

Clausal comparison without degree abstraction in Mandarin Chinese

Michael Yoshitaka Erlewine, July 2015

This paper argues (a) that the *bǐ* comparative construction in Mandarin Chinese is a form of clausal comparative and (b) that Mandarin Chinese lacks abstraction over degree variables.

Beck et al. (2004) proposes that languages may vary in whether or not they allow for abstraction over degree variables. In previous work, comparatives with clausal standards have been uniformly analyzed cross-linguistically as involving an \bar{A} -movement step abstracting over a degree variable, and thereby predicted to not occur in languages without degree abstraction. The paper shows that clausal comparison without degree abstraction is not only theoretically possible but attested, contributing to the cross-linguistic typology of degree constructions.

I first present evidence from *bǐ* comparatives involving various types of movement chains, which shows that a phrasal analysis is untenable. I detail the comparative deletion enforced in *bǐ* comparatives and show that various properties of *bǐ* comparatives fall out of general constraints on ellipsis parallelism. I then argue that the computation of *bǐ* comparatives does not—and cannot—involve abstraction over a degree argument. Gradable predicates in Mandarin can take their degree argument last, allowing for clausal comparison without using degree abstraction.

Keywords: Mandarin Chinese, comparative, clausal comparison, comparative deletion, ellipsis, Degree Abstraction Parameter, Degree Last

Acknowledgements: I thank Sigrid Beck, Patrick Grosz, Jeremy Hartman, Irene Heim, James Huang, Sabine Iatridou, Chris Kennedy, Hadas Kotek, Jo-wang Lin, Chen-Sheng Luther Liu, Jason Merchant, Waltraud Paul, David Pesetsky, Omer Preminger, Norvin Richards, Yasutada Sudo, Maziar Toosarvandani, and audiences at the 2010 MIT Workshop on Comparatives and WCCFL 29 at the University of Arizona for discussion and comments on this work. In addition, for extensive discussion of judgments I thank Celia Jia Cui, Julie Jiang Li, Chi-Ming Louis Liu, Pamela Pan, Cheng-Yu Edwin Tsai, Wei Wang, Yuncheng Zhou, and especially Tingchun Chen and Yimei Xiang. Presented at MIT, WCCFL. Parts of the data in section 4 and a substantially different analysis appeared in the Proceedings of WCCFL 29 as Erlewine (2012). All errors are mine.

Contents

1	Introduction	3
2	Analyzing comparison	4
2.1	Clausal comparison	6
2.2	Phrasal comparison	8
3	Proposal	9
3.1	Syntactic derivation	10
3.2	Compositional semantics	11
4	The argument from parallel movements	13
4.1	Subject raising and reconstruction	13
4.2	Internal argument comparatives as object preposing	18
4.3	<i>bèi</i> long passives	21
4.4	Verb-copy constructions	23
4.5	Summary	25
5	On comparative deletion	25
5.1	Obligatory deletion and the lack of subcomparatives	25
5.2	Licensing by parallelism domains	27
5.3	Adverbial comparatives	30
5.4	A note on the size of ellipsis	32
6	Mandarin Chinese lacks degree abstraction	34
6.1	A preliminary: The lack of embedded standards	36
6.2	Matching embedded target and standard clauses	38
6.3	Attributive comparatives	41
7	Conclusion	46

1 Introduction

Recent literature has documented significant variation in the syntactic and semantic strategies employed by different languages in the expression of comparison and, more generally, in making claims about the degree to which gradable predicates are true. An important goal is to understand the *shape* of this variation, for example by the identification of parameters by which languages may vary. One controversial parameter that has been proposed is the *Degree Abstraction Parameter* of Beck et al. (2004):

(1) **Beck et al.’s (2004) Degree Abstraction Parameter (DAP):**


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

Given a language that has degrees in its semantic ontology, Beck et al. (2004) claims through the proposal of the DAP that some languages are unable to construct complex predicates of degrees by abstracting over a degree argument.¹

An example of a structure which would be banned by the negative setting of the DAP is the clausal standard in the English comparative in (2) below. It has been well established since Bresnan (1973) and Chomsky (1977) that the structure of such clausal standards involve \bar{A} -movement of a null operator of degree type. The null operator movement is interpreted as λ -abstraction over a degree variable—here, the degree argument of the gradable predicate *tall*. (For movement interpreted as λ -abstraction, see e.g. Heim and Kratzer, 1998.)

(2) **A clausal standard interpreted using degree abstraction:**

John is taller than $[\text{standard } \lambda d [\text{TP Mary is } d\text{-tall}]]$.



This results in the interpretation of the standard as a $\langle d, t \rangle$ predicate of degrees: $[\text{standard}] = (\lambda d . \text{Mary is } d\text{-tall})$. The entire comparative in (2) is true if and only if John’s height exceeds the maximal degree which satisfies the derived predicate $[\text{standard}]$.

Against this theoretical backdrop, in this paper I investigate the canonical comparative construction in Mandarin Chinese, the *bǐ* comparative, which I claim exemplifies a heretofore undescribed type of comparative: *a clausal comparative in a language without degree abstraction*.²

A simple example of a *bǐ* comparative is given in (3):

(3) Yuēhàn bǐ Mǎlì gāo.

John bǐ Mary tall

‘John is taller than Mary.’

A currently widely accepted view is that the standard in a *bǐ* comparative is *not* a clausal structure, in contrast to the standard in the English example (2) above (Xiang, 2003, 2005; Erlewine,

¹The statement of the DAP may at first glance sound much broader, but the key here is *in the syntax*. Individual lexical items which take degree arguments, which will therefore locally bind degree variables within their lexical entry, are *not* meant to be ruled out by a negative setting of the DAP.

Beck et al. (2009, p. 19) proposes a separate parameter, the *Degree Semantics Parameter*, which controls whether or not a language has gradable predicates (predicates which take arguments of degree type) in the lexicon. I take as my starting point the fact that Mandarin Chinese does have degrees in its semantic ontology as well as gradable predicates as lexical items, and therefore this Degree Semantics Parameter will not be discussed here. See Beck et al. (2009) for explicit discussion of this question and supporting arguments.

²The *bǐ* comparative construction is so-called for its use of the *bǐ* (比) morpheme. This morpheme 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*.

2007; Lin, 2009, a.o.). These so-called “phrasal” approaches have a What You See Is What You Get character: for example, the standard ‘Mary’ in (3) would be analyzed syntactically as simply a DP denoting the individual Mary. The syntax and semantics of such phrasal analyses will be presented in more detail.

In this paper I will argue instead that the *bǐ* comparative is always a clausal comparative. The underlying structure that I propose for example (3) is sketched in (4) below. Obligatory ellipsis results in the surface string in (3).

(4) **Proposed structure for (3):**

[*target clause* John [*predicate* tall]] *bǐ* [*standard clause* Mary [*predicate* tall]]

Evidence for this clausal analysis comes from *bǐ* comparatives which involve various overt movement chains. These movement chains will show that there must be *two* instances of the gradable predicate in each *bǐ* comparative—one forming a clause with the target (‘John’ above) and one forming a clause with the standard—thereby necessitating a clausal analysis.

Both the “target clause” and “standard clause” in *bǐ* comparative structures as in (4) will semantically denote type $\langle d, t \rangle$ predicates of degrees, just like the clausal standard in the English comparative (2). However, I will show that the interpretation of the *bǐ* comparative does not—and in fact, cannot—utilize degree abstraction, unlike the English structure sketched in (2). This will form my primary argument that *Mandarin Chinese lacks degree abstraction*, i.e. has the negative setting of Beck et al.’s (2004) DAP (1). I will supplement this argument with discussion of attributive comparatives. By showing the existence of a language without degree abstraction, this work also offers support for the existence of Beck et al.’s (2004) controversial DAP itself.

Of course, there then remains a question regarding the interpretation of the target and standard clauses in the *bǐ* comparative: how can these denote type $\langle d, t \rangle$ predicates of degrees if degree abstraction is not available? I propose that gradable predicates in Mandarin Chinese always have the option of taking their degree argument last, allowing them to saturate all other arguments first and end up with a $\langle d, t \rangle$ description. I will refer to this property as *Degree Last*:

(5) **Degree Last:**

Gradable predicates can take their degree argument as their last argument.

Concrete implications of the Degree Last property for the inventory of lexical items in Mandarin Chinese, as well as for the cross-linguistic typology of degree constructions, will be discussed.

I begin in the next section with background on the syntax and semantics of clausal and phrasal comparison. I then present my proposal for the *bǐ* comparative as a clausal comparative in section 3. I present evidence for the clausal approach in section 4 and then discuss further details of the ellipsis observed in the *bǐ* comparative (see (4) in section 5). In section 6 I demonstrate that the derivation of *bǐ* comparative constructions cannot involve degree abstraction, and argue that Mandarin Chinese generally lacks degree abstraction. I propose that Mandarin gradable predicates always take their degree arguments last, allowing for the construction of a clausal comparative without degree abstraction, and discuss this Degree Last property. I conclude in section 7.

2 Analyzing comparison

The analysis of comparative constructions such as (6b) yields a puzzle for compositionality. The gradable predicate “tall” in its positive form in (6a) takes one argument to satisfy its syntactic and semantic valency. In its comparative form in (6b), on the other hand, the predicate composes with both a *target* “John” and a *standard* “Mary,” in order to assert that the “tallness of John” exceeds the

“tallness of Mary.” The key question, then, is how does the gradable predicate compose with both the target and the standard in (6b), given that it composes with just one argument in its positive form (6a)?

- (6) a. John is **tall**. *positive form*
 b. John is **taller** than Mary. *comparative form*

We can ask this same question of the Mandarin *bǐ* comparative as well. The basic word order of the Mandarin *bǐ* comparative is given in (7) below:

- (7) **The *bǐ* comparative construction:**
 Word order: “target *bǐ* standard gradable predicate”
 Meaning: ‘*target* is more *predicate* than *standard* is *predicate*.’

Consider example (8) below, repeated from (3). The scale of comparison is introduced linguistically through the predicate *gāo* ‘tall.’ Formally, gradable predicates relate entities (such as individuals, states, or events) to degrees (Cresswell, 1976), as in (9).

- (8) Yuēhàn bǐ Mǎlì gāo.
 John BI Mary tall
 ‘John is taller than Mary.’
 (9) $\llbracket gāo \text{ ‘tall’} \rrbracket = \lambda d . \lambda x . x \text{ is } d\text{-tall}$ type $\langle d, \langle e, t \rangle \rangle$

The truth conditions of (8), in (10) below, 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 argument, composes with both ‘John’ and ‘Mary.’

- (10) $\llbracket (3/8) \rrbracket = \max(\lambda d . \text{John is } d\text{-tall}) > \max(\lambda d . \text{Mary is } d\text{-tall})$

The solutions developed in the literature fall broadly into two categories, which I will refer to here as *clausal comparison* and *phrasal comparison*. In clausal comparison, the standard of comparison is syntactically a clause which includes its own gradable predicate. In phrasal comparison, the standard of comparison is a phrase and the comparative operator does the work of composing the standard with the gradable predicate in the semantics. The relevant properties are summarized here in (11–12).

- (11) **Clausal comparison:** (= “Reduction Analysis”; 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 forms a clause with the target and the other forms a clause with the standard.
 (12) **Phrasal comparison:** (= “Direct Analysis”; see Heim 1985)
 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.

See also Bhatt and Takahashi (2007, 2011) and additional citations there for discussion of these two approaches.

These approaches can be illustrated using familiar examples from English. Conveniently, English has been argued to have two different types of comparative constructions:

(13) **Two types of comparatives in English:**

a. John is taller than [_{DP} Mary].

phrasal comparative (=6b)

b. John is taller than [_{clause} Mary is ____].

clausal comparative

Example (6b), repeated as (13a) here, is an example of a comparative with a phrasal standard.³ In contrast, the standard in example (13b) is clearly a clause with an elided predicate, simply annotated here as a gap. I will refer to such deletion of material in comparative constructions using the term *comparative deletion*, originally introduced by Bresnan (1975).⁴

In the following subsections I will discuss the two approaches in further detail, presenting their compositional semantics and formalizing the requisite syntax. I will also briefly review previous work on the Mandarin *bǐ* comparative that have taken these approaches.

2.1 Clausal comparison

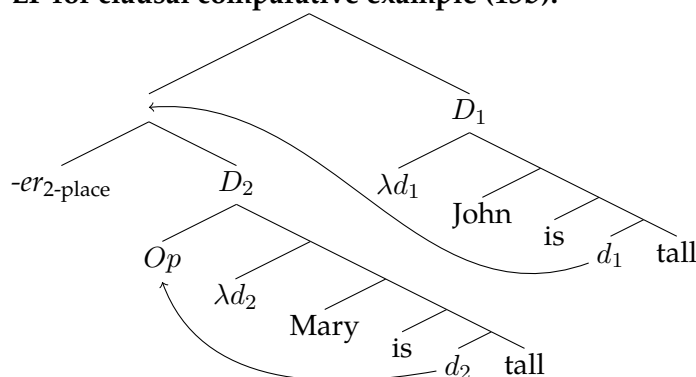
In the clausal comparison approach, there are underlyingly two instances of the gradable predicate in the syntax: one for the target and one for the standard. The degree descriptions (predicates of degrees) to be compared are standardly constructed by \bar{A} -movement of a null operator (Bresnan, 1973; Chomsky, 1977). Evidence for this \bar{A} -dependency in English has come from the availability of embedded standards such as in (14) and the island-sensitivity of the region between the edge of the standard clause, introduced by *than*, and the gap (15).

(14) John is taller than [Mary thinks [that he is ____]].

(15) * John is taller than [Mary believes [island the claim [that he is ____]]].

Here I will sketch the derivation of the basic clausal standard example (13b), *John is taller than Mary is*. Movement of the comparative operator *-er* with the standard clause occurs in order to construct the degree description for the target (Wold, 1995; Heim, 2000; Bhatt and Pancheva, 2004).⁵ This results in an LF as in (16) below, where the two degree-denoting expressions are labeled D_1 and D_2 . D_1 is the predicate of degrees true if and only if John is (at least) that tall and D_2 is the predicate of degrees true if and only if Mary is (at least) that tall.

(16) **LF for clausal comparative example (13b):**



³We might imagine that the structure in (13a) is also underlyingly clausal, as in (13b), but with a larger constituent elided, yielding the illusion of a small, phrasal standard. See Hankamer (1973) for classic arguments that this is not the case and see also recent discussion in Bhatt and Takahashi (2007, 2011).

⁴Here I use “comparative deletion” as a cover term which also includes comparative ellipsis; see also Napoli (1983) on the distinction and Corver (2005) for a broader overview.

⁵Non-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 6, the derivation of Mandarin *bǐ* comparatives does not involve such movement steps.

Once degree descriptions for the target and the standard have been constructed, the comparative operator simply selects for these two degree predicates and asserts a ranking between the maximal degrees satisfying each.

(17) **A two-place *-er* for clausal comparison:**

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

In the case of example (13b) derived as (16), we yield the following truth conditions:

$$\begin{aligned} (18) \quad \llbracket (13b) \rrbracket &= \llbracket \text{-er}_{2\text{-place}} \rrbracket (D_2)(D_1) \\ &= \llbracket \text{-er}_{2\text{-place}} \rrbracket (\lambda d_2 . \text{Mary is } d_2\text{-tall})(\lambda d_1 . \text{John is } d_1\text{-tall}) \\ &= \max(\lambda d_1 . \text{John is } d_1\text{-tall}) > \max(\lambda d_2 . \text{Mary is } d_2\text{-tall}) \end{aligned}$$

To summarize, in clausal comparison, 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.

Liu (1996) presents an analysis of Mandarin *bǐ* comparatives as clausal comparison with an obligatory comparative deletion operation eliding one of the the gradable predicates, resulting in the surface word order with just one pronounced instance of the gradable predicate. Liu’s (1996) approach for Mandarin assumes a null degree operator movement for the construction of degree descriptions, as in (16) above, modeled after the analysis of English clausal comparatives in Chomsky (1977) without independent argumentation for its use in Mandarin. (See also footnote 6 below.) Hsieh (2015) presents an argument from the binding of the *zìjǐ* reflexive and its “blocking effect” for the *bǐ* comparative being a clausal comparative, but without a full analysis; a similar argument from the blocking effect of *zìjǐ* is presented in Erlewine (2010). In the interest of space, this argument from binding will not be presented here.

Before moving on to the phrasal comparison approach, I will note one variant of clausal comparison that will become important later in this paper. In the clausal comparison approach demonstrated above in (16), the two degree descriptions were constructed by movement of a degree-type operator, abstracting over a lower degree variable. In theory, it is also possible to construct degree descriptions of this sort without employing degree abstraction, if the gradable predicates involved take their degree argument as their innermost (last) argument—a possibility I discuss further for Mandarin Chinese. For example, consider a denotation for *tall* as in (19a), which takes its degree argument last. The result of *tall* combining with a subject results in a degree description of type $\langle d, t \rangle$ as in (19b), without the use of degree abstraction. The two-place *-er* (17) could then simply take two of these degree descriptions and assert a comparative over them.

(19) **Hypothetical clausal comparison without degree abstraction:**

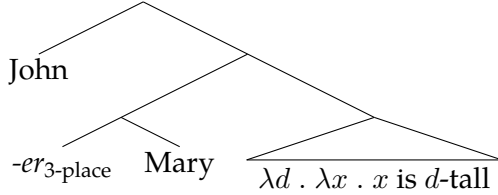
- a. $\llbracket \text{tall} \rrbracket = \lambda x . \lambda d . x \text{ is } d\text{-tall}$ type $\langle e, \langle d, t \rangle \rangle$ (cf 9)
- b. $\llbracket \text{John is tall} \rrbracket = \lambda d . \text{John is } d\text{-tall}$
- c. $\llbracket \text{John is taller than Mary is} \rrbracket = \llbracket \text{-er}_{2\text{-place}} \rrbracket (\llbracket \text{Mary is tall} \rrbracket) (\llbracket \text{John is tall} \rrbracket)$
 $= \llbracket \text{-er}_{2\text{-place}} \rrbracket (\lambda d_2 . \text{Mary is } d_2\text{-tall})(\lambda d_1 . \text{John is } d_1\text{-tall})$
 $= \max(\lambda d_1 . \text{John is } d_1\text{-tall}) > \max(\lambda d_2 . \text{Mary is } d_2\text{-tall})$

(19) is not meant to be a proposal for English clausal comparatives, but rather is a proof of concept for clausal comparison without the use of degree abstraction. The point here is that the clausal approach does not itself necessitate degree abstraction, although the two are usually employed together and degree abstraction is certainly necessary for the derivation of embedded standards. Clausal comparison without degree abstraction, similar to what is sketched in (19), is ultimately what I will propose for the Mandarin *bǐ* comparative.

