Mandarin Clausal Comparatives Involve Standard Embedding*

Haoming Li & Zhouyi Sun

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1 Overview

1.1 Goals of talk:

1. We first present several novel arguments in favor of the proposal that the syntactic structure of Mandarin clausal comparatives involve an **embedding relation** between the two clauses rather than a coordinate relation, as recently argued by Erlewine (2018).

2. We then explore the implications of the embedding structure for degree semantics. Since the embedding approach is generally held to involve degree abstraction, our proposal lends support from the perspective of syntactic structure to the argument that **Mandarin has 'degree abstraction'** (Gong and Coppock 2021), contrary to what is argued by Beck et al. (2009); Krasikova (2008); Erlewine (2018). We further demonstrate that even the coordinate approach requires degree abstraction. All these results cast doubt on the proposal of the 'Degree Abstraction Parameter' (DAP) (Beck et al. 2004).

1.2 Roadmap:

Section 2: Introduction to Mandarin *bi* comparatives and analyses on the market

Section 3: Our proposal: *bi* comparatives are clausal comparatives and the two clauses have an embedding relation rather than a coordinate relation

Section 4: Arguments for the embedding approach

Section 5: The implications of the embedding structure for degree semantics

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2 Introduction

2.1 Basics of Mandarin comparatives

▷ In Mandarin *bi* comparative constructions as exemplified in (1), the pre-*bi* part (**target**) has a greater degree of the predicate than the post-*bi* part (**standard**).

▷ The occurrence of *geng* (the overt phonological realization of the comparative operator, *-er*; see section 5.3) between the standard subject and the predicate is optional.

(1)　Li **bi** Xu (**geng**) gao.
　　Li ʙɪ Xu ɢᴇɴɢ tall
　　'Li is taller than Xu.'

2.2 Clausal vs. phrasal comparatives in Mandarin

▷ There is debate about whether clausal, phrasal, or both are used to construct comparatives in Mandarin Chinese.

▷ Crucial observation: great flexibility in the standard that can surface between *bi* and the predicate, no constituency requirement.

(2)　*Subject*
　　Zhangsan bi **Lisi** gao.
　　Z.　　　ʙɪ L.　tall
　　'Z. is taller than L.'

(3)　*Subject, temporal and place adverbial*
　　Zhangsan zuotian　zai xuexiao bi **Lisi jintian zai jiali**　geng　gaoxing.
　　Z.　　　yesterday at　school ʙɪ L.　today　at　home ɢᴇɴɢ joyful
　　'Z. was happier yesterday at school than L. is today at home.'　　　(Erlewine 2018:452)

(4)　*Subject, reason adjunct*
　　Xu yinwei dubo　　bi **Li yinwei　chaogu**　　　kui-le　geng　duo　qian.
　　X. because gambling ʙɪ L. because stock.speculation lose-ᴘꜰᴠ ɢᴇɴɢ much money
　　'Xu lost more money because of gambling than Li because of stock speculation.'

▷ We follow Erlewine (2018) in recognizing the availability of clausal comparatives which is the focus of our talk, and leave the debate to future research.
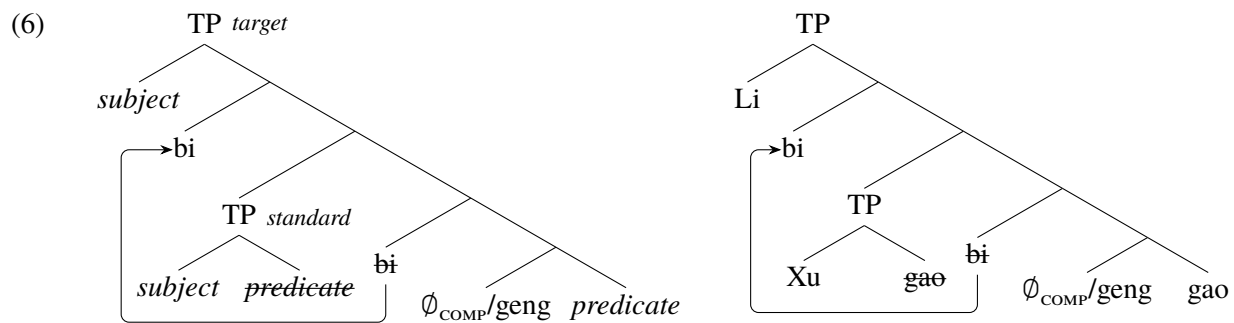
2.3 Clausal approaches

▷ There are two clausal approaches to Mandarin *bi* comparatives:

i. Coordination approach: Erlewine (2018) argues for the following structure in (5), treating *bi* as a coordinator, coordinating the target and standard clauses, with the predicate in the target clause deleted.

