful readers might find this point seems to be inconsistent with the discussion in chapter two, where we assume that *dou* is a quantificational element that induces the kind of quantifier barrier effect in Beck (1996). This is not a problem because although *dou* itself is not a quantificational element, the distributive structure is. There might be more than one ways to implement a revision for our earlier discussion in Chapter 2. One possibility is that *dou* can mark the position of the implicit generalized distributor D. Because D is quantificational, our arguments in Chapter can be maintained.

in this case the leftness condition holds because the universal quantifier has to take wide scope over the existentially quantified event argument. To see this more clearly, we can modify the representation in (83) to (84), which has the same interpretation:

(84) Suppose X is the distributee argument and e is the event argument

$[_{CP}$ X... dou D (Cov) (e)] is true iff:

(i). ||Cov|| is a distributive cover of X

(ii). $\forall y\ [(y \in ||Cov||) \rightarrow \exists e\ (e(y))]$

As shown in (84), achieving the distributive meaning requires that the universal quantifier, which quantifies over the atomic individuals of X, has to scope over the existentially quantified event. It is known that in Chinese the scope relation is explicitly marked by the surface word order (Aoun & Li 1993). If X in (84) happens to the object argument, it has to scramble to the front to scope over the event.

We can extend the same scope analysis to the leftness condition in the *even* use of *dou*. The basic analysis for the *even* use of *dou* is repeated in (85). What is crucial for our purpose here is that through scalar implicature the universal quantification over the members of the alternative set has to take scope over the existentially quantified event argument. Again, assuming that the scope relation in Chinese has to be explicitly marked by the surface word order, it is not surprising that the focused argument X, which introduces the alternative set of arguments, has to scramble to the left of the predicate.

(85) [(lian) X [pred...dou...]], D is an implicit topical set of alternatives to X and X at the extreme end of a contextually given scale on D:

(i) asserts PRED (X)

(ii) implicates $\forall y(y \in D) \rightarrow \exists e$ [Pred(e,y)]

(iii) D_e is the set of events derived in (ii) and the event PRED (X) is at the extreme end of a likelihood scale on D_e

To summarize, the leftness condition takes place to satisfy the scope relation between an argument and the event that this argument is part of. If this characterization is correct, we have a tool to explain why the leftness condition doesn't constrain the *already* use of *dou*. Under the *already* use of *dou*, we are looking at two events in the discourse, the event that *dou* operates on is the one that can best evaluate the other event along a contextually specified dimension. We don't need to front any argument because *dou* is not operating on any individual argument. Consider (82) again, data repeated in (86):

(86) John dou he-wan **yi tong** le, Bill cai he dao dier bei.
John dou drink-finish one bucket perf. Bill only drink to second glass
John already finished a whole bucket, but Bill is only at his second glass.

(87) [Bill finished x-amount], and Bill is drinking his second glass.

Beyond expectation →	**e1: John finished 2 bucket**	expectation scale
	e2: John finished 1 bucket	
	e3: John finished 3 glasses	
	.....	

The alternative events that *dou* could have operated on, namely, *John finished two buckets*, *John finished one bucket*, or *John finished three glasses*, etc, are evaluated along an expectation scale with respect to another event, namely, the event that Bill is drinking his second glass. Crucially different from the other two kind of cases I have just discussed, these are two separate events, instead of an alternative set of arguments and an event that these argument could be part of. Therefore, there is no scope relation at stake here.

3.2.2.5 Summary

In this section we argued for two main points. First, the semantics of *dou* is to specify the end of a scale. Second, the intended semantics of *dou* interacts with structural constraints. Specifically, if the semantic output of *dou* is quantificational, it complies with the general word order constraint on scope relations in Chinese, which leads to overt movement when it is necessary.

3.3. Licensing NPI through a scale

In this section we are going to use the semantics of *dou* as a tool to poke at the question of how NPIs are licensed in comparatives. Note that in Chinese *dou* can also license NPIs in constructions other than comparatives. For instance, the wh-word in (88) is interpreted as a polarity item, not an interrogative word.

(88) Ta shenme dou bu chi
he what dou not eat
He won't eat anything.

Ideally we would like to see that when NPIs are licensed by *dou*, whether it is in comparatives or not, *dou* works the same way. Cheng (1995) proposed an analysis to explain how *dou* licenses NPIs in general. Although she didn't discuss comparatives specifically, probably she would carry over the same analysis to comparatives too. Let's take a look at her analysis first. After that, I will make a proposal to explain how NPIs are licensed in Chinese comparatives, and extend this analysis to account for English comparatives too. Finally, I will show that the current analysis fits nicely with the general rationale of NPI licensing.

3.3.1. Cheng (1995)

The analysis in Cheng (1995) mainly consists of two steps: first, the polarity items constructed from wh-words are variables that need a binder (Cheng 1991, Heim 1982, Reinhart 1997); second, *dou* as a quantificational adverb binds wh-words and give them universal quantification force. The binding takes place when at LF *dou* is at a position that m-commands the *wh*-word.

My main opposition to this analysis is the assumption that *dou* carries universal quantification force and that is the source of the universal quantification on NPIs. In section 3.2.1.1. I have shown some evidence that supports a different position. The main argument there is that *dou* is compatible with DPs that are already explicitly marked as universal. If *dou* carries universal force itself, we would have a doubly quantified DP. The relevant data are repeated below:

(89) a. **Suoyoude** ren **Dou** lai-le.

all people Dou come-perf.

All the people came.

b. ***All** the people **all** came.

(90) a. Tamen **quan** **Dou** lai-le.

They all/completely Dou come-perf.

They all came.

b. * They all all came.

Portner (2002) also provides some interesting and compelling evidence to argue against the quantificational status of *dou*. Porner noticed that if *dou* can bind indefinite variables and give them universal interpretation (in the fashion of Heim 1982), we can't explain the contrast between the following two examples (examples are different from Portner's to form a minimal pair).

(91) a. Ta **yi-fen-qian** dou jinjinjijiao.

he one-penny-money dou calculate

He calculates even a penny (i.e. he calculates on everything)

b. *Ta **yi-fen-qian** dou hua

he one-penney-money dou spend

He spends everything.

In both sentences we have the same indefinite *a penny*. If *dou* is the source for universal

quantification, it is puzzling why only in (91a) *a penny* is interpreted universally as *everything*, but the same interpretation in (91b) is ungrammatical. Note that the only difference between the two lies in the predicates. It suggests that universal force actually is related to the meaning of the predicate. This intuition is further confirmed by the observation that *a penny* in (92) can be interpreted universally if we add negation to the predicate, as shown below:

(92) Ta yi-fen-qian dou **bu** hua
he one-penney-money dou not spend
He doesn't spend anything.

The puzzle is explained under our analysis of *dou*. Under the present analysis, *dou* itself is not quantificational, it only picks out the end point of a contextually determined scale. The output of the *dou* operation could be quantificational. In the case of (91a), by common sense, *calculating a penny* could be the end point of a likelihood scale because it is not expected for most people, when we look at how generous they are with money. If this event on the extreme end of the likelihood scale is true, by inference we can conclude that *he calculates everything*, i.e., we can draw an inference with universal quantificational force. In contrast to this, spending a penny in (91b) is not the least likely event we expect. (91b) is ungrammatical because the end-of-scale requirement of *dou* isn't satisfied. On the other hand, not spending a penny in (92) is a very unusual event. Again, if this end-of-scale event is true, we can draw an inference that *he doesn't spend anything*.

To summarize, if *dou* doesn't carry universal quantification force, Cheng's analysis on how *dou* license wh-NPIs can't be maintained. In the next section, I will make a proposal that *dou* licenses NPIs through a scale.

3.3.2. *Dou* and NPI licensing

Recall that *dou* only licenses NPIs in *bi*-comparatives, but not in bare comparatives (data repeated in (93)):

(93) a. Zhangsan bi shei dou gao yidian.
Zhangsan than who all tall a little
Zhangsan is a little taller than anybody.

b. *Zhangsan dou gao shei yidian
Zhangsan dou tall who a little
Zhangsan is a little taller than anybody.

This is not unexpected because we have seen that as part of the leftness constraint, in order to be licensed, the NPI has to stay to the left of *dou*, which is violated in (93b). Therefore, because of the inherent syntactic property of the bare comparatives, they can't host *dou* to license NPIs. In the rest of this chapter, I will leave aside bare comparatives, and concentrate only on bi-comparatives.

The basic idea I am going to pursue is that the indefinite NPI gets interpreted as a universal quantifier through the end of the scale implicature. Specifically, since *dou* contributes to the end of the scale implicature, the comparatives that contain a *dou*-

licensed NPI will be interpreted as superlatives. To see how this works, let's start with an example without an NPI.

(94) Ta bi Yaoming dou gao.
He bi Yaoming dou tall
He is even taller than Yaoming.

According to the semantics of *dou*, the sentence in (94) expresses three things. First there is an alternative set of people compared to Yaoming, suppose they are {a, b, c...}. If we apply the comparative predicate to these alternative arguments, we have a set of alternative events, as shown in (95):

(95) {he is taller than a, he is taller than b, he is taller than c...}

Second, all these events, including the one that *he is taller than Yaoming*, can be ordered on a likelihood scale. *He is taller than Yaoming* is on the end of the scale, i.e., it is the least likely, or the most unlikely event. This is so because by common sense, Yaoming as a NBA player, is much taller than the majority of the Chinese. Finally, *dou* picks out the event on the top of the scale. That is to say, it picks out the event asserted in (95).

Since the presence of *dou* forces the assertion of the least likely event, both examples below are ungrammatical, or at least very odd because the scalar requirement isn't satisfied.

(96) a. *John bi xiao haizi dou gao.

John bi little kid dou tall

John is even taller than little kids.

b. *John bi Yaming dou ai.

John bi Yaoming dou short

John is even shorter than Yaoming

(96a) is odd because it is not the least likely event that John is taller than little kids. The fact is probably to the contrary that he is very likely to be taller than little kids. (96b) is odd for the same reason. If by common sense Yaoming is much taller than average height, instead of being the least likely event, the chance is high that John is shorter than Yaoming. Therefore, in both case, the intended semantics of the sentences are in contradictions with the semantics of *dou*.

Turning now to the NPIs in comparatives, data repeated in (97). We find that *dou* works very much the same way for NPIs as for non-NPIs in (94).

(97) Zhangsan bi **shei** dou gao yidian.

Zhangsan than who all tall a little

Zhangsan is a little taller than anybody.

First of all, the licensed NPI has to move to the left of *dou*, as expected from the leftness constraint. This is satisfied automatically because the surface structure of *bi*-comparatives. The focus on the indefinite NPI induces a set of alternatives. The

semantics of *dou* makes sure that the comparative event associated with the NPI is the least likely event. In the context of comparatives, the least likely event is a superlative. For instance, if we compare the height of John with other people in a statement *John is taller than...*, the least likely to happen is that John is taller than the tallest person in the comparison set. If even this event is asserted to be true, by scalar implicature, any other alternative event, which involves an alternative argument to the NPI, is true too. This is semantically equivalent as saying for each member X in the alternative set, there is an event such that John is taller than X. In this way the universal quantification over the set of alternatives scopes over the existentially quantified event argument. The overt movement of the NPI ensures the surface word order complies with the scope relation.

Our discussion up till now builds upon a simple logic: since the NPI licensing in Chinese comparatives is closely related to the presence of *dou*, if we understand how *dou* works, we gain some insights on how NPIs work in comparatives. To compile what we have done so far, to license NPIs in comparatives and achieve universal interpretation through the indefinite NPI, three criteria need to be met:

(i) There needs to be an enlarged set that contains more than just the NPI. In the case of Chinese, and probably many other languages, we derive such a set by putting a focus on the NPI, since focus induces an alternative set.

(ii) There needs to be a scale that orders all the events, namely, the event associated with the NPI and the events associated with the members in the alternative set.

(iii) There needs to be a pointer that makes sure the event associated with the NPI, i.e., the currently asserted event is the least likely event. In Chinese, the (ii) and the (iii)

points are achieved through the operation of *dou*.

If all of these are met, by scalar implicature, the indefinite NPI will give us a universal interpretation.

3.3.3. NPI licensing in English comparatives

On the surface, the current analysis on Chinese comparatives is similar to Zepter (2003) analysis of English comparatives. Although the basic idea is very similar, I will argue that Zepter's analysis can't be maintained on its original form.

Zepter's analysis is partly inspired by the analysis in Kadmon and Landman (1993) (thereafter K&L), where they explored the pragmatic function of using NPIs. K&L proposed that the semantic contribution of *any* is to reduce tolerance of exceptions, i.e. to make a stronger statement than the non-*any* version. The following are the main ingredients of their analysis.

(98) **a.** *any NP* = the corresponding indefinite *a NP* plus the additional semantic/pragmatic characteristics (widening, strengthening) contributed by *any*.

b. WIDENING

In an DP of the form any NP, any widens the interpretation of the common noun phrase (NP) along a contextual dimension.

c. STRENGTHENING

Any is licensed only if the widening that it induces creates a stronger statement, i.e., only if the statement on the wide interpretation entails the statement on the narrow interpretation.

Let's illustrate their point with the example below.

(99) I don't have *any* potatoes.

The DP *any potatoes* in this examples is treated like a normal indefinite DP. However, any can widen the domain of the interpretation of potatoes in different ways, depending on the context. For instance, consider a situation where you ask me if I can cook potatoes for dinner, and I could utter either (100a) or (100b) as my reply:

(100) a. I don't have potatoes.

b. I don't have *any* potatoes.

Note that in this scenario, the default understanding is that only the set of potatoes that I can cook for you should be relevant to your question. Therefore, even if I do have a few rotten potatoes, or plastic potatoes, (100a) can still be considered to be true. On the other hand, for (100b) to be true, I am implying that I don't even have rotten ones, or plastic ones. Therefore, *any* in (100b) widens the domain to include normal potatoes or rotten/plastic potatoes. We can also consider a situation where you want me to cook potatoes for 50 people. Now the quantity of potatoes becomes relevant. If I have one or two potatoes in my kitchen, I can still utter (100a) as a reply to your request. However, if

I utter (100b), I am implying that I don't have even one potato. In this case, *any* widens the domain of potatoes to include the smallest quantities. Therefore the widening associated with *any* is often related to some salient features of the context. In addition to contributing a widened domain associated with the common noun, *any* needs to be constrained by the strengthening requirement. Let's still consider the example of potatoes in (99). Since *any potatoes* in (99) is just an indefinite DP, (99) could be represented as

(101) $\neg\exists x$ [potato (x) $\wedge$ I have x]

After any widens the domain, the strong/wide interpretation we have is *I don't have potatoes, neither cooking ones nor others*. This entails a narrow interpretation that *I don't have rotten potatoes*. The strengthening condition is satisfied, and *any* is licensed in (99). On the other hand, if we use *any* in (95a), the strengthening condition will not be satisfied.

(102) a. *I have *any* potatoes.

b. $\exists x$ [potato (x) $\wedge$ I have x]

(102a) can be represented in (102b). After *any* widens the domain of potatoes, the wide interpretation of (102) is that *I have some kind of potatoes, cooking or rotten ones*, and this doesn't entail the narrow interpretation that *I have cooking potatoes* or *I have rotten potatoes*. Therefore, *any* is not licensed.

The question for comparatives is that what is special about comparatives that will make sure an NPI in it is interpreted as having a widened domain and a strengthened meaning. Fauconnier (1975) noticed that the existential quantification over the highest point of a scale will give rise to universal quantification. Elaborating on this idea, Zepter (2003) argued that NPIs are interpreted as universals in comparatives because they are interpreted as superlatives. Comparatives naturally provide a partially ordered scale. An NPI can zoom in to the highest point on the scale. If John is taller than the highest point on the scale, he is taller than everybody in the domain. For a concrete demonstration of this analysis, let's look at the following examples.

(103) a. John is taller than someone in the class.

b. John is taller than anybody else in the class.

In (96a) the normal existential indefinite *someone* is used, in (103b) the existential indefinite NPI *anybody* is used, and only the latter gives a universal interpretation. Zepter argues that similar to normal existential indefinites, an NPI carries an open variable that gets existentially closed in the nuclear scope (Heim 1982). However, different from normal existential indefinites, an NPI also carries a function δ that restricts the domain of the existential quantification over a set. The formal definition of an NPI by Zepter is given below:

(104) The NPI *any, ever* are functions that restrict the domain of the existential quantification over a set: λP [δ(P)](x). (p217)

In the context of a comparative as (103b), the set of people are ordered on a scale by their heights. The NPI function δ not only widens (in the sense of Kadmon and Landman 1993, see below) the set from one person to all the people ordered by the scale, but also zooms in to the highest end on the scale. As a result we have a semantic representation as below:

(105) a. δ(people) = the highest person in the relevant context

b. John is taller than ∃x [[δ(people)](x)]

The representation in (105b) means John is taller than a person, who is the tallest in the relevant context, hence by inference John is taller than everybody in the context.

This analysis explains NPI in comparatives without appealing to DE environment. It also catches our intuition that comparatives involve scale of some sort and that gives a universal interpretation from an existential indefinite. Although I agree with this intuition and the current analysis also embraces the insight about a scale, I don't think this is the complete analysis. The problem is that the function δ defined in (105a) seems somewhat arbitrary. This function δ not only widens the domain, it also picks up the highest end on the scale. Although we can give a semantic definition to make δ do both the widening and zooming in jobs, we don't know exactly where it comes from. It seems to be only invented to operate upon NPIs such as *any* or *ever* in comparatives. However, we know that neither the lexical properties of NPIs nor the semantics of comparative constructions

necessarily carry such a widening function. Otherwise Chinese comparatives should have licensed NPIs automatically, without appealing to the presence of *dou*.

What is missing in Zepter's analysis, therefore, is a more elaborated analysis of the mysterious δ function. δ does two things: widen the domain to include other relevant members, besides the NPI indefinite; and pick out the end of the scale point. Compare this to Chinese, the first thing is achieved by focus, and the second thing is done by *dou*. This suggests that a language probably has its own way to express the same functions that δ is set up to do. Instead of proposing a very vague δ, we should be able to compose the same semantics from specific lexical and syntactic expressions.

For this reason, I will adopt the analysis in Lee and Horn (1994) for English NPIs, although it isn't addressing comparatives specifically. Lee and Horn (1994) analyze NPI and free choice *any* as semantically equivalent to the indefinite determiner *a*. Different from the normal indefinite determiner *a*, the FC *any* contains an incorporated focus *even*, which presupposes a scale in the discourse context. It is this incorporated *even*, which is implicit on the surface, that is responsible for the limited distribution and the widened domain (Kadmon and Landman 1993) of NPI and FC *any*. Notice that under this analysis both NPI and FC *any* are analyzed as indefinite, which means even the universal reading of the FC *any* is not analyzed as coming from universal quantification, instead, it is achieved through the semantics/pragmatics of *even*.

Even associates with a focus and presupposes a contextually related scale, and the DP associated with even usually refers to the lowest point on the scale. Consider (106):

(106) Even Bill ate the spinach.

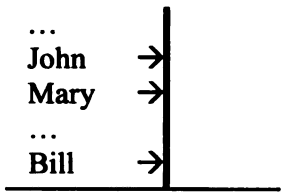
(106) presupposes two things:

(i). Bill is the least likely person to eat spinach (e.g. he hates vegetables)

(ii). Everybody else in the context ate the spinach.

It is clear from the inferences above that *even* in (106) imposes a scale of the likelihood of eating spinach, and Bill is at the bottom of the scale, as in (107):

(107) The likelihood of eating spinach



Now consider the following cases in Horn and Lee (1994).

(108) a. There isn't any person here.

b. There isn't even a single person here.

(109) a. There isn't any food left.

b. There isn't even the least amount of food left.

(110) a. I like any apple.

b. I like even the least delicious apple.

(111) a. Any puppy is cute.

b. Even the ugliest puppy is cute.

All the (a) sentences can be paraphrased as the corresponding (b) sentences by using *even*. This suggests that just like *even*, *any* imposes a contextually relevant scale in these examples too, and the DP associated with *any* is at the bottom of the scale. For (108) and (109), the scale is along the dimension of quantity, therefore the bottom of the scale is the least amount of quantity, which could be zero. For (110) and (111), it is a scale of kind, therefore the bottom of the scale is the kind of entities that is least likely to satisfy the predicate. As we can see from these examples, if the predicate holds even for the bottom of the scale, it will automatically hold for the whole scale. The existence of an implicit *even* in English NPIs finds support in other languages, where an overt morpheme *even* is part of the NPI form, Hindi, for instance (Lahiri 1998).