2.2 Phrasal comparison

Consider next the derivation of the basic phrasal standard example (13a) *John is taller than Mary*. A standard phrasal analysis posits an LF for such comparatives as in (20) (Heim, 1985; Bhatt and Takahashi, 2011). See Bhatt and Takahashi (2011) for discussion of the covert movement operations which would yield (20) from its surface structure.

(20) **LF for phrasal comparative example (13a):**



The LF in (20) 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).

(21) **A three-place *-er* for phrasal comparison:**

$$\llbracket -er_{3\text{-place}} \rrbracket = \lambda y_e . \lambda G_{\langle d, \langle e, t \rangle \rangle} . \lambda x_e . \max(\lambda d_1 . G(d_1)(x)) > \max(\lambda d_2 . G(d_2)(y))$$

This yields the following truth conditions for (13a):

$$\begin{aligned} (22) \quad \llbracket (13a) \rrbracket &= \llbracket -er_{3\text{-place}} \rrbracket (\text{Mary})(\lambda d . \lambda x . x \text{ is } d\text{-tall})(\text{John}) \\ &= \max(\lambda d_1 . (\lambda d . \lambda x . x \text{ is } d\text{-tall})(d_1)(\text{John})) > \\ &\quad \max(\lambda d_2 . (\lambda d . \lambda x . x \text{ is } d\text{-tall})(d_2)(\text{Mary})) \\ &= \max(\lambda d_1 . \text{John is } d_1\text{-tall}) > \max(\lambda d_2 . \text{Mary is } d_2\text{-tall}) \end{aligned}$$

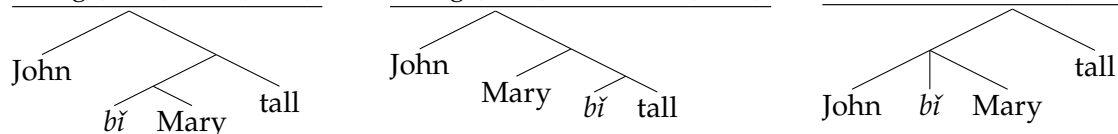
Note that in (20), there are no syntactic objects that correspond to the degree descriptions $(\lambda d . \text{John is } d\text{-tall})$ or $(\lambda d . \text{Mary is } d\text{-tall})$. There is only one instance of the gradable predicate in the syntax, which then composes with the target and the standard in the semantics. More precisely, the construction of the degree descriptions takes place entirely within the process of evaluating $-er_{3\text{-place}}$.

A number of recent proposals have given a phrasal comparative analysis for the Mandarin *bǐ* comparative (Xiang, 2003, 2005; Erlewine, 2007; Lin, 2009).⁶ One motivation cited for adopting a phrasal comparative approach is the lack of so-called *subcomparative* constructions and embedded standards in Mandarin, the latter illustrated in English in example (14). I will discuss these facts in more detail in sections 5.1 and 6.1.

Based on the surface word order of the *bǐ* comparative, we can imagine at least three different structural relationships between the target, standard, gradable predicate, and *bǐ*:

⁶Liu (2011) proposes a “hybrid analysis,” wherein both clausal and phrasal *bǐ* comparatives exist in Mandarin Chinese, with the clausal comparative derivation based on the proposal in Liu (1996). The arguments I present against all phrasal comparative approaches will also apply to Liu’s (2011) phrasal analysis, thus invalidating the hybrid analysis itself.

- (23) **Some possible phrase structures for a phrasal analysis of the *bǐ* comparative:**
 a. Xiang (2003); Lin (2009): b. Xiang (2005); Erlewine (2007): c. Keenan and Moss (1985):

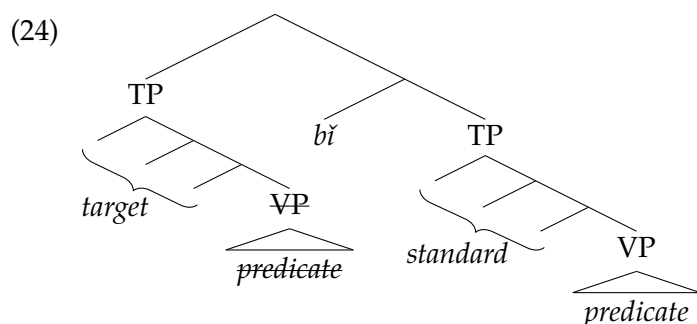


These different structural options require *bǐ* to take its arguments in different orders.⁷ For the purposes of the discussion here, however, the differences between the options in (23) are immaterial. They all share the defining characteristics of a phrasal comparative: (a) there is only one instance of the gradable predicate in the derivation and (b) the comparative operator acts as the “glue” to semantically compose the target with the predicate and the standard with the predicate.

In the following section I will present my proposal which takes a clausal comparative approach, where each *bǐ* comparative includes two instances of the predicate of comparison in the syntax. Then in section 4 I will argue that no phrasal analysis—regardless of the particular phrase structure chosen—can adequately model the Mandarin *bǐ* comparative.

3 Proposal

I propose that the Mandarin *bǐ* comparative is a clausal comparative. 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 morpheme *bǐ* is then categorically a clausal conjunction, although the comparative meaning that it introduces is asymmetric (cf Moltmann, 1992). This configuration is schematized in (24).⁸ A Comparative Deletion Requirement will be proposed, yielding the final word order with only one instance of the predicate pronounced.



⁷The structure in (23a) would require *bǐ* to have semantic type $\langle e, \langle \langle d, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle \rangle$. Beck et al. (2012) calls this variant $-er_{\text{Heim}}$ after Heim (1985). (23b) would require *bǐ* to have semantic type $\langle \langle d, \langle e, t \rangle \rangle, \langle e, \langle e, t \rangle \rangle \rangle$. Beck et al. (2012) calls this variant $-er_{\text{Kennedy}}$ after Kennedy (1997). The original formulation in Kennedy (1997, p. 143, #134c) has a slightly different type signature (because Kennedy (1997) views gradable predicates as measure functions of, for example, type $\langle e, d \rangle$) but the order of composition is the same as in (23b) above. The structure in (23c) would have *bǐ* with a type signature of $\langle e, \langle e, \langle d, \langle e, t \rangle \rangle \rangle \rangle$, assuming binary branching within the constituent “John *bǐ* Mary.”

⁸Derivations will be given here with (a) no extended projections for VP or AP and (b) base-generation of subjects in Spec,TP, for ease of illustration. The proposal made here is also compatible with the predicate-internal subject hypothesis (Kuroda, 1988; Kitagawa, 1986; Koopman and Sportiche, 1991, a.o.)—as has been proposed for Mandarin in Huang (1993). The only substantive difference will be due to the movement of the subject from the predicate-internal position (e.g. Spec,vP) to Spec,TP. However, if such movements happen in parallel in both the target and standard clauses, they will not adversely affect the licensing of ellipsis. See section 4.1 for the derivation of a comparative involving parallel subject raising. See also footnote 15 below.

A clausal comparison 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 three ways: (a) I provide empirical evidence that necessitates the use of clausal analysis over a phrasal one (in section 4), (b) I explicitly describe the mechanics of the ellipsis operation used and discuss its motivations and corollaries, and (c) the clausal analysis proposed does not involve degree abstraction.

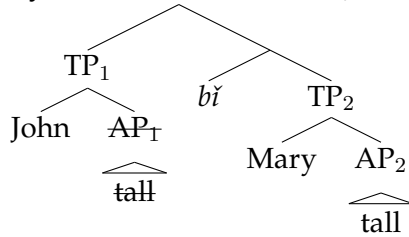
For concreteness, I will illustrate this proposal with our basic example (3), repeated here as (25). We'll first look at the syntactic derivation before turning to the compositional semantics.

- (25) Yuēhàn bǐ Mǎlì gāo.
 John BI Mary tall
 'John is taller than Mary.'

3.1 Syntactic derivation

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

- (26) Syntactic derivation for "John *bǐ* Mary tall" (3/25):



For concreteness, I assume that the standard TP is the complement of *bǐ* (TP₂) and therefore linearized to follow *bǐ* and the target TP is in a specifier position (TP₁) and linearized to precede *bǐ*.

In order to derive our final word order, the predicate inside TP₁ must be elided. To ensure that this ellipsis takes place, I propose the Comparative Deletion Requirement (27) below:

- (27) **Comparative Deletion Requirement (CDR):**

In a *bǐ* comparative, elide a *local predicate* (28) of the target TP under identity with a local predicate of the standard TP. If the target TP has no elidable local predicate, the derivation is illicit.

- (28) **Definition: Local predicate**

Given a TP β , α is a *local predicate* of β iff (a) α is a VP or a predicative AP, (b) β dominates α , and (c) there is no TP which dominates α and is dominated by β .

The ellipsis enforced by the CDR joins instances of comparative deletion in other languages in having the interesting property of being obligatory: if the required ellipsis does not take place, the resulting *bǐ* comparative is ungrammatical. This obligatoriness of comparative deletion contrasts with other instances of ellipsis outside of comparatives, which are optional. A deeper explanation for this property of comparative deletion is beyond the scope of this paper. See Kennedy (2002) for extensive data and discussion.⁹

⁹Two other properties of comparative deletion in the *bǐ* comparative make it notable: first, that the deletion is backwards, in the sense that the elided "gap" position linearly precedes its antecedent; and second, that the elided gap cannot

Furthermore, 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).¹⁰ Takahashi and Fox's (2005) formulation of this mechanism is paraphrased in (29–30).

(29) **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 (30). Call this constituent the *Parallelism Domain*, PD.

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

PD must be semantically identical to an *Antecedent Constituent*, AC, modulo focus-marked constituents: there exists a focus alternative PD_{Alt} , $\llbracket PD_{Alt} \rrbracket \in \llbracket PD \rrbracket^f$, such that for every assignment function g , $\llbracket AC \rrbracket^g = \llbracket PD_{Alt} \rrbracket^g$.¹¹

For the basic example (25), illustrated in (26) above, we can simply use the predicative APs themselves as the Parallelism Domain and its antecedent: $PD = AP_1$, $AC = AP_2$. $\llbracket AC \rrbracket = \llbracket PD \rrbracket \in \llbracket PD \rrbracket^f$, licensing ellipsis of the AP 'tall' within TP_1 and satisfying the CDR. This yields the observed word order in (25), as desired.

3.2 Compositional semantics

Next we turn our attention to the compositional semantics of the *bǐ* comparative. Unlike English *-er* which may be ambiguous between a two-place comparative operator and three-place one, *bǐ* is unambiguous; *bǐ* is a two-place comparative operator, equivalent in denotation to *-er*_{2-place} above.¹² It will take two degree expressions of type $\langle d, t \rangle$ —composing first with the standard clause (D_2) and then with the target clause (D_1)—and assert that the maximum of the target's degree description (D_1) is greater than the standard's (D_2).¹³

be in an embedded clause in the target clause, and its antecedent cannot be in an embedded clause in the standard clause.

Deletion with these properties is also observed in other languages, in particular in processes targeting coordinate structures. Right Node Raising has been argued to be a form of backwards deletion in this sense (Wexler and Culicover, 1980; Kayne, 1994; Bošković, 2004; Chalcraft, 2006). Gapping also exhibits a requirement that the deleted constituent and its antecedent cannot be embedded (Hankamer, 1979), as illustrated through the minimal pair in (i–ii) from Johnson (2009, p. 293). See Toosarvandani (to appear) for discussion and a recent analysis of gapping as ellipsis.

- (i) ✓ Some had eaten mussels and others ____ shrimp.
- (ii) * Some had eaten mussels and she claims that others ____ shrimp.

The comparative deletion in *bǐ* comparatives, analyzed here as a coordinate structure, is thus a case of ellipsis which exhibits these two properties which are each separately observable in other coordinate structures.

¹⁰ All cases of movement discussed in this paper are instances of overt movement. I therefore assume that the representations evaluated at the PF and LF interfaces are identical modulo comparative deletion.

¹¹ $\llbracket \cdot \rrbracket^f$ is the focus value denotation function. See Rooth (1992b) for more on the computation of focus-semantic values.

¹² I propose here that the semantic function of *bǐ* is to introduce the ranking between the target and the standard, equivalent to the semantics ascribed to *-er* in section 2 and in much previous literature, but its syntactic function could be described as more similar to the standard marker *than*. Alrenga et al. (2012) proposes that it is in fact the semantic function of the standard marker (e.g. *than*) to introduce the ordering, cross-linguistically. This approach would allow us to draw a closer parallel between the inventory in English and Mandarin. See Alrenga et al. (2012) for further details.

¹³ The *bǐ* comparative in Mandarin can optionally take a differential, with the differential following the gradable predicate. Semantically, the differential would be an argument of the comparative operator, *bǐ*, with a modified comparative semantics which specifies the differential as equal to the difference $\max(D_1) - \max(D_2)$. I will leave an extension of the proposal here to *bǐ* comparatives with differentials for future work. See Xiang (2005) for extensive discussion of differentials in Mandarin comparatives.

(31) ***bǐ* is the familiar two-place comparative operator:**

$$\llbracket bǐ \rrbracket = \llbracket er_{2\text{-place}} \rrbracket (17) = \lambda D_2 \langle d, t \rangle . \lambda D_1 \langle d, t \rangle . \max(D_1) > \max(D_2)$$

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 proposal of the Degree Last property (32) for Mandarin Chinese:¹⁴

(32) **Degree Last: (=5)**

Gradable predicates can take their degree argument as their last argument.

Thus, the predicate *gāo* ‘tall’ will be available with the type signature $\langle e, \langle d, t \rangle \rangle$, instead of the more commonly assumed type $\langle d, \langle e, t \rangle \rangle$:

$$(33) \llbracket gāo \text{ ‘tall’} \rrbracket = \lambda x . \lambda d . x \text{ is } d\text{-tall}$$

The advantage of Degree Last is seen in the semantic interpretation of (25) in (34) below:

(34) **Semantic computation for “John *bǐ* Mary tall” (3/25):**

$$\begin{aligned} & \llbracket bǐ \rrbracket (\llbracket TP_2 \rrbracket) (\llbracket TP_1 \rrbracket) \\ &= \max(\llbracket TP_1 \rrbracket) > \max(\llbracket TP_2 \rrbracket) \\ &= \max(\lambda d . \text{John is } d\text{-tall}) > \max(\lambda d . \text{Mary is } d\text{-tall}) \end{aligned}$$

$$\begin{array}{c} TP_{1, \langle d, t \rangle} \\ \lambda d . \text{John is } d\text{-tall} \\ \swarrow \quad \searrow \\ \text{John}_e \quad AP_{\langle e, \langle d, t \rangle \rangle} \\ \quad \quad \quad \downarrow \\ \quad \quad \quad \text{tall} \\ \quad \quad \quad \lambda x . \lambda d . x \text{ is } d\text{-tall} \end{array}$$

$$\begin{array}{c} TP_{2, \langle d, t \rangle} \\ \lambda d . \text{Mary is } d\text{-tall} \\ \swarrow \quad \searrow \\ \text{Mary}_e \quad AP_{\langle e, \langle d, t \rangle \rangle} \\ \quad \quad \quad \downarrow \\ \quad \quad \quad \text{tall} \\ \quad \quad \quad \lambda x . \lambda d . x \text{ is } d\text{-tall} \end{array}$$

In each clause, the gradable predicate of type $\langle e, \langle d, t \rangle \rangle$ composes with the subject through functional application. This results in two degree descriptions of type $\langle d, t \rangle$: the target clause TP_1 describes the height of John and the standard clause TP_2 corresponds to the height of Mary. The standard two-place comparative operator (31) 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 a clausal comparative which does not involve degree abstraction.

In the next section, I will present a new argument that shows that the *bǐ* comparative must be clausal comparison as proposed here, rather than phrasal comparison. Then in section 5 I will return to discuss details of the ellipsis proposed in the CDR. Evidence that degree abstraction is not used in the *bǐ* comparative—and in fact, that Mandarin Chinese therefore must generally lack degree abstraction—will then be presented in section 6.

¹⁴An alternative approach would be to make all gradable predicates measure functions that return their maximal degree after saturating all their arguments (Heim, 1985; Kennedy, 1997, a.o.). For example, *tall* would have a type signature of $\langle e, d \rangle$ under such a system. For the purposes of this paper, this measure function approach is completely equivalent to the Degree Last proposal made here and could be adopted for the Mandarin Chinese facts. Here I choose the technical variant which does not require varying the definition of the two-place comparative operator (31), albeit only notationally.

4 The argument from parallel movements

The most important characteristic of my proposal is that the derivation of each *bī* comparative includes two instances of the predicate in the syntax, i.e. that it is a clausal comparative. I will present evidence in support of the clausal approach from what I term *parallel movement* constructions: comparatives which involve both movement from the predicate to the target and movement from the predicate to the standard. This configuration is schematized here:

(35) Pronounced word order of a comparative with parallel movement:

$$\underbrace{\dots \alpha_1 \dots}_{\text{target}} \quad \text{b} \check{\text{ř}} \quad \underbrace{\dots \alpha_2 \dots}_{\text{standard}} \quad \underbrace{\dots t_\alpha \dots}_{\text{predicate}}$$

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.

Parallel movements can be straightforwardly captured under a clausal analysis as the derivation includes two TPs, which can each involve movement operations available in Mandarin simplex clauses:

(36) **Proposed structure for parallel movement examples:**

$$[target\ clause \ \dots \ \overset{\uparrow}{\alpha_1} \ \dots \ [\underline{predicate \ \dots \ t_\alpha \ \dots}]] \text{ bI } [standard\ clause \ \dots \ \overset{\uparrow}{\alpha_2} \ \dots \ [predicate \ \dots \ t_\alpha \ \dots \]]$$

Under a phrasal analysis, though, there is only one instance of the predicate in the syntax and it is therefore impossible to derive the two α -movement chains: 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*. The existence of such comparatives therefore constitutes a strong argument in favor of the clausal analysis of the *bī* comparative.

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.

4.1 Subject raising and reconstruction

The first case of parallel movements will come from subject raising. A sentence like (37a) and its Mandarin counterpart (37b) are observed to have two distinct readings differing in the scope of the subject indefinite 'an Australian.' In the wide scope indefinite reading, the speaker asserts that there is an Australian who has the property of being likely to win the race, while in the narrow scope indefinite reading the speaker asserts that it is likely that there is some Australian who will win the race.

(37) **Wide and narrow scope indefinite readings:**

- a. An Australian is likely to win the race.
b. Àozhōurén yǒukěnéng yíng zhè chǎng bǐsài.
Australian likely win this CL competition

Wide scope: 'There is a (specific) Australian who is likely to win the race.'

