

**FUNCTIONAL UNCERTAINTY IN THE MANDARIN  
NOMINAL:**

A UNIFIED ANALYSIS OF RELATIVE CLAUSES AND  
LOCATIVE STRUCTURES

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## Abstract

Bresnan's Endocentric Mapping Principles (Bresnan, 2001) are used as diagnostics to demonstrate that the Mandarin relative clause structure is an endocentric one, in which the particle *de* is the sole functional *and* c-structural head, and the modified noun is one of two specifiers. The relative clause occupies a phrase-initial specifier position associated with a Modifier DF, and the final NP occupies a phrase-final specifier position associated with the DF, Focus. Support for this analysis comes from a comparison of relative clauses and main clauses with post-posed topics, and from theory-internal arguments relating to the linking of DFs and GFs in functional uncertainty equations (based on Dalrymple, 2001). The same analysis accounts for associative structures, where a nominal phrase modifies a noun, including locative structures where a nominal predicate selects a nominal argument.

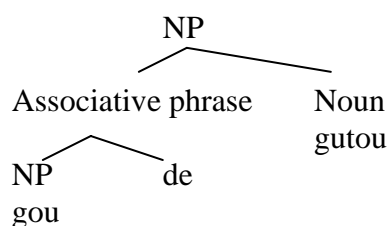
## 1 Introduction

When Mandarin nouns are modified, the modifier and modified noun are generally separated by a particle *de*. The Mandarin relative clause (RC) structure shown in (1a) and associative structures like (1b), where the modifier is nominal, are both examples of this.

- (1) a. nà wèi [niàn shū] de rén  
thatCL [read book] DE person  
That person (who) reads books
- b. wǒ de shū  
1sg DE book  
My book

Two quite different analyses have been proposed for these structures, reflecting fundamentally different views of nominal structure. Li and Thompson (1981), who coined the label 'associative phrase', describe it as "the first noun phrase together with the particle *de*" (Li and Thompson, 1981:113), and depict the whole structure as shown in (2). The associative phrase is the sister of the second noun which heads a matrix NP containing both.

- (2) Associative Phrase (after Li & Thompson, 1981:126)

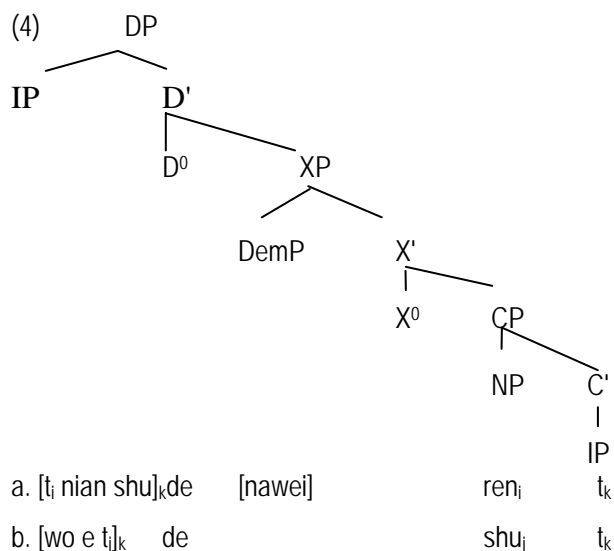


They describe the relative clause similarly, as a constituent formed by "placing the particle *de* after a verb, a verb phrase, a sentence, or a portion of a sentence including the verb" (Li and Thompson, 1981:575), which is then placed in an NP headed by the noun it modifies. This then is an NP analysis that unifies associative and RC structures.

On the other hand, Simpson (2001) proposes a DP analysis for both structures. Drawing on distributional and functional similarities between the Mandarin particle *de*, Japanese *no*, and Burmese *thii*, and on an analysis of RCs proposed by Kayne (1994), Simpson argues that *de* is, in fact, a determiner, and the Mandarin RC and associative structures are derived by movement from (unattested) structures like those at (3).

- (3) a. \*de [XP[nà wèi] [CP [IP rén niàn shū]]]  
 DE [[DemP that CL] [CP [IP person read book]]]
- b. \*de [XP [IP wǒ e shū]]  
 DE 1sg have book

The determiner *de* selects as its complement, a functional phrase, XP, that in turn selects a clausal complement, CP and, optionally, a DemP specifier. An NP is extracted from within the clause to the specifier of CP, then the IP from which it came – now with a gap - moves past CP and DemP to land in the specifier of DP, producing the structure shown in (4).



Simpson suggests that the IP must move, rather than the closer DemP or NP, because *de* is a clitic that can only attract and attach to an IP. Because of this, he suggests the possessor in (1b) is in an embedded IP with a covert predicate. This predicate is said to be a possessive predicate that occurs in RCs but not main clauses because null copulas occur in the latter, blocking the use of any other null predicate. Copulas do not appear in RCs, so, Simpson suggests, the null possessive predicate can surface there.

This paper presents evidence against both these analyses, and proposes instead an analysis within the framework of LFG, where both RC and associative structures are accommodated in a relatively simple phrase structure in which CP is not involved, the nominal is not necessarily a DP, and the modifier and *de* do not form a constituent. This new analysis makes use of functional uncertainty equations that link discourse functions to argument functions along lines proposed by Sells (1985) and Dalrymple (2001). It accounts for variations in co-reference patterns and interpretations of associative structures, and also explains variation in the optionality of *de*.

The paper is organised as follows. Section 2 illustrates some basic facts about modification in Mandarin nominal structures, then outlines problems with accounts that treat Mandarin RCs as CPs or as any other kind of phrasal modifier *inside* NP. Section 3 introduces Dalrymple's (2001) account of English RCs, and argues that the mapping processes proposed by Dalrymple can be readily applied to Mandarin nominal structure, but the analysis as a whole cannot be transferred to Mandarin because Mandarin nominal c-structure differs significantly from that assumed for English. Specifically, English nominals support adjunction, and Mandarin nominals do not. Section 4 reviews proposals by Grimshaw (1998) and Bresnan (2001) about the nature of endocentric phrases, and the implications of those proposals for Mandarin nominal structure. Section 5 determines the nature of the functional uncertainty equations and the path necessary to account for co-reference in the

Mandarin RC structures. Section 6 explains how the same analysis accounts in a straightforward way for most associative structures, and then presents evidence to show that locative structures, where the final noun is a predicate involve a slightly different *c*-structure. Nonetheless, the possibility for such structures 'falls out' of the analysis proposed for RC structures.