Applying Lee and Horn's analysis to comparatives, English comparatives are analyzed in a similar way as Chinese comparatives. The implicit focus marker *even* in (112a) imposes a set of alternatives that will make the statement *John is taller than X* true. Among all the alternatives, the statement in (112a) describes the least likely event. In a comparative context as (112a), the least likely event would be paraphrased as (112b), i.e. *John is taller than tallest person*. If this event is true, by scalar inference, we get the universal interpretation that John is taller than everybody. This analysis confirms Zepter's intuition that comparatives containing NPIs are interpreted as if they were superlatives, but different from Zepter's analysis, now we can explain why they are interpreted this way.

(112) a. John is taller than anybody.

b. John is taller than even the tallest person.

It is worth noting that different from common assumptions that the DP associated with *even* expresses the lowest point on a relevant scale (Haspelmath1997, Lee and Horn 1994), under the present analysis, it is an event that is associated with the lowest point of the scale. Specifically we are concerned with the least likely event. This point is most clearly demonstrated by the paraphrase of (112a), as shown in (112b), where the DP associated with *even* is actually the highest point on a scale of height, but the even that *John is taller than the tallest person* is still at the lowest point of a likelihood scale[6].

3.3.4. Summary

Mainly based on Chinese data, in this section we give a scalar analysis of NPIs in comparatives, and I also show that this analysis can be extended to English as well. To license an NPI in comparatives, we need to have first, a widened domain, probably induced by focus; second, a scale that orders all the alternative events along a likelihood

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[6] This could explain an argument against the *even* analysis of NPIs like *any* or *ever* (Heim 1984). Heim argued that it is the class of minimizers, not normal NPIs as *any* or *ever*, that contain an implicit *even*. Minimizers are a class of NPIs that on the surface expresses minimal quantity or degrees, for instance, ***lift a finger, utter a ingle word, lend a red cent***, etc. One critical property that Heim claims to distinguish minimizers on one hand and *any* or *ever* on the other, is that minimizers add rhetorical flavor to questions, but *any* or *ever* doesn't (also see Ladusaw 1979, Wilkinson 1996, Han 1998). Guerzoni (2004) attributes the negative bias of minimizers to the scope interaction between the implicit *even* and the interrogative operators. In the following examples, the (a) questions, which contain minimizers, are biased towards a *no* answer, but the (b) questions are not biased to either *yes* or *no* answer.

(1)	a. Will Mary lift finger to help?	Negatively biased
	b. Will Mary do anything to help?	Neutral
(2)	a. Do you have the faintest idea?	Negatively biased
	b. Do you have any idea?	Neutral
(3)	a. Did he say a single word?	Negatively biased
	b. Did he say anything?	Neutral

This objection wouldn't apply to NPI in comparatives because as shown in (112) the DP associated with the NPI is tied to the highest point on a scale, and the event is presupposed as the least likely event. This is different from minimizers, whose association with the negative rhetoric force, as pointed out by Guerzoni, is closely tied to the fact that they express the lowest point on a scale themselves, and the event related to them are presupposed to be the most likely event.

scale; and thirdly a way to pick out the event on the top of the scale, i.e., the least likely event. Crucially, different languages have their own ways to implement these ingredients. For example, Chinese overtly moves the NPI for focus reasons and uses an adverb on the predicate to achieve the end of the scale interpretation, on the other hand, For English NPIs, the same functions can be encoded in the lexicon through an implicated incorporated *even*. Since none of these ingredients is an inherent requirement on either NPIs or comparatives, it is also expected if some languages don't license NPIs in comparatives at all, which means those languages lack specific implementations for one, or even all the above ingredients for comparatives. However, I will leave a full exploration to another occasion.

3.4.Conclusion

NPI in comparatives poses some challenges to some previous analyses of NPIs in general. We have shown in this chapter that a scalar analysis explains the data better. How about the previous analyses then, for instance, the downward entailing analysis and the (non)veridicality analysis? Independent investigations outside of comparatives have shown that they each can account for some part of the NPI data. Moreover, the scalar analysis has its own limitations too. For instance, Rullmann (1996) has criticized Lee and Horn's analysis based on Dutch data. Therefore, the purpose of this chapter is not to replace other proposals with the scalar analysis. In fact, it is notoriously difficult, if not completely impossible, to give one single analysis to all the variations of NPIs crosslinguistically. Comparatives provide a good opportunity for us to see one way, probably among many other ways, that a NPI can not only be licensed, but also be

interpreted as universal. The next step of the exploration would be looking for the link behind all these different proposals that can place them together under the same big picture.

Chapter 4

The Degree Argument

4.0. Introduction

While discussing the semantic issues in previous chapters, we have seen that the semantics and syntax in comparative constructions are closely related. Starting from this chapter, I will address in more details some issues about the syntax of comparatives. As mentioned in the Introduction, to address the structure of comparatives, one has to address a critical question first, that is if we need a degree argument in the structure. There have been some debates in the literature over this issue. In this chapter I will provide evidence to support the existence of such an argument. And in the next chapter, I will propose a structure that integrates the degree argument.

4.1. Do we need a degree argument?

4.1.1. Quantification over degrees

Gradable adjectives are relational expressions that relate individuals to degrees on a scale (Cresswell 1976, Hoeksema 1983, von Stechow 1984, Kennedy 1997, Heim 1985, 2002). For instance, when we say *x is smart*, we map x to a point of degree d[1] on the scale of intelligence. The semantic representation of the adjectival predicate *smart* is as stated in (1):

(1) smart (x, d)

[1] I am assuming degrees are points on the scale. For discussions about degrees as extents/intervals on the scale, see Kennedy (1997, 1999), Schwarzschild & Wilkinson (2002).

If the statement *x is smart* maps x to a degree on the scale of intelligence, the comparative statement *x is smarter than y is* should also map x to its degree of intelligence, let's call it d_x. At the same time, d_x is compared to another degree of intelligence d_y. Traditionally, it is assumed that comparative constructions involve existential quantification over degrees. That is to say, the adjectival predicate takes a degree argument. The logical representation of the statement *x is smarter than y is* is stated as (2):

(2) X is smarter than Y is.

$\exists d_x[d_x>(\lambda d_y \text{ smart } (y, d_y))][\text{smart}(x, d_x)]$

In traditional terms, d_y is called the standard degree. Also following von Stechow (1984) and Rullmann (1995), I will assume that the comparative clause, i.e., the *than*-clause, is under the operation of a maximality operator. That is to say, for (2) to be true, X has to be smarter than the maximal degree of Y's intelligence. The maximality operator is defined as (3). Adding this maximality operator, the logical representation of (2) is stated as (4):

(3) $\text{MAX}(D) = \iota d \in D\ [\forall d' \in D: d \geq d']$

(4) X is smarter than Y is.

$\exists d_x[d_x> \text{MAX}(\lambda d_y \text{ smart } (y, d_y))][\text{smart}(x, d_x)]$

Although the semantic representation in (4) captures the correct meaning, there are two concerns as to whether we should consider comparative constructions as involving quantification over degrees. The first question is that, as Kennedy (1997) pointed out, some scope facts seem to show that degree arguments don't exist. Secondly, even if the degree argument does exist, it is unclear how to fit it into the syntactic structure of comparatives. I will turn to these two issues one by one.

4.1.2. The debate about quantification over degrees

Semantic ambiguity arising from scope ambiguity between two quantificational elements is very common in languages. For example, depending on the scope interaction between the two quantificational DPs in (5), example (5) has two different meanings.

(5) Everybody likes a teacher.

a. $\forall x \exists y$ [teacher (y) & x likes y]

b. $\exists y \forall x$[teacher (y) & x likes y]

Under the interpretation of (5a), each person likes a different teacher; but under (5b) there is a specific teacher that everybody likes. If the inherent semantics of adjectives involves quantification over a degree argument, we expect to see its interaction with other quantificational elements, e.g. quantifiers, negation, and intensional operators. Kennedy (1997) discussed these issues and arrived at a negative answer. Let's take a look at one example in which the subject of the comparative construction is a strong quantifier.

(6) Every squirrel on campus is bigger than my cat.

a. $\forall x[\text{squirrel}(x)][\exists d_1[d_1 >_{MAX} (\lambda d_2\ \text{big}(\text{my cat}, d_2))]][\text{big}(x, d_1)]]$

b. $\exists d_1[d_1 >_{MAX} (\lambda d_2\ \text{big}(\text{my cat}, d_2))][\forall x[\text{squirrel}(x)]\ [\text{big}(x, d_1)]$

If the degree argument of the adjective *big* (i.e. d_1) participates in scope ambiguities in sentence (6), we should have two interpretations as represented in (6a) and (6b). In (6a), the universal quantifier *every squirrel* takes scope over the degree argument d_1. (6a) says every squirrel possesses a degree of bigness d_1, and d_1 exceeds d_2, which is the degree of bigness of my cat. This amounts to say that each squirrel is bigger than my cat, and that is the natural reading we get for (6). When the scope between the two inverts, as shown in (6b), we get an interpretation that there exists a degree d_1 which exceeds d_2, the bigness of my cat, and every squirrel is d_1-big. (6b) forces a reading that every squirrel is the same size, and that is not a natural reading we get from (6). Kennedy argued that similar facts also hold for negation and intensional operators, i.e. the degree argument fails to scope over them and give rise to semantic ambiguity. These facts cast serious doubts on the quantificational nature of the degree argument and Kennedy takes them further to argue that there doesn't exist such a degree argument.

Heim (2000) argued that although Kennedy's observations are largely correct, the degree argument does show a scope ambiguity in a limited number of cases. In particular, although the degree argument can't scope over a higher quantificational DP, as in (6), nor can it scope over a higher negation, it can scope over some intensional predicates, e.g. a possibility sentence as in (7).

(7) (This draft is 10 pages) The paper is allowed to be less long than that.

a. allowed [less than that]$_i$ [the paper is d_i -long]

i.e. the paper is not allowed to be longer than 10 pages.

b. [less than that]$_i$ [required] [the paper is d_i -long]

i.e. the paper is not allowed to be as long as 10 pages

Heim acknowledged that the conclusion drawn from intensional predicates (also see Stateva 1999) is tentative, because besides the movement of the degree argument, there might be other ways to explain the ambiguity in (7). She suggests that a stronger argument for the degree argument comes from its behavior in comparatives that contain Antecedent Contained Deletion (ACD), where the covert movement of such an argument is detectable. A standard diagnosis for covert movement of a quantificational DP (QR) is its ability to license ACD. For example, in (8), to resolve the ellipsis site after *did* one needs to copy its antecedent, i.e. the higher predicate VP1, into VP2. However, since VP2 is contained within VP1, such an operation will suffer from the infinite regress problem. QR can be used to rescue the situation. After the DP is moved out of VP1, there is a simple VP1 *read* that can be copied into VP2, as shown in (9).

(8) I [$_{VP1}$ read [$_{DP}$ every book that you [$_{VP2}$ did Δ]]].

(9) [$_{DP}$ every book that you [$_{VP2}$ did Δ]]$_i$ [I [$_{VP1}$ read t_i]]

To the extent that (8) is a perfectly fine sentence despite the ACD problem on the surface, covert movement in (9) of the quantificational DP must have happened at LF. Following Wold (1995), Heim argued that the same argument can be carried over to the degree argument in comparatives, as shown in (10).

(10) John was climbing higher trees than Bill was.

To understand (10), we have to first understand a similar sentence in (11).

(11) *John was climbing trees that Bill was.

Carlson (1975) noticed that ACD is degraded in a relative clause as (11), in which the head of the relative clause is a weak indefinite, especially an existentially read weak plural. This was explained in Diesing (1992) as the conflict between two contrary conditions. On the one hand, to resolve ACD, the DP *trees that Bill was* has to undergo QR; on the other hand, on independent ground Diesing claimed that existential bare plurals do not QR, instead they stay inside VP to get existentially bound via existential closure. In contrast to (11), the ACD in (10) can be resolved by QR of the degree argument while leaving the bare plural inside the VP, as shown in (12).

(12) [-er than Bill was ~~climbing d_i -high trees~~]$_i$ [John was climbing d_i -high trees]

To summarize, the ACD facts in comparatives seem to strongly support the quantificational status of the degree argument. In next section, I will discuss another issue that also involves ACD in comparatives. That is, the definiteness effect in attributive comparatives. I will show that using the quantificational degree argument we can provide a simple account for the definiteness effect.

4.2. The Definiteness Effect

In previous studies, the scope property of the degree argument was used to examine whether there is a quantificational degree argument or not. Recall that the main argument in Kennedy (1997) is that since we don't seem to find evidence that the degree argument enters into scope ambiguities with other quantificational elements, there shouldn't be a degree argument in the representation. Part of the counter arguments in Heim (2000) also focused on looking for scope ambiguity between the degree argument and other quantificational elements. To the extent that scope ambiguity does exist in some limited cases, we still have reason to believe the quantification over degree arguments. In this section, I will present some new evidence to support the quantificational view. The test I am using is the intervention effect at LF. As proposed in Beck (1996), LF movements are blocked by intervening quantifiers. I will show that the LF intervention effect accounts for the definiteness effect in comparatives, which in turn supports LF movement for degree arguments.

4.2.1. The definiteness effect in attributive comparatives

Lerner and Pinkal (1995) noticed that attributive comparatives show a definiteness effect (DE). As shown below, the comparative DP has to be an indefinite DP.

(13) a. George owns a/some/a few faster car(s) than Bill (does).

b. *George owns every/the faster car than Bill (does).

They also noticed that the indefiniteness effect is dependent on the explicit occurrence of a complement phrase (i.e., the *than*-phrase), since all of the examples in (11), which have no complement, are acceptable.

(14) a. George owns a faster car.

b. George owns every faster car.

c. George owns the faster car.

Beil (1997) attributes the DE above to a requirement on strong DPs that their domain has to be presupposed in previous context. Although his proposal might be independently needed for comparatives anyway, I will argue in the next section that it is not sufficient to account for the whole range of data of the definiteness effect in comparatives.

4.2.2. Beil (1997)

Beil (1997) noticed that for strong determiners, the observation about the lack of a complement phrase is correct only when there is a presupposed comparison set in the previous context. Consider the examples below:

(15) a. Of those cars, Sue bought one. George bought every faster car.

b. Sue bought a car. *George bought every faster car.

c. Sue bought a car. George bought a faster car.

Intuitively (15a) is preferred over (15b) because in (15a) there is a contextually given comparative instance (namely, Sue's car) that is taken from a contextually presupposed set (namely, of those cars). The absence of such a presupposed set does not matter for the weak DP in (15c). Beil attributes the difference to a general rule that strong quantifiers always presuppose their domain (Moltmann 1996), but weak ones do not. The interpretation of *every faster car* in (15a) depends on the presupposition of a set of cars, and that set is provided in context. Notice that the single instance *Sue's car* has to be a subset of some set of cars whose definition can have various instantiations, but mentioning Sue's car in the context of (15b) does not eliminate the ungrammaticality. Based on the contrast between (15a) and (15b), Beil argues that it is crucial that the domain of the strong quantifier is not just non-empty, but is also defined in the previous context.

The presupposition difference between strong and weak DPs is independently motivated by some other linguists too. Milsark (1974) argues that strong determiners are unambiguously presuppositional, whereas weak determiners are ambiguous between a presuppositional interpretation and a nonpresuppositional one, for example, the cardinal reading. For instance, the strong determiners in (16) presuppose the existence of ghosts. If there are no ghosts, the truth value of (16) is undefined.

(16) a. Every ghost danced in my house.

b. Most ghosts danced in my house.

On the other hand, the weak determiners in (17) are ambiguous. (17a) only asserts the existence of ghosts, it does not presuppose it. If it turns out there is no ghost in the house, the sentence is false, but if there are ghosts in the house the sentence is true. The sentence in (17b), usually with a stressed reading of the determiner, carries a presupposition of the existence of the ghost. It is read more like a partitive determiner, such as *some of the ghosts, three of the ghosts*.

(17) a. There is/are a/some/a few ghost(s) dancing in my house.

b. A/SOME/A FEW ghost(s) is/are dancing in my house, (the others are dancing in the street).

However, the presupposition property alone is not sufficient to explain the definiteness effect in attributive comparatives. For example, it is not clear how Beil's analysis can be extended to explain the cases where the comparative complements are explicit, although Beil claims it does. If we add a context to the original examples in Lerner and Pinkal (1995), the judgments are still similar:

(18) Of those cars, Bill owns some. George owns a/some/a few faster car(s) than Bill (does).

(19) Of those cars, Bill owns some. *George owns every/the faster car than Bill (does).

As Beil notes himself, in the following examples, even if there is a presupposed set (because *contestant* lexically presupposes the set of participants in a contest), there is a difference between the weak comparative DP and strong comparative DP.

(20) Sue defeated a stronger contestant than Al.

a. Sue defeated a contestant that is stronger than Al is.

b. Sue defeated a stronger contestant than Al did. (i.e. the contestant defeated by Sue is stronger than the contestant defeated by Al.)

(21) ?Sue defeated every stronger contestant than Al.[2]

a. Sue defeated every contestant stronger than Al.

b. *Sue defeated every stronger contestant than Al did (i.e. every contestant defeated by Sue is stronger than every contestant defeated by Al).

(20) has two interpretations. In the first reading, we are comparing the contestant defeated by Sue with another person Al; in the second reading we are comparing the person Sue defeated and the person Al defeated. When we change the indefinite DP in (20) to a definite DP in (21), we lose the second interpretation. If the domain presupposition requirement is the only difference between a weak and a strong DP, the contrast above is left unexplained. The same problem exists in the following examples:

---

[2] For some reasons, (21) sounds degraded to native speakers. Most people would prefer a word order like " ...every contestant stronger than AL". But the contrast between (18a) and (18b) is nevertheless robust.

(22) a. ?Of those cars, Sue bought a BMW. George bought every faster car than that BMW.

b. *Of those cars, George bought every faster car than Sue did.

The context "*of those cars,...*" provides a presupposed set of cars in both examples. However, the DE is avoided only in the (a) example.

To summarize, the presupposition account alone is not the desired solution. The alternative I will propose reduces DE in comparatives to an LF intervention effect laid out in Beck (1996). The basic idea is that at LF, in order to yield a final interpretation, the degree argument of the gradable adjective has to move across the DP head, namely, the determiner. Being quantificational, strong determiners will block such movements; but weak determiners will not. In the next section, I will review the discussion on the quantifier intervention effect, and propose my analysis of the DE.

4.3. The DE as an indication of the degree argument movement

4.3.1. The quantifier intervention effect at LF

The main finding in Beck (1996) is informally schematized as below, which indicates that quantifiers block LF movements.

(23) *[....X_i....[Q...[...t_i...]]]

The main arguments come from German split-quantifiers, as shown in (24) and (25).

(24) a. **Wen alles** hat Luise gesehen?

Whom all has Luise seen

Who-all did Luise see?

b. **Wen** hat Luise **alles** gesehen?

Whom has Luise all seen

Who-all did Luise see?

(25) a. **Wen von den Musikern** hat Luise getroffen

Whom of the musicians has Luise met

Which of the musicians did Luise meet?

b. **Wen** hat Luise **von den Musikern** getroffen

Whom has Luise of the musicians met

Which of the musicians did Luise meet?

In (24a), *wen alles* is originally one argument, but it can split in (24b); a similar case holds for *wen von den musikern* in (25). Since in the (b) sentences what is left behind is the restriction of the wh-phrase, the natural conclusion is that there are LF movements for the (b) sentences in order to have a complete quantifier argument to derive the correct interpretation. So *alles* in (24b) and *von den Musikern* in (25b) will move at LF to join *wen*. Interestingly, quantifier splitting is not allowed if there is another intervening quantifier.

(26) a. ?? **Wen** hat niemand **alles** gesehen?

Whom has nobody all seen

Who-all did nobody see?

b. ?? **Wen** hat keine studentin **von den Musikern** getroffen

Whom has no student of the musicians met

Which of the musicians did no student meet?