$\exists > \textit{likely}$

Narrow scope: 'It is likely that some Australian will win the race.'

 $likely > \exists$

The existence of the narrow scope indefinite 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 narrow scope indefinite reading (see May, 1977). Note that Lin and Tang (1995) argues that epistemic modals in Mandarin, of which *yǒukěnéng* is one, are raising verbs.¹⁵

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*. We see in (38b) that this reading is indeed available.¹⁶

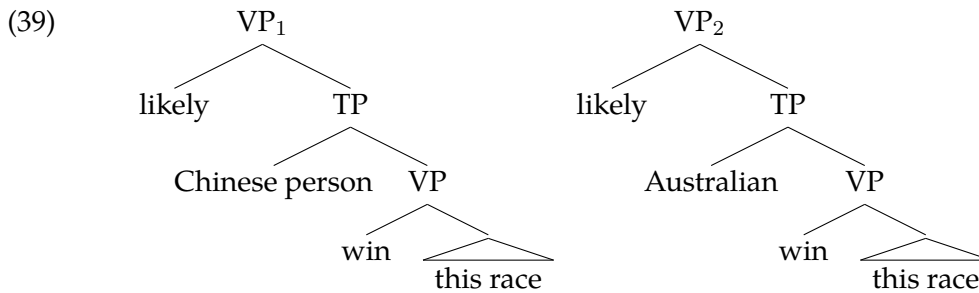
(38) **Both target and standard can reconstruct at the same time:**

Zhōngguó rén bǐ Àozhōu rén yǒukěnéng yíng zhè chǎng bǐsài.
Chinese person BI Australian likely win this CL competition

- a. ✓ Wide scope/wide scope: 'There is a (specific) Chinese person and a (specific) Australian such that the Chinese person is more likely to win the race than the Australian.'
 $\exists^2 > \text{likely}$
- b. ✓ Narrow scope/narrow scope: 'It is more likely that some Chinese person will win the race than that an Australian will.'
 $\text{likely} > \exists^2$

Given the availability of the narrow scope/narrow scope reading in (38b), we know that *both subjects* must have been raised from within the complement of *likely*. In the clausal analysis proposed here, this can be accounted for straightforwardly, as the derivation includes two instances of the predicate.

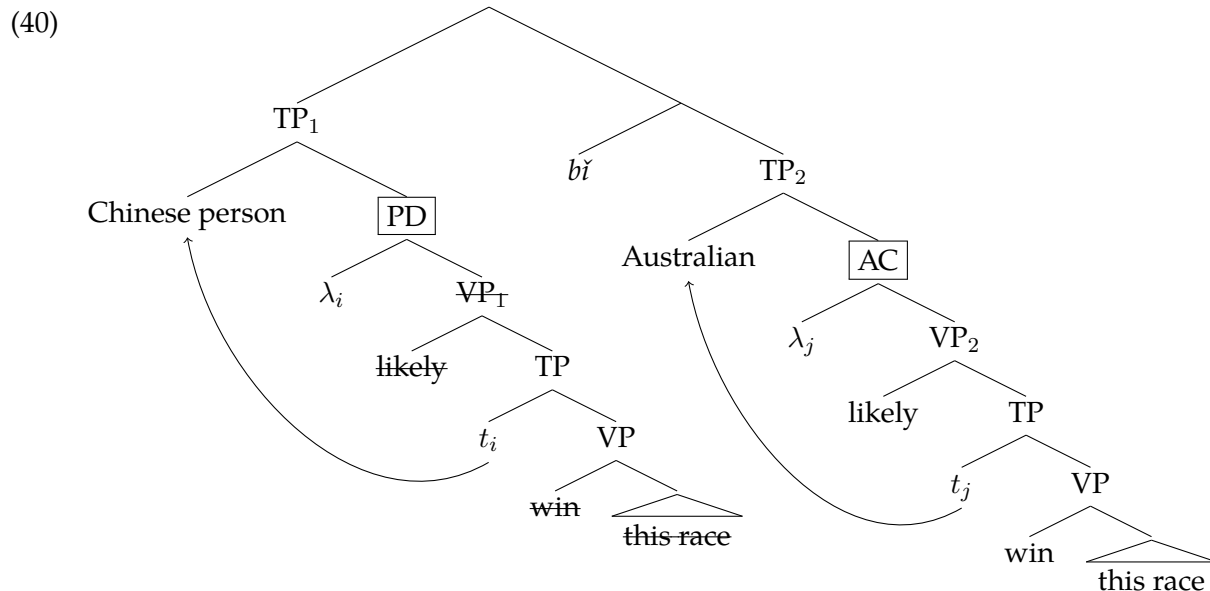
We begin by generating one instance of 'likely' and its nonfinite complement which includes 'Chinese person,' and one instance of 'likely' with its own complement which includes 'Australian.' Note that at this point, VP₁ cannot be elided under identity with VP₂, as they are not semantically identical: VP₁ contains the DP 'Chinese person' and VP₂ contains the DP 'Australian.' However, the two trees are otherwise structurally identical.



¹⁵Here I concentrate on examples with the raising verb *yǒukěnéng*, but similar effects obtain due simply to the predicate-internal subject hypothesis as well; see footnote 8 above. For example, an anonymous reviewer notes that the same contrasts observed here in (37) and the test case (38) below can also be observed with the adverb *róngyì* 'easily' in place of the raising verb *yǒukěnéng* 'likely.' Under the predicate-internal subject hypothesis, the subject would be base-generated within the scope of 'easily' and then moves above it, leading to the same scope possibilities observed here.

¹⁶The logic of this argument draws from Grosz (2015). I thank Patrick Grosz for discussion of the argument in this section.

The raising of these DPs out of their respective VPs is what will enable ellipsis of the desired size. In (40) 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 -binders associated with movement.



The CDR requires that we elide the local predicate of TP₁ and to do so, we must identify a Parallelism Domain which satisfies the Ellipsis Parallelism condition (30), repeated here:

(41) **Ellipsis Parallelism (Takahashi and Fox, 2005):** (=30)

PD must be semantically identical to an *Antecedent Constituent*, AC, modulo focus-marked constituents: there exists a focus alternative PD_{Alt}, $\llbracket \text{PD}_{\text{Alt}} \rrbracket \in \llbracket \text{PD} \rrbracket^f$, such that for every assignment function g , $\llbracket \text{AC} \rrbracket^g = \llbracket \text{PD}_{\text{Alt}} \rrbracket^g$.

In particular, the semantic identity enforced by (30) 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 the trace of ‘Chinese person’ (Takahashi and Fox, 2005; Hartman, 2011). We thus choose the projection marked PD in (40) as the relevant Parallelism Domain. $\llbracket \text{PD} \rrbracket = \llbracket \text{AC} \rrbracket = (\lambda x . \lambda d . \text{it is } d\text{-likely that } x \text{ win the race})$, and so we satisfy the Parallelism requirement in (30) and are able to elide the local predicate VP₁.

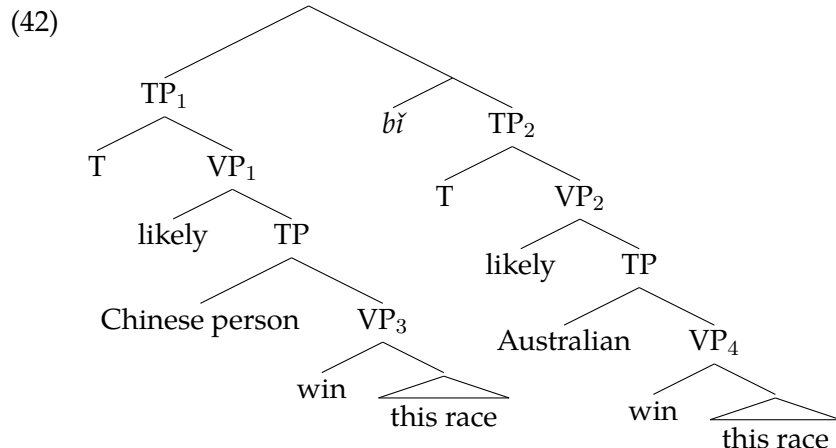
With a clausal comparative derivation as in (40), both subjects are independently raised out of the complement of a raising verb, and can reconstruct for interpretation. This yields the availability of the narrow scope/narrow scope reading in (38b).

Furthermore, the proposal here also accurately rules out a variant of the derivation in (40) which cannot result in a grammatical comparative. Consider a hypothetical variant of (40), where the subjects have not raised out of the lower TPs. This is illustrated in the tree in (42). I posit that there is no grammatical comparative that results from this derivation.¹⁷

¹⁷Note that *yǒukěnéng* is in general an optionally raising verb, allowing for both the word order in (37b) above with a raised subject and in (i) below with an unraised subject:

- (i) Yǒukěnéng Àozhōurén yíng zhè chǎng bǐsài.
likely Australian win this CL competition
‘It is likely that an Australian will win this race.’

Although the detailed semantic computation is not illustrated here in (42), the semantic interpretation would con-



The issue with (42) will be how it is able to satisfy the CDR. Consider first the ellipsis of VP₁ in the target clause. Deletion of VP₁ would make the constituent ‘Chinese person’ have no presence in the surface form, violating the Recoverability Condition on Deletion (Katz and Postal, 1964, see also Fiengo and Lasnik, 1972).¹⁸ Next consider the deletion of VP₃, which would lead to the surface string in (43) below. I note first that this result is ungrammatical:

- (43) * Yǒukěnéng Zhōngguórén bǐ yǒukěnéng Àozhōurén yíng zhè chǎng bǐsài.
 likely Chinese person *bǐ* likely Australian win this CL competition
 Int.: ‘It is more likely that a Chinese person will win the race than that an Australian will.’

Deletion of VP₃ in (42) is licensed by the Ellipsis Licensing condition in (29), using VP₃ itself as the Parallelism Domain and VP₄ as the antecedent. However, note that VP₃ is not a local predicate of TP₁, as there is an intervening TP projection. The CDR (27) requires that a local predicate be elided, explaining the ungrammaticality of (43). As deletion of VP₁ and VP₃ in (42) both lead to ungrammatical results, there are no *bǐ* comparatives with a derivation as in (42).

I will now demonstrate how phrasal comparatives are unable to derive the narrow scope/narrow scope reading in example (38). Recall that the phrasal comparison approach is compatible with a number of different phrase-structural configurations. Some possible structures are repeated from (23):

- (44) **Some possible phrase structures for a phrasal analysis of the *bǐ* comparative: (=23)**
 a. Xiang (2003); Lin (2009): b. Xiang (2005); Erlewine (2007): c. Keenan and Moss (1985):
-

I will first discuss phrasal analyses where the target and standard do not form a constituent, as in (44a,b), and then those where they do together form a constituent, as in (44c).

Consider a phrasal analysis of the comparative wherein the target and the standard do not form a constituent, as in (44a,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

verge. The gradable predicate in each clause is ‘likely,’ which composes with its clausal complement to yield a degree predicate of type $\langle d, t \rangle$.

¹⁸See Kennedy (2002, §4) for more detailed discussion and a formalization of the Recoverability Condition in the context of comparative deletion.

the opportunity to syntactically reconstruct. However, as this is a phrasal comparative, 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 (44a,b), we predict that at least one of the subjects would not be able to reconstruct, preventing the narrow scope/narrow scope reading.

Now consider the phrasal analysis sketched in (44c), which to my knowledge is the one option here which has not been proposed for the *bǐ* comparative in previous literature. The constituency in (44c) is most similar to Keenan and Moss’s (1985) analysis of the English string *more students than teachers* in (45) below as a quantifier, where *more* and *than* is a discontinuous head taking two arguments.¹⁹

- (45) [More students than teachers] attended the rally. (Keenan and Moss, 1985, p. 76)

This option is unique among those in (44) in that the target and standard form a constituent together and could conceivably move as a unit. Nonetheless, this type of phrasal comparative is also unable to derive the desired interpretation of example (38).

Consider a derivation of (38) based on this phrasal analysis in (44c). “Chinese person *bǐ* Australian” is constructed first and then merged in as the subject of ‘win the race.’ The entire constituent then raises above ‘likely’ resulting in the surface structure in (46) and then is reconstructed for interpretation (47).

- (46) **Hypothesis: “target *bǐ* standard” is a complex quantifier**

[Zhōngguórén bǐ Àozhōurén] yǒukěnéng [TP ____ yíng zhè chǎng bǐsài]
 Chinese person BI Australian likely t win this CL competition



- (47) **Hypothetical LF with reconstruction:**

yǒukěnéng [TP [Zhōngguórén bǐ Àozhōurén] yíng zhè chǎng 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 (47) 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 (48).

- (48) * Zhōngguórén bǐ Àozhōurén yíng zhè chǎng bǐsài.
 Chinese person BI Australian win this CL competition

In the desired interpretation of (38), ‘Chinese person’ and ‘Australian’ take scope below ‘likely,’ but the comparative operator *bǐ* must take scope over ‘likely,’ the gradable predicate. However, this approach 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 phrasal analyses for the Mandarin *bǐ* comparative are unable to derive the available readings in (38).

¹⁹The details of the compositional semantics will be different, however, as *more students than teachers* simply combines with a predicate of type $\langle e, t \rangle$ (*attended the rally* in (45)) and compares the quantity of students and teachers that satisfy the predicate. In contrast, the complex “John *bǐ* Mary” in the hypothetical phrasal comparative structure in (44c) would be comparing the target and standard in terms of the degrees to which they satisfy the gradable predicate (here, ‘tall’).

4.2 Internal argument comparatives as object preposing

The second example of parallel movements comes from comparatives such as (49), 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*.

(49) **Internal Argument (IA) comparatives (ex. from 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 (49) 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.

(50) **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.’²⁰ All of these objects are grammatical in postverbal position. In the right column, we see parallel grammaticality judgments for IA comparatives with internal arguments of corresponding animacy.²¹

²⁰Tsao (1989) credits Tsao (1979) with the original observation of the animacy condition on the felicity of object preposing. Paul (2002, fn. 7) cites Hou (1979) as first documenting this animacy condition, and also notes that a similar observation is made in C.-T. James Huang’s unpublished MA thesis. Examples and judgments here are from Tsao (1989).

²¹There seems to be variation regarding the felicity conditions for object preposing and IA comparatives. For example, Liu (2011) gives example (i) below which has one interpretation (b) which is an IA comparative with animate objects in the target and standard. (Interpretation (a) is a case of object topicalization, not an IA comparative.) I thank an anonymous reviewer for pointing this out.

- (i) Máo zhǔxí Zhōu Ēnlái bǐ Dèng Xiǎopíng hái-yào xìnren
Mao chair Zhou Enlai than Deng Xiaoping even-more trust
a. ‘Zhou Enlai trusts Chairman Mao_i more than Deng Xiaoping trusts him_i.’
b. ‘Chairman Mao_i trusts Zhou Enlai more than he_i trusts Deng Xiaoping.’

What is predicted by my analysis, borrowing from Tsao’s observation, is a correlation between the conditions on object preposing and IA comparatives. Therefore, speakers who accept examples such as (ib) and therefore do not have a strong animacy constraint in IA comparatives should also accept animate object preposing constructions. This anonymous reviewer is such a speaker, judging (ib) as grammatical and also allowing animate object preposing sentences.

(51) **Animacy restrictions on object preposing and IA comparatives (Tsao, 1989):**

<u>Object preposing:</u>		<u>Comparative:</u>	
a.	* Wǒ Zhāng Sān xǐhuān. I Zhang San like Intended: 'I like [Zhang San] _F .'	a'.	* Wǒ Zhāng Sān bǐ Lǐ Sì xǐhuān. I Zhang San _{BI} Li Si like Intended: 'I like Zhang San more than I like Li Si.'
b.	? Wǒ māo xǐhuān. I cat like Intended: 'I like [cats] _F .'	b'.	? Wǒ māo bǐ gǒu xǐhuān. I cat _{BI} dog like Intended: 'I like cats more than I like dogs.'
c.	Wǒ dàishù xǐhuān. I algebra like 'I like [algebra] _F .'	c'.	Wǒ dàishù bǐ jǐhé xǐhuān. I algebra _{BI} 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.

(52) a.	* Wǒ Zhāng Sān bǐ dàishù xǐhuān. I Zhang San _{BI} algebra like Int: 'I like Z.S. more than I like algebra.'	b.	* Wǒ dàishù bǐ Zhāng Sān xǐhuān. I algebra _{BI} Zhang San like Int: 'I like algebra more than I like Z.S.'
---------	--	----	---

Another similarity between object preposing and IA comparatives reported in Tsao (1989) concerns the morphological size of the verb. Tsao (1989) claims that object preposing is ungrammatical when the verb is monosyllabic. Example (53a) is judged to be ungrammatical due to its monosyllabic verb *ài* 'love,' while the minimally contrasting (51c) with the disyllabic verb *xǐhuān* 'like' is grammatical. We observe the same contrast between the minimal pair of comparatives (53a') and (51c').

(53) **No monosyllabic verbs in object preposing and IA comparatives (Tsao, 1989):**

<u>Object preposing: (cf 51c)</u>		<u>Comparative: (cf 51c')</u>	
a.	* Wǒ dàishù ài. I algebra love Intended: 'I love [algebra] _F .'	a'.	* Wǒ dàishù bǐ jǐhé ài. I algebra _{BI} geometry love Intended: 'I love algebra more than I love geometry'

Finally, to these parallels between object preposing and IA comparatives observed by Tsao (1989), I will add one more. Object preposing is incompatible with having a contrastive subject. For example, recall that object preposing is often used with an explicit contrasting object in a continuation, as in example (50). If the continuation is changed to involve a contrasting subject, as in (54a), the expression becomes ungrammatical. Similarly, IA comparatives with contrasting subjects are ungrammatical, as in (54b), as noted by Liu (2011).

(54) **Subjects cannot contrast in object preposing and in IA comparatives:**

- a. Object preposing: (cf 50)
 * [Zhāng Sān]_F [dàishù]_F xǐhuān __, [Lǐ Sì]_F [jǐhé]_F xǐhuān __.
 Zhang San algebra like Li Si geometry like
 Intended: '[Zhang San]_F likes [algebra]_F, (and /but) [Li Si]_F likes [geometry]_F.'
- b. Comparative: (Liu 2011, example 19b; cf 49)
 * Zhāng Sān dàishù bǐ Lǐ Sì jǐhé xǐhuān __.
 Zhang San algebra _{BI} Li Si geometry like

Intended: ‘Zhang San likes algebra more than Li Si likes geometry.’

