Share to Compare: The Mandarin *bǐ* Comparative

Michael Yoshitaka Erlewine
Massachusetts Institute of Technology

1. Introduction

Different languages employ differing syntactic means to express comparison, i.e. to assert a ranking of two entities along a scale. The scale of comparison is introduced linguistically using a gradable predicate which relates entities (such as individuals, states, or events) to degrees (Creswell, 1976). Gradable predicates can be used to make assertions not only of the relative degrees of two entities (as in 1b) but of individual entities as well, in positive forms such as (1a).

(1) a. John is **tall**.
b. John is **tall**-er than Mary.

Given that a gradable predicate needs only one entity to satisfy its core syntactic and semantic valency, how does it then compose with two entities in a comparative, as in (1b)? In this paper I answer this question for the case of the Mandarin Chinese *bǐ* comparative construction, based on novel syntactic considerations. Pretheoretically, the *bǐ* comparative follows the schema in (2). Two basic examples are in (3).[1]

(2) target *bǐ* standard gradable predicate of comparison
"*target* is more *predicate* than *standard* is *predicate*."

(3) a. [Yuēhàn] bǐ [Tāngmǔ] [xǐhuān Mǎlì]
John BI Tom like Mary
"John likes Mary more than Tom does."
b. [Yūehàn qí mǎ] bǐ [Mǎlì qí niú] [qí de kuài]
John ride horse BI Mary ride cow ride DE fast
"John rides horses faster than Mary rides cows."

Two predominant approaches have been proposed for the syntax/semantics of comparative constructions: the Reduction Analysis (borrowing a term from Bhatt & Takahashi (2011)) and the Direct Analysis following Heim (1985).

(4) **Reduction Analysis syntax/semantics**:
The comparative morpheme COMP is a two-place operator, taking two degree-denoting expressions, D_1 for the target and D_2 for the standard, and asserting $\exists d.D_1(d) \wedge \neg D_2(d)$. Each of the degree-denoting expressions include an instance of the gradable predicate.

(5) **Direct Analysis syntax/semantics** (Heim 1985):
The comparative morpheme COMP is a three-place operator, merging with a gradable predicate G, a target x, and standard y, and then asserting $\exists d.G(d)(x) \wedge \neg G(d)(y)$. The syntax contains only one occurance of the gradable predicate.

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[1] Square brackets [] are used here and in examples throughout to delimit the interpreted target, standard, and predicate, rather than to make a claim of syntactic constituency.

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In a Reduction Analysis, both the target and standard are merged directly into the structure as arguments of the gradable predicate. This results in two degree-denoting clauses, each with its own instance of the predicate, and the comparative operator asserts an ordering relation between them. In a Direct Analysis, there is only one instance of the gradable predicate in the syntax, therefore either the target or the standard or both must be introduced by the comparative operator rather than by the predicate itself. The comparative operator then applies both the target and the standard to the predicate and asserts that the resulting degree computed with the target exceeds the one computed with the standard.

Recent analyses of the Mandarin *bǐ* comparative (Erlewine, 2007; Lin, 2009; Xiang, 2005) have adopted a Direct Analysis approach. Against this consensus, I argue in this paper that the *bǐ* comparative cannot employ a Direct Analysis syntax/semantics. Instead, I propose a structure for the *bǐ* comparative in which both the target and standard are each directly composed with the gradable predicate in syntax.

In the next section I will give my proposal and present an example derivation. The particular technical implementation I use here involves multidominance. In section 3 I will further motivate this proposal with examples where both the target and standard include distinct material which have moved out of the same position from within the gradable predicate. This shows that both the target and standard participate in syntactic dependencies with the predicate. Such evidence is immediately problematic for the Direct Analysis approaches, in which the target and standard are not both directly composed with the predicate in the syntax.

2. Proposal: Independent Dependency

I propose that the Mandarin *bǐ* comparative does not follow a Direct Analysis where the predicate of comparison is composed with the target and with the standard only in the semantics; rather, the predicate must independently form a clause together with the target and together with the standard, following the regular rules of Mandarin clausal syntax. This hypothesis is stated in (6):

(6) **Independent Dependency:**
A comparative [target *bǐ* standard predicate] includes both [$_{TP}$ target predicate] and [$_{TP}$ standard predicate] within its syntactic derivation.

Unlike the recent Direct Analyses approaches, this proposal predicts there to be the same syntactic dependencies between the predicate and the target and between the predicate and the standard as those which are independently observed in Mandarin simplex clauses. Evidence to this effect will be presented in section 3.