## 2 Modified Nouns in Mandarin

Mandarin nominal structures, unlike those of most Indo-European languages, have no obvious counterpart for the articles that are said to head DP. On the other hand, they do have classifiers (Class), which vary with the choice of noun. Demonstratives (Dem) and numbers (Num) can combine with count nouns only if a classifier is present, but otherwise all nominal elements, including N, are optional.

The relative order of most nominal elements is fixed, and the noun is always last, but the position of RCs is somewhat variable. Though they must be followed immediately by the particle *de*, that particle can appear either immediately to the left of the modified noun, or immediately to the left of a demonstrative preceding the modified noun. This is often taken as evidence that *de* and the modifier that precedes it form a constituent (Li and Thompson, 1981; Gao, 1994; but see also, Pan, 1990, 1999; Tang, 1990a, 1990b).

A comparison of Mandarin independent and relative clauses is shown in (5) – (7); the alternative word orders are shown just once, in (5b) and (c), but are available in each case.

- (5) a. nà wèi rén bù huì niàn shū  
that CL person NEG can read book  
That person can't read books.
- b. nà wèi [e bù huì niàn shū] \*(de) rén jiào Lǐsì  
that CL [e NEG can read book DE person call Lisi  
That person [that] can't read books is called Lisi.
- c. [e bù huì niàn shū] \*(de) nà wèi rén jiào Lǐsì  
[e NEG can read book DE that CL person call Lisi  
That person [that] can't read books is called Lisi.
- (6) a. nà běn shū wǒmen bù huì niàn e  
that CL book 1pl NEG can read  
That book, we would not read.
- b. nà běn [wǒmen bù huì niàn e] \*(de) shū  
that CL 1pl NEG can read DE book  
That book [that] we would not read.
- (7) a. wǒmen gěi tā niàn shū  
1pl to 3sg read book  
We read books to him/her.
- b. nà wèi [wǒmen gěi tā niàn shū] \*(de) rén  
that CL 1pl to 3sg read book DE person  
That person to [whom] we read books

(5a) shows a clause with a transitive verb whose Subject contains a demonstrative and a classifier; this illustrates the basic SVO word order within the sentence, and the basic Dem (Num) Class N order within the nominal. (5b) shows a clause like (5a) used as a relative clause; the gap in the RC is indicated by 'e'. (5c) shows the RC in initial position.

(6a) shows the verb from (5) in a clause with a topical Object; i.e. one whose referent is already active in discourse; the 'OSV' order seen here is the norm in such cases. (6b) shows the corresponding relative clause. The Object of the RC is *not* a

Topic: its referent is *not* already active in discourse. In fact, the very function of an RC is to anchor or locate an otherwise unlocatable referent (Fox and Thompson, 1990). NPs denoting such referents are Foci, not Topics (Lambrecht, 1987).

Note that the classifier preceding the RC agrees in each case with the final noun; in (5b) it is the classifier for people *wèi*; in (6b) it is the classifier for books, *běn*. This shows that the final noun specifies the gender value for the nominal as a whole, or at least that part containing itself, the classifier, the RC, and *de*.

In (7a), the same verb is shown again, in a clause with an oblique argument introduced by the co-verb<sup>1</sup> *gěi*; this co-verb and its Object both precede the main verb. In the corresponding RC in (7b), there is no gap; a 3<sup>rd</sup> person pronoun still follows the co-verb and functions as its Object. Despite the fact that Mandarin is a pro-drop language, the pronoun is obligatory in this context; gaps occur only in core GF positions (Subject, Object, Obj2).

In associative structures word order is also variable, but each noun can be associated with its own demonstrative and classifier which complicates the issue somewhat. Moreover, associative structures fall into several semantic sub-types with slightly different characteristics as far as word orders are concerned. As well as structures where the modifier is interpreted as a possessor, like (8) below, there are also associative structures where modifiers denote attributes as at (9). In possessive structures like (8), the modifier and *de* generally precede the demonstrative, as in (8a); reversing the order, as in (8b) sounds odd.

- (8) a. zhè ge rén de nà běn shū  
       this Class person DE that class book  
       That book (belonging to) this person.
- b. ?nà běn zhè ge rén de shū  
       that class this Class person DE book  
       ?That book of this person's

However, this may simply reflect the preference for human referents to be accorded greater salience than inanimates (Dubois, 1987). This makes it preferable for a possessor to precede any nominal element associated with the inanimate possessed item. In attributive structures like (9), the modifier usually follows the demonstrative; but the alternative order is also possible, with a shift in emphasis. In (9a), the classifier agrees with the final noun, not the closer noun, *mùtóu*, showing that the associative phrase occupies a position between the final noun and the classifier associated with it; in (9b) it precedes that classifier and the demonstrative it licenses.

- (9) a. nàzhāng yíng mùtóu de zhuōzi  
       that class hard wood DE table  
       That table made of hard wood
- b. yíng mùtóu de nàzhāng zhuōzi  
       hard wood DE that class table  
       The table that is made of hard wood

There are also associative structures in which the phrase preceding *de* functions as an argument of the final noun, as in (10) and (11) below. The argument and *de* can precede the demonstrative associated with the predicate noun, as shown in (10a) and (11a), but, if agreement features allow, the final noun can also be associated with a demonstrative and classifier that precedes that argument as shown in (10b). The

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<sup>1</sup> Coverbs are defined by Li and Thompson as lexemes that function either as main verbs, or as prepositions introducing oblique arguments, as here.

classifier there can accompany virtually any noun, and as a consequence (10b) is ambiguous.

- (10) a liǎng zhǒng kēxué de zhè zhǒng fāzhǎn  
 two kind science DE this kind development  
 This kind of development in (these) two kinds of science
- b zhè liǎng zhǒng kēxué de fāzhǎn  
 this two kind science DE development  
 These two kinds of scientific development .  
 Development in these two kinds of science.