(5)
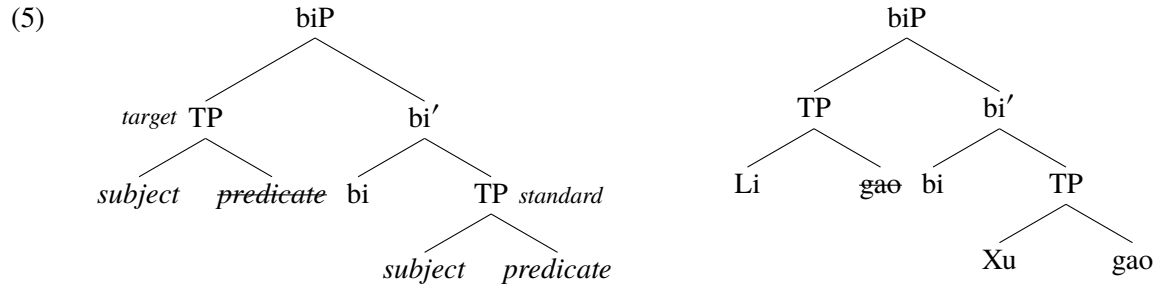
ii. Embedding approach: The other way is to suppose that the standard clause is embedded in the target clause and the predicate in the embedded standard clause is deleted (5) (see Erlewine 2007; Liu 1996, 2011; Hsieh 2017).

(6)

▷ (6), following several past approaches, identifies *bi* as head in the verbal projections. However, other embedded clausal analyses above have *bi* head the standard clause, forming a constituent with it.

▷ We leave the debate open, and the differences between these embedding proposals will be abstracted away since this talk mainly focuses on the embedding versus the coordinate relation between the target and the standard clauses. The structure in (6) will be assumed for concreteness in what follows.

▷ Observe that the key difference between (5) and (6) lies in structural (a)symmetry. This mainly concerns whether the material on the left can c-command into the right and whether extraction of the target subject is permitted. We will use both of these aspects to investigate the underlying syntactic structure.

3 Proposal

▷ Following Erlewine (2018), we also identify the *bi* construction as **clausal comparative**.

▷ But contra Erlewine (2018), we think the **embedding approach** is the right analysis of Mandarin clausal comparatives.

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▷ Evidence from several viewpoints will be provided for this claim:

- **Principle C**, with the standard subject c-commanded by the target subject
- **Binding**, with anaphors in either the standard subject or the predicate being c-commanded by the target subject
- **Relative extraction**, with the extraction of the subject violating CSC in the coordination approach
- **Scope of matrix obligatory control predicates**, which is by default higher than the comparative

▷ All of the above structural facts pose problems for the coordination approach, but are natural consequences of the embedding approach.

4 Arguments for the embedding approach

4.1 Target subject binding

▷ A crucial structural difference between the coordination and embedding approaches is whether the target subject c-commands elements in the standard clause and the overt predicate.

▷ In the coordination approach, the target subject **does not c-command** either the standard subject or the overt predicate.

▷ In the embedding approach, the target subject **does c-command** both.

▷ In this subsection, we set out to diagnose whether these two c-command relationships hold.

Case 1 – Principle C violation

▷ (7a) shows that Principle C is in effect in Mandarin (see also Huang et al. 2009).

▷ (7b), as an instance of Principle C violation, indicates that the standard subject is c-commanded by the target subject, which holds in the embedding approach but not the coordinate approach.

(7)   a.   *Ta$_1$ kandao le Li$_1$ de laoshi.
           he   see   LE Li DE teacher
           Intended: 'Li saw his own teacher'
      b.   *Ta$_1$ bi Li$_1$ de laoshi   gao.
           he   BI Li DE teacher tall
           Intended: 'Li is taller than his own teacher.'

Case 2 – Binding into the standard subject

▷ The target subject can serve as the antecedent for reflexives such as *ziji* 'self' in the standard subject (8).

▷ This shows that the target subject should c-command the standard subject, which is true of the embedding approach:

(8)   Li$_1$ [bi [**ziji**$_1$ de laoshi] gao.]
      Li   BI self DE teacher tall
      'Li is taller than his own teacher.'

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▷ In the coordination approach, the target subject does not c-command the reflexive, predicting the binding relationship impossible (✘ below will mean that the illustrated structure cannot be the correct one):

(9) ✘[$_{TP}$ Li$_1$ g̶a̶o̶] bi [$_{TP}$ **ziji$_1$** de laoshi gao]
       L.   BI   self DE teacher tall
     Intended: 'Li is taller than his own teacher.'

▷ (9) is exactly parallel to the following example involving regular coordination, which also does not allow binding of the reflexive by the subject of the first conjunct:

(10) *[$_{TP}$ Li$_1$ gao] danshi$_\&$ [$_{TP}$ ziji$_1$ de laoshi bu gao].
        L.   tall   but   self POSS teacher NEG tall
      'Li$_1$ is tall but his$_1$ teacher is not tall.'

▷ Notice that in Mandarin unbound reflexives can only be speaker-oriented (Huang et al. 2009), c-command is a necessary condition for the co-reference reading.