Consider example (7) below. One curious property of the Mandarin *bǐ* comparative is that the target and standard can be made up of multiple arguments which do not form a constituent. This is particularly notable in cases where both the target and standard include arguments which are logically internal arguments of the predicate of comparison, which I call Internal Argument (IA) comparatives. Note that internal arguments are canonically post-verbal in Mandarin.

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

[wǒ dàishù] bǐ [*pro* jǐhé] [xǐhuān ___]
I algebra BI geometry like

"I like algebra more than I like geometry."

Independent Dependency predicts that [$_{TP}$ target predicate] and [$_{TP}$ standard predicate] are each independently available clauses in Mandarin[2] and this is indeed the case:

(8) a. TP_1 = [$_{TP}$ target predicate]:

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

"I, algebra, like."

b. TP_2 = [$_{TP}$ standard predicate]:

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

"I, geometry, like."

[2]modulo positive degree morphology *hěn* which is sometimes required in the positive form of gradable predicates. See Grano (to appear) for details.

According to Independent Dependency, the derivation of (7) contains the full derivations of (8a–b), which I refer to as TP_1 and TP_2. Note that TP_1 and TP_2 exhibit *object preposing* (Ernst & Wang, 1995; Paul, 2002), a process in Mandarin which moves objects to a pre-verbal position without any additional marking. Preposed objects are often interpreted in contrast to implicit or explicit alternatives.

(9) **Object preposing:**

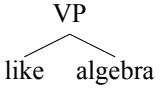
wǒ [dàishù]$_F$ xǐhuān ___, kěshì *pro* [jǐhé]$_F$ bù xǐhuān ___
I algebra like but *pro* geometry NEG like

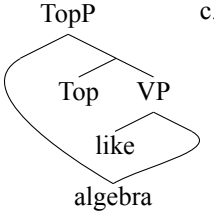
≈ 'I, [algebra]$_F$, like; but, [geometry]$_F$, don't like.'

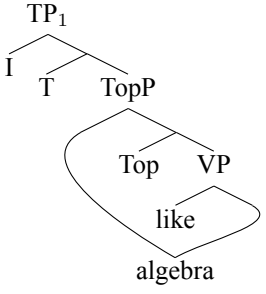
Now let us step through the derivation of (7). An important question here is how the predicate can be part of the target clause and the standard clause but only be linearized once. Technically, such a derivation could involve ellipsis or multidominance. Here I will not attempt to distinguish between these two approaches and will present an analysis based on multidominance (cf Gračanin-Yuksek, 2007, 2009). In multidominance terms, the *bǐ* comparative will be derived as the conjunction of two clauses that share their gradable predicates.[3]

We begin by constructing the verb phrase for TP_1, (8a), by merging *like* with *algebra* (10a). In (10b), we've merged in a Topic head and then *algebra* has been moved to the TopP specifier, following Paul's (2002) analysis of object-preposing. Note that under a multidominance framework, movement is indicated by the object being merged once to *like*, then being "remerged" to a higher constituent which dominates the first merge site. Next we merge in a Tense head and the subject *I*, resulting in the full target clause TP_1, (10c).

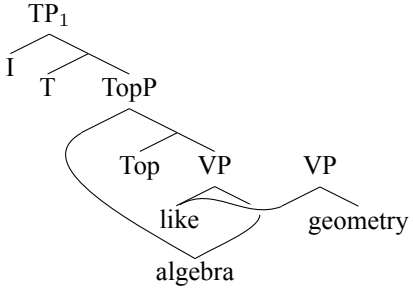
(10) **Derivation of (7):**

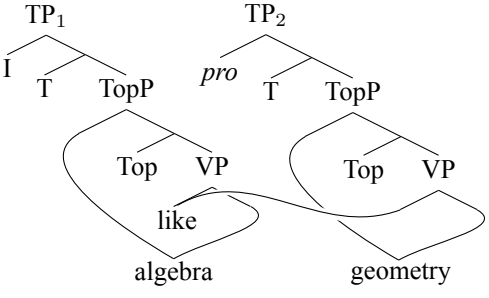
a. 

b. 

c. 

Next we do a parallel derivation for TP_2, (8b), but importantly we must "reuse" the *like* verb from TP_1. We begin by taking the *like* in TP_1 and merging it with *geometry*, producing a new VP projection elsewhere in the workspace (10d). We then continue to follow the exact same derivational steps as we did for TP_1, object-preposing *geometry*, then merging a Tense and the subject *pro*, yielding the structure in (10e). We now have two full TPs in the workspace which were independently formed following the processes of Mandarin simplex TP construction, but sharing the single verb node between them.

