Syntactic composition in the Mandarin *bǐ* comparative

Michael Yoshitaka Erlewine, December 10, 2012

This paper discusses the division of labor between syntax and semantics in the Mandarin Chinese *bǐ* comparative construction. I argue that the derivation of a *bǐ* comparative involves two instances of the predicate in syntax: one which composes with the target and one which composes with the standard. Evidence for this syntactic structure comes from comparatives with movement from the predicate to the target and the predicate to the standard, at the same time. Recent analyses which only posit one instance of the predicate in syntax (Xiang, 2005; Erlewine, 2007; Lin, 2009) thus cannot be maintained. I posit an obligatory ellipsis operation to yield the final word order, and show that various properties of *bǐ* comparatives fall out of general constraints on ellipsis parallelism. Finally, I argue that the computation of *bǐ* comparatives does not—and cannot—involve abstraction over a degree argument. Gradable predicates in Mandarin take their degree argument last, allowing for comparison without using degree abstraction.

1 Introduction

The analysis of comparative constructions such as (1a) yields a classic syntax/semantics mismatch. When we consider the positive form of a gradable predicate such as "tall" in (1b), we observe that it only takes one non-degree argument to satisfy its core syntactic and semantic valency. In a comparative such as (1a), however, both the target "John" and the standard "Mary" are composed with the predicate, in order to assert that the "tallness of John" exceeds the "tallness of Mary."

(1) a. John is **taller** than Mary.   *comparative form*

 b. John is **tall**.   *positive form*

The key question, then, is how does the gradable predicate compose with both the target and the standard in (1a)? Two approaches have been suggested in the literature: what I will refer to here as *syntactic composition* and *semantic composition*:

(2) **Syntactic composition:** (Bresnan 1973; Chomsky 1977; von Stechow 1984; Bhatt and Pancheva 2004; a.o.)
There are two instances of the gradable predicate in the syntax. One composes with the target and the other composes with the standard, *in the syntax*.

(3) **Semantic composition:** (a.k.a. "Direct Analysis"; Heim 1985; Bhatt and Takahashi 2007, 2011; a.o.)
There is only one instance of the gradable predicate in the syntax. The comparative operator takes that one predicate and composes it with the target and with the standard, *in the semantics*.

In this paper I present an answer to this puzzle for the case of *the Mandarin Chinese* bǐ *comparative construction*, exemplified in (4).[1,2] I show that this construction must use the syntactic composition strategy in (2). In particular, I argue for a derivation of *bǐ* comparatives in which both the target and standard are

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[1] The *bǐ* comparative construction is so-called for its use of the *bǐ* (比) morpheme. The morpheme *bǐ* (比) is both historically and contemporarily also a lexical verb meaning "compare." Here I assume that the functional lexeme *bǐ* studied here is distinct from the lexical verb *bǐ*.

[2] The arguments presented here also hold for the *gēn...yīyàng* equative and the *měiyǒu...(name)* comparative of inferiority.

each directly composed with the gradable predicate in the syntax, on the basis of novel syntactic arguments. An obligatory ellipsis operation yields the surface word order in which only one instance of the gradable predicate is pronounced.

(4) Yuēhàn bǐ Mǎlì gāo
     John   BI Mary tall
     "John is taller than Mary."

(5) **Proposed structure for (4):**
     [*target clause* John [*predicate* ~~tall~~]] *bǐ* [*standard clause* Mary [*predicate* tall]]

Primary evidence for this syntactic structure comes from comparatives with movement from the predicate to the target and the predicate to the standard, at the same time. This configuration, which I refer to as *parallel movements*, is schematized in (6) below. In such comparatives, there is a constituent α_1 in the target and α_2 in the standard, which are both heads of movement chains interpreted as originating within the predicate of comparison. However, there is only one "gap" position in the predicate. Under the syntactic composition approach, such cases can straightforwardly be analyzed as two different movement chains, as in (7).

(6) **Parallel movement:**
     " ... α_1 ...   *bǐ*   ... α_2 ...   ... t_α ... "
          target   standard   predicate

(7) [*target clause* ... α_1 ... [*predicate* ~~... t_α ...~~]] *bǐ* [*standard clause* ... α_2 ... [*predicate* ... t_α ...]]

Recent analyses of the Mandarin *bǐ* comparative (Xiang, 2005; Erlewine, 2007; Lin, 2009) have adopted a semantic composition approach. I demonstrate that these parallel movement comparatives cannot be derived within a semantic composition approach to the *bǐ* comparative. Furthermore, I will argue that no semantic composition approach—regardless of the particular syntactic constituency proposed—would be able to accurately model the *bǐ* comparative.

My proposal also makes a unique theoretical claim regarding the semantic computation of the Mandarin *bǐ* comparative. Comparatives employing syntactic composition are standardly analyzed as utilizing *degree abstraction*: movement of a null operator of degree type in order to create a degree description. Instead, I propose that the Mandarin *bǐ* comparative does not utilize degree abstraction. I show that this accurately predicts the lack of particular types of embeddings in comparatives. This makes the Mandarin *bǐ* comparative typologically unique, in being a syntactic composition comparative without null operator movement to construct the degree descriptions to be compared.

I begin in the next section with a survey of the formal details of the syntactic and semantic approaches and the predictions that these two approaches make for the *bǐ* comparative. In section 3 I present my proposal which uses syntactic composition and present a series of syntactic arguments which prove fatal for semantic composition approaches. I also give technical details of the ellipsis operation proposed, where I adopt the work of Takahashi and Fox (2005) and others in enforcing a semantically-sensitive licensing condition on the ellipsis, and present evidence from the *bǐ* comparative for this formulation. In section 4 I discuss the most recent proposal, Lin (2009), which presents a way to reconcile some problematic data with the semantic composition approach, and show that this modified semantic composition approach also faces problems. In section 5 I demonstrate that the derivation of *bǐ* comparative constructions does not involve degree abstraction. I conclude in section 6.

2 Analyzing comparison

Let us illustrate the central puzzle explored here with the basic example in (4), repeated below. The two entities compared here, "John" and "Mary," are referred to as the TARGET and STANDARD, respectively. The scale of comparison is introduced linguistically through the predicate "tall." Formally, gradable predicates relate entities (such as individuals, states, or events) to degrees (Creswell, 1976), as in (9).

(4) Yuēhàn bǐ Mǎlì gāo
     John   BI Mary tall
     "John is taller than Mary."

(8) | target | *bǐ* | standard | | gradable predicate |
     "*target* is more *predicate* than *standard* is *predicate*."

(9) $[\![gāo]\!] = \lambda d.\lambda x.x$ is d-tall   type $\langle d, \langle e, t \rangle \rangle$

(4′) $[\![(4)]\!] = max(\lambda d.$ John is d-tall$) > max(\lambda d.$ Mary is d-tall$)$

The truth conditions of (4), in (4′), assert that the maximal degree which satisfies "John is d-tall" is greater than the maximal degree which satisfies "Mary is d-tall." The question we are exploring is how the predicate *gāo* "tall," which only takes one non-degree argument, composes with both "John" and "Mary."

Syntactic composition and semantic composition are both approaches to solving this core problem of comparative syntax / semantics: getting the gradable predicate to combine with both the target and the standard of a comparative. However, these approaches are radically different in the syntax and semantics that they assume for the comparative construction.

In the syntactic composition approach (10a), there are two instances of the predicate in the syntax: one for the target and one for the standard. These approaches must then perform some operation to explain why only one instance of the predicate is pronounced. This is done through some reduction operation, often called *comparative deletion*, which yields the pronounced word order as in (4).

In a semantic composition approach (10b), there is only one instance of the predicate throughout the syntactic derivation.[3] The semantics of the comparative acts as a mediator between the predicate and arguments of the comparative.

(10) **Some simplified LFs for syntactic and semantic composition approaches:**
     a. Syntactic composition: b. Semantic composition:
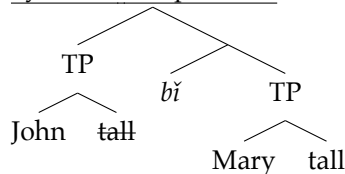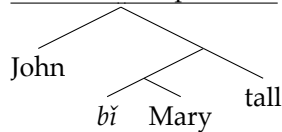
Before describing these two approaches in more detail, it is important to understand the nature of this dichotomy. The goal is not to identify the correct analysis of all comparative constructions across all languages, but rather to identify the appropriate syntax / semantics strategy for a particular construction in a particular language—in this paper, the *bǐ* comparative in Mandarin Chinese.

To illustrate the two approaches, I will use familiar examples from English. Conveniently, English has been argued to have two different types of comparative constructions: one which uses semantic composition and another which uses syntactic composition (Bhatt and Takahashi, 2011, a.o.). Comparatives with

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[3]Note that (10b) below is simply a representative syntactic structure. In section 2.4, I will discuss alternative phrase structures for the semantic composition approach.

a phrasal standard as in (1a), commonly referred to as "phrasal comparatives" and repeated here as (11a), utilize semantic composition. Comparatives such as (11b) represent their standards as reduced clauses and are thus called "clausal comparatives." These comparatives have been analyzed using the syntactic composition approach.

(11) a. John is taller than Mary.   *"phrasal comparative," semantic composition*
      b. John is taller than Mary is.   *"clausal comparative," syntactic composition*

In the following subsections I will illustrate the two approaches, formalize the requisite syntax and semantics for them, and discuss the different properties of comparative constructions that are predicted by them.

2.1 The syntactic composition approach

In the syntactic composition approach, there are underlyingly two instances of the gradable predicate in the syntax: one for the target and one for the standard. The degree descriptions (sets of degrees) to be compared are standardly constructed by $\overline{\text{A}}$-movement of a null-operator (Bresnan, 1973; Chomsky, 1977). Evidence for this $\overline{\text{A}}$-dependency has come in English from the availability of embedded standards such as in (12) and the island-sensitivity of these embeddings as in (13).

(12)   John is taller than [Mary thinks [he is ___]]

(13)   * John is taller than [$_{\text{island}}$ Mary's claim that [he is ___]]

Movement of the comparative operator *-er* and the standard clause occurs in order to construct the degree description for the target (Wold, 1995; Heim, 2000; Bhatt and Pancheva, 2004).[4] This results in an LF as in (12') below, where the two degree-denoting expressions are labeled D_1 and D_2. D_1 is the set of degrees such that John is that tall and D_2 is the set of degrees such that Mary thinks he is that tall.

(12')
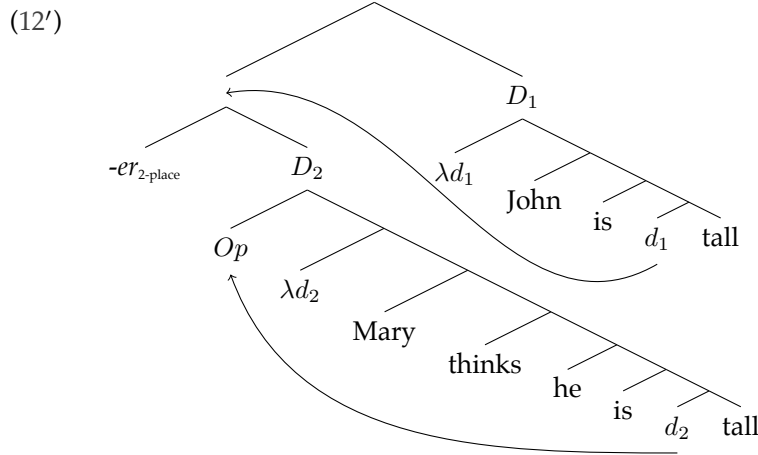
Once degree descriptions for the target and the standard have been constructed, the comparative operator simply selects for these two degree-denoting expressions and asserts a ranking between them.

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[4]Non-trivial details of this derivation, such as the late merger of the standard-denoting clause (Bhatt and Pancheva, 2004), are not discussed here as they are orthogonal to the discussion of Mandarin comparatives. As will be discussed in section 5, the derivation of Mandarin *bǐ* comparatives does not involves such movement steps.

(14)   **A two-place *-er* for the syntactic composition approach:**

$\textit{-er}_{\text{2-place}} = \lambda D_{1\,\langle d,t\rangle}.\lambda D_{2\,\langle d,t\rangle}.max(D_1) > max(D_2)$

In the case of example (12), we yield the following truth conditions:

(15) $[\![(12)]\!] = \textit{-er}_{\text{2-place}}(D_2)(D_1) = \textit{-er}_{\text{2-place}}(\lambda d_2.$ Mary thinks John is d_2-tall$)(\lambda d_1.$ John is d_1-tall$)$
$= max(\lambda d_1.$ John is d_1-tall$) > max(\lambda d_2.$ Mary thinks John is d_2-tall$)$

To summarize, in a syntactic composition approach, the degree descriptions corresponding to the target and the standard are each constructed as individual syntactic objects. This is possible since there are underlyingly two instances of the gradable predicate in the syntax.

In the next section I present the semantic composition approach, before comparing the predictions of the two approaches.

2.2   The semantic composition approach

In the semantic composition approach, there is only one instance of the gradable predicate in the syntax. The comparative operator takes the gradable predicate and composes it with the target and with the standard in the semantics. There are no syntactic objects which correspond to the degree descriptions compared, as there were in the syntactic composition approach.

Consider the basic example (11a), repeated here. A standard semantic composition approach to English comparatives posits an LF for such comparatives as in (11a') (Heim, 1985; Bhatt and Takahashi, 2011). See Bhatt and Takahashi (2011) for details of the covert movement operations proposed which yields (11a') from the English (11a).

(11a)   John is taller than Mary.

(11a')
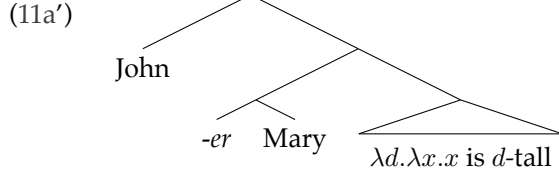
The LF in (11a') isolates three components: the target *John*, the standard *Mary*, and the gradable predicate. The comparative operator *-er* is then a three-place operator which takes the standard, the gradable predicate, and the target as arguments. The comparative operator applies the gradable predicate to the target and to the standard and asserts an ordering over the resulting degree descriptions (Heim, 1985).

(16)   **A three-place *-er* for the semantic composition approach**:

$\textit{-er}_{\text{3-place}} = \lambda y_e.\lambda G_{\langle d,\langle e,t\rangle\rangle}.\lambda x_e.max(\lambda d.G(d)(x)) > max(\lambda d.G(d)(y))$

This yields the following truth conditions for (11a):

(17) $[\![(11a)]\!] = \textit{-er}_{\text{3-place}}(\text{Mary})(\lambda d.\lambda x.x$ is d-tall$)(\text{John})$
$= max(\lambda d(\lambda d.\lambda x.x$ is d-tall$)(d)(\text{John})) > max(\lambda d(\lambda d.\lambda x.x$ is d-tall$)(d)(\text{Mary}))$
$= max(\lambda d.$ John is d-tall$) > max(\lambda d.$ Mary is d-tall$)$

Note that in (11a'), there are no syntactic objects that correspond to the degree descriptions ($\lambda d.$ John is d-tall) or ($\lambda d.$ Mary is d-tall). There is only one instance of the gradable predicate in the syntax, so if it directly

composed with the target or the standard in the syntax, we would not be able to compute the competing degree description. Thus in this approach, the gradable predicate is only composed with the target and the standard in the semantics. More precisely, the construction of the degree descriptions takes place entirely within the process of evaluating -$er_{\text{3-place}}$.

2.3 Predictions of the two approaches

The two approaches presented, syntactic composition and semantic composition, predict very different properties for comparative constructions which use them. In this section I will lay out the different predictions, using English examples. Recall that English has two types of comparative constructions: "phrasal" comparatives, which use semantic composition, and "clausal" comparatives, which use syntactic composition:

(11) a. John is taller than Mary.   *"phrasal" comparative, semantic composition*
       b. John is taller than Mary is.   *"clausal" comparative, syntactic composition*

A number of syntactic differences come from the simple idea that the standard in a clausal comparative as in (11b) is an embedded clause, while the standard in a phrasal comparative as in (11a) is truly a simple DP rather than a reduced clause. For example, accusative case can be assigned to phrasal but not clausal standards, and phrasal standards can be reflexives bound by the target (Hankamer, 1973):

(18) **Accusative case in the phrasal standard:**
       a.   John is taller than her.
       b.   * John is taller than her is.

