

The Order of Stage-level and Individual-level Relatives and Superiority Effects^{*}

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This paper argues that the two-layer modification of noun phrases as proposed in Larson & Takahashi (2004), Del Gobbo (2005), and Hsieh (2005) cannot account for the distribution of the order of stage-level and individual-level relatives in Mandarin. Alternatively, it is suggested that I-level relatives must occur closer to the head nouns than S-level relatives because I-level modifiers are arguments of “augmented nouns”, whereas S-level modifiers are true adjuncts. It is always the case that adjuncts are base-generated outside arguments. It is also shown that relative clauses in Mandarin may be attracted to the specifier position of DP. When they move, however, they have to obey syntactic economy conditions such as Shortest. Consequently, the hierarchical positions of an S-level and I-level relative after the movement must preserve their original base-generated hierarchical order before movement.

Key words: stage-level, individual-level, relative clauses, superiority effects

1. Introduction

Bolinger (1967) observed that postnominal and prenominal adjectives show a meaning difference. While postnominal adjectives such as (1a) attribute a temporary or episodic property to the head noun they modify, prenominal adjectives such as (1b) characterize intrinsic properties. Svenonius (1994) has suggested that Bolinger’s meaning distinction between prenominal and postnominal adjectives is the individual-level vs. stage-level distinction.

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- (1) a. the stars visible
- b. the visible stars

Larson & Takahashi (2004), however, show that both prenominal and postnominal adjectives may have a stage-level interpretation. For instance, the postnominal adjective *visible* in (2a) has a stage-level interpretation and this is also the case for the first *visible* in (2b).

- (2) a. The visible stars visible include Capella.
- b. The visible visible stars include Capella.
- (3) a. The nonvisible visible stars include Capella.
- b. #The visible nonvisible stars include Capella.

That the first *visible* must be stage-level is supported by the oddness of (3b). On the basis of examples such as (2)-(3), Larson & Takahashi arrive at the conclusion that individual-level adjectives always occur closer to the head noun than stage-level adjectives.¹ They further show that the same restriction applies to prenominal relatives in Japanese, Korean, and Turkish. For instance, in Japanese though multiple relatives of the same type may order freely, an individual-level relative must occur closer to the head noun than a stage-level relative. The examples below are taken from Larson & Takahashi (2004).

- (4) I-level RCs
 - a. [Tabako-o suu] [sake-o nomu] hito-wa Tanaka-san desu.²
 [tobacco-ACC inhale] [sake-ACC drink] person-TOP T.-COP
 ‘The person who drinks sake who smokes is Miss Tanaka.’
 - b. [Sake-o nomu] [tabako-o suu] hito-wa Tanaka-san desu.
- (5) S-level RCs
 - a. [Watashi-ga kinoo atta] [sake-o nonde ita] hito-wa Tanaka-san desu.
 [1SG-NOM yesterday met] [sake-ACC drinking] person-TOP T.-COP
 ‘The person who was drinking sake who I met yesterday is Miss Tanaka.’
 - b. [Sake-o nonde ita] [watashi-ga kinoo atta] hito-wa Tanaka-san desu.

¹ Larson & Takahashi (2004) also show that time modifiers exhibit a similar contrast. Time modifiers, when in a prenominal position, are ambiguous between a deictic and a generic reading. When two time modifiers precede a noun, the generic modifier must be closer to the head noun than the deictic modifier.

² Abbreviations used in this article are as follows. ACC: accusative case marker; NOM: nominative case marker; TOP: topic marker; REL: relative clause marker; CL: classifier marker, DE: modification marker

(6) I-level RC, S-level RC

- a. [Watashi-ga kinoo atta] [tabako-o suu] hito-wa Tanaka-san desu.
[1SG-NOM yesterday met] [tobacco-ACC inhale] person-TOP T.-COP
'The person who smokes who I met yesterday is Miss Tanaka.'
- b. ?* [Tabako-o suu][watashi-ga kinoo atta] hito-wa Tanaka-san desu.

In order to account for such facts, Larson & Takahashi, adopting Larson's (1998, 2000) idea, suggests that noun phrases have two distinct domains of modification. The outer modifier reflects DP-modification, whereas the inner modifier reflects NP modification, as is shown schematically below:

- (7) $[_{DP} D \beta [_{NP} \Gamma e [\alpha N]] \beta]$ (α = NP-modifier; β = DP-modifier)

According to them, individual-level relatives must appear within the NP domain, because NP in DP contains a generic quantifier *Te* with scope limited to NP. Modifiers outside NP will not be able to get an individual-level/generic reading because they occur outside the scope of the generic operator.

Extending Larson & Takahashi's observations, Del Gobbo (2005) claims that Mandarin, like Japanese, Korean, and Turkish, allows more than one relative clause of a given sort, i.e. stage-level or individual-level, and may order freely among themselves. But when the two types of relative both appear, individual-level ones need to occur closer to the head noun than stage-level ones. Moreover, she also points out that if a demonstrative is present, only stage-level relatives can precede it, while between the demonstrative and the head noun, the only possible order is again stage-level preceding individual-level. Her relevant data are reproduced below.

(8) I-level RCs

- a. $[_{RC} \text{ Hui shuo Yidaliyu de}] [_{RC} \text{ xihuan qu yinyuehui de}]$
can speak Italian REL like go concerts REL
ren shi Zhangsan.
person be Zhangsan
'The person who speaks Italian who likes to go to concerts is Zhangsan.'
- b. $[_{RC} \text{ Xihuan qu yinyuehui de}] [_{RC} \text{ hui shuo Yidaliyu de}]$
like go concerts REL can speak Italian REL
ren shi Zhangsan.
person be Zhangsan
'The person who likes to go to concerts who speaks Italian is Zhangsan.'

(9) S-level RCs

- a. [RC Cong Yidali huilai de] [RC wo zuotian kanjian de]
 from Italy come-back REL I yesterday meet REL
 ren shi Lisi.
 person be Lisi
 'The person who came back from Italy who I met yesterday is Lisi.'
- b. [RC Wo zuotian kanjian de] [RC cong Yidali huilai de]
 I yesterday meet REL from Italy come-back REL
 ren shi Lisi.
 person be Lisi
 'The person who I met yesterday who came back from Italy is Lisi.'