- (11) nà liàng chē de zhè liǎng biān  
 that classifier car DE this two side  
 On these two sides of that car

## 2.1 The NP analysis

The variable order of the Dem-Class combination and so-called associative phrase is the most convincing evidence in favour of the NP analysis proposed by Li and Thompson (1981). The most immediate evidence *against* that analysis is that suggesting that a) Mandarin Nouns generally do not tolerate adjacent phrases, and b) *de* and the phrase that precedes it do not form a constituent.

First, as indicated by the starred brackets in (5) – (7) above, omission of the particle *de* from an RC structure gives rise to ungrammaticality. This shows that Mandarin nouns do not tolerate adjacent *clauses* or at least adjacent IPs. Second, the associative structures at (12) and (13) below show that they do not tolerate adjacent nominal phrases either. In (12), the particle *de* *must* intervene between the modifying nominal phrase and modified N.

- (12) a. wǒrènshi [tāmen liǎngr] \*(de) bàbà  
 1sg recognise 3pl two DE father  
 I recognise the father(s) of / drawn by/ described by/ portrayed by those two
- b. wǒ zhǎo [nàzhī gǒu] \*(de) gǔtǒu  
 1sg find that class dog DE bone  
 I am looking for the bone of/ for/from that dog

In (13) omission of *de* does not lead to ungrammaticality, but it does impose a particular interpretation which excludes a string preceding N from being construed as a single constituent.

- (13) a. wǒ māmā de bàbà  
 1sg mother DE father  
 My mother's father.

- a'. wǒ māmā bàbà  
 1sg mother father  
 My [mother and father].  
 NOT \*[My mother's] father.

- b. zìjǐ zhòngde mùtóu de zhuōzi  
 self grow DE wood DE table  
 The table made of wood we grew ourselves

- b'. ?zìjǐ zhòngde mùtóu zhuōzi  
 self grow DE wood table  
 The wooden table we grew ourselves

NOT The table made of wood we grew ourselves

c. tā xuéxíliǎngzhǒng kēxué de fāzhǎn  
3sg study two kinds science DE development  
She studies the development of two kinds of science

c'. tā xuéxíliǎngzhǒng kēxué fāzhǎn  
3sg study two kinds science development  
She studies two kinds of [development in science]

NOT She studies the development of [two kinds of science]

In (13) a, b, and c, where *de* occurs, the string preceding it is interpreted as a phrase; in (13)a', b', and c', where *de* is omitted, that interpretation is no longer available. In (13a), the pronoun and the first of two relational nouns must be interpreted as a complex possessor; in (13a'), where *de* is omitted, the two relational nouns must be understood as a conjunct: [*mother and father*]. In (13b) the complex structure *zìjǐ zhǒng de mùtóu wood we grew ourselves'* modifies a common noun, 'table'. In (13b') the last two nouns must be construed as a compound *wooden table*, modified by the RC '*that we grew ourselves*', giving rise to an absurd interpretation in which the table has been grown, rather than the wood. In (13c), a quantity expression followed by a noun can be construed as a single complex argument of the following predicate *fāzhǎn*; but again in (13c'), the two nouns must be understood as a compound; when *de* is omitted the quantifier and the first noun cannot be construed as a single phrase.

Of course, Simpson suggests that the apparently nominal modifiers in these associative structures are really clauses, or IPs. If this is correct, these restrictions would simply be more evidence that Mandarin nouns don't tolerate adjacent IPs. However clear evidence is available to show that they are not IPs as Simpson suggests. IPs containing the overt verb of possession *yǒu* can include the negative aspect morph *méi* (14a). As expected, this morph can also appear in RCs constructed with that verb (14b). If possessors are simply NPs in a clause with a covert verb of possession, then the same negative morph should be able to negate possessors too, but it cannot, as shown in (14c).

- (14) a. wǒ méi yǒu shū  
1sg have book  
My book.
- b. wǒ méi yǒu de shū  
1sg have DE book  
The book(s) that I don't have.
- c. \*wǒ méi de shū  
1sg DE book

The modifiers in associative phrases are just what they seem: nominal phrases. The fact that *de* cannot be omitted from (12), and the strings preceding N in (13) cannot be construed as a single constituent shows that Mandarin nouns do not generally tolerate adjacent nominal phrases any better than adjacent IPs. In short, the Mandarin NP cannot generally accommodate modifying or argument phrases of any kind.

Independent evidence that *de* and the modifier that precedes it do not form a constituent comes from examples like those at (15). (15a) shows that a modifier, *de*, and a noun can appear *together* in sentence-initial position and control a gap within a nominal that follows the verb. As the three items occupy one sentence-initial topic

position, they must form a single constituent. (15b) shows that the noun on its own can do the same: the NP is a complete sub-constituent within the more complex structure, formed by a modifier, *de* and NP. (15c) shows that the combination of a modifier and *de* cannot do occupy the Topic position and control a gap: they do not form a complete constituent.

- (15) a. hěn dà de zhuōzi wǒ mǎi.le nà yī zhāng  
 very big DE table 1 sg buy.ASP Dem one CL  
 '(As for) big tables, I bought that one'
- b. zhuōzi wǒ mǎi.le nà yī zhāng hěn dà de  
 table 1 sg buy.ASP Dem one CL very big DE  
 '(As for) tables I bought that big one'
- c. \*hěn dà de wǒ mǎi.le nà yī zhāng zhuōzi  
 very big DE 1 sg buy.ASP Dem one CL table

On this basis, we must conclude that the modifying clause and *de* do *not* form a single constituent adjoined or otherwise adjacent to N. This and the Mandarin noun's clear aversion to either nominal or clausal neighbours seriously undermines Li and Thompson's claim that a nominal modifier and *de* form an 'associative phrase' adjacent to N, and dominated only by NP.

