

A New Syntax-Semantics for the Mandarin *bi* Comparative

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Submitted in partial fulfillment of the requirements for the degree of Master of Arts in Linguistics
University of Chicago, May 9, 2007.

Note (November 2015): Please see my newer paper, "Clausal comparison without degree abstraction in Mandarin Chinese": <http://mitcho.com/research/bi.html>

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Acknowledgments

I am indebted to my advisors Christopher Kennedy and Jason Merchant for invaluable feedback on this project, as well as to the rest of our supportive faculty who have taught me so much in the past four years. This project has benefited from inspiration from and discussion with Thomas Grano, James Huang, Luther Liu, and Osamu Sawada. I thank my informants, Celia Jia Cui, Fan Wang, and Fei Yu, without whose judgements this project would have been impossible. Finally, I must thank Shirley Johnson, Katherine Wogstad, and Jun Yang, who have taught me the joys of Mandarin Chinese: their claims that Mandarin grammar is very simple and straightforward sparked my curiosity and have pushed me to this day. I accept all errors as my own.

Chapter 1

Introduction

The study of the comparative is a particularly interesting area of linguistic research, precisely because of the universality of the act. Comparison is a basic linguistic task which we expect all languages to express with grace, albeit in their own distinct way. The examination of these structures across languages may give us valuable insights into broader principles of their syntax-semantics.

In this thesis we will focus on a class of Mandarin comparatives, most of which exhibit the morpheme *bi*. The most common Mandarin *bi* comparative has a pattern that can be described as in (1). As we see from (2-3), the predicate of comparison here must be gradable but can be adjectival or verbal (or, more theory-neutrally, intransitive or transitive).

- (1)

target

bi

standard

predicate of comparison

- (2) 我 比 他 高。
wo bi ta gao
1sg bi 3sg tall
“I am taller than him/her.”
- (3) 我 比 他 喜欢 面。
wo bi ta xihuan mian
1sg bi 3sg like noodles
“I like noodles more than he/she does.”

In addition to the cases which have nominal targets and standards as above, we see that the target and standard may also be clausal, as is possible in English.

- (4) 约翰 骑 马 比 玛丽 骑 牛 骑 得 快。
[Yaohan qi ma] bi [Mali qi niu] [qi de kuai]
John ride horse bi Mary ride cow ride DE fast
“John rides horses faster than Mary rides cows.”

Much as there has been a debate on the analysis of the relationship between phrasal and clausal comparatives in English (Bresnan, 1973; Hankamer, 1973; Kennedy, 1999), there has been a corresponding debate in the Mandarin literature (Liu, 1996; Xiang, 2003, 2005). Of course, the considerations in either case are not equivalent. In particular, there are a number of empirical puzzles that have haunted the Mandarin *bi* comparative. These include:

(5) **The Internal Argument Prohibition:**

Comparatives may not directly target object positions.

- a. 约翰 比 汤姆 喜欢 玛丽。

Yaohan bi Tangmu xihuan Mali

John bi Tom like Mary

“John like Mary more than Tom does.”

* “John like Mary more than he likes Tom.”

- b. * 约翰 喜欢 玛丽 比 汤姆。

Yaohan xihuan Mali bi Tangmu

John like Mary bi Tom

intended: “John like Mary more than Tom does.”

(6) **Lack of embedded clausal standards:**

- a. John rides horses faster than [I think [Mary rides cows]].

- b. * 约翰 骑 马 比 [我 认为 [玛丽 骑 牛]] 骑 得 快。

Yaohan qi ma bi wo zhidao Mali qi niu qi de kuai

John ride horse bi 1sg think Mary ride cow ride DE fast

intended: “John rides horses faster than I think Mary rides cows.”

(7) **Lack of comparative subdeletion:**

- a. My chair is taller than your table is wide.

- b. * 我的 椅子 比 你的 桌子 宽 高。

wo de yizi bi ni de zhuozi kuang gao

1sg GEN chair bi 2sg GEN table wide tall

intended: “My chair is taller than your table is wide.”

In this thesis I introduce a new verbal syntax for the Mandarin *bi* comparative and a novel neo-Davidsonian semantics of comparison. While a number of the arguments for my particular syntactic analysis are considered in other works, particularly Xiang (2003), I augment these arguments with unique evidence from passivization and *ge* distributive quantifier. Acknowledging the syntactic similarities between the *bi* comparative and the double object construction, *bi* is analyzed as part of the extended verbal projection, with category *v*.

As part of the comparative comparatives research program introduced by Kennedy (2007 and earlier), I establish the Mandarin *bi* comparatives as instances of *explicit* comparison. My semantic

analysis crucially handles the comparatives examined here as instances of *individual* comparison, as opposed to *degree* comparison—that is, a ranking of intensity is established over eventualities directly, rather than establishing an ordering of algebraic degree variables (see Kennedy, 2007). Following Kratzer’s (1996) neo-Davidsonian event-semantics, I will show how my semantics trivially derives all three of the puzzles noted above.

I begin in chapter 2 by reviewing some facts about the English comparative and examining two established analyses thereof. I then examine a selection of Mandarin comparative data, first describing the inventory of comparatives, then giving closer attention to the puzzles considered above, and concluding by laying out some relevant research questions in §3.2.4. At this point I will also take a moment to establish the *bi* comparative as explicit comparison in §3.3. Chapter 4 constitutes a literature review on the subject, focusing on two more recent and prominent analyses of Liu (1996) and Xiang (2005). In chapter 5, I will introduce my proposal for the syntax and semantics of phrasal and clausal *bi* comparatives and compare my solutions to the questions posed in §3.2.4 with the other analyses. In the conclusion, chapter 6, I will review my proposal and discussion and finally close with some exciting research directions for the future.

Chapter 2

Analyses of the English comparative

An investigation into Mandarin comparatives must be grounded in the general literature of comparatives. As such, let us begin with a review of English comparatives and two standard analyses.

2.1 Components of a comparative

There are certain components of comparatives that we take to be universal, based on the act of comparison itself. Comparatives, simply put, orient two entities along a scale. We call the subject in a comparative the *target*,¹ as opposed to the entity to which it is compared, the *standard*. The scale is introduced through a gradable predicate, which I will refer to as the *predicate of comparison*.² In sentence (8) below, “John” is the target, “Mary” is the standard, and “taller” is the predicate of comparison.

(8) John is taller than Mary.

In English, we note that the standard co-occurs with the word “than,” which we call the *standard marker*. In addition, we note that the predicate of comparison is modified by the suffix “-er.” Note that a comparative need not explicitly state the standard.

(9) John is taller.

It is important to note that (9) is infelicitous without a context in which the standard is clear. However, as the suffix “-er” suffices to trigger a comparative reading, we call “-er” the English *comparative morpheme*.³ With some adjectives and adverbial as well as verbal predicates of comparison, we use a different comparative morpheme, the adverbial “more.”

¹“correlate” in Heim (1985)

²These terms, particularly the term “target,” is due to Kennedy (2005b).

³Alternatively, we could call it the English *morepheme*.

- (10) a. The dress is **more** expensive than the hat.
 b. John eats **more** politely than Mary.
 c. John eats **more** than Mary.

In addition, comparatives may optionally express a degree to which the target is superior to the standard. I will refer to these optional elements as *differentials*.

- (11) a. John is **much** taller than Mary.
 b. John is **two feet** taller than Mary.

2.2 Phrasal and clausal analyses of the English comparative

To better understand the previous literature on English comparatives, we must first examine the distinction between phrasal and clausal standards and their treatment—an important division between analyses. We begin by identifying two classes of comparatives in English, contrasted in (12).

- (12) a. John is taller than Mary.
 b. John is taller than Mary is.

We note that the two examples in (12) are truth-conditionally equivalent. Bresnan (1973) introduced the idea that (12a) is derived from the same deep structure as (12b), both with ellipsis in the standard clause. Such an analysis of surface-phrasal standards (e.g. 12a) is often referred to as the “clausal analysis.”

- (12') a. John is taller than [_S Mary is ~~×much tall~~].
 b. John is taller than [_S Mary is ~~×much tall~~].

Chomsky (1977) then made explicit the idea that the degree expressing element moves to outside the standard clause, as an instance of *wh*-movement. This was motivated by Bresnan’s (1973) observation that comparatives can violate the Complex NP Constraint, as in (13).

- (12'') John is taller than X [_S Mary is ~~×much tall~~].
 (13) * John is taller than [_{NP} the claim that [_S Mary is ~~×much tall~~]].

However, subsequent studies have introduced many arguments for syntactically different analyses of the surface phrasal and clausal comparatives (Hankamer, 1973; Heim, 1985; Hoeksema, 1984;

Kennedy, 1999). For example, we see that while clausal standards form *wh*-islands—expected by Chomsky’s (1977) view of comparatives as involving the movement of a *wh*-operator and successive cyclic movement—phrasal standards are not. Case facts also support this analysis, with accusative case in the phrasal standard but nominative case in the clausal.

(14) *Wh*-extraction from clausal and phrasal standards

- a. John is taller than Mary is.
- b. * Who is John taller than ~~who~~ is?
- c. John is taller than Mary.
- d. Who is John taller than ~~who~~?

(15) Accusative case in the phrasal standard

- a. John is taller than she.
- b. John is taller than her.
- c. John is taller than she is.
- d. * John is taller than her is.

We also note that reflexives may appear in phrasal comparatives but not clausal comparatives, implying no underlying clause in the phrasal comparative (Hankamer, 1973).

(16) Reflexives in the phrasal standard

- a. John cannot be taller than himself.
- b. * John cannot be taller than himself is.

In addition, we note that phrasal comparatives license negative quantifiers, while clausal comparatives do not.

(17) Licensing of negative quantifiers

- a. John is taller than no one.
- b. * John is taller than no one is.

One difficulty of the phrasal analysis, though, is the question of what degree is expressed by the phrasal standard—for example, in (12a), if there is no gradable predicate downstairs at any point of the derivation, how do we know what we are comparing John’s height to? Heim (1985) offers a solution to the problem by distributing the gradable predicate over both entities and then comparing their degrees. Heim here views gradable adjectives as expressions with free degree variables (e.g., $\text{tall}(x, y)$, meaning x is at least y -tall) which is later bound by movement of the comparative operator, turning the expression into a lambda-iota function (e.g., $\lambda x. \iota y (\text{tall}(x, y))$) which takes an

argument and returns a maximal degree. She gives a semantics of the -er comparative operator as follows:

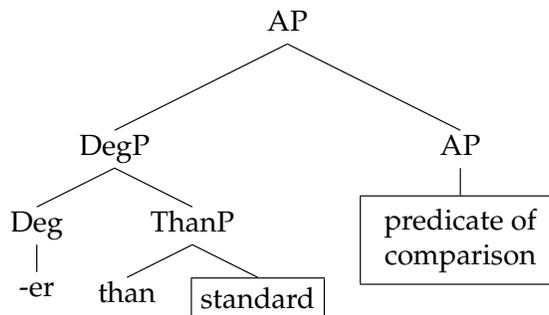
$$(18) \quad \llbracket \text{-er} \langle a, b \rangle f \rrbracket = 1 \text{ iff } f(a) > f(b)$$

2.3 The syntax of comparatives

Let us now review two widely-accepted syntactic approaches to the English adjectival comparative.

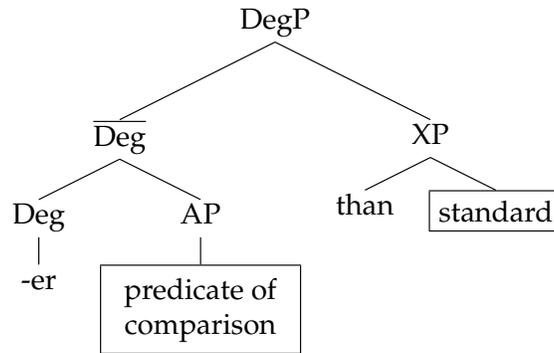
2.3.1 The traditional analysis (Bresnan, 1973)

We recall that Bresnan (1973) introduced the clausal analysis of phrasal comparatives, positing an underlying clausal standard in all English comparatives. Bresnan analyzed the structure of the underlying “tall” in the standard [[x much] tall], where x was a variable—a “reference point” of comparison, unspecified” (Bresnan, 1973, p. 317). Following her morphosyntactic analysis of absolute degree arguments, the comparative morphology, in more contemporary terms, is generated with the standard as a constituent sister to the adjective.



2.3.2 The extended functional projection analysis (Kennedy, 1999)

Kennedy (1999) notes that, while Bresnan’s (1973) model has been widely influential, it does not neatly align with more contemporary theories of functional phrase structure, such as that of noun and verb categories. He argues that the comparative morphology first selects the predicate and then the standard, which is already semantically a degree expression.



As is a common assumption, the gradable predicate G here is a function from individuals to degrees. Under Kennedy's view, the morephrase has semantics

$$\llbracket \text{-er} \rrbracket = \lambda G \lambda G \lambda x. \mathbf{more}(G(x), d)$$

Our final semantics would be of the form $\mathbf{more}(d_{\text{target}}, d_{\text{standard}})$, where $d_{\text{target}} = G(\text{target})$. There is crucially no degree variable to be bound in Kennedy's comparative semantics: he notes that we observe none of the expected variable scope effects of an existentially bound degree variable.

Chapter 3

Mandarin Comparatives

Having considered some basic facts about the structure of English comparatives and their analysis, we now consider the variety of Mandarin *bi* comparatives and their syntactic properties. Later in the chapter we will examine some of the issues concerning an analysis of these structures and identify relevant questions any proposal must address.

3.1 The *bi* comparative

We shall begin with the consideration of a few simple comparatives.

- (19) a. 我 比 他 高。
wo bi ta gao
1sg bi 3sg tall
“I am taller than him/her.”
- b. 我 比 他 喜 欢 面。
wo bi ta xihuan mian
1sg bi 3sg like noodles
“I like noodles more than he/she does.”
- c. 我 比 他 骑 得 快。
wo bi ta qi de kuai
1sg bi 3sg ride DE fast
“I ride faster than he/she rides.”

In each of these examples, we note the following basic word order:¹

¹It is worth noting that the *bi* comparative is but one in a paradigm of three types of comparison—superiority, weak superiority (the “equaling” comparative of Chao (1968)), and equality—as expressed below in a paradigm I owe to Fu (1978, p. 105):

(20)

target

bi

standard

predicate of comparison

In addition to this basic similarity, we observe contrasts between the examples above. First, there is one fundamental difference between (19a) and (19b-c): that is, while the predicates of comparison in all three of these examples are of course gradable, (19a) has an adjectival predicate while (19b-c) have verbal predicates. Note that both types of predicate are acceptable, at least in the forms above, and the choice of verbal or adjectival predicate does not affect the surface word-order or comparative morphology (cf. English, where “-er” may only affix to adjectives and adverbs). We note further a contrast between (19b) and (19c): in (19b) we are comparing degrees of liking, a scale derived from the main verb “like,” while in (19c), we are comparing the speed of riding, a scale derived from the adverbial “fast.”

As a philological aside, we must note that *bi* 比 by itself is also a verb which means “compare.” In addition, the ideogram 比, originally a depiction of two people side by side, is semantically related to comparison, and is used in other compounds such as 比赛 (*bisai* “competition”) and 比较 (*bijiao* “relatively”). It is important to note, however, that while there is clearly a historical connection between the verb *bi* and the functional *bi* at issue here, it has been made clear that such considerations are not reliable clues toward the proper synchronic analysis of the language (see Li and Thompson, 1974).

In the rest of this section, we will identify three types of comparatives employing the comparative morpheme *bi*. The first two differ not in word order but in the surface category of the target and standard: phrasal and clausal.

3.1.1 The “phrasal” comparative

The “phrasal” comparative is distinguished by both the target and standard being, descriptively, single non-verbal phrasal categories. All examples in (19) were phrasal comparatives. The categories of the target and standard must match and, in addition to the noun phrases as seen in (19), may also be prepositional phrases or some adverbials.

