

**Henda Guwu--More on the Type Matching Constraint on Modification**

Shi-Zhe Huang & Y.-H. Audrey Li

**Abstract**

This article further develops the basic tenet of Huang (2006), which argues for a semantic type-matching constraint on modification. We point out that the more stringent sortal matching constraint as defined in the same article makes wrong predictions on data, and we analyze *henda guwu* ‘great encouragement’ as a case of intersection between two type <e,t> entities, as first proposed in Huang (2001). This treatment of *henda guwu* leads to a uniform account of some puzzling phenomena in Chinese, such as the ungrammatical modification structure *henda chitang* ‘big pond’ but grammatical modification structure *henda yige chitang* ‘a big pond.’ On the issue of why most modification structures allow for the ‘de’ as in [modifier +de+ modifiee], while there is much more restriction on de-less modification as in [modifier+modifiee], we suggest that in de-less modification, the modifier and modifiee form conjunction as sisters and therefore must meet the type matching constraint in order for intersection to take place. Whereas, with de in the modification structure, the modifier and modifier are not sisters (Li 2008), and do not have to be of the same semantic type, thus allowing for greater flexibility. We suggest that this latter case is possible either because de insures type matching between the modifier and modifiee by being a type shifter or its presence makes the type matching constraint null.

Key words: adjectives, modification, conjunction, 的 ‘de’, 和 ‘he’

**1. Introduction**

Modification structure in Chinese has been a challenge to linguistic analysis over the past sixty years since Zhu’s seminal work published in 1956. There have been numerous articles and books focusing on Chinese adjectives and their use in the modification structure with or without de. In this short paper, we do not attempt to provide a comprehensive review of the literature or the data beyond what is necessary. Instead, we will focus on Huang (2006), which provides a semantic type matching account of the (partially) complementary distribution of simple adjectives (SA) and complex adjectives (CA) that Zhu Dexi studied over several decades with great insight (Zhu, 1956, 1961, 1983, 1993). Most importantly, we will point out that sortal matching, which is a stronger constraint than type matching entertained in Huang (2006), leads to incorrect predictions. We show that we can remove sortal matching and fall back on type matching and still account for expressions such as *henda guwu* ‘great encouragement,’ if we interpret both *henda* ‘big; great,’ and *guwu* ‘encouragement’ as type <e,t>. We then show that the solution may be applied to a wider set of data, although some recalcitrant problems still remain.

Huang (2006) makes the following observations and claims:

A. It is widely observed in the Chinese literature that simple adjectives (SAs) and complex adjectives (CAs) have a complementary distribution (Shen 1997; Huang 1997, among others). These distributional patterns can be summarized as follows:

1. SAs can occur alone in adnominal, modifier position
2. CAs cannot; in modifier position, they need *de*
3. SAs cannot occur alone in the root clause predicate position; they need some sort of predication marker (such as *hen*, among other things)\(^1\)
4. CAs can occur alone in predicate position. \(^2\)

The complementarity in distribution between SAs and CAs can be illustrated by the following data:

---In the modifier position:

---Simple adjectives:

(2) a. zang shui ‘dirty water’
    b. hong fangzi ‘red house’
    c. gaodang che ‘high-end car’
    d. piaoliang yifu ‘pretty clothes’

---Complex Adjectives

(3) a. hen zang *(de) shui ‘very dirty *(DE) water’
    b. hen hong *(de) fangzi ‘very red *(DE) house’
    c. hen gaodang *(de) che ‘very high-end *(DE) car’
    d. hen piaoliang *(de) yifu ‘very pretty *(DE) clothes’

---Simple and Complex Adjectives in the predicate position:

(4) a. Zhangsan *(hen) gao.
    Zhangsan very tall
    ‘Zhangsan is (very) tall.’
    b. Zhangsan *(bi Lisi) lei.
    Zhangsan compared-to Lisi tired
    ‘Zhangsan is more tired than Lisi.’
    c. Lisi *(zui) congming.

---In many but not all non-root clause context, SAs are fine. Huang and Li (2008) made a distinction between root clauses and some non-root clauses; this issue will be discussed in more detail in Section 5.

---The distributional patterns with CAs are more complex than this. Interested readers can refer to Huang (2006) for more specific discussions on subgroups of the complex adjectives, particularly with regard to the use of the so-called predicate marker *de2* on some of them. Regarding clausal types, Huang (2006) only considers the predicate position of a root clause as the locus for this distributional pattern of SAs and CAs. See Sections 3.1 below for a discussion of small clauses in Huang (2006) and Huang and Li (2008) (cf. Gu (2008)). In Huang and Li (2008) we considered a few other clausal types, such as conditionals, and also found SA in predicate positions in those clause types. This issue will be discussed in Section 5, where we show that there are still questions to be answered.
Lisi  most smart
‘Lisi is the smartest.’

B. The background theory adopted in Huang (2006) is (a form of) Property Theory. In particular, following Chierchia (1984, 1985), it is assumed that properties exist in two forms: (a) as propositional functions that are argument taking, unsaturated structures (of type <e,t>), and (b) as nominalized properties, to be thought of as entities (non argument taking and type e). One major consequence of this theory is that syntactic expressions that denote properties, such as verb phrases or adjectival phrases, can be found in argument positions; these are the nominalized properties, and as such should be treated as being of type e, rather than type <e,t>. In the domain of discourse, individuals therefore occur in various sorts, such as:

• singular individuals (standard assumption)
• plural individuals (Landman, 1988; Link, 1983; Chierchia, 1998a, b;)
• kind individuals (Chierchia, 1998b)
• ‘‘states,’’ ‘‘acts,’’ etc., as the individual images of predicates (Chierchia, 1984, 1985, 1998a)

The Property Theory defined as such can help explain (1). Huang argues, first of all, that bare nouns in Chinese should be interpreted as type e since they can appear in argument positions in their bare form (Chierchia (1998a); Huang (2001)). For instance,

(5)  nanhai xihuan xiaogou.
    boy      like     puppy
    ‘The boy likes the puppy.’ Or
    ‘Boys like puppies.’

Secondly, Huang shows that adjectives can also appear in argument positions in bare form (SAs):

--SAs in subject position:
(6)  a. Ta hen qinfen.
     she very diligent
     ‘She is very diligent.’
      b. Qinfen shi yige meide
diligent is one-CL beautiful virtue
     ‘Diligence is a beautiful virtue.’

--SAs in object position
(7)  a. Tamen neige diqu hen pinqiong.
     they that region very poor
     ‘Their region is very poor.’
      b. Women yao zhansheng pinqiong.
we want overcome poverty
     ‘We want to wipe out poverty.’
Huang interprets these and other facts to mean that primarily, bare nouns and bare adjectives (SAs) are of type e and complex adjectives (CAs) are of type <e,t>. Furthermore, she claims that de is a type shifter that shifts a type <e,t> modifier to type e so as to match with the head noun, which is by default type e. Accordingly, de is of type <<e,t>,e>. The non-intensifier hen is also a type shifter that shifts a type e element to type <e,t>; therefore, its type is <e,<e,t>>.