(19) **Reflexives possible in the phrasal standard:**
       a.   John cannot be taller than himself.
       b.   * John cannot be taller than himself is.

Moreover, following (Chomsky, 1977), the derivation of a clausal standard involves $\overline{\text{A}}$-movement of a null operator, predicting that the clausal standard is a *wh*-island for extraction. As also noted by Hankamer (1973), no such extraction difficulty is observed in the phrasal comparative.

(20) ***Wh*-extraction possible from phrasal standards:**
       a.   Who is John taller than ___ ?
       b.   * Who is John taller than ___ is?

Additional differences between the two approaches stem from the fact that there are two instances of the predicate in the syntax for the syntactic composition approach, but only one instance of the predicate in the syntax in the semantic composition approach. The syntactic composition approach can straightforwardly account for cases where both predicates are overtly pronounced (21) or where two different but commensurable predicates are used (22; a so-called *subcomparative* construction).

(21) $^{??}$ John is taller than Mary is tall.

(22)   My chair is taller than your table is wide.
       LF: $max(\lambda d.$ my chair is d-tall$) > max(\lambda d.$ your table is d-wide$)$

Under a semantic composition approach, on the other hand, there is only one instance of the gradable predicate in syntax, so the predicate composed with the target and the predicate composed with the standard must be exactly the same. Thus subcomparatives such as (22), where two different gradable predicates are used, are impossible under semantic composition.

More generally, nothing is allowed to vary between the gradable predicate applied to the target and the gradable predicate applied to the standard. For example, comparatives with clausal embeddings in the standard which are not also reflected in the target cannot be computed using semantic composition, and instead must use syntactic composition. An example of such a comparative is (12), repeated below.

(12)   John is taller than Mary thinks he is.
        LF: $max(\lambda d.$ John is d-tall$) > max(\lambda d.$ Mary thinks John is d-tall$)$

Finally—and most importantly for the arguments later in this paper—the syntactic composition and semantic composition approaches make different predictions for movement in comparative constructions. Consider a node α which is base-generated within the gradable predicate and must move to a higher position (23).

(23) $[_{\text{TP}} ... \alpha ... [_{predicate} ... t_\alpha ...]]$

The two approaches make different predictions as to whether multiple simultaneous α-movement chains can occur in a comparative. This type of configuration is schematized in (24), where there are two moved elements, α_1 and α_2, but only one overt gap.

(24)   **Parallel movement:**
        " ... α_1 ...   bǐ   ... α_2 ...   ... t_α ... "
           target   standard   predicate

In the semantic composition approach, there is only one instance of the gradable predicate in the syntax, and thus there is also only one base-generated instance of α. The semantic composition approach would only allow at most one α-movement chain within a comparative. On the other hand, in the syntactic composition approach, there are two instances of the predicate in syntax, so an α can be base-generated in each predicate and can independently move into the target and the standard at the same time (25).

(25) $[_{target\ clause} ... \alpha_1 ... [_{\overline{predicate\ ...\ t_\alpha\ ...}}]] \ bǐ \ [_{standard\ clause} ... \alpha_2 ... [_{predicate} ... t_\alpha ...]]$

In section 3, I will show the existence of comparative constructions which involve parallel movements from the predicate to the target and from the predicate to the standard at the same time (25). This will lead to the conclusion that the semantic composition approach is not tenable for the Mandarin *bǐ* comparative.

Although the facts will ultimately rule in favor of the syntactic composition approach, the *bǐ* comparative exhibits several properties which point at an analysis using the semantic composition approach. Thus, before I present my proposal and the evidence supporting it, I will review the recent analyses of the Mandarin *bǐ* comparative which utilize a semantic composition approach and survey the properties that led their authors to choose this approach.

2.4 Semantic composition approaches to the Mandarin *bǐ* comparative

A number of recent proposals for the syntax/semantics of the Mandarin *bǐ* comparative have taken a semantic composition approach (Xiang, 2003, 2005; Erlewine, 2007; Lin, 2009).[5] The *bǐ* comparative indeed exhibits many properties which are straightforwardly predicted under a semantic composition approach. The Mandarin *bǐ* comparative lacks certain properties which would clearly require a syntactic composition approach. First, it does not allow subcomparison or embedded standards:

(26) **No subcomparatives**

   * wo de yizi gao bi ni de zhuozi kuan
     1SG GEN chair tall BI 2SG GEN table wide

   Intended: "My chair is taller than your table is wide."

(27) **No embedded standards**

   * Yuehan bǐ Mali renwei tā gāo
     John   BI Mary thinks he tall

   Intended: "John is taller than Mary thinks he is."

The Mandarin *bǐ* comparative can have a target and standard which look to include clausal material (28a). (Such cases will be discussed in detail in section 3.2.4.) Even in these cases, however, the addition of a clausal embedding in the standard is ungrammatical (28b).

(28) **No embedded standards, even with clausal-looking standards**

  a. ✓ Yūehàn qí mǎ bǐ Mǎlì qí niú qí de kuài
     John   ride horse BI Mary ride cow ride DE fast
     "John rides horses faster than Mary rides cows."

  b. * Yūehàn qí mǎ bǐ wǒ renwei Mǎlì qí niuʹ qí de kuài
     John   ride horse BI 1SG think Mary ride cow ride DE fast
     Intended: "John rides horses faster than I think Mary rides cows."
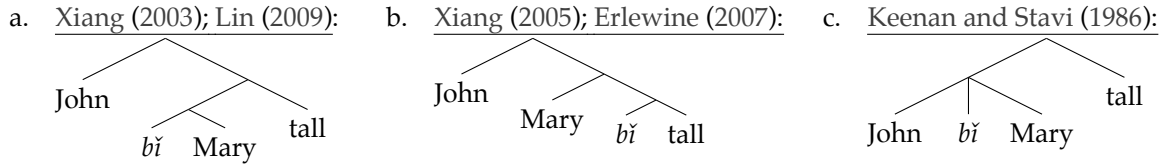
As discussed in the previous section, subcomparatives and embedded standards are two constructions which require a syntactic composition approach. In the past, the lack of these constructions in Mandarin has been presented as an argument for a semantic composition approach to the *bǐ* comparative. I will argue that the mere nonexistence of such constructions in Mandarin does not entail that the Mandarin *bǐ* comparative does not utilize syntactic composition. Instead, I will argue that there are independent reasons why such constructions do not exist.

The semantic composition approach is compatible with a variety of different phrase structural configurations, some of which have been proposed in the literature:[6]

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    [5]Liu (2011) proposes a "hybrid analysis," wherein both syntactic composition and semantic composition *bǐ* comparatives exist in Mandarin Chinese. The arguments I present against all semantic composition approaches will also apply to Liu's (2011) semantic composition analysis, thus invalidating the hybrid analysis itself. Note that my own proposal is conceptually similar to the syntactic composition approach presented in Liu (2011), based on Liu (1996).

    [6]For some authors, *bǐ* does not itself represent the locus of the comparative operator. Here I have categorized different constituent structures based on the relationship between the target, standard, predicate, and the comparative operator, which I represent as *bǐ*.

(29) **Some possible semantic composition phrase structures at LF:**
    a. Xiang (2003); Lin (2009):   b. Xiang (2005); Erlewine (2007):   c. Keenan and Stavi (1986):

a. [John [[*bǐ* Mary] tall]]

b. [John [Mary [*bǐ* tall]]]

c. [[John *bǐ* Mary] tall]

These different syntactic configurations have different implications for the constituency of *bǐ* comparatives as well as the syntactic category of *bǐ*. However, they all share the defining characteristics of semantic composition: (a) that there is only one instance of the gradable predicate in the derivation and (b) that the comparative operator has the task of combining the target with the predicate, and the standard with the predicate, in the semantics.

In the following sections I will argue that no semantic composition approach—regardless of the particular phrase structure chosen—can adequately model the Mandarin *bǐ* comparative.

3 Proposal and evidence

In this section I will present my proposal for the *bǐ* comparative and supporting evidence. The proposal put forth here is a syntactic composition approach, where each *bǐ* comparative includes two instances of the predicate of comparison. An obligatory ellipsis operation is proposed to derive the final word order, where only one instance of the predicate is pronounced.

A syntactic composition approach to the Mandarin *bǐ* comparative has been proposed previously, most notably by Liu (1996). However, the treatment here diverges from all previous approaches in two ways: it provides (a) empirical evidence that necessitates the use of a syntactic composition approach over a semantic composition one and (b) an explicit characterization of the mechanics of the ellipsis operation used, and its motivations and corollaries.

Following the basic proposal in section 3.1, section 3.2 will demonstrate the necessity of a syntactic composition approach to the *bǐ* comparative. Evidence in support of the semantics of section 3.1, which does not use degree abstraction, will be discussed in section 5. Section 3.3 provides empirical support for different aspects of the ellipsis operation proposed and presents its correct predictions. Finally, section 3.4 provides a review of the proposal and the empirical evidence presented for different components of the proposal.

3.1 Proposal

I propose that the Mandarin *bǐ* comparative utilizes syntactic composition. Despite appearances, the syntax of a *bǐ* comparative includes two instances of the gradable predicate. One forms a clause together with the target and the other forms a clause with the standard, each following the regular rules of Mandarin clausal syntax. The comparative morpheme *bǐ* is then categorically a clausal conjunction. This configuration is schematized in (30).[7] A Comparative Deletion Requirement will be proposed, yielding the final word order with only one instance of the predicate pronounced.

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[7]In this study I assume a classic pre-vP view of Mandarin phrase structure. I assume (a) no vP extended projection of VP and (b) base-generation of subjects in Spec,TP. This choice is made for ease of illustration and because, to my knowledge, no clear argument has been made for a vP-internal subject specifically in Mandarin Chinese.

The proposal made here, however, is also compatible with the vP-internal subject hypothesis; one need only change (32) to require ellipsis of a vP instead of a VP. The only substantive difference will be due to the movement of the subject from Spec,vP to Spec,TP.

(30)
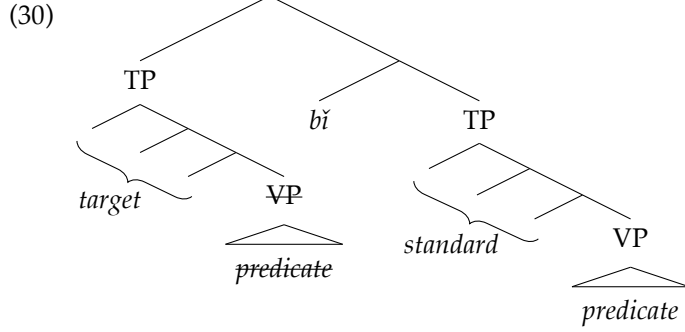
For concreteness, I will illustrate this proposal with our basic example (4), repeated here. We'll first look at the syntactic derivation before turning to the compositional semantics.

(4) Yuēhàn bǐ Mǎlì gāo
     John   **BI** Mary tall
     "John is taller than Mary."

3.1.1 Syntactic derivation

The syntactic composition approach requires that clauses corresponding to the strings "*target predicate*" and "*standard predicate*" be independently constructed. We then conjoin these two TPs with *bǐ*.

(4′) **Syntactic derivation for "John *bǐ* Mary tall":**
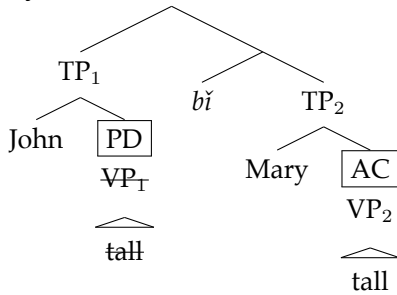
In order to derive our final word order, the VP inside TP_1 must be elided. To ensure that this ellipsis takes place, I propose the Comparative Deletion Requirement (32) below.

(31) **Definition: Local VP**
      Given a TP β, α is a *local VP* of β iff (a) α is a VP, (b) β dominates α, and (c) there is no TP which dominates α and is dominated by β.

(32) **Comparative Deletion Requirement (CDR):**[8]
      In a *bǐ* comparative, elide the largest elidable local VP of the target TP under identity with a local VP of the standard TP. If the target TP has no elidable local VP, the derivation is illicit.

I follow the work of Rooth (1992a); Heim (1997); Takahashi and Fox (2005) in adopting a semantically sensitive licensing condition for ellipsis, wherein every instance of ellipsis must be licensed by a corresponding Parallelism Domain (PD). Takahashi and Fox's (2005) formulation of this mechanism is paraphrased in (33–34).

However, if these movements happen in parallel in both the target and standard clauses, they will not adversely affect the licensing of ellipsis. See section 3.2.1 for the derivation of a comparative involving subject raising, which would be similar to what would happen with ubiquitous Spec,*v*P to Spec,TP movement.

[8]A variant of this proposal which uses multidominance rather than ellipsis is presented in **?**.

(33) **Ellipsis Licensing** (Takahashi and Fox, 2005):

For ellipsis of α to be licensed, there must exist a constituent, which reflexively dominates α, and satisfies the parallelism condition in (34). Call this constituent the *Parallelism Domain*, PD.

(34) **Ellipsis Parallelism** (Takahashi and Fox, 2005):

PD must be semantically identical to another constituent AC, modulo focus-marked constituents: there exists a focus alternative PD_{Alt}, $[\![PD_{Alt}]\!] \in [\![PD]\!]^f$, such that for every assignment function g, $[\![AC]\!]^g = [\![PD_{Alt}]\!]^g$.[9]

In the case of (4), we can simply use the VPs themselves as the Parallelism Domain and its antecedent: PD = VP_1, AC = VP_2. $[\![AC]\!] \equiv [\![PD]\!] \in [\![PD]\!]^f$, licensing ellipsis of the VP "tall" within TP_1 and satisfying the CDR. This yields the observed word order in (4), as needed.

3.1.2 Compositional semantics

Next we'll turn our attention to the compositional semantics of the *bǐ* comparative. Unlike English *-er* which may be ambiguous between a the two-place and three-place comparative operators, *bǐ* is unambiguous; *bǐ* is two-place comparative operator. It will take two degree expressions of type $\langle d, t \rangle$, and assert that the maximum of the target's degree description is greater than the standard's.

(35) **bǐ is the familiar two-place comparative operator:** = (14)

$[\![bǐ]\!] = \lambda D_{2\langle d,t\rangle}.\lambda D_{1\langle d,t\rangle}.max(D_1) > max(D_2)$

However, unlike what has been proposed for many other languages, I argue that degree abstraction is not used to construct these degree descriptions in Mandarin. This is made possible through the following Degree Last assumption (36) for Mandarin Chinese:[10]
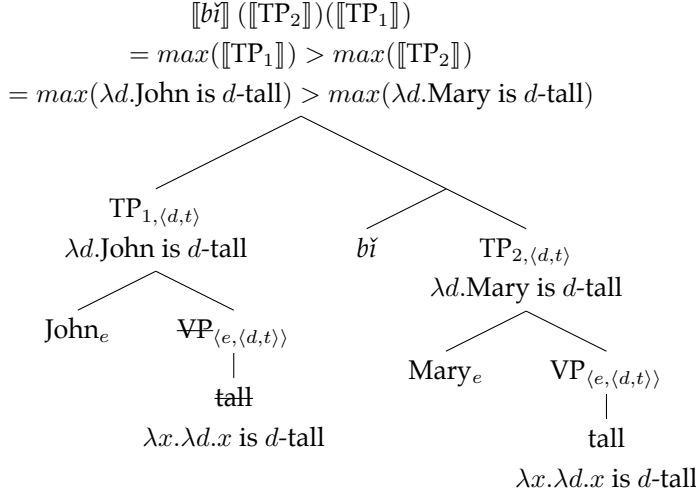
(36) **Degree Last:**

Gradable predicates in Mandarin Chinese take their degree argument as their last argument.