## 2.2 Movement through DP

However, Simpson's (2001) transformational account is also difficult to maintain. Firstly, as we have already seen, the possessor in associative structures cannot be plausibly understood as an IP, because it cannot be negated by the verbal negator *méi*. In fact, if associative structures were formed with a null possessive verb, then all associative structures would have to have possessive interpretations, and they do not. Attributive structures and argument predicate structures are not open to possessive interpretations at all. Moreover, even in a structure like (1b) above, repeated below as (16), the 'possessor' could be the creator, publisher or would-be purchaser of the book, or simply in habitual or even temporary proximity to it. It is because these structures are generally semantically so vague that Li and Thompson label them 'associative'.

- (16) wǒ de shū  
 1sg DE book  
 My book

To further complicate matters, locative structures like (17b), which clearly do *not* have a possessive interpretation, might be plausibly derived by extraction from structures like (17a) below, but they do *not* pattern like RC structures in terms of predicate and argument order.

- (17) a. nà liàng chē lǐmian  
 That Class car inside  
 Inside that car
- b. nà liàng chē de lǐmian  
 that classifier car DE inside  
 Inside of that car

According to Simpson's analysis, the structure at (17a) could follow *de* with *nà liàng chē lǐmian* being a CP (I assume the specifier of XP is empty). In (17b) the NP *lǐmian* has been extracted *past* *nà liàng chē* to land in Spec CP, and the residue of the IP containing *nà liàng chē* and a null predicate has been extracted to the Specifier



of DP. The problem with this proposal is that the noun *lǐmian* that follows *de* is a relational noun and the NP *chē* that precedes *de* is its semantic argument, not the argument of a covert verb of possession. The order of argument and predicate is the opposite of that in RC structures. This reversal is unexpected and unaccounted for.

An obvious alternative account of (17b) is that the extracted phrase is not an IP, but the nominal constituent, *nà liàng chē*, but this is excluded in Simpson's analysis by the explicit claim that *de* can only attract and attach to an IP. Moreover, an extraction analysis is not available for the argument-predicate structure at (18a) below, because the counterpart without *de* at (18b) has a different meaning from the structure with *de*, as discussed above.

- (18) a. tā xuéxí liǎngzhǒng kēxué de fāzhǎn  
 3sg study two kinds science DE development  
 She studies the development of two kinds of science
- b. tā xuéxí liǎngzhǒng kēxué fāzhǎn  
 3sg study two kinds science development  
 She studies two kinds of [development in science]
- NOT She studies the development of [two kinds of science]

(18a) cannot be derived by extraction of *liǎng zhǒng kēxué* from (18b) because that string in (18b) cannot be interpreted as a single constituent.

The obvious implication of these differences in co-reference is that associative structures fall into two categories, each sharing different characteristics with RCs. Most associative structures serve the same function as RCs, restrictive modification, but do not exhibit evidence of argument sharing. So the association between the nominal modifier and the final noun is open to various interpretations. On the other hand, associative structures where the final noun is a predicate exhibit fixed thematic interpretations and argument sharing like RC structures, but exhibit a different correspondence between linear order and *functional* relationships: NP1 functions as an argument, not as a restrictive modifier, but the order of predicate and argument is the reverse of that seen in RC structures.

It is clear that associative structures cannot be explained on the basis of extraction from a clausal or a complex nominal constituent along lines suggested by Simpson. Nor can they be explained as a *deP* constituent included in NP as suggested by Li and Thompson. The next section shows how Dalrymple's (2001) analysis of English relative clauses, in the LFG framework provides the basis of an analysis where both can be explained in terms of a single c-structure.

### 3 Functional Uncertainty

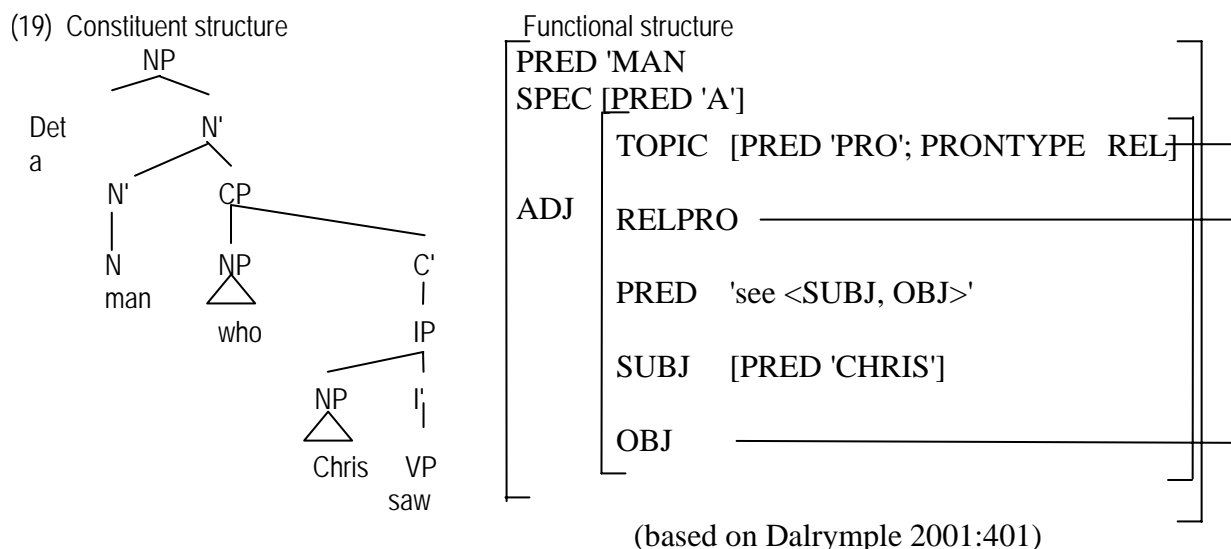
#### 3.1 English Relative Clauses

Dalrymple's analysis of English RCs, illustrated at (19) below, links constituents to grammatical and discourse functions by way of functional uncertainty equations implemented in functional structure. This separation of constituent and functional structures makes it possible in principle for different functional relationships to be played out across a single constituent structure.

Dalrymple takes the view that English RC structures involve a CP with an overt specifier, introduced into nominal structure. However, where Simpson's analysis has CP as a complement within DP, Dalrymple's has CP adjoined to NP, much like Li and Thompson's (1981) NP analysis of Mandarin RCs. Dalrymple suggests, following Sells (1985), that the specifier of this CP is associated with a DF linked to a GF of the RC by way of a functional identity equation. This link is shown as a line in the functional-structure at (19).