In (26), the quantifier *niemand 'nobody'* is intervening between the split quantifiers. Since that degrades the acceptability of the sentence, Beck concludes that the LF movement of *alles* and *von den Musikern* is blocked.

The above discussion is formalized into the following two definitions:

(27) **Quantifier-Induced Barrier (QUIB):**

The first node that dominates a quantifier, its restriction, and its nuclear scope is a Quantifier-Induced Barrier.

Minimal Quantified Structure Constraint (MQSC)

If an LF trace β is dominated by a QUIB α, then the binder of β must also be dominated by α.

Beck also notices that indefinite DPs do not generate the same kind of LF blocking effect as other quantificational structures. She suggests that only inherently quantificational elements can induce the LF blocking effect. Following Heim (1982), indefinites are variables with no inherent quantification force, so they do not induce the LF blocking effect.

Interestingly, the distinction between indefinite DPs and other DPs in terms of their quantificational status seems to find support in the discussion in Diesing (1992). Diesing argues that strong and weak DPs differ with their ability to QR. Strong DPs are quantificational; hence they can be raised by QR. On the other hand, only presuppositional weak DPs are quantificational and undergo QR. Cardinal (non-presuppositional) weak DPs are not quantificational and stay in-situ at LF. If this analysis is on the right track, it suggests that strong determiners or weak but presuppositional determiners will induce the LF intervention effect, but weak determiners will not. This assumption will become crucial for the discussion in the next section.

To summarize, strong determiners block LF movements, because they are genuinely quantificational, but weak non-presuppositional determiners are just variables with no inherent quantificational force, so they do not block LF movements. In my analysis in the next section, I will show that the DE arises as the result of an interaction between the LF movement of the degree argument and the strong/weak determiners.

4.3.2. A new proposal

Consider (28). Following Lerner and Pinkal (1995), (28a) is elliptical just as (28b) is. I also follow Chomsky (1977) in treating the clausal complement as a wh-construction.

(28) a. George ate a bigger cake than [Op_i Bill e_i].

b. George ate a bigger cake than [Op Bill did].

Following the traditional QR solution for ACD cases, (25a) will receive a derivation at LF as in (29):

(29) a. [a bigger cake than [Op Bill [e]]]$_2$ [George$_1$ [t_1 ate t_2]]

⇓

b. [a bigger cake than [Op$_j$ Bill [ate t_j]]]$_2$ [George$_1$ [t_1 ate t_2]]

As noted by Lerner and Pinkal, there is a problem for the above syntactic analysis. In the resulting structure in (29b), the wh-operator binds an individual variable. We know it is of an individual type because it is copied from another individual type variable, t_2. However, to derive a sensible interpretation, the wh-operator has to bind a degree variable. How can we connect the individual cake introduced by t_j to its degree of bigness? Lerner and Pinkal's solution is to introduce an implicit anaphoric element that relates individuals to degrees. Let's call this anaphoric component P_0 and give it a semantic interpretation as (30), and the semantics of the comparative site of (29b) is given in (31):

(30) $\lambda Q \exists y[P_0(y, d) \wedge Q(y)]$

(31) $\exists y[P_0(y, d) \wedge \text{ate (Bill, y)}]$

Now we have a degree variable *d* that is derived from the individual variable. The wh-operator needs to be re-interpreted as binding the degree variable.

Although this analysis can give us the desired semantics, it is not an ideal solution. We not only need to introduce a hidden anaphoric element, but also have to

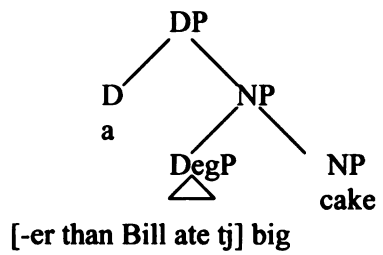
reinterpret the wh-operator with no obvious syntactic support. I will suggest that we can apply QR again to solve the problem. Since the problem only arises for the DP in (29b), in my discussion I will separate it from the rest of the structure. The problem now is how to derive a degree variable that can replace the individual variable t_j in (32):

(32) $[_{DP}$ a bigger cake than [Op_j Bill [ate t_j]]]

If the gradable adjective *big* takes a degree argument, (32) actually has the structure in (33), namely *[-er than Bill ate]* is the degree argument of *big*. Following the tradition that modifiers are generated at [Spec, NP] position, (33) has a tree structure as (34):

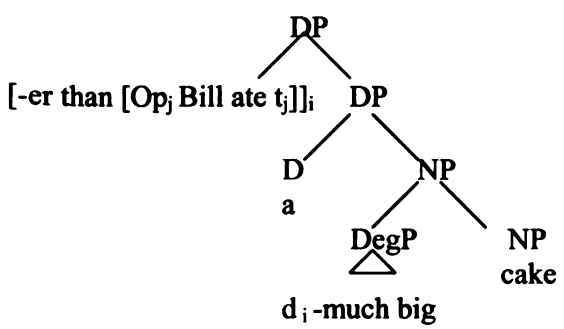
(33)$[_{DP}$ a [-er than [Op_j Bill [ate t_j]]] big cake]

(34)



Since the degree argument is quantificational, it is able to QR again, as shown in (35):

(35) [-er than [Bill ate [e]]]$_i$ $[_{DP}$ a $[_{NP}$ d_i-much big cake]]



Now a degree variable is available inside the NP. What we need is only copying that NP into the object position of *ate*, and that gives us (36):

(36) [-er than [Op_j Bill ate [d_j-much big cake]]]$_i$ [$_{DP}$ a [$_{NP}$ d_i-much big cake]]

In (36), we let the wh-operator bind the degree variable that is copied from the NP. Combining (36) with (29b), the final LF structure we derive is (37):

(37) [$_{DP}$[-er than [Op_j Bill ate [d_j-much big cake]]]$_i$ [$_{DP}$ a [$_{NP}$ d_i-much big cake]]]$_2$ [$George_1$ [t_1 ate t_2]]

Now we can read the meaning of (37) with no problems. (37) says George ate a cake that is d_i-much big such that d_i exceeds the degree of bigness d_j which is the size of the cake eaten by Bill.

One point is worth mentioning. In (36) what is copied is only the NP, not the DP, because there are reasons to believe that the determiner is not copied back to the ellipsis site (Lerner & Pinkal 1995, Lechner 1999). As shown below, the sentence *George ate a bigger cake than Bill* only has the interpretation in (38a), not (38b). The same point is shown by examples with other determiners, as in (39).

(38) George ate a bigger cake than Bill

a. George ate a bigger cake than [Op_i Bill ate **any** d_i-much big cake] (i.e. George ate a bigger cake than any of the cakes Bill ate)

b. *George ate a bigger cake than [Op$_i$ Bill ate **a** d$_i$-much big cake] (i.e. George ate a bigger cake than a cake Bill ate)

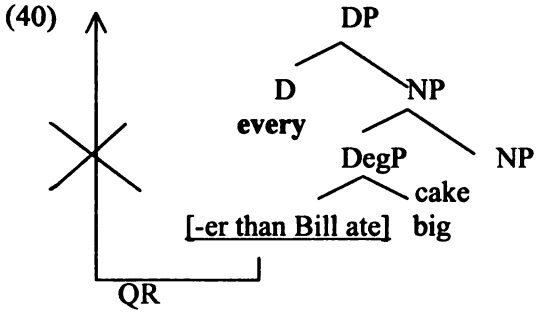
(39) George ate at least two/three/at most three bigger cakes than Bill

a. George ate at least two/three/at most three bigger cake than [Op$_i$ Bill ate **any** d$_i$-much big cake]

b. *George ate a bigger cake than [Op$_i$ Bill ate **at least two/three/at most three** d$_i$-much big cake]

To summarize, we derive the interpretation of the sentence *George ate a bigger cake than Bill* by applying QR twice. First, the object DP undergoes QR in order to resolve ACD and recover the materials in the ellipsis site; second, the degree argument undergoes QR in order to establish a degree variable in the *than*-phrase. It is at the second step that the DE arises. As discussed in the last section, strong and weak determiners have different ability to block LF movements. When we QR the degree argument, as in (35), if there is a strong determiner in the way, that movement will be blocked. The derivation crashes because the final interpretation can not converge, as shown in (40). But weak determiners would not intervene, so the derivation will go through fine:

(40)



4.3.3. Predictions

Since the current analysis crucially makes use of the movement of the degree argument, it makes two predictions. First, in cases where movement is not needed to derive the final interpretation, the DE will not emerge; second, if movement has to cross over an island, the derivation will fail. I will argue in this section that both predictions are borne out.

So far in my discussion the movement of the object DP is necessary in order to resolve ACD, and consequently one needs to move the degree argument. However, not all comparatives face the ACD issue. Lerner and Pinkal (1995) distinguish two kinds of attributive comparatives: the narrow reading (NRA) as in (41a), and the wide reading (WRA) as in (41b):

(41) a. George owns a faster car than this BMW.

b. George owns a faster car than Bill.

Crucially, Lerner and Pinkal argue that we should treat the two readings differently. The NRA readings are genuine phrasal comparatives, and the WRA constructions are genuinely elliptical ACD constructions. To derive the WRA readings, the missing material in the comparative site (i.e. the materials contained in the *than*-phrase) has to be recovered first. The structural difference between two readings is demonstrated below:

(42) NRA: a. George owns a faster car than [$_{DP}$ this BMW]

b. Sue defeated a stronger contestant than [$_{DP}$ Al].

c. Sue defeated every stronger contestant than [$_{DP}$ Al]

(43) WRA: a. George owns a faster car than [$_{CP}$ Bill does]

b. Sue defeated a stronger contestant than [$_{CP}$ Al did].

c. Sue defeated every stronger contestant than [$_{CP}$ Al did]

For more details of this analysis, I refer readers to Lerner and Pinkal (1995). At this point, what is crucial for my purpose is that the NRA readings do not involve movements, but the WRA readings do. Interestingly, this explains some old data that are problematic for Beil (1997). Consider his original data again.

(44) Sue defeated a stronger contestant than Al.

a. Sue defeated a contestant that is stronger than Al is.

b. Sue defeated a stronger contestant than Al did. (i.e. the contestant defeated by Sue is stronger than the contestant defeated by Al.)

(45) ?Sue defeated every stronger contestant than Al.

a. Sue defeated every contestant stronger than Al.

b. *Sue defeated every stronger contestant than Al did (i.e. every contestant defeated by Sue is stronger than every contestant defeated by Al).

Recall the problem is that the presence of a weak determiner in (44) allows two interpretations of the sentence, but the strong determiner in (45) blocks one interpretation. In other words, the DE only arises for the (b) interpretations, but not the (a)

interpretations. Interestingly, the (a) interpretations are exactly the same kind of interpretation as the NRA readings of (42), and the (b) interpretations are the same as the WRA readings of (43). That is to say, no movement is needed to derive the (a) interpretations, but (b) interpretations require movements. The contrast between (44) and (45) suggests that the DE is sensitive to syntactic movements, and this is exactly what the current analysis can capture. Specifically, weak determiners never induce the DE, as shown in (44). Strong determiners induce DE only when there is movement, as shown in (45). I summarize the results in the following table:

	Involves Ellipsis?	Definiteness Effect?
Phrasal comparatives (the (a) interpretations)	NO	NO
Clausal comparatives (the (b) interpretation)	YES	YES

The same approach extends to another contrasting pair observed earlier, repeated below for convenience:

(46) a. ?Of those cars, Sue bought a BMW. George bought every faster car than that BMW.

b. *Of those cars, George bought every faster car than Sue did.

Again, (46a) is a case of NRA, and (46b) a WRA. The strong determiner *every* only shows a DE effect in (46b).

Let's use the following data to test the second prediction. As shown in (47), there exists a contrast between a pre-nominal modifier and a post-nominal modifier.[3]

(47) a. John met a taller girl than Bill did.

b. *John met a girl who is taller than Bill did.

I hope it is clear now how (47a) can be derived. It should be derived in the same way as (28a). The exact same process applies to (47b), but problems arise as shown below. First, the whole object DP undergoes QR, and the predicate VP is copied into the ellipsis site, as shown in (48a) and (45b); in (48b) what is needed is a degree variable in the ellipsis site, but we have an individual variable, so the degree argument, as shown in (48c), needs to undergo QR again, as in (48d). It is at this step problems arise. The degree argument can not undergo QR because it is within a relative clause island. Since (48d) and (48e) can not proceed, the semantic interpretation would fail because there is no degree generated in the ellipsis site.

(48) a. [a girl who is taller than Bill [e]]$_j$ [John met t_j]

b. [a girl who is taller than Bill [met t]]$_j$ [John met t_j]

c. [a girl who is [-er than Bill met t] tall]$_j$ [John met t_j]

d. *[[-er than Bill met t]$_k$ [a girl who is d_k -much tall]]$_j$ [John met t_j]

e. *[[-er than Bill met [girl who is d-much tall]]$_k$ [a girl who is d_k -much tall]]$_j$ [John met t_j]

[3] I thank Chris Wilder for pointing out this to me.

To summarize, I reviewed the debate about the existence of a quantificational degree argument. New evidence from the definiteness effect lends support to the traditional view that comparatives involve quantification over a degree argument. The immediate problem is how to fit this argument into the syntactic structure. I will address this issue in the next section.

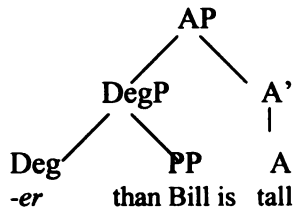
4.4. The syntactic structure of comparatives

4.4.1. The discrepancy between semantics and syntax

If comparatives involve quantifications over degree arguments, assuming that the argument is generated at the specifier position of its head, we can derive a syntactic structure of comparatives as in (49a). The DegP *[-er than Bill is]* denotes the degree argument of the adjective head *tall* and they are in a [Spec, head] relation. One advantage of this structure is that it makes a comparative construction as in (49) analogous to a simple adjectival predicate as in (50). In both sentences, the predicate *tall* takes a degree argument DegP, so both mean *John is d-much tall.* The difference between the two only lies in the content of the degree argument. As (49b) shows, (49) means John is tall to a degree d1, and d1 is defined as a degree exceeding the maximal degree d2 to which Bill is tall. (50) also means John is tall to a degree d1, but d1 is defined as six-feet.

(49) John is taller than Bill is.

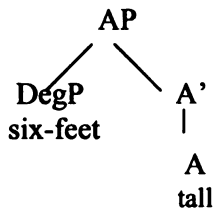
a. John is [$_{AP}$ [$_{DegP}$ *–er* than Bill is] tall]



b. ∃d1[d1> $_{MAX}$ (λd2.tall(Bill, d2))] [tall (John, d1)]

(50) John is six-feet tall.

a.



b. ∃d1[six-feet(d1)] [tall (John, d1)]

One problem with the structure in (49) is that on the surface the degree argument DegP is not a constituent. To derive the correct word order, Bresnan (1973) proposed to extrapose the *than*-clause to the right. However, extraposition can't solve a deeper problem of (49). As Corver (1997) noticed, it is impossible to extract the DegP out of the adjective phrase, instead, one has to extract the whole AP to ask a question, as shown in (51) and (52).

(51) John is [$_{AP}$[$_{DegP}$-er than Bill is] tall]

a. *How$_i$ is John [ti tall]?

b. How tall is John?

(52) John is [$_{AP}$[$_{DegP}$ six-feet] tall]

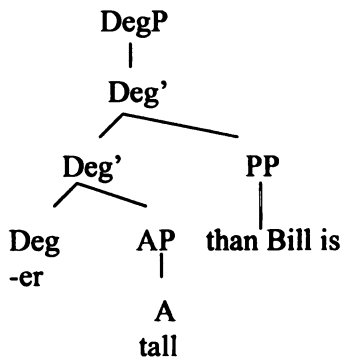
a. *How$_i$ is John [ti tall]?

b. How tall is John?

This is unexpected under a structure as in (49), because there is no reason that we shouldn't be able to extract the specifier of a maximal projection.

From the discussion above, we know that the structure in (49) can't be right. It over-generalizes and wrongly rule in cases like (51) and (52). The problem can be avoided if we adopt an extended DegP structure for comparatives (see Abney 1981, Corver 1997, Kennedy 1997), as shown in (53).

(53) John is [$_{DegP}$ [$_{DegP}$ *–er* [$_{AP}$ tall]] [$_{PP}$ than Bill is]]



Syntactically, (53) can solve a couple problems. First, it preserves the surface word order; second, the degree morpheme *–er* and the PP *than Bill is* don't form a constituent, so we can't extract them without extracting the whole DegP, as in (51) and (52).

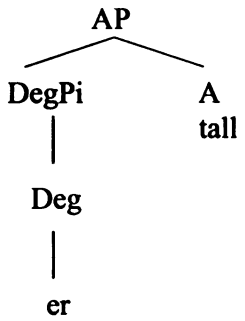
However, although the structure in (53) is independently motivated on syntactic grounds, it does speak against the kind of semantics that assumes quantification over degree arguments. This is so exactly because now the head of the projection is the degree morpheme *–er*, and it takes two arguments, the gradable adjective *tall* and the standard degree *than Bill is*. The adjective head *tall* isn't taking any degree argument, and in fact it can't because the degree argument *[-er than Bill is*] isn't a constituent at any point of the derivation. To maintain this structure, one has to give up the degree argument. This is the approach taken in Kennedy (1997). To maintain the degree argument, which seems necessary from discussion in the last section, one has to give up the extended DegP structure, namely, one needs to go back to a structure like (49). Could we have another alternative that can rescue us from this dilemma? What we need is a structure that maintains the degree argument, but at the same time maintains the surface word order and possibly the extended DegP structure. Next, I will review two proposals in the literature.

4.4.2. Solution one—late merge the than-clause

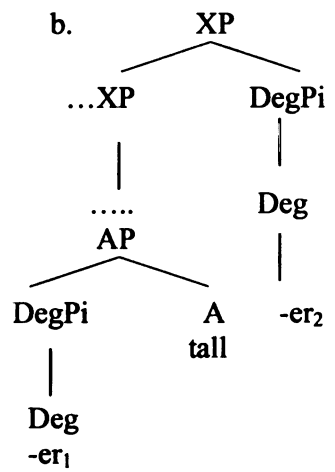
To maintain that the degree morpheme *–er* and the *than*-clause together form a degree argument on the one hand, and on the other hand they are discontinuous on the surface, Bhatt and Pancheva (2004) proposed that the *than*-clause is countercyclicly merged to the *–er* after *–er* undergoes QR. The lower copy of *–er* is spelled out, whereas the than-clause is merged to the higher *–er* at the QR position. This explains why on the surface *–er* and the *than*-clause are not pronounced as a constituent, but they semantically behave as one degree argument. Let's illustrate this proposal in more detail. As shown in (54a), the degree argument is merged with the adjective head at the [Spec,

AP] position. The degree argument at this point only contains the degree morpheme *–er*. Being a quantificational argument, the DegP is able to undergo QR, as shown in (54b). The lower copy of *–er* (-er$_1$) is the one that is spelled out in pronunciation, whereas the higher *–er* is interpreted at LF.

(54) a.

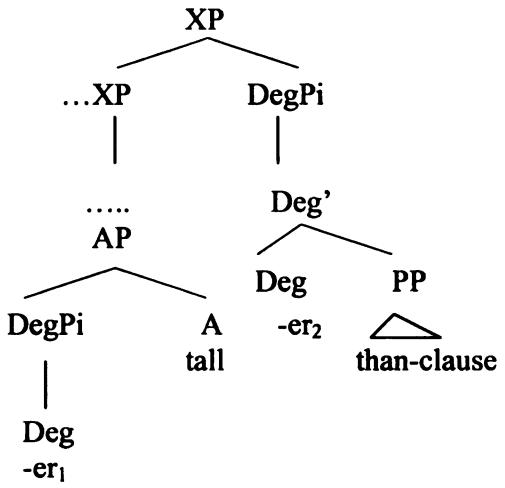


b.



At the high DegP position, the *than*-clause is merged, as shown in (55).

(55)



As shown in (55), the degree argument [-er_2 than-clause] gets interpreted at LF as one constituent, but it is *–er*$_1$, not *–er*$_2$ that is pronounced.

