Mandarin Clausal Comparatives Involve Standard Embedding

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1. Introduction

In Mandarin *bi* comparative constructions such as (1), the pre-*bi* part (hereinafter, *target*) is understood as having a greater degree of the predicate than the post-*bi* part (hereinafter, *standard*).

(1) Li **bi** Xu (**geng**) gao.
Li BI Xu GENG tall
'Li is taller than Xu.'

The occurrence of *geng* (the overt phonological realization of the comparative operator, the Mandarin counterpart of English *-er*; see section 4.3) between the standard subject and the predicate is optional.

1.1. Clausal vs. phrasal comparatives in Mandarin

In English, two strategies are employed for comparative constructions, clausal or phrasal.

(2) a. John is taller than Mary. (phrasal)
    b. John is taller than Mary is. (clausal)

There is debate about whether clausal, phrasal, or both are used to construct comparatives in Mandarin Chinese. A crucial relevant observation is that there is great flexibility in the standard that can surface between *bi* and the predicate. In particular, there is no requirement that the material between *bi* and the predicate to be a constituent.

(3) *Subject, temporal and place adverbial*
Zhangsan zuotian zai xuexiao bi **Lisi jintian zai jiali** geng gaoxing.
Z. yesterday at school BI L. today at home GENG 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 BI L. because stock.speculation lose-PFV GENG much money
'Xu lost more money because of gambling than Li because of stock speculation.'

These examples show that Mandarin Chinese cannot only have phrasal comparatives, since in the examples above, it is not a single phrase that constitutes the standard. We thus recognize the definite availability of clausal comparatives following Erlewine (2018). Clausal comparatives will then serve as the focus of our paper, and whether phrasal comparatives are also necessary in Mandarin Chinese is left to future research.
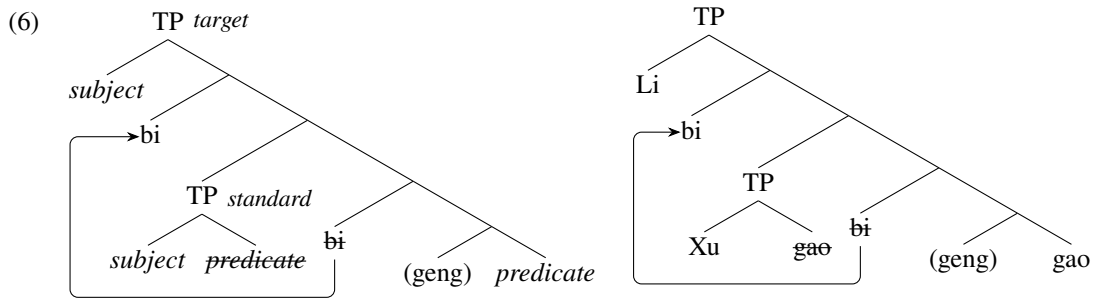
1.2. Clausal approaches

There are two clausal approaches to Mandarin *bi* comparatives. The first approach sees comparative structures as instances of coordination. 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)
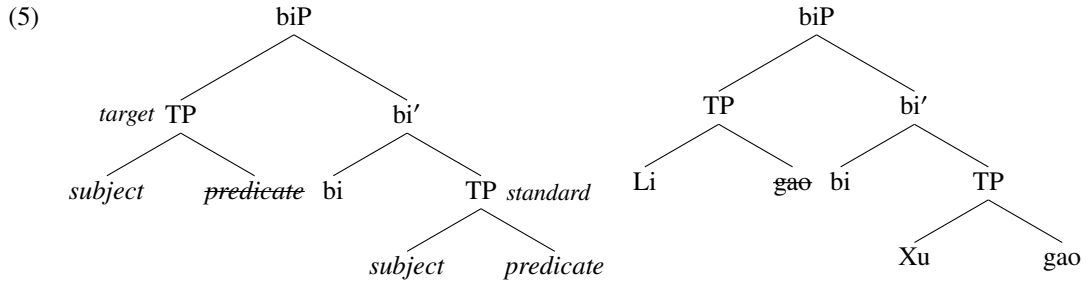
The second approach sees comparative structures as involving clausal embedding rather than coordination. The standard clause is embedded in the target clause and the predicate in the embedded standard clause is deleted (5) (see Erlewine 2007, Liu 1996, 2011, Hsieh 2017).

(6)

The structure in (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.