(10) I-level + S-level RCs

- a. [RC Wo zuotian kanjian de] [RC xihuan qu yinyuehui de]
 I yesterday meet REL like go concerts REL
 ren shi Zhangsan.
 person be Zhangsan
 'The person I met yesterday who likes to go to concerts is Zhangsan.'
- b. *[RC Xihuan qu yinyuehui de] [RC wo zuotian kanjian de]
 like go concerts REL I yesterday meet REL
 ren shi Lisi.
 person be Lisi
 'The person who likes to go to concerts who I met yesterday is Lisi.'

(11) S-level + I-level RCs + Demonstrative

- a. [RC Zuotian meiyong lai de] na-ge [RC hen xihuan shang ke de]
 yesterday not come REL that-CL very like go class REL
 xuesheng jiao Zhangsan.
 student call Zhangsan
 'That student who didn't come yesterday who likes to come to class very much is called Zhangsan.'
- b. *[RC Hen xihuan shang ke de] na-ge [RC zuotian meiyong lai de]
 very like go class REL that-CL yesterday not come REL
 xuesheng jiao Zhangsan.
 student call Zhangsan
- c. Na-ge [RC zuotian meiyong lai de] [RC hen xihuan shang ke de]
 that-CL yesterday not come REL very like go class REL
 xuesheng jiao Zhangsan.
 student call Zhangsan
 'That student who didn't come yesterday who likes to come to class very much is called Zhangsan.'

- d. *Na-ge [_{RC} hen xihuan shang ke de] [_{RC} zuotian meiyou lai de]
 that-CL very like go class REL yesterday not come REL
 xuesheng jiao Zhangsan.
 student call Zhangsan

On the basis of the above data, Del Gobbo suggests that Larson & Takahashi's (2004) two layers of modification apply to Mandarin as well. Moreover, she suggests that the NP-modification vs. DP-modification corresponds to the difference between the so-called "descriptive" relatives vs. restrictive relatives in Mandarin.³ She claims that the "descriptive" relatives are generic or individual-level modifiers, and not appositive, i.e. unrestrictive, relative clauses.

In a similar vein, Hsieh (2005) has also claimed that Larson & Takahashi's distinction between stage-level and individual-level modifiers holds in Mandarin. An important argument offered by her has to do with the following contrast:

- (12) a. Ni kanjian [_{DP} [_{CP} ta zuotian mai de] [_{DP} shenme dongxi]] ma?
 you see he yesterday buy REL what thing Q
 'Did you see anything that he bought yesterday?'
 b. *Ni kanjian [_{DP} shenme [_{DP} [_{CP} ta zuotian mai de] dongxi]] ma?
 you see what he yesterday buy REL thing Q
- (13) a. Ta mai-le [_{DP} shenme [_{NP} haochi de] dongxi]] ma?
 he buy-ASP what delicious REL thing Q
 'Did he buy any delicious thing?'
 b. *Ta mai-le [_{DP} haochi de][_{DP} shenme dongxi]] ma?
 he buy delicious REL what thing Q

According to Hsieh, the relative clause in (12) is a stage-level modifier, whereas the one in (13) is an individual-level modifier and *shenme* 'what' is analyzed as a determiner. Thus, the contrast between (12) and (13) follows from the two-layer approach to nominal modification.

The purpose of this paper is to show that Del Gobbo's and Hsieh's extension of Larson & Takahashi's two-layer modification approach to the stage-level vs. individual-

³ Chao (1968:286), followed by Yue-Hashimoto (1971:24-25), claims that in Chinese a relative clause is descriptive when the demonstrative precedes the relative clause, whereas it is restrictive when the order is reversed. Chao's term of "descriptive" has sometimes been taken to be equivalent to non-restrictive. However, Lin (2003) and Del Gobbo (2001, 2002, 2003) have argued that this perhaps is wrong.

level distinction may not be on the right track. Instead, it is argued that the ordering restriction of prenominal relatives between stage-level and individual-level relatives is a consequence of lexical semantics of nouns as well as syntactic superiority economy.

2. Criticisms of Del Gobbo (2005) and Hsieh (2005)

2.1 Problems with Del Gobbo's analysis

I agree that Del Gobbo's (2005) observation of (8)-(11) is correct, but she crucially overlooks an important fact about the distribution of single occurrence of a stage-level or individual-level relative in a context with a demonstrative. A single relative, be it stage-level or individual-level, is free to occur before or after a demonstrative-(numeral)-classifier sequence, obtaining the same restrictive interpretation (Lin 2003). This is illustrated below.

(14) Individual-level relative

- a. na-wei xihuan qu ting yinyuehui de yuyanxuejia
that-CL like go listen concerts REL linguist
'the linguist that likes to go to concerts'
- b. xihuan qu ting yinyuehui de na-wei yuyanxuejia
like go listen concerts REL that-CL linguist
'the linguist that likes to go to concerts'

(15) Stage-level relative

- a. na-wei ni zuotian jiandao de yuyanxuejia
that-CL you yesterday meet REL linguist
'the linguist that you met yesterday'
- b. ni zuotian jiandao de na-wei yuyanxuejia
you yesterday meet REL that-CL linguist
'the linguist that you met yesterday'

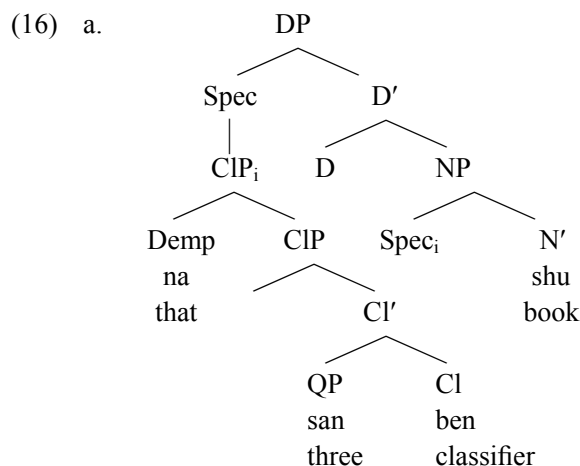
If it is assumed that demonstratives in Mandarin occupy the D position, then phrases preceding D must be within the domain of DP. Since both stage-level and individual-level relatives can be placed before a demonstrative, both can be licensed in the domain of DP. On the other hand, if it is assumed that a position lower than a numeral-classifier is within the domain of NP,⁴ then stage-level and individual-level relatives both should also be able