One advantage of this approach is that since the *than*-clause is base generated high, instead of being moved from a lower position, we can explain nicely the absence of the Condition C effects in (56).

(56) a. * I will tell him$_i$ a sillier rumor about John$_i$.

b. I will tell him$_i$ a sillier rumor (about Ann) tomorrow than Mary told John$_i$.

(56a) demonstrate a typical Condition C violation. The absence of the Condition C effect in (56b) suggests that the *than*-clause is situated out of the VP to escape being c-commanded by the indirect object *him*. The late merge approach explains why the *than*-clause could escape the c-command domain of *him*.

The late merge approach wasn't originally implemented on an extended DegP structure. As shown in (54), it is assuming a traditional AP structure, which we argued against in the last section. However, I believe this proposal can be implemented with the extended DegP structure as well.

4.4.3. Solution two—the DegP-shell structure

Based on the semantic and syntactic parallel between DP structure and DegP structure, Larson (1991) motivated the DegP-shell structure for comparatives on independent grounds.

Under generalized quantifier theory, determiners are interpreted as relational items, namely, they express relations among sets. For example, the sentence *all students dance* is true if the set of students and the set of dancers stand in such a relation that the former is a subset of the latter; *some students dance* is true if the set of students and the set of dancers stand in such a relation that their intersection is not empty. The following are some examples of how determiners are interpreted:

(57) a. all (A, B) $=1$ iff $A \subseteq B$

b. some (A, B) $=1$ iff $A \cap B \neq \varnothing$

c. no (A, B) $=1$ iff $A \cap B = \varnothing$

d. □at least five (A, B)□$=1$ iff $|A \cap B| \geq 5$

Under this analysis, a determiner behaves like a binary transitive predicate. It has two arguments, one restriction and one scope. The common noun part is the restriction, the

main predicate is the scope, and the determiner contributes to the relation that links the two, in particular, how many things restricted by A also satisfy the scope B.

All the determiners in (57) are dyadic determiners, namely they express relations between two sets. The same analysis can be extended to triadic determiners, which express relations among three sets. For example, the complex determiner *more than* expresses relation between two arguments and a predicate. For *More women than men came* to be true, we need to consider three sets: X the set of women, Y the set of men and Z the set of people who came. The intersection of X and Z has to exceed the intersection of Y and Z.

(58) a. more than (Z, Y, X) $\square$=1 iff $|X \cap Z| \geq |Y \cap Z|$

b. *more women than men came* iff

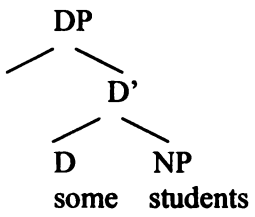
$|\{x: \text{woman } (x)\} \cap \{z: \text{people who came } (z)\}| \geq$

$|\{y: \text{man } (y)\} \cap \{z: \text{people who came } (z)\}|$

Ideally we would like a single structure that can cover both kinds of determiners in (57) and (58). The commonly assumed DP structure for dyadic determiners is as shown in (59). The determiner *some* takes one argument *students* in its complement position, and the other argument will be provided by the predicate of the sentence that this DP appears in[4].

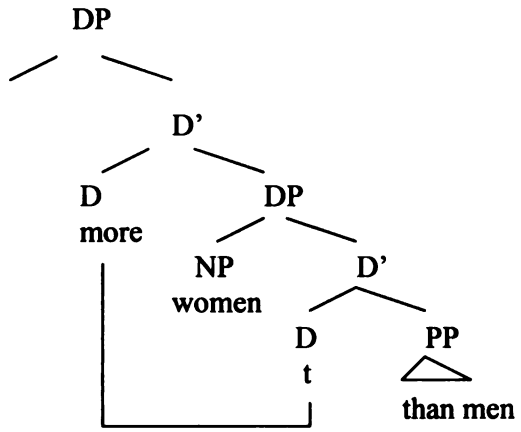
[4] In Larson's analysis, the second argument (and for the triadic determiners, the third argument too), is generated in *pro* at the [spec, DP] position. The value of this *pro* given by the main predicate at LF. In this way, all the arguments of a determiner can be generated within the maximal projection of that determiner. The exact details of this analysis are beyond the scope of our discussion.

(59)



To add the third argument for the triadic determiner, Larson proposed a DP-shell structure shown in (60). Under this structure, the determiner starts at the lower D position to link two of its arguments. Then it is raised to the higher D position to derive the correct word order. The derivation conveniently accounts for the discontinuous dependency between *more* and the *than*-phrase.

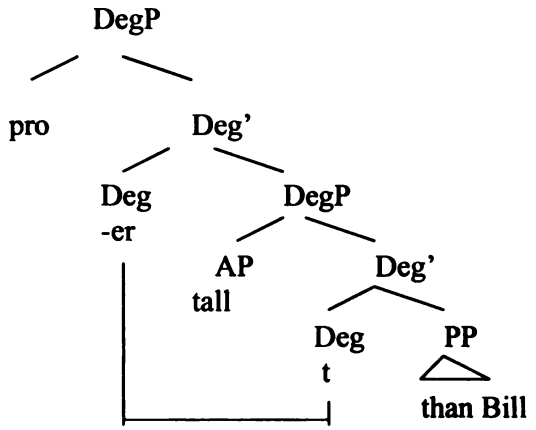
(60)



Now let's turn to comparative constructions. Assuming that adjectival expressions such as comparatives are quantificational in nature, Larson argued that quantificational degrees have a parallel semantics to quantificational determiners, namely they are both relational items. The degree morpheme such as *–er/more* expresses a three-way relation between an adjective and two DPs. To link these three things together, syntactically *-er/more* first combines with the *than*-phrase, then with the adjective, as shown in (61), and finally in order to introduce the third argument, *-er* moves to the higher DegP

projection. Putting aside technical details, the subject argument at this point is only a *pro*, its value will be identified later in the derivation as the subject argument.

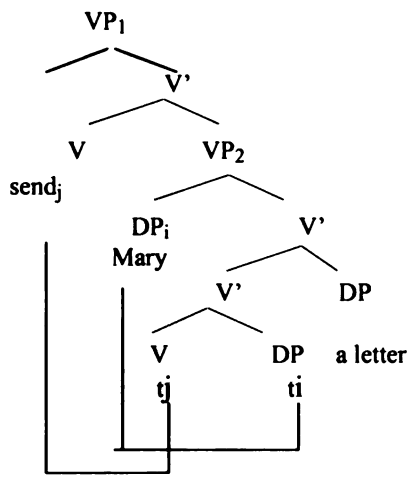
(61)



A slightly different version of the DegP-shell structure was proposed in Izvorski (1995) and I will not go into more details of those discussions. What is important for our purpose here is that at some stage of the derivation, the degree morpheme and the than-phrase forms one constituent, i.e. the Deg' structure in (61). Interestingly, the DegP-shell structure is reminiscent of the VP-shell structure in double object constructions (Larson 1988). For instance, the example in (62) has a structure as in (63). I will have more discussion about double object constructions and comparatives in the next chapter.

(62) John sent Mary a letter.

(63)



4.5. Summary

In this section, we see two proposals that can incorporate the degree argument into the syntactic structure and at the same time satisfy the surface word order requirement. In the late merge analysis, the degree morpheme and the than-phrase forms a constituent at the late merge position; whereas in the DegP-shell structure, the same constituent can be formed at the lower DegP structure.

The two proposals are originally motivated on different grounds. The late merge approach was mainly motivated by scope and condition C interactions, whereas the DegP-shell analysis was motivated by the similarity between DPs and DegPs. As far as I know, the two proposals cover more or less the same range of facts for English comparatives[5]. However, when we move to other languages, it seems that the DegP-shell analysis makes more sense. As will be discussed in Chapter five, the head movement in the shell structure is actually lexically implemented in Chinese comparatives and gives us two different comparative constructions that are underlyingly related. If we believe that crossliguistically there should be one unified structure for comparatives, Chinese data might lend support to the DegP-shell structure for English data as well. However, I also want to point out that before we find any direct empirical evidence in English to defend the DegP-shell structure against the other alternatives, it is just a convenient assumption. Moreover, instead of completely adopting Larson's structure in (61) for Chinese comparatives, substantial revisions will also be made for both conceptual and empirical reasons.

[5] It is not clear at this point if the DegP shell analysis can account for the Condition C facts discussed in Bhatt and Pancheva 2004.

Chapter 5

The DegP-shell analysis of Chinese comparatives

In Chapter 4, I argued that comparatives indeed involve quantification over degree arguments, as has been assumed traditionally. The question left is how to build this degree argument into the overall structure of comparatives. The literature has provided at least two approaches: the late merge approach and the DegP-shell approach. In this chapter I will look at the structure of Chinese comparatives, which lends support to the DegP-shell like structure, although some revisions need to be made to Larson's original structure. Some of the arguments here might still be speculative at this point, and many questions are left open, but nevertheless I hope that the general properties of Chinese comparatives will add to our understanding of comparatives from a cross-linguistic perspective.

5.0. Introduction

Li & Thompson (1981) summarized different types of Chinese comparatives. According to him, the basic pattern of Chinese comparatives is (1):

(1) X comparison word Y (adverb) dimension

In (1), X is the subject or topic under comparison, Y is the standard degree that X is compared to, and dimension refers to the predicate which specifies the dimension along which the comparison is made. In Li's survey, there are three types of comparison words:

(i) Superiority: *bi* ('than')

(2) Ta bi ni gao

He than you tall

He is taller than you.

(ii) Inferiority: *mei you/bu ru*...(name) (literally 'not as..as...')

(3) Ta meiyou/buru ni (name) gao

He not you (that) tall

He isn't as tall as you.

(iii) Equality: gen...yiyang (literally 'with...same...')

(4) Ta gen ni yiyang gao

He with you same tall

He is as tall as you.

Throughout this thesis, I will only investigate the first type, superiority comparatives. I believe the conclusions derived from this discussion will also apply to the second and the third types, but I will leave this as an empirical question for future research.

Chinese actually has two types of superiority comparatives. One type is like the sentence in (2), and (5a) below, in which the standard degree is introduced by a morpheme *bi (than),* I will call this kind *bi*-comparatives. The standard degree can also be introduced without *bi*, as shown in (5b), I will call this a bare comparative. The word order of the two types is different: in bare comparatives, the gradable adjective predicate precedes the standard degree argument, whereas in the *bi*-comparatives, this order is reversed.

(5) Superiority comparatives

a. Zhangsan bi wo gao yicun (bi-comparative)

Zhangsan than me tall one-inch

"Zhangsan is one inch taller than me".

b. Zhangsan gao wo yicun (bare comparative)

Zhangsan tall me one-inch

"Zhangsan is one inch taller than me".

Since the two examples in (5) express the same meaning, it is natural to ask if they share similar syntactic structures too. Ideally, we would like to see that there is a unified syntactic structure that can account for both word orders, and this is exactly what I am going to argue for in this chapter.

Before we get into the details of Chinese comparatives, I will briefly introduce some background on Chinese adjectives. There has been some debate as to whether Chinese has a genuine class of gradable adjectives. It is so because Chinese gradable adjectives show behaviors like verbs in many respects. I will keep agnostic to the final conclusion of the debate, but I will show some facts that suggest a close relation between gradable adjectives and verbs in Chinese.

First, Chinese gradable adjectives, just like verbs, can bear aspectual markers.

(6) Huaer hong-**le**

Flower red-**perf**.

The flowers have become red.

(7) Ta ye cengjin meili **guo**.

She also ever beautiful **perf**.

She was beautiful before.

Second, when an adjective is used as a predicate, there isn't a copular preceding the adjective. This is different from a nominal predicate.

(8) a. Ta (*shi) hen piaoliang.

she is very pretty.

She is very pretty.

b. Ta *(shi) ge xuesheng

She is CL student

She is a student.

Although based on these facts we can't definitely conclude that Chinese gradable adjectives are verbs, it is worthwhile to keep these facts in mind when we discuss Chinese comparatives.

This chapter is organized as follows. Since bare comparatives and *bi*-comparatives don't select the same set of adjectives, in section 5.1 I will introduce more data about this issue. I discuss the structure of the standard degree in Chinese comparatives in section 5.2, and argue that at least for the kind of comparatives we are discussing here, the standard degree is expressed as a DP, not an elided CP. Section 5.3. and 5.4. discuss the structure of bare comparatives and *bi*-comparatives. I argue that the

DegP-shell analysis can unite the two kinds of comparatives through head movements. Some consequences of the DegP-shell analysis are explored in section 5.5. Since in the DegP-shell analysis, the lower DegP structure is claimed to be the degree argument, I will investigate the LF movement of this argument in section 5.6. The last section is a conclusion.

5.1. The adjective selection constraints

Bi-comparatives and bare comparatives are not completely interchangeable. Although we can always use any adjective in *bi*-comparatives, bare-comparatives seem to be severely constrained in terms of what adjectives can be used. The following are some examples:

(9) a. Ta bi wo gao/ai/zhong/qing /piaoliang/xixing /gaoxing /youqu yidian
he bi me tall/short/heavy/light/pretty/careful/happy/interesting a little
He is a little *taller/shorter/heavier/lighter/prettier/more careful/happier/more interesting* than me.

b. Zhe-gen-shenzi bi na-gen-shenzi chang/duan/cu/xi yidian
this-CL-rope bi that-CL-rope long/short/thick/thin a little
This rope is a little *longer/shorter/thicker/thinner* than that one.

c. Zhe-jian-fangjian bi na-jian ganjing/shufu /mingliang haoduo
this-CL-room bi that-CL clean /comfortable/bright much
This room is much *cleaner/more comfortable/brighter* than that one.

(10) a. Ta gao/ai /zhong /qing wo yidian

he tall/short/heavy /light me a little

He is a little taller than me.

b. *Ta piaoliang/xixing /gaoxing /youqu wo yidian

she pretty /careful /happy /interesting me a little

She is a little more prettier/careful/happier/interesting than me.

c. Zhe-gen-shenzi chang/duan/cu/xi na-gen-shenzi yidian

this-CL-rope long/short/thick/thin that-CL-rope a little

This rope is a little longer/shorter/thicker/thinner than that one.

d. *Zhe-jian-fangjian ganjing/shufu /mingliang na-jian haoduo

this-CL-room clean /comfortable/bright that-CL much

This room is much cleaner/more comfortable/brighter than that one.

This shows that some adjectives, such as *pretty, careful, happy, interesting, clean, comfortable* and *bright* can only be used in *bi*-comparatives, not bare-comparatives; whereas other adjectives, such as *tall, short, fast, slow, long, thick,* can be used in both. In the following discussion, I will call the former the constrained adjectives, and the latter the free adjectives.

What is the difference between the two types of adjectives? I am going to argue that dimensional adjectives (DA) are free to occur in both structures, but evaluative adjectives (EA) are constrained in their occurrences. I have adopted the two terms DA and EA from Bierwisch (1989). Bierwisch found that adjectives like *long, short, old, young* (DA) are very different from adjectives such as *lazy, industrious, pretty, ugly*

(EA), although the distinction is not completely clear-cut all the time. One common test for a DA is that positive DAs can be modified by a measure phrase, as shown in (11):

(11) a. 2-feet tall

b.10-inches long

c. 10-years old

Presumably this is because dimensional adjectives describe explicit scales, such as height, length, size, etc. In contrast, evaluative adjectives are not related to explicit measurement. Although we can still modify the degree using degree adverbs such as *very, a little*, we can not use measure phrases to modify EAs.

(12) a. a little pretty

b. very happy

c. *two-?? careful

d. *10-?? comfortable

Interestingly, all the free adjectives in (10a) and (10c) satisfy the measure phrase test (recall we only need to test the positive one), but not the constrained adjectives in (10b) and (10d), as shown below:

(13) a. liang-mi gao

two- meter tall

b. liang-mi chang

two-meter long

c. liang-bang zhong

two-pound heavy

d. san-cun cu

three-inch thick

(14) a. *liang-?? piaoliang

two-?? pretty

b. *san-?? xixing

three-?? careful

Interestingly, there are some adjectives that don't pass the measure phrase test, but they can still show up in bare-comparatives. For instance, *pang (fat), kuai (fast)* in the following examples.

(15) a. *10-bang pang

10-pound fat

b. * 3-fenzhong kuai

3-minutes fast

(16) a. Zhangsan pang wo shi-bang.

Zhangsan fat me 10-pound.

Zhangsan is fatter than me by 10 pounds.

b. Zhangsan kuai wo san-fenzhong.

Zhangsan fast me 3-minutes.

Zhangsan is faster than me by 3-minutes.

I think these examples don't really challenge the generalization that the adjectives in bare-comparatives are DAs. Although *fat* and *fast* can't be directly modified by measure phrases, they are still related to dimensions that are measurable, for instance weight, and speed. In this sense, they should be categorized as DAs. As we will see in a moment that *fat* and *fast*, as well as other DAs, can be categorized under one class by a negation test in Chinese.

Based on Bierwisch (1989), the main difference between DAs and EAs is that antonymous DA pairs such as *long/short, large/small*, refer to the same scale of a given dimension and differ in the ordering on the scale, whereas antonymous EA pairs such as *pretty/ugly, lazy/industrious, clever/stupid*, refer to different scales. For example, both *long* and *short* are mapping individuals to a scale of length. Under a simplified view each individual would correspond to a degree point on the scale, and we can order these degrees along the scale. But depending on whether we choose a positive DA (e.g. *long*) or a negative DA (e.g. *short*) there will be different ordering of the degrees. So if A is longer than B and B is longer than C, we have the following ordering:

(17) $A >_{long} B >_{long} C$

But the above ordering is reversed if we order the three degrees along the dimension of shortness, although the fact under description is still the same, as shown below:

(18) $C >_{short} B >_{short} A$

This explains why the following two statements are equal in truth values:

(19) Beethoven's fifth symphony is longer than a Beatle's song.

⇔A Beatle's song is shorter than Beethoven's fifth symphony.

On the other hand, the positive EA and the positive EA don't necessarily refer to the same scale. So although a short song nevertheless has some length, a lazy person is not industrious to some extent. The following two statements are not equal either.

(20) John is more industrious than Mary. ⇏ Mary is lazier than John.

The first statement leaves open whether two people are industrious or not, but the second statement implies both people are lazy to some extent. So the two statements in (20) don't have the same relation as the two statements in (19).

With this distinction in mind, I will now turn to a negation test that can distinguish free adjectives and constrained adjectives. The test proceeds as follows: take an adjective A, add a negation in front of it, then use the degree intensifier adverb ***hen*** *(very)* to modify the negated adverb. Interestingly, the adjectives that can surface in bare-

comparatives are the adjectives whose negated versions refuse to be modified by *hen*. Some examples are given below[1]:

(21) **Free adjectives**

negated form: bu-gao/chang/cu/zhong

not-tall/long/thick/heavy

hen-modification: * hen bu-gao/chang/cu/zhong

very not-tall/long/thick/heavy

(22) **Constrained adjectives**:

negated form: bu-piaoliang/ganjing/shufu/qingkuai

not-pretty/clean/comfortable/industrious

hen-modification: hen bu-piaoliang/ganjing/shufu/qingkuai

very not-pretty/clean/comfortable/industrious

Since *hen (very)* in Chinese is a degree intensifier adverb that can modify any gradable adjective, the contrast in (21) and (22) suggests that the negated adjectives in (21) don't behave as lexical adjectives, although they can surface as predicate negation, as shown in (23). On the other hand, the negated adjectives in (22) are themselves lexical items that

[1] I intentionally only tested positive adjectives. For some reason there is no difference with respect to this test among the negative adjectives, no matter they are from the DA group, such as *ai* (short), *xi*(thin), or from the EA group, such as *zang* (dirty), *chou* (ugly). Similar facts hold for English, as discussed in Horn (1989) p274-275.

can be modified again by *hen (very)*. Note that the negated forms in (22) can also serve as predicate negation, as shown in (24), which is not relevant for our purpose here.