Case 3 – Binding into the overt predicate

▷ When an ellipsis site contains a reflexive, both sloppy and strict readings are expected:

(11) John took of picture of himself, and Bill did too/[t̶a̶k̶e̶ ̶a̶ ̶p̶i̶c̶t̶u̶r̶e̶ ̶o̶f̶ ̶h̶i̶m̶s̶e̶l̶f̶].
        ✓   Sloppy reading   J. took a picture of J.   B. took a picture of B.
        ✓   Strict reading on J.   J. took a picture of J.   B. took a picture of J.
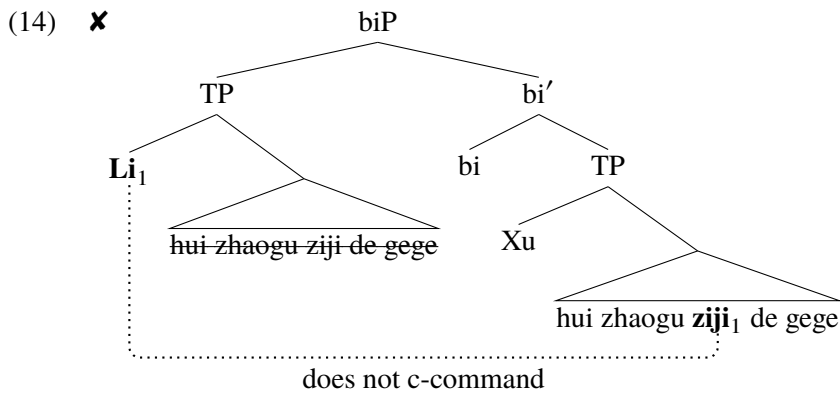   ✘   Strict reading on B.   J. took a picture of B.   B. took a picture of B.

▷ Crucially, the generalization is that out of the two subjects, the one whose predicate is not elided can serve as the shared reference of the strict reading.

▷ This is because the overt reflexive is obligatorily bound and therefore c-commanded by it.

▷ In other words, the subject providing the shared reference for the strict reading is the one that c-commands the overt reflexive.

▷ A Mandarin comparative example with a reflexive in the predicate behaves exactly the same as (11) in terms of co-reference patterns:

(12) Li bi Xu geng hui zhaogu **ziji** de gege.
      Li BI Xu GENG can take.care.of self DE brother
      'Li is better than Xu at taking care of his$_{refl}$ own brother.'
        ✓   Sloppy reading   Li takes care of Li's brother   Xu takes care of Xu's brother
        ✓   Strict reading on Li   Li takes care of Li's brother   Xu takes care of Li's brother
        ✘   Strict reading on Xu   Li takes care of Xu's brother   Xu takes care of Xu's brother

▷ In the available strict reading, ***Li*, the target subject, serves as the shared reference, and should c-command the overt reflexive**.

▷ The embedding approach provides the correct structure satisfying the requirements:

(13)

```
                        TP
        Li₁
              bi
                        TP                    bi̶
                  Xu                              geng
                      hui zhaogu ziji de gege          hui zhaogu ziji₁ de gege
                              c-commands
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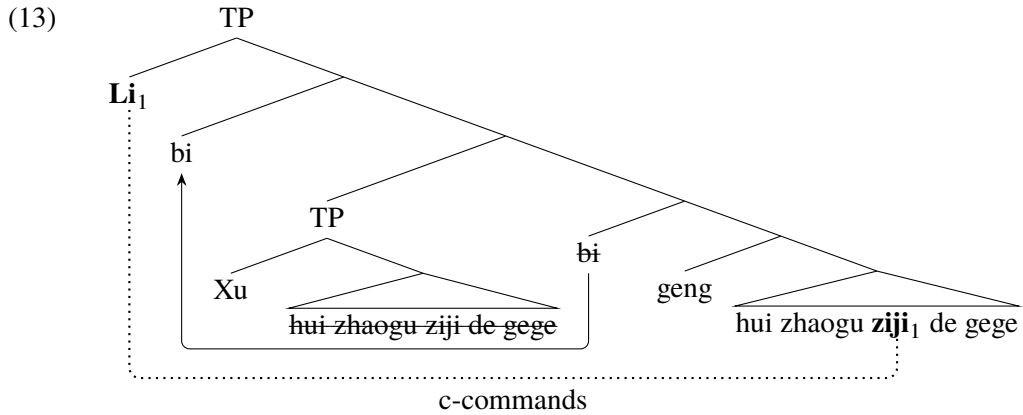
▷ The coordination approach, on the other hand, gives the wrong c-command relationships: the target subject does not c-command the overt reflexive, making binding impossible and making the wrong prediction:

(14) ✗