Thus, the predicate *gāo* "tall" will have the denotation $(\lambda x.\lambda d.x$ is d-tall) and be of type $\langle e, \langle d, t \rangle \rangle$, instead of the more commonly assumed type $\langle d, \langle e, t \rangle \rangle$. The advantage of Degree Last is seen in the semantic derivation of (4), below:

(4″) **Semantic computation for "John bǐ Mary tall":**

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[9]$[\![\cdot]\!]^f$ is the focus value denotation function. See Rooth (1985, 1992b); Beaver and Clark (2008) for more on the computation of focus values.

[10]An alternative approach would be to make all gradable predicates measure functions, i.e. of type $\langle \tau, d \rangle$ for some type τ, and make gradable predicates return their maximal degree after saturating all their arguments (Heim, 1985; Kennedy, 1999). This approach is completely equivalent in spirit to the proposal made here. Here I choose the technical variant which does not require varying the definition of the two-place comparative operator, albeit only notationally.

$$\llbracket b\check{\imath} \rrbracket \, (\llbracket \text{TP}_2 \rrbracket)(\llbracket \text{TP}_1 \rrbracket)$$
$$= max(\llbracket \text{TP}_1 \rrbracket) > max(\llbracket \text{TP}_2 \rrbracket)$$
$$= max(\lambda d.\text{John is } d\text{-tall}) > max(\lambda d.\text{Mary is } d\text{-tall})$$

$\text{TP}_{1,\langle d,t\rangle}$
$\lambda d.\text{John is } d\text{-tall}$
$b\check{\imath}$
$\text{TP}_{2,\langle d,t\rangle}$
$\lambda d.\text{Mary is } d\text{-tall}$

John_e
$\text{VP}_{\langle e,\langle d,t\rangle\rangle}$
~~tall~~
$\lambda x.\lambda d.x \text{ is } d\text{-tall}$

Mary_e
$\text{VP}_{\langle e,\langle d,t\rangle\rangle}$
tall
$\lambda x.\lambda d.x \text{ is } d\text{-tall}$

In each clause, the gradable predicate merges with its subject. As the predicate is of type $\langle e, \langle d, t\rangle\rangle$, this occurs through regular functional application. This results in two degree descriptions of type $\langle d, t\rangle$: TP$_1$ represents the target's "tallness of John" and TP$_2$ represents the standard's "tallness of Mary." The standard two-place comparative operator then takes these two arguments and asserts the ordering over the maxima of these degree descriptions.

This makes the Mandarin *bǐ* comparative cross-linguistically unique in that it is an explicit, syntactic composition comparative which does not involve degree abstraction.[11] Evidence that degree abstraction is not used in the *bǐ* comparative will be presented in section 5.

3.2 The argument from parallel movements

The most important characteristic of the derivation proposed here is that it includes two instances of the predicate, i.e. it is a syntactic composition approach. I will present evidence in support of syntactic composition from *parallel movement* constructions: comparatives which involve movement from the predicate to the target and the predicate to the standard, at the same time. This configuration is schematized here:

(37) **Pronounced word order of parallel movement constructions:**

"… α_1 …   *bǐ*   … α_2 …   … t_α … "
   target   *standard*   *predicate*
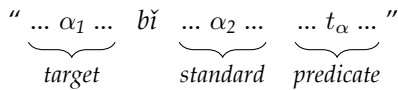
In such configurations, we observe two nodes α_1 and α_2 in the target and standard, respectively, and one gap position in the predicate which corresponds to the trace position of α-movement.

In the next four sections, I will present examples of comparatives which involve such parallel movements, involving four different types of Mandarin movement constructions: subject raising, object preposing, *bèi*-passivization, and verb-copy. This is strong evidence in favor of the syntactic composition approach as they cannot be analyzed under semantic composition.

Parallel movements can be straightforwardly captured under syntactic composition as the derivation includes two TPs, which can each involve movement operations available in Mandarin simplex clauses. Under a semantic composition analysis, though, there is only one instance of the predicate in the syntax.

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[11]"Explicit" comparison, in the sense of Kennedy (2007). See Erlewine (2007) for arguments that the Mandarin *bǐ* comparative is an explicit comparative.

It is thus impossible to derive the two α-movement chains simlutaneously: if both α_1 and α_2 moved out of the same gap position, they must have been base-generated in the same position, which is impossible. Thus *analyses with just one copy of the predicate in the syntax cannot adequately account for such data.* It is crucial in this line of argumentation to show that *both* α_1 and α_2 are indeed the products of such movement out of the predicate, rather than, for example, only one element undergoing that movement and the other being base-generated in its surface position. This is precisely what we will see.

3.2.1 Subject reconstruction with *de dicto* readings

The first case of parallel movements will come from subject raising. A sentence like (38a) and its Mandarin counterpart (38b) are observed to have two distinct readings differing in the specificity of the referent of the subject indefinite "an Australian." In the *de re* reading, there is a specific Australian in the mind of the speaker who is likely to win the race, while in the *de dicto* reading the speaker states that it is likely that there is an Australian who will win the race, but without a particular Australian in mind.

(38)   ***De re/de dicto* readings via raising:**

    a. An Australian is likely to win the race.
          De re: "A (specific) Australian is likely to win the race." $\exists > likely$
          De dicto: "It is likely that an Australian will win the race." $likely > \exists$

    b. Àozhōurén yǒukěnéng yíng zhè ge bǐsài
        Australian likely   win this CL competition
        ✓$\exists > likely$, ✓$likely > \exists$

    The existence of the *de dicto* reading, where the modal operator *likely* and the indefinite's existential force are interpreted with inverse scope, is attributed to the fact that *likely* is a raising predicate and thus there is an A-movement chain from the subject position of "win the race" to its surface position. The indefinite is able to *reconstruct* into its lower position at LF, below the *likely* operator, yielding the *de dicto* reading (cf May, 1977).

    The question, then, is whether reconstruction is possible in a comparative construction where the predicate of comparison is of this type, e.g. 'likely to win the race,' and both the target and standard are indefinite subjects. In particular, we would like to know whether *both* subjects can reconstruct at the same time, which would show us that both the target and standard must have been base-generated below *likely* at the same time. We see in (39) that this reading is indeed available.[12]

(39)   **Both target and standard can reconstruct at the same time:**

    Zhōngguórén   bǐ Àozhōurén yǒukěnéng yíng zhè ge bǐsài
    Chinese person BI Australian likely   win this CL comp.

    De re/de re: "A (specific) Chinese person is more likely to win the race than a (specific) Australian."
    $\exists^2 > likely$

    De dicto/de dicto: "It is more likely that a Chinese person will win the race than that an Australian will." $likely > \exists^2$

   Given the availability of the *de dicto/de dicto* reading in (39), we know that *both subjects* must have been raised from within the complement of *likely at the same time.* In the syntactic composition approach proposed here, this can be accounted for straightforwardly, as the derivation includes two instances of the predicate.

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[12]The logic of this argument draws from Grosz (2009).

We begin by generating one instance of "likely" and its nonfinite complement which includes "Chinese person," and one instance of "likely" with its own complement which includes "Australian." Note that at this point, VP$_1$ cannot be elided under identity with VP$_2$, as they are not semantically identical: VP$_1$ contains the DP "Chinese person" and VP$_2$ contains the DP "Australian." However, the two trees are otherwise structurally identical.

(40)
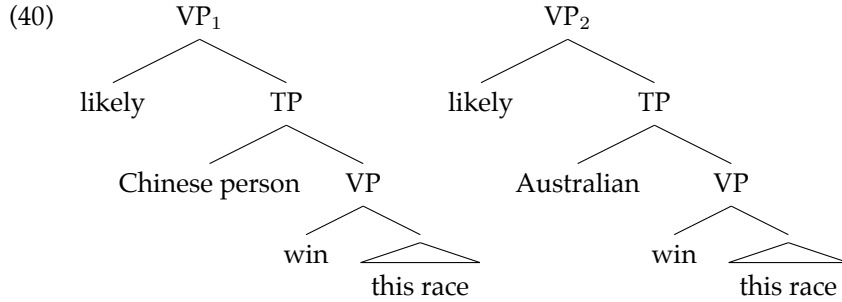
The raising of these DPs out of their respective VPs is what will enable ellipsis of the desired size. In (41) I illustrate the result of raising both DPs and conjoining the resulting TPs using *bǐ*. Following Heim and Kratzer (1998), I explicitly annotate the λ-binder associated with movement.

(41)
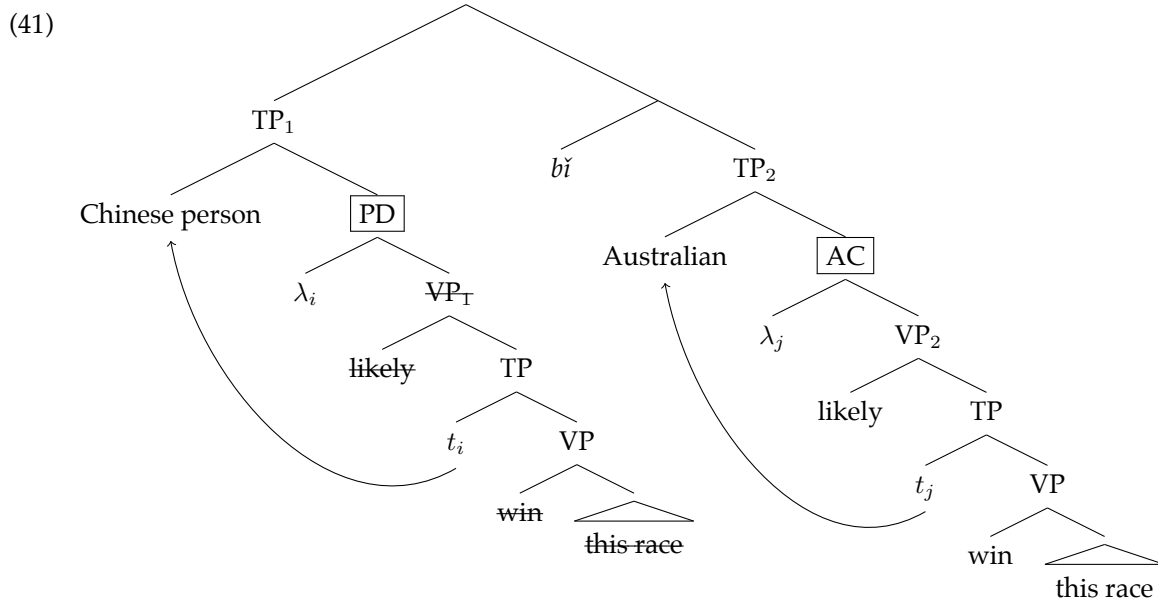
The CDR requires that we elide the local VP of TP$_1$ and to do so, we must identify a Parallelism Domain which satisfies the Ellipsis Parallelism condition (34), repeated here:

(34) **Ellipsis Parallelism** (Takahashi and Fox, 2005):
PD must be semantically identical to another constituent AC, modulo focus-marked constituents: there exists a focus alternative PD$_{Alt}$, $[\![PD_{Alt}]\!] \in [\![PD]\!]^f$, such that for every assignment function g, $[\![AC]\!]^g = [\![PD_{Alt}]\!]^g$.

In particular, the semantic identity enforced by (34) requires that the PD not include free variables whose identity would be affected by a change in assignment function, and thus the PD must be large enough to include the λ-binder of "Chinese person" (Takahashi and Fox, 2005; Hartman, 2009). We thus choose the

projection marked PD in (41) as the relevant Parallelism Domain. $[\![PD]\!] \equiv [\![AC]\!] = (\lambda x.\lambda d.$ it is d-likely that x win the race), and so we satisfy the Parallelism requirement in (34) and are able to elide VP_1.

With a syntactic composition approach as in (41), both subjects are independently raised out of the complement of a raising verb, and can reconstruct for interpretation. This yields the availability of the *de dicto/de dicto* reading in (39).

I will now demonstrate how semantic composition approaches are unable to derive the *de dicto/de dicto* reading in example (39). Recall that semantic composition approaches are compatible with a number of different phrase structural configurations. Some possible structures are repeated from (29):

(29) **Some possible semantic composition phrase structures at LF:**

a. Xiang (2003); Lin (2009):   b. Xiang (2005); Erlewine (2007):   c. Keenan and Stavi (1986):
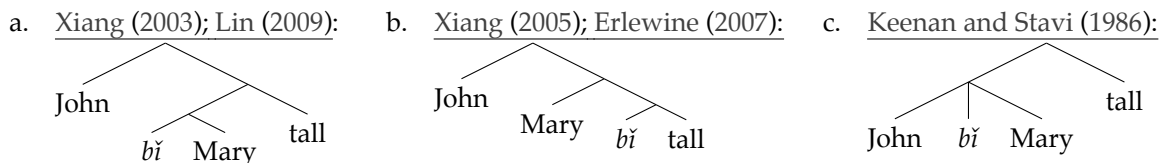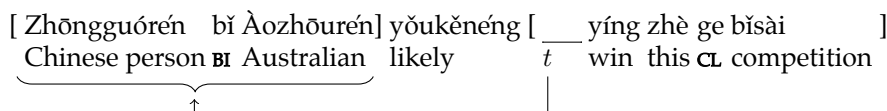

I will first discuss semantic composition approaches where the target and standard do not form a constituent, as in (29a,b), and then those where they do together form a constituent, as in (29c).

Consider a semantic composition analysis of the comparative wherein the target and the standard do not form a constituent, as in (29a,b). As "likely" is a raising verb, we assume that a constituent was base-generated as the subject of "win the race" and then raised, and this constituent would have the opportunity to syntactically reconstruct. However, as this is a semantic composition approach, only one instance of the predicate "likely to win the race" is constructed in the derivation of the sentence. Hence only one nominal—either the target or the standard—will be able to reconstruct below the scope of "likely." Therefore in a derivation like (29a,b), we predict that at least one of the subjects would not be able to reconstruct, preventing the *de dicto/de dicto* reading.

Now consider a semantic composition analysis based on Keenan and Stavi (1986) (29c), where "*target bǐ standard*" is a constituent and forms a complex quantifier. This type of semantic composition approach is also unable to derive the desired interpretation of example (39).

Under this view, the complex quantifier "Chinese person *bǐ* Australian" itself is first base-generated as the subject of "win the race." This complex quantifier raises above "likely" (42) and then is reconstructed for interpretation (43).

(42) **Hypothesis: "*target bǐ standard*" is a complex quantifier**

[Zhōngguórén   bǐ Àozhōurén] yǒukěnéng [___   yíng zhè ge bǐsài   ]
  Chinese person **BI** Australian   likely t win this **CL** competition

(43) **Hypothetical LF with reconstruction:**

yǒukěnéng [[Zhōngguórén   bǐ Àozhōurén] yíng zhè ge bǐsài   ]
likely   Chinese person **BI** Australian   win this **CL** competition

In this LF, "Chinese person" and "Australian" would indeed both be interpreted within the scope of "likely," as desired. However, this LF in (43) would not be interpretable. In particular, this LF requires that the comparative operator *bǐ* also be interpreted below "likely," taking "win this race" as its gradable predicate. The VP "win this race" is not itself gradable, as evidenced by the ungrammaticality of (44).

(44)   * [Zhōngguórén   bǐ Àozhōurén] yíng zhè ge bǐsài
       Chinese person **BI** Australian   win this **CL** competition

In the desired interpretation of (39), "Chinese person" and "Australian" take scope below "likely," but the comparative operator *bǐ* must take scope over "likely," the gradable predicate. However, the semantic composition analysis based on Keenan and Stavi (1986) builds a complex quantifier from the target, standard, and comparative operator *bǐ*, predicting them to take scope together. In this way, we see that both types of semantic composition analyses for the Mandarin *bǐ* comparative are unable to derive (39).

3.2.2   Internal argument comparatives

The second example of parallel movements comes from comparatives such as (45), where both the target and the standard include arguments which are logically internal arguments of the predicate of comparison. I call such cases *Internal Argument (IA) comparatives*.

(45)   **Internal Argument (IA) comparatives** (Tsao, 1989):

wǒ$_i$ dàishù bǐ *pro$_i$* jǐhé   xǐhuān ___
I   algebra **BI** *pro* geometry like

"I like algebra more than I like geometry."