(21) *locative prepositional phrase:*

(a) superiority: (b) weak superiority: (c) equality:	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>target</td></tr></table>	target	$\left\{ \begin{array}{l} bi \text{ 比} \\ you \text{ 有} \\ gen \text{ 跟} \end{array} \right\}$	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>standard</td></tr></table>	standard	$\left\{ \begin{array}{l} (gen \text{ 更}) \\ name \text{ 那么} \\ yiyang \text{ 一样} \end{array} \right\}$	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>predicate of comparison</td></tr></table>	predicate of comparison
target								
standard								
predicate of comparison								

Suppose for discussion that our gradable predicate *G* is a map from entities to degrees. The relationship between these three types of comparison here is incredibly logical: $\llbracket(a)\rrbracket$ is true $\iff G(\text{target}) > G(\text{standard})$, $\llbracket(b)\rrbracket$ is true $\iff G(\text{target}) \geq G(\text{standard})$, and $\llbracket(c)\rrbracket$ is true $\iff G(\text{target}) = G(\text{standard})$, where *G* represents the predicate of comparison as a function from entities to partially-ordered degrees. As such, the most common utterance for a comparison of inferiority is the negation of (b), clearly capturing $\neg(G(\text{target}) \geq G(\text{standard})) \equiv G(\text{target}) < G(\text{standard})$ rather than the negation of (a) which expresses $\neg(G(\text{target}) > G(\text{standard})) \equiv G(\text{target}) \leq G(\text{standard})$.

The optionality of *geng* in the comparison of superiority as opposed to the other types remains a particularly interesting feature of this paradigm. Both synchronic and diachronic analyses of this contrast would be worthwhile areas of further investigation.

我 在 家 里 比 在 学 校 舒 服。
wo zai jia li bi zai xuexiao shufu
1sg at house inside bi at school comfortable

“I am more comfortable at home than at school.”

(22) *temporal adverb:*

我 今 天 比 昨 天 爱 你。
wo jintian bi zuotian ai ni
1sg today bi yesterday love 2sg

“I love you more today than yesterday.”²

In addition, noun phrases in target or standard position may correspond to subject (see 19, above) or topic position, in the sense of Jiang (1991).

(23) 象 比 熊 鼻 子 长。
xiang bi xiong bizi chang
elephant bi bear nose long

“Elephants’ noses are longer than bears’.” or “An elephant has a longer nose than a bear.”

3.1.2 The “clausal” comparative

In the “clausal” comparative, both the target and standard are clauses, describing two different events or possibilities. Below are two examples of the clausal comparative:

(24) a. 我 去 比 你 去 好。
[wo qu] bi [ni qu] hao
1sg go bi 2sg go good

“It would be better if I went than if you went.”³

b. 约 翰 骑 马 比 玛 丽 骑 牛 骑 得 快。
[Yaohan qi ma] bi [Mali qi niu] [qi de kuai]
John ride horse bi Mary ride cow ride DE fast

“John rides horses faster than Mary rides cows.”

²I thank the venerable Spiral Staircase for this example.

³As Mandarin is a pro-drop language, we assume sentences such as the following with only overt VP’s in the target and standard to also be instances of clausal comparatives. For example:

(1) 去 比 不 去 好。
[qu] bi [bu qu] hao
go bi Neg go good

“It would be better to go than not to go.”

There are a number of features of the clausal comparative that must be laid out. First, the predicate of comparison in comes in two varieties, exemplified above: a proposition-taking predicate (e.g., 好, *hao* “good”) or an adverb exhibiting reduplication of the verb (e.g., 騎得快, *qi de kuai* “ride fast” or “fast-riding”). Second, we note that in either of these examples, both the target and standard can form a grammatical sentence with the predicate of comparison.

- (24) a'. 我去好。
 [wo qu] hao
 1sg go good
 “It would be good if I went.”
- a''. 你去好。
 [ni qu] hao
 2sg go good
 “It would be good if you went.”
- b'. 約翰 騎 馬 騎 得 快。
 [Yaohan qi ma] [qi de kuai]
 John ride horse ride DE fast
 “John rides horses quickly.”
- b''. 瑪麗 騎 牛 騎 得 快。
 [Mali qi niu] [qi de kuai]
 Mary ride cow ride DE fast
 “Mary rides cows quickly.”

In particular, sentences (24b'-b'') are Descriptive Complement Constructions (DCC) with verb reduplication whose structures have been widely contested in the literature (see Huang 1988 and references there).

3.1.3 The “adverbial” comparative

There is also another type of comparison which exhibits the morpheme *bi* with substantively different word order, to which I will refer as the “adverbial” comparative. The crucial feature of an “adverbial” comparative is the occurrence of *bi* and the standard between the particle *de* and an adverb from which the scale of comparison is derived. The adverbial passive word order is only observed with adverbial predicates of comparison—as there is no *de* in an adjectival or simple verbal predicate, the word order contrast would trivially only surface with these complex verbal predicates. Note the target and standard are both phrasal.

- (25) 約翰 騎 得 比 瑪麗 快。
 Yaohan qi de bi Mali kuai
 John ride DE bi Mary fast
 “John rides faster than Mary (rides).”

We note that (25) is equivalent in meaning to (19c). It has been claimed that in general adverbial comparatives have equivalent surface-phrasal paraphrases (Lü, 1980, p. 62).

We identify the basic surface word order, then, to be:

- (26) target V de bi standard Adv

3.1.4 The “transitive” comparative

Finally, there is another peculiar type of comparative construction in Mandarin which I call the “transitive” comparative.⁴ I introduce it here, even though it does not employ the morpheme *bi*, because it has properties similar to the *bi* comparatives. Consider the the transitive comparatives in (27–30).

- (27) 约翰 高 玛丽 十公分。
 Yaohan gao Mali shi-gongfen
 John tall Mary ten-centimeters
 “John is ten centimeters taller than Mary.”
- (28) 约翰 高 玛丽 一头。
 Yaohan gao Mali yi-tou
 John tall Mary one-head
 “John is a head taller than Mary.”
- (29) * 约翰 高 玛丽。
 Yaohan gao Mali
 John tall Mary
- (30) 我 高 他 五 分。
 wo gao ta wu fen
 1sg high 3sg five CL_{points}
 ‘I was five points higher than him (on a test).’

In this comparative, we observe a basic word order of:

- (31) target gradable adjective standard differential measure

We note that the differential measure in this construction is obligatory. The position of the adjective here surfaces before the standard, giving us the surface appearance of a transitive predicate—hence

⁴Xiang (2005) calls this type of comparative the “bare” comparative, indicating the lack of *bi*. Such instances are called “adjectives with noncognate objects” by Chao (1968, p. 690) who explains them as cases where “the same verb [adjective] is sometimes transitive and sometimes intransitive.” I personally will refer to these as “transitive comparatives,” based on their word order, and to avoid the confusion with the class of bare adverbials used to introduce an implicit comparison, e.g., 他高 *ta gao*, literally “he tall,” but meaning “he is taller” in the proper context (see §3.3 below).

the “transitive” descriptive designation. Note also the fact that this comparative of superiority does not have corresponding equality or weak superiority forms such as the *bi* family of comparatives. The construction can be negated, but still requires the differential.

(32) 约翰 不 高 玛丽 十公分。
 Yaohan bu gao Mali shi-gongfen
 John Neg tall Mary ten-centimeters
 “John is not ten centimeters taller than Mary.”

(33) *约翰 不 高 玛丽。
 Yaohan bu gao Mali
 John Neg tall Mary

Not surprisingly, this construction requires that the gradable adjective be *measurable*, meaning a differential degree can be established. For example, predicates such as “red” *hong* are not measurable and thus cannot be used in this transitive configuration.

3.2 A look at the issues

So far we have familiarized ourselves with basic Mandarin comparative data and identified four descriptive types of comparatives that will define our inquiry. We now move on to more puzzling comparative data that give us a taste of the personality of the Mandarin comparative. After exploring some such phenomena, I will lay out a number of relevant research questions which I aim to attack.

3.2.1 Phrasal and clausal standards

One of the crucial points of analysis here is the structural distinction between phrasal and clausal standards—a decision complicated by some puzzling data that distinguish the Mandarin phrasal / clausal contrasts from those in English. For example, if we assume the phrasal comparative to have been derived from a clausal comparative, we may expect to be able to embed the standard in a clause, as we can in English clausal comparatives.

(34) a. John rides faster than [Mary does ~~ride~~].
 b. John rides faster than [I think [Mary does ~~ride~~]].

(35) a. 约翰 比 [玛丽 骑] 骑 得 快。
 Yaohan bi Mali qi de kuai
 John bi Mary ride DE fast
 “John rides faster than Mary.”

- b. * 约翰 比 [我 认为 玛丽 骑] 骑 得 快。
 Yaohan bi wo renwei Mali qi de kuai
 John bi 1sg think Mary ride DE fast

While a simple explanation would be that phrasal comparatives are not underlyingly clausal, we note that this type of embedding is disallowed in the clausal comparative as well!

(36) John rides horses faster than I think Mary rides cows.

- (37) * 约翰 骑 马 比 我 认为 玛丽 骑 牛 骑 得 快。
 Yaohan qi ma bi wo zhidao Mali qi niu qi de kuai
 John ride horse bi 1sg think Mary ride cow ride DE fast
 intended: "John rides horses faster than I think Mary rides cows."

In addition, Mandarin does not allow *comparative subdeletion*:

(38) My chair is taller than your table is wide.

- (39) * 我 的 椅子 比 你 的 桌子 宽 高。
 wo de yizi bi ni de zhuozi kuang gao
 1sg GEN chair bi 2sg GEN table wide tall
 intended: "My chair is taller than your table is wide."

What is the underlying structure of the Mandarin phrasal and clausal comparatives, and how does it explain the contrasts between English and Mandarin clausal comparatives, in particular the lack of embedded standards and comparative subdeletion in Mandarin?

3.2.2 The syntactic status of *bi*

Following the analysis of English "than," it may be tempting to assume *bi* to be a preposition or complementizer. Indeed, *bi* is often glossed as a preposition in dictionaries and descriptive grammars. However, a prepositional adjunct would, for example, dictate the position of negation below it.

- (40) a. 约翰 对 玛丽 不 丢 球。
 Yaohan dui Mali bu diu qiu
 John toward Mary Neg throw ball
 "John didn't throw Mary a ball"
- b. * 约翰 不 对 玛丽 丢 球。
 Yaohan bu dui Mali diu qiu
 John Neg toward Mary throw ball

From (41), however, we see clearly that negation in the *bi* comparative surfaces above *bi*.

- (41) a. 我 不 比 他 高。
 wo bu bi ta gao
 1sg Neg bi 3sg tall
 "I am not taller than him."
- b. *我 比 他 不 高。
 wo bi ta bu gao
 1sg bi 3sg Neg tall

Mandarin also has a unique form of yes-no questions involving negation, referred to as A-Not-A questions (Li and Thompson, 1981). In this construction, a verb in the sentence is followed by its negated form. This construction also applies to adjectives as well.

- (42) a. 约翰 喜欢 不 喜欢 玛丽。
 Yaohan xihuan bu xihuan Mali
 John like Neg like Mary
 "Does John like Mary?"
- b. 约翰 高 不 高。
 Yaohan gao bu gao
 John tall Neg tall
 "Is John tall?"

When constructing an A-Not-A question of a *bi* comparative, *bi* is the element that is reduplicated, rather than the predicate.

- (43) a. 你 高 不 高。
 ni gao bu gao
 2sg tall Neg tall
 "Are you tall?"
- b. 你 比 不 比 他 高。
 ni bi bu bi ta gao
 2sg bi Neg bi 3sg tall
 "Are you taller than him?"
- c. *你 比 他 高 不 高。
 ni bi ta gao bu gao
 2sg bi 3sg tall Neg tall

We see from these examples that *bi* can exhibit some verb-like behavior. What, then, is the status of *bi*, and what is its syntactic relationship to the standard?

3.2.3 Comparison over objects

Perhaps the most fascinating aspect of the Mandarin comparative, however, is the phrasal comparative's inability to compare directly over object positions. Consider, for example, the ambiguous English sentence "John likes Mary more than Tom." The subject may be the target of comparison, yielding the reading "John like Mary more than Tom does," or the object "Mary" may be the target: "John like Mary more than he likes Tom." Now consider the Mandarin equivalent in (44).

- (44) 约翰 比 汤姆 喜欢 玛丽。
Yaohan bi Tangmu xihuan Mali
John bi Tom like Mary
"John like Mary more than Tom does."
* "John like Mary more than he likes Tom."

- (45) a. * 约翰 喜欢 比 汤姆 玛丽。
Yaohan xihuan bi Tangmu Mali
John like bi Tom Mary
b. * 约翰 喜欢 玛丽 比 汤姆。
Yaohan xihuan Mali bi Tangmu
John like Mary bi Tom

Notice that (44) is unambiguous, and can only have the subject-targeted reading. The other object-targeted reading cannot be constructed as a phrasal comparative, even by moving *bi* and the standard. Instead, to compare over object position, we must use a clausal comparative, such as in (46).

- (46) [约翰 喜欢 玛丽] 比 [约翰 喜欢 汤姆] 喜欢 得 多。
Yaohan xihuan Mali bi Yaohan xihuan Tangmu xihuan de duo
John like Mary bi John like Tom like DE more
"John likes Mary more than he likes Tom."

Recall that the phrasal comparative can take a range of adverbs and adjuncts as its target and standard, e.g., (21, 22). The basic descriptive fact here, then, is that the phrasal comparative cannot take an object position as its target or standard. I will refer to this fact as the **Internal Argument Prohibition**.

3.2.4 Questions

As we have begun to see, Mandarin *bi* comparatives have a number of interesting properties which distinguish them from the English comparative. Here then are four relevant questions of analysis, most of which I intend to answer with my proposal in chapter 5.

- (47) **Q1. The Phrasal / Clausal Problem:**
Are Mandarin “phrasal” comparatives truly phrasal, or underlyingly clausal?
- (48) **Q2. The Individual / Degree Problem:**
Are Mandarin comparatives individual or degree comparatives in the sense of Kennedy (2007)? Are degree arguments necessary in the semantics?
- (49) **Q3. The Structure of the Comparative:**
What is *bi* syntactically and what is its relationship to the standard and predicate of comparison?
- (50) **Q4. The Internal Argument Prohibition:**
Why can we not compare directly over object positions?
- (51) **Q5. The Adverbial and Transitive Comparatives Problem:**
What are the syntactic and semantic structures of the adverbial and transitive comparatives, and how do they relate to the phrasal and clausal?

3.3 Aside: *bi*-comparatives as explicit comparison

Before we move to consideration of the syntactic and semantic structure of the Mandarin comparative, we must identify the semantics of the *bi* comparative as employing one of two strategies. Kennedy (2007) broadly identifies two different possible strategies that a language can use to make comparisons. Following Sapir (1944), he calls these options *implicit comparison* and *explicit comparison*, defined as follows.⁵

- (52) Kennedy (2007):
- a. *Implicit comparison:*
Establish an ordering between objects *x* and *y* with respect to gradable property *g* using the positive form by manipulating the context or delineation function in such a way that the positive form is true of *x* and false of *y*.
 - b. *Explicit comparison:*
Establish an ordering between objects *x* and *y* with respect to gradable property *g* using special morphology whose conventional meaning has the consequence that the degree to which *x* is *g* exceeds the degree to which *y* is *g*.

We see examples of implicit comparison in English, in addition to the explicit comparison involving the comparative morpheme “-er”. Consider (53).

⁵Perhaps also following Sapir (1944), Chao (1968, p. 680) also uses the terms “implicit” and “explicit” comparison, referring approximately to the same distinction drawn here. However, as Chao does not mention what I call the transitive comparative, it is hard to know if his criteria for “explicitness” was specifically the use of the *bi* morpheme or the explicit occurrence of the standard.

(53) Compared to Verne Troyer, I am tall.

In this example, we note the use of the positive form of *tall* without the overt comparative morpheme “-er.” We note that this sentence could be true even if I were not tall out of context.⁶ In this sense, we are using the positive form but manipulating the context to adjust what constitutes “being tall.”

Kennedy (2007) lays out a number of diagnostics for identifying implicit versus explicit comparatives. The first is that of crisp judgments.