```
                            biP
              TP                        bi′
        Li₁                       bi        TP
              hui zhaogu ziji de gege    Xu
                                            hui zhaogu ziji₁ de gege
                        does not c-command
```

4.2 Relative extraction

▷ The other crucial difference between the two approaches is that the extraction of the target subject violates CSC in the coordination approach but not the embedding approach.

▷ Comparatives can be used in relative clauses, with the subject of the comparative target relativized:

(15)　　Li shi ge [$_{RC}$ —₁ bi Xu gao de] xuesheng₁.
　　　　Li BE CL　　　BI Xu tall REL student
　　　　Li is a student who is taller than Xu.

▷ To derive the relative clause in (15), the coordination approach violates the Coordinate Structure Constraint (CSC), since only the operator as the subject of the first TP conjunct is extracted:

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(16) ✗
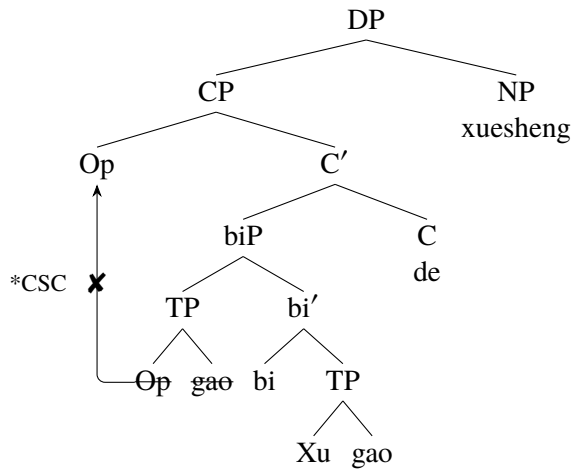
▷ The same holds for conjunct subextraction out of TP coordination, and it is not allowed in Mandarin:

(17) *Li shi ge [$_{RC}$ [$_{TP}$ —$_1$ kaixin] erqie [$_{TP}$ laoshi ye kaixin] de] xuesheng$_1$.
Li BE CL   be.happy and   teacher also be.happy REL student
Intended: 'Students are happy and teachers are happy. And Li is one of the happy students.'

▷ But relativization does not pose any problem to the embedding approach:

(18)
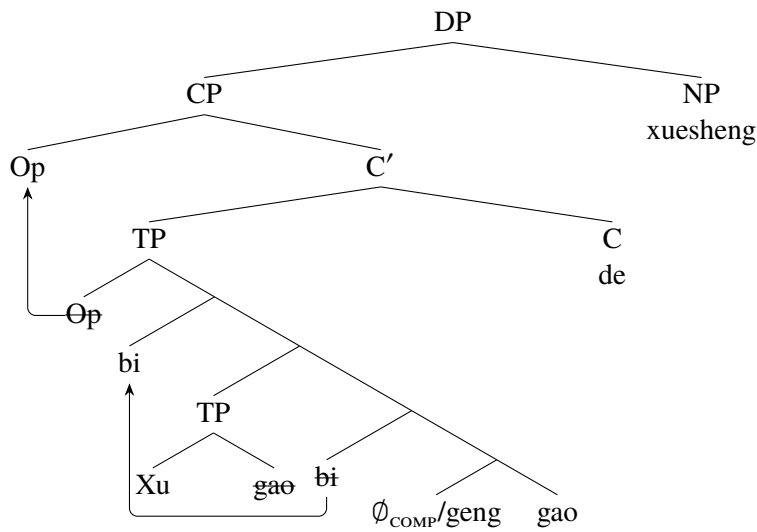
4.3 Scope of control predicates

▷ Notice that obligatory, exhaustive control predicates such as *shitu* 'try' can have a clausal complement that contains a comparative:

(19)   Li **shitu** bi Xu pao-de-kuai.

       Li try   BI Xu run.fast

    a.   low-scope de dicto (try > -er, Xu):

        'Running faster than Xu' is the intention of Li.

    b.   low-scope de re (Xu > try > -er):

        Xu runs d-fast. 'Running faster than d' is the intention of Li.

    c.   high-scope de re (Xu, -er > try):

        Xu runs d-fast. 'Running d'-fast' is the intention of Li. $d' > d$.

▷ (19a) is the most salient reading. (19b-c) are more difficult to obtain and are not available to all speakers. Thus, **any adequate account of Mandarin clausal comparatives should at least be able to derive reading (19a)**.

▷ The embedding approach (20) straightforwardly provides the low-scope de dicto reading in (19a), and (19b-c) can be derived through basic theories of intensional scope.

(20)   try > -er, Xu
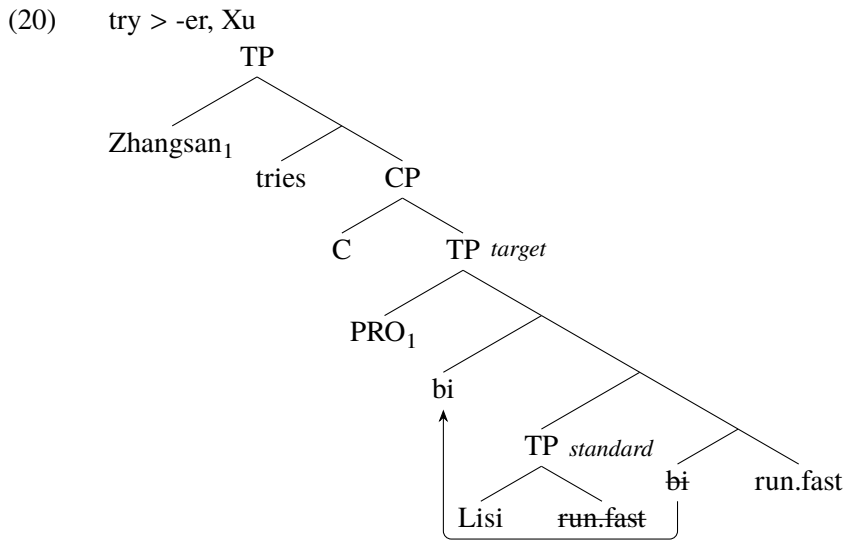
▷ Now we turn to the coordination approach.

▷ First, we know that obligatory exhaustive control predicates like *shitu* 'try' cannot embed a coordinated clausal complement only one of whose conjunct contains PRO:

(21)   *Li₁ shitu [CP [TP PRO₁ pao-de-kuai] bingqie_& [TP Xu tiao-de-yuan]].

    L.   try   run.fast   and   Xu jump.far