(23) X bu gao/chang/cu/zhong

X not tall/long/thick/heavy

X is not tall/long/thick/heavy

(24) X bu piaoliang/ganjing/shufu/qingkuai

X not pretty/clean/comfortable/industrious

X is not pretty/clean/comfortable/industrious

I take the contrast in (21) and (22) to demonstrate the rule of morphological blocking. Let's take *gao (tall)* and *piaoliang (pretty)* as our examples. If the negated adjective *not-A* refers to the same scale of the base adjective, but with an opposite direction of ordering of the degrees on the scale, since *gao(tall)* and *ai(short)* are two lexical items co-existing in the lexicon and they already map to the opposite orderings of the same scale, any other lexical items that refer to the opposite ordering of *gao(tall)* on the same scale should be blocked. On the other hand, *piaoliang (pretty)* and *chou (ugly)* are mapping individuals to two different scales, therefore the existence of *chou (ugly)* will not block *not-pretty*. The blocking rule works the same way in English. Although negative prefixes are productive for English EAs, as shown in (25a), they can never attach to the positive English DAs, as shown in (25b).

(25) a. unhappy, unhealthy, impossible, inconsistent, immoral, nonsymmetric

b. *un/im/in-tall, *un/im-long, *un/im- thick

Interestingly, the two semi-DAs earlier *fat* and *fast* pass our negation-test.

(26) a. *hen bu-pang

very not-fat

b. *hen bu-kuai

very not-fast

Now I can safely conclude that free adjectives are DAs, and constrained adjectives are EAs. To put it in another way, bare-comparatives only license DAs, whereas *bi*-comparatives license all kinds of adjectives[2]. One remaining puzzle is that we don't know

[2] The following data seems to show that if the standard degree arguments are implicit, EAs are fine in bare-comparatives too:

(i) Ta piaoliang/xixing /gaoxing /youqu (*wo) yidian
She pretty /careful /happy /interesting me a little
She is a little more prettier/careful/happier/interesting (than me).

(ii) Zhe-jian-fangjian ganjing/shufu /mingliang (*na-jian) haoduo
This-CL-room clean /comfortable/bright that-CL much
This room is much cleaner/more comfortable/brighter (than that one).

Examples (i) and (ii) have to be uttered in a context that the standard degree arguments are provided by context. For instance, (i) and (ii) can be uttered as answers to the question "compare Mary and me, who is pretty?". So the generalization is not that EAs can not occur in bare-comparatives per se, it is rather that EAs can't be followed by explicit standard degree arguments. Since the standard degree arguments stay in different syntactic positions for bare-comparatives and *bi*-comparatives, we see the artifact that the choice of adjectives is conditioned by the choice of a particular structure. The problem with this approach is that the judgments are very vague and fuzzy as to whether (i) and (ii) have the comparative meaning "She is prettier" without claiming any property of prettiness or the absolute meaning "She is pretty". Since the data is very unclear, I will not discuss it further.

why the two comparative forms are constrained by the lexical property of adjectives. I will leave this problem open.

5.2. Chinese phrasal comparatives

As shown by all the examples we have looked at until now, the standard degree in Chinese comparatives is in general expressed by a DP. Recall that we had some discussion in Chapter one about the relation between phrasal and clausal comparatives. In this section I will show that Chinese phrasal comparatives are better analyzed with a direct analysis than a comparative deletion analysis. Since all the facts I will discuss below apply equally to *bi*-comparatives and bare comparatives, and as discussed in the last section, *bi*-comparatives are less constrained by adjective selections, I will primarily use *bi*-comparatives as my examples. The particular kind of data we are looking at here is as below:

(27) Zhang san bi Lisi gaoxing
Zhangsan than Lisi happy
Zhangsan is happier than Lisi.

Following the clausal analysis, the DP *Lisi* above has been analyzed as an elided clause in Liu (1996). Xiang (2003) argued that for three reasons it is better to analyze *Lisi* as a simple DP, not an elided clause. First, Chinese does not allow long distance wh-movement. English clausal comparatives allow long distance wh-movement, as shown below:

(28) John is taller than [$_{CP}$ Op$_i$ [$_{CP}$ Max thought [$_{CP}$ Bill was t$_i$]]]

Since in general Chinese allows long distance wh-movement, e.g. long distance wh-movement in relative clauses (Huang 1982), one would expect that Chinese comparatives would behave the same as (28), if they are really clausal, but this is not the case, as shown in (29).

(29) *Zhangsan bi Wangwu renwei Lisi zuotian gaoxing.
Zhangsan than Wangsu think Lisi yesterday happy.
Zhangsan is happier than Wangwu thought Lisi was yesterday.

Second, Chinese does not allow subdeletion. Comparatives like (30) below are called subdeletion in English. The biggest difference between subdeletion and other comparatives is that it is a full clause that is contained in the comparative site. The standard analysis of it is to posit a degree variable in the comparative site, which is bound by a wh-operator, as shown in (31):

(30) The table is longer than the door is wide.

(31) The table is longer [than [$_{CP}$ wh$_i$ the door is d$_i$-much wide]].

Surprisingly, Chinese doesn't allow subdeletions like (30). Example (32) below is bad in Chinese.

(32) *Zhuozi bi men kuan chang

table than door wide long

The table is longer than the door is wide.

Notice that if the clausal analysis of Chinese comparatives is right, a comparative sentence like (33) has an LF representation like (34):

(33) Zhuozi bi men chang

Table than door long

The table is longer than the door.

(34) Zhuozi [bi [$_{CP}$ wh_i men d_i-much $chang_k$]] $chang_k$

table [than [$_{CP}$ wh_i door d_i-much $long_k$]] $long_k$

The table is $longer_k$ [than [$_{CP}$ wh_i the door is d_i-much $long_k$]]

Comparing (34) and (31), we see that they share the same mechanism of deriving the standard degree: there is a degree variable bound by a wh-operator. The only difference between (34) and (31) is that (34) contains an elided clause at the comparative site, so reconstruction has to be used to recover the predicate, whereas in (31), no ellipsis is involved, hence no reconstruction. As we have shown in (32), the counterpart of (31) in Chinese is bad. Now we have a puzzle: if (34) is a valid representation, why is (32) out in Chinese? One stipulation is that Chinese comparatives can host an elided CP, but not a full CP. However, it is surprising that a marked construction like ellipsis would be

preferred over an unmarked one like a normal clause, and there is no natural explanation for this.

A third problem for the clausal analysis concerns the interaction between the Chinese distributor *dou* and comparatives. I already had a discussion about *dou* in Chapter 3. Recall that one usage of it is to behave as a distributor that distributes over a plurality argument to its left (see Lin 1998, Wu 1999 among others). If the subject of the clause is singular and not distributable, the presence of *dou* is not licensed, as shown in (35a).

(35) a. *Zhangsan dou zai jia.
Zhangsan dou at home.
Zhangsan is all at home.
b. Mei-ge-ren dou zai jia.
Every-CL-person dou at home
Everybody is (all) at home.

In (35b), the subject is a strong quantifier, and *dou* is allowed to distribute over the subject. Moreover, the presence of *dou* is obligatory in this situation, as shown by the contrast between (a) and (b) in (36).

(36) a. Mei-ge-ren dou xihuan youyong.
Every-CL-person dou like swim
Everyone likes swimming.

b. *Mei-ge-ren xihuan youyong.

Every-CL-person like swim

Everyone likes swimming.

With this small background on *dou* in mind, let's now turn to comparatives.

(37) Mei-ge-nanhaizi dou bi mei-ge-nuhaizi gao

Every-CL-boy dou than every-CL-girl tall

Every boy is taller than every girl.

In (37) there are two strong quantifiers, one is the subject of the matrix clause, the other is inside the *bi*-phrase. *Dou* can be licensed by the first quantifier, i.e. the subject of the matrix clause. The grammaticality of (37) is unpredicted by the clausal analysis. If *every-girl* in (37) is the subject of an elided CP, as in (38), the sentence is wrongly predicted to be bad just like (36b), because there is no *dou* in this CP.

(38) Mei-ge-nanhaizi dou [$_{PP}$ bi [$_{CP}$ mei-ge-nuhaizi e]] gao

Every-CL-boy dou than every-CL-girl tall

Every boy is taller than every girl.

The clausal analysis would also predict that if we add another *dou* in the elided CP, it could be licensed by the subject *every-girl*, and the sentence should be fine. This is an incorrect prediction too, as shown in (39).

(39) * Mei-ge-nanhaizi dou [$_{PP}$ bi [$_{CP}$ mei-ge-nuhaizi dou e]] gao

Every-CL-boy dou than every-CL-girl dou tall

Every boy is taller than every girl.

Examples (37) to (39) strongly suggest a phrasal status of *every girl* in the comparative site. However, there seem to be counter-examples. For instance, the presence of *dou* is fine in (40a).

(40) a. Zhangsan bi mei-ge-ren dou gao.

Zhangsan than every-CL-person dou tall

Zhangsan is taller than everybody.

b. Zhangsan bi mei-ge-ren gao.

Zhangsan than every-CL-person tall

Zhangsan is taller than everybody.

On the surface, (40a) seems to support a clausal analysis of *everybody*, since if we assume everybody is the subject of an elided CP, the detailed structure of (40a) is like (41), and *dou* would be required in this CP.

(41) Zhangsan [$_{PP}$ bi [$_{CP}$ mei-ge-ren dou e]]gao

Zhangsan than everybody dou tall

What is strange for this analysis is that (40b), which also has an LF like (41), isn't bad, although there is no *dou* following *everybody*. This is unexpected since the structure in (41) predicts a contrast between the pair in (40), just like the contrast between the pair in (36).

Now we face a dilemma. If we analyze (40a) as (41), we can't explain the grammaticality of (40b), on the other hand, if we don't analyze *everybody* in (40a) as the subject of a clause, why is *dou* licensed in (40a)? As has been noticed in the literature, the licenser of *dou* needs to be at the left of *dou* (the leftness constraint, Lin 1998), but it can be in various syntactic positions, for example, a topicalized or scrambed object, as in (42), or an indirect object, as (43).

(42) a. Mei-ben-shu, Zhangsan dou du-le.
Every-CL-book, Zhangsan dou read-perf.
Zhangsan has read every book.

b. Zhangsan mei-ben-shu dou du-le.
Zhangsan every-CL-book dou read-perf.
Zhangsan has read every book.

(43) Zhangsan gei mei-ge-ren dou mai-le liwu.
Zhangsan for every-CL-person dou buy-perf. present
Zhangsan has bought present for everybody.

These facts suggest that (40) can't provide evidence to show that the standard degree DP is the subject of an elided CP, because *dou* not only licenses subjects to its left, it also licenses objects to its left. This is an interesting fact for our discussion later, because as it will turn out the standard degree in Chinese comparatives does behave like an object of the predicate.

Based on these arguments, I will adopt the direct analysis position for Chinese phrasal comparatives, namely the element denoting the standard degree is a DP and not a clause.

5.3.The Structure of bare-comparatives

5.3.1. The differential degree argument

The differential degree argument measures the difference between the two degrees under comparison. For instance, if John is taller than Mary, there must be a difference between John's height and Mary's height. This point seems to be trivial, because the difference between the two degrees comes for free as long as we have two degrees to compare. Therefore one would think that we don't have to include the differential degree argument in our formal representation of comparatives. Moreover, in many languages, e.g. English, the differential degree argument is also not obligatorily expressed in narrow syntax. Therefore, the syntactic status of this argument has been ignored most of the time. However, in this section I will argue that the differential degree argument might not be as simple as has been assumed. First, it has crucial contribution to semantic interpretations for some kind of comparatives; second, even for simple comparatives, it is obligatorily expressed in some languages, for example, Chinese.

Kennedy (1997) discussed one kind of comparative that depends crucially on the differential degree argument to derive the correct semantic interpretation, namely, the comparison of deviation. Consider the contrast in (44):

(44) a. San Francisco Bay is more shallow than Monterey Bay is.

b. San Francisco Bay is more shallow than Monterey Bay is deep.

(44a) is the kind of comparative we normally see. It only compares the depth of two bays. There is no implication about the actual depth of them. They could be both very deep or shallow, or one deep and the other shallow. As long as San Francisco Bay is more shallow, the sentence is true. However, (44b) implies that San Francisco Bay is shallow and Monterey Bay is deep, and what is being compared are the two differential degrees, namely, the degree to which San Francisco Bay is shallow and the degree to which the Monterey Bay is deep. The first degree is the differential degree between the actual depth of the bay and the commonly assumed standard depth that can be called *shallow*, and the second degree is the differential degree between the actual depth of Monterey Bay and the standard depth that can be called *deep*. One can't derive the correct interpretation of (44b) without employing the differential degree argument.

One would ask except for the complex cases such as (44b), do we need the differential degree argument in our formal representations? Beck (1997) briefly suggested that even for simple comparatives, we should encode a differential degree argument in the semantic representations. For instance, although there is no explicit differential degree argument for (45a) the two sentences in (45) could have the same semantic

representation as in (46), in which the degree head *–er* takes a differential degree argument *d*.

(45) a. Luise is taller than Otto is.

b. Luise is 3 cm taller than Otto is.

(46) [[-er]] $(D_1)(d)(D_2)$ =1 iff the max $d_2D_2(d_2)$ = d + the max $d_1D_1(d_1)$

Schwarszchild and Wilkinson (2002) also highlighted the function of a differential degree argument in deriving semantic interpretations. But as far as I know the syntactic status of this argument hasn't attracted much attention. Fortunately, Chinese provides us an opportunity to see that the differential degree argument is indeed a non-trivial syntactic argument, even if sometimes it doesn't appear in the surface syntax explicitly.

The measure phrase, which expresses the differential degree, is always obligatory in Chinese bare comparatives, as shown in (47). This is very different from their English counterparts, where measure phrases are always optional, as shown in (48). This suggests that Chinese requires an explicit spell-out of the differential degree argument.

(47) Zhangsan gao wo *(yicun/yidian)

Zhangsan tall me one-inch/a little

"Zhangsan is one inch/ a little taller than me".

(48) John is (two-inches) taller than me.

The obligatory differential degree argument also plays a role in sentences that have gradable adjective as predicates, but don't involve explicit comparison. As shown in (49), in Chinese, a bare adjective usually can't be used as a predicate unless it is modified by some degree phrase.

(49) a. ??Ta gao

He tall

He is tall

b. Ta hen/you dian er/ feichang/bu zenme/tai gao

He very/a little /very/ not how / extremely tall

He is very/ a little / not very much/extremely tall

This has been considered merely as an idiosyncratic property of Chinese adjectives. But by taking the differential degree argument into account we can give a more principled explanation for it. Following Kennedy (1997), we take the adjectival predicate in (49) as a comparative construction too, but with an implicit standard degree, e.g. a degree of height by most people's standard to be called *tall*. When we say x is tall, we mean if the standard height *d* that we consider to be *tall* is six feet, x is at least six-feet tall, or probably taller. The degree modification in (49b) actually marks the difference between x's height and d. If the difference is big, *he is very/extremely tall* is true; if the difference

is small, *he is a little tall* is true. Therefore, (47) and (49) actually pattern the same in the sense that they both require an obligatory differential degree argument.

The discussion so far suggests that the differential degree argument is a necessary syntactic argument for comparative constructions. A comparative predicate is actually a three-way predicate: it relates an external argument, the subject, to its two internal arguments, the standard degree argument and the differential degree argument. Next I will turn to the question how to represent this three-way predicate in the syntactic structure.

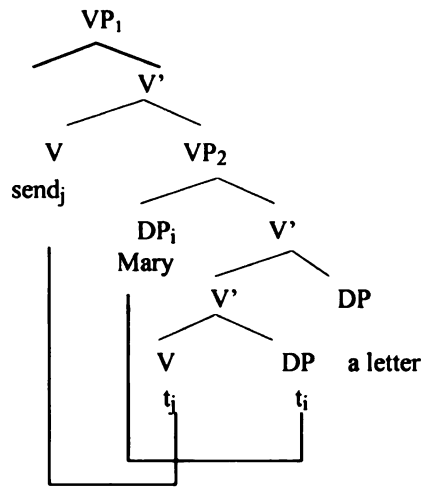
5.3.2. The VP-shell structure for double object constructions

Based on the discussion in the previous section, the argument structure of comparatives, therefore, is similar to a double object construction, in the sense that they both have three syntactic arguments, one external argument and two internal arguments. In this section I will show that comparatives indeed share some structural similarities to double object constructions.

The structure of double object has generated lots of discussion in the literature. Without doing justice to all the alternatives, I will assume the VP-shell structure in Larson (1988) and variants of the same kind (e.g. Johnson 1991) for double object constructions. Under a VP-shell analysis, the sentence in (50) contains a VP structure as in (51):

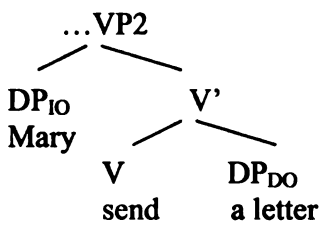
(50) John sent Mary a letter.

(51)



In (51), the verb head takes the indirect object as its complement at the early stage of the derivation, namely, at the lower VP shell. The verb then undergoes head movement to the higher VP shell, and the indirect object also moves up through XP movement. One important insight this analysis captures is that we end up having a small clause like structure for the two objects (also see Johnson 1991, Kayne 1984). That is to say, at some point in the derivation the indirect object becomes the subject of a small clause-like structure, and asymmetrically c-commands the direct object, as shown in (52):

(52)



Larson argued that the asymmetric c-command relation in (52) accounts for a number of important asymmetries between two objects, as discussed in Barss and Lasnik (1986). First, since reflexives and reciprocals must be c-commanded by their antecedents, (52) explains the asymmetric pattern with respect to anaphor licensing in (53):

(53) a. I showed Mary herself.

b. *I showed herself Mary.

Similarly, a bound pronoun must be c-commanded by its binder, so the asymmetry in (54) is explained too.

(54) a. I gave every worker$_i$ his$_i$ paycheck.

b. *I gave its$_i$ owner every paycheck$_i$.

Thirdly, it is known that a wh-phrase can't move over a c-commanding phrase if the c-commanding phrase contains a pronoun that is co-referential with the wh-phrase. This is called a weak crossover effect. In (55), the ungrammaticality of (55b) indicates that the wh-phrase must have moved from a position c-commanded by the indirect object *his mother*. Whereas (55a) is grammatical meaning that the wh-phrase is moved from a higher position than the direct object *his paycheck*.

(55) a. Which man$_i$ did you send t_i his$_i$ paycheck?

b. *Whose$_i$ pay did you send his$_i$ mother t_i ?

Finally, negative polarity items are asymmetrically licensed too in double object constructions, as in (56).

(56) a. I showed no one anything.

b. *I showed anyone nothing.

So the asymmetric relation between the two objects is a crucial property that any analysis should capture. Interestingly, Chinese comparatives show some similar variable binding facts that indicate the standard degree argument should asymmetrically c-command the differential degree argument.

(57) Zhe-gen shengzi chang na-gen shengzi yiban

This-CL rope long that-CL rope half

This rope$_i$ is longer than that rope$_j$ by half (of that rope*$_{i/j}$)

In (57), the differential degree argument *half* can be called a relational noun, because it has to be interpreted with respect to something else, i.e. one can't talk about *half* by itself, it has to be half of something. Relational nouns are usually analyzed as containing an implicit argument that is bound by an antecedent (Barker 1991). In the case of (57), that means the standard degree *that rope* is binding the implicit argument variable contained in *half*, as shown in (58):

(58) that rope$_j$....[e$_j$ half]

The same fact also holds for *bi*-comparatives, as shown in (59). Since the variable binding relation requires asymmetric c-command, (57) and (59) suggest comparatives, at

least Chinese comparatives, have a structure similar to double object construction as in (52).

(59) Zhe-gen shengzi bi na-gen shengzi chang yiban
This-CL rope bi that-CL rope long half
This rope$_i$ is longer than that rope$_j$ by half (of that rope$*_{i/j}$)

Notice that since the variable binding relation requires asymmetric c-command, if the c-command relation in (58) doesn't hold, we lose the binding interpretation too, as shown in (60). In (60), *that rope* doesn't c-command half. It is the head of the relative clause *the box* that c-command half. Therefore, we only have an interpretation that it is the half of the length of the box, not that rope. (60) is a *bi*-comparative, and bare comparatives work the same way.