⁴ There are at least two possible analyses for numerals and classifiers. One possibility is that they project an independent functional head. The other possibility is to treat a numeral-classifier as an

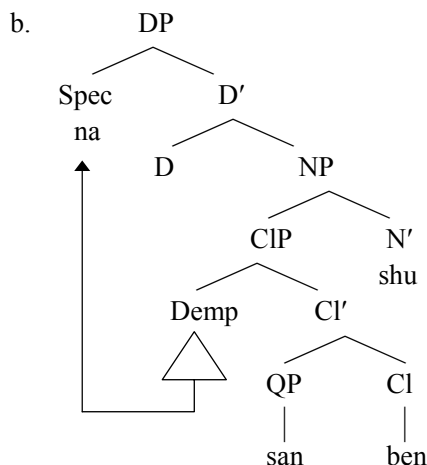
to be licensed in the domain of NP. This conclusion is contrary to Larson & Takahashi's (2004) and Del Gobbo's (2005) two-layer approach to prenominal relatives in Mandarin. In particular, their approach wrongly predicts that the occurrence of an individual-level relative before a demonstrative such as (14b) is not allowed. On the other hand, the occurrence of a stage-level relative in a post-demonstrative position does not necessarily result in a generic interpretation as Del Gobbo has suggested. The episodic interpretation is the only reading allowed for (15a). The real generalization emerging from the data (in (14)-(15) and (8) through (11) reported by Del Gobbo) is that any Mandarin relative, be it stage-level or individual-level, may freely appear in NP or DP domain. But when a stage-level relative and an individual-level relative both occur, the former must precede the latter.

2.2 Problems with Hsieh's (2005) analysis

Unlike Del Gobbo, Hsieh does explain the distribution of some of the single occurrences of prenominal relatives in a context with or without a demonstrative. Following Lin's (1997) idea, she proposes that the demonstrative + numeral + classifier (DNC) sequence or the numeral + classifier (NC) sequence is base-generated in the Spec of NP and the DNC sequence raises to the Spec of DP just as a subject is moved from the Spec of VP to the Spec of TP. The demonstrative may optionally raise to the Spec of DP by itself, leaving the numeral and classifier behind, in a way similar to quantifier floating for English *all*. Her analysis of noun phrase structure is shown in (16).



adjectival predicate. On either assumption, expressions to the right of a numeral-classifier are in the domain of NP.



On the other hand, she assumes that stage-level modifiers are adjoined to DP or D' and I-level modifiers are adjoined to NP or N'.

On the above assumptions, the word order in (15a-b) can be explained as follows. The word order in (15b) is straightforward. In this case, the S-level relative is adjoined to DP. In contrast, the relative in (15a) is adjoined to D'. Since the DNC sequence is raised from the Spec of NP to the Spec of DP, the relative follows the DNC.

Now consider the examples in (14). (14a) is easy to explain under Hsieh's assumption. The I-level relative in (14a) is adjoined to NP (or N') and the DNC is raised to the Spec of DP. However, (14b) might be a problem with Hsieh's analysis. No matter whether the I-level relative in (14b) is assumed to be adjoined to NP or N', it will not precede the DNS sequence, which is raised to the Spec of DP. The only possibility of accounting for the fact is to say that the I-level relative in (14b) is adjoined to NP but the DNC sequence stays in situ instead of raising to the Spec of DP. But if this optional raising is allowed, one is left to wonder what the motivation for raising the CIP constituent at the very beginning is.⁵

Another problem with Hsieh's analysis is conceptual. As noted, in Hsieh's analysis, demonstratives do not occupy the functional head D but are the specifier of a classifier projection. Thus, in most cases, the D head is left empty. This makes one wonder why there is no overt realization of the D head. The only case suggested by Hsieh is the

⁵ It should be noted that though Hsieh (2005) has claimed that raising the demonstrative alone would also produce grammatical sentences such as (i) below.

(i) [na [fei de][san-zhi] yang]
that fat DE three-CL sheep
'that three sheep that are fat'

However, such sentences sound quite odd to my ear; nor do the informants I consulted accept such word order. This further casts doubt on the raising analysis of the CIP constituent.

non-interrogative *shenme* ‘what’. This suggestion, however, does not dispel the doubt but further begs the question of why a D head can only be a *wh*-word. In fact, the treatment of the non-interrogative *shenme* ‘what’ as a determiner does not support the two-layer approach of nominal modification as nicely as Hsieh originally thinks. Recall that one of the major examples motivating Hsieh’s adoption of Larson & Takahashi’s two-layer approach is the impossibility of placing an I-level relative before the non-interrogative *shenme* ‘what’ as is shown in (13b). However, if we search for a similar datum in the internet, real life data like the following appear.

- (17) Erqie shuo zhen-de, zhe bing bu shi hen zhengui de shenme dongxi.
and say true this actually not be very precious DE what thing
‘And honestly, this is not something that is very precious.’

In (17), the I-level relative is placed before the non-interrogative *wh*-word and the sentence is perfectly acceptable, which is contrary to what Hsieh’s theory predicts.

3. Motivating a semantic account for ordering restriction

It has been widely noticed that prenominal adjectives are subject to an “adjective ordering restriction” (AOR in abbreviation). For instance, according to Teodorescu (2006), among all the sentences in (18) adapted from Morzycki (2004), in the absence of any special intonation, only (18a) is acceptable. All the other combinations sound awkward.

- (18) a. a beautiful small black purse
b. #a beautiful black small purse
c. #a small beautiful black purse
d. #a small black beautiful purse

Different proposals have been made to account for the adjective ordering restrictions. Two proposals are the following:

- (19) a. Quality > Size > Shape > Color > Provenance (Sproat & Shih 1991)
b. Value > dimension > Physical property > Speed > Human Propensity > Age > Color (Dixon 1982)

Although hierarchies like those illustrated in (19) represent a widespread phenomenon, Teodorescu (2006) points out that not every adjective is subject to ordering restriction. For some adjectives, the word order is just free. She has discussed several cases where the

adjective ordering restrictions can be lifted (also see Sproat & Shih 1991, Cinque 2005a, b).