Note that the gradable predicate in (45) is a transitive verb and internal arguments are canonically postverbal in Mandarin. However, Mandarin has a process by which an object of a transitive verb is moved to a preverbal position without any additional marking, known as *object preposing* (Ernst and Wang, 1995; Paul, 2002). Preposed objects are often interpreted in contrast to implicit or explicit alternatives.

(46)   **Object preposing:**

wǒ$_i$ [dàishù]$_F$ xǐhuān ___ , kěshì *pro$_i$* [jǐhé]$_F$ bù xǐhuān ___
I   algebra   like   but *pro* geometry **NEG** like

"I like [algebra]$_F$, but I don't like [geometry]$_F$."

One important property of IA comparatives is that not all objects can participate in such a frame. Tsao (1989) observed a number of distributional restrictions on IA comparatives, which I will review below. The objects involved in IA comparatives cannot be animate or indefinite and the verb involved cannot be monosyllabic. Importantly, Tsao (1989) also notes that these restrictions are precisely the same set of restrictions which govern object preposing as well.

Let us first review in turn the parallel restrictions on object preposing and IA comparatives as reported by Tsao (1989). We begin with the animacy restriction. As presented in the left column, object preposing is grammatical with the inanimate object, "algebra," but degrades with the semi-animate "cat," and is ungrammatical with the human "Zhang San." In the right column, we see parallel grammaticality judgments for IA comparatives with internal arguments of corresponding animacy.

(47)   **Animacy restrictions on object preposing and IA comparatives**

16

	Object preposing:		Comparative:

a. * wǒ Zhāng Sān xǐhuān
 I Zhang San like
 Intended: "I, Zhang San, like."

a′. * wǒ Zhāng Sān bǐ Lǐ Sì xǐhuān
 I Zhang San ʙɪ Li Si like
 Intended: "I like Zhang San more than I like Li Si."

b. ? wǒ māo xǐhuān
 I cat like
 Intended: "I, cat, like."

b′. ? wǒ māo bǐ gǒu xǐhuān
 I cat ʙɪ dog like
 Intended: "I like cats more than I like dogs."

c. wǒ dàishù xǐhuān
 I algebra like
 "I, algebra, like."

c′. wǒ dàishù bǐ jǐhé xǐhuān
 I algebra ʙɪ geometry like
 "I like algebra more than I like geometry."

Moreover, IA comparatives in animate-inanimate or inanimate-animate object order are uniformly judged as deviant; i.e. the animacy restriction applies equally to objects in the target and objects in the standard.

(48) a. * wǒ Zhāng Sān bǐ dàishù xǐhuān
 I Zhang San ʙɪ algebra like
 Int: "I like Z.S. more than I like algebra."

b. * wǒ dàishù bǐ Zhāng Sān xǐhuān
 I algebra ʙɪ Zhang San like
 Int: "I like algebra more than I like Z.S."

Second, object preposing is ungrammatical when the verb is monosyllabic. Example (49a) is judged to be ungrammatical due to its monosyllabic verb *aì* "love," while the minimally contrasting (47c) with the disyllabic verb *xǐhuān* "like" is grammatical. We observe the same contrast between the minimally distinct comparatives (49a′) and (47c′).

(49) **No monosyllabic verbs in object preposing and IA comparatives** (cf 47c+47c′ above)
	Object preposing:		Comparative:

a. * wǒ dàishù ài
 I algebra love
 Intended: "I, algebra, love."

a′. * wǒ dàishù bǐ jǐhé ài
 I algebra ʙɪ geometry love
 Intended: "I love algebra more than I love geometry"

As object preposing offers a way to realize objects in a pre-verbal position and exhibits the same restrictions observed with IA comparatives, it would be preferable to derive IA comparatives as involving two simultaneous instances of object preposing. Object preposing with obligatorily transitive verbs such as *xǐhuān* "like" are derived via movement from the post-verbal object position (Ernst and Wang, 1995; Paul, 2002).[13] Thus in these IA comparatives, there must be a movement chain from the post-verbal object position to the target object as well as a movement chain from that same post-verbal object position to the standard object.

I will now present the derivation for the comparative in (45). Our syntactic composition assumptions first predict that "*target predicate*" and "*standard predicate*" are each independently available clauses in Mandarin and this is indeed the case:

(50) a. TP$_1$ = "*target predicate*":

wǒ [dàishù]$_F$ xǐhuān ___
I algebra like

"I, algebra, like."

b. TP$_2$ = "*standard predicate*":

wǒ [jǐhé]$_F$ xǐhuān ___
I geometry like

"I, geometry, like."

We begin by independently constructing the two TPs, each involving object preposing, and conjoin them using *bǐ*.[14] Comparative Deletion requires that we elide the VP within the left conjunct, TP$_1$. The semantic

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[13]Note that not all preposed objects are derived via movement; see Paul (2002) for some examples of "object preposing" with overt post-verbal objects.

[14]Following Paul (2002), I represent object preposing as movement to the specifier of a TP-internal Topic projection.

identity enforced by Ellipsis Parallelism (34) requires that the Parallelism Domain include the λ-binders of movement traces, so we use the Parallelism Domain labeled PD below. This projection is semantically identical to the projection marked AC, so we satisfy the Parallelism requirement in (34) and are able to elide VP_1.

(51) **Derivation of (45):**
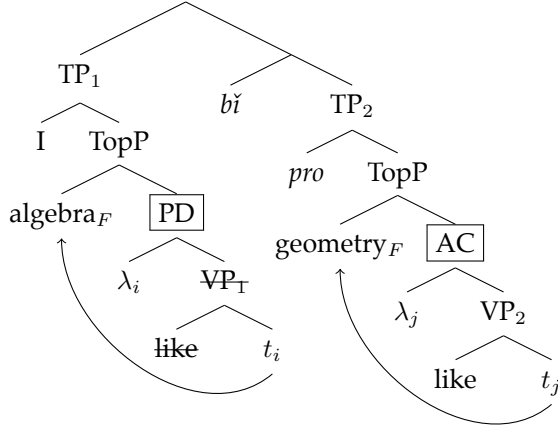
The syntactic composition approach hence derives the restrictions on IA comparatives from independently existing restrictions on object preposing.

The semantic composition approach, on the other hand, would have to introduce a separate mechanism by which IA comparatives can be built by base-generating an object directly in at least one of the target and standard. Such an approach would view the parallel restrictions on object preposing and IA comparatives as a coincidence. Lin (2009) pursues this alternative, introducing a semantic composition approach which can generate IA comparatives without making use of object preposing.[15] His analysis predicts that IA comparatives are free of the restrictions on object preposing reviewed here, contrary to fact, and overgenerates many IA comparatives.

3.2.3 *bèi* long passives in comparatives

Mandarin Chinese offers a curious and well-studied passivization strategy known as the *bèi* long passive, exemplified in (52). Huang (1999) argues that *bèi* long passives involve $\overline{\text{A}}$-movement of a null operator to a position between *bèi* and the agent (53).[16]

(52) **The *bèi* long passive**

Yūehàn bèi bàba   mà   de hěn cán
John   **BEI** father scold **DE HEN** serious

"John was scolded seriously by his father."

(53) John **BEI** $[Op_i$ [father scold t_i ...]]

The operator movement in (53) is interpreted as λ-abstraction over the base object position, constructing a predicate of $(\lambda x$. father scolds x seriously$)$ which is then used in the interpretation of the passive.

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[15]The Lin (2009) analysis will be presented in detail in section 4, where we will observe another incorrect prediction made by it.
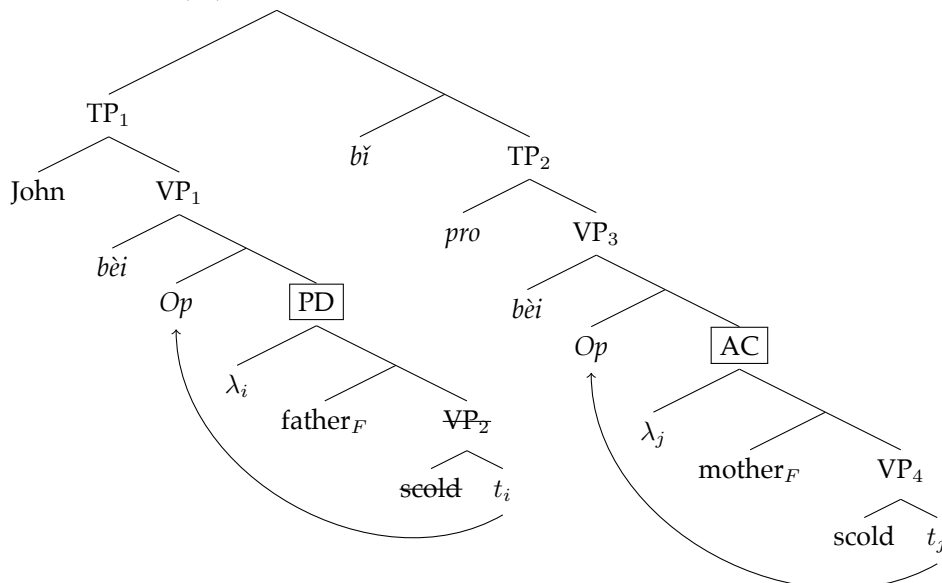
[16]In positive form uses, addition of the morpheme *hěn* is required on gradable predicates in some environments. The nature of this *hěn* morpheme is outside of the scope of this paper. See Grano (2011) for a recent approach to *hěn*.

Now consider a comparative (54) involving two contrasting agents of *bèi* long passives.[17] Following Huang (1999), we must posit two simultaneous instances of operator movement, both originating within the predicate of comparison as the complement of *scold*, with one landing between *bèi* and *father* in the target and the other landing between *bèi* and *mother* in the standard. These parallel movements would again be problematic under a semantic composition view where there is only one gradable predicate in the syntax.

(54) Yūehàn bèi bàba bǐ bèi māma mà   de gèng cán
     John   BEI father BI BEI mother scold DE more serious
     "John was scolded by his father more seriously than by his mother."

Under our syntactic composition proposal, however, the parallel movements out of the predicate are not at all problematic, as there can simply be two different instances of the null operator in the derivation. The derivation for (54) is presented in (55):[18]

(55) **Derivation of (54):**

$$
\begin{array}{l}
\text{TP}_1 \\
\quad \text{John} \quad \text{VP}_1 \\
\qquad \text{bèi} \\
\qquad Op \quad \boxed{\text{PD}} \\
\qquad\qquad \lambda_i \\
\qquad\qquad \text{father}_F \quad \text{VP}_2 \\
\qquad\qquad\qquad \text{scold} \; t_i \\
\quad \text{bǐ} \quad \text{TP}_2 \\
\qquad \textit{pro} \quad \text{VP}_3 \\
\qquad\qquad \text{bèi} \\
\qquad\qquad Op \quad \boxed{\text{AC}} \\
\qquad\qquad\qquad \lambda_j \\
\qquad\qquad\qquad \text{mother}_F \quad \text{VP}_4 \\
\qquad\qquad\qquad\qquad \text{scold} \; t_j
\end{array}
$$

In order to satisfy the CDR, we must elide a local VP of TP$_1$. The largest local VP is VP$_1$, but it contains a focus-marked constituent "father" and ellipsis cannot delete focus-marked material, so we cannot elide VP$_1$. The next largest local VP of TP$_1$ is VP$_2$.[19] In order to elide VP$_2$ against its antecedent VP$_2$, we must identify an appropriate Parallelism Domain and its matching antecedent. Since the VP$_1$ includes a free variable in the trace t_i of the null operator, it cannot be used as its own Parallelism Domain. We must instead use the constituent which includes the associated λ-binder, identified as PD in (55) as the Parallelism Domain. The corresponding antecedent in TP$_2$ is labeled AC.

Note, however, that PD is not semantically identical to AC: $[\![\text{PD}]\!] = (\lambda x.\text{father scold } x \text{ seriously})$ and $[\![\text{AC}]\!] = (\lambda x.\text{mother scold } x \text{ seriously})$. However, the Ellipsis Parallelism condition (34) from Takahashi

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[17]Example (54) was brought to my attention by an anonymous reviewer.

[18]The manner adverb *seriously* is not represented to simplify the example. The precise position of the adverb is not crucial to the argument made here.

[19]In Huang (1999), the projections corresponding to "father scold t seriously" and "mother scold t seriously" in (55) are considered to be standard finite IPs (TPs in the terms used here). However, if they were labeled TPs here, VP$_2$ "scold t seriously" would not count as a local VP of TP$_1$, so we would not be able to satisfy the CDR. As the CDR proposed here accurately rules out subcomparative constructions in Mandarin with this one possible exception, here I will simply consider these clauses inside *bèi*-passives to be defective TPs and will leave this technical detail open.

and Fox (2005) crucially requires that AC be equal to a focus alternative of PD, i.e. if PD includes any focus-marked material, these focus-marked constituents can be replaced with contextually salient alternatives to form AC. As "father" and "mother" are the contrasting subparts in otherwise identical conjuncts, they will naturally be focus-marked (Rooth, 1992b). Assuming that "mother" is a salient alternative to "father," we yield $\llbracket AC \rrbracket \in \llbracket PD \rrbracket^f$, satisfying Ellipsis Parallelism.

3.2.4 Verb-copy constructions

The fourth and final argument against semantic composition comes from the Mandarin verb-copy construction. There are cases of *bǐ* comparatives which have a target and standard which both superficially look like clauses, including a verb and object, and the gradable predicate is a verb with an adverbial modifier (56). As noted by Liu (1996), in *bǐ* comparatives of this form, all three instances of the verb must match (57).

(56)   **Comparatives with SVO target and standard:**

Yūehàn **qí**   mǎ   bǐ Mǎlì **qí**   niǔ **qí**   de kuài
John   ride horse **BI** Mary ride cow ride **DE** fast

"John rides horses faster than Mary rides cows."

(57)   **All three verbs must match in comparatives with SVO target and standard** (Liu, 1996):

* Yūehàn **qí**   mǎ   bǐ Mǎlì **gan** yang **qí**   de hǎo
John   ride horse **BI** Mary keep sheep ride **DE** good

Intended: "John rides horses better than Mary keeps sheep."

Liu (1996) argues that this is predicted through a derivation of (56) that involves two instances of the Mandarin manner verb-copy construction (58), which requires that its two exponents of the verb be identical. Huang (1988) and Cheng (2007) argue that these verb-copy constructions are derived via movement without deletion of the lower copy.

(58)   **Mandarin manner "verb-copy" construction:**

Yūehàn **qí**   mǎ   **qí**   de kuài
John   ride horse ride **DE** fast

"John rides horses fast."

As Liu suggests, syntactic composition would be able to straightforwardly derive comparatives such as (56) using two instances of verb-copy. This derivation for (56) is given below. There are two independent instances of verb-copy, which are represented as regular movement chains, including λ-binders.[20]

(59)   **Derivation of (56):**

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[20]See Hartman (2009) for evidence that head-movement leaves semantically real λ-binders of this form for the purposes of computing ellipsis parallelism.