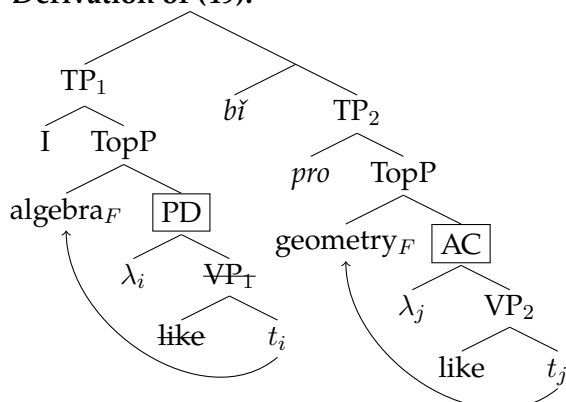
As object preposing offers a way to realize objects in a pre-verbal position and exhibits the same restrictions observed with IA comparatives, it would be preferable to derive IA comparatives as involving two separate instances of object preposing. Object preposing with obligatorily transitive verbs such as *xǐhuān* ‘like’ are derived via movement from the post-verbal object position (Ernst and Wang, 1995; Paul, 2002).²² 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 (49). The clausal comparative approach first predicts that “*target predicate*” and “*standard predicate*” are each independently available clauses in Mandarin and this is indeed the case:

- (55) a. $TP_1 = \text{“target predicate”}$:
 wǒ [dàishù]_F xǐhuān ____
 I algebra like
 ‘I like [algebra]_F.’
- b. $TP_2 = \text{“standard predicate”}$:
 wǒ [jǐhé]_F xǐhuān ____
 I geometry like
 ‘I like [geometry]_F.’

We begin by independently constructing the two TPs, each involving object preposing, and conjoin them using *bǐ*.²³ The CDR requires that we elide the VP within the left conjunct, TP_1 . The semantic identity enforced by Ellipsis Parallelism (30) 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 (30) and are able to elide VP_1 .

(56) **Derivation of (49):**



The clausal comparative approach proposed here therefore derives the restrictions on IA comparatives from independently existing restrictions on object preposing.

Now consider how these facts would be analyzed under a phrasal comparison approach. First, I note that the Keenan and Moss (1985) style analysis, where “*target bǐ standard*” is taken to be a constituent which is a complex quantifier, cannot account for this data. Such an approach takes the sequence “*algebra bǐ geometry*” in example (49) to be a DP constituent generated in object position, predicting an example with “*algebra bǐ geometry*” in object position (57) to be grammatical, contrary to fact.

²²Note that not all preposed objects are derived via movement; see Paul (2002) for some examples of “object preposing” with overt post-verbal objects. In all cases discussed here, however, the preposed object corresponds to a post-verbal gap.

²³Following Paul (2002), I represent object preposing as movement to the specifier of a TP-internal Topic projection.

- (57) * Wǒ xǐhuān [dàishù bǐ jǐhé].
 I like algebra BE geometry
 Intended: ‘I like algebra more than I like geometry.’

Under my proposal, example (57) is ungrammatical because no VP is elided in the target clause, in violation of the CDR, and instead the verb in the standard clause has somehow been deleted.²⁴ This hypothetical derivation for (57) is illustrated in (58).

- (58) * [TP Wǒ_i xǐhuān dàishù] bǐ [TP *pro*_i xǐhuān jǐhé].
 I like algebra BE *pro* like geometry

Second, for a phrasal approach where the target and standard are not a constituent, we would have to introduce a separate mechanism by which IA comparatives can be built by base-generating an object directly in the target and/or 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 modified phrasal analysis which can generate IA comparatives without making use of object preposing. His analysis predicts that IA comparatives are free of the restrictions on object preposing reviewed here, contrary to fact, and overgenerates many IA comparatives.

4.3 *bèi* long passives

Mandarin Chinese offers a curious and well-studied passivization strategy known as the *bèi* long passive, exemplified in (59). Following Feng (1995), Chiu (1995), a.o., Ting (1998) and Huang (1999) argue that *bèi* long passives involve \bar{A} -movement of a null operator to a position between *bèi* and the agent (60).²⁵

- (59) **The *bèi* long passive:**^{26,27}
 Yūehàn bèi bàba mà de hěn cǎn.
 John BEI father scold DE HEN serious
 ‘John was scolded seriously by his father.’
 (60) John BEI [*Op*_i [father scold *t_i* ...]]
 ↑

The operator movement in (60) is interpreted as λ -abstraction over the base object position, resulting in the predicate (λx . father scolds *x* seriously) which is then applied to the subject (in (59), ‘John’) by BEI (Huang, 1999).

Now consider the comparative in (61) involving two contrasting agents of *bèi* long passives. Following Ting (1998) and Huang (1999), we must posit two 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.

²⁴This deletion of ‘like’ in the standard clause is particularly problematic due to the unavailability of gapping in Mandarin Chinese (Tang, 2001, a.o.).

²⁵The term “*bèi* long passive” refers to those *bèi* passives which have an overt agent, in contrast to the “*bèi* short passive” which does not have an overt agent. Ting (1998) and Huang (1999) argue that, unlike the long passive, short passives do not involve null operator movement. Here I will only discuss long passives since it is their null operator movement step which is crucial to my argumentation.

²⁶The morpheme *de* is obligatory when postverbal adverbs are introduced. It is orthographically distinct from the genitive marker *de* which is glossed in this paper as GEN. See Huang (1988); Cheng (2007) for discussion of this *de* which appears with manner adverbials.

²⁷In 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 (2012) for a recent approach to *hěn*.

These parallel movements would again be problematic under a phrasal analysis where there is only one gradable predicate in the syntax.

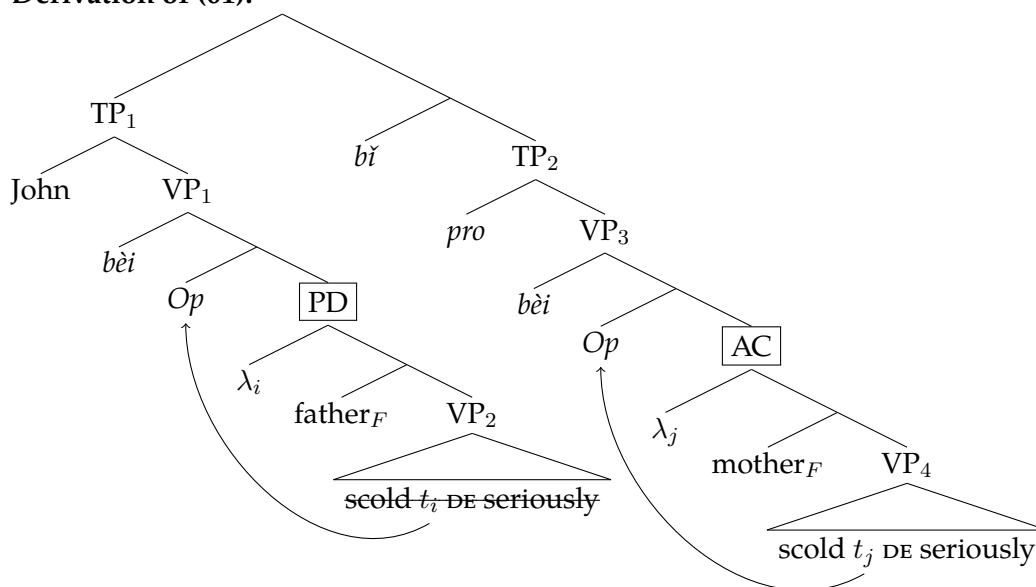
(61) *bèi* long passive agents in the target and standard:²⁸

Yūehàn bèi bàba bǐ bèi māma mà de gèng cǎn.
John BEI father BI BEI mother scold DE GENG serious

‘John was scolded by his father more seriously than by his mother.’

Under my clausal comparative 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 (61) is presented in (62).²⁹

(62) Derivation of (61):



In order to satisfy the CDR, we must elide a local predicate of TP_1 . VP_1 is a local predicate of TP_1 , but it contains a focus-marked constituent ‘father’ and ellipsis cannot delete focus-marked material, so we cannot elide VP_1 . We will instead try to elide VP_2 , another local predicate of TP_1 .³⁰ In order to elide VP_2 under identity with VP_4 , 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 (62), as the Parallelism Domain. The corresponding antecedent in TP_2 is labeled **AC**.

²⁸The existence of examples of this form was brought to my attention by an anonymous reviewer.

The particular example here, which comes from this reviewer, includes the morpheme *gèng* preceding the gradable predicate *cǎn*. The morpheme *gèng* often optionally appears in *bǐ* comparatives and has been described as an intensifier (Krasikova, 2008) which introduces an evaluative presupposition (Liu, 2010), similar to Japanese *motto* as discussed in Beck et al. (2004).

²⁹The internal syntax of the lower VPs are not illustrated here in order to simplify the illustration. The precise syntax of the adverb is not crucial to the argument made here.

³⁰I take the projections corresponding to “father scold t seriously” and “mother scold t seriously” in (62) to be v Ps with predicate-internal subjects, even though Ting (1998) and Huang (1999) describes them as IPs, corresponding to TPs in the terms used here. This difference is important for the analysis of example (61) here: If they were labeled TPs, VP_2 “scold t seriously” would not count as a local predicate of TP_1 in (62), so we would not be able to satisfy the CDR.

Note, however, that PD is not semantically identical to AC: $\llbracket \text{PD} \rrbracket = (\lambda x . \text{father scold } x \text{ seriously})$ and $\llbracket \text{AC} \rrbracket = (\lambda x . \text{mother scold } x \text{ seriously})$. However, the Ellipsis Parallelism condition (30) from Takahashi 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 $\llbracket \text{AC} \rrbracket \in \llbracket \text{PD} \rrbracket^f$, satisfying Ellipsis Parallelism.

4.4 Verb-copy constructions

The fourth and final argument against phrasal analyses 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—i.e., they include a verb and object—and the gradable predicate is a verb with an adverbial modifier (63). As noted by Liu (1996), in *bǐ* comparatives of this form, all three instances of the verb must match (64).

(63) **Comparatives with verbs in both 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.’

(64) **All three verbs must match in such comparatives (Liu, 1996):**

*Yūehàn qí mǎ bǐ Mǎlì gǎn yáng {qí, gǎn} de hǎo.
John ride horse BI Mary keep sheep ride, keep DE good

Intended: ‘John rides horses better than Mary keeps sheep.’

Liu (1996) argues that this is predicted through a derivation of (63) that involves two instances of the Mandarin manner verb-copy construction (65), 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 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.

There is, however, a range of evidence which supports the view that these constituents are not full embedded clauses, including some observations in Huang (1999). Example (ia) from Huang (1999, fn. 6) shows that this constituent does not constitute an independent binding domain for Binding Condition B, unlike full clausal embeddings as in the baseline (ib).

- (i) a. Zhāng Sān_i bèi [^{*}tā_i/[✓]zìjǐ_i hài-cǎn-le]. b. Zhāng Sān_i zhīdào [[✓]tā_i/[✓]zìjǐ_i hài-cǎn-le wǒ].
Zhang San BEI him/self harm-badly-PERF Zhang San BEI him/self harm-badly-PERF me
‘Zhang San_i was badly harmed by himself_i.’ ‘Zhang San_i knows that he_i badly harmed me.’

Huang (1999) also notes that temporal modifiers cannot be hosted inside the embedding and similarly Her (2009) shows that the embedding cannot include high epistemic adverbs. Example (ii) below combines the relevant data presented in Huang (1999, p. 429) and Her (2009, p. 443):

- (ii) *Zhāng Sān bèi [Li Sì zuótiān/xiǎnrán/dàgài/huòxǔ piàn-le].
Zhang San BEI Li Si yesterday/obviously/probably/possibly trick-PERF
Intended: ‘Zhang San yesterday/obviously/probably/possibly was tricked by Li Si.’

Such evidence supports the view that this embedding is not a full clause. The fact that comparative deletion can target the VP within this constituent, as in (62) above, but not a VP within a complement clause (see §6.1 below), offers an additional contrast between full clauses and this embedding in the *bèi* long passive.

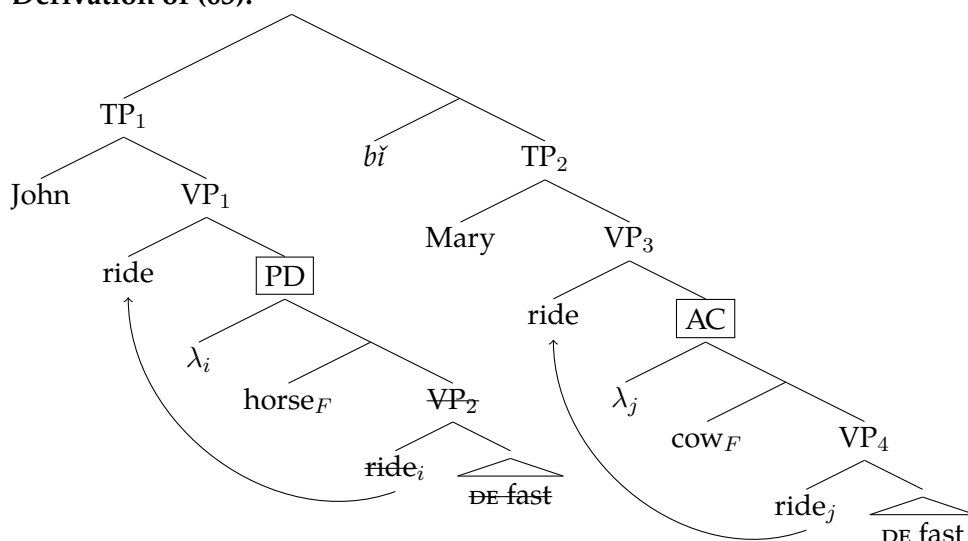
(65) Mandarin manner “verb-copy” construction:

Yūehàn [VP qí mǎ] [VP qí de kuài].
 John ride horse ride DE fast

‘John rides horses fast.’

As Liu suggests, a clausal comparative would be able to straightforwardly derive comparatives such as (63) using two instances of verb-copy and also explain the matching effect observed in (64). This derivation for (63) is given below. There are two independent instances of verb-copy, which are represented as regular movement chains, including λ -binders. See Hartman (2011) for evidence that head-movement leaves semantically real λ -binders of this form for the purposes of computing Ellipsis Parallelism.

(66) Derivation of (63):



Now consider how the CDR will apply to this structure. VP₁ is a local predicate of TP₁, but it contains the focus-marked constituent ‘horse,’ so it cannot be elided. Next consider the ellipsis of VP₂. As VP₂ 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.

As with the *bèi* passive example in the previous section (61), 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 $\llbracket \text{cow} \rrbracket \in \llbracket \text{horse} \rrbracket^f$, Ellipsis Parallelism is satisfied. We are thus able to elide the VP within PD in TP₁, including the lower copy of the verb-copy chain. We are thus left with three instances of ‘ride’ linearized at PF.

This derivation also yields the verb matching constraint. As each TP is constructed using verb-copy, the two verbs in TP₁ will match and the two verbs in TP₂ will match. Furthermore, Ellipsis Parallelism will require that the lower copy of V in TP₁ and the lower copy of V in TP₂ be identical. By transitivity, all three pronounced instances of the verb must match exactly.

Phrasal comparison would not be able to naturally derive comparatives such as (63) 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.³¹

³¹See Erlewine (2007) for such an attempt.

4.5 Summary

The last four sections presented different types of *bǐ* comparatives which are challenging for phrasal comparison in precisely the same way: all involved parts of the standard and target 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 part based on parsimony: phrasal analyses for these types of comparatives may not necessarily be 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 a clausal analysis, any comparative derivation involves two separate TPs—one for the target and predicate and another for the standard and predicate—and thus we need not introduce any new comparative-specific mechanisms for the derivation of the complex comparatives reviewed here.

5 On comparative deletion

In the previous section I presented various comparatives which involve parallel movements into the target and into the standard, which necessitate a clausal comparison approach to the *bǐ* comparative. To yield the final word order, I proposed a Comparative Deletion Requirement which forces only one instance of the predicate to be pronounced:

(67) **Comparative Deletion Requirement (CDR): (=27)**

In a *bǐ* comparative, elide a local predicate (28) of the target TP under identity with a local predicate of the standard TP. If the target TP has no elidable local predicate, the derivation is illicit.

In this section I will provide further evidence to motivate this statement of the CDR and discuss its consequences. I begin in section 5.1 by discussing the lack of so-called *subcomparative* construction in Mandarin Chinese. In section 5.2 I discuss additional cases of comparatives involving verb-copy and show that their pattern of grammaticality is correctly predicted by the ellipsis licensing through LF identity—specifically, the identification of *parallelism domains*, as proposed—but not through PF identity. In section 5.3 I discuss cases where the target clause and standard clause differ substantially in their structure, but still lead to a grammatical comparative: so-called *adverbial comparatives*. Finally, in section 5.4, I will discuss cases where there are multiple local predicates that are candidates for comparative deletion.

5.1 Obligatory deletion and the lack of subcomparatives

In this section I discuss the lack of so-called *subcomparative* constructions in Mandarin Chinese. A subcomparative expresses a relation between the degrees of two different but commensurable predicates. An example of an English subcomparative is given in (68) below:

(68) **An English subcomparative:**

My chair is taller than [_{clause} your table is wide].

LF: $\max(\lambda d . \text{my chair is } d\text{-tall}) > \max(\lambda d . \text{your table is } d\text{-wide})$

It has been observed that subcomparatives can only be built using the syntactic and semantic strategies of clausal comparison. A clausal comparative can straightforwardly express such meanings because there is one gradable predicate used to construct the target degree description (i.e. *tall* above) and an independent predicate used to construct the standard degree description (*wide*). In

a phrasal comparative, on the other hand, there is just one gradable predicate in the syntax. The predicate that composes semantically with the target and with the standard must be the same. Thus subcomparatives such as (68), where two different gradable predicates are used, are impossible to construct as a phrasal comparative as in section 2.2 above.