Crisp judgments

The idea here is that, by adjusting the standards of what constitutes “being long,” for example, the implicit comparison is only true if there is a significant and discernible degree between the target and standard. In contrast, in the explicit comparison we are positing an ordering relation between the degrees of longness, for example, we may yield crisp judgments even when the degrees are quite close. We consider the examples from (Kennedy, 2005a, p. 11) and consider their Mandarin equivalents. Note that for the equivalents of the English explicit comparative, we will test both the corresponding Mandarin phrasal comparative and transitive comparative. In addition, we use the phrase *bi-qilai* 比起来 as the equivalent of “comparing...”

(54) Context: A 600 word essay and a 200 word essay.

- a. This essay is longer than that one.
- b. 这篇 文章 比 那片 文章 长。
Zhei-pian wenzhang bi nei-pian wenzhang chang
This-CL essay bi that-CL essay long
“This essay is longer than that one.”
- c. 这篇 文章 长 那片 文章 四百 个 字。
Zhei-pian wenzhang chang nei-pian wenzhang sibai ge zi
This-CL essay chang that-CL essay four-hundred CL words
“This essay is four hundred words longer than that one.”
- d. Compared to that essay, this one is long.
- e. 这篇 文章 跟 那片 文章 比起来, 这篇
Zhei-pian wenzhang gen nei-pian wenzhang bi-qilai, zhei-pian
This-CL essay with that-CL essay compare-PRT, this-CL
文章 长。
wenzhang chang
essay long
“Comparing this essay and that essay, this one is long.”

⁶While I am indeed not tall out of context (at least in the United States), Verne Troyer is only 2 feet 7 inches tall, making (53) felicitous.

- (55) Context: A 600 word essay and a 590 word essay.
- a. This essay is longer than that one.
 - b. 这篇 文章 比 那片 文章 长。
Zhei-pian wenzhang bi nei-pian wenzhang chang
This-CL essay bi that-CL essay long
“This essay is longer than that one.”
 - c. 这篇 文章 长 那片 文章 十 个 字。
Zhei-pian wenzhang chang nei-pian wenzhang shi ge zi
This-CL essay chang that-CL essay ten CL words
“This essay is ten words longer than that one.”
 - d. ?? Compared to that essay, this one is long.
 - e. ?? 这篇 文章 跟 那片 文章 比起来, 这个 文章
Zhei-pian wenzhang gen nei-pian wenzhang bi-qilai, zhei-ge wenzhang
This-CL essay with that-CL essay compare-PRT, this-CL essay
长。
chang
long
“Comparing this essay and that essay, this one is long.”

Indeed, we observe the same contrast between the 600-200 and 600-590 cases across both English and Mandarin. That is, the *bi* comparative yields crisp judgments while the *bi-qilai* construction does not.

Absolute gradable adjectives

Absolute gradable adjectives are those whose denotations are clearly true or false, regardless of context, yet are still gradable and thus comparable (e.g., “wet,” “open,” “bent,” etc.). As the positive forms are computed without reference to a context-dependent standard, we would expect implicit comparison to be unavailable, as it involves a shifting of the implicit standard. Indeed, we see this to be the case. (English results are again from Kennedy (2005a, 2007).)

- (56) Context:

Rod A:  Rod B: 

- a. B is more bent than A.
- b. 这根 棍子 比 那根 棍子 弯。
Zhei-gen gun.zi bi nei-gen gun.zi wan
This-CL rod bi that-CL rod bent
“This rod is more bent than that rod.”

- c. ? 这根 棍子 弯 那根 棍子 一 点。
 Zhei-gen gun.zi wan nei-gen gun.zi yi dian
 This-CL rod bent that-CL rod one point
 “This rod is a bit more bent than that rod.”
- d. ?? Compared to A, B is bent.
- e. ?? 这根 棍子 根 那根 棍子 比起来, 这根 棍子 弯。
 Zhei-gen gun.zi gen nei-gen gun.zi bi-qilai, zhei-gen gun.zi wan
 This-CL rod with that-CL rod compare-PRT, this-CL rod bent
 “This rod is a bit more bent than that rod.”

Differential measurements

Consider the optional differential degree, such as “*ten centimeters taller.*” In an explicit comparative, such an explicit measure would correspond to a differential, while in an implicit form, it may be confused with an absolute degree. (English results again from Kennedy (2005a, 2007).)

- (57) a. John is 10cm taller than Mary.
 b. 约翰 比 玛丽 高 十 公分。
 Yaohan bi Mali gao shi gongfen
 John bi Mary tall ten centimeters
 “John is 10cm taller than Mary.”
 c. John is 10cm taller than Mary.
 d. 约翰 高 玛丽 十 公分。
 Yaohan gao Mali shi gongfen
 John tall Mary ten centimeters
 “John is 10cm taller than Mary.”
 e. ?? Compared to Mary, John is 10cm tall.
 f. 约翰 比 玛丽 比起来, 约翰 高 十 公分。
 Yaohan gen Mali bi-qilai, Yaohan gao shi gongfen
 John with Mary compare-PRT, John tall ten centimeters
 ?? “John is 10cm taller than Mary.”
 “Comparing John and Mary, John is 10cm tall.”

Summary: explicit comparison in Mandarin

While Mandarin does not exhibit a telltale marker such as the English “-er” or “more” morepheme, we can see from these tests that the Mandarin *bi* and transitive comparatives are instances of explicit comparison. Mandarin also has a form of implicit comparison, using the expression 比起来 *bi-qilai*. The fact that the *bi* and transitive forms are explicit comparison, in the sense of Kennedy

(2007), is an important preliminary in considering the proper semantic representation for these structures. In the next section, I will introduce my proposal for these explicit Mandarin comparative constructions.

Chapter 4

Previous accounts

To the end of positing an explanatory analysis of the Mandarin *bi* comparative, we must review previous analyses in the literature. While the systematic generative treatment of the comparative in Chinese begins with the Transformational account of Fu (1978), we will here review the work of two more recent scholars: Liu (1996) and Xiang (2003, 2005) (see Chung 2006 and references there for other recent works on the subject). Along the way, we will see what answers these analyses offer in response to the pertinent questions (47–50) outlined above.

4.1 Liu (1996)

Couched in terms of the wider antecedent-contained deletion (ACD) literature, Liu (1996) aims to examine the Mandarin comparative as an instance of ACD and see what implications it will have for possible solutions to ACD. We will focus here on his arguments for the clausal analysis of the Mandarin phrasal comparative and his particular syntactic analysis.

Liu first sets out to answer two structural questions: first, does the Mandarin comparative construction involve coordination and, second, does it contain a gap inside? His answers are no and yes. His arguments against the coordination view comes from binding facts and from the position of the temporal adverb *yizhi* “always.” For example, in (58), we note that the adverb *yizhi* can only come before *bi*, but not after the standard. It had been argued that *yizhi* must be T-licensed (Travis, 1988), forcing *bi* to be inside TP. (Examples from Liu, 1996, p. 221)

- (58) 郭靖 ✓一致 比 黄蓉 *一致 高兴。
Guojing ✓ **yizhi** bi Huangrong ***yizhi** gaoxing
Guojing ✓ **always** bi Huangrong ***always** happy
“Guojing is always happier than Huangrong is.”

- (59) 郭靖 很 快地 比 黄蓉 多 喝了 三 杯 水。
 Guojing hen **kuai**de bi Huangrong duo he-le san bei shui
 Guojing very **quickly** bi Huangrong more drink-Asp three cup water
 “Guojing quickly drank three more cups of water than Huangrong did.”¹

In addition, he notes that VP-adverbs such as *kuai*de can occur before *bi* (see 59). Thus his conclusion is that *bi* and the standard must occur inside the VP, and that *bi* cannot be a coordinator. He then offers a basic syntactic configuration that posits *bi* and the standard as constituting a prepositional phrase, together an adjunct to the gradable predicate: [AP [PP *bi*_P standard] AP]. He gives no evidence for *bi* being a preposition,² though he does offer one piece of evidence for *bi* and the standard being a constituent, based on coordination (60).

- (60) 張三 比 李四 或者 比 王五 高。
 Zhangsan bi Lisi huozhe bi Wangwu gao
 Zhangsan bi Lisi or bi Wangwu tall
 “Zhangsan is taller than Lisi or Wangwu.”

He next gives two arguments for the clausal analysis of the comparatives. First, Liu offers the following datum: (Liu, 1996, p. 222)

- (61) 郭靖 今天 比 黄蓉 昨天 高兴。
 Guojing jintian [PP bi Huangrong zuotian] gaoxing
 Guojing today bi Huangrong yesterday happy
 “Guojing is happier today than Huangrong was yesterday.”

Ignoring for the moment his assumed constituency of *bi Huangrong zuotian*, we note the interesting standard in this example. Indeed, we are comparing happiness across two “dimensions,” comparing two situations contrasting in both experiencer and time. Liu argues that this is best explained with an underlyingly clausal standard. I will offer an alternative analysis of this sentence later in §5.4.2.

- (62) 郭靖 今天 [PP 比 [CP 黄蓉 昨天 ~~高兴~~]] 高兴。
 Guojing jintian bi Huangrong zuotian ~~gaoxing~~ gaoxing
 Guojing today bi Huangrong yesterday ~~happy~~ happy
 “Guojing is happier today than Huangrong was yesterday.”

His second argument is from the existence of surface-clausal comparatives. In these examples, clearly the standard is clausal, but he implicitly assumes that they have the same underlying

¹This is actually a case of a *duo*-comparative, which has a markedly different semantics. The predicates of comparison in these constructions are crucially not gradable (see Li, 2007).

²except to note that he is following Lü (1980), a Chinese reference dictionary/grammar. Lü (1980) indeed glosses the relevant instances of *bi* as 介词 “preposition” but does not give any justification for it.

structure as the surface-phrasal comparative. Consider his example reconstruction (64) (Liu, 1996, p. 223):

- (63) 郭靖 骑 马 骑得 好。
 Guojing qi ma qi-de hao
 Guojing ride₁ horse ride₂-DE good
 “Guojing rides horses well.”
- (64) * 郭靖 骑 马 [PP 比 [CP 黄蓉 赶 羊 骑得好]] 骑得 好。
 Guojing qi ma bi Huangrong gan yang ~~qi-de hao~~ qi-de hao
 Guojing ride horse bi Huangrong tend sheep ~~ride-DE well~~ ride-DE well

Liu follows Huang’s influential (1988) analysis of the descriptive complement construction (e.g., 63), which posits the first verb *ride*₁ as the true main verb, with *ride*₂ being the reduplicated form. As it is a reduplication, the phonological value should be the same, as we see in (63). However, we see that the verbs in the descriptive complement construction yielded by reconstruction in the clausal standard in (64) do not match. As there is no way this underlying clause can surface independent of the comparative, (64) is ungrammatical.

In terms of the details of the clause-internal deletion, he notes that the standard does not and cannot include the dummy auxiliary *shi* (cf. English *do*) and offers that the deletion in the standard is a case of \bar{I} -ellipsis. He notes that, without a local I node, the subject of the standard clause (the phrasal standard) would not pass the Case Filter—that is, Huangrong would have no Case assigner in (62). He solves this by letting *bi* exceptionally case mark the standard across the clausal boundary.

- (65) Guojing jintian [PP bi [CP **Huangrong** zuotian ~~gaoxing~~]] gaoxing
- (66) Guojing jintian [PP bi [CP Guofu renwei (“think”) [CP **Huangrong** zuotian ~~gaoxing~~]]] gaoxing

This also explains, he argues, why we do not yield embedded clausal standards: while *bi* exceptionally case-marks *Huangrong* in (65), *bi* is too far away from the embedded subject to check its case in (66), explaining its ungrammaticality. Liu’s solution to recover the elided value is similar to the QR solution to other antecedent-contained deletion problems (see Larson, 1987; May, 1985).

4.2 Xiang (2003, 2005)

Ming Xiang argues against the clausal analysis of phrasal comparatives in Xiang (2003) and then expands on this work in Xiang (2005), exploring a number of semantic facts related to the comparative and proposing a syntax/semantics for the adjectival phrasal comparative.

Xiang (2003) has two goals: first, to argue against the clausal analysis of phrasal comparatives, in particular Liu’s (1996) analysis; and second, to offer an implementation of the phrasal analysis

involving A to V movement. As Xiang (2005) argues more systematically for a revised syntactic proposal, I will not entertain her structure from 2003. For example, Xiang (2003) adopts Liu's hypothesis that (a) *bi* and the standard constitute a phrase and (b) the "*bi*-phrase" is an adjunct to the verb phrase, both of which is not assumed in Xiang (2005).

Xiang first notes that Liu's ECM explanation to the Case Filter issue is inadequate. She then shows evidence that there is no comparative subdeletion in Mandarin, a difficult fact to explain given a clausal account of the phrasal comparative. In her words, "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." (Xiang, 2003, p. 5)³

Xiang next examines the interaction of the distributor *dou* in the comparative construction. Note that the Mandarin distributor must be licensed by a plural or distributable noun before it, which can be a theme, subject, or what she views as a VP-adjunct (see Lin, 1998).

(67) Xiang (2005, pp. 5–6):

- a. 每个人都在家。
Mei-ge ren **dou** zai jia
every-CL person **dou** at home
"Everyone is (all) at home."
- b. 张三给每个人都买了礼物。
Zhangsan gei mei-ge ren **dou** mai-le liwu
Zhangsan for every-CL person **dou** buy-Asp present
"Zhangsan bought a present for everyone."

She then considers the possible positions of *dou* in the comparative construction:

(68) Xiang (2005, pp. 6–7):

- a. 每个男孩子都比每个女孩子高。
Mei-ge nanhaizi **dou** bi mei-ge nuhaizi gao
Every-CL boy **dou** bi every-CL girl tall
"Every boy is taller than every girl."
- b. 张三比每个人□高。
Zhangsan bi mei-ge ren **dou** gao
Zhangsan bi every-CL person **dou** tall
"Zhangsan is taller than everyone."
- c. 张三比每个人高。
Zhangsan bi mei-ge ren gao
Zhangsan bi every-CL person tall

³Xiang also notes that "Chinese comparatives don't license a clause in the comparative site at all, no matter whether it is an elided CP, or a full CP" (Xiang, 2003, p. 5), which is patently false, given the availability (though restricted) of clausal comparatives as outlined in §3.1.2.

“Zhangsan is taller than everyone.”

We note that, in addition to the pre-*bi* position of (68a), *dou* can also surface after *bi* and the standard, as in (68b). Xiang explains the fact that it may surface in that position as analogous to (67b), where *mei-ge-ren* is clearly not in a clause. She takes this to be evidence that the proper analysis of the phrasal standard is without an underlying clause boundary.⁴

Next let us examine her dissertation, Xiang (2005). While many of the semantic facts she introduces—such as the interaction of quantifiers and NPI in comparative contexts—are quite interesting, here we will focus more on the arguments she uses to motivate her comparative syntax, introduced in chapter 5.

Xiang first uses primarily English data to argue that the definiteness effect—that DP's in attributive comparatives must be indefinite (cf. George owns a faster car than Bill (does), *George owns the faster car than Bill (does), see Lerner and Pinkal (1995))—can only be accounted for with a quantificational degree argument and type in our semantics, contrary to the scope reasoning of Kennedy (1999). We note at this point that this claim is substantiated solely on English data and only with attributive comparatives, which Mandarin does not have.⁵ Nevertheless, Xiang sets out to identify a syntax-semantics compatible with a degree argument and yielding the proper word order, which she argues requires a DegP-like structure as in Kennedy (1999).