2. Proposal and roadmap

In this paper, we argue that comparatives in Mandarin Chinese involve clausal embedding. Following Erlewine (2018), we also identify the *bi* construction as clausal comparative. But contra Erlewine (2018), we think the embedding rather than coordination approach is the right analysis of Mandarin clausal comparatives.

Evidence from several novel diagnostics will be provided for this claim in section 3. First, Principle C effects will show that the standard subject is c-commanded by the target subject (section 3.1.1). Second, anaphor binding patterns demonstrate that anaphors in either the standard subject or the predicate are c-commanded by the target subject (sections 3.1.2 and 3.1.3). Third, relative extraction is possible with the target subject, yet the coordination approach predicts this extraction to violate the Coordinate Structure Constraint (CSC) (section 3.2). Finally, the coordination approach fails to produce grammatical examples involving matrix obligatory control predicates with scope above the comparative (section 3.3). All of the above structural facts pose problems for the coordination approach, but are natural consequences of the

embedding approach. Then, in section 4, the consequences of this conclusion for degree semantics will be discussed. In particular, we will show that clausal embedding for comparatives will necessitate degree-abstraction, which casts doubt on the status of Mandarin Chinese as a [−DAP] language (Beck et al. 2004, 2009) and the validity of the DAP overall.

3. Arguments for the embedding approach

3.1. 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.

3.1.1. Principle C violation

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

3.1.2. 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.'

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, rather than that the surface string is unacceptable with the given interpretation):

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

Example (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.

3.1.3. Binding into the overt predicate

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

(11) John took a picture of himself, and Bill did too/[~~take a picture of himself~~].
     ✓   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$_{\text{refl}}$ 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)
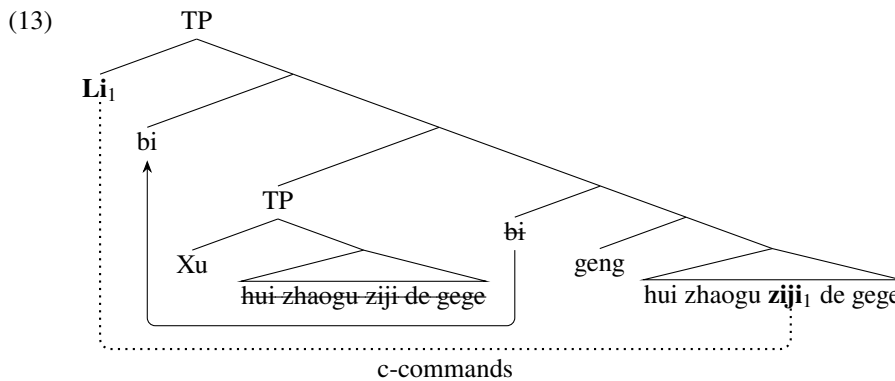
The coordination approach gives the wrong c-command relationships: the target subject does not c-command the overt reflexive, making binding impossible and making the wrong prediction:

(14) ✗
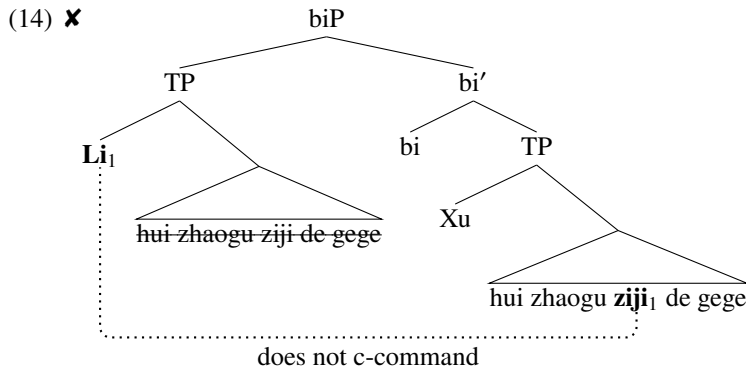
3.2. Relative extraction

The other crucial difference between the two approaches is that the extraction of the target subject violates the Coordinate Structure Constraint (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.