C. Type Matching Constraint on Modification


(8)  A Type Matching Constraint on the Nominal Modification Structure:

A bare noun and its modifier must be of the same semantic type.3

The combination of this constraint and the basic syntactic rules ensures that the head noun determines what the type the conjunction will be. In Chinese, since the head noun is of type e, then the modifier must be of type e. This, then, helps explain the puzzle that Zhu has observed since his earliest work: the fact that a modifier of a noun has to be nominal itself. If not, they have to become one (e.g., the dialectal data showing modification phrases with a structure such as [Adjective+de2+de3+N], where adjectives with the so-called predicate marker de2 is nominalized by de3 when modifying a noun.4 Huang’s explanation of this puzzle is that with bare nouns in Chinese being of type e, a modifier in Chinese must therefore also be of type e or it won’t satisfy the type matching constraint in (8). Simple adjectives being of type e are able to occur in the modifier position of a bare head noun while complex adjectives, being of type <e,t>, fail to meet the condition for modification and therefore either have to be type shifted by de or be tossed out.5

The formal definition of nominal modification is as follows:

(9)  Definition of Nominal Modification in Chinese (first version)

a. \( x \land y = \text{nom}(\lambda z[\text{pred}(x)(z) \land \text{pred}(y)(z)]) \)

b. \( \text{xin shu} \rightarrow \text{xin} \land \text{shu} \) ‘new book’

Through the two operators pred and nom, the two type shifters that lift or lower the type (Chierchia (1998)), and the lambda operator, which creates a set out of each of the two

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3 Huang (2006) points out that this constraint follows naturally from the conjunction analysis of modification as well as the Chierchian property theory. For ease of exposition, it is more convenient to refer to type matching, a practice we will follow in this article.

4 For further discussion of the literature on this point, see Zhu (1993), Huang (2006, 2008) and references cited therein.

5 Note that being of the same type is a necessary but not sufficient condition for modification. What the type matching constraint stipulates is that mismatch in semantic type will not result in good modification in syntax. However, it is not necessarily true that a good match in semantics will result in good match in syntax.
type e conjuncts, modification is interpreted as an intersection of the conjuncts (modifier and modifiee). Below is a side-by-side look of the syntax-semantics interface of the acceptable as well as unacceptable modification structure in Chinese. 6

(10) Nominal Modification Structure in Chinese

<table>
<thead>
<tr>
<th>Modifiers</th>
<th>Modifiee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a.</strong> syntax-SA</td>
<td>bare noun</td>
</tr>
<tr>
<td>semantics e</td>
<td>e</td>
</tr>
<tr>
<td><strong>b.</strong> syntax-CA</td>
<td>bare noun</td>
</tr>
<tr>
<td>semantics &lt;e,t&gt;</td>
<td>e</td>
</tr>
<tr>
<td><strong>c.</strong> syntax-CA+ de</td>
<td>bare noun</td>
</tr>
<tr>
<td>semantics e</td>
<td>e</td>
</tr>
</tbody>
</table>

D. Sortal Matching as an Additional Component of Type Matching Constraint

While the type matching constraint works well to account for the data examined, Huang considered a particular kind of noun phrase in which the modifier is CA without de marking. The following is an example of such a combination:

(11) hen da guwu

‘very great encouragement’

We have seen that hen da ‘big/great’ is CA, and therefore it is of type <e,t>. Nevertheless, Huang (2006) decides to treat CA as flexible between type e and type <e,t> based on the observation that CAs can be argumental in some contexts, and tries to account for the distribution of CAs in the modification structure in terms of their sortal properties. This shift motivated a revision of the definition of modification by incorporating sortal matching.

In this article we show that both of these claims, that CAs can be argumental, and that sortal matching can ensure an adequate constraint on the modification structure, run into problems under closer scrutiny. In Section 3 we examine the two problems related to CAs and sortal matching. In Section 4, we re-consider the possibility of providing a type <e,t> interpretation of both henda and guwu and the advantage of resorting to the type matching account to modification structures where hen da and guwu are involved. In Section 5 we will discuss a number of remaining problems, particularly concerning the types of various categories and their distribution. In addition, we will discuss the optionality of de in the modification structure. This last point is probably the most interesting result coming out of this study, which follows Li (2008), where it is suggested de shares properties with a conjunction word and therefore might be treated as such, taking the modifier and modifiee to be its arguments. Our study reveals that type matching constraint is a necessary but not sufficient condition that is strictly applied to de-less modification; when de is present, however, the modifiers and modifiees do not

6 Huang (2008) discusses briefly how the type matching constraint works in English and Russian.
seem to be held under this constraint, suggesting either that *de* coerces type matching or that type matching is not relevant in this kind of construction.


Let us start with the error. The sortal matching augmentation to type matching basically says that the modifier and modifiee not only have to be matched by their type, but have to be further matched by their sort. Recall that in Chierchia’s domain of discourse, there are four sorts of individuals, namely four sorts of type e elements. The initial motivation for stipulating sortal matching was due to the claim that CAs can be argumental and therefore can be interpreted as type e. But treating CAs as type e would fail to account for all the examples in (4), where we have seen that CAs cannot modify bare common nouns. To ensure proper combinatorial possibilities in modification, Huang proposes that in addition to type matching, the modifier and modifiee have to be matched in terms of their sortal properties. In the spirit of the Frege-Chierchian conception of sorted individuals, Huang separates the type e entities into concrete individuals and abstract individuals, with common nouns falling into the former category and CAs such as *henda* and deverbal nouns such as *gwu* falling into the latter category (but all of them are still of type e). Under this definition, the modification structure *henda guwu* ‘big/great encouragement’ is fine because they meet the sortal match condition. On the other hand, *fangzi* ‘house’ or *shu* ‘book’ denote concrete individuals and therefore cannot be modified by *henda*. Thus the data in (4) can be handled adequately.

However, (and this is where the error is), this sortal match constraint incorrectly predicts that *xin shu* ‘new book’ would be illicit because the modifier and modifiee belong to different sorts of type e just as *hen xin* ‘very new’ and *shu* ‘book’ do, when in fact *xin shu* is perfectly fine. This paper is an attempt to re-examine the motivating factor in sortal matching, namely the so-called argumental interpretation of CAs. Once we show that the original evidence is not strong enough to hold this argumental interpretation of CAs, we would not need to maintain the sortal matching constraint in modification. Furthermore, we revisit an account of *hen da guwu* proposed in Huang 2001, where both *henda* and *gwu* were treated as type <e,t>. Before elaborating on this type <e,t> treatment of *gwu*, we need to look at the claim in Huang (2006) that CAs can be type e and show that the data can be either explained differently or not strong enough to support such a view.

3.1 Can *hen da* Be Argumental?

Huang (2006: 356) offers the following data as positive evidence that CAs can be type e:

(12) a. Tai lan bu heshi.
   too lazy not suitable
   ‘Being too lazy is not suitable.’

   b. Yonggong bi bu yonggong geng youliyu gongzuo.
   hard-working compared not hard-working further beneficial work
   ‘Being hard-working is more beneficial to work than not being hard-working.’
The CA in (12a) uses a different degree adverb; if we replace it with *hen* the sentence does not sound very good:

(13) ??Hen lan bu heshi.
    very lazy not suitable
    ‘Being very lazy is not suitable.’