Sells (1985), suggests that the path linking a focus DF to a GF can “range over arbitrary sequences of function names (such as COMP COMP SUBJ, etc.)” so that it

“effectively .... builds in the Extended Coherence Condition” (Sells, 1985:182, footnote 22). The uniqueness condition ensures that the GF selected is one associated with no other PRED value. However, Dalrymple (2001) reviews evidence firstly, that the peripheral constituent in RC structures is a Topic, not a Focus, and secondly, that the path that links the Topic to a GF is not arbitrary, but subject to certain constraints. She argues that the Focus in an RC is the relative pronoun, which may be contained within a larger constituent, and it is this constituent that is linked to a GF in the RC.



Furthermore, restrictions on the choice of constituent in English RCs are much the same as restrictions on clause-initial topics. This is illustrated in (20) and (21) below (taken from Dalrymple 2001:404)

- (20) a. Chris, we think that David saw.  
 b. A man who we think that David saw
- (21) a. \*Chris, that David saw surprised me.  
 b. \*A man who that David saw surprised me

This parallel between RCs and Topic structures supports the idea that the English RC involves an embedded CP, with an initial topic.

Dalrymple proposes that the path linking the Topic to some GF is stored at the c-structural node where the Topic itself appears, as part of a functional equation. Simplified somewhat that equation takes the form:

$$(22) \quad (\uparrow \text{TOPIC}) = (\uparrow \text{COMP}^* \text{GF}).$$

The first side of the equation identifies a DF; the second represents the path. The component COMP\* indicates that the DF can be linked to a GF embedded at any depth within a series of complements. The final GF represents the target of the search. Heads which block the link between the Topic and a GF in their functional structure have a lexical feature indicating that they do not permit long-distance dependencies: [-LDD]. The full definition of the path excludes GFs of heads with this feature.

Clearly then, functional uncertainty equations offer a means by which arguments in Mandarin RC structures and associative structures can be linked to alternative GF and DF positions within a single nominal c-structure. However, since functional identity equations are implemented with respect to specific nodes in c-structure, it is vital to have a clear picture of the c-structural positions occupied by the constituents within the Mandarin structures.

### 3.2 Mandarin Relative Clauses

As shown above, Mandarin nouns do not tolerate adjacent clauses, and the RC does not form a constituent with the particle *de*. In addition, the Mandarin RC structure contains only one nominal element, the *final* modified noun, not a head *and* a relative pronoun, like the English structure. This is shown again in (23) below, where the RC is initial.

- (23) [e niàn shū] de nà wèi rén  
 [read book DE that CL person  
 That person [that] reads books

Therefore we cannot assume the English c-structural analysis of RCs for Mandarin.

Of course, Mandarin is a pro-drop language, so it could be argued that the Mandarin RC simply has a null topic under anaphoric control. However, there is good reason to think that this is not the case. First, a conventional null pronoun in Mandarin can *always* be replaced by an overt counterpart, either a personal or a reflexive form. Neither of these can appear in an initial position of a Mandarin RC, *or* in the position of a core argument:

- (24) a. nà wèi (\*ta/\*ziji) niàn shū de rén  
 that CL (\*3 sg / \*self) read book DE person
- b. nà běn [(\*ta) wǒmen bù huì niàn (\*ta)] de shū  
 that CL 3 sg 1pl NEG can read 3 sg DE book  
 That book [we would not read].

Second, Mandarin has no overt relative pronoun, so there is no basis on which to postulate a covert one. Note that *de* itself cannot be understood as a relative pronoun because it appears even in associative structures like (12) and (13) above, where no arguments are shared.

Simpson's proposal is that it is not the Topical NP that is missing in the Mandarin structure, but the head noun. In other words, Mandarin RCs are headless RCs, and the final NP is the controller of the gap, functionally comparable to the Topic in English RCs, not a co-referent head licensed by a GF of the main predicate. This finds some support from a comparison of Mandarin RC structures and main clauses with *post-posed* Topics. (25a) shows a Mandarin main clause with an interrogative particle *ma*. This is just one of several illocutionary force particles that appear clause-finally, and take scope over the entire sentence. This makes illocutionary force particles the best candidates in Mandarin for heads of CP. (25b) shows the same interrogative with a clause final topic, following the particle *ma*. It is constrained to co-reference with a missing Subject. (25c) shows a post-posed Topic co-referent with a missing Object, and (25d) shows that the object of an oblique must still appear, as a pronoun, when a clause-final Topic is co-referent with it.

- (25) a. nǐ niàn shū ma?  
 3sg read book Q-PRT  
 Reading are you?
- b. e niàn shū ma? nǐ  
 read book Q-PRT 3sg  
 Reading are you?
- c. nǐ niàn e ma? nà běn shū  
 2 sg read Q-PRT that CL book  
 You're reading [it] are you, that book?

- d. nǐ gěi \*(tā) niàn ma? nà wèi rén  
 2 sg to 3sg read Q-PRT that CL person  
 You're reading to him are you, that person?

These main clauses exhibit precisely the same word order as Mandarin nominals modified by a relative clause, and the same constraints on co-occurrence of co-referent nominals. Since the final NP in the main clauses is clearly not a nominal head of an external clause, there is no reason to assume such an analysis for the final NP relative clause structures. Instead the phrase whose head is *de* must function as an argument, just as the IP whose head is *ma* functions as a clause.

The examples above also show that Mandarin has functional phrases with two specifiers, one pre-posed, the other postposed: (25c) involves both a sentence initial Subject, and a sentence-final Topic, but only one overt functional head, the question-particle.

We might reasonably hypothesize therefore that *de*, another clause-final particle is after all just another head of CP. However, this cannot be the case. As we have already seen, a modifying clause does not form a constituent with *de* and Mandarin nouns do not tolerate an adjacent constituent. Conversely, illocutionary force-markers cannot select a preceding NP complement; the minimal Mandarin sentence consists of a *verbal* predicate, not a nominal one as shown in (26).