TP$_1$ John VP$_1$ ride PD λ_i horse$_F$ VP$_2$ ride$_i$ DE fast *bǐ* TP$_2$ Mary VP$_3$ ride AC λ_j cow$_F$ VP$_4$ ride$_j$ DE fast
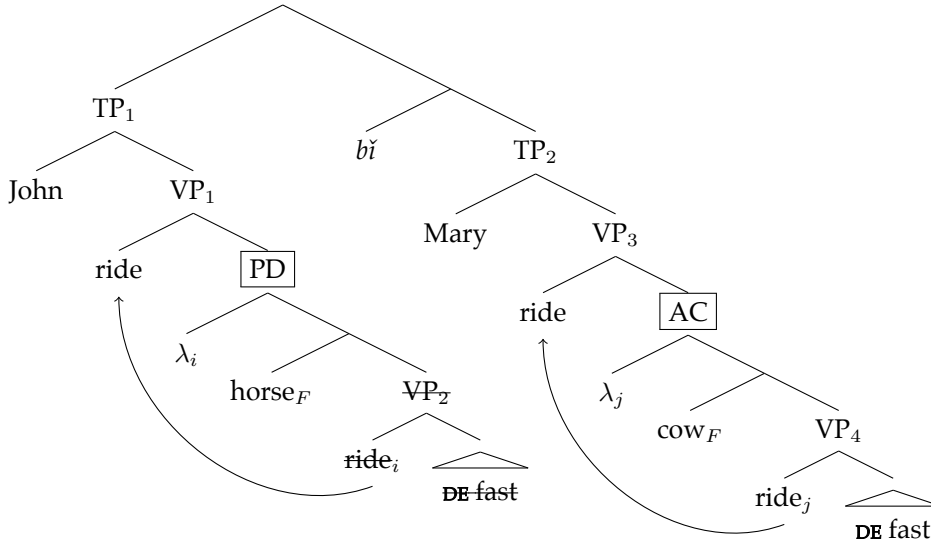
Now consider how the CDR will apply to this structure. The largest local VP of TP$_1$ is VP$_1$, but VP$_1$ contains the focus-marked constituent "horse," so it cannot be elided. The next largest VP is VP$_2$. As VP$_2$ includes the lower, trace position of the movement chain of "ride," it cannot act as its own Parallelism Domain; instead, we must use the projection labeled PD above, which includes the λ-binder associated with this movement chain (see footnote 20).

As with the *bèi* passive example in the previous secion (54), PD and AC necessarily include material that differ: here, "horse" and "cow." However, as contrasting constituents within a conjunction, they will be focus-marked. Assuming $[\![\text{cow}]\!] \in [\![\text{horse}]\!]^f$, Ellipsis Parallelism is satisfied. We are thus able to elide the VP within the verb-copy construction in TP$_1$, including the lower copy of the verb-copy chain. We are thus left with three instances of "ride" linearized at PF.

This derivation also derives the verb matching constraint. As each TP is constructed using verb-copy, the two verbs in TP$_1$ will match and the two verbs in TP$_2$ will match. Further, Ellipsis Parallelism will require that the lower copy of V in TP$_1$ and the lower copy of V in TP$_2$ be identical. By transitivity, all three pronounced instances of the verb must match exactly.

Semantic composition would not be able to naturally derive comparatives such as (56) with all three exponents of the verb derived through verb-copy, and would instead have to give a separate account for the verb matching constraint.[21]

3.2.5 Summary of the argument from parallel movements

The last four sections presented different types of *bǐ* comparatives which are challenging for semantic composition in precisely the same way: all involved parts of the standard and target simultaneously moving out of the predicate of comparison. Two items have moved out, but we only see one gap.

The argument being made here is in some sense one of theoretical efficiency: semantic composition for these types of comparatives is not necessarily impossible, but brand new mechanisms must be proposed for comparatives that seemingly involve subject raising, object preposing, *bèi* passives, and verb-copy, independently maintaining the characteristics of each construction. Using syntactic composition, any comparative derivation involves two separate TPs—one for the target and predicate and another for the standard and

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[21] See Erlewine (2007) for such an attempt.

predicate—and thus we need not introduce any new comparative-specific mechanisms for the derivation of the complex comparatives reviewed here.

3.3 Evidence for the ellipsis requirements

In the last section I presented various comparatives which involve parallel movements into the target and into the standard, which necessitates a syntactic composition approach to the *bǐ* comparative. Thus the derivation of every *bǐ* comparative includes two instances of the predicate of comparison. In order to yield the final word order a Comparative Deletion Requirement was proposed which forces only one instance of the predicate to be pronounced. The CDR is repeated here:

(60)   **Comparative Deletion Requirement (CDR):**
       In a *bǐ* comparative, elide the largest elidable local VP of the target TP under identity with a local VP of the standard TP.[22] If the target TP has no elidable local VP, the derivation is illicit.

In this section I will provide evidence to support two properties of the CDR proposed here. First, I discuss cases where there are multiple local VPs that are candidates for comparative deletion, in order to motivate the requirement that it be the largest elidable local VP that is elided. Second, I show how the mechanism of ellipsis licensing through parallelism domains (Rooth, 1992a; Heim, 1997; Takahashi and Fox, 2005; Hartman, 2009) accurately rules out comparatives which involve movement chains which are not parallel between the target and standard clauses.

3.3.1 Eliding the largest local VP possible

In this section I will motivate the specification in the CDR that the local VP elided be the largest elidable local VP. Regular clauses in Mandarin simply have one maximal VP projection per clause, but we have seen two constructions in Mandarin wherein a single TP includes two local VPs: the verb-copy construction and *bèi* passives. In this section I will illustrate the argument using the verb-copy construction.

A basic example of a simplex verb-copy clause is repeated below. Again, following Huang (1988) and Cheng (2007), I take verb-copy constructions to involve a movement chain of the verb without deletion of the lower copy. I assume that this structure results in a single TP containing two projections which are labeled VP.

(61)   Yūehàn [$_{VP}$ qí   mǎ   [$_{VP}$ qí   de kuài
       John   ride horse   ride **DE** fast
       "John rides horses fast."

In a *bǐ* comparative involving verb-copy, then, there are in theory two different ellipsis options. What we will observe—and what the formulation of the CDR here predicts—is a correlation between the choice of ellipsis size and the position of contrasts between the two clauses. If the higher VPs are identical across the target and standard clauses, the higher VP will be elided. If there is contrasting material within the higher VPs, the lower VP will be elided.

Consider the *bǐ* comparative in (62), where the target clause and standard clause differ only in their subjects, "John" and "Mary." (As contrasting constituents in a conjunction, they will be focus-marked (Rooth,

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[22]Given a TP β, α is a *local VP* of β iff (a) α is a VP, (b) β dominates α, and (c) there is no TP which dominates α and is dominated by β.

1992b).) The word orders which result from ellipsis of the higher and lower local VPs are given in (62a,b). Ellipsis of the higher VP (62a) is grammatical, while ellipsis of the lower VP (62b) is judged as degraded.

(62) [$_{TP}$ John$_F$ [$_{VP}$ ride horse [$_{VP}$ ride fast]]] *bǐ* [$_{TP}$ Mary$_F$ [$_{VP}$ ride horse [$_{VP}$ ride fast]]]

    a.   Higher VP ellipsis:

      ✓Yūehàn bǐ Mǎlì qí   mǎ   qí   de kuài
       John   **BI** Mary ride horse ride **DE** fast
       "John rides horses faster than Mary rides horses."
       Derivation: [$_{TP}$ John$_F$ [$_{VP}$ ~~ride horse [$_{VP}$ ride fast]~~]] *bǐ* ...

    b.   Lower VP ellipsis:

      $^{?}$*Yūehàn qí   mǎ   bǐ Mǎlì qí   mǎ   qí   de kuài
       John   ride horse **BI** Mary ride horse ride **DE** fast
       "John rides horses faster than Mary rides horses."
       Derivation: [$_{TP}$ John$_F$ [$_{VP}$ ride horse [$_{VP}$ ~~ride fast~~]]] *bǐ* ...

Recall that focus-marked material cannot be elided. In (62), the higher local VPs in the target and standard clauses are identical and they thus will not contain focus-marking. This allows both local VPs of the target clause to be legal targets of ellipsis. In this situation where both higher and lower local VPs of the target clause are elidable, ellipsis of the largest elidable VP is required, as predicted by the CDR.

When there is contrasting material in the higher VPs, however, the lower local VP of the target is elided. Consider (63), where the objects additionally contrast between the target and the standard clauses. By assumption, the objects in verb-copy constructions (in bold in 63) are above the lower VPs. Again, we assume that contrasting material between the clauses is naturally focus-marked.

(63) [$_{TP}$ John$_F$ [$_{VP}$ ride **horse**$_F$ [$_{VP}$ ride fast]]] *bǐ* [$_{TP}$ Mary$_F$ [$_{VP}$ ride **cow**$_F$ [$_{VP}$ ride fast]]]

    a.   Higher VP ellipsis:

      Yūehàn bǐ Mǎlì qí   niǔ qí   de kuài
      John   **BI** Mary ride cow ride **DE** fast
      * "John rides *horses* faster than Mary rides cows." (intended reading)
      ✓"John rides *cows* faster than Mary rides cows."
      Intended derivation: [$_{TP}$ John$_F$ [$_{VP}$ ~~ride horse$_F$ [$_{VP}$ ride fast]~~]] *bǐ* ...

    b.   Lower VP ellipsis:

      ✓Yūehàn qí   mǎ   bǐ Mǎlì qí   niǔ qí   de kuài
      John   ride horse **BI** Mary ride cow ride **DE** fast
      "John rides horses faster than Mary rides cows."
      Derivation: [$_{TP}$ John$_F$ [$_{VP}$ ride horse$_F$ [$_{VP}$ ~~ride fast~~]]] *bǐ* ...

The relationship between ellipsis size and contrast in the *bǐ* comparative is made clear in the *bǐ* comparatives presented in this section. If there is contrasting (and therefore focus-marked) material in the higher VP, the lower VP is elided. If ellipsis of both local VPs are possible, ellipsis of the higher VP is strongly preferred. This motivates the formulation of the CDR as proposed.[23]

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[23]This preference for the higher local VP to be elided may remind readers of the "MaxElide" constraint proposed in the work of Takahashi and Fox (2005) and Merchant (2008):

  (i)   MaxElide (Takahashi and Fox, 2005): Elide the biggest deletable constituent reflexively dominated by the PD.

3.3.2 Licensing by parallelism domains

In this paper I've proposed that the derivation of *bǐ* comparatives involves an obligatory ellipsis step, and moreover that this ellipsis must be licensed through the identification of a *parallelism domain* à la Rooth (1992a); Heim (1997); Takahashi and Fox (2005); a.o. An alternative would be to require that ellipsis of the local VP be licensed by simple PF identity, without requiring any LF identity of parallelism domains. In this section I will argue that LF identity is essential for the explaining the grammaticality and interpretation of Mandarin *bǐ* comparative constructions.

I will illustrate my argument in this section using *bǐ* comparatives which involve the verb-copy construction. I begin by considering the *bǐ* comparative in (64) below. In the syntactic composition approach proposed here, where the comparative is made up of two clauses with ellipsis in the target clause, we could imagine two different parses for the comparative, which correspond to two different assertions.

In the first option (64a) both the target and standard clauses are verb-copy constructions, and it asserts a ranking of the speeds at which John rides horses and Mary rides horses. In this parse, the predicate elided in the target clause is the higher VP in the verb-copy construction, "ride horse ride fast." In the second parse (64b), the target clause is simply the verb "ride" with the adverb "fast," without an overt object and verb-copy. This interpretation would assert that the speed that John rides (in general) is faster than the speed that Mary rides horses. However, this latter interpretation is not available.[24]

(64) Yūehàn bǐ Mǎlì qí mǎ qí de kuài
      John   **BI** Mary ride horse ride **DE** fast

    a. ✓ [Yūehàn ~~qí mǎ qí de kuài~~] bǐ [Mǎlì qí mǎ qí de kuài]
        John ride horse ride **DE** fast **BI** Mary ride horse ride **DE** fast
        "John rides horses faster than Mary rides horses."

    b. * [Yūehàn ~~qí de kuài~~] bǐ [Mǎlì qí mǎ qí de kuài]
        John ride **DE** fast **BI** Mary ride horse ride **DE** fast
        "John rides (in general) faster than Mary rides horses."

This fact about the interpretation of (64) is an important argument for the necessity of identifying a parallelism domain to license the ellipsis. A simple PF identity approach to ellipsis would predict both

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However, the effects of MaxElide and the formulation given here are different. MaxElide requires that, *given a particular parallelism domain*, the largest deletable constituent in it be deleted. However, in the case of (62) where the higher VP ellipsis is preferred, different parallelism domains can be chosen to license ellipsis of the higher VP or the lower VP in a MaxElide-obeying way. Thus even if MaxElide is adopted here, the higher VP ellipsis and lower VP ellipsis options would not be competitors. (Recall that the movement of verb in the verb-copy construction introduces a trace and λ-binder, and that ellipsis parallelism domains cannot include unbound traces; see Hartman 2009.)

(ii) a. Higher Parallelism Domain $\Rightarrow$ higher VP ellipsis
      [$_{TP}$ John$_F$ | PD: [$_{VP}$ ride λ_i horse [$_{VP}$ ride$_i$ fast]] |] *bǐ* ...
      $\rightarrow$ [$_{TP}$ John$_F$ ~~[$_{VP}$ ride horse [$_{VP}$ ride fast]]~~] *bǐ* ...
      $\rightarrow$ "John *bǐ* Mary ride horse ride fast"

    b. Lower Parallelism Domain $\Rightarrow$ lower VP ellipsis:
      [$_{TP}$ John$_F$ [$_{VP}$ ride | PD: λ_i horse ~~[$_{VP}$ ride$_i$ fast]~~ |]]] *bǐ* ...
      $\rightarrow$ [$_{TP}$ John$_F$ [$_{VP}$ ride horse ~~[$_{VP}$ ride fast]~~]] *bǐ* ...
 $\rightarrow$ "John ride horse *bǐ* Mary ride horse ride fast"

The constraint on the *bǐ* comparative must be stronger than MaxElide: regardless of the parallelism domains used, the largest elidable local VP must be elided.

[24]Note that the target clause proposed in the unavailable parse, (64b), is by itself grammatical in a positive form. The positive form here requires addition of the morpheme *hěn*.

parses to be available, whereas the ellipsis licensing conditions used here accurately generate the parse in (64a) and disallow the parse in (64b). We'll step through these two derivations (one grammatical and one ungrammatical) one at a time.

I begin with the grammatical derivation of (64a), where we will see that this structure is allowed by the licensing of ellipsis through parallelism domains. We start, as in all derivations of *bǐ* comparatives, with the conjunction of two TPs. In this case, both TPs will be verb-copy clauses of the form "ride horse ride fast."

(65) **Grammatical derivation of (64a):**
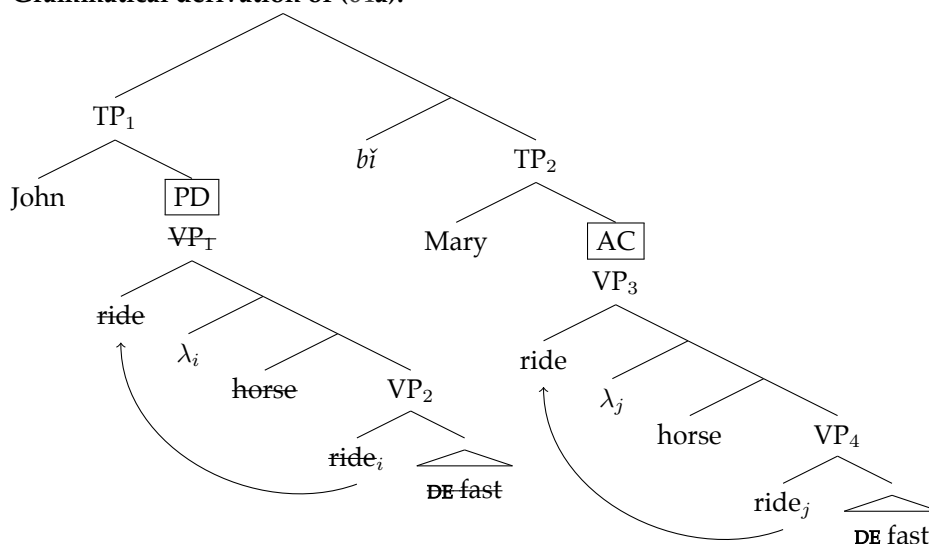
The CDR requires that we elide a local VP within TP_1, and moreover that that be the largest local VP possible. The largest local VP of TP_1 is VP_1. We now must identify a parallelism domain for VP_1 and its antecedent. A parallelism domain cannot include any unbound variables, but there are none in VP_1, so we can simply use the VP_1 projection as its own parallelism domain. An antecedent to PD is easily found in TP_2: the projection labelled AC. The denotations of AC and PD are identical under any variable assignment. Finally, VP_1 contains no focus-marked material. With these conditions satisfied, we can elide VP_1 and satisfy the CDR. This yields the word order in (64).