It has been noted since Fu (1978) that Mandarin Chinese does not allow the construction of subcomparatives with *bǐ*. Consider, for example, the ungrammatical subcomparative in (69):³²

(69) **No *bǐ* subcomparatives:**

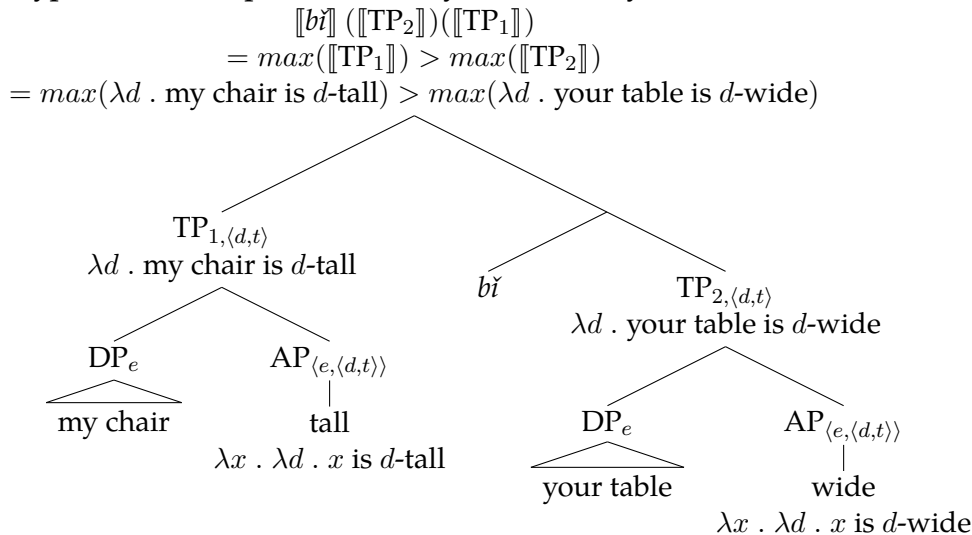
* [Wǒ de yǐzi gāo] bǐ [nǐ de zhuōzi kuān].
 1SG GEN chair tall BI 2SG GEN table wide

Intended: ‘My chair is taller than your table is wide.’

The lack of subcomparatives in Mandarin has been presented as an argument for phrasal analyses of the *bǐ* comparative in work such as Xiang (2003, 2005) and Erlewine (2007). The logic of these arguments is as follows. Assuming the *bǐ* comparative is a clausal comparative derived in the manner familiar from English, we would expect subcomparatives to be available, just as they are in English. However, these constructions are not possible in Mandarin. Therefore, the *bǐ* comparative must not be a clausal comparative. As discussed recently by Hsieh (2015), this logic of this argument is fundamentally flawed: the lack of subcomparatives does not entail that a language does not employ clausal comparison. Hsieh (2015) notes that there are other languages which have clausal standards but do not allow subcomparison (see Hsieh, 2015, §4.1).

Given my analysis of *bǐ* comparatives as a clausal comparative and the evidence provided for it above, a different explanation is sought for the lack of subcomparatives. I propose that the explanation is the obligatory nature of comparative deletion in the *bǐ* comparative, as enforced by the CDR. Consider the hypothetical structure and semantic interpretation in (70) for the attempted subcomparative in (69) above, based on the proposal put forward here.

(70) **Hypothetical computation of “My chair tall *bǐ* your table wide” (69):**



Two clauses are built in (70), one using the gradable predicate ‘tall’ and the other using ‘wide.’ We know that the structure of these TPs is grammatical, as they are isomorphic to the TPs in the

³²Examples of ungrammatical subcomparatives in the literature differ in their word order depending on the particular author’s assumptions regarding where the deleted predicate is linearized in a clausal analysis of *bǐ* comparatives.

grammatical “John *bǐ* Mary tall,” as illustrated in (34) above in section 3.2. In each clause, the subject of type *e* saturates the outermost argument of the gradable predicates. Because degree-last denotations are used, this results in two type $\langle d, t \rangle$ degree predicates in TP₁ and TP₂. The operator *bǐ* can compose with these two degree descriptions to yield the same truth-conditions as the English example (68) above.

As we see, the individual steps in the syntactic derivation and semantic interpretation of the structure in (70) are licit. The ungrammaticality of (69) thus must be due to the violation of the CDR: the local predicate of the standard clause (TP₁), ‘tall,’ cannot be elided. Here then is the difference between clausal comparison in English and Mandarin Chinese. While the predicate is elided in an English standard clause when possible, the predicate is not elided when it is contrastive and cannot be elided and this results in the subcomparative (see also Kennedy, 2002). In contrast, a local predicate *must* be elided in the Mandarin *bǐ* comparative, as stated in the CDR.

An alternative explanation may be that the predicates in question—here, ‘tall’ and ‘wide’—are not *commensurable*; that is, degrees of ‘tall’ and degrees of ‘wide’ cannot be ordered in Mandarin. However, we see that this is not the case through examples such as (71), which offer a grammatical way to express the comparison intended in (69) above. Here we have nominalized each gradable predicate using *-dù* ‘degree’:

(71) **Grammatical comparison of height and width:**

Wǒ de yǐzi de gāo-dù chāoguò nǐ de zhuōzi de kuān-dù.
 1SG GEN chair GEN tall-degree exceed 2SG GEN table GEN wide-degree

‘The height of my chair exceeds the width of your chair.’

The lack of subcomparison must be a fact about the syntactic structure of *bǐ* comparatives and not due to a difference in the semantics of degrees in Mandarin.

Finally, I note that the lack of subcomparatives has also been presented as one argument that Mandarin Chinese lacks degree abstraction in Krasikova (2008), but this argument does not go through. Recall the hypothetical semantic computation for a Mandarin subcomparative in (70) above. Although this structure is not grammatical due to the violation of the CDR, the semantic interpretation in (70) gives us the desired subcomparative meaning without invoking degree abstraction. The availability of this structure—as well as the independently motivated CDR, which explains the ungrammaticality of such subcomparatives—shows that the nonexistence of subcomparatives does not entail that Mandarin Chinese lacks degree abstraction. I will ultimately argue in section 6 below that Mandarin Chinese indeed lacks degree abstraction, supporting Krasikova’s conclusion, but I will show that a more involved line of argumentation is necessary in order to do so.

5.2 Licensing by parallelism domains

In this section I will argue that LF identity, enforced through the identification of parallelism domains, is essential to explaining patterns of ungrammaticality when the target clause and standard clause are insufficiently structurally parallel.³³ An alternative which I discuss would be to require that ellipsis of the local predicate be licensed by simple PF identity, without requiring any LF identity of parallelism domains.

³³A similar “parallelism” requirement between the target clause and standard clause is described in Liu (2011). Liu’s explanation for the effect is different than what is put forth here, though: Liu describes parallelism as establishing a minimal pair between the target clause and standard clause, so as to facilitate comparison. The approach presented here

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 (72) below. In the clausal analysis 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.

- (72) 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.’

In the first option (72a) 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 DE fast.” In the second parse (72b), 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.

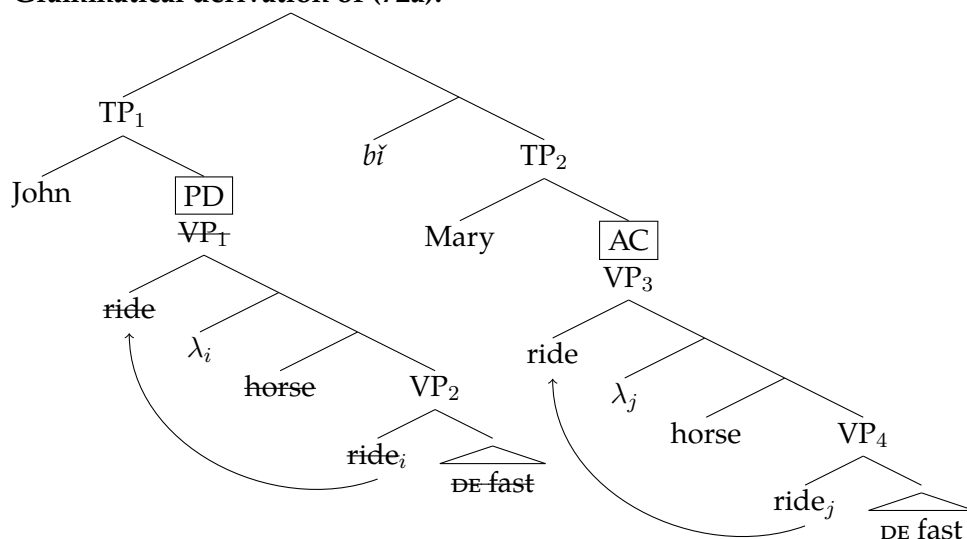
This fact about the interpretation of (72) is an important argument for the necessity of identifying a parallelism domain to license the ellipsis. A simple PF identity approach to ellipsis would predict both parses to be available, whereas the ellipsis licensing conditions used here accurately generate the parse in (72a) and disallow the parse in (72b). We’ll step through these two derivations (one grammatical and one ungrammatical) one at a time.

I begin with the grammatical derivation of (72a), 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 “*subject* ride horse ride DE fast.” 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.

instead views parallelism requirements as a result of licensing comparative deletion, using the preestablished notion of Parallelism Domains for ellipsis licensing.

Note that Liu (2011) argues that this parallelism must hold between “minimal clauses,” reminiscent of the notion of “local predicate” developed here. See Liu (2011, fn. 23) for details.

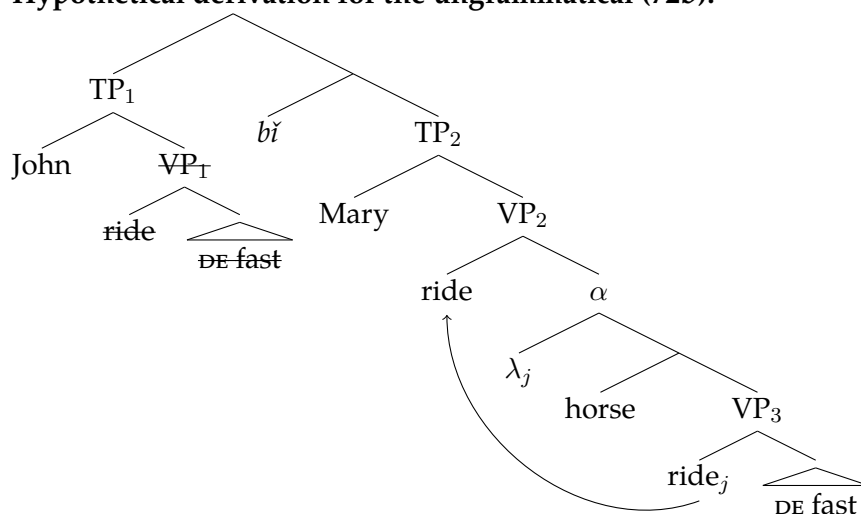
(73) Grammatical derivation of (72a):



In order to elide VP₁ in (73), we must identify a parallelism domain for VP₁ and its antecedent. A parallelism domain cannot include any unbound variables, but there are none in VP₁, so we can simply use the VP₁ projection as its own parallelism domain. An antecedent to PD is easily found in TP₂: VP₃, also labelled AC above. The denotations of AC and PD are identical under any variable assignment. Finally, VP₁ contains no focus-marked material. With these conditions satisfied, we can elide VP₁. This satisfies the CDR because VP₁ is a local predicate of the target clause (TP₁) and yields the desired word order in (72).

Next consider a hypothetical derivation for the ungrammatical parse, (72b). Here, we would like to yield the same word order as with (72a) but using a different target clause, which does not include the object and verb-copy construction. To yield the desired word order, we must elide VP₁. VP₁ is a local predicate of the target clause, so if we can successfully elide it, the CDR will be satisfied.

(74) Hypothetical derivation for the ungrammatical (72b):



Under an approach where ellipsis is satisfied simply by PF identity, this ellipsis would be possible, as the PF form of VP₁ is identical to that 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, 2011). 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.³⁴ 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 (72b) for (72).

This same logic ruling out (72b) 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 (72) which does have a grammatical parse (72b), there is no grammatical derivation leading to the word order in (75). Thus the sentence (75) is simply judged as ungrammatical.

- (75) * 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)’
 Intended derivation: [TP John [VP ride horse {VP ride DE fast}]] bǐ [TP Mary [VP ride DE fast]]

The effects exemplified above go beyond verb-copy constructions. Licensing ellipsis in the *bǐ* comparatives through parallelism domains entails a restriction against non-parallel movements out of the elided predicate and its antecedent.

5.3 Adverbial comparatives

A different way of interpreting the facts presented in the previous section might be to introduce a more general parallelism requirement which holds between the target clause and the standard clause. We could imagine requiring, for example, that verb-copy occur in a standard clause if and only if verb-copy takes place in the target clause. In this subsection I will show that no such general parallelism requirement exists, and along the way I will describe the structure of another class of *bǐ* comparatives.

Consider example (76) below. On the surface, this comparative looks quite different from most grammatical examples we have seen (e.g. (72) above), in that there is verbal material in the target, to the left of *bǐ*, without corresponding material in the standard, to the right of *bǐ*.³⁵

- (76) **Adverbial comparative:**
 Yūehàn qí mǎ qí de bǐ Mǎlì kuài.
 John ride horse ride DE BI Mary fast
 ≈ ‘John rides horses faster than Mary.’

Such examples were called “adverbial comparatives” by Erlewine (2007), because of the surface appearance of *bǐ* and the standard being in a postverbal modifier of ‘ride,’ introduced by *de* (see footnote 26).

³⁴ A horse is a horse, of course of course.

³⁵ I thank an anonymous reviewer for requesting discussion of such examples. Example (76) was offered by this reviewer.

The approach here can derive the comparative in (76) through a target clause which includes the complex VP with verb-copy “ride horse ride DE fast” and a standard clause with just the predicate ‘fast.’ This derivation is illustrated in (77):

(77) **Proposed derivation for (76):**

[_{TP1} John [_{VP} ride horse [_{VP} ride DE [_{AP} fast]]]] bǐ [_{TP2} Mary [_{AP} fast]]

The ‘fast’ in the target clause is deleted under identity with the predicate ‘fast’ in the standard clause, and this satisfies the CDR.^{36,37}

The following observation supports this analysis of adverbial comparatives: there is a semantic difference between comparatives with complex predicates in both clauses versus these adverbial comparatives where I propose that the verb (‘ride’ in examples above) is only in the target clause. Consider first the comparative in (78), which is grammatical but judged as infelicitous.

(78) **Comparative with “run DE fast” implies that airplanes run:**

Yūehàn bǐ fēijī (pǎo bù) pǎo de kuài.
John BI airplane run feet run DE fast

≈ ‘John runs faster than airplanes run.’

Speaker comment: strange/infelicitous because airplanes do not run.

Derivation: [_{TP} John [_{VP} run feet [_{VP} run DE [_{AP} fast]]]]
bǐ [_{TP} airplane [_{VP} run feet [_{VP} run DE [_{AP} fast]]]]

The complex VP “(run feet) run DE fast” in (78) must be part of both the target and standard clauses. The semantics of (78) then makes a claim regarding the speed at which airplanes run and is therefore infelicitous. Airplanes cannot be described as ‘running’ with the verb *pǎo*.

In contrast, consider the adverbial comparative (79) below formed of the same words as (78). In this word order, the sentence is judged as completely natural. Intuitively, (79) compares the speed at which John runs to the speed of airplanes, not the speed at which airplanes run. This semantic difference is explained by the approach to adverbial comparatives presented here.

³⁶I assume here that the predicate *kuài* ‘fast’ which may be described as having an adverbial function in the target clause is in fact identical to the predicate adjective *kuài* ‘fast’ in the standard clause.

³⁷The reviewer expresses a concern regarding this derivation in (77): the predicate ‘fast’ is not normally felicitous for describing humans, as reflected in the degraded status of (i), which the reviewer judges as a *.

- (i) * Mǎlì (hěn) kuài.
Mary HEN fast
Intended: ‘Mary is fast.’

However, speakers report that in a context where we are watching a sports game such as a race, it is grammatical to express the comparative form in (ii) using the predicate ‘fast,’ without using the complex predicate “run DE fast.”

- (ii) ✓ Yūehàn bǐ Mǎlì (pǎo de) kuài.
John BI Mary run DE fast
‘John is faster (at running) than Mary.’

The grammaticality of (ii) shows that it is in fact felicitous to use the bare predicate adjective ‘fast’ to describe humans, at least in a rich context where it is clear what aspect of the individuals are being described—here, their running. In the case of examples such as (76), analyzed as (77), the target clause itself supplies the necessary rich context.

(79) **Adverbial comparative does not imply that airplanes run:**

✓ Yūehàn (pǎo bù) pǎo de bǐ fēijī kuài.
John run feet run DE BI airplane fast

‘John runs faster than {an airplane/the speed of an airplane}.’

Derivation: [TP John [VP run feet [VP run DE {AP fast}]]] bǐ [TP airplane [AP fast]]

The grammaticality of adverbial comparatives such as (76) and (79) shows that it is not simply the case that the target clause includes a complex predicate with verb-copy if and only if the standard clause does. Compare this to the ungrammatical derivation in (75) above, repeated here as (80):

(80) * 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)’ (=75)

Intended derivation: [TP John [VP ride horse {VP ride DE fast}]] bǐ [TP Mary [VP ride DE fast]]

The ungrammaticality of (80) cannot be due to the lack of verb-copy in the standard clause, and instead must be due to the fact that an appropriate parallelism domain cannot be identified for this choice of ellipsis, as discussed above.

The semantically sensitive ellipsis licensing condition adopted here correctly predicts the grammaticality of various comparative constructions involving verb-copy, including so-called adverbial comparatives which involve ellipsis across target and standard clauses with significant structural differences.

5.4 A note on the size of ellipsis

The Comparative Deletion Requirement proposed here requires that a local predicate of the standard clause be elided. In this section I discuss what happens in comparatives where there are multiple local comparatives which could be elided in order to satisfy the CDR.

Regular clauses in Mandarin simply have one local predicate per clause, but we have seen two constructions in Mandarin wherein a single TP includes two local predicates: the verb-copy construction and *bèi* passives. Here again I will demonstrate these considerations through verb-copy examples, although the same effects can be shown to hold in comparatives with *bèi* passives as well.

Consider the *bǐ* comparative structure in (81), where the target clause and standard clause differ only in their subjects, ‘John’ and ‘Mary.’ The entire verb copy structure “ride horse ride DE fast” in the target clause has an identical antecedent in the standard clause, and therefore my analysis predicts ellipsis of both the higher and lower VP to be licensed. The word orders which result from ellipsis of the higher and lower VPs are given in (81).

(81) **When multiple local predicates are elidable, larger VP ellipsis is preferred:**

[TP John [VP ride horse [VP ride DE fast]]] bǐ [TP Mary [VP ride horse [VP ride DE fast]]]
‘John rides horses faster than Mary rides horses.’

a. Larger VP ellipsis:

✓ Yūehàn bǐ Mǎlì qí mǎ qí de kuài.
John BI Mary ride horse ride DE fast

- Derivation: [TP John [_{VP} ride horse [_{VP} ride ~~DE~~ fast]]] bǐ ...
- b. Smaller VP ellipsis:
 ??/*Yūehàn qí mǎ bǐ Mǎlì qí mǎ qí de kuài.
 John ride horse BI Mary ride horse ride DE fast
 Derivation: [TP John [_{VP} ride horse [_{VP} ride ~~DE~~ fast]]] bǐ ...

Interestingly, the sentence resulting from ellipsis of the higher VP (81a) is uniformly judged as grammatical, whereas ellipsis of the lower VP (81b) is judged as either slightly degraded or ungrammatical, depending on the speaker. This status is indicated by ??/* in (81b).