    Intended: 'Li₁ tries [PRO₁ to run fast and for Xu to jump far].'

▷ This means that the following structure, which would have derived the most salient low scope de dicto reading in (19a), is impossible for the coordination approach:

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(22) ✘

Li$_1$

tries   CP

C   biP

target TP   bi′

PRO$_1$ ~~run.fast~~ bi   TP *standard*

Xu run.fast
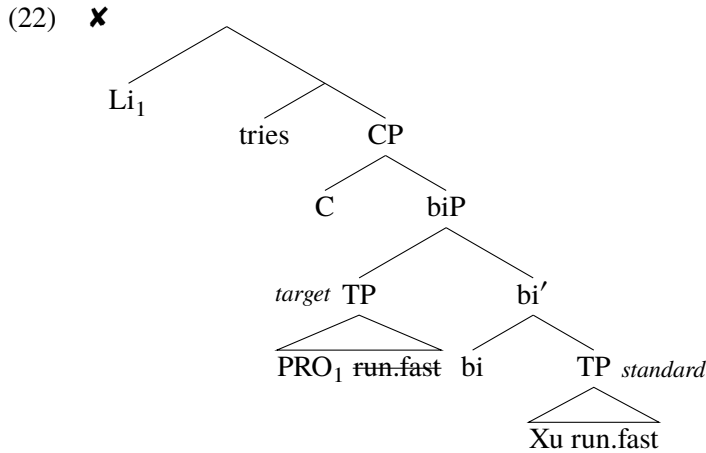
▷ We are forced to adopt the structure shown in (23). However, this structure can only derive the high-scope de re reading in (19c):

(23)   -er, Xu > try

biP

TP *target*   bi′

Li$_1$ tries PRO$_1$ ~~run.fast~~ bi   TP *standard*

Xu run.fast
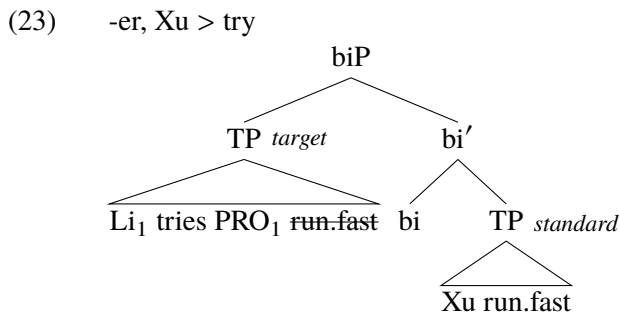
▷ Here, since both *bi* and *Xu* are outside the scope of *shitu* 'try,' it is clear that the reading is high scope de re of (19c). It does not seem to be able to derive the other two readings at all.

5 Implications for degree semantics

5.1 Clausal comparatives and degree abstraction

▷ By degree abstraction, we refer to the process of QR the degree quantifier to create a degree predicate which is considered crucial in the derivation of clausal comparatives (see Bresnan 1973; Heim 2000; Bhatt and Pancheva 2004):

(24)   a.   John is taller than Mary.

    b.   [-er [(than) *Op* λd Mary is d-tall]] [λd John is d-tall].
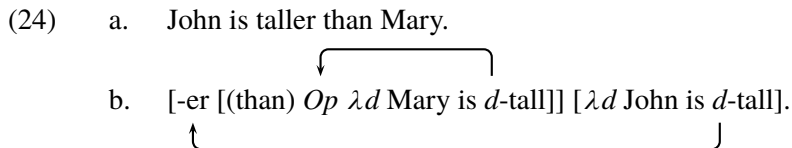
▷ Based on the claimed absence of degree-related phenomena in some languages (contrary to, say, English and German) such as the lack of subcomparatives, Beck et al. (2004, 2009) propose the **Degree Abstraction Parameter (DAP)** and categorize languages including **Mandarin**, Japanese, Mooré, Samoan, and Yorùbá as [−DAP] languages.

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▷ Erlewine (2018) offers multiple pieces of evidence supporting that Mandarin *bi* construction is a form of clausal comparative, but since analyses of clausal comparatives go hand in hand with degree abstraction, a puzzle emerges.

▷ Crucially, Erlewine proposes by adopting a coordination approach and 'Degree Last' gradable predicates, it is possible to have clausal comparatives without degree abstraction, backing up the proposal that degree abstraction is a point of cross-linguistic variation and Mandarin is [−DAP].

▷ 'Degree Last' gradable predicates are of type $\langle e, \langle d, t \rangle \rangle$. As shown in (25), by taking a type e argument first, it yields a $\langle d, t \rangle$ predicate, which essentially mirrors the result of degree abstraction as in (24b).

(25) $\max(\lambda d.\,\text{L. is } d\text{-tall}) > \max(\lambda d.\,\text{X. is } d\text{-tall})$
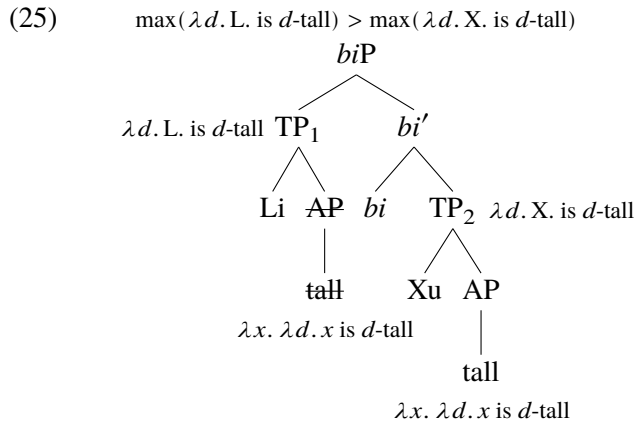
(adapted from Erlewine 2018:457)

5.2 The necessity of degree abstraction

▷ We think, however, Erlewine's attempt to reconcile clausal comparatives with the lack of degree-abstraction is not successful.