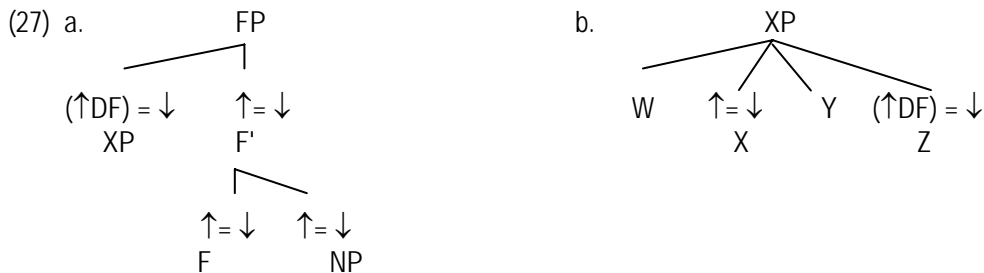
- (26) a. \*gǒu ma  
 dog PRT  
 \*[Is it a] dog?  
 b. gòu ma  
 enough PRT  
 [Is it] enough?

Finally, *de* can come between two nominals: it clearly needs *no* clausal complement. This means *de* cannot head the Mandarin CP. Nonetheless, it can still be understood as a functional head that selects a post-posed specifier. In fact, Bresnan's endocentric mapping principles also indicate that this is the best analysis for *de*.

#### 4. Endocentric Mapping Principles

According to Grimshaw (1998), phrases tend to be endocentric structures where a lexical head may select a complement that fills an argument function and the resulting phrase may then be selected as the complement or specifier, of a functional head. The phrase resulting from that merger may then be selected in turn as the complement or specifier of another functional head. Specifiers and complements are not sisters; they occupy distinct levels in c-structure.

On the basis of these generalisations, Bresnan (2001) proposes a set of mapping principles for endocentric phrases (EMPs), relating certain functional attributes with certain c-structural attributes. According to these principles the annotation  $\uparrow GF = \downarrow$ , is added to the c-structural sister of any lexical head, linking it to an argument function. The annotation  $\uparrow = \downarrow$  is added to the c-structural sister of a functional head making them f-structural co-heads which share all their features. The specifier of a functional head is annotated  $\uparrow DF = \downarrow$ , linking a constituent in that position to a discourse function (DF). This is shown schematically in (27a), below. However phrases may also be lexocentric, having multiple sisters, with the head and other functions specified by language-specific c-structure rules. This is shown schematically in (27b).

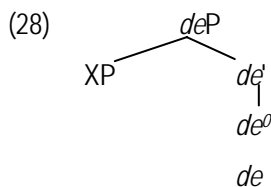


Bresnan suggests that "any c-structural pattern can be considered *unmarked* if it is an instantiation of these universal endocentric constraints" (Bresnan, 2001:101, emphasis added). Moreover, endocentric structures can be recognised as such because they are associated with fixed word order, differential access to permutations, and the inability of a specifier and functional head to form a constituent. This means, on the basis of evidence reviewed thus far, we can conclude that Mandarin nominals are endocentric: we have seen that the order of Dem, Num, Class and N is fixed; NP alone can appear *outside* the matrix nominal structure, and the combination of a modifier and *de* do not form a constituent.

Further, according to the EMPs, a lexical NP should have no phrasal sisters except its arguments, while the functional head that selects that NP may select a specifier, associated with a DF. We have seen that Mandarin common nouns tolerate no phrasal sisters, and the modifiers that precede *de* do not have a specific thematic roles they way arguments would. On the other hand, those constituents do share a common *discourse* function: they restrict the reference of a focal noun.

Restrictive modification is generally understood to be an Adjunct function, and this is conventionally treated as a kind of freely available GF, rather than a DF. Thus, even though Mandarin nominal structures do not allow c-structural adjunction, the GF called Adjunct should still be freely available in f-structure. The question is then: how can completeness be satisfied with respect to an optionally introduced Adjunct GF, if no adjoined position is available in c-structure. The only possible answer is that the Adjunct GF is linked to a DF, which, according to the EMPs is associated with a *specifier* position. Conversely, as DFs are subject to the extended coherence condition, they must be linked to some GF, and the optionally available Adjunct GF provides one when no predicate is otherwise available. To differentiate the DF associated with specifiers in c-structure from the freely available Adjunct GF represented only in Mandarin f-structure, I will refer to the former as Modifier (Mod).

The facts we've reviewed so far - the fixed order of Dem-Num-Class and N, the extractability of NP, its intolerance of phrasal sisters, and the presence of a DF position immediately to the left of *de* - all point overwhelmingly to the same conclusion: the Mandarin nominal is an endocentric structure whose functional head is the particle *de*, and it selects RCs and other restrictive modifiers as specifiers. This gives Mandarin RCs the partial structure:



#### 4.1 Headless Relative Clause

The other rather natural conclusion to draw is that the final NP is the c-structural sister and lexical co-head of *de*. However there is one obvious argument against this position: the final NP in an RC structure clearly occupies a DF position. This is evident firstly from the fact that its status can be best generalised in terms of pragmatic considerations: it is a focal NP, in the sense that its referent is not within the pragmatic presupposition. That is why it must be modified. Secondly, it is linked

to *different* GFs within the nominal structure at different times. In RC structures it is linked to various argument GFs, SUBJ or OBJ, but in associative structures, it is linked to the Adjunct GF. Under the EMPs, this indicates that the final NP occupies a DF position, not a head or complement position. This means the final NP must also be a specifier of *de* and *not* its complement.

In short *deP* does have some of the characteristics entailed by Simpson's DP analysis: the structure as a whole is a functional phrase headed by *de*; there is no lexical head NP; and both the RC and the final NP occupy *specifier* positions. *DeP* has *two* *specifiers* and *no* lexical head, just like the Mandarin CP shown in (25) above. However, this does not make *de* a head of CP, or a determiner. There is no evidence for an empty CP, or XP introducing CP, and no movement is required.