In (10b), the CA is Neg+A. Once again, it is difficult to replace it with *hen*:

(14) ??Hen jinshen bi hen cuxin geng youliyu gongzuo.
    very cautious compared very sloppy further beneficial work
    ‘Being very cautious is more beneficial to work than being very sloppy.’

(12c) and (12d) involve the same kind of structure, which, for convenience, we will call small clause. We’ll concentrate on (12d). Huang (2006) starts by observing that unlike in the root sentence where SAs cannot function as predicates by themselves, in the small clause, they can:

(15) Laoshi kua tamen yonggong.
    teacher praise they hard-working
    ‘The teacher praised them for being hard-working.’

Under the Chierchian Property Theory, the small clause is the argument of the verb *kua*, and, according to Huang, if one finds a CA, i.e., *hen yonggong*, in the same predicate position of the small clause, then that CA is type e, just like the corresponding SA *yonggong*.

However, such an analogy does not hold: while a small clause may be argumental, its internal components are not necessarily so. There is also reason to consider a different

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7 It is not uncommon in the Chinese literature to consider such combinations as adjectival. See, for example, Wang (2003:195) and Guo (2004:130). Huang (2006) allows such combinations to be argumental (nominal). It is also plausible that some of such cases have a clausal structure, which complicates the issues further.

8 Compare this with (i), which is perfectly fine:

(i) jinshen bi cuxin geng youliyu gongzuo.
    cautious compared sloppy further beneficial work
    ‘Being cautious is better for work than being sloppy.’
account. In Huang & Li (2008) we point out that the observed distributional patterns of SAs and CAs in Chinese may be tied with the need for a functional category (FC) for some structures including the root clause and lack of such in some other structures such as a small clause. The two bracketed representations would illustrate the root clause and a small clause respectively (for illustration only):

(16)  [root clause NP [FC…[VP]]]
(17)  [small clause [NP] [VP]]

We claim that *hen appears under the functional category FC in (16) but it is not necessary in (17) because such an FC does not appear in a small clause. In this context, illustrated by (9d), *hen is used in its original lexical role: a degree modifier. Under this account, the adjectives in both the root clause and the small clause function as predicates, not as arguments and therefore they should be interpreted as type <e,t> rather than type e. One way to test out this interpretation is through the use of connectives. We know that *he is the connective for arguments (Huang 2001. Aoun and Li (2003) observe that *he is for individuals\(^9\); whereas *ergie conjoins non-nominal phrases (Aoun and Li (2003:143)). If the CA in the small clause is type e, as Huang (2006) originally claims, one would expect that it can be conjoined with another CA by *he, not by *ergie. But if they are serving as predicates, they should be conjoined by *ergie, not *he. The following examples support our claim that the adjectives in both the root clause and the small clause are in a predicate position, not an argument position:

(18)  Lisi *hen congming *ergie *hen yonggong.
      Lisi very smart       and   very diligent
      ‘Lisi is smart and diligent.’

(19)  *Lisi *hen congming *he  *hen yonggong.
      Lisi very smart       and   very diligent
      ‘Lisi is smart and diligent.’

(20)  Laoshi kua *tamen (hen) congming *ergie (hen) yonggong
teacher praise them very smart       and   very diligent
      ‘The teacher praised them being smart and diligent.’

(21)  *Laoshi kua *tamen (hen) congming *he  (hen) yonggong
teacher praise them very smart       and   very diligent
      ‘The teacher praised them being smart and diligent.’

We conclude based on these facts that interpreting CAs as type e is problematic, especially with *hen+Adj.\(^{10}\) Since the argumental interpretation of CAs was the original reason for proposing sortal matching to account for *henda guwu ‘big/great encouragement and *henxin shu ‘very new book,’ the motivation for resorting to sortal

\(^9\) See the next section for more discussion on conjunction words.

\(^{10}\) It has been observed in the literature that *hen does not behave exactly like other adverbs such as *ting ‘very’, *zui ‘most’, etc. (Lu (1980), Ma (1991)).
matching cannot be maintained.\footnote{11} We argue, following Huang (2008), that CAs should still be interpreted as type $\langle e, t \rangle$, which explains the ungrammaticality of *henxin shu ‘very new book’ as a result of type mismatch—it’s a $\langle e, t \rangle e$ modification structure. What we still need to account for is the grammaticality of *henda guwu ‘big/great encouragement,’ a case where a type $\langle e, t \rangle$ expression modifies a bare noun whose semantic type needs to be determined. This will be the focus of the next section.

4. Back to Type Matching Account of [Henda X]

4.1 Defining the Empirical Scope of the Study

Recall that the contrast to be captured is the following:

(22) *henda chitang ‘big pond’
(23) henda guwu ‘great encouragement’

The contrast between (22) and (23) was the original focus in Huang (2006), which has a rather brief discussion on the latter group. In this article, we would like to have a more detailed examination of henda guwu and some related structures, and show to what extent type matching may apply to them.

Henda X: The words that can replace X in this construction have been called verbal nouns by Xiao Fu (1956) and nominal verbs by Zhu (1985). They can be divided into two subgroups.

Group 1: deverbal process nominals such as: guwu ‘encouragement/inspiration,’ biance ‘urging on,’ zhichi ‘support,’ ciji ‘stimulation/excitement,’ qifa ‘enlightenment,’ bangzhu ‘help,’ chongji ‘impact,’ tiaozhan ‘challenge,’ daji ‘shock,’ weixie ‘threat,’ sunhai ‘damage.’. All these nominals can also function as verbs. When used as the nominal modifier in the construction under examination (modified by henda), their theta grid is the same as that of a verb.\footnote{12} They have PPs containing the theme or other theta roles associated with X as illustrated below:

   A give B great encouragement/support/enlightenment/stimulation
   ‘A gives B great encouragement/support/enlightenment/stimulation.’

   A to B have great help/impact
   ‘A has great help/impact on B.’

\footnote{11} We do not, however, rule out the possibility of sortal matching in principle, as this mechanism is useful in many different contexts.

\footnote{12} All lexical categories, including nominal and verbal categories, can assign thematic roles to their complements, (Chomsky’s 1970 X’-theory): This interests me greatly. I am quite interested in this. I have a great interest in this matter. Deverbal process nouns can retain the thematic structure of the corresponding verb: The enemy destroyed the city. the enemy’s destruction of the city. See Abney 1987, Grimshaw 1990, among many others, for relevant studies. For an extensive study on the relevant structures in Chinese from the generative perspective, see Fu (1994).
A is a great challenge/shock/threat to B.’

‘A has great contribution/restriction/improvement regarding B’

‘A makes great effort for B.’

‘A make B receive great encouragement/damage
‘A makes B inspired/hurt greatly.’