For simplicity and concreteness, we follow the assumption that relative clauses in Mandarin Chinese are derived through null operator movement. To derive (15), the coordination approach violates the CSC, since only the operator as the subject of the first TP conjunct is extracted:

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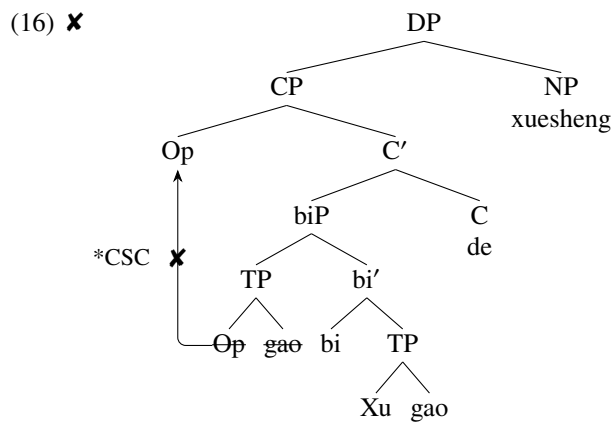
The same holds for conjunct subextraction out of TP coordination, and it is not allowed in Mandarin:

(17) *Li shi ge [RC [TP —1 kaixin]   erqie [TP laoshi ye   kaixin]   de] xuesheng1.
      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; it is the subject of a matrix clause (in the comparative construction) that is extracted.

(18)
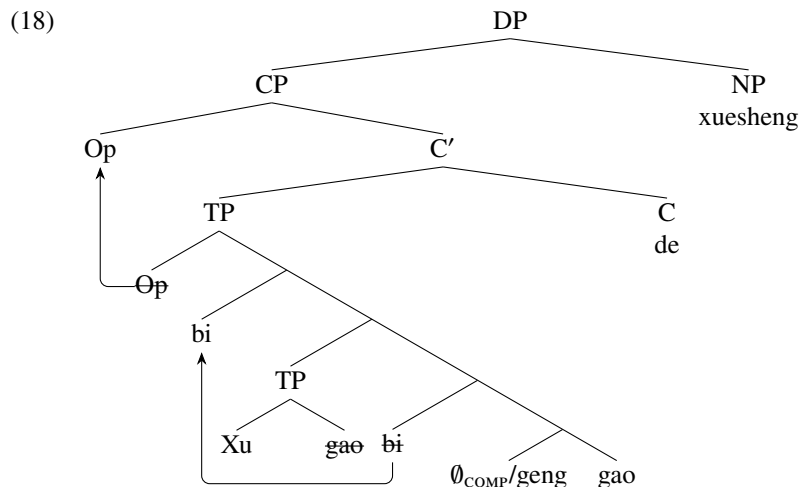
3.3. Scope of control predicates

Finally, the scope of control predicates when used in conjunction with comparatives can help diagnose the structure of the latter. 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. $d' > d$.

Reading (19a) is the most salient. Readings (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
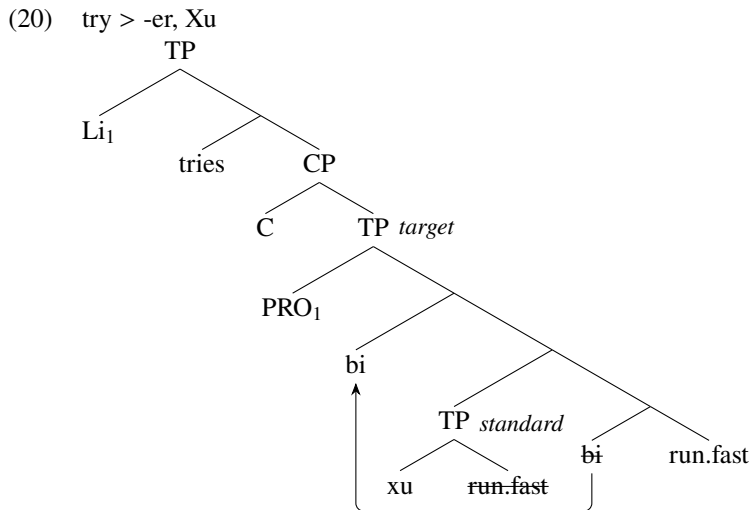
Now we turn to the coordination approach. First, we know that obligatory exhaustive control predicates like *shitu* 'try' cannot embed a coordinated clausal complement only one of whose conjunct contains PRO:

(21) *Li$_1$ shitu [$_{CP}$ [$_{TP}$ PRO$_1$ pao-de-kuai] bingqie$_\&$ [$_{TP}$ Xu tiao-de-yuan]].
      L. try   run.fast   and   Xu jump.far
      Intended: 'Li$_1$ tries [PRO$_1$ 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:

(22) ✘

TP
- Li$_1$
- tries
- CP
  - C
  - biP
    - *target* TP
      - PRO$_1$ ~~run.fast~~
    - bi′
      - bi
      - TP *standard*
        - Xu run.fast
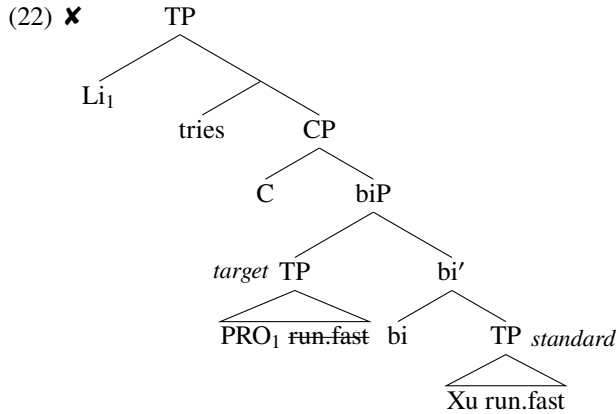
We are forced to adopt the structure shown in (23). However, this structure can only derive the high-scope de re reading in (19c):

(23) -er, Xu > try

biP
- TP *target*
  - Li$_1$ tries PRO$_1$ ~~run.fast~~
- bi′
  - bi
  - TP *standard*
    - Xu run.fast
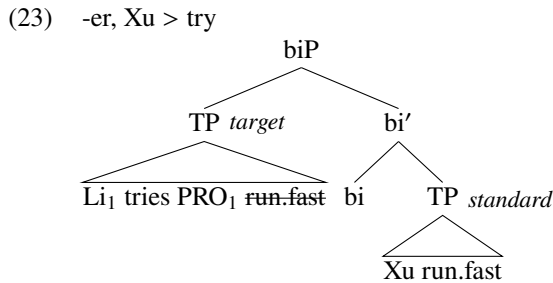
Here, since both *bi* and *Xu* are outside the scope of *shitu* 'try,' it is clear that the reading is high scope de re of (19c). It does not seem to be able to derive the other two readings at all.

4. Implications for degree semantics

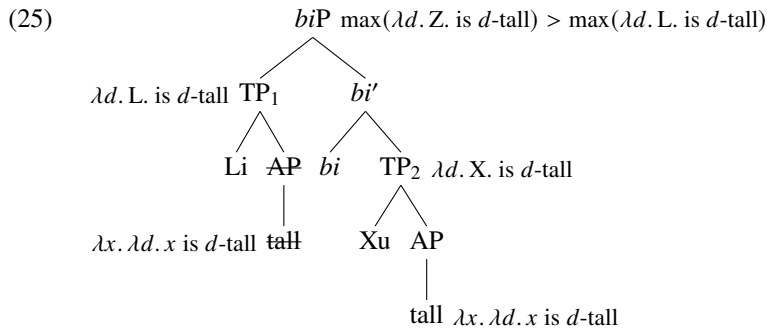### 4.1. Clausal comparatives and degree abstraction

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 & 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 English) such as the lack of subcomparatives, Beck et al. (2004, 2009) propose the Degree Abstraction Parameter (DAP) and categorize languages including Mandarin, Japanese, and Yorùbá as [−DAP] languages.

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 that 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 in (24b).

(25) biP $\max(\lambda d.\,\text{Z. is }d\text{-tall}) > \max(\lambda d.\,\text{L. is }d\text{-tall})$

$\lambda d.\,\text{L. is }d\text{-tall }$ TP$_1$ bi'

Li   A̶P̶ bi TP$_2$ $\lambda d.\,\text{X. is }d\text{-tall}$

$\lambda x.\,\lambda d.\,x \text{ is }d\text{-tall }$ t̶a̶l̶l̶   Xu   AP

tall $\lambda x.\,\lambda d.\,x \text{ is }d\text{-tall}$

(adapted from Erlewine 2018: 457)

4.2. The necessity of degree abstraction

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). 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 [Li d-tall] $\xrightarrow{\,\text{✗}\,}$ $Op\ \lambda d$ Mary thinks [Li d-tall]

In section 3.3, 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:

(23)   -er, Xu > try

biP

TP *target*   bi$'$

Li$_1$ tries PRO$_1$ r̶u̶n̶.̶f̶a̶s̶t̶ bi   TP *standard*

Xu run.fast
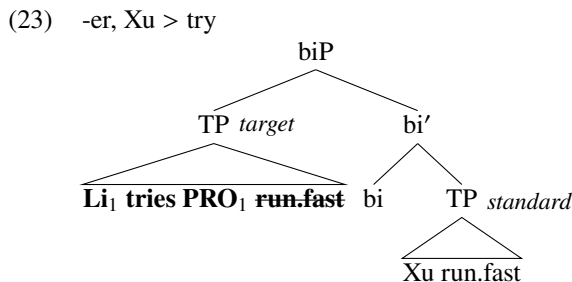
Under the same assumptions that Erlewine (2018) used to argue against the availability of degree ab-

straction 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.