▷ First, we have shown that Mandarin *bi* comparatives involve embedding rather than coordination, making them essentially similar to clausal comparatives seen in [+DAP] languages like English; the degree-last machinery is no longer applicable.

▷ Second, there is a more striking problem with the degree-last abstraction-free approach that is even present without the structural re-orientation.

▷ Erlewine (2018) has employed the unavailability of clausal embedding in the standard clause as an argument against the presence of degree abstraction in Mandarin:

(26)   *Yuehan bi Mali renwei Tangmu gao.
        John   BI Mary think Tom   tall
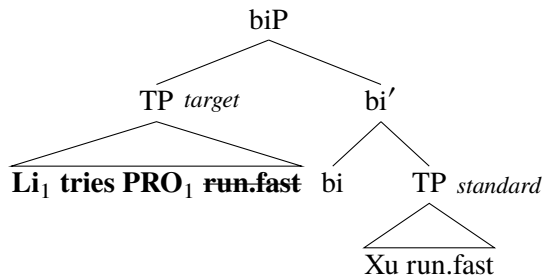   Intended: 'John thinks Tom is taller than Mary thinks he is.'   (Erlewine 2018:451)

▷ The argument posits that if degree abstraction were present in Mandarin, deriving a degree predicate through degree abstraction in the standard clause—even when it involves embedding—would not pose any difficulty.

▷ This is supported by the grammaticality of the English translation of (26), as English clausal comparatives are generally assumed to involve degree abstraction.

▷ A degree-last abstraction-free approach would naturally exclude target or standard clauses with embedding because there is no way to bring the degree operate out of the embedded clause and create the desired degree predicate:

(27)   Mary thinks [λd Li d-tall] $\xrightarrow{\text{✗}}$ λd Mary thinks [Li d-tall]

▷ In section 4.3, we looked at an argument in support of the embedding approach based on scopal relations between control predicates and comparatives.

▷ This argument, in addition to diagnosing the syntax, poses a more fundamental challenge to the degree-last coordination approach.

▷ We saw that the coordination analysis forces the control predicate and its clausal complement to be contained within a single conjunct. Recall:

(23)   -er, Xu > try

$$
\begin{array}{c}
\text{biP} \\
\swarrow \qquad \searrow \\
\text{TP } \textit{target} \qquad \text{bi}' \\
\swarrow \quad \searrow \qquad \swarrow \quad \searrow \\
\textbf{Li}_1 \textbf{ tries PRO}_1 \textbf{ run.fast} \quad \text{bi} \qquad \text{TP } \textit{standard} \\
\text{Xu run.fast}
\end{array}
$$

▷ Under the same assumptions that Erlewine (2018) used to argue against the availability of degree abstraction in Mandarin through (26), degree abstraction would be necessary in the first conjunct of (23) to render the structure interpretable.

▷ Thus, the degree-last coordination approach to clausal comparatives in Mandarin, **driven by the assumption that Mandarin lacks degree abstraction, in the end, forces a structure that is only interpretable with degree abstraction**.

▷ A fundamental contradiction is thus derived from this approach.

5.3 *Geng* as the comparative operator

▷ It has been argued that Mandarin has a null comparative operator (Grano 2012; Grano and Kennedy 2012; Liu 2018), and Gong and Coppock (2021) suggest it can be overtly realized in the form of *geng* (contra Erlewine (2018), who identifies *bi* as the comparative operator).