‘A to/in B has great interest/put in great effort/has great effect’

‘A in terms of B exists great disparity’

‘A in terms of B has great meaning/potential’

‘A with B has great relation—A is greatly related to B’

‘A to B brings great risk’

Note that it is possible that these all involve light verbs (C.-T. J. Huang 2006) or dummy verbs, as Zhu Dexi (1985) call them, in which case the modifiees are akin to gerunds. This won’t be incompatible with the analysis proposed here. However, we do not intend to discuss the specifics of such a syntactic account in this article, except to note that these nouns are all part of the predicate along with the light or dummy verb.
Three questions can be raised regarding these patterns containing \(henda \; X\):

**Question (a).** In all the examples above for both Group 1 and Group 2 cases, \(X\) has a special interpretive relation with \(A\) and \(B\) that a common noun such as *chitang* ‘pond’ or *fangzi* ‘house’ does not have; \(A\) and \(B\) are like arguments of \(X\) even when \(X\) is a nominal. The explanation of this particular relation can be easily found in \(X’\)-theory (Chomsky 1970), which allows related nouns and verbs to have the same thematic requirements. Abney also discussed derived nominals retaining their theta-grid (e.g., Abney 1987:74-75). In other words, Group 1 nominals have their thematic-grid, just as they do when they function as verbs. The question is about Group 2 cases, where the \(X\) does not have an obvious verbal root.

**Question (b).** All the \([henda \; X]\) phrases we have examined appear as part of the predicate. Is the semantics of the structure \([henda \; X]\) up to this role?

**Question (c).** Although the modifiees exhibit verbal properties, Zhu (1985:3) pointed out that their coordination still requires he (conjoining nominals), not *bing* or *you...you...*(conjoining verbs, as well as adjectives). The coordination facts are revealing but none of the current theories on conjunction is adequate. An explanation is needed.

We will tackle these three issues one by one below.

4.2. **Discussing Question (a).** As mentioned in footnote (12), nouns can have thematic structures, just as their verbal counterparts do. The nouns in Group 1 and 2 need to assign thematic roles to their complements. It is expected that Group1 nouns behave just like their verbal counterparts in their ability to assign thematic roles. The question concerns Group2 nominals, which do not have clear verbal counterparts. Here we turn to Yuan (1994), which specifically addresses this issue. He proposes that the Group2 nouns are bivalent nouns, which he defines as nouns that have two depending expressions. For example, *xingqu* expresses a “downgraded” predicate linking two parties: someone (holding interest) towards something, so its semantic structure is something like the following (Yuan 1994:138, with slight modifications):

\[(35) \quad xingqu \, \text{interest} <\text{of someone}_{a}\, \text{towards someone}_{b}/\text{somethings}_{b}\, > \]

\[(haogan \, \text{favorable impression} <\text{of someone}_{a}\, \text{towards someone}_{b}\, > \]

Yuan postulates that this semantic structure can be abstracted as \(N <a \, P \, b>\), where \(P\) is what he calls “downgraded” predicate inherent in this noun, and \(a\) and \(b\) stand for the depending expressions. Yuan argues that “It is clear that the semantic expression \(N <a \, P \, b>\) can reflect the valence requirement of bivalent nouns and thereby contains much syntactic information.” \(^{14}\) (ibid) Yuan shows that this valence requirement helps explain why the sentence in (36) sounds odd. But (37), which contains the arguments, is fine.

\(^{14}\) In fact, Xu Liejiong & Shen Yang (1998) argue that it is quite easy for Chinese scholars who had adopted the Valency Theory (配价理论) to deal with particular Chinese issues to make a transfer to Theta Theory for their shared theoretical as well as empirical concerns. According to them, Theta Theory has an advantage over the Valency Theory because the former has wider coverage and higher conceptual goals. It is not our intention here to make an evaluation of this comparison, but rather to use Yuan’s insight that
(36) *Wo yizhi meiyou haogan.
    I always not-have good-feeling

(37) Wo dui ta yizhi meiyou haogan.
    I to him always not-have good-feeling
    ‘I never had a good feeling towards him.’

A noun such as xingqu or haogan under Yuan’s analysis can be easily reinterpreted as being associated with a two-place predicate in predicate logic or as a predicate having its theta-grid with a and b assigned particular theta roles, along the line of Abney (1987:74-75). Yuan’s analysis of the verbal nouns reconciles the conflicting demands of a noun and the inherent predicative properties by positing a predicate structure for the nominal. This is compatible with Huang (2001; 2008) where such nouns which still have their verbal properties intact are treated as type <e,t>.\(^{15}\) Seen in this way, the X of [henda X] is type <e,t>. Given our take on henda as type <e,t>, as discussed in Section 3, we have a case of type matching between the modifier and modificiee. From this point on, we can treat the words in Group 1 and Group 2 as essentially the same. For convenience, we will call all of them deverbal nominals.

In light of this account, we need to modify our formal definition on modification to accommodate phrases like [henda X].

(38) Definition of Nominal Modification: Modification is defined as Intersection
  1. If the head noun is of type e, modification is defined as follows:
     a. x \land y = nom(\lambda z[\text{pred}(x)(z) \land \text{pred}(y)(z)])
     b. xin shu \rightarrow xin \land shu ‘new book’

  2. If the head noun is of type <e,t>, modification is defined as follows:
     a. X \land Y = (\lambda z[(X)(z) \land (Y)(z)])
     b. henda guwu \rightarrow henda \land guwu ‘great encouragement’

The two-part definition guarantees that the type of the head will be preserved for the entire modification structure. If the head is of type e, it requires its modifier to be of type e, and the entire structure will be of type e; if the head is of type <e,t>, it requires its modifier to be type <e,t>, and the entire modification structure will be of type <e,t>. It is clear that this definition would work for both Chinese and English. An English noun phrase such as new book would be defined by the second part of the definition, thus the

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\(^{15}\) Strictly speaking, they should be interpreted as <e,<e,t>> since they are bivalent. (We thank Muffy Siegel for pointing this out to us.) Here we will not make this distinction among predicates, using <e,t> to stand for predicates in general.
modification structure would be \([e,t] \wedge [e,t]\), just like *henda guwu.*\(^{16}\) With this expanded definition let us turn to the next topic.

### 4.3. Discussing Question (b).
This question asks about the semantic property of the structure \([henda\ X]\), particularly whether it is the right component in the larger context. As we can see from the semantic properties as defined above, the answer is yes. The semantic type of \([henda\ X]\) is \(<e,t>\); it is a property denoting predicate function. It is actually small wonder that such phrases overwhelmingly appear in the predicate part of the sentences we have examined, most of which are headed by a light verb (C.-T. J. Huang 2007) or dummy verbs (Zhu (1985)), such as *gei* ‘give,’ *you* ‘have,’ *shi* ‘be,’ etc. C.-T. J. Huang (2007:10) has pointed out that the gerundive part of the syntactic structure requires non-referential phrases. Abney (1987:75) lists three main characteristics of deverbal process nominals (he lists four but one of them is for the result nominals only). The most relevant to Chinese is the characteristic that they do not occur with demonstrative determiners.\(^{17}\) This is indeed the case for both groups of deverbal nominals in Chinese:

\[(39)\]

From Group 1:

\[\text{*na-ge henda guwu} \quad \text{that CL great encouragement}\]

\[\text{A gei B de na-ge henda guwu} \quad \text{A to B DE that CL great encouragement}\]

\[(40)\]

From Group 2:

\[\text{*naxie henda yali} \quad \text{that great pressure}\]

\[\text{A dui B de naxie henda yali} \quad \text{A to B DE that great pressure}\]

These examples show that \([henda\ X]\) resists being turned into referential, which is just right for the light verb context in which it appears. They have the mixed properties of nouns and verbs (cf. Grimshaw and Mester 1988, among many others).