The proposal she adopts in the end is chosen based on its similarity to the familiar *vP*-shell structure Larson (1988) proposes for the double object construction. This is motivated by her observation that the standard must asymmetrically c-command the predicate of comparison and its differential degree argument:⁶

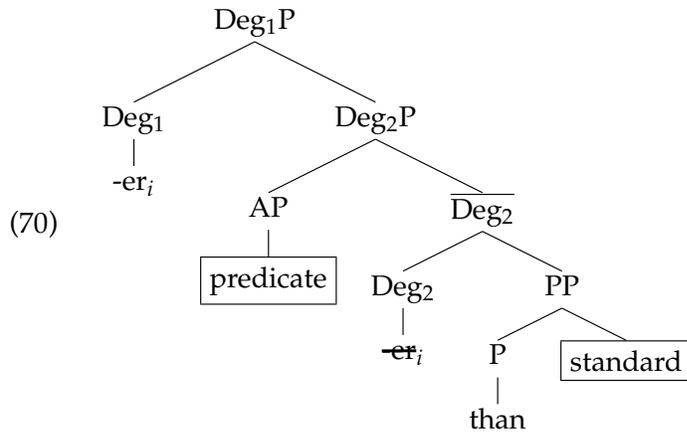
- (69) 这根 绳子 比 那根 绳子 长 一半。
 Zhe-gen shengzi bi na-gen shengzi chang yiban
 This-CL rope bi that-CL rope long half
 “This rope_i is longer than that rope_j by a half (of that rope_{*i/j})”

Xiang bases her syntax on Larson's (1991) DegP-shell structure, which was originally motivated based on the similarity to the DP structure in attributive comparatives (with configuration seen in 70).

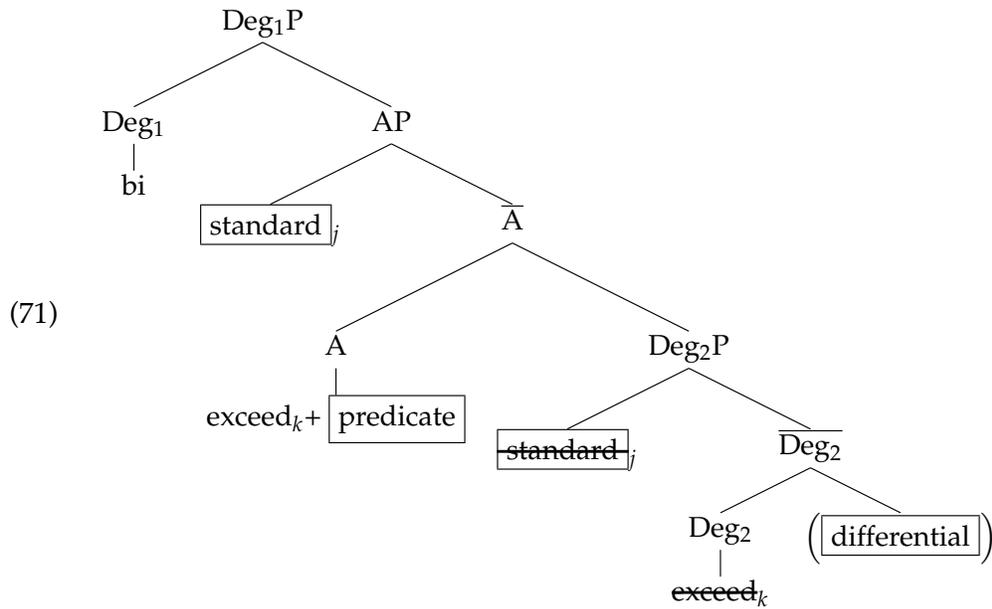
⁴The observant reader will notice that the sentence with the strong quantifier *mei* but without any *dou* is also available (68c), and still has the distributive meaning. Xiang does not address this issue, even in Xiang (2005) and, as I will not focus on the proper analysis of *dou*, I leave the issue open.

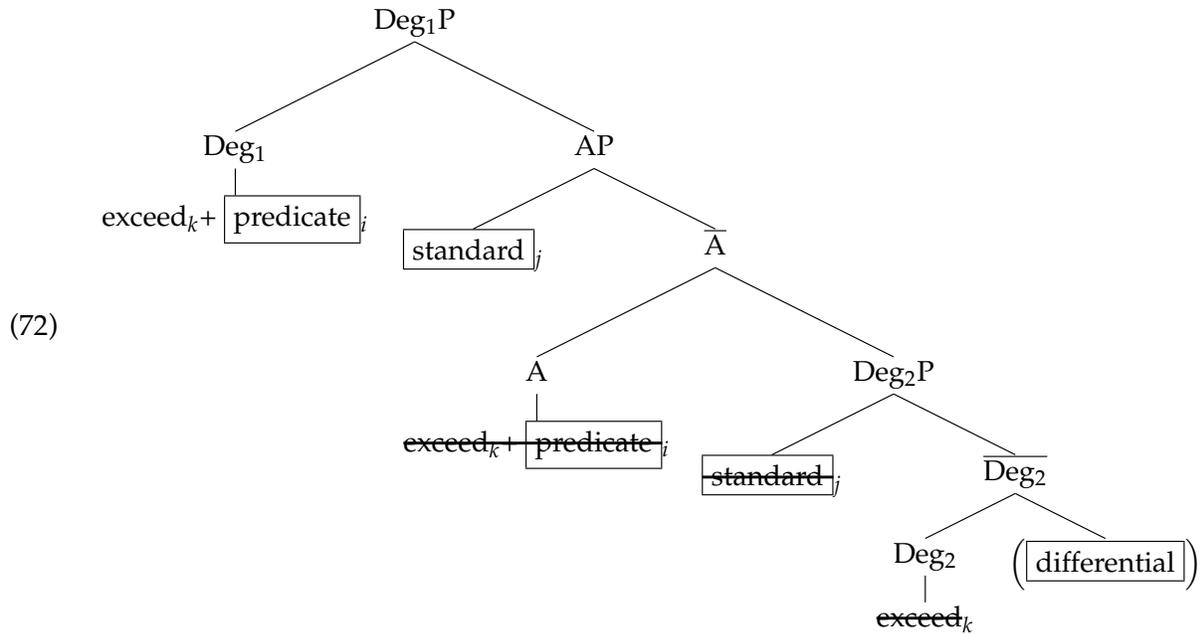
⁵Cases which may look like attributive comparison exhibit 的 *de*, and thus may be analyzed as relative clauses, though it has been argued that Mandarin has attributive adjectives which cannot be analyzed as relative clauses (see Paul, 2005).

⁶The careful reader may note that, as there is no reflexive such as *ziji* in this structure, it may not be clear that the relationship between *rope_j* and the implied argument of *half* must be binding, and thus c-commanding. We will later see similar examples with an explicit reflexive in chapter 5.



She makes an adjustment to yield the correct word order in Mandarin, and constitutes her proposal, expressed in (71). Note here that she posits a phonologically null comparative morpheme, *exceed*, which is separate from *bi*. Her structure has the advantage, she argues, of also generating the transitive comparative by head-movement of the *exceed*+predicate from A to Deg₁ position in lieu of *bi* (see 72).





While this yields the correct word order for the transitive comparative, we recall that an important feature of the transitive comparative is the fact that the differential degree was obligatory. Xiang unfortunately gives no explanation of this alternation, only mentioning the optionality of the differential in the *bi* comparative: “this is not surprising because of the idiosyncratic nature of the argument structure. It is known that not all of the arguments have to be explicitly expressed” (Xiang, 2005, p. 193).

In the final leg of her dissertation, she goes against both Liu (1996) and Xiang (2003) by examining some evidence against the view of *bi* and the standard forming a PP adjunct. In particular, she explains away Liu’s coordination evidence (60) as an instance of ellipsis inside VP-coordination, or ATB movement. She also notes that many adverbs are seen freely before or after *bi* and the standard, but that this does not necessarily mean *bi* and the standard form an adjunct. Finally, she refers back to her previous binding evidence.

It is interesting that, given a DegP-shell analysis was chosen based on its syntactic properties shared with the *v*P-shell, she did not consider the comparative’s projection to be verbal rather than a DegP structure. In fact, she even mentions that “instead of being a preposition, *bi* behaves more like a verb,” (Xiang, 2005, p. 194) and “according to these arguments, I will assume that *bi* is a verb, not a preposition.” (Xiang, 2005, p. 196) The only argument she cites here, however, comes from historical evidence that the morpheme / grapheme *bi* (比) is also a verb meaning “compare”—evidence which we previously discarded.

Xiang’s intuition that there are similarities between the *v*P-shell of Larson’s and the structure of the Mandarin comparative is a striking one and I argue, ultimately, not accidental. Xiang only focuses on adverbial comparatives, but this similarity is even more striking when the exploration includes verbal predicates of comparison—much of the evidence for my proposal, in fact, draws from such

observations. In the next chapter I will introduce my proposal and evidence to support it.

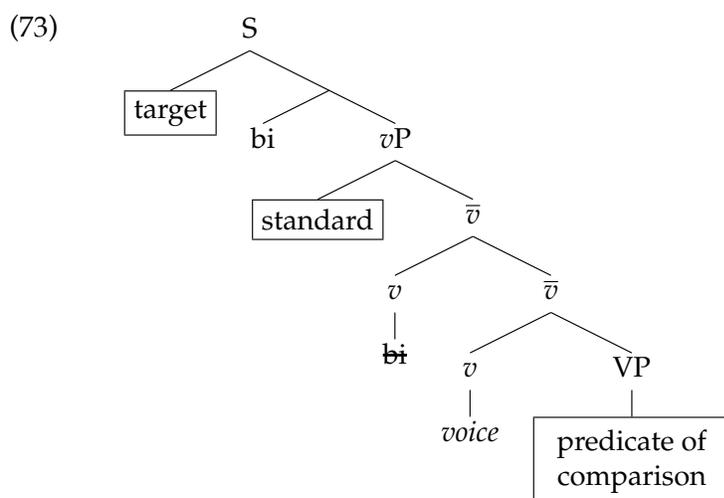
Chapter 5

A new syntax / semantics of comparison

5.1 My proposal

The Mandarin comparative has a number of unique properties that distinguish it from English and other languages' comparatives. In this section I will introduce my own unique proposal of the Mandarin comparative. My proposal is comprised of two core ideas: a verbal syntax and a novel neo-Davidsonian eventuality-semantics of comparison.

Syntactically, I argue that *bi* is a verbal functional head—part of the extended projection of VP—with category *v*. *bi* subcategorizes for a voice \bar{v} which, in turn, has subcategorized for the predicate of comparison (we call this here a VP, encompassing both adjectival and verbal predicates). We yield the observed word order through head movement of *bi* out of *vP* (Paul, 2000, cf. Huang, 1994).



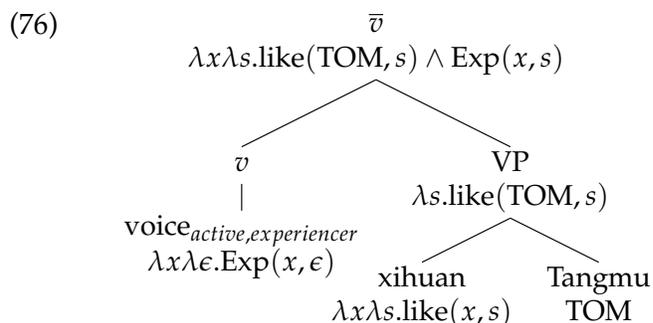
Following the neo-Davidsonian semantics of voice first characterized in Kratzer (1996), we intro-

duce a *voice* v node which introduces an eventuality variable ϵ .¹ We will see arguments for this *voice* projection below *bi* when we look at evidence from passivization in §5.2.5.

For example, consider the simple phrasal comparative sentence (74). Our active *voice* node would have semantics as in (75), and merge with the predicate of comparison via Event Identification (Kratzer, 1996).

(74) 约翰 比 玛丽 喜欢 汤姆。
Yaohan bi Mali xihuan Tangmu
John bi Mary like Tom
“John likes Tom more than Mary does.”

(75) $\llbracket \text{voice}_{\text{active,experiencer}} \rrbracket = \lambda x \lambda \epsilon. \text{Exp}(x, \epsilon)$



The semantics of *bi* has a three functions: it uses two eventuality variables ϵ_1 and ϵ_2 and establishes two external arguments (to be selected) as their external arguments, respectively; it existentially binds the standard’s eventuality ϵ_2 ; and, finally, it establishes the comparative semantics of ϵ_1 being greater than ϵ_2 along a scale established by the predicate. To introduce the comparative itself, I will adopt Kennedy’s (1999) conclusion against the use of explicit degree variables, rejecting Xiang’s (2005) arguments to the contrary, which were based only on the attributive comparative—a type of comparative Mandarin lacks. Instead, I introduce a proposition of the form $\epsilon_1 \ggg \epsilon_2$. In the same way that eventualities may be ordered in time, \ggg defines an *intensity* ordering.²

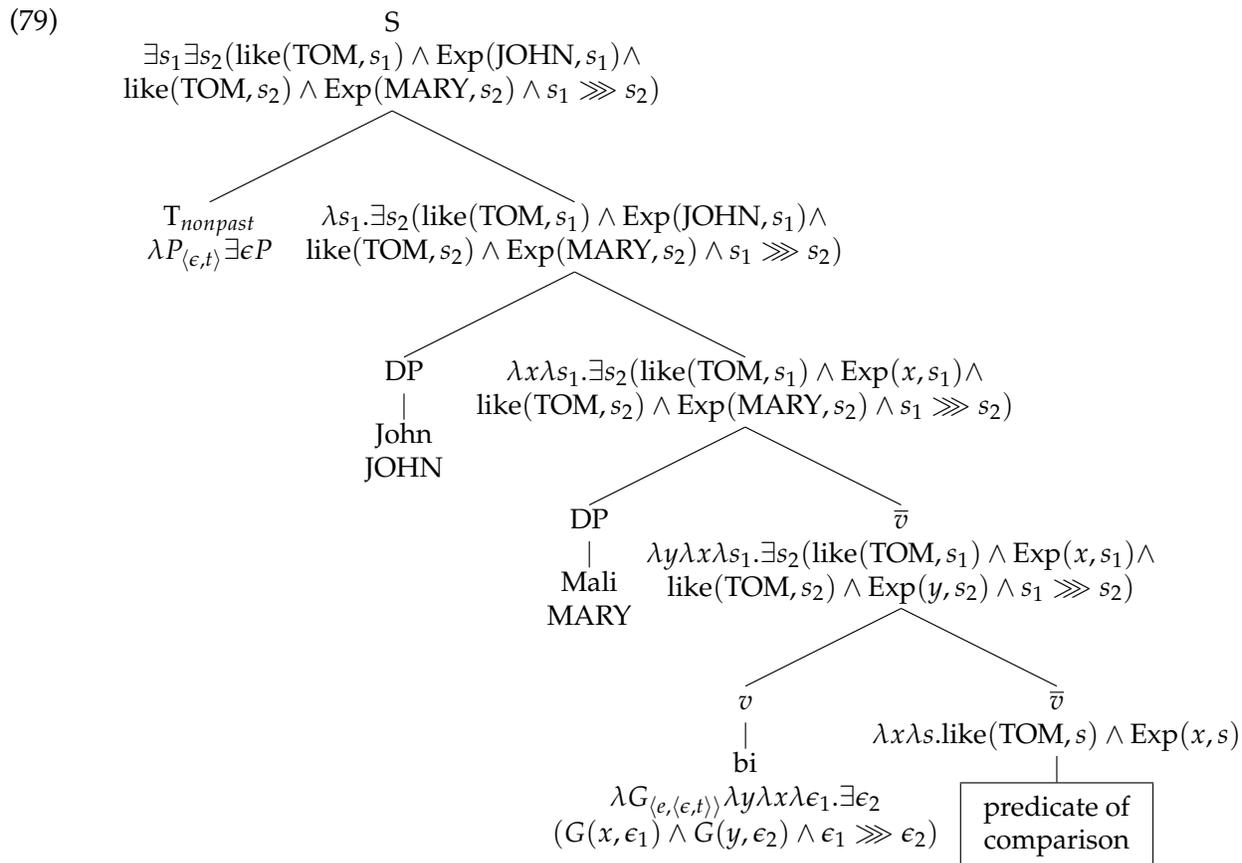
(77) $\llbracket \text{bi} \rrbracket = \lambda G_{\langle e, \langle \epsilon, t \rangle \rangle} \lambda y \lambda x \lambda \epsilon_1. \exists \epsilon_2 (G(x, \epsilon_1) \wedge G(y, \epsilon_2) \wedge \epsilon_1 \ggg \epsilon_2)$

After this product is merged with our standard and target and the target eventuality ϵ_1 is existentially closed by Tense, we yield an interpretable expression:

¹Recall that aspect is not incompatible with the Mandarin comparative, so we should not limit our model here to states. Here I will use the metavariable ϵ to represent both events and states (s), as appropriate. Luckily, I need not refer to a semantic type which has an eventuality argument in it that must be an event and not a state, which could cause some confusion. The elements referred to by semantic type e , then, are the individuals D_e .