I propose that the contrast observed between the options in (81a) and (81b) reflect a general preference to maximize ellipsis of repeated material.³⁸ As noted by Kennedy (2002), such preferences can be thought of as related to more general principles of Economy and pressures to minimize articulatory effort. The speaker variation observed may reflect general variation in the strength of such effects.³⁹

It's important to note that it is not simply the case that some speakers reject ellipsis of the lower VP in a verb-copy construction. Consider the structure in (82), where the objects (in bold) contrast between the target and the standard clauses, making the higher VPs distinct. I again assume that contrasting material between the clauses is naturally focus-marked.

(82) **Adding contrasting material in the higher VP forces smaller VP ellipsis:**

[TP John [_{VP} ride **horse**_F [_{VP} ride DE fast]]] bǐ [TP Mary [_{VP} ride **cow**_F [_{VP} ride DE fast]]]
 'John rides horses faster than Mary rides cows.'

- a. Larger VP ellipsis:⁴⁰
 *Yūehàn bǐ Mǎlì qí niǔ qí de kuài.
 John BI Mary ride cow ride DE fast
 Intended derivation: [TP John [_{VP} ride **horse**_F [_{VP} ride ~~DE~~ fast]]] bǐ ...
- b. Smaller VP ellipsis:
 ✓Yūehàn qí mǎ bǐ Mǎlì qí niǔ qí de kuài.
 John ride horse BI Mary ride cow ride DE fast
 Derivation: [TP John [_{VP} ride **horse**_F [_{VP} ride ~~DE~~ fast]]] bǐ ... (=63)

In this example, the higher VP cannot be elided because it contains focused material and cannot be recovered, explaining the ungrammaticality of (82a) with the intended interpretation. The

³⁸This preference for larger ellipsis observed here 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.

The effect of MaxElide, however, is different than what we observe here. MaxElide requires that, *given a particular parallelism domain*, the largest deletable constituent in it be deleted. However, in the case of (81) 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. The higher VP itself acts as the parallelism domain for ellipsis of the higher VP in (81a), whereas a lower node including just the λ -binder of the verb-copy-chain can act as the parallelism domain for ellipsis of the lower VP—this is illustrated in the tree in (66). The higher VP ellipsis and lower VP ellipsis options are not competitors for the purposes of MaxElide and therefore MaxElide cannot be the explanation for this effect.

³⁹I note that for those speakers who do not find (81b) completely ungrammatical, the second instance of "ride horse" must be destressed. On similarities between ellipsis and destressing, see Tancredi (1992).

⁴⁰The surface string in (82a) does have a grammatical parse, but not with the intended structure and interpretation. It means 'John rides *cows* faster than Mary rides cows,' with a derivation as in (73).

comparative formed by ellipsis of the lower VP (82b), on the other hand, is uniformly judged as grammatical, and is in fact the original verb-copy comparative example discussed as (63) above.

As noted by an anonymous reviewer, a similar preference to maximize ellipsis up to the position of focus can be observed in English as well. Consider first the structure in (83). English has two grammatical options for deletion in the clausal standard in (83): the larger deletion option, involving VP ellipsis of *ride horses fast* (83a), is judged as completely natural, whereas an option where only the adverb *fast* is deleted is judged as degraded. Note that, to the extent that (83) is grammatical, the second instance of *rides horses* must be destressed, just as it must in the Mandarin example (81b) above (see footnote 39).

(83) **Maximizing deletion in English clausal comparatives:**

John rides horses faster than [λd . Mary rides horses *d-fast*].

a. Larger deletion: VP ellipsis

✓ John rides horses faster than Mary does ~~ride horses fast~~.

b. Smaller deletion: comparative deletion of *fast* only

? John rides horses faster than Mary rides horses ~~fast~~.

Furthermore, just as in the Mandarin example (82) above, making the objects contrast between the target and the standard makes the larger ellipsis option ungrammatical (84a) and making the smaller deletion option (84b) clearly grammatical.

(84) **Adding contrasting material forces smaller deletion:**

John rides **horses_F** faster than [λd . Mary rides **cows_F** *d-fast*].

a. Larger deletion: VP ellipsis

* John rides horses faster than Mary does ~~ride cows fast~~.

b. Smaller deletion: comparative deletion of *fast* only

✓ John rides horses faster than Mary rides cows ~~fast~~.

See Kennedy (2002) for more on the derivation of these clausal comparatives in English and for an explicit account of the effect observed above in (83–84) using Optimality Theory. The parallel between the Mandarin and English behavior observed here supports the view that the preference for larger ellipsis observed in (81–82) reflects a general preference to maximize ellipsis.

6 Mandarin Chinese lacks degree abstraction

In this paper, I have proposed that the Mandarin *bǐ* comparative is a clausal comparative. 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 satisfying each predicate.

It is standardly assumed following the early work of Bresnan (1973) and Chomsky (1977) on English that such degree descriptions (predicates of degrees) for the target and standard are constructed by \bar{A} -movement of a null operator of type d . *Degree abstraction*, i.e. predicate abstraction over a variable of type d , results in a degree description of type $\langle d, t \rangle$.⁴¹

(85) John is taller than [_{standard} $Op \lambda d$ [TP Mary is ~~*d-tall*~~]].

⁴¹The movement illustrated in (85) 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.

As noted in the introduction, it has been proposed by Beck et al. (2004) that languages differ as to whether their grammars allow degree abstraction. This is known as the Degree Abstraction Parameter (DAP), repeated here:

(86) **Degree Abstraction Parameter (DAP) (Beck et al., 2004): (=1)**

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

Beck et al. (2004) proposed the DAP based on a close study of comparative constructions in Japanese and posits that Japanese has the negative setting of the DAP and therefore cannot construct complex degree descriptions as in (85). However, recent work including Kennedy (2009); Shimoyama (2012); Sudo (2015) have questioned the validity of the conclusions of Beck et al. (2004) for Japanese, including the proposal of the DAP itself. Here I do not review these arguments from Japanese in detail; I refer the interested reader to these works and references therein.

In this section I will argue that Mandarin Chinese is a language that lacks degree abstraction, i.e. that Mandarin Chinese is a [-DAP] language.⁴² Although the *bǐ* comparative involves the construction of $\langle d, t \rangle$ degree descriptions for the target and the standard, it will not do so via degree abstraction as in (85). Instead, I propose that Mandarin Chinese has the Degree Last property in (87), allowing each clause conjoined by *bǐ* to be a $\langle d, t \rangle$ degree description after merging in all its other arguments:

(87) **Degree Last: (=5)**

All gradable predicates can take their degree argument as their last argument.

At this point a note on methodology is in order. As reflected by the active debate in the literature on the DAP in Japanese, cited above, it is difficult to argue definitively that a particular language lacks degree abstraction. Arguments that degree abstraction does not occur take the form of a proof by contradiction, the logic of which is sketched here:

(88) **General logic for demonstrating the lack of degree abstraction by proof by contradiction:**

a. Assume:

- i. a particular degree construction has certain syntactic properties and restrictions; and
- ii. degree abstraction is available.

b. (i) + (ii) entails that structure X with interpretation Y should be grammatical.

c. Observe: Structure X with interpretation Y is not grammatical.

d. Conclusion: Degree abstraction is not available (i.e. assumption (ii) was incorrect).

In this form of argumentation, it is imperative that the postulate in (i) be water-tight. When we observe that structure X with interpretation Y is not grammatical, we must have a sufficient understanding of all the ingredients in X so that we are sure that there is not an independent reason why structure X with interpretation Y is unavailable. It is therefore the degree constructions whose syntax and semantics we understand best that should be used as test cases for degree abstraction. The argument that I develop in this paper will therefore be based on the *bǐ* comparative construction.

I will begin in section 6.1 by discussing the lack of embedded standards and targets in the Mandarin *bǐ* comparative. This will turn out not to form an argument for or against degree abstraction,

⁴²Krasikova (2008) has previously claimed that Mandarin Chinese lacks degree abstraction, although her evidence is unfortunately inconclusive. See discussion of her evidence in section 5.1 above and footnote 44 below. Krasikova's same claim and evidence is also repeated in the coauthored Beck et al. (2009).

but it does act to highlight what needs to be considered in order to form such an argument. Following this preliminary discussion, in section 6.2 I will present an argument which *does* lead to the conclusion that Mandarin Chinese must lack degree abstraction. In section 6.3 I will supplement this with an argument from the lack of attributive comparatives in Mandarin.

The arguments from previous sections that the Mandarin *bǐ* comparative is a clausal comparative, together with the arguments in this section that Mandarin lacks degree abstraction, paint a unique picture for Mandarin Chinese: Mandarin is a language without degree abstraction but which nonetheless employs a clausal comparative. To my knowledge such a situation has never been claimed before for any language.

6.1 A preliminary: The lack of embedded standards

A good candidate for constructing a test of whether Mandarin Chinese has degree abstraction or not would be a construction which we know in other languages necessitates the use of degree abstraction. One such example is comparatives with embedded standards.

Recall that part of the original argument that English clausal standards involve \bar{A} -movement of a null degree operator is the observation that the relevant gradable predicate can be embedded within the standard clause (Bresnan, 1973; Chomsky, 1977), as in example (89) below, repeated from (14).

- (89) **An English comparative with an embedded standard:** (=14)
 John_i is taller than [_{standard} Op λd Mary thinks [that he_i is ~~*d*-tall~~]].

The intended meaning involves the construction of the degree description (λd . Mary thinks [John is *d*-tall]), which can be done using degree abstraction: the null operator movement is interpreted as λ -abstraction over a degree variable in the trace position (see e.g. Heim and Kratzer, 1998), resulting in a predicate of degrees of type $\langle d, t \rangle$. It is precisely this construction of a degree predicate through syntactic means—binding a degree variable in the syntax—which would be banned by a negative setting of the DAP.

It has been noted, for example in Liu (1996), that Mandarin Chinese apparently disallows embedded standards. An example modeled after (89) is in (90).

- (90) **No embedded standards in *bǐ* comparatives:**

* Yuēhàn_i bǐ Mǎlì rěnwéi tā_i gāo.
 John_i bǐ Mary thinks he_i tall

Intended: ‘John is taller than Mary thinks he is.’

Intended derivation: [_{TP1} John [_{VP1} ~~tall~~]] *bǐ* [_{TP2} Mary [_{VP2} think [_{TP3} he [_{VP3} tall]]]]

In previous work such as Xiang (2003, 2005); Erlewine (2007), this lack of embedded standards in Mandarin Chinese has been presented by as an argument against clausal analyses of the *bǐ* comparative and for phrasal analyses. The logic is similar to that based on the lack of subcomparatives in Mandarin, reviewed above in section 5.1: embedded standards cannot be generated in a phrasal analysis, because the same gradable predicate must be applied to both the target and standard, therefore the lack of embedded standards is suggestive of the lack of a clausal standard strategy. However, given the strong evidence for a clausal analysis proposed here in section 4, we must identify another reason why (90) is ungrammatical.

The possible answer I will consider here first is the idea that Mandarin Chinese lacks degree abstraction. Consider the interpretation of the standard clause (TP₂) without degree abstraction.

First we note that the embedded clause TP_3 must denote either a type $\langle d, t \rangle$ degree predicate ($\lambda d .$ John is d -tall) or a proposition of type t if the degree variable of ‘tall’ is internally saturated (or their intensionalized variants). Of course, the predicate that we hope to end up with should take its input and interpret it as the degree argument of ‘tall,’ so therefore the variant where the degree argument is unsaturated at this point is what we want. The problem now is that the verb ‘think’ is not expecting a complement of type $\langle d, t \rangle$; the predicate ‘think’ expects an (intensional) proposition complement. The result is that we are unable to interpret the standard clause TP_2 , let alone yield the desired interpretation.⁴³ The lack of degree abstraction in Mandarin Chinese—as I propose here—would therefore explain the ungrammaticality of example (90).

But does this then constitute an argument that Mandarin Chinese must lack degree abstraction? It does not. That’s because there is an independent explanation for why example (90) is ungrammatical. This is the Comparative Deletion Requirement (CDR) that was motivated above. The CDR is repeated here:

(91) **Comparative Deletion Requirement (CDR): (=27)**

In a *bǐ* comparative, elide a local predicate (28) of the target TP under identity with a local predicate of the standard TP. If the target TP has no elidable local predicate, the derivation is illicit.

In the intended derivation in (90), we have elided the local predicate of the target clause, VP_1 , using VP_3 as the antecedent. The CDR is not satisfied here because VP_3 is not a local predicate of the standard clause. More generally, there is no way to satisfy the CDR in example (91). The derivation in (90) is independently ruled out by the CDR and therefore the ungrammaticality of (90) does not constitute an argument that Mandarin Chinese lacks degree abstraction.

It is worth noting that the target’s gradable predicate also cannot be in an embedded clause inside the target clause of *bǐ*. Consider example (92) below. We could imagine two different derivations for this structure: one where the target clause denotes the degree description ‘the height that John thinks Mary is,’ and another where the entire comparative is embedded under ‘John thinks.’ Only the latter reading is available:

⁴³Implicit in the discussion here is that we do not have a rich inventory of free type-shifting rules such as the Geach rule (Geach, 1970; see e.g. Jacobson, 2014). If such arbitrary type-shifting procedures exist, we will be unable to account for the effects attributed to the lack of degree abstraction in Mandarin, which I present in the subsequent sections. Alternatively, the “directly compositional” variant of the negative setting of the DAP may be to say that such type-shifters cannot be used for certain types in some languages. A full discussion of what we predict if such type-shifters are made a part of grammar is beyond the scope of this paper.

(92) **No embedded targets, either:**

Yuēhàn_i rěnwéi Mǎlì bǐ tā_i gāo.
John thinks Mary_{BI} he tall

- a. * Intended: ‘The height that John thinks Mary is is greater than the height of Mary.’
Intended derivation: [TP John [VP thinks [TP Mary {VP tall}]]] bǐ [TP he [VP tall]]
- b. ✓ ‘John thinks [Mary is taller than he is].’
Derivation: [TP John thinks [[TP Mary {VP tall}]] bǐ [TP he [VP tall]]]

This too could be due to the lack of degree abstraction in Mandarin Chinese or due to the CDR. Because the CDR is independently motivated above, we still have not seen an argument that Mandarin lacks degree abstraction.⁴⁴

The discussion of embedded standards and targets here exemplifies the difficulty in constructing an appropriate test case for degree abstraction. In the next section I will present a valid test case which *does* show that Mandarin Chinese must lack degree abstraction, based in part on the discussion of embedded standards and targets here.

6.2 Matching embedded target and standard clauses

In this section I will present my primary argument that degree abstraction is not available in Mandarin Chinese.

Recall that in the previous section, I showed that the lack of embedded standards and targets does not form an argument against degree abstraction, due to the relevant examples independently violating the CDR. Based on these previous examples, in this section I will build a test case with an embedded target and a *matching* embedded standard. This will allow us to make sure that the CDR is satisfied, unlike with the cases above, and therefore we can properly attribute its ungrammaticality to the lack of degree abstraction.

This test case is presented in (93), with the intended corresponding English example in (94). I argue that the ungrammaticality of (93) shows that degree abstraction is not available in Mandarin Chinese.

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

* Yuēhàn bǐ Mǎlì rěnwéi 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.
 $\max(\lambda d . \text{John thinks Tom is } d\text{-tall}) > \max(\lambda d . \text{Mary thinks Tom is } d\text{-tall})$

The logic of this argument is as follows, modeled after (88) above:

⁴⁴Krasikova (2008) offers a similar argument based on the scope of a modal in the target, to the left of *bǐ*, relative to the scope of the comparative operator, and claims that this supports the idea that Mandarin Chinese lacks degree abstraction. I believe her data is inconclusive, for two reasons: first, she does not control for the effects of comparative deletion, which I have discussed here, and second, her test case uses a special type of comparative known as the Differential Verbal Comparative (DVC; Li, 2009). (See also footnote 46.) The DVC has been shown by Li (2009) to have many different properties from regular *bǐ* comparatives described here, and its structure has been less studied overall, making it a poor choice test case.

(95) **Demonstrating the lack of degree abstraction by proof by contradiction:**

- a. Assume:
 - i. the clausal analysis of *bǐ* comparatives, motivated above;
 - ii. the target and standard clauses are independently grammatical in their positive forms;
 - iii. \bar{A} -movement exists and can be long-distance in Mandarin Chinese (Huang, 1982); — and —
 - iv. degree abstraction is available.
- b. The above assumptions together entail that (93) with its intended interpretation will be grammatical.
- c. Observe: Example (93) is not grammatical.
- d. Conclusion: Degree abstraction is not available (i.e. assumption (iv) was incorrect).

Assumption (i) is supported by the work of the previous sections of this paper and assumption (iii) is shown in Huang (1982) and much subsequent literature on Mandarin Chinese. Therefore I will now discuss clause (ii).

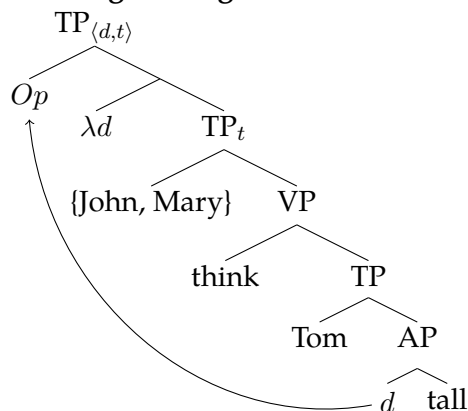
The two clauses required in order to construct (93), “John think Tom tall” and “Mary think Tom tall” are each grammatical in their positive forms. As noted previously in footnote 27, positive forms of gradable predicates in some environments require the addition of the morpheme *hěn* (Grano, 2012).

- (96) {Yuēhàn, Mǎlì} rěnwéi [Tāngmǔ hěn gāo].
 John Mary thinks Tom HEN tall
 ‘{John, Mary} thinks that Tom is tall.’

In addition to assumptions (i–iii), we assume for contradiction clause (iv), that degree abstraction is possible. Next we move on to demonstrating step (b), that these assumptions together entail that the test sentence (93) can be generated and will have the intended interpretation.