### 4.4 Discussing Question (c).
The next question is about conjunction. From the previous section we know that Chinese conjunction words have been shown to be sensitive to word categories (Zhu (1985), Aoun and Li (2003), Huang (1996, 2005: 61), and Zhang (to appear)). The general consensus is that *he* conjoins noun phrases (denoting individuals) and *bing, ergie, ye, you...you...* conjoin verbal and adjectival elements.\(^{18}\) Huang (2006), however, has shown that it is not a matter of noun phrases vs. verb phrases/adjective phrases; rather it is argument vs. predicate, or type e vs. type \(<e,t>\) for the selection of the connective *he*:

\[(41)\]

a. *Lisi da paiqiu he youyong.
   Lisi play volleyball and swim

---

\(^{16}\) This two-part definition is only meant to spell out semantic details for conjunction. The idea about modification is a simple one: Intersection/conjunction, which requires the sameness of types on the conjuncts. One could imagine that if the head noun is of another type, the definition requires that the modifier be of the same type.

\(^{17}\) The other two being no plural marking and no co-occurrence with an adjunct [of NP].

\(^{18}\) There are more conjunction words in the language but we will not go through all of them here.
b. Lisi yao da paiqiu he youyong.
   Lisi want play volleyball and swim
   ‘Lisi wants to play volleyball and swim.’

c. Da paiqiu he youyong dui shenti you haochu.
   play volleyball and swim to body have benefits
   ‘Playing volleyball and swimming are good to health.’

In (41a), the conjunction of two VPs appears in the matrix predicate position, the sentence is not acceptable. However, when the same conjunction appears as the internal argument of the matrix verb yao or the external argument of the matrix predicate dui shenti you haochu ‘beneficial to health,’ it is fine. Thus Huang concludes that he is a connective for arguments, not for predicates. An alternative to this argumental analysis of he is to propose that the conjuncts of he must be [+N]. This feature analysis of he can account for all the typical examples of he conjunction plus the ones presented in (41b) and (41c), which involve infinitives and gerunds, respectively. We expect deverbal nouns such as guwu ‘encouragement,’ bangzhu ‘help,’ and qifa ‘inspire,’ to be conjoined by he, because they both bear the feature [+N].

4.5. A Closer Examination of the \(<e,t> \& <e,t>\) Modification Structure
We have presented in this section the possibility of explaining the contrast between *hen da chitang ‘big pond’ and hen da guwu ‘great encouragement’ in terms of type matching. We adopt Huang (2001) in treating both henda and guwu as type <e,t>. Now that we have posited in Chinese an additional modification structure where the modifier and modifiee are both type <e,t>, we will next show that we can extend this analysis to three more cases, which either have not been accounted for or have not attracted much attention before. In order to do so, we need to revise the type matching constraint slightly. Recall that in (8) the constraint is stated to apply to the bare head noun and its modifiers; a more reasonable assumption is that the constraint applies to the modifier and modifiee, allowing the latter to be a more complex structure (Huang 2008:56).

(42) A Type Matching Constraint on the Nominal Modification Structure (Revised):
   A modifiee and its modifier must be of the same semantic type.

Discussions in the following subsections will bear this out.

4.5.1 henda with YI-Classifier-Bare Noun
Observe the following pair of expressions:

(43) a. *[⟨<e,t>, hen da⟩ [e chitang]]
       very big pond
   b. *[⟨<e,t>, hen da⟩ [⟨<e,t>, yi-ge chitang⟩]]

19 For a review of the categorial analysis (Zhang, to appear, Aoun and Li 2003), the argumental analysis (Huang 2006), and the feature analysis as proposed here, see Huang 2009.
The contrast found in this pair of expression is interesting. Even though *henda* cannot modify *chitang* directly, it can modify [*yi-ge chitang*] just as it can modify a deverbal noun. This parallel between an indefinite nominal expression and a deverbal noun is not surprising because the former such as [*yi-ge chitang*] is of type <e,t>. *Yi-ge* is akin to *a* in English in terms of introducing a variable (Kamp 1981, Heim 1982). If the modifiee is not headed by *yi-ge* but by other numbers or the demonstratives, there will be a type clash, for only *yi* can be a variable-introducing indefinite marker, like *a*, which the other numbers cannot. A demonstrative would make the modifiee type e. This is attested by the following examples, which have been widely discussed in the literature (i.e., Lu (2006)):

(44) a. ??[<e,t> hen da] ['san-ge chitang')] (type mismatch between type <e,t> and type e)
   b. *[[<e,t> hen da] ['zhe-ge chitang']] (type mismatch between type <e,t> and type e)

The Number Phrase (NumP) is just not the right type for a type <e,t> modifier.  

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20 Note that the NumP [*yi+ Classifier + Noun*] in the context of [*henda ___*] behaves differently from the NumP in other contexts. As widely observed in many published and unpublished works (such as Cheng and Sybesma 1999), *yi* is very often omitted in Mandarin Chinese when the relevant nominal expression is indefinite or unstressed (see Li 1996). However, in all of our examples involving [*<e,t> ∧ <e,t>*] modification where the modifie is [*Yi-Classifier N*], *yi* can never be omitted. We leave this issue for further research.

21 For convenience, we will simply identify NumP as type e. In Li 1998, two types of NumP are distinguished: one is projected as NumP, denoting quantity. It does not express the notion of plurality or singularity. Rather it is about quantity: *three kids can eat 5 cakes*. The other NumP is an indefinite expression dominated by DP with an empty D. So, categorically, we either have a NumP (quantity denoting) or a DP (indefinite individual denoting). Both DP and NumP in argument positions can be treated as type e. This is justifiable, at least, by the distribution of such phrases. For one thing, NumP with a number higher than one has a distribution very much like that of a proper name or pronoun.

We do note that NumP has syntactic characteristics that are not shared by proper names or pronouns. For instance, Li (1998) has advocated that number is a functional head; Abney (1987) has stated that functional heads are second order entities. These attributes perhaps contribute to the fact that in Chinese a NumP generally does not take a regular modifier. It is a different story in English, though. As Jackendoff (1977:129) observes, *a beautiful two weeks* is an example where *a beautiful* modifies *two*, so the bracketing would be as follows: [*a[beautiful[two]]* weeks]. Crucially, *a* agrees with *two*, which Jackendoff treats as a singular noun, and *weeks* appears in plural form in keeping with the meaning of *two*. We may test the legitimacy of this idea via a constituency test (we thank Muffy Siegel for pointing out the constituency issue and also thank her and Tom Ernst for judgment):

(i) I met five very outgoing and three very reserved visitors.
(ii) ?We spent a beautiful three and (a) lousy two weeks at the beach.

However, Jackendoff did not advocate a NumP in his work, so the comparison between Chinese and English is not that straightforward.