- (20) a. Adjectives that are homophonous with reduced relatives are freely ordered.
- b. Adjectives that bear “comma intonation” are freely ordered.
- c. Adjectives that bear focus are freely ordered.
- d. Operator adjectives such as *former* and *alleged* are freely ordered.
- e. Adjectives in non-definite superlatives are freely ordered.

According to Teodorescu, all these cases have a special reason not to obey AOR. For example, a focused adjective does not obey AOR, because it has to move to a focus position and switching the order of an operator adjective would yield different truth conditions. On the basis of these observations she has argued that “the syntactic component imposes ordering restrictions only on semantically equivalent structures,” as shown in (21).⁶

- (21) a. if $[A_1 A_2 N] \neq [A_2 A_1 N] \rightarrow$ AOR do not apply
- b. if $[A_1 A_2 N] = [A_2 A_1 N] \rightarrow$ AOR can apply

If Teodorescu is correct, it clearly shows that syntactic ordering restrictions are sometimes sensitive to semantic factors.

Returning to relative clauses, it is well accepted that the semantics of relative clauses are like one-place predicates and when they modify a common noun, the interpretation is a conjunction of predicates.⁷ So (22a), just like (22b) is roughly interpreted as something like (22c).

⁶ An anonymous reviewer asked why non-predicative modifiers in Chinese such as *suowei de* ‘so called’ and *zhuyao de* ‘main’ are not ordered freely, as is shown below:

(i) zuotian lai de na-wei suowei de jiaoshou
 yesterday come REL that so-called DE professor
 ‘the so-called professor who came yesterday’

(ii) *suowei de na-wei zuotian lai de jiaoshou

The ungrammaticality of (ii) is perhaps due to the fact that the non-predicative *suowei* ‘so-called’ categorically selects an N as its complement. This suggestion is reasonable because the meaning of *suowei de* N is not obtained through conjunction of the meaning of *suowei de* and the meaning of N as in other cases.

⁷ An anonymous reviewer points out that a conjunction analysis may wrongly predict that *small expensive houses*, which are houses that are small within the expensive ones, denotes the same houses as *expensive small houses*, which are houses that are expensive relative to small ones. For this type of problem, the reader is referred to Heim & Kratzer (1998) for possible solutions.

- (22) a. boy who is sick
 b. sick boy
 c. $\lambda x[\text{boy}(x) \ \& \ \text{sick}(x)]$

According to this analysis, when a common noun is modified by two relative clauses, it is a conjunction of three predicates and there is no truth-conditional difference when the conjoined predicates are reordered. Therefore, according to Teodorescu's generalization of AOR as stated in (21), it is not surprising that S-level and I-level relatives display an ordering restriction. The next step is to show what semantic mechanisms may explain such ordering restrictions.

4. A possible lexical account for the ordering restriction

4.1 Morzycki's (2004) feature bundle account for adjective ordering

In a recent draft discussing prenominal modification, Morzycki (2004) has proposed a new way of looking at the relative order and interpretation of prenominal modifiers. According to him, "classificatory" adjectives obligatorily occur closer to the noun than evaluative, size, or color adjectives:

- (23) a. an awful pulmonary disease
 b. *a pulmonary awful disease
 (24) a. a huge political problem
 b. *a political huge problem
 (25) a. a beige dental instrument
 b. *a dental beige instrument

On the other hand, composition nouns obligatorily occur above classificatory adjectives as shown in (26)-(27) but are below color adjectives as in (28)-(30).

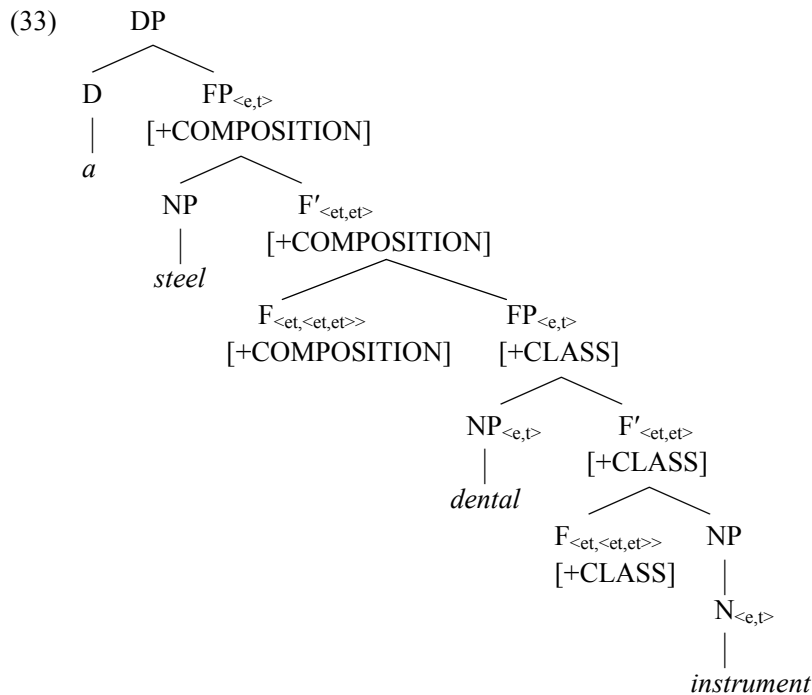
- (26) a. a steel dental instrument
 b. *a dental steel instrument
 (27) a. a leather bridal gown
 b. *a bridal leather gown
 (28) a. a blue cotton shirt
 b. *? a cotton blue shirt
 (29) a. a yellowish metal shelf
 b. *? a metal yellowish shelf
 (30) a. a grey stone lion
 b. *? a stone grey lion

Color adjectives in turn are restricted to positions below evaluative and size adjectives.

- (31) a. the big red ball
b. *the red big ball
- (32) a. the beautiful red ball
b. *the red beautiful ball

The relative order among adjectives is a familiar puzzle in linguistics but it remains one for which a satisfying explanation is elusive.