(10) d. 

e. 

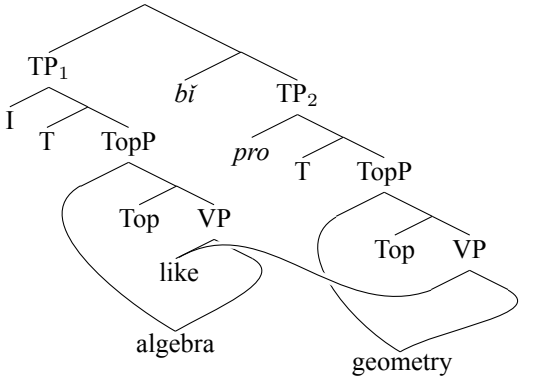
[3]Formally, the two gradable predicates are required to completely dominate the same set of nodes, using the definition below. See Erlewine (in preparation) for further discussion.

Complete dominance (Fox & Pesetsky, 2005): a node α completely dominates a node β iff every path from β to the root includes α.

Multidominated structures such as those above are produced by not restricting the operation Merge to nodes which are not already dominated by another node.[4]

Finally, TP_1 and TP_2 are conjoined with *bǐ* to form the resulting structure:

(10) f.



Gračanin-Yuksek (2007, 2009) offers a revised version of Kayne's (1994) Linear Correspondence Axiom which can linearize structures involving sharing. This algorithm has the property that material that is multiply-dominated, such as *like* in (10f), are linearized downstream, so we yield the correct word order as in (7). In this way, a *bǐ* comparative can be constructed in a manner compatible with Independent Dependency—that is, that [$_{TP}$ target predicate] and [$_{TP}$ standard predicate] are each constructed according to the standard processes of Mandarin simplex TPs—while sharing material across the two gradable predicates, yielding a linearization in which the gradable predicate only surfaces once.

In this section I presented my main proposal, that the derivation of Mandarin *bǐ* comparatives involve the full derivations of two clauses—one for the target and one for the standard. I dub this proposal Independent Dependency. This proposal explicitly allows for simultaneous syntactic dependencies between the predicate and target and between the predicate and standard, which are not predicted by a Direct Analysis approach. In the next section I present four cases in which such dependencies can be observed.

3. Evidence for parallel movements

In this section I will present evidence in support of the Reduction Analysis from constructions that involve movement simultaneously from within the predicate to the target and from the same position within the predicate also to the standard. This can be straightforwardly captured under Independent Dependency as the derivation includes two TPs, each separately derived with movement operations available in Mandarin simplex clauses. Four different types of such constructions are given: internal argument comparatives, subject reconstruction, passivization, and verb-copy.

Consider, on the other hand, how a Direct Analysis could derive such complex comparatives. Schematically, such movements could be represented as in (11):

(11) [*target* ... X ...] *bǐ* [*standard* ... Y ...] [*predicate* ... t ...]

Under a Direct Analysis, there is only one instance of the predicate in the syntax. In order to derive the movements of X and Y above, X and Y must have both been first merged in the lower position t within the predicate. Here, however, both chains involve the same tail position. Thus X and Y must have been base-generated in the same position, which is a contradiction. Thus *analyses with just one copy of the predicate in the syntax cannot adequately account for such data.*

It is crucial in this line of argumentation to show that *both* X and Y are indeed the products of such movement out of the predicate, rather than, for example, only one undergoing that movement and the other being base-generated in its surface position. This is precisely what I will show.

[4]Note that this theoretical move has also been made in the Minimalist Program in casting the operation Move as an instance of Merge.

3.1. Internal argument comparatives

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

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

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

Object preposing:	Comparative:
a. * wǒ Zhāngsān xǐhuān I ZS like Int: 'I, Zhang San, like'	a'. * wǒ Zhāngsān bǐ Lǐsì xǐhuān I ZS bi LS like Int: 'I like ZS more than I like LS'
b. ? wǒ māo xǐhuān I cat like Int: 'I, cat, like'	b'. ? wǒ māo bǐ gǒu xǐhuān I cat bi dog like Int: 'I like cats more than dogs'
c. wǒ dàishù xǐhuān I algebra like 'I, algebra, like.'	c'. wǒ dàishù bǐ jǐhé xǐhuān I algebra bi geometry like 'I like algebra more than geometry.'

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

Second, preposed objects cannot be indefinite (Tsao 1989, a.o.). The same effect is observed with IA comparatives:

(13) **Internal arguments in IA comparatives cannot be indefinite**
Context: looking at a course listing.