22 A more compositional analysis would tease apart the role played by the classifier *ge*. Classifiers have been treated as type lifters (Chierchia (1998), Krifka (1995), Huang (1997, 2005)). Huang (2006:355) has shown that this is supported by restriction facts. When we use the universal quantifier *mei*, a classifier must be used so as to type shift the following type e noun into type <e,t> so that restriction on quantification obtains: *mei *(ge) xuesheng* 'every CL student.' However, we will not pursue this line of thinking here as the relationship between classifiers such as *ge* and the deverbal nouns such as *gugu* and *guli* is still unclear.
This account of (43)-(44) also offers a solution to a puzzling set of data that has been resistant to previous accounts in the literature (Lu (2006:21) has discussed some of these expressions):

(45) a. bai yifu
    white clothing
    ‘white shirt’
b. *xuebai yifu
    snow-white clothing
    ‘snow-white shirt’

(46) a. *bai yi-jian yifu
    white one-CL clothing
b. xuebai yi-jian yifu
    snow-white one-CL clothing
    ‘a snow-white shirt’

We can mark the semantic type of the relevant parts (modifiers and modificees) in these examples as follows:

(47) a. [[bai] [εyifu]]
    (type match between e and e)
    white clothing
    ‘white shirt’
b. *[εt,εxuebai] [εyifu]]
    (type mismatch between <e,t> and e)
    snow-white clothing
    ‘snow-white shirt’

---

to us since they can be combined to form yige guwu even though guwu is already type <e,t>. See Section 4.5.4 for more discussions.

23 This modifier-modifiee structure in (44a) has a one-two syllable structure. To ward off prosodic effects, we can run one-one, two-two, and two-one syllable structures as follows:

(i) a. jiu shu ‘old book’
b. *hen jiu shu ‘very old book’
c. *jiu yiben shu ‘old one-CL book’
d. hen jiu yiben shu ‘very old one book’

(ii) a. congming xuesheng ‘smart student’
b. *hen congming xuesheng ‘very smart student’
c. *congming yige xuesheng ‘smart one-CL student’
d. hen congming yige xuesheng ‘very smart one-CL student’

(iii) a. gaodang che ‘high class car’
b. *hen gaodang che ‘very high class car’
c. *gaodang yiliang che ‘high class one-CL car’
d. hen gaodang yiliang che ‘very high class one-CL car’

The consistency of the results shows that the combinatorial (im)possibilities are not due to prosody.
Recall that under Huang (2006), bare adjectives (SAs) and bare (regular) nouns are both of type e. Complex adjectives (CAs) are of type <e,t>. With these assumptions in place, we can see why (45a) and (46b) are good but (45b) and (46a) are not. (45a) has a bare adjective as modifier and a bare common noun as modifier. They match in semantic type; thus this modification structure is fine. In (45b) the modifier xuebai ‘snow-white’ is classified by Zhu as a complex adjective. As such it is of type <e,t>, which prevents it from modifying a bare noun but allows it to modify yijian yifu ‘a shirt’ in (46b) because the latter is of type <e,t>. In (46a) we see a bare adjective in the modifier position for a modifier that is of type <e,t>, violating the type match constraint.

4.5.2 CA with YI--Classifier-Bare Noun
The second modification structure that exhibits the same pattern is the following kind shown in a four way contrast. The most pertinent factor is that kong-dangdang ‘empty-empty’ is what Zhu has classified as a CA. Thus it is type <e,t>.

4.5.3 Zenmeyang with YI--Classifier-Bare Noun
Lu (2006) also presents the following pair, which constitutes the third case exemplifying the revised type matching constraint:

These fall under the type matching analysis as well. The expression zenmeyang is type <e,t>, as proven by the example below:
‘How are they?’

As such, it can go with a type <e,t> modificie directly, but not a modificie that is of type e. In (46a) de is obligatory, just as it is obligatory when a complex adjective modifies a common noun as we have seen in the introductory discussions in Section 1. Following Li (2008) we can treat de as a conjunction word that creates/coerces type matching. In (46b), the modificie yige ren ‘a person’ is of type <e,t>, so de is optional. All of this is shown below:

(52) a. [yige[[<e,t>zenmeyang] de [₃ren]]]? 
    a’. *[yige [[<e,t>zenmeyang [[₃ren]]]? 
    b. [[<e,t>zenmeyang][<e,t>yige ren]]]?

4.5.4 *Henda Yige Guwu

The three cases examined above bear out the intersective analysis of modification, following a strict type matching constraint revised to accommodate more complex modificies. There is one more case, however, that seems to present a challenge to our analysis. In 4.5.1, we have seen that *henda chitang ‘big pond’ is bad but henda yige chitang ‘a big pond’ is fine. Now if we substitute the common noun with a deverbal noun, we have the following minimal pair:

(53) a. [[<e,t>hen da] [<e,t>guwu]] (type match between <e,t> and <e,t>) 
    very big encouragement 
    b. *[[<e,t>hen da] [yi-ge [<e,t>guwu]]] 
    very big one-CL encouragement 

(53a) is acceptable but not (53b). We may be tempted to attribute the unacceptability of (53b) to having the wrong type to feed the classifier ge, if we assume that a classifier requires a type e entity to be its argument (See footnote 21). The problem with this account is that yige guwu is an acceptable combination as we can see in the following example:

(54) Zhe dui wo laishuo wuyi shi yige guwu.⁵⁵ 
    this to me say no-doubt be one-CL encouragement 
    ‘This is no doubt an encouragement to me.’

So apparently yige guwu is an acceptable combination. We leave this issue for more detailed investigation in a separate work.⁵⁶

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⁵⁵ Or it may render type matching constraint moot. In Section 5, we will discuss the function of de in more detail.
⁵⁶ We did a google search for “henda yige guwu” and did not get a single result; a search for “yige guwu” produced many such combinations, and so did a search for “yige henda guwu.” All of this will be discussed in future work.
⁵⁶ The semantic type approach will continue playing an important role. Note that we need to distinguish between result and process deverbal nouns, as indicated by the following contrast:

(i) a. Zhe dui wo laishuo wuyi shi ?(yige) guwu.
Briefly summarizing, we have made our account of the data in Section 4.5 based on two recognitions: (1) Descriptively speaking, in Chinese some modification structures are \([<e,t> <e,t>]\) while others are \([e,e]\) (which through lambda operation will become an intersection of two sets). (2) The type matching constraint should be stated not just in terms of the relationship between the head noun and its modifiers but between the modifiee and its modifier, thus allowing more flexibility for what would constitute the modifiee, including a bare noun and an expression of the form \([\text{YI-CL N}]\). All of the data examined in Section 4 bear out the central claim: All conjuncts in modification must meet the (revised) type matching constraint. When the conjuncts do not match in semantic type, the modification relationship does not obtain.

The patterns of modification structure within a nominal phrase and the contexts where \(de\) can be missing are complex and have eluded an adequate and unified analysis. Following Huang (2006), this work is an attempt to show how a type-matching analysis offers a new perspective and how the various patterns can be accommodated in this approach. It tried to show that the sortal matching problems can be solved if we identify deverbal nouns as a different type from common nouns. That is, the type-matching analysis proposed in Huang (2006) can still be pursued as long as some details of the analysis are revised.