²An ordering of intensity must have an appropriately intense binary relation: hence, \ggg . On a more serious note, though, the \ggg ordering violates trichotomy. For example, if ϵ_1 represents a liking eventuality, while ϵ_2 represents a running eventuality, ϵ_1 and ϵ_2 are not comparable. For two eventualities to be \ggg -comparable (or *commensurable*), they must be the same type of eventuality.

(78) $\llbracket(74)\rrbracket = \exists s_1 \exists s_2 (\text{like}(\text{TOM}, s_1) \wedge \text{Exp}(\text{JOHN}, s_1) \wedge \text{like}(\text{TOM}, s_2) \wedge \text{Exp}(\text{MARY}, s_2) \wedge s_1 \ggg s_2)$



This semantics has a number of interesting advantages. For one, the v position of *bi* and its neo-Davidsonian semantics clearly explain why we can only compare over subject position (the external argument). For example, suppose we intend to construct a Mandarin sentence equivalent to the phrasal reading of (80) (equivalent in sense to (81)) using a phrasal comparative with the semantics explored above.

(80) John_i likes Tom more than Mary.

(81) John_i likes Tom more than he_i likes Mary.

As *bi* subcategorizes for a voice \bar{v} node, which in turn contains the predicate of comparison, we must first identify our predicate of comparison. Note that the predicate is a VP with semantic type $\langle \epsilon, t \rangle$. At this point we have already run into a problem. When constructing the predicate of comparison, we will have to introduce the internal argument of *xihuan* “like”: the object of liking. Due to the semantic type of the VP, it is impossible to let this argument be a free variable, bound later by an argument of *bi*. In this way, a phrasal derivation (as above) of comparison over an object position is impossible. Crucially, topic and subject positions can be compared over as,

under a neo-Davidsonian semantics, the external argument is a semantic argument of voice, not of the verb. This simple explanation derives the Internal Argument Prohibition.

In addition, the eventuality-semantics we posit has advantages as we consider the clausal comparative in §5.3. The intuition here is that the Mandarin clausal comparative is also an instance of individual comparison rather than degree comparison, operating with proposition-taking predicates of comparison. Before considering the clausal proposal, though, we will motivate the syntactic configuration proposed above.

5.2 Evidence of a verbal syntax

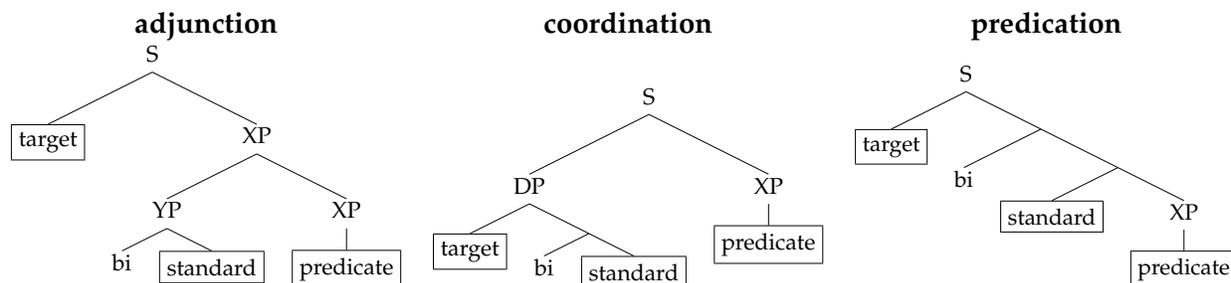
In this section we will examine evidence for our *vP*-shell structure of the comparative. We recall that in the phrasal and clausal comparatives, *bi* and the standard surface after the target and immediately before the predicate of comparison. We see here from the contrast in (82) that adverbs after the standard, for example, are interpreted as part of the predicate of comparison.

- (82) a. 约翰 今天 比 玛丽 高兴。
Yaohan jintian bi Mali gaoxing
John today bi Mary happy
“John is happier today than Mali is (always).”
- b. 约翰 比 玛丽 今天 高兴。
Yaohan bi Mali jintian gaoxing
John bi Mary today happy
“John is happier today than Mali is today.”

A crucial question for any analysis of *bi* is the relationship between *bi* and the standard. Based solely on surface word-order facts, we hypothesize the following three configurations as possible syntactic structures for the phrasal and clausal comparatives.^{3,4}

³These constituencies will only represent one level of analysis or derivation. We assume here that the target *c* commands the standard, as the reflexive *ziji* in the standard can refer to the target. We also assume binary branching.

⁴The coordination hypothesis here is quite interesting, though not worth serious consideration. Here, [target *bi* standard] would be analyzed as a constituent, akin to the complex quantification of Keenan and Stavi (1986). Analyzing *bi* as coordination trivializes the issue of the target and standard matching in category and, indeed, this approach is taken by Hong (1991) in the GPSG framework (see discussion in Chung, 2006). However, we recall Liu’s (1996) binding evidence against *bi* as a coordinator, and also note that Mandarin lacks the type of complex quantifiers examined by Keenan and Stavi. In addition, various syntactic evidence to follow will clearly lead us to another hypothesis.



Our first test will be to see if we can establish the constituency of *bi* and the predicate.

5.2.1 The *bi* and the standard

We note that the standard cannot be dislocated with or without stranding *bi*, nor can it appear after the predicate of comparison.⁵ Note also that nothing else (such as a temporal adverb) can come between *bi* and the standard.

- (83) a. * 玛丽, 约翰 比高。
 Mali, Yaohan bi gao
 Mary, John bi tall
- b. * 比 玛丽, 约翰 高。
 bi Mali, Yaohan gao
 bi Mary, John tall
- (84) * 约翰 比今天 玛丽 高。
 Yaohan bi jintian Mali gao
 John bi today Mary tall

We see from these examples that the case for the constituency of *bi* and the standard is quite weak. We will give an alternate analysis of Liu's (1996) evidence to the contrary in §5.4.2.

5.2.2 Evidence from negation

Negation normally surfaces right before the verb phrase (or adjective phrase) in Mandarin without any additional auxiliary element (cf. English *do*). Based on data of known adjuncts such as *dui* "towards" (see 85), if *bi* were in an adjunct position, we may expect negation to surface immediately

⁵The standard can be preposed without *bi* by using a resumptive pronoun. We note, however, that this would be a hanging topic rather than a left dislocation (see Badan and Del Gobbo, 2006).

- (1) 玛丽_i, 约翰 比他_i 高。
 Mali_i, Yaohan bi ta_i gao
 Mary_i, John bi 3sg_i tall
 "Mary_i, John is taller than her_i."

before the predicate of comparison. The position of negation in Mandarin phrasal and clausal comparatives, however, is crucially before *bi*.

(85) 约翰 *不 对 玛丽 ✓不 丢 球。
 Yaohan *bu dui Mali ✓bu diu qiu
 John *Neg toward Mary ✓Neg throw ball
 “John does not throw balls toward Mary.”

(86) 我 ✓不 比他 *不 高。
 wo ✓bu bi ta *bu gao
 1sg ✓Neg bi 3sg *Neg tall
 “I am not taller than him.”

In fact, we note that in this regard *bi* mimics *gei* in the ditransitive construction. This acts as evidence against the adjunct and coordination analyses, and lends support for *bi* as a verbal category.

(87) 约翰 ✓不 给 玛丽 *不 送 信。
 Yaohan ✓bu gei Mali *bu song xin
 John ✓Neg give Mary *Neg send letter
 ‘John doesn’t send Mary letters’

5.2.3 Evidence from the distributive quantifier *ge*

Another diagnostic we may employ is the distribution of the distributive quantifier *ge*. Soh (2005) discusses the syntactic position of the adverb *ge* (各 “each”) following Lin (1998), concluding that the following conditions must be met for *ge* to be licensed:

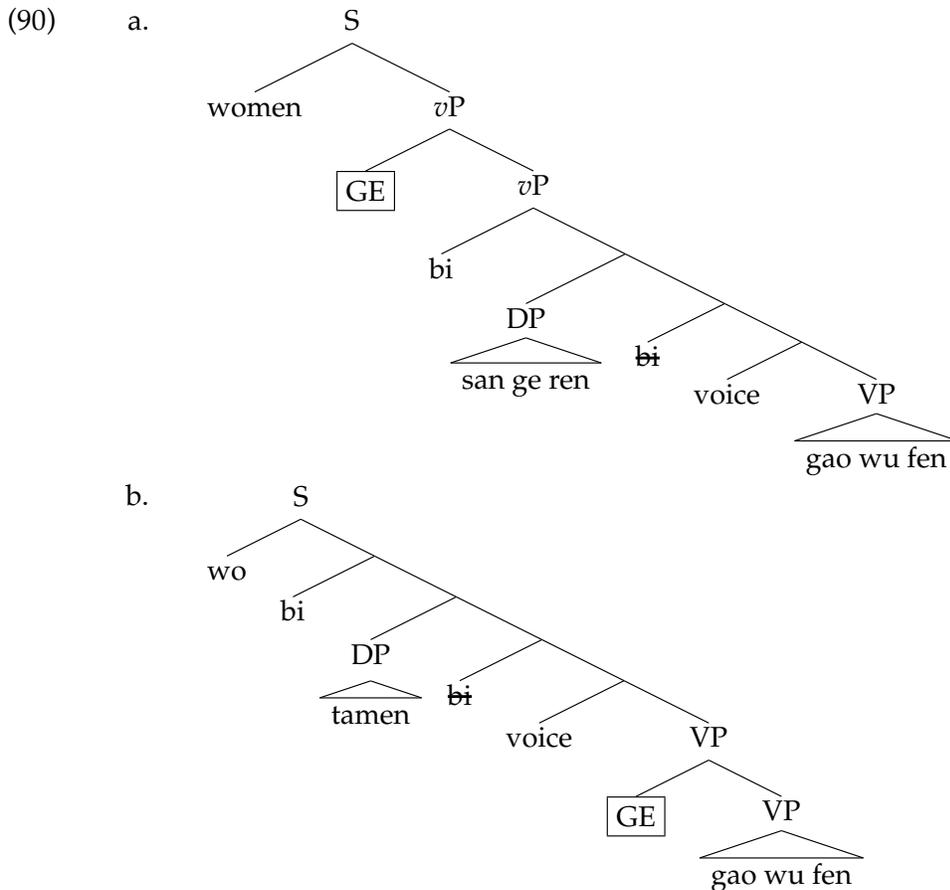
- (88) (Soh, 2005, p. 165):
- a. There must be a *vP* or a *VP* for *GE* to adjoin to;
 - b. There must be an indefinite expression c-commanded by *GE*;
 - c. There must be a plural argument within the sentence when *GE* adjoins to *vP*, and within *vP* (or *FP*) when *GE* adjoins to *VP*;
 - d. In a case when *GE* adjoins to *vP*, the event denoted must be complete in the sense that all event internal modifiers are included in the projection.

For example, in our *bi* comparatives, we would expect to be able to adjoin *ge* to both the *bi*-phrase (*vP*) and the predicate of comparison (*VP*). Indeed, we see this to be the case:

(89) Situation: having taken a test.

- a. 我們 各 比 三 個 人 高 五 分。
 women ge bi san ge ren gao wu fen
 1pl GE bi three CL_{person} person high five CL_{points}
 ‘Each of us were five points higher than three people.’ (where each of our “three people” may be distinct)
- b. 我 比 他們 各 高 五 分。
 wo bi tamen ge gao wu fen
 1sg bi 3pl GE high five CL_{points}
 ‘I was five points higher than each of them.’

Let us examine the syntactic structures of these examples and verify Soh’s conditions on the proper licensing of GE.



Consider (89a). GE is adjoined to the high *vP* node (88a). GE c-commands the indefinite expression *san ge ren* “three people” (88b). A plural argument, the target, *women* “we” merges with the *vP* (88c). Finally, all event-internal modifiers are indeed already in this projection (88d).

Next, consider (89b). GE is adjoined here to the VP predicate of comparison (88a), c-commanding the indefinite *wu fen* “five points” (88b). There is also a plural argument within *vP*, namely *tamen* “they” (88c), satisfying all of the GE-licensure conditions.

Crucially, this evidence from (89), combined with Soh’s (2005) conditions on GE-licensing, strongly motivates a structure in which *bi* and the standard are within the *vP* extended verb phrase, above VP. In addition, the ability of GE to adjoin to two different positions also strengthens the argument for the *vP* projection in this structure.

5.2.4 Evidence from reflexivization

In this section we explore binding constraints of the Mandarin reflexive *ziji* (自己) in a comparative context. We recall the basic descriptive generalizations of *ziji*: (Xue et al., 1995)

- (91) a. Subject Orientation: The antecedent of *ziji* must be in subject position.
 b. The Blocking Effect: The antecedent of *ziji* need not be in the minimal clause containing *ziji*, as long as the referent and all other intermediate subjects have the same ϕ -features as the minimal clause subject.
 c. Animacy Restriction: The antecedent of *ziji* must be animate.

There is evidence, however, that certain “coverb” argument positions may also be able to receive reference from *ziji*:

- (92) 约翰_i 给 玛丽_j 送 自己_{i/j} 的 信。
 Yaohan gei Mali song ziji de xin
 John give Mary send self GEN letter
 “John_i sent Mary_j her_j own letter.”
 “John_i sent Mary_j his_i letter.”
- (93) 约翰_i 对 玛丽_j 丢 自己_{i/*j} 的 球。
 Yahoan dui Mali diu ziji de qiu
 John toward Mary throw self GEN ball
 **“John_i threw Mary_j her_j own ball.”
 “John_i threw Mary_j his_i ball.”

We note that in a comparative, an argument in the predicate of comparison can refer to the standard:

- (94) a. 约翰_i 比 玛丽_j 喜欢 自己_{i/j}。
 Yaohan bi Mali xihuan ziji
 John_i bi Mary_j like self_{i/j}
 “John_i likes himself_i more than Mary_j likes herself_j.” or
 “John_i likes himself_i more than Mary_j likes him_i.”
- b. Lidz (1996):

张三_i 比李四_j 为 自己_{i/j} 辩护 得 好。
 Zhangsan bi Lisi wei ziji bianhu de hao
 Zhangsan bi Lisi for self defend DE well

'Zhangsan_i defended himself better than Lisi_j defended himself_j.' or
 'Zhangsan_i defended himself better than Lisi_j defended him_i.'⁶

The felicity of the first reading tells us that *ziji* is able to refer to Lisi, even though it seems to not be a subject. Given that *ziji* is a reflexive pronoun, we conclude that the standard *c*-commands the predicate of comparison. This rules out both the coordination hypothesis and the adjunct hypothesis.

5.2.5 Evidence from passivization

Finally, we must motivate our *v bi* to be positioned above the relevant *voiceP*. We yield such evidence through an investigation of passivization. In English, comparison can co-occur with passivization.

- (95) John was respected more by Mary than by Bill.
 (96) John was respected by Mary more than Bill was.

A sentence equivalent to (95) may be "John was respected by Mary more than John was respected by Bill." In this sentence, we are comparing over two experiencers of respect with a common theme. On the other hand, (96) is equivalent to "John was respected by Mary more than Bill was respected by Mary," comparing over two themes with a common experiencer.

Comparison and passivization can also co-occur in Mandarin, but it is more restricted. Here, we consider the relation *zunjing* "respect" which is passivizable and, being an emotional attitude verb, can also be used as the predicate of comparison.

- (97) a. 约翰 被 玛丽 尊敬。
 John bei Mali zunjing
 John bei Mary respect
 "John is respected by Mary."
 b. 约翰 比 汤姆 尊敬 玛丽。
 Mali bi Tangmu zunjing Yaohan
 Mary bi Tom respect John
 "Mary respects John more than Tom does."

⁶Zhong (2004) says this reading is unavailable, but that may be a point of native speaker disagreement. The reading we are interested in, however, is the first one.