▷ If this is the case, then there is another problem for the coordination approach.

▷ In the coordination approach, *geng* surfaces in the standard clause, but as the comparative operator, it has to be external to the standard syntactically and scopally to make the clause interpretable.

(28)   #[TP-target Li ~~gao~~] **bi** [TP-standard Xu **geng** gao].
              Li   BI   Xu GENG tall
         UNINTERPRETABLE

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▷ Such requirements are naturally satisfied in the embedding approach (29).

(29) Li **bi** [$_{\text{TP-standard}}$ Xu ~~gao~~] **geng** gao.
      Li BI   Xu tall   GENG tall
      'Z is taller than L.'

▷ While Erlewine might respond that *geng* need not be a comparative operator, the problem then is that its appearance in the standard clause under his analysis is still completely mysterious.

▷ The situation is made worse for his account by the fact that *bi* is not required for comparatives but *geng* (or its covert counterpart) alone is sufficient:

(30) *Given two salient individuals, Li and Xu,*
      Li (**geng**) gao.
      Li GENG tall
      a. 'Li is taller (than Xu).'
      b. *'Li is tall.'

▷ The optional appearance of *geng* can also be used to signal which degree is abstracted over when there are more than one candidates:

(31) a. Zhangsan bi Lisi **geng** neng   xie-chu   hao-de   wenzhang.
          Z.   BI L.   GENG be.able.to write-OUT good-DE paper
          'Z. is more able than L. to write good papers.'
      b. Zhangsan bi Lisi neng   xie-chu   **geng** hao-de   wenzhang.
          Z.   BI L.   be.able.to write-OUT GENG good-DE paper
          'Z. is able to write better papers than L.'

▷ Returning to the alleged ungrammaticality of embedded standards in *bi* comparatives (26), it can be significantly improved by adding a *geng* before the predicate (32). We suggest that the overt realization of the comparative operator facilitates the processing of degree abstraction:

(32) ?Yuehan bi Mali renwei Tangmu **geng** gao.
       John   BI Mary think Tom   GENG tall
       'John thinks Tom is taller than Mary thinks he is.'

5.4 The questionable status of the DAP

▷ In addition to Gong and Coppock's (2021) arguments that **Mandarin has degree abstraction**, our counterargument to the coordination approach further weakens the proposal that Mandarin is [−DAP] from a structural point of view, as degree abstraction is necessary for the embedding approach. We have also demonstrated that degree abstraction is, in fact, unavoidable even for the coordination approach.

▷ Along with works arguing for the existence of degree abstraction in Japanese (Kennedy 2007; Shimoyama 2012; Sudo 2015) and Yorùbá (Howell 2013), our proposal raises additional doubts about the existence of the DAP as proposed by Beck et al. (2004, 2009).