According to Morzycki, one possible approach to the adjective ordering restriction is to adopt a Cinquean (1994) style in which the adjective is placed in a specifier position of a functional projection as indicated in (33). This, together with a proper semantics of the features [+CLASS], [+COMPOSITION], etc., given in (34), can then explain why composition noun and classificatory adjective interpretations should be restricted to particular positions. The step-by-step computation of (33) is given in (35).

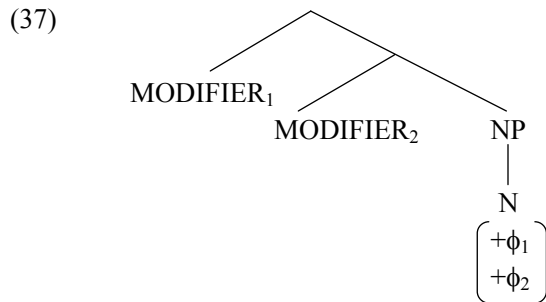
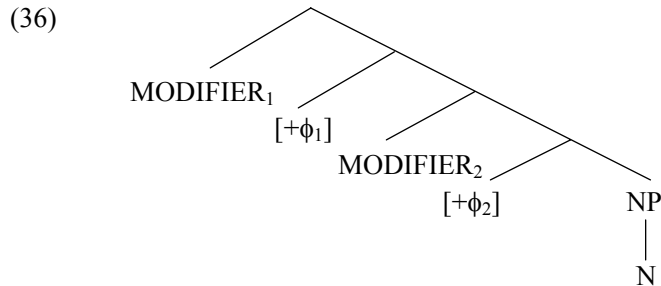


- (34) a. $\| [+CLASS] \| = \lambda P_{\langle e,t \rangle} \lambda A_{\langle e,t \rangle} \lambda x. \exists k [A(k) \wedge P(x) \wedge x \text{ realizes } k]$
 b. $\| [+COMPOSITION] \| = \lambda P_{\langle e,t \rangle} \lambda C_{\langle e,t \rangle} \lambda x. P(x) \wedge \exists y [C(y) \wedge x \text{ is composed of } y]$

- (35) a. $\|instrument\| = \lambda x.instrument(x)$
 b. $\|dental\| = \lambda k.dental(k)$
 c. $\|dental [+CLASS] instrument\|$
 $= \|[+CLASS]\|(\|instrument\|)(\|dental\|)$
 $= \lambda x.\exists k[dental(k) \wedge instrument(x) \wedge x \text{ realizes } k]$
 d. $\|steel\| = \lambda y.steel(y)$
 e. $\|steel [+COMPOSITION] dental [+CLASS] instrument\|$
 $= \|[+COMPOSITION]\|(\|dental [+CLASS] instrument\|)(\|steel\|)$
 $= \lambda x.\exists k[dental(k) \wedge instrument(x) \wedge x \text{ realizes } k] \wedge \exists y[steel(y) \wedge x \text{ is composed of } y]$

The above Cinquean approach to prenominal modifiers, though successful in providing an account for the order of adjectives and their interpretations, comes at a price, in addition to the cost of the stipulation of the order of the features; namely, the phrase structures posited are perhaps more complicated than one might wish and lack independent motivation. It is this problem that leads Morzycki to explore an alternative approach which gets the same or nearly the same benefits but in a more theoretically conservative way. His analysis is briefly summarized below.

Morzycki's basic idea is that the features associated with the prenominal modifiers need not be distributed among distinct heads but are all on the same head, namely, the head noun. Thus, what looks like (36) in Cinquean style is reanalyzed as (37).



The phrase structure in (37) is of course simpler than that in (36). Thus, all else being equal, (37) would be preferable to (36). To make all else equal, however, it would be necessary to derive the order of adjectives and their interpretations correctly. The difficulty is that if the semantics of the features like [+CLASS], [+COMPOSITION], [+COLOR], etc., are to remain the same, functional application would not be the right operation for interpreting the elements of a “feature bundle”. Thus, Morzycki has instead proposed the operation of “function composition” and applies it below the word level.⁸ Briefly, “function composition” involves applying one function to the result of another and has the effect of postponing the interpretation of one argument. To illustrate with a hypothetical linguistic example such as *help build our mechanical ferret*, function composition, which takes a form like (38), would make it possible to interpret *help build* first, postponing saturation of the internal argument.

$$(38) \quad A \circ B = \lambda c.A(B(c))$$

According to this rule, the above illustrative linguistic example is computed as below:

$$(39) \quad \begin{aligned} \text{a.} \quad & \| \text{help} \| = \lambda P_{\langle s, t \rangle} \lambda e. \exists e' [P(e') \wedge \text{help-to-happen}(e')(e)] \\ \text{b.} \quad & \| \text{build} \| = \lambda x \lambda e'. \text{build}(x)(e') \\ \text{c.} \quad & \| \text{help} \| \circ \| \text{build} \| \\ & = \lambda x. \| \text{help} \| (\| \text{build} \| (x)) \\ & = \lambda x \lambda e. \exists e' [\text{build}(x)(e') \wedge \text{help-to-happen}(e')(e)] \\ \text{d.} \quad & \| \text{help build} \| (\text{our-mechanical-ferret}) \\ & = \lambda e. \exists e' [\text{build}(\text{our-mechanical-ferret})(e') \wedge \text{help-to-happen}(e')(e)] \end{aligned}$$

Morzycki has proposed a generalized version of function composition which is able to skip more than one argument as in (40).

$$(40) \quad \begin{aligned} \text{a.} \quad & A \circ \circ B = g^n(A)(B) \\ & \text{where } g^n \text{ is } n \text{ instances of applying } g \text{ and } n \text{ is the smallest} \\ & \text{integer } \geq 0 \text{ such that } B \text{ is in the domain of } g^n(A). \\ \text{b.} \quad & g(\alpha) = \lambda V \lambda C. \alpha(V(C)) \\ & \text{for } V \text{ of type } \langle c, a \rangle \text{ and } C \text{ of type } c \\ \text{c.} \quad & g(A)(B) = [\lambda C. A(B(C))] = A \circ B \end{aligned}$$

⁸ See Jacobson (1999), Fintel (1995), and elsewhere for the assumption that function composition plays a role in grammar.