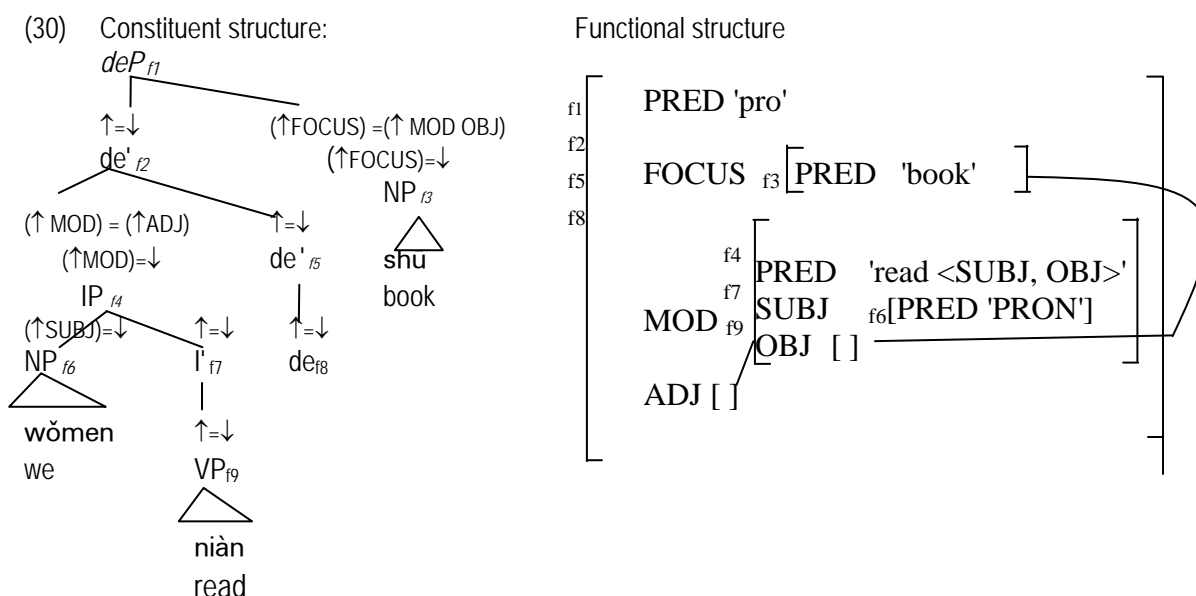
Two questions remains: firstly, how are the DFs, Focus and Mod, linked to GFs in order to satisfy extended coherence? Secondly, how is the completeness condition satisfied with respect to the predicate that selects this entire modified nominal structure as an argument? The second issue is straightforward, *de* must introduce a PRED value, 'pro'. In this sense, *de* is a relative pronoun after all. Its ability to supply a PRED value accounts for its obligatory presence in RC and most Associative structures. However, we'll see shortly that the PRED 'pro' value of *de* must be optional, because at times *de* does have a lexical co-head.

## 5 The Focus-Path in Mandarin

In simple RC structures like that at (29) below, the focal NP is linked to a GF within a clause that bears the DF Mod. The uniqueness condition restricts the choice of GF to the Object GF, which is otherwise unassigned.

(29) wǒmen niàn de shū  
we read de book

In the illustration of this Mandarin RC structure at (30) below, this relationship is captured by the annotation on the right-hand specifier of the equation, ( $\uparrow$ FOCUS) = ( $\uparrow$ MOD OBJ).



This equates the f-structure of the Focus NP with the f-structure of the Object GF introduced by the verb in the RC. This satisfies the extended coherence condition with respect to the DF Focus, and the completeness condition with respect to the GF OBJ. Under the EMPs, the initial specifier position, where the RC is located, also necessarily bears a DF, the DF Mod. The equation: ( $\uparrow$ MOD) = ( $\uparrow$ ADJ) equates the f-

structure of this DF with that of an Adjunct *GF* contained within *deP*. This is necessary to satisfy the extended coherence condition with respect to the DF Mod<sup>2</sup>.

Both equations can be understood as specific solutions to a general functional uncertainty equation:  $(\uparrow DF) = (\uparrow (DF) GF)$ . This differs from the equation proposed by Dalrymple for English because the Mandarin Focus path links a specifier to a *GF* within another *specifier*, so the path must include reference to DFs (rather than GFs).

The target *GF* to which a focal DF is linked can also be deeply embedded within Mod, as in (31) and (32).

(31) tā shuō wǒ rènwéi e bù huì jiè qián de rén  
 [<sub>MOD</sub>3sg says [<sub>COMP</sub>1sgreckon [<sub>COMPE</sub> NEG can borrow money]]] DE person  
 The person [he says [I reckon [e would not borrow money ]

(32) tā shuō wǒ rènwéi tā bù huì jiè e ]] de qián  
 [<sub>MOD</sub>3sg says [<sub>COMP</sub>1sgreckon [<sub>COMP</sub> 3sg NEG can borrow e ]]] DE money  
 The money [he says [I reckon [he would not borrow]

To allow for this possibility, the general focus path must actually have the form:  $(\uparrow DF) = (\uparrow MOD COMP^* GF)$ , where any number of COMPS (including none) may be traversed. (The complements of co-verbs must also be excluded by annotating the path further with the specification that the complement must not have a – value for its LDD feature: COMP [LDD ≠ -].)

## 6 Associative Structures

We can now turn to associative structures. Associative structures that do not contain a final predicate noun can be accounted for within the RC analysis. The initial nominal, which, for convenience I will refer to as NP1, functions as a restrictive modifier for a focal nominal, NP2, just as an RC does. So, NP1 bears the DF Mod, which is linked to an Adjunct *GF*, just as in RC structures. The extended coherence condition requires NP2 to be linked to a *GF* as before, but the nominal modifier NP1 introduces no unassigned *GF*, the way an RC does. Extended coherence and uniqueness are both satisfied by inclusion of a *second* Adjunct *GF* in f-structure. In this case, the resolved form of the functional uncertainty equation associated with the focal NP would be:  $\uparrow FOCUS = \uparrow ADJUNCT$ . This indicates that the DF is also an optional step in the focus path; the general path is therefore :  $(\uparrow DF) = (\uparrow (DF) COMP^* GF)$ .