(60) Zhe-gen shengzi bi zhuang na-gen shengzi de hezi chang yiban
This-CL rope bi contain that-CL rope part. box long half
This rope is longer than [the box that contains that rope$_i$]$_j$ by half (of that rope$*_{i/j}$)

To summarize, in the previous section I showed that a comparative predicate actually has two internal syntactic arguments, the standard degree argument, and the differential degree argument. This raises the possibility that they are similar to a double object construction, which has two internal arguments too. In this section, we see further

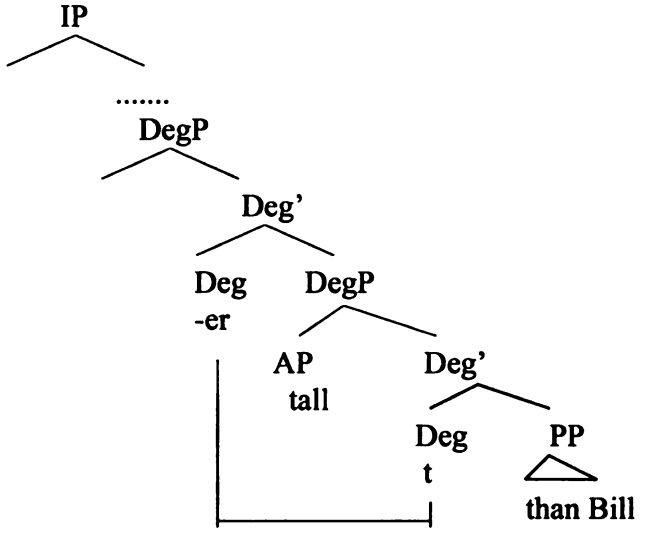
evidence that the standard degree argument and the differential degree argument have to stand in an asymmetric c-commanding relation[3].

5.3.3.The DegP-shell structure for bare-comparatives

As discussed briefly at the end of Chapter 4, Larson's analysis of comparatives in terms of a DegP-shell structure intuitively looks like the VP-shell analysis of double object constructions. The discussion in the previous two sections in this chapter suggests that comparatives and double object construction do share some structural properties. Therefore, Larson's DegP-shell structure looks very promising to capture the structure of comparatives. However, instead of completely adopting Larson's analysis, I will argue that some revisions have to be made.

Larson's DegP-shell structure for comparatives is repeated in (128):

(128)



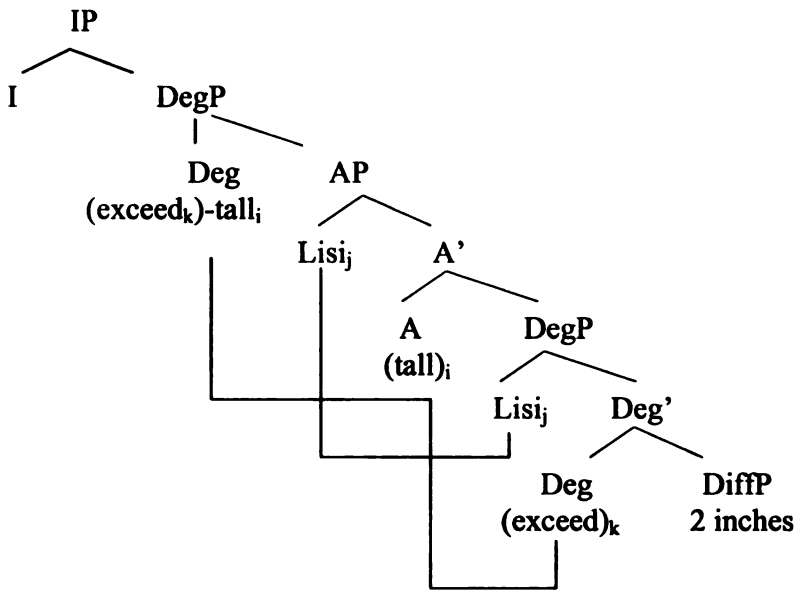
[3] However, one problem left unsolved is that the c-command relation, for some unknown reason, needs to be very local. As shown in (22) and (24), although the subject *this rope* also c-commands *half*, there is no binding interpretation between them.

As discussed in Chapter 4, one advantage of this structure is that it can be mapped onto the standard semantics of gradable adjectives, namely, gradable adjectives involve quantification over degree arguments. For instance, since the adjective *tall* takes two argument, an individual argument and a degree argument (because *tall* maps an individual to a degree of height), the sentence *John is taller than Bill* actually means *John is [-er than Bill] tall*, with *[-er than Bill]* as the degree argument of the adjective. Since the degree head *–er* and the *than*-phrase don't form a constituent on the surface, we need a syntactic structure that views them as a constituent at some level of the representation. In this sense, the DegP-shell structure in (128) is appealing, since at the lower Deg' structure, the degree head *–er* and the *than*-phrase form a constituent. However, also based on the semantics of the adjective *tall*, the degree argument *[-er than Bill]* should be an argument of the adjective *tall*, and this is not reflected in the structure in (128). In fact, what (128) shows is that the adjective is an argument of the degree head *–er*. To keep the essence of the DegP-shell structure and at the same time make the degree argument an argument of the adjective, I will suggest to revise the structure in (128) in a way that the AP structure is sandwiched in between the two DegP structures. I use the following example of Chinese bare comparatives to demonstrate the structure:

(61) Wo gao Lisi liang-cun

I tall Lisi two-inch

I am two inches taller than Lisi



There is no explicit degree morpheme in Chinese comparatives. On the surface it seems that the adjective tall itself expresses both the adjective and the comparative meanings.. Following the lexical decomposition approach (see Hale and Keyser 1993, 2002, Huang 1996, Lin 2001) that there exists in syntax phonetically empty heads that are decomposed from single lexical items, I assume there is a phonetically null degree morpheme which I call *exceed*. The degree morpheme merges with its two internal arguments first, the standard degree argument and the differential degree argument, as shown by the lower DegP structure in the tree. The degree morpheme internally merges with the adjective through head movement, and the standard degree DP *Lisi* moves to the [Spec, AP] position for EPP feature checking, thus we derive a small-clause like structure at the AP level. Finally, in order to introduce the external argument, the complex head *exceed-tall* moves to the higher Deg-head through head movement.

One empirical advantage of the revision made in (61) is that it also leads to a natural explanation of the *bi*-comparatives, which I will turn to in the next section. In a

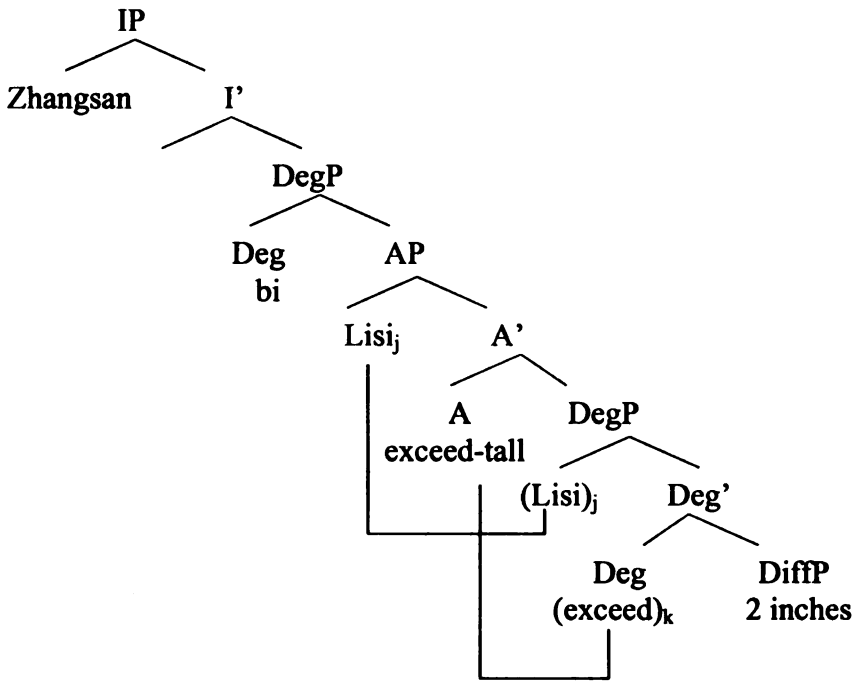
nutshell, by generating the AP structure in between the two DegP projections, bare comparatives and *bi*-comparatives are united under one single structure through the head movement.

5.4.Bi-comparatives

5.4.1. Head movement

Given that bare-comparatives and *bi*-comparatives express similar meanings, a natural thought is that they are structurally related. There is an easy way to implement the idea. In the structure of bare comparatives in (61), the Deg-head moves to the higher DegP shell position to introduce its external argument. If at this point of the derivation, instead of doing the head movement, the morpheme *bi* can be externally merged with the AP and project the higher DegP-shell. In this way a *bi*-comparative is derived, as shown in (62).

(62)



Notice that different from bare-comparatives, for *bi*-comparatives, the differential degree argument is optional, as shown in (63).

(63) Ta bi wo gao (yidian)

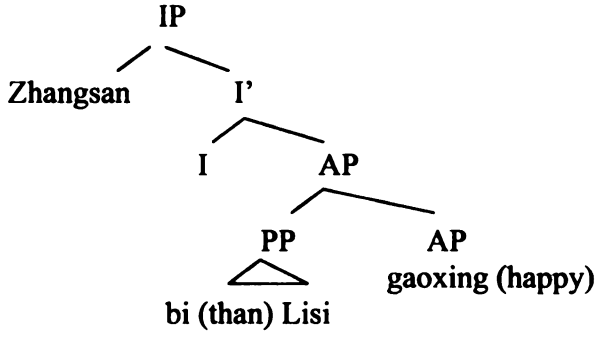
He bi me tall (a little)

He is (a little) taller than me.

This is not surprising because of the idiosyncratic nature of the argument structure. It is known that not all the arguments have to be explicitly expressed.

I will call the analysis in (62) a unified analysis, since it is derivationally related to the bare-comparatives. This is the analysis I am going to pursue. Conceptually a unified analysis has obvious advantage because it reduces different patterns of comparatives to one single syntactic structure. However, empirically it faces a few challenges. The most important challenge to the unified analysis is that there seem to be independent reasons for us to believe that the *bi*-phrase should be analyzed as an adjunct (e.g. Liu 1996, Xiang 2003). As shown below, if the adjunct analysis is correct, *bi*-comparatives are very different from bare-comparatives in structure.

(64) Adjunct analysis



This section is organized as following. First I will review the existing and potential arguments for the adjunct analysis of *bi*-comparatives and show that none of these arguments are really strong enough to motivate the adjunct analysis. I will also provide evidence to show that the adjunct analysis is empirically inadequate. Second, I will discuss some welcome consequences if we adopt the unified analysis.

5.4.2. Against the adjunct analysis

On the surface, *bi*-comparatives are similar to English *than*-comparatives, except that *bi*-phrase stays before the adjective, whereas *than*-phrase stays after the adjective. Liu (1996) analyzed *bi*-phrase as a left adjunct of the predicate, and Xiang (2003) adopted this position. There are two basic arguments for the adjunct status of *bi*-phrase, as shown below. However, I will show that these tests are not decisive.

First, the coordination test seems to show that *bi*-phrase is a constituent, and it is taken by Liu (1996) as an argument to show that the *bi*-phrase is a prepositional adjunct.

(65) Zhangsan bi Lisi huozhe bi Wangwu gao
Zhangsan bi Lisi or bi Wangwu tall
Zhangsan is taller than Lisi or Wangwu.

However, there are other ways to explain (65) without appealing to (64). To see why the alternative might be more reasonable, let's first look at the category of *bi*. Based on the similarity between *bi* and English *than*, it is tempting to draw the conclusion that *bi* is a preposition in Chinese. However, a closer look at the data shows that this conclusion is artificial. Instead of being a preposition, *bi* behaves more like a verb. For instance, *bi* can

be used alone as a verb to mean *compare*, as shown in (66). Since (66) is describing a perfect event, *bi* is followed by an existential perfect marker *guo*, which often attaches to verbs.

(66) a. Ni **bi**-guo na-liang-ben shu de jiaqian ma?
You compare-perf. that-two-CL book DE price Q
Have you compared the price of those two books?

b. Ta lao na wo he Mary **bi**.
He always take me and Mary compare
He always compares me with Mary.

Also, when used as a bound morpheme, *bi* can be combined with other morphemes to form verbs. As shown in (67), these verbs often have the meaning of comparison of some kind.

(67) a. bi-jiao
compare-compare
compare

b. bi-shi
compare-try
compete

c. pan-bi

climb-compare

compete

According to these arguments, I will assume that *bi* is a verb, not a preposition. However, when used in comparative constructions, *bi* seems to lose the status of a main verb. For instance, different from (66a), aspect markers need to follow adjectives, instead of *bi*, in comparatives, as shown in (68).

(68) Ji nian bu-jian, ta **bi(*-le)** wo **gao-le** hau-duo

several year not-see, he bi me tall-perf. much

After not seeing him for a few years, he became much taller than me.

The current analysis can handle (68) easily. In the shell structure, *bi* is not a complete verb anymore, instead, it forms a complex predicate together with the adjectival head and the lower degree head at LF though head movements.

Assuming the verbal status of *bi* and the shell structure of comparatives, let's look at the coordination fact in (65) again. There are at least two ways to derive (65) under the current analysis. It could be done though coordination plus deletion, as shown in (69).

(69) Zhangsan [bi Lisi ~~gao~~] huozhe [bi Wangwu gao]

Zhangsan [bi Lisi ~~tall~~] or [bi Wangwu tall]

Zhangsan is taller than Lisi or Wangwu.

In this way, the two constituents that *or* relates are DegPs, not PPs. Alternatively, it could be derived through a rightward across the board movement (ATB movement), as shown in (70).

(70) Zhangsan [[bi Lisi ~~gao~~$_k$] huozhe [bi Wangwu ~~gao~~$_k$] gao$_k$]
Zhangsan [[bi Lisi ~~tall~~$_k$] or [bi Wangwu ~~tall~~$_k$] tall$_k$]
Zhangsan is taller than Lisi or Wangwu.

I will leave it open which implementation is more correct, but it at least shows that the coordination test does not necessarily mean that the bi-phrase is a prepositional phrase.

The second argument for the adjunct analysis is that the relative position between the *bi*-phrase and other VP adverbs is flexible. Since Chinese has relatively free order between VP adverbs, this fact is taken to mean *bi*-phrase is an adjunct too.

(71) a. Zhangsan (zhongshi) bi Lisi (zhongshi) gao yidian
Zhangsan (always) bi Lisi (always) tall a little
Zhangsan is always a little taller than Lisi.

b. Zhangsan (bu) bi Lisi (bu) gao duoshao.
Zhangsan (not) bi Lisi (not) tall much
Zhangsan isn't much taller than Lisi

The position of adverbials is notoriously flexible, depending on the scope of the adverbial modification, as well as the type of the adverbials. It is true that if the *bi*-phrase is an adjunct, the above data could be explained as the free ordering among adjuncts. But note that this argument is only valid if the position of an adjunct is only free relative to another adjunct, which is not true. For instance, an adjunct can often appear either before or after the verb phrase in English.

(72) a. She quietly left.

b. She left quietly.

It is true that in Chinese adjuncts often precedes the verb phrase, as shown below:

(73) Ta qiaoqiaode likai-le (*qiaoqiaode)

she quietly leave-perf. (*quietly)

She quietly left.

However, it is also common that adjuncts can appear between a verb phrase and a higher functional projection, and the relative position between an adjunct and the higher functional projection is flexible. Consider the well-known BA-structure in Chinese. The functional morpheme BA triggers the SOV word order, as shown below:

(74) a. Ta chi-le na-ge pingguo. (without BA, SVO)

she eat-perf. that-CL apple

She ate that apple.

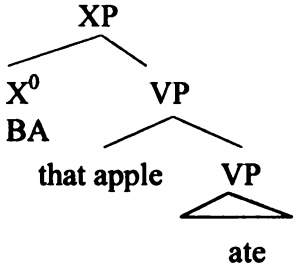
b. Ta BA na-ge pingguo chi-le (with BA, SOV)

She BA that-CL apple eat-perf.

She ate that apple.

Some analyses have treated BA as a functional morpheme that heads its own projection (Sybesma 1999, Zou 1993), some have treated it as a verb (Hashimoto 1971; Ross, 1991; Bender 2000). Analyses also vary in many other respects, for instance, whether or not the object DP is moved from a post-verbal position. I will leave these questions open, but crucially for our purpose here, it is less controversial that BA is often analyzed as a head that takes a VP as its complement, as shown below:

(75)



Interestingly, adjuncts can appear either before BA, or between BA and part of the verb phrase, as shown below.

(76) Ta **(dakou-dakou-de)** BA na-ge pingguo **(dakou-dakou-de)** chi-le

She (big-bite) BA that-CL apple (big bite) eat-perf.

She ate that apple in big bites.

This suggests that adverbials in Chinese, have possible flexible positions not only relative to other adverbials, but also to other functional projections. If this generalization is correct, the data in (71) pose no problem for the current analysis anymore. Similar to the BA-structures, in comparatives, adverbials could stay either before *bi*, or sandwiched between *bi* and the lower part of the DegP-shell structure.

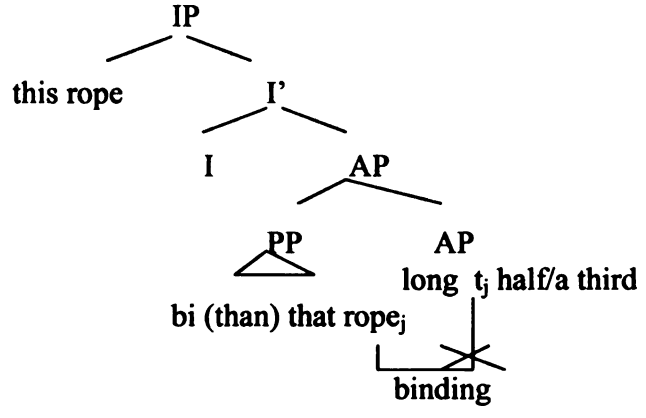
The adjunct analysis also makes the wrong prediction about binding. Recall that in section 3.3.2., we saw the standard degree argument can bind the variable within the differential degree argument (data repeated below). Since the binding relation is built upon the c-command relation between the two arguments, if the standard degree is generated within an adjunct, as shown in (78b), we can not derive the necessary c-command condition to satisfy the binding requirement, contrary to the data shown in (78a).

(78) a. Zhe-gen shengzi bi na-gen shengzi chang yiban/san-fen-zhi-yi

This-CL rope bi that-CL rope long half/a third

This rope$_i$ is longer than that rope$_j$ by half/a third (of that rope$^*_{i/j}$)

b.



5.5.Some consequences of a DegP-shell analysis

5.5.1. Reduplication of the adjectival predicate

In the DegP-shell analysis, the bare comparatives are related to *bi*-comparatives through head movement of the adjectival predicate. Let's take a look at the bare comparative again. After the complex head [*(exceed)-tall*] undergoes head movement to the higher DegP-shell position, there is a copy left in the AP position, as shown in (79a), the structure is repeated in (79b):

(79) a. Yuehan gao Mali yidiandian

John tall Mary a little

John is a little taller than Mary.

b. John $[_{DegP1}\ [_{Deg0}(\text{exceed})_j\text{-tall}_k]_i\ [_{AP}\ \sout{(\text{exceed})_j\text{-tall}_k}\ [_{DegP2}\ \sout{\text{exceed}_j}\ \text{a little}]]]$

Since in (79b), the head *exceed* is a null morpheme anyway, I will only refer to the copies in the chain as higher *tall* and lower *tall* from now on. Normally in a chain of movement, only the highest copy of the chain is pronounced (spelled out), and lower copies in the chain are not. Therefore in (79a) only the higher *tall* is pronounced. Under the current analysis, the *bi*-comparatives are derived by externally merging *bi* to the higher DegP-shell position, as shown in (80):

(80) a. Yuehan bi Mali gao yidiandian

John bi Mary tall a little

John is a little taller than Mary.

b. John [$_{DegP1}$ [$_{Deg0}$ bi] [$_{AP}$ (exceed)$_j$-tall$_k$ [$_{DegP2}$ ~~exceed~~$_j$ a little]]]

Comparing (79) and (80), if the lower *exceed-tall* in (79) could also be spelled out, we would have a clear minimal pair in which only the highest position of the chain is different. Before we look for such cases, let's detour a little bit to the issue of spelling out a chain formed by movement.