5. Some Remaining Issues
In this article, we first set out to address sortal matching proposed in Huang (2006), which leads to incorrect predictions about modification. That discussion led us to re-examine the modification structure such as henda guwu and to adopt a type \(<e,t>\) account of guwu proposed in Huang (2001, inspired by Fan 1979) along with a type \(<e,t>\) interpretation of CAs. We then examined a fuller set of data involving henda and showed that between a type \(<e,t>\) account of henda and the type matching constraint, we could account for why, on the one hand, \(*\text{henda chitang} is bad, but on the other hand, henda yige chitang ‘a big pond’ and henda guwu ‘big/great encouragement’ are fine. With this expansion, we now have two kinds of nominal modification structures in Chinese: one where both the modifier and modifiee are of type e, and the other where both the modifier

\[\begin{align*}
\text{b. Zhe dui wo laishuo wuyi shi ??(hen da de) guwu.} \\
\text{this to me say no-doubt be very big DE one-CL encouragement} \\
\text{‘This is no doubt (big) encouragement to me.’}
\end{align*}\]

(ii) Women kaishi women dui ta de (*yige) guwu. \\
\text{we begin to him DE be one-CL encouragement} \\
\text{‘We began our encouragement to him.’}

Those in (i) favor a result reading and the one in (ii) forces a process reading. The contrasts suggest, descriptively, that in the typical process reading, yige should not appear. In the result reading context, yige and the adjectival modifier with \(de\) are strongly favored. To phrase this in terms of semantic types, deverbal nouns with a result reading are of type e, and those with a process reading are of type \(<e,t>\). This would allow us to explain why yige can be used with a result deverbal noun but not with a process deverbal noun: yige, being a type lifter, takes a type e entity as its argument. The result deverbal noun meets this condition but the process deverbal noun does not.
and modifiee are of type \(<e,t>\). Admittedly the latter kind of modification is more complex than the one just involving type e expressions. Nevertheless, the pattern that has emerged is one where the modifier and modifiee conform to the type matching constraint proposed in Huang (2006, 2008), which claims that a modification structure is not well formed if the modifier and modifiee are of different semantic types. The current work provides further support to the type matching constraint in dealing with de-less modification structures. It is important to stress that this analysis does not make the claim that all semantically matched elements can form a modification relationship.\[\text{27}\]

We have tried to push the type matching theory as far as we can within the limited space to demonstrate how it can work in what aspects. We made some strides in accounting for old and new data. However, there still remain important questions, as usual. We would like to address some remaining issues and suggest directions to solutions in a type-matching approach to the distribution of adjectives.

The first issue concerns the correlation noted in (1), repeated below:

(1) a. SAs can occur alone in adnominal, modifier position  
   b. CAs cannot; in modifier position, they need de  
   c. SAs cannot occur alone in the root clause predicate position; they need some sort of predication marker (such as \(\text{hen}\), among other things)  
   d. CAs can occur alone in predicate position.

A strong interpretation of (1) is that a correlation exists between (1a) and (1c): the elements that can occur alone in adnominal modifier positions do not function as predicates; these are simple adjectives (SAs). Moreover, a correlation exists between (1b) and (1d), namely those that cannot modify a noun directly can function as predicates; these are complex adjectives (CAs).

However, these correlations cannot be maintained strictly. Consider the distribution of SAs. We showed that there are cases of SAs functioning as predicates, in addition to the expected ability to modify nouns directly. Indeed, a number of recent works noted that bare adjectives can function as predicates in a variety of patterns (Gu 2008, Huang and Li 2008, Liu 2008). For instance, the following small clause structures allow an SA as a predicate, as illustrated by the use of the conjunction words:

(55) Tamen xian ta lan.  
     they complain he lazy  
     ‘They dislike him for being lazy’

(56) Tamen xian ta chun erqi/#he lan/ you chun you lan  
     they complain he dumb and/ and lazy/ both dumb and lazy

---

27 Nor is such a claim more desirable. Stated as a necessary but not sufficient condition, the type matching constraint is reminiscent of Lasnik’s (1976) insight captured in the Binding Principle B, which does not tell what (co-)reference a pronominal item has; rather it tells what co-reference it cannot have.
‘They dislike him for being dumb and lazy.’

The patterns below illustrate the use of a SA as a predicate in a conditional clause and in a clause which is the subject of a sentence:

(57) [Ta congming] hen zhongyao.  
    he smart very important  
    ‘It is important that he is smart.’

(58) [Ruguo ta congming] ni jiu mei fa zhan ta pianyi.  
    if he smart you then no way take him advantage  
    ‘If he is smart, you have no way to take advantage of him.’

At the same time, these simple adjectives can modify a noun directly:

(59) chou xiao-ya, chou nuren lan haizi lan xuesheng  
    ugly duckling ugly women lazy kid lazy student

So with SAs there is evidence that they may appear in either argument positions or predicate positions, albeit in certain contexts. This suggests the possibilities of rethinking about their default semantic type as either e or <e,t> or undefined (Borer 2005).

The other side of the issue concerns the distribution of CAs. CAs generally function as predicates and do not modify nouns directly. However, we did find CAs modifying deverbal nouns directly, which was the main reason prompting a re-examination of the types available to nouns. We proposed to accommodate these cases by allowing certain kinds of nouns to be type <e, t> --- those bearing some relation to verbs. Nonetheless, not all modifiers appearing with such <e, t> nouns can be predicates. For instance, guli ‘encouragement’ and other similar deverbal nouns not only can be modified by henda but also by others such as dali, jili etc.,

(60) a. Ta dui women de dali/jili zhichi  
    he to us DE big-strength/exhaust-strength support  
    ‘his big/full support for us’

    cf, a’. *Ta dui women de zhichi dali/jili.  
    he to us DE support big-strength/exhaust-strength  
    Intended meaning: ‘His support for us is great.’

    b. Ta dui women de xixin zhaogu  
    he to us DE careful care  
    ‘his tender care of us’

    cf, b’. *Ta dui women de zhaogu *(hen) xixin.  
    he to us DE care very careful
Obviously, a strict correlation given by a strong interpretation of (1) cannot be maintained. Thus, the type-matching approach to modification structures should be considered as a necessary but not sufficient condition: modification structures must match in their semantic types but the semantic type alone does not determine the distribution of the relevant phrases. In fact, the adequacy of such a weaker view is also dependent on the answer to the question of what the default semantic type should be for SAs and the considerations in the following paragraphs.

Even without considering the correlations between (1a) and (1c) on the one hand, and between (1b) and (1d) on the other hand, the four patterns listed in (1) need to be reconsidered on their own, as the type-matching approach has forced us to examine the properties of these patterns more carefully and raise important questions. For instance, some of the questions are (1) when SAs occur alone as predicates, are they really alone? (2) When some modifiers modify <e,t> nouns but cannot serve as predicates, is there a generalization to this subset of modifiers?

The first question is addressed in Liu (2008), who, following Kennedy (2005, 2007), proposes that a covert morpheme, counterpart to hen, is present with such SAs, an interesting proposal that deserves more evaluation.

The second question might be partially addressed by considering the possibility that some modifiers modifying <e,t> nouns are derived from adverbs and cannot serve as predicates. Indeed, the examples in (56) all have a counterpart with the modifier of the deverbal noun functioning as adverbial modifying the related verb:

(61) a. Ta dui women dali/jili zhichi.
    he to   us        big-strength/exhaust-strength support
    ‘He greatly/fully supported us.’

    b. Ta dui women xixin zhaogu.
    he to us    tender care
    ‘He cared for us tenderly.’

In other words, the so-called CAs modifying <e, t> nouns might come from different sources and the possibilities of a predicative use are affected accordingly.