- c. 约翰 比汤姆 被 玛丽 尊敬。
 Yaohan bi Tangmu bei Mali zunjing
 John bi Tom bei Mary respect
 “John is respected by Mary more than Tom is.”
- d. *约翰 被 玛丽 比(被)汤姆 尊敬。
 Yaohan bei Mali bi bei Tangmu zunjing
 John bei Mary bi bei Tom respect
 intended: “John is respected by Mary more than by Tom.”

We note that only examples akin to (96) are possible in Mandarin. Descriptively, we observe the passive morphology *bei* only surfacing after *bi*. We may view the passive here as being part of the whole predicate of comparison: *bei Mary zunjing*, “be respected by Mary.” In other words, comparison operates above voice and voice may not act above comparison.⁷

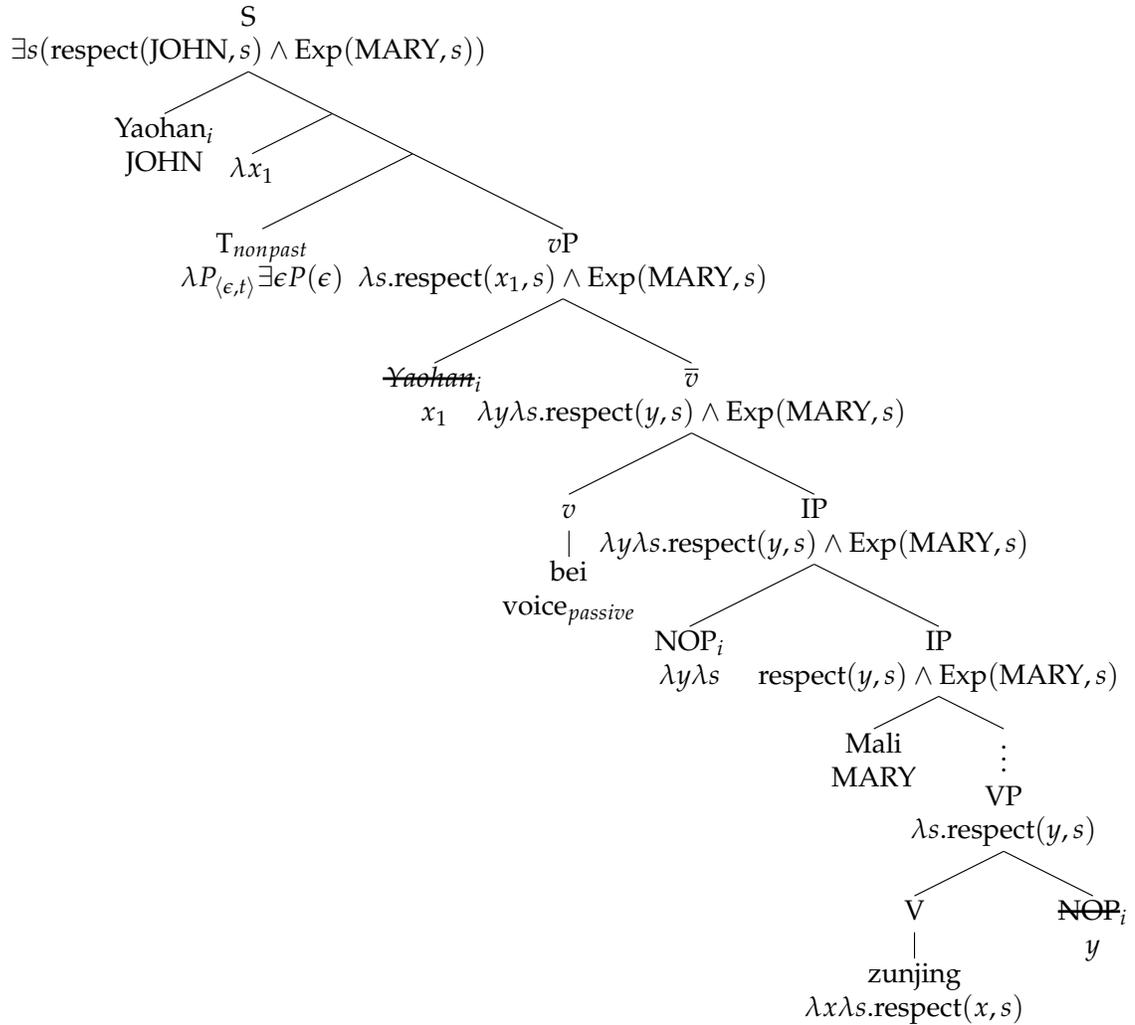
Let us examine how such a structure like (97c) would be constructed given our proposed syntax and semantics. Following the work of Huang (1999) and Tang (2001), here I will adopt a null operator analysis of the Mandarin “long passive,” with *bei* being a voice *v* node, in line with our neo-Davidsonian approach. In such an approach, the straightforward passive (97a) is analyzed syntactically as (98).⁸

⁷We note also that the transitive comparative in Mandarin (considered in §5.4.1) cannot be passivized:

- (1) 约翰 高 玛丽 一頭。
 Yaohan gao Mali yitou
 John gao Mary one-head
 “John is a head taller than Mary.”
- (2) *约翰 被 玛丽 高 一頭。
 Yaohan bei Mali gao yitou
 John bei Mary gao one-head
 intended: “John was a head taller-ed by Mary.”

⁸The analysis of the Mandarin *bei* passive continues to be an area of controversy, but what is important for our analysis here is that the alternation is controlled by a voice node which, after the movement of a null operator is of type $\langle e, \langle \epsilon, t \rangle \rangle$, where the outermost argument will correspond to the passive subject.

(98)



The crucial point to note in the analysis above is the introduction of a phonologically null operator which first satisfies *zunjing*'s object position, then adjoins to the intermediate IP. As Huang argues, through λ -abstraction, this modifies the IP into a predicate of "being respected by Mary."⁹ Semantically, this structure then applies to the subject *Yaohan*, and the state variable is bound, yielding an interpretable expression.

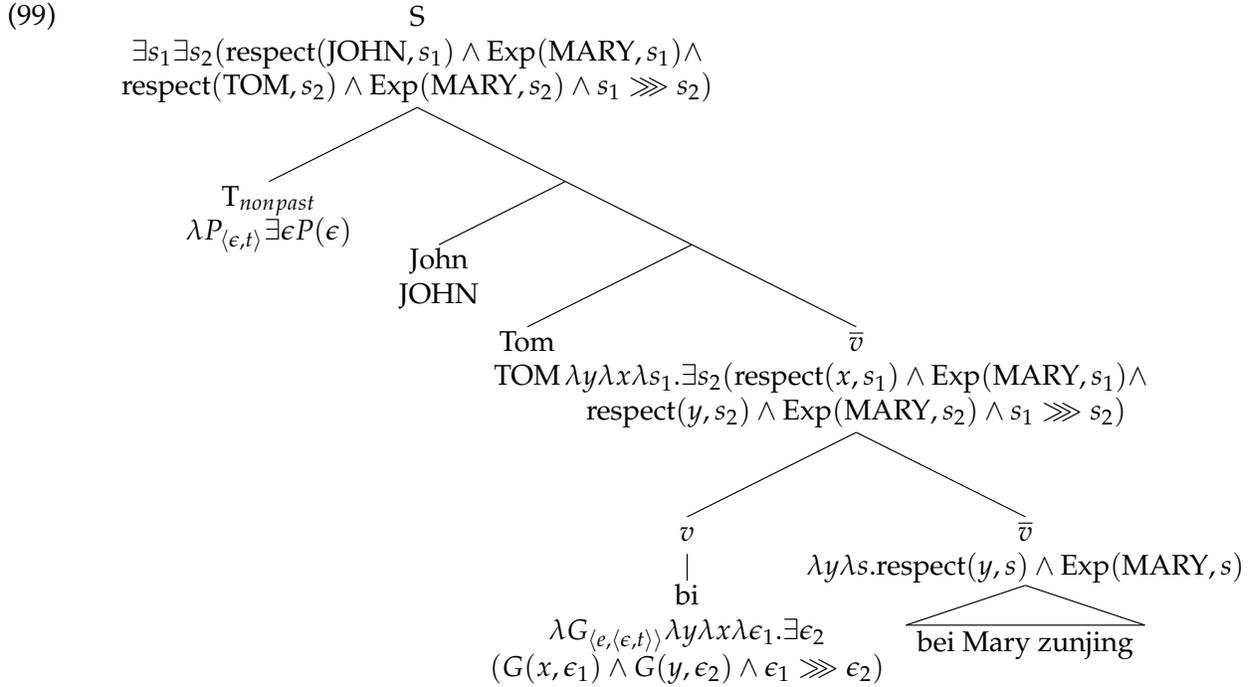
⁹Huang (1999) did not consider how the null operator would affect the event-semantic description. I argue that the matrix sentence must continue to access the same event description, making the null operator not only open up the y variable as an argument, but also make the ϵ variable accessible. This requires the underlying IP to be headed by a particular node which does not bind off the ϵ event variable or trigger existential closure of the free argument variable—again, the details of *bei*-passivization is not our focus here.

In addition, we note that our analysis does not accurately rule out (97d), the passive of a comparative: following Huang's (1999) null-operator analysis, a null operator can be base generated as the object of respect in the predicate of comparison:

- (1) * 约翰 被 [IP NOP [IP 玛丽 比 汤姆 尊敬 NOP]]
 Yaohan bei NOP Mali bi Tangmu zunjing NOP
 John bei NOP Mary bi Tom respect NOP

This construction reflects the overreach of the null-operator analysis. Such arguments may actually motivate an analysis of the *bei*-passive *without* an internal IP. This would be a worthwhile direction of further research.

We note that in the passive analysis above, the \bar{v} node is of type $\langle e, \langle s, t \rangle \rangle$, letting it be the argument of *bi*. In the case of a comparative such as (97c), then, *bi* subcategorizes for this same \bar{v} node. After merging Tom, John, and Tense, we yield the following interpretable structure.



Note that the semantics of this expression derive the correct truth values:

- $\llbracket (97c) \rrbracket = 1 \iff$ John is respected by Mary more than Tom is respected by Mary
 \iff John's being respected by Mary \ggg Tom's being respected by Mary
 \iff Mary's respecting of John \ggg Mary's respecting of Tom
 $\iff s_1 \ggg s_2$

In this way, our analysis properly accounts for examples such as (97c), where the predicate of comparison itself is passive. These facts also motivate *bi*'s selection of the voice \bar{v} node.¹⁰

¹⁰The alternative would be to introduce multiple distinct *bi* lexical entries which apply the appropriate θ -role to the target and standard, depending on the predicate. Intuitively, this approach would be collapsing both the voice morphology and the function of *bi* as analyzed here. The correct *bi* would be introduced through Event Identification. My approach here was chosen, even with the nonstandard selection of a \bar{v} node, (a) to keep the voice and comparative functions separate, reflecting the analytic spirit inherent in the language's morphology, and (b) because in the case of a passive predicate of comparison, as examined here, *bi* and the passive morpheme *bei* clearly act as two separate morphemes in the morphosyntax.

5.3 The clausal comparative

5.3.1 The clausal proposal

In this section we will see how my proposal extends to clausal comparatives and how my eventuality-
semantics of comparison explains a number of empirical puzzles about the Mandarin clausal com-
parative. Recall first that the two types of predicates of comparison which are observed in clausal
comparatives are proposition-taking predicates (e.g., 好 *hao* “good”) and V-de-Adv constructions,
which I refer to as “complex adverbs” (e.g., 骑得快 *qi de kuai* “ride fast”).

We first consider the simple proposition-taking predicate, as in (24a), reproduced below. Fol-
lowing Kratzer’s (2000; 2005) analyses of resultatives and target state passives, I argue that these
predicates take a proposition with an unsaturated Davidsonian eventuality argument¹¹ and return
a state-description, and thus are of semantic type $\langle\langle\epsilon, t\rangle, \langle s, t\rangle\rangle$, as in (100), below. We introduce
another version of *bi* which has the proper semantics to account for the appropriate semantic types.

- (24a) 我去比你去好
[wo qu] bi [ni qu] hao
1sg go bi 2sg go good
“It would be better if I went than if you went.”

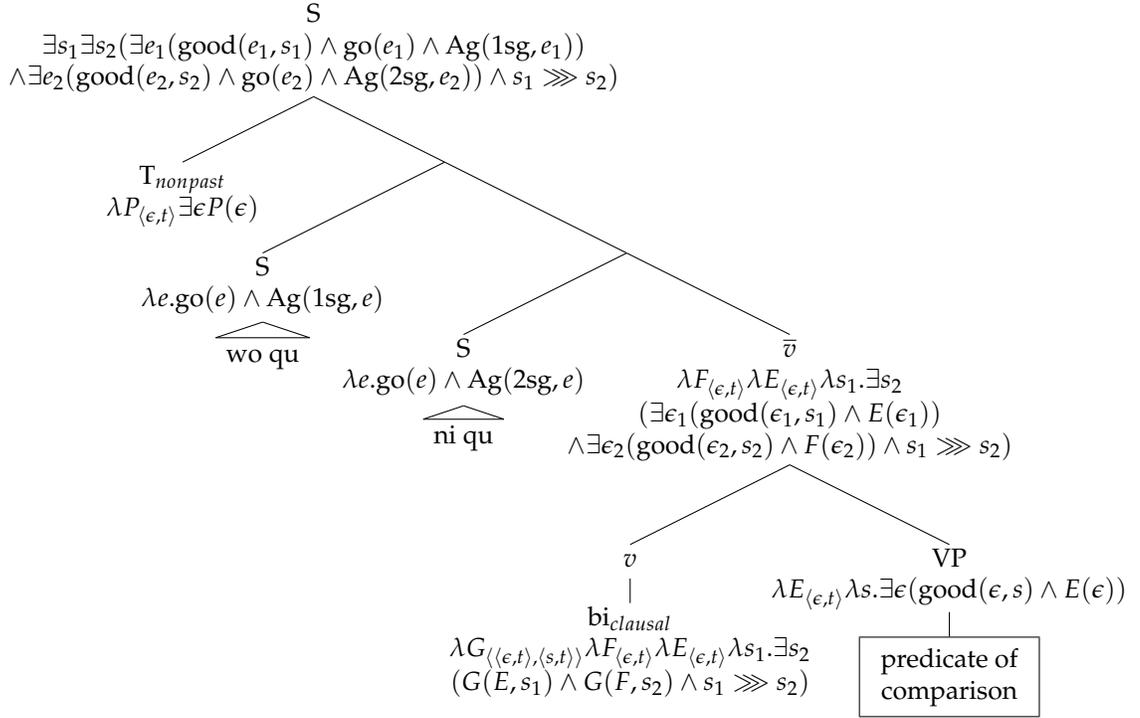
(100) $\llbracket \text{hao} \rrbracket = \lambda E_{\langle\epsilon, t\rangle} \lambda s. \exists \epsilon (\text{good}(\epsilon, s) \wedge E(\epsilon))$

(101) $\llbracket \text{bi}_{\text{clausal}} \rrbracket = \lambda G_{\langle\langle\epsilon, t\rangle, \langle s, t\rangle\rangle} \lambda F_{\langle\epsilon, t\rangle} \lambda E_{\langle\epsilon, t\rangle} \lambda s_1. \exists s_2 (G(E, s_1) \wedge G(F, s_2) \wedge s_1 \ggg s_2)$

The proper semantics are constructed through a derivation mirroring that of the phrasal compar-
ative. The surface word order is again reached through movement of *bi* out of *vP*.

¹¹A term also lifted from Kratzer (for example, Kratzer, 2000, p. 12). Here, for the eventuality variable to be “unsat-
urated,” we are requiring the T node (if extant in the propositional argument) to not existentially bind the eventuality
variable. Recall that a similar move was required in the analysis of the passive predicate of comparison (see footnote 9,
above).