I begin by demonstrating the syntactic derivation of (93). I take each of the clauses in (96) with a null degree-type operator *Op* merged in place instead of the positive form morphology. I then move the null operator to the edge of the clause, long-distance. (This chain could include a stop in an intermediate landing site, but this is not illustrated here as it does not make a difference.) The null operator movement is interpreted as predicate abstraction, as indicated by the λ binder (Heim and Kratzer, 1998). The null operator itself is semantically inert. This much is illustrated in the following structure:

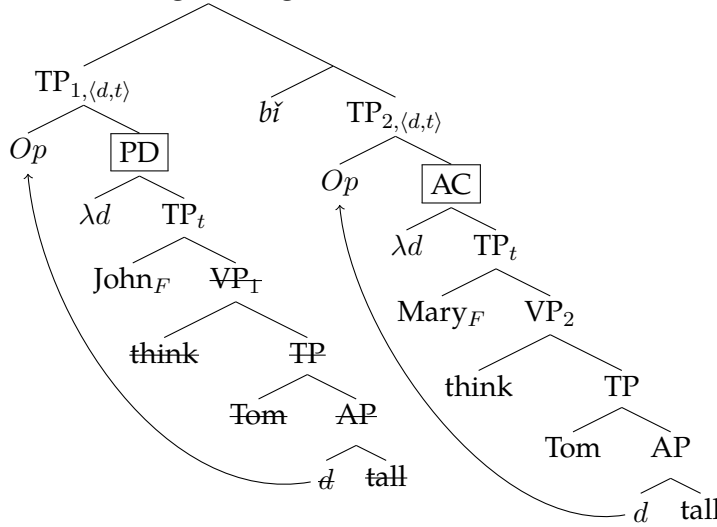
(97) **Constructing the target and standard clauses:**



Here I am demonstrating the derivation using a type $\langle d, \langle e, t \rangle \rangle$ denotation for the predicate ‘tall,’ as is commonly assumed for gradable predicates cross-linguistically. However, nothing here hinges on this choice.

Next I coordinate the two clauses in (96) using *bī*. As John and Mary are contrasting material in a coordination, they will be focused, as indicated by F-marking (Rooth, 1992b). The CDR requires that a local predicate of the target clause, TP_1 , be elided under identity with a local predicate of the standard clause, TP_2 . There is only one local predicate in the target clause, VP_1 , and there is only one local predicate in the standard clause, VP_2 .

(98) **Coordinating the target and standard clauses:**

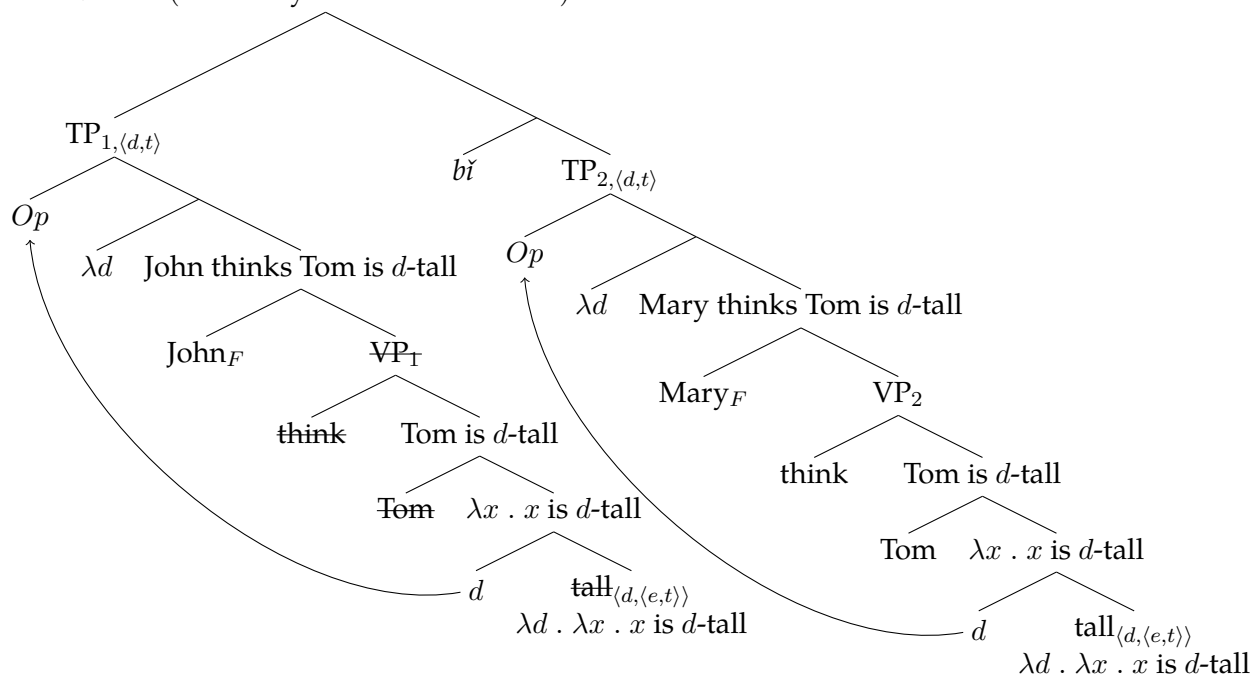


As VP_1 includes an unbound trace, we must use the constituent labeled PD as our parallelism domain. Ellipsis Parallelism requires that the semantic value of PD be equal to an antecedent, AC, allowing for substitutions to focus-marked material. Given the focus-marking on the contrasting constituents ‘John’ and ‘Mary,’ $\llbracket AC \rrbracket \in \llbracket PD \rrbracket^f$, and thus ellipsis of VP_1 is licensed under identity with VP_2 . This satisfies the CDR. Ellipsis of VP_1 yields the intended word order “John *bī* Mary think Tom tall.”

Now we turn to the semantic interpretation of this structure, illustrated in (99) below.

(99) **Interpretation:**

$$\begin{aligned}
& \llbracket b\check{i} \rrbracket (\llbracket TP_2 \rrbracket) (\llbracket TP_1 \rrbracket) \\
& = \max(\llbracket TP_1 \rrbracket) > \max(\llbracket TP_2 \rrbracket) \\
& = \max(\lambda d . \text{John thinks Tom is } d\text{-tall}) \\
& > \max(\lambda d . \text{Mary thinks Tom is } d\text{-tall})
\end{aligned}$$



As noted above, the null operator movements of degree type will be interpreted as degree abstraction. This yields the construction of the degree predicates $\llbracket TP_1 \rrbracket = (\lambda d . \text{John thinks Tom is } d\text{-tall})$ and $\llbracket TP_2 \rrbracket = (\lambda d . \text{Mary thinks Tom is } d\text{-tall})$. The comparative operator $b\check{i}$ takes these two degree descriptions and results in the intended truth conditions. We have thus successfully completed step (b) in (95) above, to show that the assumptions in (i–iv) together entails that the test example (93) can be constructed and yield the intended interpretation.

Finally we have reached the contradiction step of the argument. Example (93) above is judged as ungrammatical. The ungrammaticality of (93) teaches us that (at least) one of the assumptions in (i–iv) must be incorrect. Given that we have independently demonstrated each of the assumptions in (i–iii), the incorrect assumption must be (iv), that degree abstraction is available. The conclusion of this argument is that degree abstraction is not available in Mandarin Chinese.

6.3 Attributive comparatives

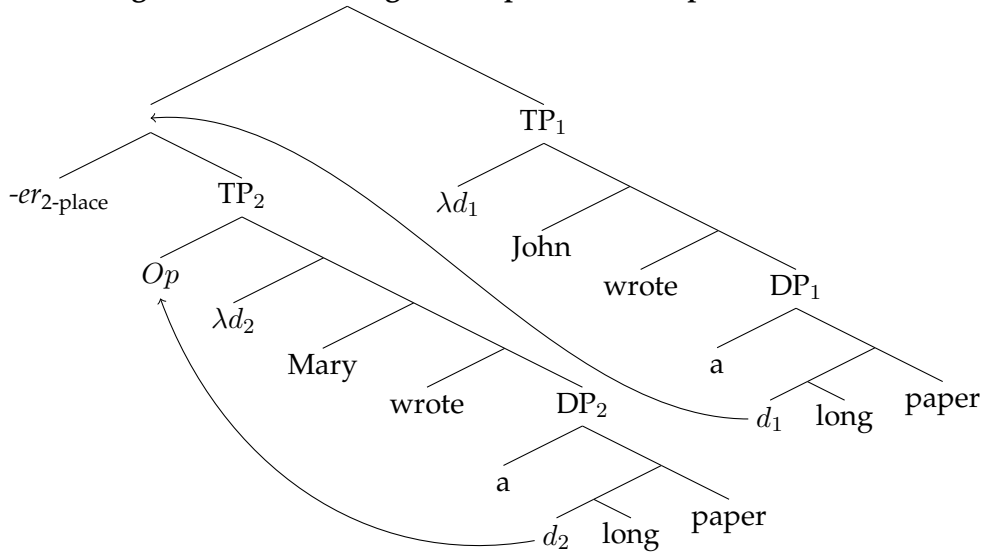
In all of the $b\check{i}$ comparatives we have looked at, the gradable predicate introducing the scale of comparison has been a verb, predicate adjective, or an adverb. Gradable predicates could conceivably be introduced elsewhere in the clause, including within a nominal. Comparatives which use a nominal-modifying predicate as their gradable predicate are called *attributive* comparatives. 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 are given in (100).

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

- a. Attributive degree comparative:
 John wrote a longer paper than Mary did.
 $max(\lambda d . \text{John wrote [a } d\text{-long paper]}) > max(\lambda d . \text{Mary wrote [a } d\text{-long paper]})$
- b. Attributive quantity comparative:
 John wrote more papers than Mary did.
 $max(\lambda d . \text{John wrote [} d\text{-many papers]}) > max(\lambda d . \text{Mary wrote [} d\text{-many papers]})$

It has been argued that attributive comparatives are derived through \bar{A} -movement of a degree argument from within the DP (Bresnan, 1973; Chomsky, 1977; Kennedy, 1997; Kennedy and Merchant, 2000, a.o.). Consider example (100a), where we are comparing degrees of *long*. The following tree sketches a possible LF structure for (100a) based on discussion in section 2.1; a similar configuration would hold for the LF of (100b):

(101) **LF for English attributive degree comparative example (100a):**



This LF structure reflects two movements of degree-type operators: first, there is a null operator movement of degree type from the degree argument of *long* in DP₂ to the edge of the standard clause, and second, there is movement of *-er* from the degree argument of *long* in DP₁ to the edge of the target clause (see e.g. Wold, 1995; Heim, 2000; Bhatt and Pancheva, 2004).⁴⁵ Both of these movements will be interpreted as degree abstraction, i.e. λ -abstraction over a variable of degree type, resulting in the two degree descriptions $\llbracket TP_1 \rrbracket = (\lambda d . \text{John wrote [a } d\text{-long paper]})$ and $\llbracket TP_2 \rrbracket = (\lambda d . \text{Mary wrote [a } d\text{-long paper]})$.

These degree abstraction steps in (101) are crucial for the interpretation of the attributive comparatives. Without degree abstraction, it is impossible for the degree argument of a predicate inside a nominal to be exposed at the TP level.

My proposal that Mandarin Chinese does not have degree abstraction therefore predicts a lack of attributive *bǐ* comparatives. In this section I will show that this prediction is borne out.

I begin with attributive degree comparatives, using the English (100a) as a model. The baseline in (102a) 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

⁴⁵These movements may 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, comparative deletion enforced by the CDR would satisfy this purpose, if the construction were otherwise available.

(102b). Instead, in order to make this comparison, both objects could be nominalized (102c) or one object can be nominalized and compared with within a relative clause on the other (102d).

(102) **Mandarin lacks attributive degree comparatives:**

- a. Baseline gradable adjective on object:
 ✓ 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. Attributive comparative:
 * 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. Grammatical alternative: nominalize both papers
 ✓ [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].’
- d. Grammatical alternative: compare with the other paper inside a relative clause
 ✓ Zhāng Sān xiě-le (yī piàn) [DP bǐ [DP Lǐ Sì xiě de (lùnwén)]] cháng de
 Zhang San write-PERF one CL BI Li Si write DE paper long DE
 lùnwén].
 paper
 ‘Zhang San wrote a paper that is longer than the paper that Li Si wrote.’

What goes wrong in the attributive comparative (102b)? The target and standard clauses in the *bǐ* comparatives are built using the transitive verb *xiě* ‘write,’ which takes a DP of type *e* as its complement. The degree argument of *cháng* ‘long’ must be saturated inside the DP, for example using positive degree morphology as in (102a). Without degree abstraction, there is no way for the degree argument of the attributive adjective ‘long’ to be accessible at the TP-level. We are thus unable to yield an LF similar to that of the English (100a) from the structure in (102b). The lack of attributive degree comparatives supports and is explained by my proposal that Mandarin Chinese lacks degree abstraction.

Mandarin similarly lacks attributive quantity comparatives. Example (103a) 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 (103b). The object can be nominalized in order to express this form of comparison (103c).⁴⁶

⁴⁶In addition to the nominalization strategy in (103c), Mandarin also has a distinct construction for comparing the quantity and identity of postverbal constituents, dubbed the “Differential Verbal Comparative” (DVC) by Li (2009). In a DVC, the morpheme *duō* forms a compound with a non-gradable transitive verb, resulting in a gradable predicate whose degree corresponds to the quantity of a postverbal constituent. Example (i) below is a grammatical DVC expressing a meaning similar to (103b):

- (i) Zhāng Sān bǐ Lǐ Sì duō-xiě-le liǎng piàn lùnwén.
 Zhang San BI Li Si many-write-PERF two CL paper
 ‘Zhang San wrote two more papers than Li Si did.’

Li (2009) proposes that the differential in a DVC is interpreted above both the target and standard at LF, making it compatible with the approach to differentials of *bǐ* comparatives suggested in footnote 13. However, Li (2009) also shows that the differential phrase in DVCs is very different from differentials in non-DVC *bǐ* comparatives, both in distribution and semantic interpretation. Further work is required to extend the proposal here to DVCs.

(103) **Mandarin lacks attributive quantity comparatives:**

- a. Baseline gradable *many* on object:
✓ Zhāng Sān xiě-le hěn duō lùnwén.
Zhang San write-PERF HEN many paper
'Zhang San wrote many papers.'
- b. Attributive comparative:
* Zhāng Sān bǐ Lǐ Sì xiě-le duō 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 xiě de lùnwén] bǐ [Lǐ Sì xiě de (lùnwén)] duō.
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].'

This situation in Mandarin Chinese, where attributive comparatives of both degree and quantity cannot be constructed, differs from the behavior of Japanese, the language initially studied in Beck et al. (2004) to motivate the Degree Abstraction Parameter. Ishii (1991) shows that Japanese allows for attributive comparatives of quantity but not degrees:

(104) **Japanese has attributive comparatives of quantity but not degrees (Ishii, 1991, pp. 106–107):⁴⁷**

- a. Attributive degree comparative:
?* Taroo-wa [Hanako-ga katta yori (mo)] nagai kasa-o katta.
Taroo-TOP [Hanako-NOM bought YORI (MO)] long umbrella-ACC bought
Intended: 'Taroo bought a longer umbrella than Hanako did.'
- b. Attributive quantity comparative
✓ Taroo-wa [Hanako-ga katta yori (mo)] takusan(-no) kasa-o katta.
Taroo-TOP [Hanako-NOM bought YORI (MO)] many(-GEN) umbrella-ACC bought
'Taroo bought more umbrellas than Hanako did.'

Beck et al. (2004) explains this pattern of grammaticality as follows. First, Beck et al. (2004) proposes that the function of *yor*i is to set a *contextual standard* against which we evaluate the gradable predicate—'long' in (104a) and 'many' in (104b). This context-setting function is introduced as parallel to the English expression *compared to*.⁴⁸ Second, they propose that Japanese lacks degree abstraction. The content of the *yor*i-clause *Hanako-ga katta* in both (104a) and (104b) is argued to be a free relative, denoting the individual 'what Hanako bought.' They therefore propose the following as English paraphrases to (104a–b):

(105) **Proposed English paraphrases (Beck et al., 2004, p. 300):**

- a. Paraphrase for attributive degree comparative (104a):
? Compared to what Hanako bought, Taroo bought a long umbrella.

⁴⁷The morpheme *yor*i introduces the standard. The contribution of *mo* is not discussed in Beck et al. (2004), as noted in their footnote 1.

⁴⁸Note however that this characterization of Japanese *yor*i as setting a contextual standard has been challenged (Kennedy, 2009). See also Shimoyama (2012) and Sudo (2015) for broader critiques.

- b. Paraphrase for attributive quantity comparative (104b):
 ✓ Compared to what Hanako bought, Taroo bought a lot of umbrellas.

It's noted that in these English paraphrases, too, there is a contrast between (105a) and (105b). Beck et al. (2004) propose that the difference between (105a) and (105b)—and hence between the Japanese (104a) and (104b)—relates to the relative ease with which the appropriate contextual standard is inferred. The attributive adjective *long* in (105a) requires the identification of a contextually-salient degree of length. The contextual standard introduced by *compared to* is the plurality of *what Hanako bought*, which does not by itself make salient the maximal length of the objects in that set. This leads to the relative ungrammaticality of (105a) and, by analogy, also explains the degradedness of the Japanese attributive degree comparative (104a). In contrast, the identification of the *cardinality* of a contextually-salient plurality is taken to be natural, leading to the grammaticality of (105b) and thereby also the Japanese attributive quantity comparative (104b).

Given these Japanese facts and their analysis in Beck et al. (2004), I now return to the situation in Mandarin Chinese. What is notable is Mandarin's lack of attributive *quantity* comparatives, which are available in Japanese. Beck et al. (2004) proposes that Japanese has attributive quantity comparatives despite the language's lack of degree abstraction because comparison is done by setting a contextual standard, rather than semantically composing directly with the standard. The lack of attributive quantity comparatives then not only supports the view that Mandarin Chinese lacks degree abstraction, but also provides an additional argument that *bǐ* does not derive the semantics of comparison by setting a contextual standard, as previously argued by Erlewine (2007).

7 Conclusion

The careful and detailed study of individual languages, when related to a broader cross-linguistic landscape, can teach us not only about the great diversity observed in grammar but also shed light on the *shape* of that diversity. It is in this spirit that in this paper I present an investigation of the Mandarin Chinese *bǐ* comparative construction. I have argued (a) that the *bǐ* comparative must be analyzed as a clausal comparative and (b) that Mandarin Chinese lacks degree abstraction. This situation—a clausal comparative without degree abstraction—is unique in the cross-linguistic literature on degree syntax and semantics.

I propose that the *bǐ* comparative is a clausal comparative, with each *bǐ* comparative made up of two clauses, each with its own instance of the predicate of comparison. Each clause denotes a predicate of degrees and the semantics of *bǐ* asserts an ordering over the maximal degrees in their extension. This proposal is a marked departure from recent work on the Mandarin *bǐ* comparative (e.g. Xiang, 2003, 2005; Erlewine, 2007; Lin, 2009) which have argued for a phrasal analysis, wherein there is only one instance of the gradable predicate in the syntax and the standard is individual-denoting.