To use Morzycki's words,

“So $\circ \circ$ is unlike function composition in that it skips over as many arguments as it needs to. Intuitively, the effect is to peel off as many lambdas from B as necessary to have something of which A can be predicated, then prefix these lambdas to the result.”

A feature bundle is then interpreted using the mechanism in (40). More precisely, a noun with a feature bundle is interpreted by the following feature rule:

(41) FEATURE RULE

$$\left\| \begin{array}{c} \alpha \\ \phi_1 \\ \vdots \\ \phi_n \end{array} \right\| = \left\| [\phi_1] \right\| \circ \circ \dots \circ \circ \left\| [\phi_n] \right\| \circ \circ \left\| \alpha \right\|$$

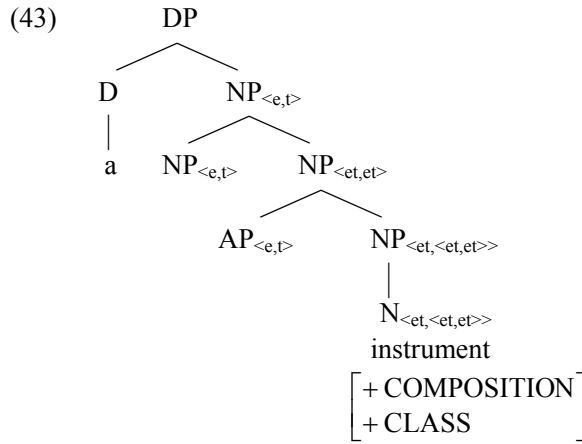
Note that the order of these features in a feature structure mirrors the order of features when distributed across different nodes. This, Morzycki suggests, can be derived broadly from semantic selections between the features defined by the feature rule.

According to Morzycki, the [N] feature can be regarded as a kind of abbreviation for features that collectively reflect the syntactic properties of a noun.

$$(42) \text{ [N] abbreviates } \left[\begin{array}{c} \vdots \\ \pm \text{CLASSIFICATORY} \\ \pm \text{COMPOSITION} \\ \pm \text{COLOR} \\ \vdots \end{array} \right]$$

He dubs such an analysis of nouns “augmented nouns”.

Given the Feature Rule, the meaning of (43) is computed as follows:



- (44)
- a. $\|instrument\| = \lambda x.instrument(x)$
 - b. $\| [+COMPOSITION] \| = \lambda P_{\langle e,t \rangle} \lambda C_{\langle e,t \rangle} \lambda x_e. P(x) \wedge \exists y [C(y) \wedge x \text{ is composed of } y]$
 - c. $\| [+CLASS] \| = \lambda P_{\langle e,t \rangle} \lambda A_{\langle e,t \rangle} \lambda x_e. \exists k_e [A(k) \wedge P(x) \wedge x \text{ realizes } k]$
 - d. $\left\| \begin{array}{c} instrument \\ [+COMPOSITION] \\ +CLASS \end{array} \right\|$
 $= \| [+COMPOSITION] \| \circ \| [+CLASS] \| \circ \| instrument \|$
 $= \| [+COMPOSITION] \| \circ \lambda A_{\langle e,t \rangle} \lambda x_e. \exists k_e [A(k) \wedge instrument(x) \wedge x \text{ realizes } k]$
 $= \lambda A_{\langle e,t \rangle} \lambda x_e. \| [+COMPOSITION] \| (\lambda x_e. \exists k_e [A(k) \wedge instrument(x) \wedge x \text{ realizes } k])$
 $= \lambda A_{\langle e,t \rangle} \lambda x_e. \exists k_e [A(k) \wedge instrument(x) \wedge x \text{ realizes } k] \wedge \exists y [A(y) \wedge x \text{ is composed of } y]$

From this point, functional application can then proceed in the familiar way, taking the classificatory modifier as the first argument and the composition modifier the second argument, getting the same result as (33)-(35) do. So we see that what is done previously by means of a proliferation of phrase structure is now achieved by means of semantic function composition with a minimalist syntax, which is quite desirable.

Above we have seen how Morzycki's analysis of nouns as consisting of feature bundle explains the order of prenominal modifiers. However, one thing that is not clearly touched on in his paper is how feature bundles might be constrained. For example, can any imaginable feature be one in a feature bundle of a noun? Clearly, the answer seems to be negative. Those features that occur in a feature bundle of a noun, it seems, are restricted to individual-level features. At least, this is true for classificatory, composition and color

features. This restriction makes sense in that individual-level properties are inherent or characterizing features that can be used to define individuals. Stage-level properties, in contrast, are accidental features of individuals and are not predictable. Consequently, such features are not part of what defines the lexical meaning of a noun. In view of this I would like to make the following claim:

- (45) Feature bundles of a noun are restricted to individual-level features.

Furthermore, I propose that in addition to those specific semantic features defined by Morzycki, other individual-level properties may also be listed as part of the feature bundles that define a common noun and are higher than the features [+COMPOSITION], [+CLASSIFICATORY], [+COLOR]. The symbol [+I-LEVEL] will be used to represent such individual-level features. In fact, the $\|+I\text{-LEVEL}\|$ feature can even be made recursive, represented as $\|+I\text{-LEVEL}^*\|$, meaning that the number of individual-level features can be zero, one or any number n . Thus, the feature bundle of a common noun may look like the following:⁹

$$(46) \quad \left[\begin{array}{c} N \\ +I\text{-LEVEL}^* \\ +\text{COLOR} \\ +\text{COMPOSITION} \\ +\text{CLASSIFICATORY} \end{array} \right]$$

The semantics of $\|+I\text{-LEVEL}^*\|$ can be defined as in (47).

$$(47) \quad \|+I\text{-LEVEL}^*\| = \lambda P_{\langle e, t \rangle} \lambda C^0_{\langle e, t \rangle} \dots \lambda C^n_{\langle e, t \rangle} \lambda x_e [P(x) \wedge C^0(x) \wedge \dots \wedge C^n(x)]$$

The above analysis, if correct, has a very important consequence with regard to the order of individual-level modifiers and stage-level modifiers. Namely, individual-level modifiers must occur closer to the noun than stage-level modifiers, because the former are the arguments of “augmented nouns”, i.e. function-composed nouns, whereas the latter are adjuncts.¹⁰ This then provides an account for Larson & Takahashi’s observation about the

⁹ Another possibility is that features like [+COMPOSITION], [+CLASSIFICATORY], [+COLOR] are also reduced to I-LEVEL* with the order determined by selectional restrictions.