* [wǒ sān ge kēmù] bǐ [nǐ liǎng ge kēmù] [xǐhuān de duō]
I three CL courses BI you two CL courses like DE more
Int: '(of these courses,) I like three courses more than you like two courses.'

Third, object preposing is ungrammatical when the verb is monosyllabic. Example (14a) is judged to be ungrammatical due to its monosyllabic verb *ai* 'love,' while the minimally contrasting (12c) with the disyllabic verb *xǐhuān* 'like' is grammatical. We observe the same contrast between minimally distinct comparatives (14a′) and (12c′).

(14) **Object preposing cannot leave behind a monosyllabic verb with gap; also restricted in IA comparatives** (cf 12c+12c' above)

Object preposing:	Comparative:
a. * wǒ dàishù ài I algebra love Int: 'I, algebra, love.'	a'. * wǒ dàishù bǐ jǐhé ai I algebra bi geometry love Int: 'I love alg. more than geo.'

As object preposing offers a way to realize objects in a pre-verbal position and exhibits the same restrictions observed with IA comparatives, it would be preferable to derive IA comparatives as involving two simultaneous instances of object preposing. Object preposing with obligatorily transitive verbs such as *xǐhuān* 'like' are derived via movement from the post-verbal subject position (Ernst & Wang, 1995; Paul, 2002).[5] Thus in these IA comparatives, there must be a movement chain from the post-verbal object

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

position to the target object as well as a movement chain from that same post-verbal object position to the standard object.

Independent Dependency allows for such cases of simultaneous object preposing into the target and the standard, as the two objects are base-generated within two separate VPs. The derivation presented in (10) is precisely such an example.

The Direct Analysis alternative would be to introduce a separate mechanism by which IA comparatives can be built by base-generating objects directly in the target and standard. Such approaches would view the parallel restrictions on object preposing and IA comparatives as a coincidence. Lin (2009) pursues this alternative, introducing a Direct Analysis syntax/semantics 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.

3.2. Subject reconstruction with de dicto readings

A sentence like (15a) and its Mandarin counterpart (15b) are observed to have two distinct readings differing in the specificity of the referent of the subject indefinite 'an Australian.' In the *de re* reading, there is a specific Australian in the mind of the speaker who is likely to win the race, while in the *de dicto* reading the speaker states that it is likely that there is an Australian who will win the race, but without a particular Australian in mind.

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

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

b. Àozhōurén yǒukěnéng yíng zhè ge bǐsài
Australian likely win this CL competition
De re: 'A (specific) Australian is likely to win the race.' $\exists >$ *likely*
De dicto: 'It is likely that an Australian will win the race.' *likely* $> \exists$

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

The question, then, is whether reconstruction is possible in a comparative construction where the predicate of comparison is of this type, e.g. 'likely to win the race,' and both the target and standard are indefinite subjects. In particular, we would like to know whether *both* subjects can reconstruct at the same time, which would show us that both the target and standard must have been base-generated below *likely* at the same time. We see in (16) that this reading is indeed available.[6]

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

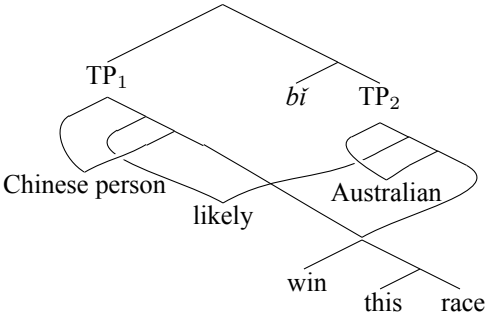
Zhōngguórén bǐ Aòzhōurén yǒukěnéng yíng zhè ge bǐsài
Chinese-person BI Australian likely win this CL comp.

De re/*de re*: 'A (specific) Chinese person is more likely to win the race than a (specific) Australian.' $\exists^2 >$ *likely*
De dicto/*de dicto*: 'It is more likely that a Chinese person will win the race than that an Australian will.' *likely* $> \exists^2$

Given the availability of the *de dicto*/*de dicto* reading in (16), we know that *both subjects* must have been raised from within the same position within the complement of *likely* at the same time. The proposal outlined here is able to construct such an example, again using multidominance. *Likely* merged into two separate TPs, each with its own subject which is then raised.

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

(17)



Within a Direct Analysis derivation of (16), at least one of the subjects must have been base-generated above *likely*, as the gradable predicate "likely to win the race" is only constructed once throughout the derivation. Therefore we predict that at least one of the subjects would not be able to reconstruct, preventing the *de dicto*/*de dicto* reading.