6 Conclusion

▷ Mandarin *bi* construction is a form of clausal comparative and involves an embedded standard.

▷ And thus the claim that Mandarin is [−DAP] cannot be salvaged by a coordination approach accompanied with 'Degree Last' gradable predicates (Erlewine 2018).

▷ More doubt therefore is cast on the proposal of Degree Abstraction Parameter (Beck et al. 2004, 2009).

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A   A tentative syntax-semantics of Mandarin clausal comparatives

▷ Here, we give a derivation of the semantics of clausal comparatives in Mandarin under the embedding approach based on the structure assumed in this handout.

▷ One crucial assumption: there is movement that leaves a semantically vacuous trace, which behaves like an identity function.

▷ The same idea has been utilized, for example, in Murphy (2017).

▷ The predicate will covertly move in such a fashion just above the surface position of *bi*, leaving an identify function as a semantic trace.

▷ $\emptyset_{\text{COMP}}$/*geng* has the same semantics as the English two-place (clausal) *-er*:

(33) $[\![\emptyset_{\text{COMP}}/\text{geng}]\!] = \lambda D_{1,dt}.\ \lambda D_{2,dt}.\ \max D_2 > \max D_1$

▷ *bi* is semantically vacuous; its purpose is to introduce the standard clause in its specifier.

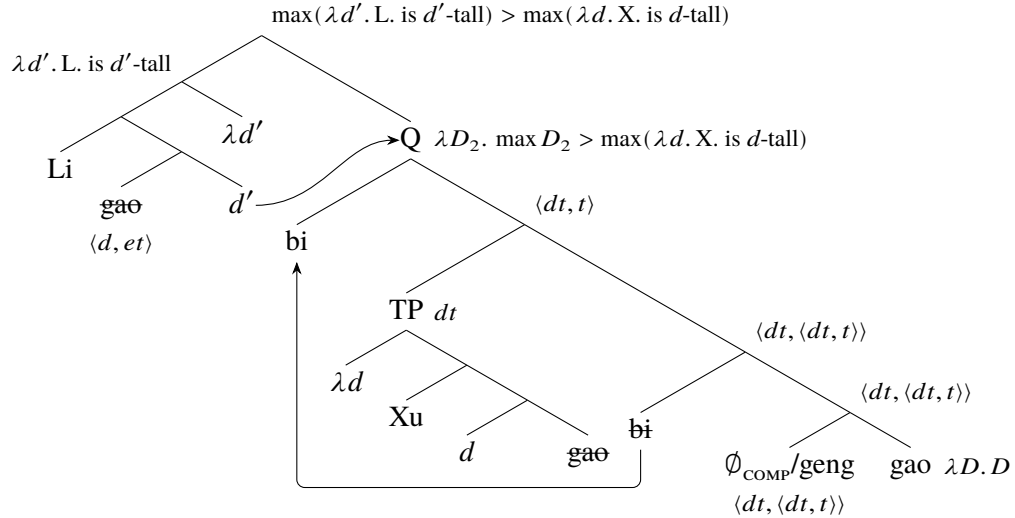▷ The node marked with Q is the degree quantifier to undergo quantifier raising.

(34)   Before QR:

15
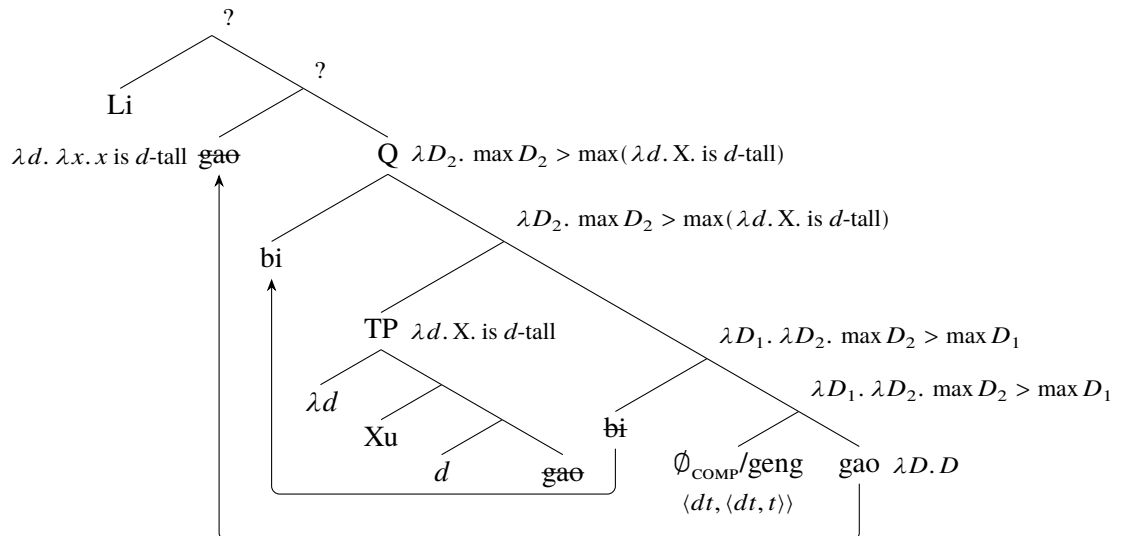
▷ Then, the entire phrase headed by the moved *bi* is a generalized quantifier over degrees, which then undergoes quantifier raising.

The resulting semantics is the expected one.

(35)   After QR:

$$\max(\lambda d'.\,\text{L. is } d'\text{-tall}) > \max(\lambda d.\,\text{X. is } d\text{-tall})$$

▷ The resulting semantics is no different from that of the regular analysis of English clausal comparatives.

▷ The movement of the predicate, if overt, can potentially be used to account for *transitive* comparative structures in Mandarin, as in the following example:
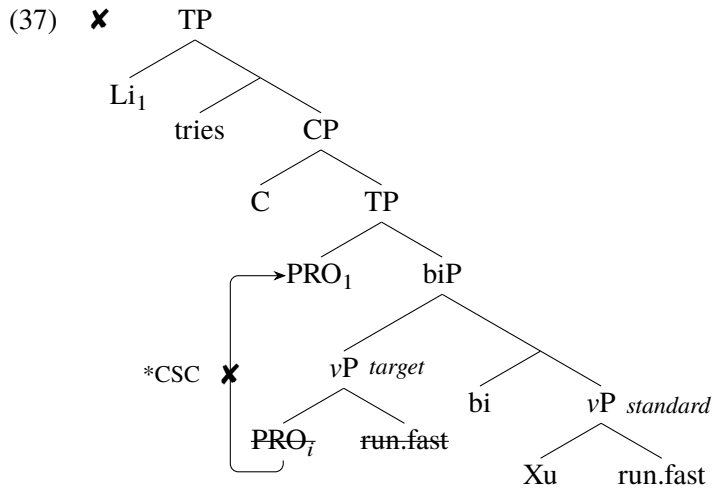
(36)   Li gao yu   Xu.
        L. tall than X.
        'Li is taller than Xu.'

▷ *Yu* can be the alternate realization of the *bi* when the predicate moves over it overtly rather than covertly.

B   Gapping

▷ Although the structure provided for (19) by the coordination approach can be improved for the most salient, low scope de dicto reading by adopting Johnson's (2017) account for gapping, the resulting construction (37) is almost the same as the embedding analysis (20) and also suffers from a CSC violation.

(37) ✗ TP

Li₁
   tries   CP

C   TP

→PRO₁   biP

*CSC ✗   *v*P *target*

bi   *v*P *standard*

~~PRO~~ᵢ ~~run.fast~~

Xu   run.fast

▷ Another problem with this structure is why it is unavailable for the basic coordination case in (21).