Under the copy theory of movement, the moved element leaves copies on its way to the target, therefore we have a chain of copies. Usually only one copy on a chain would be pronounced. In overt movement, it is usually the highest copy in the chain that is spelled out, and other copies are deleted at PF. (81) is such an example of passives.

(81) a. **John** was invited ~~**John**~~. (spell out the higher copy)

b. *~~**John**~~ was invited **John**. (spell out the lower copy)

Nunes (1996, 1999) analyzes the reduction/deletion of copies on a movement chain as the result of PF linearization considerations. Following the Linear Correspondence Axiom (LCA) (Kayne 1994), if in a syntactic structure X asymmetrically c-commands Y, then at PF X precedes Y. In the movement of (81), the higher copy *John* is asymmetrically c-commanding the lower copy. To spell out both copies in (81) would give us a contradictory result that *John* is preceding *John* itself, because the two are non-distinct copies. However, some languages allow multiple copies on the same chain to be spelled out, as shown below:

(82) a. German

Mit wem glaubst du mit wem Hans spricht

With whom think you with whom Hans talks

With whom do you think Hans is talking?

b. Frisian

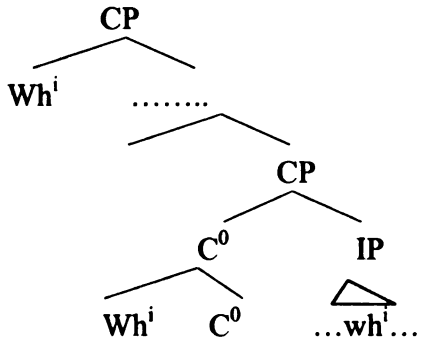
Wer tinke jo wer't Jan wennet

where think you where-that Jan lives

Where do you think that Jan lives?

Capitalizing on the proposal in Chomsky (1995) that LCA applies after morphology and hence doesn't apply word-internally, Nunes argues that the lower copy on a chain can be spelled out because it has been turned into a phonological word by some morphological process, and hence isn't subject to LCA anymore. Specifically for the above examples, Nunes suggests that the intermediate wh-copy is adjoined to an intermediate complementizer and the morphology of these languages can convert the adjunction structure $[_{C0}\ X[_{C0}C^0]]$ into a phonological word, as shown schematically in (83). Such operation is most clearly shown by the Frisian data, where the intermediate complementizer is cliticized to the wh-trace.

(83)



In (83), if the intermediate wh-word and the complementizer have been converted to one word, and if LCA only linearizes strings at the word level, it won't matter for the word internall wh-element. Therefore there is no reason the lower wh-element can't be pronounced.

Now let's go back to comparatives. The following examples seem to suggest that more than one copy involved in the head movement of comparatives (see (79)) can be spelled out.

(84) a. Zhangsan gao Lisi gao bu liao yi diandian
Zhangsan **tall** Lisi **tall** not particle a little
Zhangsan isn't much taller than Lisi.

b. Zhangsan bi Lisi gao bu liao yi diandian
Zhangsan **bi** Lisi **tall** not particle a little
Zhangsan isn't much taller than Lisi.

c. Zhangsan gao Lisi jiu gao yi diandian
Zhangsan **tall** Lisi only **tall** a little
Zhangsan is only a little taller than Lisi.

d. Zhangsan bi Lisi jiu gao yi diandian
Zhangsan **bi** Lisi only **tall** a little
Zhangsan is only a little taller than Lisi.

In the bare comparatives (84a) and (84c), the adjectival predicates are reduplicated. This is possible because in (84a) the lower copy of *tall* is housed within a reformed word *tall-*

not-particle, and in (84c) the lower copy *tall* can be housed within the complex word formed by the incorporation of focus *only* and the predicate *tall*. If this is correct, (84a) and (84c) reflect the head movement in bare comparatives, and (84b) and (84d) reflect the alternative process to the head movement, i.e. *bi*-insertion. All together they support the structural relation between bare comparatives and *bi*-comparatives.

5.5.2. The generic reading of the standard degree

Another difference between the bare-comparative and the *bi*-comparative is that the standard degree in the *bi*-comparatives can have a generic reading, but the standard degree in the bare-comparatives can not.

(85) a. Yuehan shenzhi bi changjinglu gao (yidian)
John even bi giraffe tall (a little)
John is even (a little) taller than giraffes/a giraffe

b. Yuehan shenzhi bi na-zhi changjinglu gao (yidian)
John even bi that-CL giraffe tall (a little)
John is even (a little) taller than that giraffe

(86) a. *Yuehan shenzhi gao changjinglu yidian
John even tall giraffe a little
John is even a little taller than giraffes/a giraffe

b. Yuehan shenzhi gao na-zhi changjinglu yidian
John even tall that-CL giraffe a little
John is even a little taller than that giraffe

In (85a), the bare singular DP *giraffe* expresses a generic reading. This sentence isn't comparing John with a particular giraffe. Instead, John's height is compared with the standard height any giraffe would have, and John's height exceeds that height. In contrast, (85b) compares John's height with the height of a particular giraffe, and the sentence is fine too. On the other hand, if we use bare-comparatives to express the same two sentences, as shown in (86), the standard degree has to be of a particular giraffe. The generic DP in (86a) leads to ungrammaticality. The following examples demonstrate the same point.

(87) a. Zhe zhi gang-chusheng de xiao luotuo bi ma da (yidian).
This CL just-born DE little camel than horse big (a little).
This new-born camel is a little bigger than a horse.

b. Zhe zhi gang-chusheng de xiao luotuo bi na-pu-ma da (yidian).
This CL just-born DE little camel than that-CL-horse big (a little).
This new-born camel is a little bigger than that horse.

(88) a. *Zhe zhi gang-chusheng de xiao luotuo da ma yidian.
This CL just-born DE little camel big horse a little.
This new-born camel is a little bigger than a horse.

b. Zhe zhi gang-chusheng de xiao luotuo da na-pu-ma yidian.
This CL just-born DE little camel big that-CL-horse a little.
This new-born camel is a little bigger than that horse.

So the descriptive generalization is that the *bi*-comparatives allow generic readings of the DP that denotes the standard degree argument, but the bare comparatives don't. In the rest of this section I will offer an explanation for this contrast based on the syntactic difference between the two comparatives.

DPs with generic interpretations make references to kinds instead of any individuals or objects, as shown by the italic DPs in following examples:

(89) a. *Monkeys* live in trees.

b. *The dragon* comes from China.

c. *A whale* consumes a lot.

Generic DPs have a semi-universal quantificational force. The sentences in (89) roughly mean (90):

(90) a. ∀x (x is a monkey) (x lives in trees)

b. ∀x (x is a dragon) (x comes from China)

c. ∀x (x is a whale) (x eats a lot)

The reason that they are only semi-universal is because they allow exceptions. If among all the monkeys, one monkey actually lives in the water, (89a) can still be judged to be true. In the literature, a generic operator Gen is proposed for generic sentences (see

Krifka. et al. 1995 for a review and discussion). The sentences in (89) actually have semantic interpretations as in (91):

(91) a. Gen x (x is a monkey) (x lives in trees)

b. Gen x (x is a dragon) (x comes from China)

c. Gen x (x is a whale) (x eats a lot)

How to handle the possible exception cases in (89) and how to draw a fine grained line between the universal operator and the generic operator are not issues of our concern here. To simplify the discussion below, I will roughly assume that generic DPs do involve universal quantification, as demonstrated in (90).

The second assumption of my analysis is that all predicates have an explicit event argument. Since Davidson (1967), the event argument has been widely used to study event structure. In the original proposal, only active verbs carry event arguments. I will adopt a version of the Neo-Davidsonian analysis (Parsons 1990) and assume that all predicates contain event arguments. So a sentence like (92) describes an existentially quantified event of eating where *John* is the eater and *an apple* is the thing that got eaten and *slowly* is predicated of this event.

(92) John ate an apple slowly.

∃e [eat (e) & agent (e, John) & theme (e, an apple) & slowly (e)]

When the predicate is stative, such as (93), there is also an existentially quantified event argument under the Neo-Davidsonian view[4]. Therefore (93) says that there is an event, it is an event of being bald and the theme of the event is *John*.

(93) John is bald.

∃e [bald (e) & theme (e, John)]

The event quantification in (93) is flat. The existential quantifier is simply attached to other event components that are conjoined together. A refined structured representation of event quantification has been proposed by a few authors. In general, in the style of the tripartite structure of quantifiers proposed in Heim (1982), an event quantification can also be represented as consisting of three parts: a quantifier, the restriction of the quantifier, and the scope of the quantifier. For example, Herburger (2000) maps focus structure to a tripartite event quantification, with the background information in the restriction, and the focused assertion in the scope. Larson (2004) suggests that sentence final adverbs are mapped into the scope of the event structure, and they are predicates of events. The most well-known example is probably the mapping hypothesis proposed in Diesing (1992). The problem she tries to answer is that there is a contrast with respect to the interpretation of bare plurals at a subject position, depending on whether the predicate is stage-level or individual-level. Consider (94) and (95):

(94) Stage-level predicate

[4] Note however, the view that state predicate has event argument is not uncontroversial (e.g. Katz 2003)

Firemen are **available.**

a. $\exists_x$ [x is a fireman][x is available]

b. $Gen_{x,t}$ [x is a fireman and t is a time] [x is available at t]

(95) Linguists are **intelligent.**

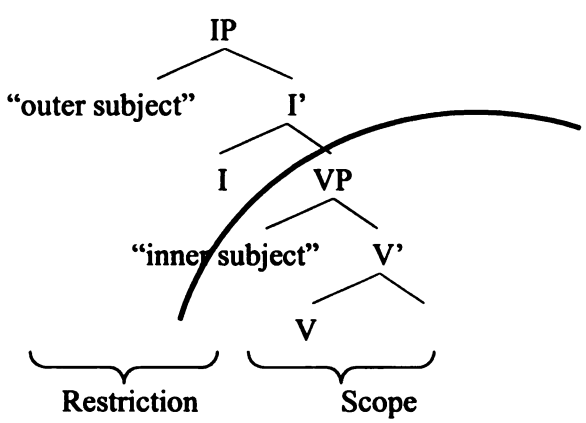
a. *$\exists_x$ [x is a linguist][x is intelligent]

b. $Gen_{x,t}$ [x is a linguist and t is a time] [x is intelligent at t]

The subject DP in (94) is ambiguous. Either it is existentially quantified, and the sentence means that there are some firemen available at some time, or it is bound by a generic operator and the sentence means that in general it is the property of firemen that they are available. On the other hand, the subject DP in (95) only has the generic reading. (95) only means that in general it is the property of linguists that they are intelligent.

To account for this contrast of stage-level and individual level predicates in terms of the interpretation of bare plural subjects, Diesing suggests that there is a simple mapping between the clausal structure and the logical representation, namely, the VP structure consists of the nuclear scope, and the residue structure is the restriction, as shown below:

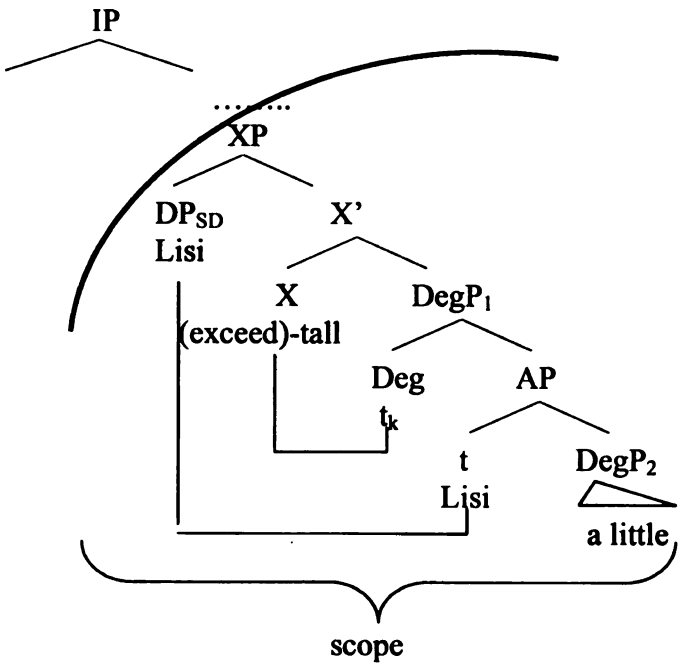
(96)



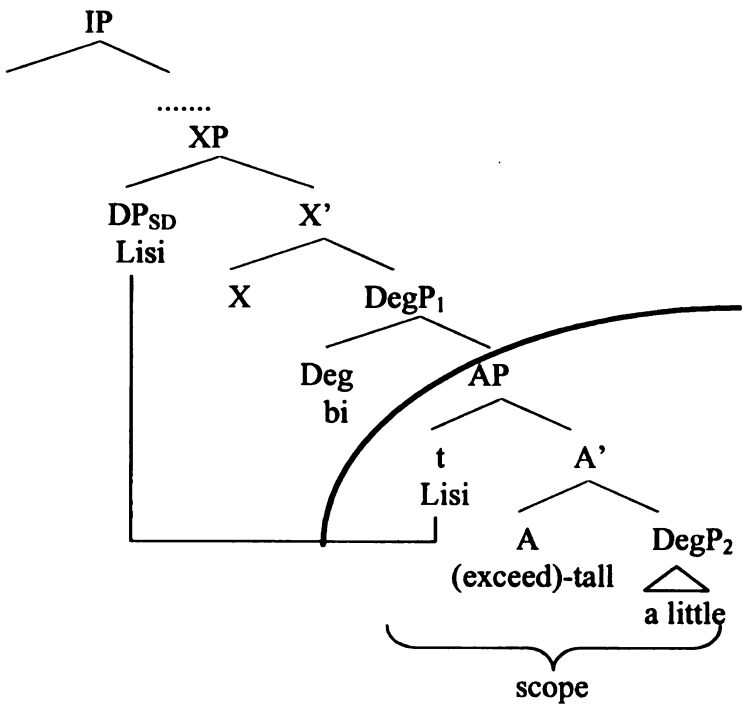
Diesing further assumes that subjects of stage-level predicates can be mapped into either the restriction or the scope, as shown by the two subject positions above, but subjects of individual level predicates must stay in the restriction. Crucially, only DPs that remain in the scope will be bound by obligatory existential closure (Heim 1982), therefore receive existential readings. The subjects of individual level predicate, being in the restriction, will be bound by the generic operator in the text and that is why they are only interpreted generically.

With this much background information, now we are ready to explain the observation in (87) and (88). Recall that the descriptive generalization is that the *bi*-comparatives allow generic readings of the DP that denotes the standard degree argument, but the bare comparatives don't. There are two main ingredients in the current solution. First, I will suggest that the event quantification maps to the clausal structure of the two kinds of comparatives differently. More specifically, I assume that the position of the adjective decides the content of the scope. Since adjectives in bare comparatives and *bi*-comparatives occupy different syntactic positions, the structure is consequently mapped onto logical representations differently. For bare comparatives, the whole DegP-shell structure, plus some higher functional projections, is included in the scope; but for *bi*-comparatives only the lower part of the shell is included in the scope. Second, the standard degree argument could be interpreted at the base position, or it could be interpreted at the case checking position, and the case is checked at some functional projection higher than the DegP-shell. This is shown below:

(97) bare comparatives



(98) bi-comparatives



As shown above, at LF, the standard degree DP_{SD} moves to [Spec, XP] to check case. In bare comparatives, the adjective head (plus the phonologically null degree head) can move to the higher functional head X^0 position. Assuming that the position of the adjective determines the boundary of the scope of the event quantification, the case checking position of the standard degree argument DP_{SD}, as well as its base position, will be included within the scope. That is to say, the standard degree argument always stays within the scope. Assuming the default existential closure on DP_{SD} within the scope area, DP_{SD} in bare comparatives will always be interpreted existentially. On the other hand, in *bi*-comparatives, the functional head *bi* prevents the head movement of the adjective *tall* to a higher functional position. Therefore, although the base position of DP_{SD} is within the scope, the case checking position is in the restriction. Consequently, DP_{SD} could either be interpreted existentially within the scope, or it could pick up some generic operator in the restriction.

5.5.3. Summary

In this section I argued that comparatives have a DegP-shell structure. The two kinds of comparative structures in Chinese are related through head movement. Recall that in Chapter four, I suggested that a DegP-shell structure can help us to implement the semantically motivated degree argument into syntax, because the degree argument can be represented as one constituent in the lower DegP-shell structure. If this approach is on the right track, we expect to see that the lower DegP-shell structure can move as a normal argument. In the next section, I will provide evidence to show that by assuming that the

lower DegP-shell is the degree argument and it can move at LF, we can nicely explain some problems.

5.6.Lower DegP as the degree arguments

In Chapter 4 I argued for the existence of a quantificational degree argument, but we left the question open where the degree argument is in the structure. The data from Chinese comparatives supports the DegP-shell structure, similar to those proposed in Larson (1991). If this is correct, the lower DegP structure would express the degree argument. In this section I will provide some evidence for this.

5.6.1. The extraction of the standard degree

The standard degree in both bare comparative and bi-comparatives is resistant to extraction, as shown in (99) and (100).

(99) a. Ta bi Zhangsan gao yidian

he bi Zhangsan tall a little

He is a little taller than Zhangsan.

b. *ta bi t_j gao yidian DE ren_j

he bi t_j tall a little DE $person_j$

the person he is a little taller than

(100) a. Ta gao Zhangsan yidian.

He tall Zhangsan a little

He is a little taller than Zhangsan

b. *ta gao t_j yidian DE ren_j

he tall t_j a little DE $person_j$

the person he is a little taller than

(99) and (100) show that relativization of the standard degree is impossible[5]. This might be expected for bi-comparatives. It is possible that for independent reasons *bi* can't be stranded, and that could block the extraction of the standard degree. For this reason, I am going to only discuss the extraction in bare-comparatives such as (99).

At first it looks like (99b) can be analyzed on a par with the extraction of an indirect object from a double object construction. As shown in (101), wh-movements such as relativization and wh-movement can not extract an indirect object from a double object construction. Since the standard degree argument in the current analysis holds the same structural position as an indirect object, the fact in (100) can be explained by the same mechanism that bans extraction from a double object structure.

(101) a. *The person that you gave a book came to see you.

b. *Who did you give a book?

[5] Note that wh-questions on the standard degree is perfectly fine. To include this data into our discussion, we essentially need to talk about the debate with regards to whether wh-in-situ involves movement or not (Huang 1982, Reinhart 1997). To avoid complicating the problem, I will put aside wh-questions for the present discussion.

(1) Ta gao shei yidian.
He tall who a little
Who is he a bit taller than?

There are a couple problems indicating this can not be the whole story. First, as shown in (102), in Chinese the extraction of an indirect object, although sounds odd, isn't as bad as the extraction of the standard degree in (100b).

(102) ??ta gei-le yi-ben-shu DE na-ge-ren
he give-perf. one-CL-book DE that-CL-person
the person that he gave a book

Further more, the extraction in Chinese double object constructions seems to be less constrained than comparatives. For example, object shift in fine on the indirect object, as in (103), but object shift of the standard degree is impossible, as in (104):

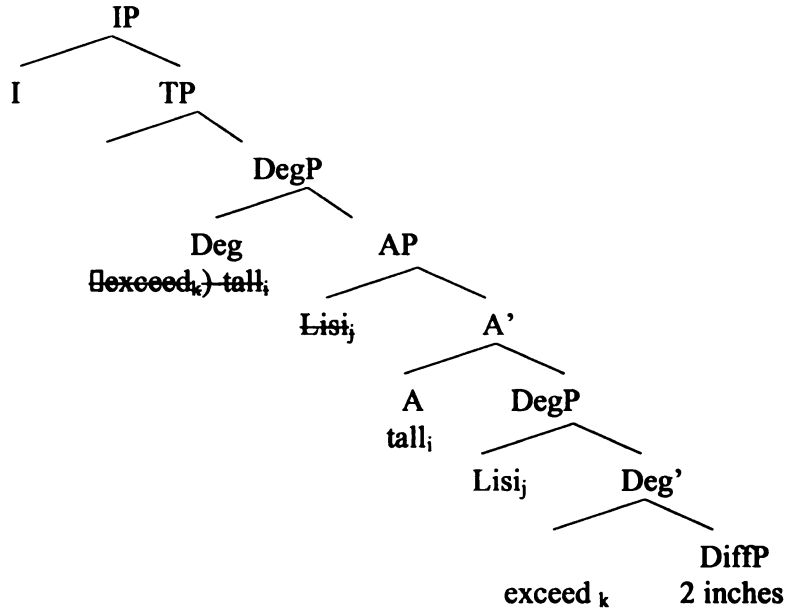
(103) Ta meigeren$_j$ dou gei-le t_j yi-ben-shu
He everybody$_j$ all give-perf. t_j one-CL-book
He gave everybody a book.