3.3. bèi *long passives in comparatives*

Mandarin Chinese offers a curious and well-studied passivization strategy known as the *bèi* long passive, exemplified in (18). Huang (1999) argues that *bèi* long passives involve $\overline{\text{A}}$-movement of a null operator to a position between *bèi* and the agent (19). The operator movement is interpreted as lambda-abstraction over the base object position, constructing a predicate of 'λx . father scolds x seriously' which is then used in the interpretation of the passive.

(18) **The *bèi* long passive**

Yūehàn bèi bàba mà de hěn cán
John BEI father scold de very serious

'John was scolded very seriously by his father.'

(19) John BEI [Op_i [$_{TP}$ father scold t_i ...]]

Now consider a comparative (20) involving two contrasting agents of *bèi* long passives. Following Huang (1999), we must posit two simultaneous instances of operator movement as in (21), 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. This simultaneous movement would again be problematic under a Direct Analysis.

(20) **"sharing" the predicate of two *bèi* long passives**

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

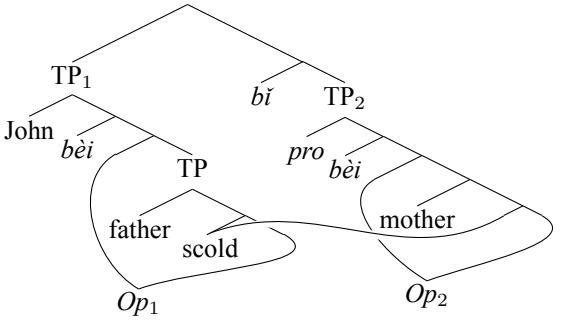
'John was scolded by his father more seriously than by his mother.'

(21) [*target* John BEI Op_i father] *bǐ* [*standard pro* BEI Op_i mother] [*predicate* scold t_i ...]

Under our Independent Dependency 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 while sharing all the other material in the gradable predicate. An Independent Dependency-obeying structure for (20) is presented in (22):[7]

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

(22)



3.4. Verb-copy constructions

The fourth and final argument against the Direct Analysis based on simultaneous movement from the predicate to the target and the standard comes from the Mandarin verb-copy construction. As noted by Liu (1996), in *bǐ* comparatives such as (23), repeated below, where the target and standard are both of the form "SVO" and the predicate of comparison is a verb with an adverbial modifier, all three instances of the verb must match:

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

[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."

Liu (1996) argues that this is predicted through a derivation of (23) that involves two instances of the Mandarin manner verb-copy construction (24), which requires that its two exponents of the verb be identical. Huang (1988) and Cheng (2007) argue that these verb-copy constructions are derived via movement without deletion of the verb in question. Liu suggests that a Reduction Analysis would be able to straightforwardly derive comparatives such as (23) using two instances of verb-copy.

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

Yūehàn **qí** mǎ **qí** de hǎo
John ride horse ride DE good

"John rides horses well."

A Direct Analysis, though, would not be able to naturally derive comparatives such as (23) 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. See Erlewine (2007) for such an attempt.

3.5. Summary

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

The argument being made here is in some sense one of theoretical efficiency: a Direct Analysis derivation for these types of comparatives is not necessarily impossible, but brand new mechanisms must be proposed for comparatives that seemingly involve subject raising, object preposing, *bèi* passives, and verb-copy, independently maintaining the characteristics of each construction. Under Independent Dependency, 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.

4. Conclusion

In this paper I presented a new Reduction Analysis for the Mandarin *bǐ* comparative, exemplified by the derivation in section 2. At its core, the proposal can be summarized as follows:

(6) **Independent Dependency:**
A comparative [target *bǐ* standard predicate] includes both [$_{TP}$ target predicate] and [$_{TP}$ standard predicate] within its syntactic derivation.

By having its derivation include the derivations for two separate TPs, each containing an instance of the gradable predicate, we predict that syntactic dependencies such as movement simultaneously between the predicate and target and between the predicate and the standard would be possible, even targeting the same gap positions within the predicate. In section 3, I presented four cases which involve movement of precisely this form: object preposing, subject reconstruction, the *bèi* long passive, and verb-copy. These examples pose a serious challenge for any Direct Analysis approach.

The solution presented in this paper involves multidominance. By multidominating the common material within the predicate across the two clauses, we can produce the comparative constructions attested with only one pronounced predicate from an Independent Dependency-obeying structure.

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