(102)



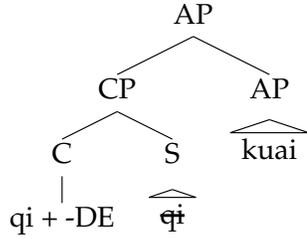
(103) $\llbracket (24a) \rrbracket = \exists s_1 \exists s_2 (\exists e_1 (\text{good}(e_1, s_1) \wedge \text{go}(e_1) \wedge \text{Ag}(1\text{sg}, e_1)) \wedge \exists e_2 (\text{good}(e_2, s_2) \wedge \text{go}(e_2) \wedge \text{Ag}(2\text{sg}, e_2)) \wedge s_1 \ggg s_2)$

We now extend this analysis to the case of complex adverbial predicates of comparison, such as (24b), reproduced here:

(24b) 约翰 骑 马 比 玛丽 骑 牛 骑 得 快。
 [Yaohan qi ma] bi [Mali qi niu] [qi de kuai]
 John ride horse bi Mary ride cow ride DE fast
 "John rides horses faster than Mary rides cows."

Again, we will here view *Yaohan qi ma* and *Mali qi niu* as sentential arguments of the VP *qi de kuai*, which must be of type $\langle \langle \epsilon, t \rangle, \langle s, t \rangle \rangle$. We note that this resembles a secondary-predication analysis as the first copy of the verb does not constitute the entire clause's main verb—a configuration argued against extensively in Huang (1988). However, we note that this is a descriptive V-*de* construction rather than a resultative one (see Huang, 1988) and there is preliminary evidence from Wei (2006) against Huang's analysis of the descriptive complement construction as a primary-predication structure. Wei offers a syntactic sketch for the *qi de kuai* construction, crucially analyzing *kuai* as the head, with *qi de* being a CP modifier. Following Wei's (2006) intuition, I will here posit the following semantics for *qi de kuai*, though such an eventuality-semantics of V-*de* constructions will require further critical study.

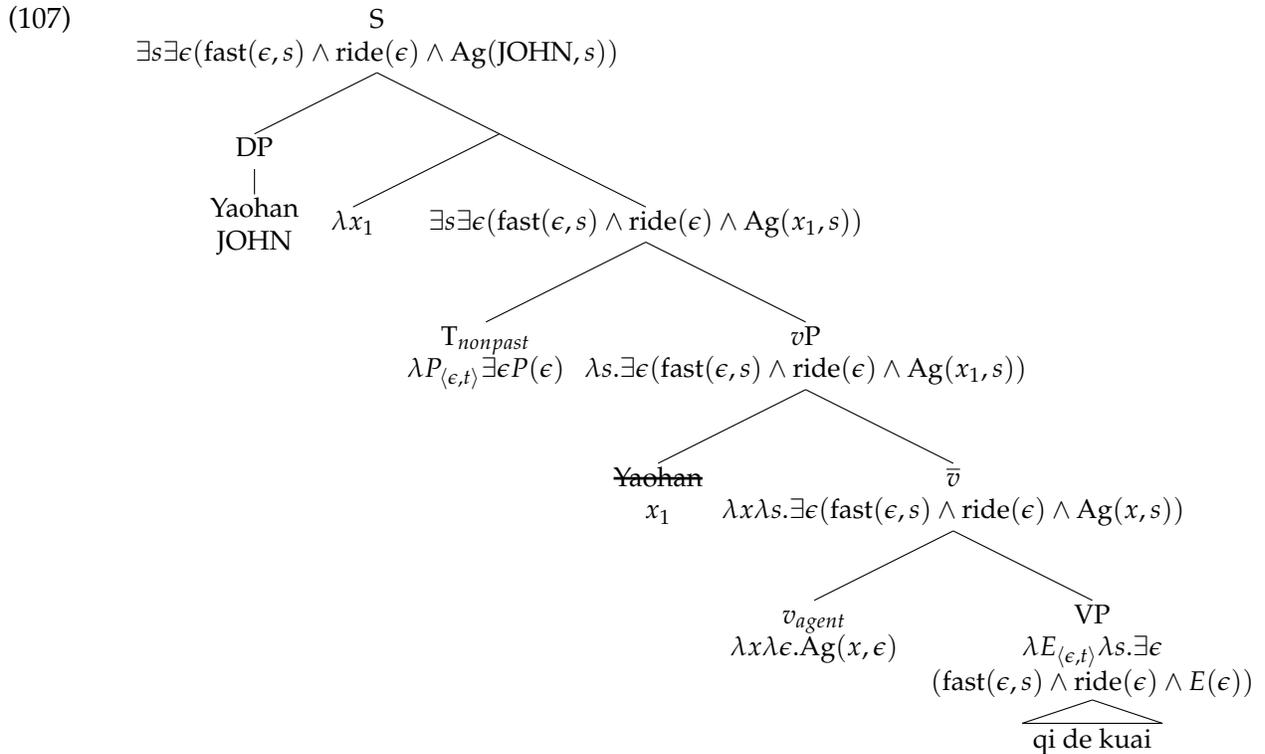
(104) Configuration from Wei (2006, p. 105) (simplified):



(105) $\llbracket \text{qi de kuai} \rrbracket = \lambda E_{\langle \epsilon, t \rangle} \lambda s. \exists \epsilon (\text{fast}(\epsilon, s) \wedge \text{ride}(\epsilon) \wedge E(\epsilon))$

Before we see how the semantics of (24b) are composed, we identify a crucial property of this denotation. Though *kuai* is the head of *qi de kuai* under our analysis here inspired by Wei, the predicate of comparison also exhibits the morpheme *qi* “ride.” Following the tenant of compositionality, we expect $\llbracket \text{qi} \rrbracket$ in $\llbracket \text{qi de kuai} \rrbracket$ and we indeed recognize the denotation of *qi* as the conjunct $\text{ride}(\epsilon)$ in (105) above. This expression guarantees that the eventive argument of *qi de kuai* is an instance of riding, particularly important when deriving the following sentence with only an explicit NP subject.¹²

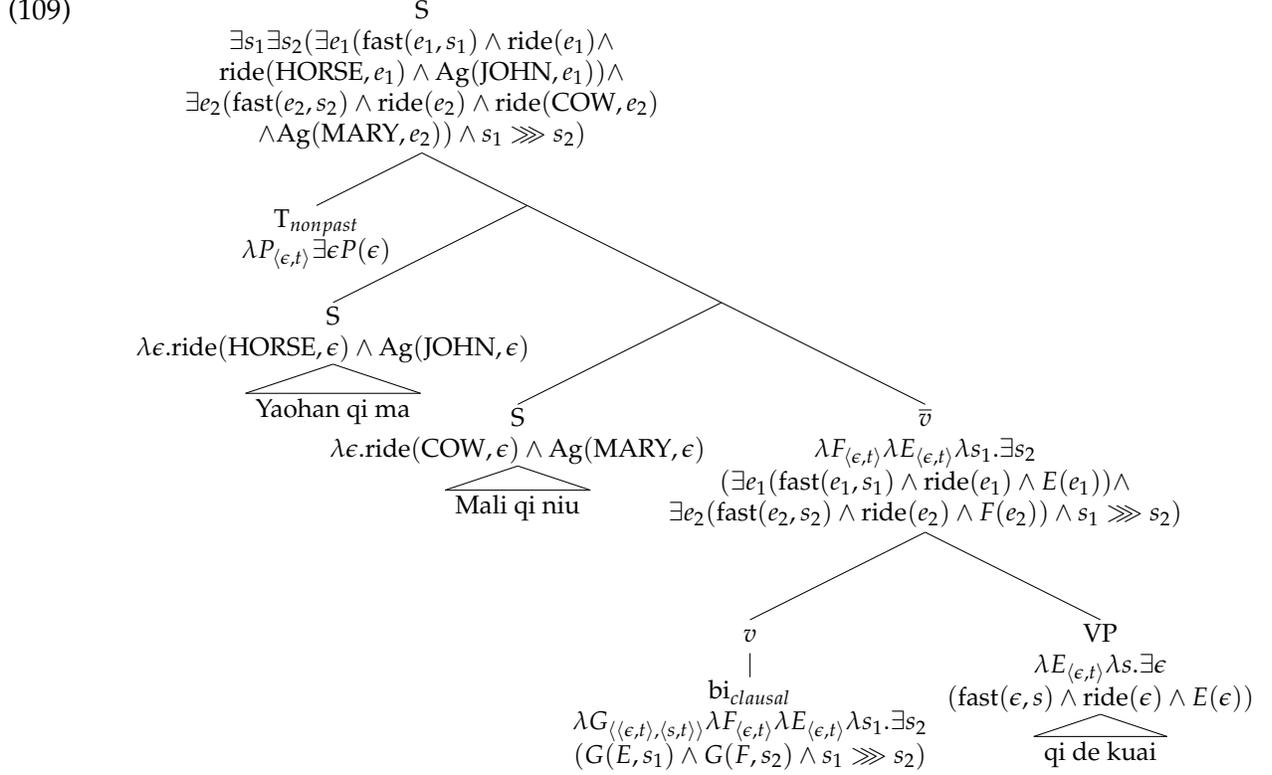
- (106) 约翰 骑 得 快。
 Yaohan [qi de kuai]
 Yaohan ride de fast
 “John rides fast.”



(108) $\llbracket (106) \rrbracket = \exists s \exists \epsilon (\text{fast}(\epsilon, s) \wedge \text{ride}(\epsilon) \wedge \text{Ag}(\text{JOHN}, s))$

¹²Note here that we use the regular v_{agent} , composed with the VP through an adapted Event Identification.

Now consider the derivation of (24b), whose semantic composition is represented in the tree below. Note, as $\{e|\text{ride}(\text{HORSE}, e)\} \subsetneq \{e|\text{ride}(e)\}$, $\{e|\text{ride}(e) \wedge \text{ride}(\text{HORSE}, e)\} = \{e|\text{ride}(e)\} \cap \{e|\text{ride}(\text{HORSE}, e)\} = \{e|(\text{ride}(\text{HORSE}, e))\}$, letting us make the simplification in (110). Intuitively, the terms cancelled are redundant, as the target and standard propositions are both designated as riding events in the propositions themselves and in the predicate of comparison.



(110)
$$\begin{aligned} \llbracket (24b) \rrbracket &= \exists s_1 \exists s_2 (\exists e_1 (\text{fast}(e_1, s_1) \wedge \text{ride}(e_1) \wedge \text{ride}(\text{HORSE}, e_1) \wedge \text{Ag}(\text{JOHN}, e_1)) \wedge \\ &\exists e_2 (\text{fast}(e_2, s_2) \wedge \text{ride}(e_2) \wedge \text{ride}(\text{COW}, e_2) \wedge \text{Ag}(\text{MARY}, e_2)) \wedge s_1 \ggg s_2) \\ &= \exists s_1 \exists s_2 (\exists e_1 (\text{fast}(e_1, s_1) \wedge \text{ride}(\text{HORSE}, e_1) \wedge \text{Ag}(\text{JOHN}, e_1)) \wedge \\ &\exists e_2 (\text{fast}(e_2, s_2) \wedge \text{ride}(\text{COW}, e_2) \wedge \text{Ag}(\text{MARY}, e_2)) \wedge s_1 \ggg s_2) \end{aligned}$$

5.3.2 Evidence for individual clausal comparison

A key feature of my proposal is that I extend the “individual” comparison of entities, as in the phrasal comparison, to the clausal variety as an individual comparison of eventualities with minimal change to the semantics.¹³ Now we will see how this proposal predicts a few puzzles regarding clausal comparatives in Mandarin.

We first note that, much like in the Mandarin phrasal comparative, the Mandarin clausal standard does not exhibit a gap at all. For example, consider the English clausal comparative (111). The

¹³“Individual,” as opposed to “degree comparison,” in the sense of Kennedy (2007).

standard clause, with its elided VP, “Mary does” cannot stand as a sentence on its own. We see, however, that the clausal standard in (112a) is itself a grammatical sentence without a gap that describes a state even out of context. Note also that if the VP (and thus internal arguments of each eventuality) were the same between the target and standard, a Mandarin speaker would simply use the phrasal comparative (112c in lieu of 112b).

(111) John likes chicken more than [_S Mary does ~~like chicken~~].

- (112) a. 约翰 喜欢 鸡肉 比 玛丽 喜欢 猪肉 喜欢 得多。
 Yaohan xihuan jirou bi [_S Mali xihuan zhurou] xihuan de duo
 John like chicken bi Mary like pork like DE more
 “John likes chicken more than Mary likes pork.”
- b. ?? 约翰 喜欢 鸡肉 比 玛丽 喜欢 鸡肉 喜欢 得多。
 Yaohan xihuan jirou bi Mali xihuan jirou xihuan de duo
 John like chicken bi Mary like chicken like DE more
 “John likes chicken more than Mary likes chicken.”
- c. 约翰 比 玛丽 喜欢 鸡肉 喜欢 得多。
 Yaohan bi Mali xihuan jirou xihuan de duo
 John bi Mary like chicken like DE more
 “John likes chicken more than Mary does.”

5.3.3 Deriving the lack of embedded standards

Next we consider embedded standard clauses. In English clausal comparatives, we see unbounded dependency and subjacency effects, as expected by the *wh*-degree operator view of Bresnan (1973) and Chomsky (1977). As noted by Liu (1996), the Mandarin comparative does not exhibit such effects.

(113) Liu (1996):

- a. i. John wrote more books than Max thought that ... that Bill read *e*.
 ii. * John wrote more books than Max believed [the claim that Bill read *e*].
- b. i. * 郭靖 吃饭 比 郭夫 认为 黄蓉 作 快。
 Guojing chi fan bi [Guofu renwei [Huangrong zuo *e*]] kuai
 Guojing eat rice bi Guofu think Huangrong cook fast
 intended: “Guojing eats rice faster than Guofu thinks Huangrong makes”
- ii. * 郭靖 吃饭 比 黄蓉 作 的 说法 快。
 Guojing chi fan bi [[Huangrong zuo *e*] de shuofa] kuai
 Guojing eats rice bi Huangrong make DE claim fast
 intended: “Guojing eats rice faster than the claim that Huangrong makes”

My proposal clearly predicts embedded standard clauses such as in (113bi) to be ungrammatical. Consider three of the eventualities constructed in the derivation of $\llbracket(113bi)\rrbracket$:

- (114) a. e_1 : Guojing’s fastness of eating
 b. e_2 : Huangrong’s fastness of cooking
 c. e_3 : Guofu’s thinking of e_2 as “intense”

Recall that my comparative semantics is introduced through a \ggg intensity-ordering of eventualities. The intended meaning requires $e_1 \ggg e_2$. Unfortunately, the two eventualities ordered in the comparative are restricted to those introduced by the *entire* target and standard clauses, so the only possible meaning is $e_1 \ggg e_3$, which is then ruled out by commensurability (see footnote 2). This lack of embedded clausal standards is a crucial feature of the individual nature of this proposal.

5.3.4 Deriving the Verb Matching Constraint

In fact, (113bi) above is a poor example for the point Liu is trying to make—even if the standard of cooking in (113bi) were not embedded in Guofu’s thinking, the sentence would be ungrammatical.

- (115) * Guojing chi fan bi [Huangrong zuo e] kuai
 Guojing eat rice bi Huangrong cook fast
 intended: “Guojing eats rice faster than Guofu thinks Huangrong makes”

Similar clausal structures are available, but only if the main verb of the target and standard clauses are the same. We refer to this as the **Verb Matching Constraint** of the clausal comparative, which reflects the issue of commensurability discussed above explicitly on the syntactic level.

- (116) Guojing chi fan bi [Huangrong chi bao] chi de kuai
 Guojing eat rice bi Huangrong chi bread eat DE fast
 “Guojing eats rice faster than Huangrong eats bread.”

We note that in (116), though, the predicate of comparison must be of the complex adverbial type. Recall that the complex adverbial introduces a redundant description of the target and standard event-type. Suppose we try to compose the semantics of (117) below, which has a complex adverbial predicate.