¹⁰ The explanation given here is reminiscent of Radford’s (1988) account for the contrast between (ia) and (ib), where *of physics* is analyzed as an argument of the noun *student* and *with long hair* an adjunct.

(i) a. a student of physics with long hair
b. *a student with long hair of physics

relative order of individual-level and stage-level modifiers.¹¹

5. Ordering restrictions on relative clauses and superiority effects

Returning to Mandarin, recall that stage-level and individual-level relatives can both freely occur within the domain of NP or DP and be interpreted restrictively, as schematically represented below.

- (48) a. [DP Det [NP I-level-relative [N' ...N]]]
 b. [DP Det [NP S-level-relative [N' ...N]]]
 c. [DP I-level-relative [D' Det [NP ...N]]]
 d. [DP S-level-relative [D' Det [NP ...N]]]

However, when stage-level and individual-level relatives both occur, it is always the case that stage-level relatives precede individual-level relatives.

- (49) a. [DP Det [NP S-level-relative I-level-relative [N' ...N]]]
 b. *[DP Det [NP I-level-relative S-level-relative [N' ...N]]]
 c. [DP S-level-relative [D' Det [NP I-level-relative [N' ...N]]]
 d. *[DP I-level-relative [D' Det [NP S-level-relative [N' ...N]]]
 e. [DP S-level-relative I-level-relative [D' Det [NP ...N]]]
 f. *[DP I-level-relative S-level-relative [D' Det [NP ...N]]]

¹¹ An anonymous reviewer wondered how one might structurally distinguish an I-level relative from a noun complement clause as in (i):

- (i) [rang ren zhenjing] de [ta cizhi] de xiaoxi
 make people shocked de he resign REL news
 Lit.: 'the news that he resigned which made people shocked'

It is not clear how the proposed analysis may explain such word order. A possibility is to use selectional restrictions as suggested by Morzycki (2004). I will leave the plausibility of such an approach an open question.

The same reviewer also asked about the order of two conjuncts the first of which is an I-level modifier and the second of which is an S-level modifier. He/she gives the following example:

- (ii) qing ba naxie da-ben de gen fang zai zhuozhi shang de shu dou fang
 please BA those big REL and put on table on REL book all put
 dao shujia
 to bookshelf

'Please put all of those books which are big and are on the table to the bookshelves.'

Such sentences do not sound natural to my ear nor to other similar ones which I tried to produce. It seems that two conjoined I-level relatives are much better. So I will leave this an open question.

Let us consider the examples in (48) first. Note that all the relatives in (48) are interpreted restrictively, whether they precede or follow the determiner demonstrative. On the basis of the meaning of the article *the*, Partee (1976) has provided a semantic argument in favor of the assumption that a restrictive relative should form a syntactic constituent with the nominal it modifies. Likewise, Heim & Kratzer's (1998) rule of Predicate Modification requires that a restrictive relative and the nominal it modifies be sisters. If Partee (1976) and Heim & Kratzer (1998) are correct, the structures in (48a) and (48b) are expected, except that the I-level relative in (48a) is interpreted as an argument of the augmented noun but the S-level relative in (48b) is not.

Next consider (48c) and (48d). The positions of the relatives in these two examples are surprising, given their restrictive interpretation (Chao 1968, Lin 2003, Del Gobbo 2003). They are surprising, because there seems to be a syntax-semantics mismatch for them; namely, though the two relatives in (48c-d) are syntactically outside DP, they are semantically interpreted inside NP. One way out of this dilemma is to say that the pre-demonstrative relatives are actually derived by a raising movement from a position within NP to the specifier of DP. Though I will not discuss it in detail, I assume that such movements are motivated by a feature F which attracts an NP-internal relative to the NP-external position. On this assumption, the semantic composition of (48c) and (48d) will then not be much different from that for (48a) and (48b) except that a property variable within NP is quantified over in the former case.¹²

The examples in (49) are more complicated and interesting than those in (48). In these examples we have two different types of relatives modifying the same noun but only a certain order is permitted. As discussed, the generalization is that the I-level relative must occur closer to the noun than the S-level relative, no matter whether they precede or follow the demonstrative or one relative precedes the demonstrative but the other follows it. Let us first consider the case where the two relatives follow the demonstrative. According to the proposed analysis of "augmented nouns" discussed in the last section, I-level modifiers, if present, are like arguments of "augmented nouns". Therefore, they must be saturated before other types of modifiers, including S-level relatives, come in the computation. This explains the grammaticality of (49a) and the ungrammaticality of (49b). In fact, (49a) can be considered as the base-representation from which other representations can be derived.

If it is correct to regard (49a) as the base-representation and to assume that pre-demonstrative relatives are derived by movement, the grammaticality judgments in (49c-f) will be strikingly reminiscent of Superiority effects and crossing paths of multiple

¹² It might be suggested that pre-demonstrative relatives are base-generated rather than raised from within NP. However, this suggestion faces a problem of being unable to obtain a restrictive interpretation without positing additional semantic mechanisms. A movement approach is thus preferred in this paper.

movements of the same type. A typical example of superiority effects is illustrated in (50).

- (50) a. Who saw what?
b. *What did who see?

Multiple movement of the same type can be illustrated by multiple *wh*-questions in a multiple *wh*-fronting language like Bulgarian discussed in Rudin (1988).

- (51) Bulgarian (Rudin 1988:449)
a. koj kogo vižda?
 who whom sees
 ‘Who sees whom?’
b. *kogo koj vižda?
 whom who see
c. koj kogo t_{subj} vižda t_{obj}
 ↑ ↑ | |

The examples in (51) show that multiple *wh*-movements of the same type cross paths and preserve the original hierarchical order of the moved elements.