4.3. Geng *as the comparative operator*

It has been argued that Mandarin has a null comparative operator (Grano 2012, Grano & Kennedy 2012, Liu 2018), and Gong & 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

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

(29) Li **bi** [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* and its position 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.'

4.4. The questionable status of the DAP

In addition to the arguments in Gong & Coppock (2021) 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 validity of the DAP as proposed by Beck et al. (2004, 2009).

5. Conclusion

This paper has argued that 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).

References

Beck, Sigrid, Sveta Krasikova, Daniel Fleischer, Remus Gergel, Stefan Hofstetter, Christiane Savelsberg, John Vanderelst & Elisabeth Villalta. 2009. Crosslinguistic variation in comparison constructions. In Jeroen van Craenenbroeck & Johan Rooryck (eds.), *Linguistic variation yearbook*, 1–66. John Benjamins.

Beck, Sigrid, Toshiko Oda & Koji Sugisaki. 2004. Parametric Variation in the Semantics of Comparison: Japanese vs. English. *Journal of East Asian Linguistics* 13(4). 289–344.

Bhatt, Rajesh & Roumyana Pancheva. 2004. Late merger of degree clauses. *Linguistic Inquiry* 35(1). 1–45.

Bresnan, Joan. 1973. Syntax of the comparative clause construction in English. *Linguistic inquiry* 4(3). 275–343.

Erlewine, Michael Yoshitaka. 2007. *A new syntax-semantics for the Mandarin bi comparative*. University of Chicago MA thesis.

Erlewine, Michael Yoshitaka. 2018. Clausal comparison without degree abstraction in Mandarin Chinese. *Natural Language & Linguistic Theory* 36(2). 445–482.

Gong, Ying & Elizabeth Coppock. 2021. Mandarin has degree abstraction after all. Ms., Boston University. `https://eecoppock.info/Mandarin_Degree_Abstraction-submitted2021.pdf`.

Grano, Thomas. 2012. Mandarin *hen* and universal markedness in gradable adjectives. *Natural Language & Linguistic Theory* 30(2). 513–565.

Grano, Thomas & Chris Kennedy. 2012. Mandarin transitive comparatives and the grammar of measurement. *Journal of East Asian Linguistics* 21. 219–266.

Heim, Irene. 2000. Degree operators and scope. In Brendan Jackson & Tanya Matthews (eds.), *Semantics and Linguistic Theory (SALT) 10*, 40–64. Ithaca, NY: CLC Publications.

Howell, Anna. 2013. Abstracting over degrees in Yoruba comparison constructions. In Emmanuel Chemla, Vincent Homer & Grégoire Winterstein (eds.), *Proceedings of sinn und bedeutung 17*, 271–288.

Hsieh, I-Ta Chris. 2017. On arguments against comparative deletion in Mandarin. *Tsing Hua Journal of Chinese Studies* 47(2). 255–287.

Huang, James Cheng-Teh, Audrey Yen-hui Li & Yafei Li. 2009. *The Syntax of Chinese*. Cambridge University Press.

Kennedy, Christopher. 2007. Modes of comparison. In *Proceedings of the 43rd annual meeting of the chicago linguistic society (cls43)*, 141–165.

Liu, Chen-Sheng Luther. 1996. A note on Chinese comparatives. *Studies in the Linguistics Science* 26(1/2). 215–235.

Liu, Chen-Sheng Luther. 2011. The Chinese *bi* comparative. *Lingua* 121(12). 1767–1795.

Liu, Chen-Sheng Luther. 2018. Projecting adjectives in Chinese. *Journal of East Asian Linguistics* 27. 67–109.

Shimoyama, Junko. 2012. Reassessing crosslinguistic variation in clausal comparatives. *Natural Language Semantics* 20. 83–113.

Sudo, Yasutada. 2015. Hidden nominal structures in Japanese clausal comparatives. *Journal of East Asian Linguistics* 24. 1–51.