Primary evidence for the clausal comparison approach was presented in section 4. 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, using four different movement constructions: subject raising, object fronting, *bèi* passives, and verb-copy constructions. Under the clausal analysis proposed here, each of these cases can be analyzed straightforwardly as two instances of movement—one in the target clause and one in the standard clause. In a phrasal analysis, on the other hand, these examples would have to be given an alternative explanation without parallel movement chains. These facts make a compelling case for the analysis of the Mandarin *bǐ* comparative as a clausal comparative.

As a clausal comparative, an important question is exactly how the overt word order is derived.

In my proposal here I put forward the Comparative Deletion Requirement (CDR). The CDR ensures that a local predicate of the target clause is elided, yielding the observed word order. I follow the work of Rooth (1992a); Heim (1997); Takahashi and Fox (2005) in adopting a semantically sensitive licensing condition on ellipsis. This formulation of ellipsis licensing is shown to accurately predict patterns of grammaticality and interpretation for comparatives involving verb-copy and also extends to so-called adverbial comparatives, demonstrating the wide empirical coverage of this approach.

Finally in section 6 I developed an argument for the nonexistence of degree abstraction in Mandarin Chinese. This argument takes the form of a proof-by-contradiction: supposing that (i) certain assumptions are true and (ii) degree abstraction exists, we expect structure X with interpretation Y to be grammatical, but in fact it is not; therefore degree abstraction cannot exist. It is crucial for such an argument that the premise in (i) is correct, i.e. that we have a sufficient understanding of “what else could go wrong.” I therefore developed my argument on top of our independently motivated understanding of the structure of the *bǐ* comparative construction. The conclusion that Mandarin Chinese lacks degree abstraction supports the idea that this is a possible point of cross-linguistic variation, the controversial Degree Abstraction Parameter:

(106) **Beck et al.’s (2004) Degree Abstraction Parameter (DAP): (=1)**

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

A priori, one might have imagined that languages without degree abstraction would lack comparison with degree-denoting clausal standards. Clausal standards are traditionally interpreted as degree predicates through the process of degree abstraction, as the semantic reflex of degree operator movement. This makes the claim that Mandarin Chinese exhibits clausal comparison without degree abstraction particularly striking.

My solution is to propose that Mandarin Chinese has the *Degree Last* property, repeated here below. I will conclude by briefly discussing its characterization and implications.

(107) **Degree Last: (=5)**

All gradable predicates can take their degree argument as their last argument.

Gradable predicates are often discussed in the literature as having a denotation as in (108a), composing with a degree argument first. Concretely, Degree Last, as proposed here in (107), allows the denotation of ‘tall’ *gāo* in Mandarin Chinese to have either the denotation in (108a) or (108b).

(108) **Two denotations for ‘tall’:**

- | | |
|--|--|
| a. $\llbracket \text{tall} \rrbracket = \lambda d . \lambda x . x \text{ is } d\text{-tall}$ | type $\langle d, \langle e, t \rangle \rangle$ |
| b. $\llbracket \text{tall} \rrbracket = \lambda x . \lambda d . x \text{ is } d\text{-tall}$ | type $\langle e, \langle d, t \rangle \rangle$ (degree-last) |

The choice between these denotations of gradable predicates is generally without significant consequence. For example, most literature on gradability and degree constructions in English assume (108a) as the denotation, but see for example Rett (2008) and Morzycki (2008) for presentations which use the degree-last denotation (108b) for English.

This ambivalence reflects the reality that in most cases, the two choices are effectively equivalent. In the case of Mandarin Chinese, however, we have been able to develop an argument for the Degree Last property: Mandarin Chinese has clausal comparatives with clauses that denote degree predicates, but does not have degree abstraction. Denotations that are degree-last as in (108b) must be used to grammatically construct and interpret *bǐ* comparatives.

In fact, even the statement of Degree Last in (107) still allows for more ambivalence that we have evidence for. The statement in (107) is in a sense a *weak* statement, requiring only that all gradable

predicates *have available* a denotation that takes their degree argument last. The facts observed here in Mandarin Chinese are compatible with a *strong* statement that only degree-last denotations are available.⁴⁹ And this still also leaves open whether or not Degree Last is a language-specific property—another potential point of cross-linguistic variation, which would also raise questions regarding the acquisition of such a property.

If we step back for a moment, all of this ambivalence both in the literature and in the discussion above could be considered surprising. If we were talking about *non-degree* arguments, this is essentially the linking problem of argument structure. For example, the Uniformity of Theta Alignment Hypothesis (UTAH; Baker, 1988, 1997) could be restated in Degree-Last-like terms, as a statement of the fixed order of composition of different kinds of arguments. These questions of the relative order and structural configuration of non-degree arguments has traditionally been an active area of work on the syntax/semantics interface.

Following the lead of Baker's UTAH, then, I speculatively conclude with a strong, universal formulation of Degree Last:

(109) **Universal Degree Last:**

Gradable predicates in all languages always take their degree argument last.

I hope that future work on the syntax and semantics of degree constructions will include arguments for or against this proposed universal.

References

- Alrenga, Peter, Chris Kennedy, and Jason Merchant. 2012. A new standard of comparison. In *Proceedings of WCCFL 30*, 32–42.
- Baker, Mark. 1997. Thematic roles and syntactic structure. In *Elements of grammar*, ed. Liliane Haegeman, 73–137. Kluwer Academic Publishers.
- Baker, Mark C. 1988. *Incorporation: A theory of grammatical function changing*. Chicago: University of Chicago Press.
- Beck, Sigrid, Vera Hohaus, and Sonja Tiemann. 2012. A note on phrasal comparison. In *Proceedings of SALT 22*, 146–165.
- Beck, Sigrid, Sveta Krasikova, Daniel Fleisher, Remus Gergel, Stefan Hofstetter, Christiane Savelsberg, John Vanderelst, and Elisabeth Villalta. 2009. Crosslinguistic variation in comparison constructions. *Linguistic Variation Yearbook* 9:1–66.
- Beck, Sigrid, Toshiko Oda, and Koji Sugisaki. 2004. Parametric variation in the semantics of comparison: Japanese vs. English. *Journal of East Asian Linguistics* 13:289–344.
- Bhatt, Rajesh, and Roumyana Pancheva. 2004. Late merger of degree clauses. *Linguistic Inquiry* 35:1–45.
- Bhatt, Rajesh, and Shoichi Takahashi. 2007. Direct comparisons: Resurrecting the direct analysis of phrasal comparatives. In *Proceedings of SALT 17*, ed. Tova Friedman and Masayuki Gibson, 19–36.
- Bhatt, Rajesh, and Shoichi Takahashi. 2011. Reduced and unreduced phrasal comparatives. *Natural Language & Linguistic Theory*.

⁴⁹The strong form of the Degree Last property is also derived under a very different approach which views gradable predicates as measure functions that return their maximal degree after saturating all their arguments (Heim, 1985; Kennedy, 1997, a.o.; see footnote 14). Kennedy (1997) argued for this denotation on the basis of various observations about scope interactions in English comparatives—a set of facts which have developed into we now call the Heim-Kennedy constraint (Heim, 2000, see also). However, the nature of this constraint is a point of active debate.

- Bošković, Željko. 2004. Two notes on right node raising. In *University of connecticut working papers* 12, ed. Miguel Rodriguez-Mondoñedo and Maria Emma Ticio, 13–24.
- Bresnan, Joan. 1973. Syntax of the comparative clause construction in English. *Linguistic Inquiry* 4:275–343.
- Bresnan, Joan. 1975. Comparative deletion and constraints on transformations. *Linguistic Analysis* 1:25–74.
- Chalcraft, Faye. 2006. Right node raising as ellipsis: evidence from (what the) British do. *Snippets* 12:7–8.
- Cheng, Lisa Lai-Shen. 2007. Verb copying in Mandarin Chinese. In *The Copy Theory of Movement*, ed. Norbert Corver and Jairo Nunes, 151–174. John Benjamins.
- Chiu, Hui-Chun Bonnie. 1995. An object clitic projection in Mandarin Chinese. *Journal of East Asian Linguistics* 4:77–117.
- Chomsky, Noam. 1977. On *wh*-movement. In *Formal syntax*, ed. Peter Culicover, Thomas Wasow, and Adrian Akmajian, 71–132. New York: Academic Press.
- Corver, Norbert. 2005. Comparative deletion and subdeletion. In *The Blackwell companion to syntax*. Blackwell.
- Cresswell, M. J. 1976. The semantics of degree. In *Montague Grammar*, ed. Barbara Hall Partee.
- Erlewine, Michael Yoshitaka. 2007. A new syntax-semantics for the Mandarin *bǐ* comparative. Master's thesis, University of Chicago.
- Erlewine, Michael Yoshitaka. 2010. Independent dependency in the mandarin *bǐ* comparative. URL <http://comparatives.mit.edu/erlewine.pdf>, presented at the MIT Workshop on Comparatives.
- Erlewine, Michael Yoshitaka. 2012. Share to compare: the Mandarin *bǐ* comparative. In *Proceedings of the 29th West Coast Conference on Formal Linguistics (WCCFL 29)*, ed. Jaehoon Choi, E. Alan Hogue, Jeffrey Punske, Deniz Tat, Jessamyn Schertz, and Alex Trueman, 54–62. URL <http://www.lingref.com/cpp/wccfl/29/paper2687.pdf>.
- Ernst, Thomas, and Chengchi Wang. 1995. Object preposing in Mandarin Chinese. *Journal of East Asian Linguistics* 4:235–260.
- Feng, Shengli. 1995. 管約理論與漢語的被動句 [GB theory and passive sentences in Chinese]. *Zhongguo Yuyanxue Luncong [Studies in Chinese Linguistics]* 1:1–28.
- Fiengo, Robert, and Howard Lasnik. 1972. On nonrecoverable deletion in syntax. *Linguistic Inquiry* 3:528.
- Fu, Yi-Chin. 1978. Comparative structures in English and Mandarin Chinese. Doctoral Dissertation, University of Michigan.
- Geach, Peter T. 1970. A program for syntax. *Synthese* 22:3–17.
- Grano, Thomas. 2012. Mandarin *hen* and universal markedness in gradable adjectives. *Natural Language & Linguistic Theory* 30:513–565.
- Grosz, Patrick. 2015. Movement and agreement in right-node raising constructions. *Syntax* 18:1–38.
- Hankamer, Jorge. 1973. Why there are two *than*'s in English. In *Papers from the 9th Regional Meeting of the Chicago Linguistics Society*, 179–189.
- Hankamer, Jorge. 1979. *Deletion in coordinate structures*. New York: Garland Publishing.
- Hartman, Jeremy. 2011. The semantic uniformity of traces: Evidence from ellipsis parallelism. *Linguistic Inquiry* 42:367–388.
- Heim, Irene. 1985. Notes on comparatives and related matters. Manuscript.
- Heim, Irene. 1997. Predicates or formulas? Evidence from ellipsis. In *Proceedings of SALT VII*, 197–221.
- Heim, Irene. 2000. Degree operators and scope. In *Proceedings of SALT 10*. CLC Publications, Cornell University.

- Heim, Irene, and Angelika Kratzer. 1998. *Semantics in generative grammar*. Blackwell.
- Her, One-Soon. 2009. Unifying the long passive and the short passive: On the *bei* construction in Taiwan Mandarin. *Language and Linguistics* 10:421–470.
- Hou, John Yien-Yao. 1979. Grammatical relations in Chinese. Doctoral Dissertation, University of Southern California.
- Hsieh, I-Ta Chris. 2015. Remark: Long-distance reflexives, blocking effects, and the structure of Mandarin comparatives. *Syntax* 18:78–102.
- Huang, Cheng-Teh James. 1982. Logical relations in Chinese and the theory of grammar. Doctoral Dissertation, Massachusetts Institute of Technology.
- Huang, Cheng-Teh James. 1988. *Wo pao de kuai* and Chinese phrase structure. *Language* 64:274–311.
- Huang, Cheng-Teh James. 1993. Reconstruction and the structure of VP: Some theoretical consequences. *Linguistic Inquiry* 24:103–138.
- Huang, Cheng-Teh James. 1999. Chinese passives in comparative perspective. *Tsing Hua Journal of Chinese Studies* 29:423–509.
- Ishii, Yasuo. 1991. Operators and empty categories in Japanese. Doctoral Dissertation, University of Connecticut.
- Jacobson, Pauline. 2014. *Compositional semantics: an introduction to the syntax/semantics interface*. Oxford University Press.
- Johnson, Kyle. 2009. Gapping is not (VP-)ellipsis. *Linguistic Inquiry* 40:289–328.
- Katz, Jerrold J., and Paul M. Postal. 1964. *An integrated theory of linguistic descriptions*. MIT Press.
- Kayne, Richard. 1994. *The antisymmetry of syntax*. MIT Press.
- Keenan, Edward L., and Lawrence S. Moss. 1985. Generalized quantifiers and the expressive power of natural language. In *Generalized quantifiers in natural language*, ed. Johan van Benthem and Alice ter Meulen, 73–124. Foris, Dordrecht.
- Kennedy, Christopher. 1997. Projecting the adjective: The syntax and semantics of gradability and comparison. Doctoral Dissertation, University of California Santa Cruz.
- Kennedy, Christopher. 2002. Comparative deletion and optimality in syntax. *Natural Language and Linguistic Theory* 20:553–621.
- Kennedy, Christopher. 2009. Modes of comparison. In *Proceedings of the 43rd Meeting of the Chicago Linguistic Society (CLS 43)*.
- Kennedy, Christopher, and Jason Merchant. 2000. Attributive comparative deletion. *Natural Language and Linguistic Theory* 18:89–146.
- Kitagawa, Yoshihisa. 1986. Subjects in Japanese and English. Doctoral Dissertation, University of Massachusetts Amherst.
- Koopman, Hilda, and Dominique Sportiche. 1991. The position of subjects. *Lingua* 85:211–258.
- Krasikova, Sveta. 2008. Comparison in Chinese. In *Empirical Issues in Syntax and Semantics*, ed. Olivier Bonami and Patricia Cabredo Hofherr, volume 7, 263–281.
- Kuroda, Sige-Yuki. 1988. Whether we agree or not: a comparative syntax of English and Japanese. *Linguistic Investigations* 12:1–47.
- Li, Xiao. 2009. Degreeless comparatives. Doctoral Dissertation, Rutgers.
- Lin, Jo-Wang. 2009. Chinese comparatives and their implicational parameters. *Natural Language Semantics* 17:1–27.
- Lin, Jo-Wang, and Chih-Chen Jane Tang. 1995. Modals as verbs in Chinese: a GB perspective. *The Bulletin of the Institute of History and Philology, Academia Sinica* 66:53–104.
- Liu, Chen-Sheng Luther. 1996. A note on Chinese comparatives. *Studies in the Linguistic Sciences* 26:215–235.
- Liu, Chen-Sheng Luther. 2010. The positive morpheme in Chinese and the adjectival structure. *Lingua* 120:1010–1056.

- Liu, Chen-Sheng Luther. 2011. The Chinese *bi* comparative. *Lingua* 121:1767–1795.
- May, Robert Carlen. 1977. The grammar of quantification. Doctoral Dissertation, Massachusetts Institute of Technology.
- Merchant, Jason. 2008. Variable island repair under ellipsis. In *Topics in ellipsis*, ed. Kyle Johnson, 132–153. Oxford.
- Moltmann, Friederike. 1992. Coordination and comparatives. Doctoral Dissertation, Massachusetts Institute of Technology.
- Morzycki, Marcin. 2008. Adverbial modification of adjectives: Evaluatives and a little beyond. In *Event structures in linguistic form and interpretation*, ed. Johannes Dölling, Tatjana Heyde-Zybatow, and Martin Schäfer, 103–126. Walter de Gruyter.
- Napoli, Donna Jo. 1983. Comparative ellipsis: A phrase structure analysis. *Linguistic Inquiry* 14:675–694.
- Paul, Waltraud. 1993. A non-deletion account of the comparative construction in Mandarin Chinese. *Cahiers de Linguistique Asie Orientale* 22:9–29.
- Paul, Waltraud. 2002. Sentence-internal topics in Mandarin Chinese: the case of object preposing. *Language and Linguistics* 3:695–714.
- Rett, Jessica. 2008. Degree modification in natural language. Doctoral Dissertation, Rutgers.
- Rooth, Mats. 1992a. Ellipsis redundancy and reduction redundancy. In *Proceedings of the Stuttgart ellipsis workshop, report series, Sprachtheoretische Grundlagen für die Computerlinguistik, no 29, SFB 340*. IBM Heidelberg.
- Rooth, Mats. 1992b. A theory of focus interpretation. *Natural Language Semantics* 1:75–116.
- Shimoyama, Junko. 2012. Reassessing crosslinguistic variation in clausal comparatives. *Natural Language Semantics* 20:83–113.
- von Stechow, Arnim. 1984. Comparing semantic theories of comparison. *Journal of Semantics* 3:1–77.
- Sudo, Yasutada. 2015. Hidden nominal structures in Japanese clausal comparatives. *Journal of East Asian Linguistics* 24:1–51.
- Takahashi, Shoichi, and Danny Fox. 2005. MaxElide and the re-binding problem. In *Proceedings of Semantics and Linguistic Theory 15 (SALT 15)*, ed. Effi Georgala and Jonathan Howell, 223–240. Ithaca, NY: CLC Publications.
- Tancredi, Christopher Damian. 1992. Deletion, deaccenting, and presupposition. Doctoral Dissertation, Massachusetts Institute of Technology.
- Tang, Sze-Wing. 2001. The (non-)existence of gapping in Chinese and its implications for the theory of gapping. *Journal of East Asian Linguistics* 10:201–224.
- Ting, Jen. 1998. Deriving the *bei*-construction in Mandarin Chinese. *Journal of East Asian Linguistics* 7:319–354.
- Toosarvandani, Maziar. to appear. A new generalization about gapping. *Linguistic Inquiry*.
- Tsao, Feng-fu. 1979. *A functional study of topic in Chinese: The first step towards discourse analysis*. Taipei: Student Book Company.
- Tsao, Feng-fu. 1989. Comparison in Chinese: a topic-comment approach. *Tsing Hua Journal of Chinese Studies* 19:151–189.
- Wexler, Kenneth, and Peter W. Culicover. 1980. *Formal principles of language acquisition*. MIT Press.
- Wold, Dag. 1995. Antecedent-contained deletion in comparative constructions. Manuscript, Massachusetts Institute of Technology.
- Xiang, Ming. 2003. A phrasal analysis of Chinese comparatives. In *Proceedings of CLS 39*, 739–754.
- Xiang, Ming. 2005. Some topics in comparative constructions. Doctoral Dissertation, Michigan State University.