Now consider a hypothetical derivation for the ungrammatical parse, (64b). Here, we would like to yield the same word order as with (64a) but using a different target clause, which does not include the object and verb-copy construction. The CDR requires that we elide the local VP of TP_1. Intuitively, we want to elide VP_1 under identity with VP_3.

(i) Yūehàn qí   de hěn kuài
     John   ride **DE HEN** fast
     "John rides fast."

(66) **Hypothetical derivation for the ungrammatical (64b):**

TP₁
John VP_T
~~ride~~
DE fast
bǐ TP₂
Mary VP₂
ride α
λⱼ
horse VP₃
rideⱼ
DE fast
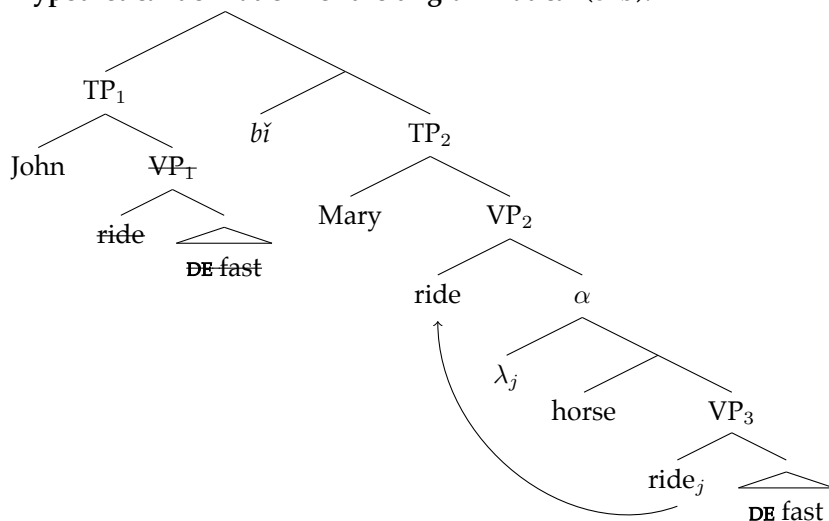
Under a simple approach where ellipsis is satisfied simply by PF identity, this ellipsis would be possible, as the pronunciation of VP₁ is equal to the pronunciation of VP₃: *qí de kuài*, glossed as "ride **DE** fast." However, the approach adopted here which requires LF identity of parallelism domains would not license this ellipsis, as a suitable parallelism domain for VP₁ does not exist. A natural choice is to use PD = VP₁ with AC = VP₃ but VP₃ contains the semantic trace of the verb-copy chain of "ride," and such traces of head movement are interpreted as variables (Hartman, 2009). Parallelism domains and antecedents cannot include any unbound variables. Since VP₃ contains the unbound trace of "ride," it is not a valid antecedent for VP₁. The smallest constituent which includes the λ-binder for this variable is that labelled α in the tree above. However, this projection now includes the object "horse." There is no "horse" in VP₁, nor any other object which could be turned into a horse by focus alternative replacement.[25] Attempting to find an antecedent for PD = TP₁—or any intermediate projection between TP₁ and VP₁ not pictured here—will also fail in the same way. Thus the ellipsis parallelism approach employed here will accurately disallow a derivation leading to interpretation (64b) for (64).

This same logic ruling out (64b) also predicts the ungrammaticality of comparatives with a verb-copy construction in the target clause but only a VP with a manner adjunct in the standard clause. Unlike (64) which does have a grammatical parse (64b), there is no grammatical derivation leading to the word order in (67). Thus the sentence (67) is simply judged as ungrammatical.

(67) * Yūehàn qí mǎ bǐ Mǎlì qí de kuài
      John   ride horse **BI** Mary ride **DE** fast
      Intended: "John rides horses faster than Mary rides (in general)"
      <u>Intended derivation:</u> [Yūehàn qí mǎ ~~qí de kuài~~] bǐ [Mǎlì qí de kuài]

In this section I showed that the identity required between parallelism domains and their antecedents ensures that a comparative cannot be formed between one verb-copy clause and a non-verb-copy clause. A simple PF identity approach to ellipsis would not accurately rule out derivations such as (64b) or (67), necessitating the approach to ellipsis licensing adopted here for the *bǐ* comparative.

The effects exemplified in this section go beyond verb-copy constructions. Licensing ellipsis in the *bǐ* comparatives through parallelism domains entails a restriction against non-parallel movements out of the

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[25]A horse is a horse, of course of course.

VPs in the target and standard clauses. If parallel movements are made out of VPs in the target and standard clauses, legal parallelism domains and antecedents can still be identified and ellipsis licensed, as was demonstrated in all the examples in section 3.2. However, if movement only occurs from within one of the clauses, or if movements are not parallel, ellipsis will not be licensed and the attempted comparative derivation will be ungrammatical.

3.4   Summary of the proposal and arguments

In this section I gave my proposal of the syntax and semantics for the Mandarin *bǐ* comparative. The proposal is a syntactic composition approach, where the *bǐ* comparative is made up of two clauses, each with its own instance of the predicate of comparison. This is a marked departure from recent work on the Mandarin *bǐ* comparative (Xiang, 2003, 2005; Erlewine, 2007; Lin, 2009), which have adopted the semantic composition approach, wherein there is only one instance of the gradable predicate in the syntax.

Primary evidence for the syntactic composition approach was presented in section 3.2. I presented examples of *bǐ* comparatives which involve *parallel movements* from within the predicate of comparison into the target and from within the predicate into the standard. Parallel movements are realized in overt word order as in the following schema:

(68)   **Pronounced word order of parallel movement constructions:**

$$\text{“ ... } \underbrace{\alpha_1 \text{ ...}}_{target} \;\; b\check{\imath} \;\; \underbrace{\text{ ... } \alpha_2 \text{ ...}}_{standard} \;\; \underbrace{\text{ ... } t_\alpha \text{ ...}}_{predicate} \text{ ”}$$

Examples of this form were presented with four different Mandarin movement constructions: subject raising, object fronting, *bèi* passives, and verb-copy constructions. The canonical examples that were discussed are repeated here:

(69)   **Comparative with parallel subject raising** (=39):

Zhōngguórén   bǐ Àozhōurén yǒukěnéng yíng zhè ge bǐsài
Chinese person **BI** Australian likely   win this **CL** comp.

"A Chinese person is more likely to win this race than an Australian is."

Derivation: [Chinese person ~~likely *t* win this race~~] bǐ [Australian likely *t* win this race]

(70)   **Comparative with parallel object preposing** (=45):

wǒ dàishù bǐ jǐhé   xǐhuān
I   algebra **BI** geometry like

"I like algebra more than I like geometry."

Derivation: [I$_i$ algebra ~~like *t*~~] bǐ [*pro$_i$* geometry like *t*]

(71)   **Comparative with parallel *bèi* passives** (=54):

Yūehàn bèi bàba   bǐ bèi māma mà   de gèng cán
John   **BEI** father **BI** **BEI** mother scold **DE** more serious

"John was scolded by his father more seriously than by his mother."

Derivation: [John **BEI** *Op* father ~~scold *t* seriously~~] bǐ [*pro$_i$* **BEI** *Op* mother scold *t* seriously]

(72)   **Comparative with parallel verb-copy** (=56):

[Yūehàn qí   mǎ]   bǐ [Mǎlì qí   niǔ] [qí   de kuài]
John   ride horse **BI** Mary ride cow ride **DE** fast

"John rides horses faster than Mary rides cows."

Derivation: [John ride horse ~~ride fast~~] bǐ [Mary ride cow ride fast]

Under the syntactic composition approach, each of these cases can be analyzed straightforwardly as two instances of movement—one in the target clause and one in the standard clause. Care was taken to show that not just one movement chain has occurred, but that both did in fact occur simultaneously. This was seen with subject raising, where both subjects were able to reconstruct below "likely" simultaneously (the *de dicto*/*de dicto* reading) and in the object preposing examples where objects in both the target and standard obey animacy constraints of the object preposing construction.

In a semantic composition analysis, on the other hand, these examples would have to be given an alternative explanation without parallel movement chains. In all of these cases, if semantic composition is used, we would have to posit various constraints specific to the *bǐ* comparative construction in order to accurately model the data. In the syntactic composition approach, on the other hand, these various effects all naturally fall out of the fact that these examples involve two parallel movement chains of the same type. These facts make a compelling case for the analysis of the Mandarin *bǐ* comparative construction using syntactic composition.

As a syntactic composition analysis, an important question is exactly how the overt word order is derived. In my proposal here I put forward the Comparative Deletion Requirement, repeated below.

(73) **Comparative Deletion Requirement (CDR):**
In a *bǐ* comparative, elide the largest elidable local VP of the target TP under identity with a local VP of the standard TP.[26] If the target TP has no elidable local VP, the derivation is illicit.

The CDR ensures that a local VP of the target clause is elided, yielding the observed word order. Moreover, in cases where the target clause has more than one local VP, the CDR ensures that the largest elidable local VP be elided, explaining the patterns of ellipsis in section 3.3.1.

Furthermore, I follow the work of Rooth (1992a); Heim (1997); Takahashi and Fox (2005) in adopting a semantically sensitive licensing condition on ellipsis. Each instance of ellipsis must be licensed through the conditions below.

(74) **Ellipsis Licensing** (Takahashi and Fox, 2005):
For ellipsis of α to be licensed, there must exist a constituent, which reflexively dominates α, and satisfies the parallelism condition in (75). Call this constituent the *Parallelism Domain*, PD.

(75) **Ellipsis Parallelism** (Takahashi and Fox, 2005):
PD must be semantically identical to another constituent AC, modulo focus-marked constituents: there exists a focus alternative PD_{Alt}, $[\![PD_{Alt}]\!] \in [\![PD]\!]^f$, such that for every assignment function g, $[\![AC]\!]^g = [\![PD_{Alt}]\!]^g$.

Parallelism domains must be equivalent to their antecedent constituents, modulo replacement of focus-marked constituents, under any assignment function. The requirement that they must be invariant with respect to assignment function necessitates that they not contain any unbound variables. Thus if a movement chain originates in the VP, its parallelism domain must include the associated λ-binder.

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[26]Given a TP β, α is a *local VP* of β iff (a) α is a VP, (b) β dominates α, and (c) there is no TP which dominates α and is dominated by β.

This logic of ellipsis licensing through parallelism domains allows for the derivation of the parallel movement comparatives in (69–72). In particular, VPs which originally contain material which differs from its antecedent (e.g. "Chinese person" vs "Australian" in 69; "algebra" vs "geometry" in 70) can undergo ellipsis if the contrasting material first independently moves out from both the eliding VP and the antecedent VP. Furthermore, it accurately predicts that parallel movements of the form discussed are the *only* possible movements originating in the predicate of comparison in a *bǐ* comparative. This accurately predicts patterns of grammaticality and interpretation for comparatives involving verb-copy, as shown in section 3.3.2.

4 Against Lin's (2009) Strict Parallelism

In this section I discuss Lin (2009), which is the most recent and comprehensive semantic composition approach to the Mandarin *bǐ* comparative. Lin (2009) is an exercise in broadening the empirical coverage of semantic composition approaches by proposing a powerful modification to the three-place comparative operator used in semantic composition. I will show that the approach taken in Lin (2009) makes a clear and strong prediction that is false.

In the previous section I presented evidence that every Mandarin *bǐ* comparative underlyingly involves two independent clauses: one for the target and one for the standard. Constraints on ellipsis parallelism ensure that the predicates in the two clauses are identical, but the clauses are allowed to differ above VP. Various kinds of material may be introduced above VP, including both additional arguments and adjuncts, predicting that the strings we descriptively call "the target" and "the standard" need not constitute constituents. The comparative in (76) below, from Tsao (1989), is one such example:

(76) tā zuótiān   zài xuexiao bǐ wǒ jīntiān zài jiālǐ   [kāixīn
      He yesterday at school   BI I   today at home happy
      "He was happier yesterday at school than I am today at home."

A comparative such as (76) is straightforward to derive under a syntactic composition account, as we independently construct the two clauses corresponding to the strings "*target predicate*" and "*standard predicate*." The adjuncts "yesterday," "at school," "today," and "at home" are adjoined to the clause as normal, and do not form a constituent with "he" or "I." The predicate "happy" is elided from the left (target) clause, yielding the word order in (76).

(77) **Syntactic composition derivation of (76):**
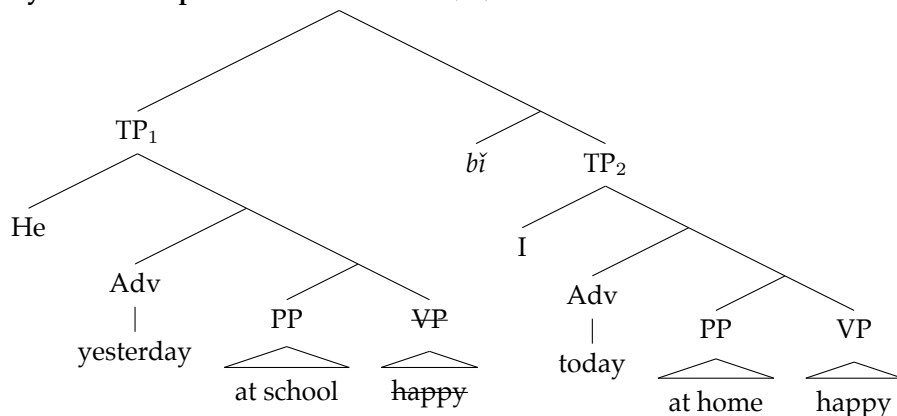
In the semantic composition approach, however, the comparative operator itself selects for the gradable predicate, the standard, and the target. Thus most proponents of semantic composition have assumed that

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the target and standard are each single constituents (Heim, 1985; Bhatt and Takahashi, 2011). Lin (2009) proposes a modified semantic composition analysis which is explicitly designed to be able to derive examples such as (76).

Lin (2009) type-shifts the traditional semantic composition three-place comparative operator (16; repeated below) into a $(2n + 1)$-ary one: Lin's *bǐ* first merges with n arguments $y_n, ..., y_1$ which form the standard, then merges with an n-place gradable predicate, then merges with the n arguments which constitute the target $x_n, ..., x_1$. Stage-level predicates are argued to take temporal and locational adjuncts as arguments as well, e.g. making *kāixīn* "happy" above a three-place predicate. Thus in the case of (76), *bǐ* is a seven-place operator: it selects for "at home," "today," "I," then the three-place gradable predicate "happy," then "at school," "yesterday," and "he."

(78) **Lin's (2009) semantic composition derivation for (76):**
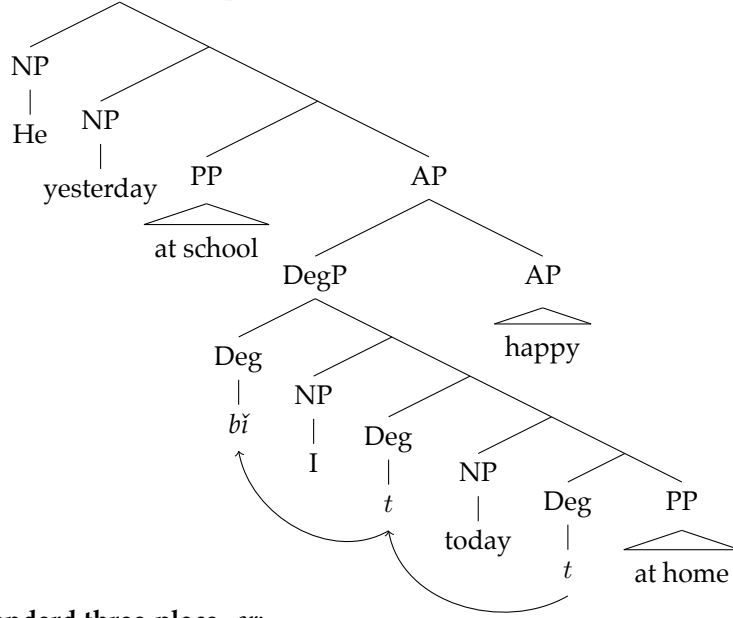
(16) **The standard three-place *-er*:**

$\textit{-er}_{\text{3-place}} = \lambda y_e.\lambda G_{\langle d,\langle e,t\rangle\rangle}.\lambda x_e.max(\lambda d.G(d)(x)) > max(\lambda d.G(d)(y))$

(79) **Lin's (2009) $(2n + 1)$-ary semantics for *bǐ*:**

$[\![bǐ]\!] = \lambda y_n \ldots \lambda y_1.\lambda P_{\langle d,\langle \tau_n,\ldots \langle \tau_1,t\rangle\ldots\rangle\rangle}.\lambda x_n \ldots \lambda x_1.max\left(\lambda d.P(d)(x_n)\ldots(x_1)\right) > max\left(\lambda d.P(d)(y_n)\ldots(y_1)\right)$,
where $n \geq 1$ and τ_i stands for the type of the arguments x_i and y_i.