Bruening (2001) shows that the same also holds true of Quantifier Raising (QR). For example, according to him, in a sentence containing two object quantifiers, whenever the second object undergoes QR, the first object must also QR to a position higher than the second object.

- (52) Ozzy gave someone everything that Belinda did. (some>>every, *every>>some) (Bruening 2001:ex.(25b))

In (52), ACD (antecedent-contained deletion) forces QR of the second object but it cannot take scope over the first object. In other words, the representation in (53a) is the representation of (51) and the representation in (53b) must be ruled out.

- (53) a. someone everything that Belinda did [Ozzy gave t_{some} t_{every}]
 ↑ ↑ | |
b. *everything that Belinda someone [Ozzy gave t_{some} t_{every}]
 ↑ ↑ | |

Following Richards (1997), Bruening (2001) has argued that superiority and QR phenomena like those in (50)-(53) can be accounted for in terms of a combination of

Shortest Attract and Shortest Move. Essentially, Shortest Attract dictates that a requirement F' attracts the closest feature F that satisfy F' , and Shortest Move requires that the distance between original and landing site of movement must be minimal. Richards has suggested that the two conditions can be lumped together as one, which he calls Shortest.

(54) Shortest

A pair P of elements $[\alpha, \beta]$ obeys Shortest iff there is no well-formed pair P' which can be created by substituting γ for either α or β , and the set of nodes c-commanded by one element of P' and dominating the other is smaller than the set of nodes c-commanded by one element of P and dominating the other.

According to the above Shortest condition, in (55) below, where K can potentially enter into a checking relation with two elements α and β , α must move to the specifier of K first rather than β . Once α has moved, β may also target the specifier of K as there is no longer an intervening element. But Shortest will constrain the movement of β as well. According to Richards, β must move and merge to a new specifier position of K to render the distance between β and β' as short as possible. Thus, β must “tuck in” as shown in (55c). (55d), on the other hand, is ruled out by the existence of the well-formed pair $\{\beta, \beta'\}$ of (55c).

- (55) a. $[K [\dots \alpha [\dots \beta]]]$
 b. $[_{KP} \alpha' [K [\dots \alpha [\dots \beta]]]]$
 ↑
 c. $[_{KP} \alpha' [_{KP} \beta' [K [\dots \alpha [\dots \beta]]]]]$
 ↑
 d. $*[_{KP} \beta' [_{KP} \alpha' [K [\dots \alpha [\dots \beta]]]]]$
 ↑

Returning to Mandarin, we have found that the contrast between (49c) and (49d) is like the contrast between (50a) and (50b) and the contrast between (49e) and (49f) is similar to the contrast between (51a) and (51b) or between (53a) and (53b). In other words, the order of S-level and I-level relatives exhibit the superiority effects. The hierarchical order of stage-level and I-level relatives in pre-demonstrative positions must preserve their original hierarchical order in pre-nominal positions. This, I suggest, should be unified under the same superiority account such as the one proposed by Richards (1997) and Bruening (1998).

6. Concluding remarks

It is argued in this paper that, contrary to their claims, Larson & Takahashi's (2004), Del Gobbo's (2005) and Hsieh's (2005) two-layer modification of noun phrases cannot account for the distribution of the order of stage-level and individual-level relatives in Mandarin. Therefore, an alternative analysis is proposed. It is shown that in prenominal positions I-level relatives must occur closer to the head nouns than S-level relatives because I-level modifiers are arguments of "augmented nouns", i.e. nouns with a feature bundle, whereas S-level modifiers are true adjuncts. It is always the case that adjuncts are base-generated outside arguments. In Mandarin, relative clauses may be attracted to the specifier position of DP. However, when they move, they have to obey syntactic economy conditions such as Shortest, proposed by Richards (1997). Consequently, the hierarchical positions of an S-level and an I-level relative after the movement must preserve their original base-generated hierarchical order before movement.

The above result is quite desirable. However, an anonymous reader suggests that it might be formally arbitrary that I-level properties are represented as part of nouns and S-level ones as adjuncts. Therefore, it is worthwhile to pursue a "deeper" characterization of the difference between these two classes of properties and why the I-level ones are a more integral part of the noun denotation. In particular, he/she points out that though I-level properties in some cases can be naturally regarded as an argument of the noun such as *oil deposit*, *oil tax*, in that they denote things which exist independently of the denotation of the noun, classificatory and color modifiers seems less true. He/she suggests that a more general property is "the distinction between what properties can change without change of identity of the object and which ones can't". He/she gives an example to illustrate this:

If I pull a jade ring from my pocket and show it to you, then put it back and pull out a gold ring, we all agree that the second ring is a different ring from the first one. But if I take the ring off my finger and give it to Bill we agree that the ring has changed location and owners, but it is the same ring.

Therefore, he/she suggests that "perhaps the deeper generalization is that properties which change identity when they change are part of the meaning of the noun" and "properties like location, ownership, etc. whose change does not trigger a change in identity are not part of the N denotation." If this "deeper" characterization of the proposed distinction between I-level and S-level properties is valid, it lends further support to the claim made in this paper, namely, the superficial order restrictions between I-level and S-level relatives are a by-product of the argument structure of noun denotations.

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試論表永恆性質及表短暫狀態關係子句 的次序問題及優越效應

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這篇論文提出證據證明 Larson & Takahashi (2004)、Del Gobbo (2005) 及 Hsieh (2005) 所主張的名詞組雙層修飾結構並無法真正解釋中文表永恆性質及表短暫狀態關係子句的句法分布，因此提出另一解釋，主張表永恆性質的關係子句是名詞論元結構的一部分，而表短暫狀態的關係子句則是不折不扣的附加語。附加語在結構上總是處於論元之外，因此表永恆性質的關係子句必須比表短暫狀態的關係子句更靠近中心語名詞。不過，中文的關係子句也可以移位至 DP 指示語的位置，但是移動時必須遵守句法上的最短距離條件，結果，移位後的關係子句的結構高低位置仍然會保留未移動前的結構高低位置，顯現了所謂的優越效應。

關鍵詞：表短暫狀態的關係子句，表永恆性質的關係子句，優越效應