- (117) * Guojing chi fan bi [Huangrong zuo fan] chi de kuai
 Guojing eat rice bi Huangrong cook rice eat de fast
 intended: “Guojing eats rice faster than Guofu thinks Huangrong makes”

- (118) $\llbracket\text{Huangrong zuo fan}\rrbracket = \lambda e(\text{cook}(\text{rice}, e) \wedge \text{Ag}(\text{HUANGRONG}, e))$

- (119) $\llbracket \text{bi [chi de kuai]} \rrbracket = \lambda F_{\langle e,t \rangle} \lambda E_{\langle e,t \rangle} \lambda s_1. \exists s_2 (\exists e_1 (\text{fast}(e_1, s_1) \wedge \text{eat}(e_1) \wedge E(e_1)) \wedge \exists e_2 (\text{fast}(e_2, s_2) \wedge \text{eat}(e_2) \wedge F(e_2)) \wedge s_1 \ggg s_2)$
- (120) $\llbracket \text{Huangrong zuo fan [bi [chi de kuai]} \rrbracket = \llbracket \text{bi [chi de kuai]} \rrbracket (\lambda e (\text{cook}(\text{rice}, e) \wedge \text{Ag}(\text{HUANGRONG}, e)))$
 $= \lambda E_{\langle e,t \rangle} \lambda s_1. \exists s_2 (\exists e_1 (\text{fast}(e_1, s_1) \wedge \boxed{\text{eat}(e_1) \wedge \text{cook}(\text{rice}, e_1)} \wedge \text{Ag}(\text{HUANGRONG}, e_1)) \wedge \exists e_2 (\text{fast}(e_2, s_2) \wedge \text{eat}(e_2) \wedge F(e_2)) \wedge s_1 \ggg s_2)$

Note that after functional application in $\llbracket \text{Huangrong zuo fan [bi [chi de kuai]} \rrbracket$, we yield the sub-expression $\text{eat}(e_1) \wedge \text{cook}(\text{rice}, e_1)$ as part of the event description of e_1 . Clearly identifying e_1 as both an eating event and a cooking event is infelicitous, and thus the entire conjoined expression is false. In this way, the verb matching constraint is enforced.

5.4 Extensions and exceptions

Next we will see how our analysis can be extended to other subsets of Mandarin comparative data.

5.4.1 On the transitive comparative

Recall that the Mandarin surface-transitive comparative (§3.1.4) is a comparative without the morpheme *bi*, but is an explicit comparative (see §3.3). The surface word order is of the form of:



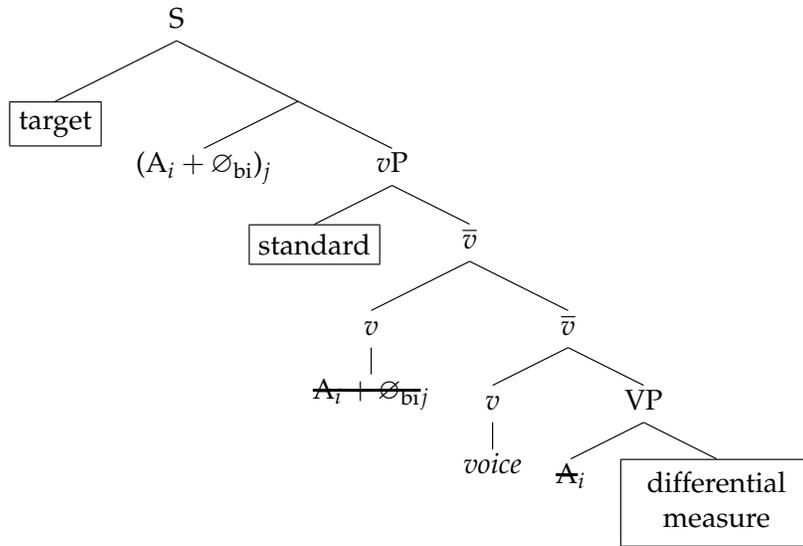
where the measure phrase is required, unlike in *bi* comparatives.

An important point with regards to the surface-transitive comparative is what introduces the comparative morphology. We could imagine there being a lexical rule allowing measurable gradable predicates to surface as a lexical item taking a DP complement, incorporating the comparative semantics, but this seems unlikely. A simpler answer would be that there is a phonologically null comparative morpheme in all of these structures. And, perhaps most interestingly, why is the differential measure obligatory in this construction? While I do not offer an answer to the final question, we are able to better understand the underlying syntax.¹⁴

Here I will follow Xiang's (2003) analysis of the transitive comparative which derives the surface word order through A to V movement, which translates in my proposal as A to *v* movement (cf., Xiang, 2005). We propose a phonologically-null version of *bi* which has approximately the same semantics as *bi* but triggers the A to *v* movement. The syntactic configuration would be thus:

¹⁴In fact, we do not attempt to incorporate the differential measure within our current eventuality-semantics of comparison. See the discussion in the conclusion.

(121)



Recall that we have previously established the transitive comparative as an instance of explicit comparison (§3.3). In addition to the arguments of Xiang (2003), I here offer two pieces of evidence to show that extending the syntax of the *bi* comparative is justified, as opposed to analyzing the transitive comparative as an instance of true transitivity.

Evidence from passivization

If the predicate of comparison here actually takes the standard as an argument, we may expect passivization to be available over this VP. However, we note that the target position in a surface-transitive comparative cannot be passivized with *bei*.

- (122) *他 被 我 高 五 分。
ta bei wo gao wu fen
3sg bei 1sg high five CL_{points}
intended: 'He was beaten by me by five points.'

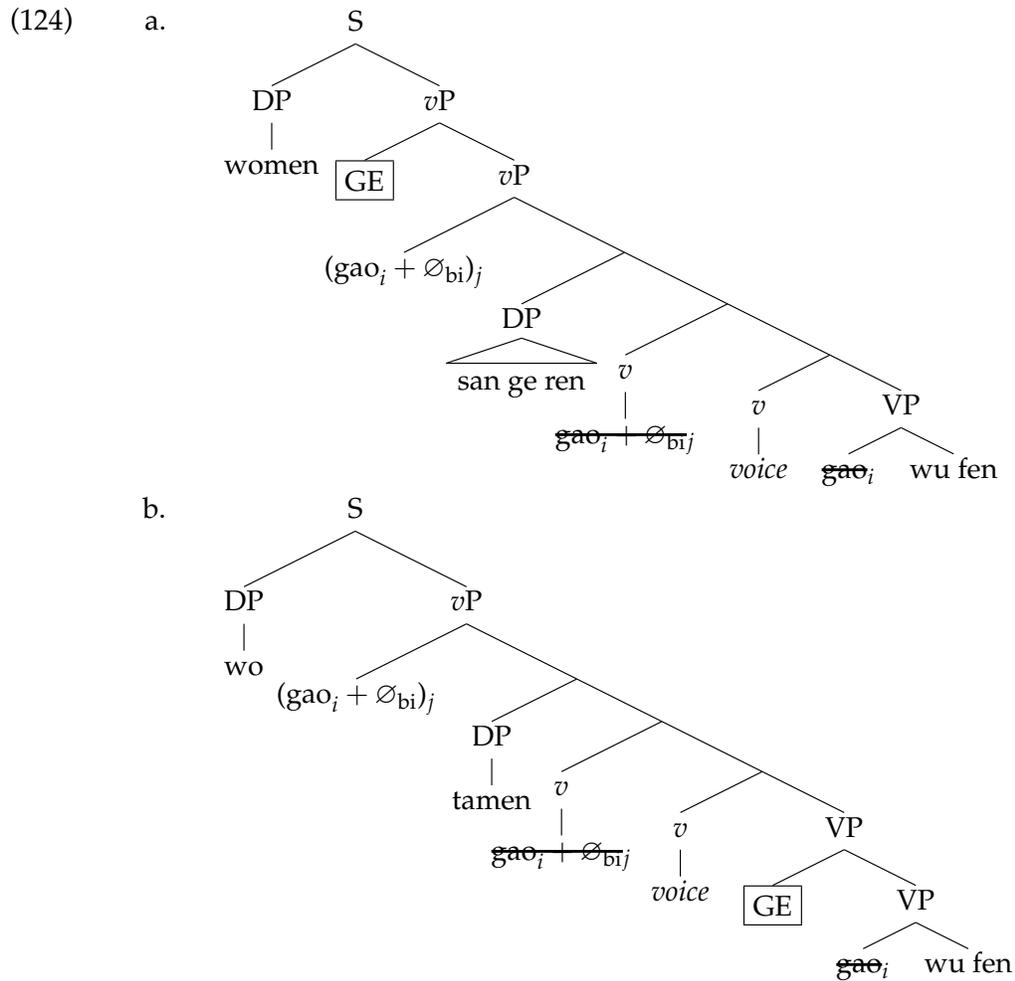
This is to be expected under the hypothesis with a phonologically null comparative morpheme of the same sort as *bi*, as *bi* can only Merge above the voice *v* projection as established above in §5.2.5.

Evidence from the distributive quantifier *ge*

Recall that the distributive quantifier *ge* can adjoin to a VP or *v*P node (Soh, 2005). The test then is whether we see two possible positions for *ge* in the transitive comparative, suggesting two different *v*- or *V*- phrase projections. We indeed see this to be the case.

- (123) a. 我們 各 高 三 個 人 五 分。
 women ge gao san ge ren wu fen
 1pl GE gao three CL_{person} person five CL_{points}
 'Each of us were five points higher than three people' (where each of our "three people" may be distinct)
- b. 我 高 他們 各 五 分。
 wo gao tamen ge wu fen
 1sg high 3pl GE five CL_{points}
 'I was five points higher than each of them.'

Notably, the ability of *ge* to surface between *tamen* and *wu fen* in (123b) suggests an underlying VP after *ge* with a V/A gap. We note again that our syntax predicts these two configurations.



5.4.2 “The Guojing of today”

Recall that one of two arguments Liu (1996) gave for the clausal analysis of Mandarin phrasal comparatives came from example (61), repeated here:

- (61) 郭靖 今天 比 黄蓉 昨天 高兴。
Guojing jintian bi Huangrong zuotian gaoxing
Guojing today bi Huangrong yesterday happy
“Guojing is happier today than Huangrong was yesterday.”

We recall that Liu’s (1996) comparative deletion analysis can easily explain such constructions, as *Huangrong zuotian* need not be a constituent but, rather, an IP that has undergone \bar{I} ellipsis.

- (125) 郭靖 今天 比 [IP 黄蓉 昨天 [I e_i]] 高兴。
Guojing jintian bi Huangrong zuotian gaoxing
Guojing today bi Huangrong yesterday happy
“Guojing is happier today than Huangrong was yesterday.”

We note, however, that Xiang (2003, 2005) and I have independently argued against the clausal analysis of phrasal comparatives. As a possible solution to this conundrum, Kennedy (p.c.) suggests that perhaps *Huangrong zuotian* in (61) can be analyzed as a DP, as a definite description with temporal information. He offers the following sentence as an example of such a construction in English.

- (126) This game can’t be won by the Alex Rodriguez of 1995. (But it can by the Alex Rodriguez of today.)

We note that in this sentence, the main verb is *can*, which is morphologically inflected in a nonpast tense. The idea of temporal information being encoded in a DP is not new (Larson and Cho, 2003; Nordlinger and Sadler, 2004; Staraki, 2007). While the details of such constructions in Mandarin are yet to be worked out, we see that sentences such as (61) only hints an analysis of Mandarin surface-phrasal comparatives as underlyingly clausal.

5.5 Comparatives, compared

In this section we laid out a novel syntax-semantics for the Mandarin *bi* comparative, featuring a verbal syntax for *bi* and an eventuality-semantics of comparison. In the final sections we looked at a couple of extensions to the model proposed.

Let us examine what answers this proposal would have for the five research questions laid out in §3.2.4. First, my analysis explains the phrasal comparative as underlyingly **phrasal (Q1)** and analyzes both phrasal and clausal comparatives as instances of **individual** comparison over eventualities (**Q2**).

Recall that Liu (1996) analyzed the syntactic status of *bi* (**Q3**) as a prepositional adjunct. Evidence from constituency, negation, and reflexive binding clearly suggest that *bi* cannot be an adjunct. While Xiang (2005) also noted structural similarities between the comparative and the double object construction, she interpreted *bi* as part of a complex DegP structure à la Larson (1991), while my analysis incorporates *bi* into the extended verbal projection. Crucially, Xiang's analysis does not derive the generalization that the predicate of comparison can be any gradable predicate, whether verbal or adjectival—particularly important when considering evidence from passivization. We may interpret the analysis presented here as yet another case of categorical overlap between Mandarin adjectives and verbs. With regard to (**Q3**), then, we see that this proposal is clearly superior.

My neo-Davidsonian event-semantics of comparison clearly explains the Internal Argument Prohibition (**Q4**), taking advantage of the rift between external and internal arguments (following Kratzer, 1996). Liu (1996) explained the IAP facts through \bar{I} -ellipsis and Case facts, but then resorted to exceptional case marking over a clause boundary, as criticized by Xiang (2003). Xiang limited her discussion to adjectival predicates of comparison, and thus did not address the issue.

With regard to (**Q5**), in the final section, we considered how the transitive comparative could be derived as a variant of the *bi* comparative as examined here, using a phonologically null version of *bi*, following Xiang (2003). However, the semantics of the transitive comparative and the structure of the adverbial comparative have yet to be established within this view.

Chapter 6

Conclusion

6.1 Discussion

In this thesis we have examined and introduced a new syntax-semantics for the Mandarin *bi* comparative. Along the way, new data from passivization and the distribution of the distribution of the quantifier *ge* were introduced. Such syntactic evidence clearly rejects the PP-adjunct analysis of *bi* (Liu, 1996; Xiang, 2003) and motivated *bi* as a head in the extended verbal system.

We introduced a novel neo-Davidsonian semantics which orders eventualities directly rather than introduce degree arguments into the semantics. Recall that we were able to extend this semantics from the phrasal comparative to the clausal cases by mere type-shifting of *bi*. This system explains the lack of embedded clausal standards and also derives the Verb Matching Constraint. In addition, the semantics of voice and the external argument derive the Internal Argument Prohibition.

6.2 Future directions of research

While the analysis introduced here can explain a number of empirical puzzles, it is also by no means complete—some syntactic issues will have to be further explored. We note that I did not explain the syntactic relationship between the adverbial comparative and the others. Recall as well that, while our model accurately predicted and constructed a comparison with a passive predicate of comparison, there is nothing to rule out a passive of a comparative under the assumptions of Huang's (1999) analysis of the *bei*-passive. This may point to the overreach of Huang's null-operator analysis. Other models of the Mandarin *bei*-passive should also be considered in this context.

The syntax-semantics I introduced for the clausal comparative also has a profound syntactic implication. Namely, our syntax-semantics worked so neatly specifically because we rejected Huang's

(1988) Primary Predication analysis of the Descriptive Complement Construction. Such comparative evidence may help motivate a new analysis of the DCC, and this would be a rewarding, but also challenging, direction of future study.

My analysis here also introduced a new kind of semantics of individual comparison of eventualities, and this brings forth a number of exciting new considerations and possibilities for investigation. We note in particular that my current semantics does not extend well to those comparatives with a differential measure. One aspect of this is that my current analysis draws no distinction between measurable predicates (such as *tall*: “ten feet tall”) and those which are not measurable—what should be a crucial distinction in the semantics of the differential measure. Note also that the *duo*-comparative, not examined here, involves a definite differential measure, and would need a different semantics as well (see Li, 2007). It would be interesting to see how my analysis can extend to these two cases. This line of research may also lead to a fruitful new discussion of an eventuality semantics of the positive form of Mandarin adjectives.

One central semantic issue that will need further attention is the notion of commensurability. We noted that the \ggg intensity ordering can only be established for two events “of the same type”: what we are looking to rule out here is, for example, a comparison of a speaking event and a running event. More borderline cases exist, though: what about synonymous verbs, or identical verbs with different argument structures? Such limits of this notion must be fleshed out and further empirically motivated.

Finally, these results should be considered in the broader comparative comparatives discussion and contrasted with evidence from other languages. Having a new syntax-semantics for the Mandarin *bi* comparative (or at least a unique proposal) suggests new options for the analysis of comparatives in other languages as well. I look forward to contrasting the evidence here in light of my proposal to comparatives in other languages.

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Document history

Revised September 6, 2007 for typos. PDF updated November 2008 with hyperlinks; updated November 2015 with a note on the first page. Retrieved from <http://mitcho.com/>.