(104) *Ta meigeren$_j$ dou gao t_j yidian.
He everybody$_j$ all tall t_j a little
He is taller than everybody.

These facts suggest that the extraction of the standard degree argument in comparatives can't be reduced completely to its similarity to double object constructions. I will suggest that the standard degree can't be extracted because the extraction will lead to a Left Branch Condition violation at LF. As shown below, at LF if we reconstruct moved elements back to their base position, or alternatively interpret the lower copy of the

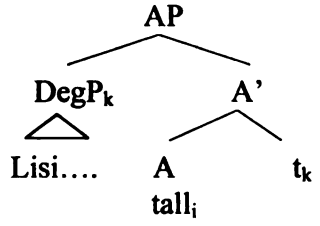
moved elements based on the copy theory, we derive a LF that contains a degree argument, namely the lower DegP-shell structure.

(105)



The degree argument DegP is the complement of the adjective head. Following the tradition that degrees are interpreted at the specifier of its adjective head (see Chapter 1), I will assume that the degree argument DegP moves at LF to the [Spec, AP] position, as shown below:

(106)



According to (106) above, the extraction of the standard degree *Lisi* will be ruled out as a violation of the Left Branch Extraction.

One puzzle I don't have much to say about is the standard degree is extractable in English, as shown in (107):

(107) a. Who is John taller than?

b. The person that John is taller than left.

Since both Chinese and English comparatives involve quantification over a degree argument, it is not obvious why the above analysis doesn't block the extraction of the standard degree in English as well. However, I want to point out that even in English, the extraction of the standard degree is not completely free. This is clearly seen in ACD cases like (108).

(108) *John is taller than everybody that I am.

[everybody that I am]$_j$ [John is taller than t_j]

If the standard degree *everybody that I am* can move at LF, as shown in (108), ACD should be resolved and (108) should have had a sensible interpretation that for every x I am taller than, John is taller than x. However, (108) is ungrammatical. Notice that the ungrammaticality in (108) doesn't come from some independent properties of comparative constructions that just block QR in ACD situations. In another slightly different example (Chris Wilder, p.c.), we see that the standard degree can undergo QR again.

(109) John is taller than more people than I am.

[more people than I am]$_j$ [John is taller than t_j]

[more people than I am taller than][John is taller than]

(109) is only slightly different from (108). But all of a sudden ACD can be resolved by extracting the standard degree. (109) means that the number of people that John is taller than is more than the number of people that I am taller than. It is mysterious why in Chinese the standard degree in general is unextractable, whereas in English it is so only in a very limited number of cases.

5.6.2. Intensifying the degree argument

Recall that in Chapter 4, I used the quantifier intervention effect at LF (Beck 1996) to examine the existence of the degree argument. In this section, we are going to look at the same effect induced by the interaction of the degree adverb *hen* and the degree argument.

We have come across the degree adverb *hen* several times earlier. The degree adverb *hen* in Chinese can be used to intensify the degree, hence it is usually called intensifier[6]. For example, by adding *hen* to (110a), as shown in (110b), it means that the difference between the two compared heights is not just a bit, it is quite a bit.

[6] The use of *hen* in comparatives seems to be conditioned by regional variations. Some consultants accept *xiangdang* (very), another morpheme similar to *hen*, but they don't accept *hen*; some other consultants don't accept this kind of degree intensification at all. Since in the author's speech, the *hen*-modification is fine, the author informally consulted 16 informants in her home community at Yichang City, Hubei Province, China. The informants were asked to judge the grammaticality of the sentences on a 1 to 5 scale, with 5 as the best score. The scores of the core data used in this section are listed below, the last number in each row is their corresponding position in the text:

(110) a. Ta gao wo yidian

he tall me a little

He is a bit taller than me.

b. Ta hen gao wo yidian

he very tall me a little

He is quite a bit taller than me.

The interpretation of (110b) suggests that the adverb is modifying the differential degree *a little*. But how is the semantic interpretation achieved? As shown in (111), the adverb *hen* can never directly modify the differential degree.

ta gao wo yi-dian he tall me a little	4.4 (110a)
ta hen gao wo yi-dian he very tall me a little	4.3 (110b)
ta bi wo hen gao yi-dian he bi me very tall a little	4.6 (120b)
ta hen bi wo gao yi-dian he very bi me tall a little	4.4 (120a)
ta bi mei-ge-ren dou hen gao yidian he bi everybody all very tall a little	3.2 (122a)
ta bi na-san-ge-ren dou hen gao yi-dian he bi those-three-people all very tall a little	4.0 (122b)
ta hen bi men-ge-ren dou gao yi-dian he very bi everybody all tall a little	1.6 (123a)
ta hen bi na-san-ge-ren dou gao yi-dian he very bi those-three-people all tall a little	2.0 (123b)
ta hen bi mei-ge-ren gao yi-dian he very bi everybody tall a little	1.7 (125a)
ta hen bi na-san-ge-ren gao yi-dian he very bi those-three-people tall a little	2.9 (125b)

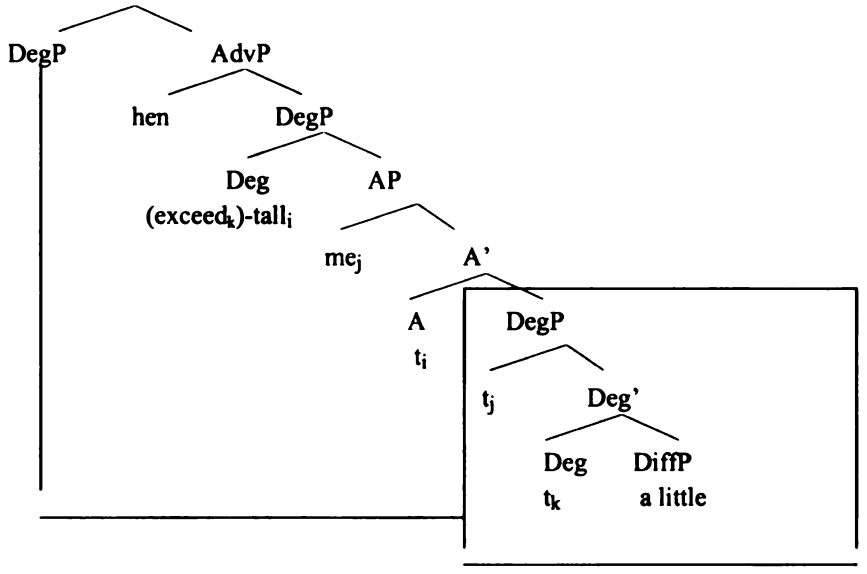
(111) *Ta gao wo hen yidian

he tall me very a little

He is quite a little taller than me.

At least from the word order, it seems that *hen* is always an adverb on the predicate. I will assume that *hen* is working as an intensifier to modify the whole degree argument. In other words, by adding the degree adverb in (110b), the sentence not only describes the degree to which the person is tall, but also intensifies that degree. I will suggest that *hen* is a head of an adverb projection, situated on top of AP, and at LF the degree argument moves to the specifier of that head. Through the [Spec, head] agreement relation between *hen* and the degree argument, the degree argument is intensified. This derivation is shown in (112).

(112)



If the LF movement of the lower DegP is real, we expect to see the quantifier intervention effect at LF (Beck 1996): a quantificational element in between *hen* and the

lower DegP should block this movement. The negation data below seems to support this prediction.

(113) a. Ta hen gao wo yidian

he very tall me a little

He is quite a bit taller than me.

b. Ta bu gao wo duoshao

He not tall me a bit

He isn't taller than me by much.

c. *Ta hen bu gao wo duoshao

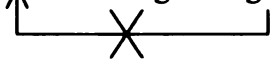
He very not tall me a bit

He really isn't taller than me by much.

The example in (113a) is the same as (112). Negation by itself is fine with comparatives, as shown in (105b). However, when we combine (113a) and (113b), the sentence becomes ungrammatical, as shown in (113c). Compare the ungrammatical (113c) with the grammatical example (113a) and (113b), the only difference is that the negation[7] is intervening between *hen* and the DegP. Crucially (113c) is not semantically uninterpretable. It can mean that the differential degree between the two people's heights is not just small, it is very small. Under the current analysis, the ungrammaticality of (113c) is expected because LF movement of the degree argument is illicit, as shown in (114):

[7] *Yidian* in (113a) and *duoshao* in (113b) means the same thing, but they are conditioned by positive/negative environment, so we can think *duoshao* as the NPI item.

(114) hen... Neg... Degree argument (illegitimate movement)



The current analysis also predicts that if we combine (113a) and (113b) with a different word order, namely, if the negation is preceding *hen*, the output should be fine. Unfortunately this prediction is not borne out. As shown in (115), when the negation is preceding *hen*, there is nothing intervening between the adverb hen and the degree argument. Therefore nothing can block the LF movement of the degree argument, as shown in (116), and the sentence should be fine, contrary to fact.

(115) *Ta bu hen gao wo yidian/duoshao

he not very tall me a bit

He isn't taller than me by much.

(116) ...Neg... hen...Degree argument (legitimate movement)

The ungrammaticality of (115) is puzzling under the present analysis. Does (115) suggest that the degree adverb *hen* and the negation are just not compatible for some reason, therefore (113) is not an argument for the movement of the degree argument after all? Or we can keep the current analysis for (113), and rule out (115) on other independent grounds? I will argue for the second possibility.

Notice that independent of explicit comparative constructions, *hen* and negation are compatible and the relative order between the two is flexible, as shown in (117). This

rules out the possibility that (113c) and (115) are both ungrammatical because of the incompatibility between *hen* and negation.

(117) a. Ta hen bu gaoxing.
he very not happy
He is very unhappy.
b. Ta bu hen gaoxing.
he not very happy
He is not very happy

Interestingly, as shown by the English translations above, the different word order between the two seems to give rise to different interpretations. In (117a), the negation is on the adjective, whereas in (117b) the negation is on the adverb *very*. Following Huang (1988), Ernst (1995), Chinese negation cliticizes into the element it precedes. Therefore in (117a) *not-happy* actually forms one complex morpheme, and so does *not-very* in (117b). Following the same line, the negation in (113c) and (115) cliticizes to the following elements too, which gives us a revised version of (114) and (116), as shown below:

(118) ...hen... *Neg-X*... Degree argument (Neg cliticized into the following element X)

(119) ...*Neg-hen*...Degree argument (Neg cliticized into the following *hen*)

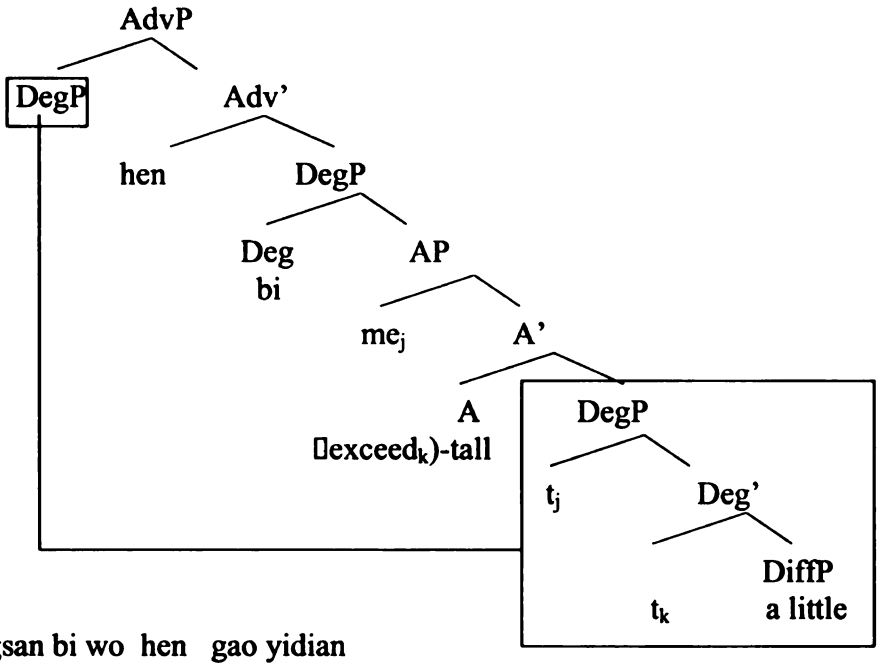
Now let's see what happens when at LF the degree argument moves to the specifier of the AdvP headed by *hen*. The movement in (118) is ruled out in exactly the same way as before: the movement is blocked by the quantificational element, i.e. the negation, on the way. What is interesting is that in (119) since the negation and *hen* are merged together now as a complex head, in order for the degree argument to move over *hen*, it has to move over the negation too. This is impossible because as I mentioned in Chapter 4, for some unknown reason the degree argument can not take scope over negation (Kennedy 1997).

We can use the intensifier *hen* in *bi*-comparatives too. As shown below, the intensifier takes flexible positions: it can be situated higher than *bi*, which means it is higher than the high DegP-shell, or it can be situated lower than bi, but higher than the low DegP-shell. In either case, under the current analysis, the degree argument (e.g. the lower DegP-structure) moves to the specifier of the *hen* head, as shown by the examples below.

(120) a. Zhangsan hen bi wo gao yidian

Zhangsan very bi me tall a little

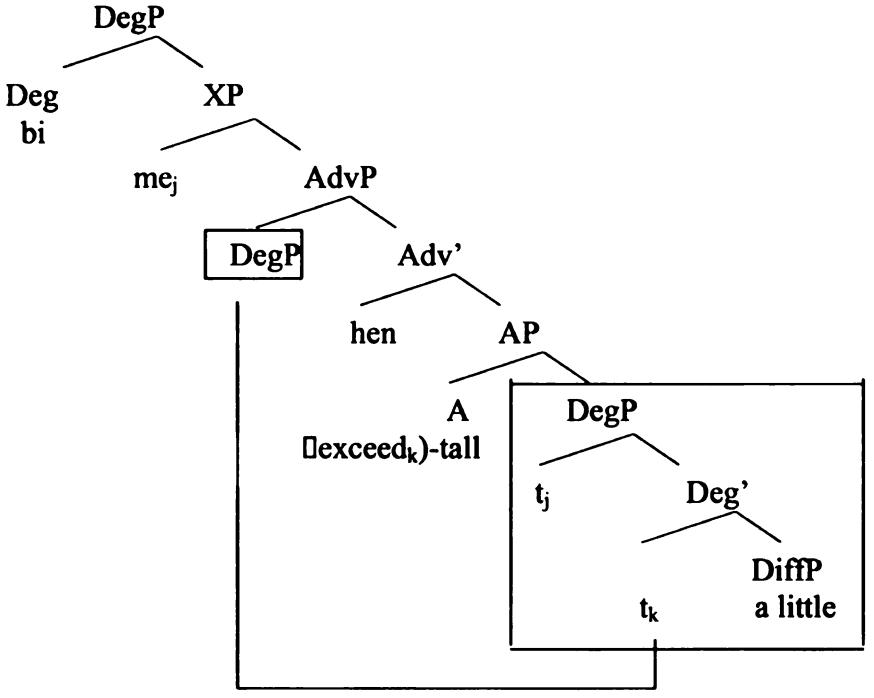
Zhangsan is much taller than me.



b. Zhangsan bi wo hen gao yidian

Zhangsan bi me very tall a little

Zhangsan is much taller than me.



What is interesting for our purpose is that in bi-comparatives we have an opportunity to add a quantificational structure *dou*-structure in between the two DegP-shells, hence it is

interesting to see if that makes a difference to the high and low position of *hen*. As discussed in Wu (1999), *dou* is a functional head that projects its own structure. It is also considered to be quantificational, so it can distribute over the DP to its left (Cheng 1995). When the standard degree is distributable, e.g. *everybody, the three people*, *dou* can be used, as shown below:

(121) a. Ta bi mei-ge-ren dou gao yidian.
He bi every-CL-person all tall a little
He is a little taller than everybody.

b. Ta bi na-liang-ge-ren dou gao yidian.
He bi that-two-CL-person all tall a little
He is a little taller than those two people.

When *hen* is low, there is no problem to add *hen* to sentences in (121), as shown in (122):

(122) a. Ta bi mei-ge-ren **dou hen** gao yidian.
He bi every-CL-person all very tall a little
He is quite a bit taller than everybody.

b. Ta bi na-liang-ge-ren **dou hen** gao yidian.
He bi that-two-CL-person all very tall a little
He is quite a little taller than those two people.

However, when *hen* is high, it becomes odd to add *hen* to sentences in (121), as shown in (123):

(123) a. ??Ta **hen** bi mei-ge-ren **dou** gao yidian.
He very bi every-CL-person all tall a little
He is quite a bit taller than everybody.

b. ??Ta **hen** bi na-liang-ge-ren **dou** gao yidian.
He hen bi that-two-CL-person all tall a little
He is quite a bit taller than those two people.

This contrast is easily explained under the present analysis that the degree argument in the low DegP-shell position is a quantificational argument and it moves to the specifier of *hen* to intensify the degree. (122) is fine because the movement of the lower DegP doesn't cross the quantificational *dou*, but in (123) *dou* is intervening between *hen* and the low DegP, so the LF movement will be blocked. Let's demonstrate the two derivations by the diagrams below:

(124) a. … dou hen … degree argument (the movement is fine)

a. … hen dou…degree argument (the movement is blocked by *dou*)

Interestingly if *dou* is dropped from (123), *mei-ge-ren* (*everybody*) still leads to ungrammaticality, but *na-liang-ge-ren* (*those two people*) is much better, as shown by the contrast below.

(125) a. ??Ta **hen** bi mei-ge-ren **(*dou)** gao yidian.

He very bi every-CL-person all tall a little

He is quite a bit taller than everybody.

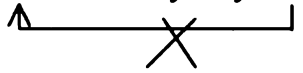
b. Ta **hen** bi na-liang-ge-ren **(*dou)** gao yidian.

He hen bi that-two-CL-person all tall a little

He is quite a bit taller than those two people.

The result in (125a) is not surprising. Although *dou* is absent, *everybody* is still quantificational and can block the degree argument movement just like *dou* does, as shown in (126).

(126) ... hen...everybody...degree argument (the movement is blocked by *everybody*)



What is interesting in (125b). DPs such as *those two people* are clearly referential, and the referentiality might not induce blocking effect as much as pure quantificational DPs. Beck (1996) also observes similar distinction between pure quantificational and referential DPs. I will leave the exact nature of this distinction open for further investigations.

To summarize, in this section I have argued that the degree intensifier *hen* triggers LF movement of the degree argument. This movement is blocked if there is another quantificational structure standing in between *hen* and the degree argument.

5.7. Conclusion

In this chapter I have shown that independent evidence suggests that Chinese comparatives are best characterized as having a DegP-shell structure. As a consequence of this analysis, the degree argument now can be implemented into syntax as the lower DegP-shell structure. The existence of the degree argument as the lower DegP-shell is supported by extraction facts in Chinese, and more importantly, the LF intervention effect in both Chinese and English.

Chapter 6

Concluding Remarks

In this thesis I investigated some issues on the semantics and syntax of comparatives. Although the domain of my investigation is far from complete, I hope I have drawn a basic picture that can capture our general intuition of how comparatives work. First, comparatives express relations between individuals and degrees. Parallel to other simple adjectival predicates, a gradable adjective in comparatives also relates an individual to its degree of some dimension. Syntactically speaking, a DegP-shell structure can capture the relation among different arguments and the degree morpheme. Second, the standard degree argument, which is part of the degree argument, can be encoded either as an elided clause, or as a simple DP. This syntactic property interacts with the semantic property of quantifiers and gives rise to unexpected wide scope interpretation of quantifiers. Thirdly, the inherent scale introduced by gradable adjectives, interacting with the semantics and pragmatics of indefinite negative polarity items, makes comparatives a licensing environment of NPIs.

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