The comparative operator then computes the maximal degree such that "he was d-happy yesterday at school" and the maximal degree such that "I am d-happy today at home" and asserts that the former is greater than the latter.

Here I would like to highlight a clear corollary of Lin's (2009) syntax/semantics. The semantics in (79) requires that the target and the standard in the *bǐ* comparative be comprised of the same number of arguments. I call this idea *Strict Parallelism*:

(80) **Strict Parallelism, a prediction of Lin (2009):**
A *bǐ* comparative cannot be composed if the number of arguments comprising the target, $x_n, ..., x_1$, are not equal to the number of arguments comprising the standard, $y_n, ..., y_1$.

In cases with apparently mismatched argument counts or types, Lin follows Tsao (1989) in analyzing such cases as involving argument-drop, fleshing out the list of arguments in the target and standard with *pro* of

appropriate types. Tsao (1989) claims that such dropped arguments may be interpreted using the present time or, in the case of gaps in the standard, as matching the corresponding argument in the target.

(81) **Apparently mismatched targets and standards interpreted as argument-drop** (examples from Tsao 1989, discussed in Lin 2009):

    a. tā$_i$ jīntiān bǐ *pro$_i$* zuótiān shūfú
       he today BI yesterday comfortable
       "He feels better today than [he] did yesterday."

    b. tā$_i$ *pro$_{time}$* bǐ *pro$_i$* gāngcái liǎnsè hǎo
       he BI a while ago face color good
       "He looks better [now] than [he] did a while ago."

However, examples can be constructed where we must interpret the target and standard as introducing different numbers of arguments, beyond what could be interpreted as argument-drop. Thus the Strict Parallelism corollary of Lin (2009) is empirically incorrect.

Consider a context where our friend Zhang San is a very important businessman. Both USPS and FedEx have special priority service specifically for Zhang San:

(82) **Context: mail delivery times**

	FedEx	USPS
to Zhang San	3 days	2 days
to everyone else	5 days	4 days

(83) **An optionally ditransitive predicate: baseline**

    a. USPS de yiban fuwu song xin song de hen kuai
       USPS GEN regular service deliver letter deliver DE HEN fast
       "USPS's regular service delivers letters quickly."

    b. FedEx gei Zhāng Sān song xin song de hen kuai
       FedEx to Zhang San deliver letter deliver DE HEN fast
       "FedEx delivers letters to Zhang San very quickly"

Using the predicate *sòng* "deliver" which can optionally take an indirect object, we construct a test sentence (84a) which has two constituents in the target, a subject and the indirect object, but only one constituent in the standard, a subject. Strict Parallelism predicts that (84a) be judged as either ungrammatical or interpreted with a argument-dropped indirect object in the standard. On the other hand, the proposal advocated for here would allow for direct comparison of the transitive delivery of letters to the ditransitive delivery of letters to Zhang San.

(84) **The test: comparing the transitive with the ditransitive**

    a. FedEx gěi Zhāng Sān bǐ USPS de yiban fuwu song xin song de kuai
       FedEx to Zhang San BI USPS.GEN regular service deliver letter deliver DE fast
       "FedEx delivers letters to Zhang San faster than USPS's regular service delivers letters."

       Derivation: [FedEx to Zhang San ~~deliver letter deliver fast~~] *bǐ* [USPS's regular service deliver letter deliver fast]

       True in context: 3 days (FedEx to Zhang San) is faster than 4 days (USPS regular service)

    b. FedEx gěi Zhāng Sān bǐ USPS gěi Zhāng Sān song xin song de kuai
       FedEx to Zhang San BI USPS to Zhang San deliver letter deliver DE fast

"FedEx delivers letters to Zhang San faster than USPS delivers letters to Zhang San"

Derivation: [FedEx to Zhang San ~~deliver letter deliver fast~~] *bǐ* [USPS to Zhang San deliver letter deliver fast]

False in context: 3 days (FedEx to Zhang San) is not faster than 2 days (USPS to Zhang San)

Native speakers judge (84a) to be both grammatical and appropriate for this context, while (84b) is false. This is because the FedEx service for Zhang San is faster than USPS's regular service, but is not faster than USPS's Zhang San express service. Thus (84a) must be interpreted with the indirect object in the standard but not in the target. Due to the violation of Strict Parallelism, Lin (2009) would explicitly rule out such sentences.

One potential avenue for reconciling (84a) with Lin's (2009) analysis would be to use a ditransitive *sòng* but fill the standard's goal argument via existential closure. This existential closure could plausibly happen at two scopes in the syntax: within the standard or above the comparison. The truth conditions of these two possibilities are paraphrased below:

(85) a. Existential closure in the standard:

$[\![(84a)]\!]$ is true $\iff$ [the maximum degree d such that FedEx delivers Zhang San letters d-quickly] > [the maximum degree d such that $\exists x$ where USPS delivers x letters d-quickly]

Predicts **false** under context (82): 3 days (FedEx to Zhang San) is not faster than 2 days (USPS to someone, in particular, Zhang San)

b. Existential closure above the comparison:

$[\![(84a)]\!]$ is true $\iff$ $\exists x$ such that [the maximum degree d such that FedEx delivers Zhang San letters d-quickly] > [the maximum degree d such that USPS delivers x letters d-quickly]

Predicts **true** under context (82): there is someone x, in particular someone other than Zhang San, such that 3 days (FedEx to Zhang San) is faster than 4 days (USPS to x)

Recall that (84a) is judged as true under context (82). So if we would like to interpret (84a) via Lin's (2009) analysis by interpreting the "missing" indirect object as existentially closed, this existential closure must happen above the comparison as in (85b). However, this high existential closure predicts incorrect truth value judgments in other contexts. Consider the following context, where FedEx delivers letters in five days to any recipient, but now USPS slows down letter-delivery to the mob boss Li Si:

(86) **Context: revised mail delivery times**

	FedEx	USPS
to Zhang San	5 days	4 days
to Li Si	5 days	6 days
to everyone else	5 days	4 days

According to the truth conditions computed with high existential closure in (85b), (84a) is predicted to be felicitous under situation (86): there exists an individual x, Li Si, such that FedEx's delivery of letters to Zhang San (5 days) is faster than USPS's delivery of letters to x (6 days). However, native speakers judge (84a) to be false in this context (86): the availability of a single individual for whom USPS delivery is slower than FedEx's delivery to Zhang San does not make the utterance felicitous. As such, we can be confident that the comparison in (84a) is between FedEx's delivery of letters specifically to Zhang San (ditransitive *sòng*) and USPS's general delivery of letters (transitive *sòng*), and that Lin's (2009) semantic composition approach cannot be rescued with existential closure.

The Strict Parallelism condition—that the target and standard must both be made up of the same number of semantic arguments—is a necessary consequence of the proposal in Lin (2009), the only proposal to date to seriously reconcile examples such as (76) with the semantic composition approach. In this section we have seen that Strict Parallelism is too strong a condition on the *bǐ* comparative.

More generally, examples such as (84a) reinforce the need to consider the predicate interpreted with the target and the predicate interpreted with the standard as separate derivational objects. Once a predicate such as "deliver letters quickly" is constructed, the derivation can conclude by simply supplying a subject, as in (83a), or specifying an indirect object with *gěi* and then supplying a subject, as in (83b). As long as the CDR is met, there is no inherent requirement that the argument structures of the predicate as interpreted with the target and with the standard must match. We thus see a further advantage to the syntactic composition approach over semantic composition, even with the modifications of Lin (2009).

5   Syntactic composition without degree abstraction

In this paper, I have proposed that the Mandarin *bǐ* comparative employs syntactic composition. Under this approach, two degree descriptions of type $\langle d, t \rangle$ are independently constructed, and the comparative operator asserts a ranking over the maximal degrees in each. It is standardly assumed, following the early work of Bresnan (1973); Chomsky (1977), that these degree descriptions (sets of degrees) for the target and standard are constructed by $\overline{\text{A}}$-movement of a null-operator of type d. *Degree abstraction*—that is, predicate abstraction of a variable of type d—results in a degree description of type $\langle d, t \rangle$.[27]

(87)   John is taller than *Op λd* [Mary thinks [he is *d-tall*]]

In contrast, the analysis I propose here does not use degree abstraction. In this section I will empirically motivate this claim that the Mandarin *bǐ* comparative, while employing syntactic composition, does not involve degree abstraction.

The question of whether the *bǐ* comparative involves degree abstraction connects to a more general question of the availability of degree abstraction in Mandarin. It has been proposed by Beck et al. (2004) that languages differ as to whether their grammars allow degree abstraction at all:

(88)   **Degree Abstraction Parameter (DAP) (Beck et al., 2004):**
       A language {does / does not} have binding of degree variables in the syntax.

In this paper I will leave open the question of whether Mandarin lacks degree abstraction, i.e. whether it has the negative setting of the Beck et al.'s (2004) DAP (88).[28] I will instead simply show that the derivation and computation of the *bǐ* comparative does not—and cannot—involve degree abstraction.

I begin by reviewing how the syntax / semantics proposed here computes the comparative semantics without using degree abstraction. Our basic example (4) is repeated here:
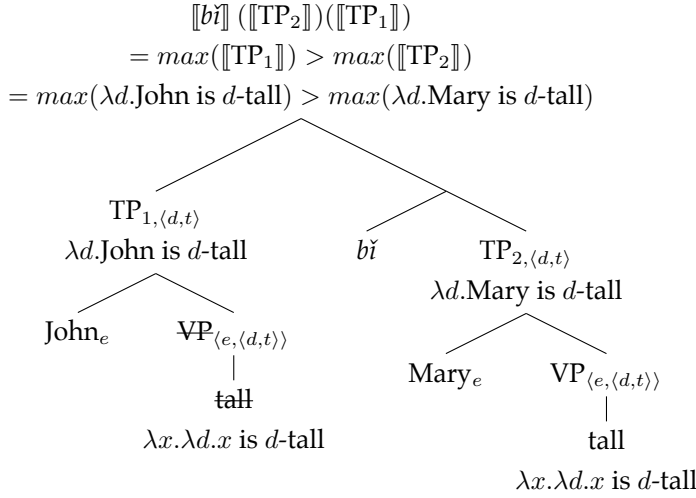
(89)   Yuēhàn bǐ Mǎlì gāo
       John   BI Mary tall
       "John is taller than Mary."

---

[27] The movement illustrated in (87) forms the degree description corresponding to the standard. In recent approaches, movement is also used to construct the degree description corresponding to the target; see Wold (1995); Heim (2000); Bhatt and Pancheva (2004) for details.

[28] Krasikova (2008) has previously claimed that Mandarin Chinese lacks degree abstraction altogether, although her evidence is unfortunately inconclusive.

The semantic computation that I propose in this paper for (89) is repeated below. Crucially, each gradable predicate is of type $\langle e, \langle d, t \rangle \rangle$, allowing it to merge with its type e subject to yield a degree description of type $\langle d, t \rangle$. Thus there is no abstraction over a degree argument in order to construct the degree descriptions. This derivation is possible because of the Degree Last property which I propose for Mandarin, also repeated below.

(90) **Semantic computation of "John *bǐ* Mary tall" proposed here:**

$$[\![b\check{i}]\!] ([\![\text{TP}_2]\!])([\![\text{TP}_1]\!])$$
$$= max([\![\text{TP}_1]\!]) > max([\![\text{TP}_2]\!])$$
$$= max(\lambda d.\text{John is } d\text{-tall}) > max(\lambda d.\text{Mary is } d\text{-tall})$$

(91) **Degree Last:**
Gradable predicates in Mandarin Chinese take their degree argument as their last argument.

By not utilizing degree abstraction in the construction of the target and standard degree descriptions, we predict that the the degrees compared have to be degree arguments of the local predicates of the target and standard clauses. Thus under the proposal here, there is no way to compare the degrees of a predicate which is within an embedded clause.

This immediately rules out embedded standards, such as (27) repeated below as (92). However, note that (92) is already ruled out by our formulation of the Comparative Deletion Requirement (CDR), which requires that the target's local VP be elided under identity with a *local VP* of the standard TP. The antecedent required for the ellipsis, the "tall" in the standard TP, is in an embedded clause of the standard TP, and is thus not a local VP of the standard clause.

(92) * Yuēhàn bǐ Mǎlì renwei tā gāo
John   BI Mary thinks he tall
Intended: "John is taller than Mary thinks he is."
Derivation: [John ~~tall~~] *bǐ* [Mary thinks he tall]

Instead, I present (93), intended as a Mandarin equivalent to the English in (94), as an accurate test of whether long-distance degree abstraction is ever possible in the Mandarin *bǐ* comparative. I argue that the ungrammaticality of (93) indicates that the degree descriptions in a *bǐ* comparative *cannot* be constructed using degree abstraction.

(93) **The test case for degree abstraction:**

* Yuēhàn bǐ Mǎlì renwei Tāngmǔ gāo
John   BI Mary think Tom   tall

Intended: $max(\lambda d.\text{John thinks Tom is } d\text{-tall}) > max(\lambda d.\text{Mary thinks Tom is } d\text{-tall})$

(94)   John thinks Tom is taller than Mary thinks he is.
$max(\lambda d.\text{John thinks Tom is } d\text{-tall}) > max(\lambda d.\text{Mary thinks Tom is } d\text{-tall})$
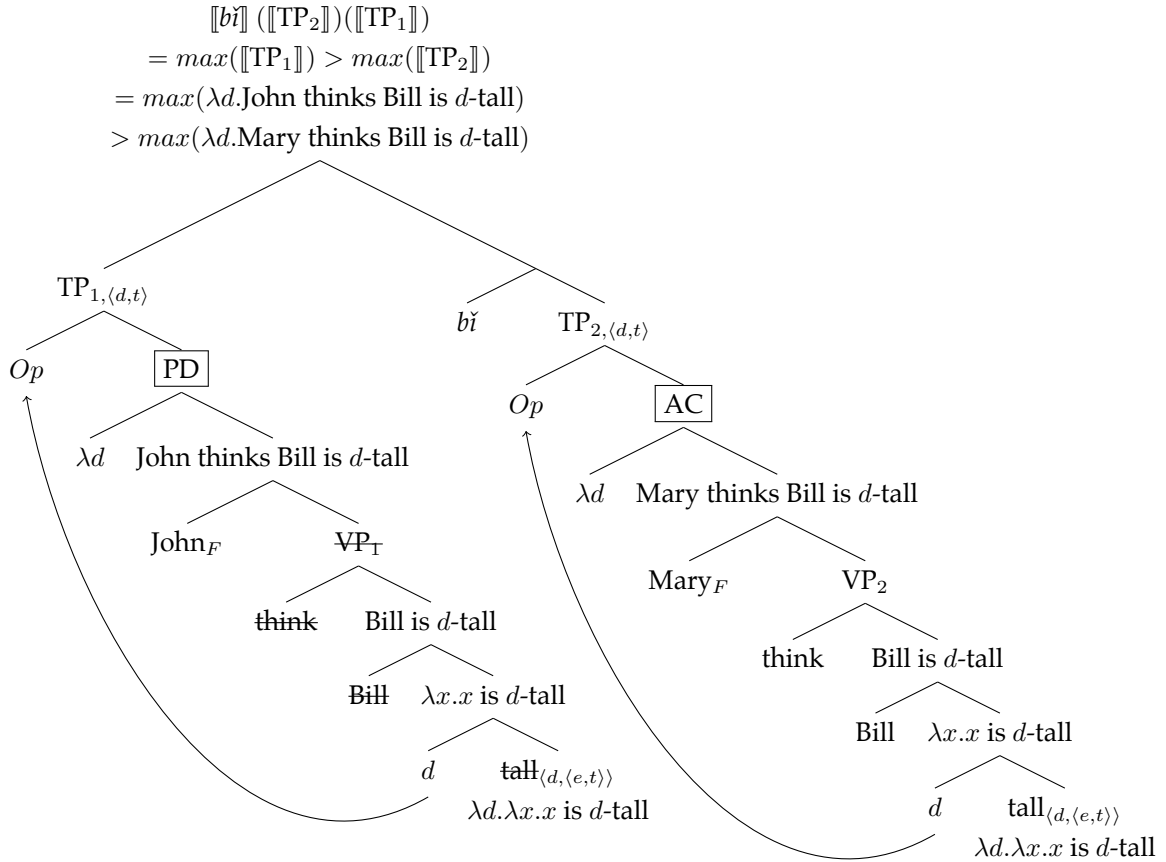
What follows is a proof by contradiction. I assume for contradiction that degree abstraction by null operator movement is at least as an option in the derivation of the *bǐ* comparative. The argument will go as follows: (a) the target and standard clauses in (93) are independently grammatical in their positive forms; (b) a hypothetical derivation of (93) following the proposal here will yield the intended meaning, satisfy the CDR, and yield the intended word order; (c) degree abstraction in languages with long-distance degree abstraction is $\overline{\text{A}}$-movement of a null operator (Chomsky, 1977); (d) Mandarin Chinese has long-distance $\overline{\text{A}}$-movement, at least covertly (Huang, 1982). Thus, if degree abstraction were available as an option in the derivation of *bǐ* comparatives, (93) should be grammatical; therefore, the ungrammaticality of (93) tells us that degree abstraction is not even an option in the derivation of *bǐ* comparatives. Parts (a) and (b) of this argument will be demonstrated explicitly here.