The research results indicate that we may have several options in defining with the semantic type of the various categories we have examined:

(62) Options in Default Semantic Types of Various Categories

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>CA</th>
<th>Common Noun</th>
<th>Deverbal Noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1. default type</td>
<td>e</td>
<td>&lt;e,t&gt;</td>
<td>e</td>
<td>&lt;e,t&gt;</td>
</tr>
<tr>
<td>Option 2. default type</td>
<td>&lt;e,t&gt;</td>
<td>&lt;e,t&gt;</td>
<td>&lt;e,t&gt;</td>
<td>&lt;e,t&gt;</td>
</tr>
</tbody>
</table>
A full examination of the pros and cons of the two options is beyond the scope of this paper, but the options need to be explored further, which may have many ramifications.

Another issue that deserves further investigation is the optionality of *de* in the modification structure, (but, obviously, a full discussion is beyond the scope of this paper).

It is notoriously difficult to capture the use of *de* in Chinese (see Huang (2006), Larson (2008), Li (2008a), Lu (2006) and the large number of references cited therein). Many scholars have tried to come to grips with the optionality of *de*. The focus of Huang (2006) was to explain the complementary distribution of simple adjectives (SA) and complex adjectives (CA) in both the sentence predicate position and in the modifier position. In that perspective, *de* is viewed as a rescuing device, namely a type shifter, that could salvage an otherwise mismatched modifier and modifiee. Within the scope of that investigation, that seems to be reasonable. However, it is also true that *de* can almost always appear between a modifier and modifiee even with type-matched cases, illustrated below:

(63) zuotian de na-fen baozhi
    yesterday DE that-CL newspaper
    ‘the newspaper yesterday’

Under the type matching analysis, it is no problem if *de* is not used in this structure: the modifier *zuotian* and the modifiee *nafen baozhi* are both type e. But the question is why *de* is used at all if there is no need for type shifting the modifier to type e. One possible explanation could be found in Li (2008a) where it is suggested that perhaps *de* is a conjunction word. This is highly plausible given the semantic analysis of modification as conjunction. The question is when *de* appears and when it does not. We would like to suggest that *de* is always possible in modification structures, as long as the modifier and the N match in their syntactic categorical features. In contrast, the absence of *de* makes it necessary that the modifier and the modifiee be matched in semantic type.

As noted in Aoun and Li (2003), Zhang (to appear), conjunction words in Chinese require their conjuncts to be of specific categories. *De* in this language requires its conjuncts to be of [+N] category, which captures the fact that a true PP cannot appear in the context of [___ de N(P)] (see Li 1990, 2008b). In other words, *de* is a head specifying its conjuncts to be [+N] categories: [conjunct1 + *de* + conjunct2] where conjunct2 is the modifiee and conjunct1 is the modifier. The modifier is a clause (which is like a nominal phrase in distribution and can be labeled as [+N] category), an adjective (which is [+N, +V]), or a nominal phrase.28

28 It seems that the same can be said of the modifiee. What follows *de*, the modifiee, not only can be a nominal expression but also take a clause (including verb phrase), an adjectival phrase, but not a PP: *zheben shu de bu chuban rang ren danyou* ‘the book’s not being published is worrisome’, *zheben shu de zhengui meiren neng liaojie* ‘this book’s preciousness, nobody can understand,’ *zheben shu de cong guowai* ‘this book’s from abroad’. The categorical status of the modifiees has been controversial in regard to whether the relevant phrases should be analyzed as nominalized expressions. We discuss this issue in a separate work.
Semantically, \([\text{modifier} + \text{de} + \text{modifiee}]\) and \([\text{modifier} + \text{modifiee}]\) expressions differ in their semantic type matching requirement. For the latter, the semantic types of the modifier and modifiee must match. For the former, such a type matching requirement between the modifier and modifiee need not exist. This contrast can be viewed as a reflection of their syntactic structures: for \([\text{modifier} + \text{modifiee}]\), the modifier and the modifiee need to be combined directly for their interpretation (defined as intersection in our analysis). For \([\text{modifier} + \text{de} + \text{modifiee}]\), \text{de} breaks the sister relation between the modifier and the modifiee. The modifier and the modifiee are the two arguments required by \text{de} \ (meeting the subcategorization requirements of the head \text{de}) \ but the two arguments are not combined directly with each other for interpretation. If semantic type matching requirements apply only to sister constituents, the contrast follows. The structure containing \text{de} allows the modifier and the modifiee not to be of identical semantic types. The modification structure not containing \text{de} does not have this possibility.

It is possible that \text{de} performs important semantic functions: it might require the modifier and modifiee to be of the same semantic type and, at the same time, it has the function of type-shifting the conjuncts to become the same types. However, this would be a theory-internal issue, as, empirically speaking, it does not make any difference if a type-matching requirement exists and \text{de} type-shifts the modifier and modifiee to make them match in semantic types or if no such type-matching requirement exists in the structures containing \text{de}.

Further note that there might be other factors affecting the use of \text{de}, such as a simple process of phonological deletion. The optionality of \text{de} is most prominent in the modification structure of \([\text{XP} + \text{demonstrative}…]\). That is, a modifier before a modifiee that begins with a demonstrative \text{zhe} ‘this’, \text{na} ‘that’ can generally do without \text{de}, regardless of the kind of modifiers in this position:

\(64\) a. Zuotian \ (de) \ na-fen\ baozhi \ yijing\ diu\ le.
\quad \text{yesterday DE that-CL newspaper already lost LE}
\quad ‘Yesterday’s newspaper has already been lost.’

\qquad b. Ni \ zui \ xihuan \ (de) \ na-fen\ baozhi \ yijing\ diu\ le.
\quad \text{you most like DE that-CL newspaper already lost LE}
\quad ‘The newspaper that you like the most has already been lost.’

\qquad c. Hen \ gui \ (de) \ na-fen\ baozhi \ yijing\ diu\ le.\textsuperscript{29}
\quad \text{very expensive DE that-CL newspaper already lost LE}
\quad ‘The expensive newspaper has already been lost.’

There are many other interesting patterns that might involve the deletion of \text{de}. For instance, even though \text{weiyi} modifying \text{fangzi} ‘the only house’ is not acceptable without

\textsuperscript{29} Deletion of \text{de} in some cases of \text{Adj} +\text{zhe/na} is much more restricted than when the modifier is a DP or a clause. This would require further studies.
*de*, another modifier with or without *de* appearing between *weiyi* and *fangzi* saves the structure:

(65)  
\[
\text{weiyi *(de) xuesheng} \\
\text{only DE student}
\]

(66)  
\[
\text{weiyi [[tamen mei kanguo] de xuesheng]} \\
\text{only they not see DE student} \\
\text{‘the only student that they have not seen’}
\]

(67)  
\[
\text{weiyi [congming (de) xuesheng]} \\
\text{only intelligent DE student} \\
\text{‘the only intelligent student’}
\]

It is possible that *de* appears after *weiyi* but is deleted under certain circumstances, which we are not clear about (see Lu 2006).

There are many interesting issues that need to be further investigated and there are other issues we have not even touched upon (e.g., the role played by prosody (Feng 2003), the issue on the subdivision of nouns, etc.). Most of the questions would not have been raised without a serious effort on exploring the extent of the coverage of a type-matching approach to modification structures (especially those without *de*), which, we hope, would be the contribution of this line of work.

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