I note first that the two clauses required in order to construct (93), "John think Tom tall" and "Mary think Tom tall" are grammatical in their positive forms. As noted previously, positive forms of gradable predicates in some environments require the addition of the morpheme *hěn* (Grano, 2011).

(95)   {Yuēhàn, Mǎlì} renwei Tāngmǔ hěn gāo
       John   Mary thinks Tom   HEN tall
       "{John, Mary} thinks Tom is tall."

Next, I will demonstrate that construction of (93) is possible within the syntax/semantics of the *bǐ* comparative proposed in this paper, if we assume (for contradiction) that degree abstraction is possible. Here I assume that the predicate "tall" is of type $\langle d, \langle e, t \rangle \rangle$, as is commonly assumed for gradable predicates cross-linguistically. As each predicate's degree argument must be saturated first, we merge a null operator of type d, construct the rest of the clause, and then move this null operator. This movement happens long-distance, resulting in the degree descriptions ($\lambda d.\text{John thinks Tom is } d\text{-tall}$) and ($\lambda d.\text{Mary thinks Tom is } d\text{-tall}$). The comparative operator *bǐ* takes these two degree descriptions and results in the intended truth conditions.

(96) **Hypothetical derivation of *bǐ* comparative with embedding (93), using degree abstraction:**

$$\llbracket b\v{i} \rrbracket \, (\llbracket TP_2 \rrbracket)(\llbracket TP_1 \rrbracket)$$
$$= max(\llbracket TP_1 \rrbracket) > max(\llbracket TP_2 \rrbracket)$$
$$= max(\lambda d.\text{John thinks Bill is } d\text{-tall})$$
$$> max(\lambda d.\text{Mary thinks Bill is } d\text{-tall})$$

$TP_{1,\langle d,t\rangle}$

Op — PD

λd — John thinks Bill is d-tall

John_F — VP_1

~~think~~ — Bill is d-tall

~~Bill~~ — $\lambda x.x$ is d-tall

d — ~~$\text{tall}_{\langle d,\langle e,t\rangle\rangle}$~~

$\lambda d.\lambda x.x$ is d-tall

bǐ — $TP_{2,\langle d,t\rangle}$

Op — AC

λd — Mary thinks Bill is d-tall

Mary_F — VP_2

think — Bill is d-tall

Bill — $\lambda x.x$ is d-tall

d — $\text{tall}_{\langle d,\langle e,t\rangle\rangle}$

$\lambda d.\lambda x.x$ is d-tall

Let us verify that the structure in (96) can pass the CDR and would yield the intended word order. The CDR requires that a local VP of the target clause, TP$_1$, be elided. There is only one such candidate, labeled VP$_1$. As this VP includes an unbound trace, we must use the constituent labeled PD as our parallelism domain. Ellipsis Parallelism requires that the semantic value of PD be equal to an antecedent, AC, allowing for substitutions to focus-marked material. Assuming focus-marking on the contrasting constituents "John" and "Mary," $\llbracket AC \rrbracket \in \llbracket PD \rrbracket^f$, and thus ellipsis of VP$_1$ is licensed. Ellipsis of VP$_1$ yields the intended word order "John *bǐ* Mary think Bill tall."

I have demonstrated that if degree abstraction were available, the proposal presented here, together with our understanding of degree abstraction cross-linguistically and of long-distance movement in Mandarin, predicts the comparative in (93) to be grammatical. I thus conclude that the ungrammaticality of (93) indicates that the derivation of *bǐ* comparatives *cannot* involve degree abstraction in the construction of the two degree descriptions.

My proposal that *bǐ* comparatives cannot utilize degree abstraction and instead takes advantage of the Degree Last property of predicates, makes the following prediction: the degree arguments that *bǐ* comparatives use are necessarily arguments of a predicate in the clause. As a consequence, this predicts the lack of attributive comparatives in Mandarin Chinese. This prediction is borne out.

There are broadly two types of attributive comparatives: those which compare the degrees of some attributive adjective and those which compare quantities. English examples of these two types of comparatives are given in (97).

(97) **Attributive comparatives in English:**

    a. John wrote a longer paper than Mary did.

        $max(\lambda d.$ John wrote [a d-long paper]$) > max(\lambda d.$ Mary wrote [a d-long paper]$)$

    b. John wrote more papers than Mary did.

        $max(\lambda d.$ John wrote [d-many papers]$) > max(\lambda d.$ Mary wrote [d-many papers]$)$

It has been argued that attributive comparatives are derived through $\overline{\text{A}}$-movement of a degree argument from within the DP (Bresnan, 1973; Chomsky, 1977; Kennedy, 1997, a.o.). For example, in example (97) where we are comparing degrees of "long," degree abstraction is used to construct the degree descriptions ($\lambda d.$ John wrote [a d-long paper]) and ($\lambda d.$ Mary wrote [a d-long paper]).[29] I have argued in this section that degree abstraction cannot be used in the derivation of Mandarin *bǐ* comparatives. This predicts that Mandarin Chinese lacks attributive adjectives. Below I show that this is indeed the case.

I begin with attributive adjectival comparatives, using the English (97a) as a model. The baseline in (98a) shows that Mandarin is able to have gradable predicates—here, "long"—modify object nominals, but we are unable to use this degree argument to construct an attributive comparative (98b). Instead, in order to make this comparison, the objects must be nominalized (98c).

(98) **Mandarin lacks attributive adjectival comparatives**

    a. <u>Baseline gradable adjective on object:</u>

        ✓Zhāng Sān xiě-le   (yī piàn) hěn cháng (de) lùnwén
        Zhang San write-**PERF** one **CL**   **HEN** long   **DE** paper
        'Zhang San wrote a long paper.'

    b. <u>Attributive comparative:</u>

        * Zhāng Sān bǐ Lǐ Sì xiě-le   (yī piàn) cháng (de) lùnwén
        Zhang San **BI** Li Si write-**PERF** one **CL**   long   **DE** paper
        Intended: 'Zhang San wrote a longer paper than Li Si did.'

    c. <u>Grammatical alternative: nominalize the papers</u>

        ✓[Zhāng Sān xiě   de lùnwén] bǐ [Lǐ Sì xiě   de (lùnwén)] cháng
        Zhang San write **DE** paper   **BI** Li Si write **DE** paper   long
        '[The paper that Zhang San wrote] is longer than [the paper that Li Si wrote].'

Mandarin similarly lacks attributive quantity comparatives. Example (99a) shows that the gradable "many/much" word *duō* can be used to quantify object nominals, but we are unable to form a comparative over this degree argument, as seen in example (99b). The object can be nominalized in order to express this form of comparison (99c).

(99) **Mandarin lacks attributive quantity comparatives**

    a. <u>Baseline gradable *many* on object:</u>

        ✓Zhāng Sān xiě-le   hěn duō   lùnwén
        Zhang San write-**PERF HEN** many paper
        'Zhang San wrote many papers.'

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[29]In many cases this movement of a degree argument will yield a left-branch extraction configuration, but this violation is alleviated by ellipsis of a constituent which properly contains the violation (Kennedy and Merchant, 2000). For Mandarin Chinese, VP comparative deletion enforced by the CDR would satisfy this purpose, if the construction were otherwise available.

b.   Attributive comparative:

    * Zhāng Sān bǐ Lǐ Sì xǐe-le   dūo   lùnwén
    Zhang San **BI** Li Si write-**PERF** many paper
    Intended: 'Zhang San wrote more papers than Li Si did.'

c.   Grammatical alternative: nominalize the papers

    ✓[Zhāng Sān xǐe   de lùnwén] bǐ [Lǐ Sì xǐe   de (lùnwén)] dūo
    Zhang San write **DE** paper   **BI** Li Si write **DE** paper   many
    ≈ '[The papers that Zhang San wrote] are more (numerous) than [the papers that Li Si wrote].'

The lack of attributive comparatives of all forms is predicted by the non-use of degree abstraction and the Degree Last approach to the derivation of *bǐ* comparatives.

In addition to the nominalization strategy in (99c), Mandarin also has a distinct construction for comparing the quantity of object nominals, dubbed the "Differential Verbal Comparative" (DVC) by Li (2009):

(100)   **Grammatical alternative to (99b): Differential Verbal Comparative (Li, 2009)**

    ✓Zhāng Sān bǐ Lǐ Sì dūo-xǐe-le   lǐang pìan lùnwén
    Zhang San **BI** Li Si many-write-**PERF** two   **CL**   paper

    'Zhang San wrote two more papers than Li Si did.'

In a DVC, as in (100), the "many/much" word *dūo* forms a compound with a non-gradable transitive verb, resulting in a gradable predicate whose degree corresponds to the quantity of the verb's objects. I argue that this specialized construction further supports the Degree Last approach to comparative semantics proposed here. The existence of a verb-modifying strategy, in lieu of a nominal-modifying one, for expressing comparatives over quantities of objects, suggests a tight coupling between access to a degree argument and the ability to semantically head a verbal projection. This is precisely what is predicted by my proposal: for a degree argument to be accessible for comparison, it must be an argument of a predicate which can semantically head a clause.

In this section I have argued that the derivation of Mandarin *bǐ* comparatives cannot involve degree abstraction, and presented supporting evidence from the lack of attributive comparatives in Mandarin. The result is a cross-linguistically unique comparative construction: the *bǐ* comparative follows syntactic composition but does not utilize degree abstraction, instead taking advantage of the Degree Last property of gradable predicates in Mandarin.

6   Conclusion

In a *bǐ* comparative such as (101), the gradable predicate of comparison—here, "tall"—is only pronounced once. The assertion made by (101) requires computation of the "tallness of John" as well as the "tallness of Mary." The gradable predicate is pronounced only once, but it must be interpreted twice. What is the mechanism which mediates this apparent syntax/semantics mismatch?

(101)   Yuēhàn bǐ Mǎlì gāo
    John   **BI** Mary tall
    "John is taller than Mary."

In this paper I presented a new proposal for the syntax/semantics of the *bǐ* comparative. In particular, I argue that the *bǐ* comparative follows the syntactic composition approach, whereby the mismatch is solved by positing two instances of the gradable predicate in the syntax:

(102)   **Syntactic composition:**
        There are two instances of the gradable predicate in the syntax. One composes with the target and the other composes with the standard, *in the syntax*.

The comparative in (101), then, is actually a *bǐ*-conjunction of two independent clauses: "[John tall] *bǐ* [Mary tall]." To yield the pronounced word order, an obligatory ellipsis operation is proposed which targets a local VP of the target clause.

(103)   **Comparative Deletion Requirement (CDR):**
        In a *bǐ* comparative, elide the largest elidable local VP of the target TP under identity with a local VP of the standard TP.[30] If the target TP has no elidable local VP, the derivation is illicit.

Evidence for the syntactic composition approach was presented in section 3.2, in the form of *parallel movement* comparatives. In these comparatives, both the target and standard include material which must have moved out of the predicate of comparison, but there is only one "gap" position in the predicate. Under the syntactic composition view, every *bǐ* comparative includes two clauses, each with its own VP, so such data can be explained straightforwardly as two independent but matching instances of movement. I presented four cases which involve movement of this form: subject raising, object preposing, the *bèi* long passive, and verb-copy. The parallel movement facts cannot be satisfactorily modeled under a semantic composition approach: as there is only one instance of the predicate of comparison, it will only be able to participate in a movement chain together with the target or the standard but not both simultaneously.

I argue that the ellipsis required by the CDR obey the semantically sensitive licensing condition proposed by Takahashi and Fox (2005). Ellipsis requires the identification of an associated parallelism domain containing the ellipsis site, and that this parallelism domain (or a focus alternative thereof) be semantically equivalent to an antecedent, regardless of the choice of assignment function. I showed that this parallelism condition ensures that movement out of the predicate in a comparative must occur in parallel in both the target and the standard clauses. This allows for the derivation of the parallel movement comparatives, while accurately disallowing ungrammatical comparatives which may be derived if ellipsis were simply licensed by PF identity.

In section 4 I presented the analysis of Lin (2009), the most recent and comprehensive semantic composition approach to the *bǐ* comparative, and showed that it has a fatal flaw. Lin's analysis extends the semantic composition approach to deal with a family of comparatives where the target and standard are made up of multiple arguments which do not together form a larger constituent. I show that Lin's semantic solution makes a strong prediction that the number of arguments in the target and in the standard must be equal. I then demonstrated that there are grammatical comparatives which have differing numbers of arguments in the target and standard, using the verb *sòng* 'deliver' which can be transitive or ditransitive.

Finally, I also discussed the compositional semantics of the *bǐ* comparative. I propose that *bǐ* is the familiar two-place comparative operator (104). This operator takes two degree descriptions—one for the target and one for the standard—and asserts that the maximal degree in one is greater than that of the other. However,

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[30]Given a TP β, α is a *local VP* of β iff (a) α is a VP, (b) β dominates α, and (c) there is no TP which dominates α and is dominated by β.

unlike other syntactic composition comparatives in the literature, I argue that the degree descriptions in the Mandarin *bǐ* comparative are not formed through degree abstraction. Instead, I propose that all gradable predicates in Mandarin exhibit the following Degree Last property.

(104) **bǐ is the familiar two-place comparative operator:**
$$\llbracket b\check{\imath} \rrbracket = \lambda D_{2\langle d,t \rangle}.\lambda D_{1\langle d,t \rangle}.max(D_1) > max(D_2)$$

(105) **Degree Last:**
Gradable predicates in Mandarin Chinese take their degree argument as their last argument.

I argue in section 5 that degree abstraction is not an option in the derivation of a Mandarin *bǐ* comparative. The Mandarin *bǐ* comparative thus exemplifies a hitherto undescribed type of comparative: an explicit comparative which utilizes syntactic composition, but without the use of degree abstraction. The argument presented here does not definitively determine whether or not Mandarin Chinese has degree abstraction in its grammar, a possible point of cross-linguistic variation as proposed by Beck et al. (2004). However, if degree abstraction *does* exist in Mandarin, it would be difficult to explain its unavailability in the derivation of a particular degree construction, the *bǐ* comparative. This result strongly suggests that Mandarin Chinese lacks degree abstraction altogether.

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Michael Yoshitaka Erlewine

Massachusetts Institute of Technology

77 Massachusetts Avenue 32-D808

Cambridge, MA 02139 USA

`mitcho@mitcho.com`