Structurally, both NPs are specifiers; syntactically, both are adjuncts of *de*; but pragmatically, NP1 restrictively modifies NP2 as a consequence of their respective DFs. This explains why interpretation of the thematic relations between these two NPs is so variable. There is no need to postulate null predicates.

### 6.1 Locative structures

Structures where NP2 is a *predicate* are clearly different from thematically unrestricted associative structures. In (33), the final noun is *not* a referent-denoting focal NP, it is a nominal predicate, and the *initial* NP is not a restrictive modifier, it is forced to co-reference with a semantic argument of the predicate noun.

<sup>2</sup> Since an English RC involves only ADJ, the involvement of MOD as well as ADJ in the Mandarin RC may seem an unnecessary complication. However, it is a direct consequence of a) c-structural differences between Mandarin and English; b) the classification of ADJ as a *GF*, c) the assumptions encoded in the EMPs; and d) the extended coherence condition. As mentioned earlier, Mandarin c-structure does not accommodate adjunction to NP; an optional item can only be represented in c-structure as a specifier. The EMPs map specifiers of functional heads to *DFs*, not to *GFs* and each DF must be linked to a *GF*. ADJ is the only *GF* that can be introduced to license MOD without itself needing to be licensed by a predicate.

- (33) a. tā xuéxíliǎngzhǒng kēxué de fāzhǎn  
 3sg study science DE development  
 She studies the development of two kinds of science
- b. tā zài [nà liàng chē] de lǐmian  
 3sg at that classifier car DE inside  
 He is in that car

Actually, the predicate *fāzhǎn* 'development' is indistinguishable from a verb. As we have seen, Mandarin nouns and verbs have similar distributions: both select classifiers in quantification, and clearly, both can function as the lexical head of an argument. However most verbs (including co-verbs, and adjective-like stative verbs) can be negated by the negator, *bu*, and can function as a minimal sentence, while nouns cannot. Conversely, certain count nouns can be quantified *without* a classifier, something that cannot be done with any verbs. By these tests *fāzhǎn* is indistinguishable from a verb, but locatives like the NP2 in (33b) are clearly nouns. When semantics allow, they can be quantified without a classifier, but they cannot be negated by the verbal negator or function as a minimal sentence (see Li and Cheng, 1982 for further discussion):

- (34) zhè liǎng biān dōu yīyàng cháng  
 This two side all same long  
 The two sides are the same length

- (35) a. tā zài bù zài zhè.bian  
 3sg at NEG at this side  
 Lit: Is she or is she not present on this side?
- b. bù zài / \*bù zhè.bian  
 Neg at / NEG this side  
 Not present / \* not this side

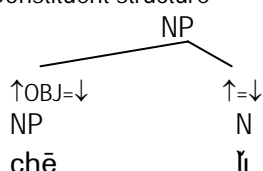
Locative nouns also form a distributional sub-class of noun; unlike other nouns they can take an immediately preceding phrasal argument. Li and Thompson refer to such locative structures without *de* as "locative phrases". The examples at (3) illustrate the relevant facts.

- (36) a. tā zài nà liàng chē (de) lǐmian  
 3sg at that classifier car DE inside  
 He is in that car
- b. nà tiáo lù (de) nánbian yǒu hěnduō dōngxi  
 that classifier road DE isouth have adv many thing  
 South of that road are many things
- c. chē (\*de) lǐ yǒu hěnduō dōngxi  
 car DE in have adv many thing  
 In the car are many things
- d. \*lù (\*de) nán yǒu hěnduō dōngxi  
 road DE isouth have adv many thing  
 South of the road are many things

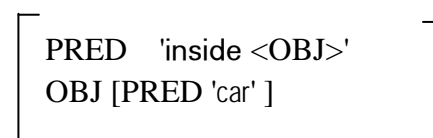


In (36a) and (b), the particle *de* is optional. (36c) and (d) show monosyllabic variants of locatives, and these *must* be immediately preceded by their argument; the particle *de* may not intervene. A morphological account of this restriction is that these monosyllabic locatives are clitics like *de* and contra Simpson, they compete for a prosodic host, in the form of the *nominal* argument. More relevant here is the fact that the locative noun is a predicate and the NP1 that precedes it is its argument. According to the EMPs an argument function is associated with the sister of a lexical head, and is annotated with the equation  $\uparrow GF = \downarrow$ . Since this GF is assigned to a nominal sister of the predicate I call it simply OBJ. (37) below shows the functional and constituent structure for locative phrases.

(37) Constituent structure



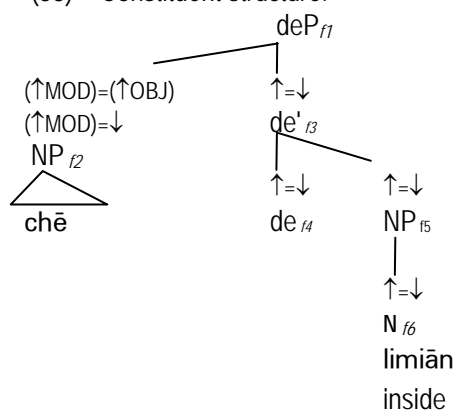
Functional structure



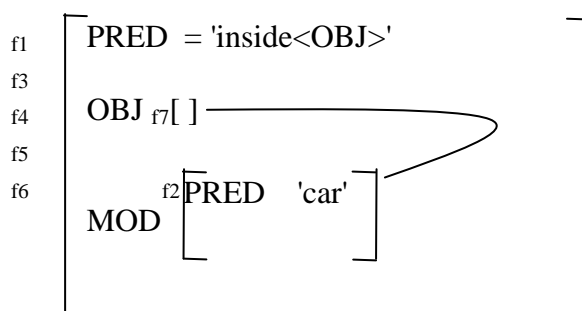
Obviously, when locative nouns combine with *de*, the initial NP is still understood as the argument of the final locative NP. The locative noun is *not* focal and therefore does not occupy the specifier of *de*. It functions as a predicate and therefore, under the EMPs, it must occupy the complement position, as co-head of *de*. Since we know *de* is preceded by a specifier with a DF function, Mod, it follows that this DF is linked to the GF OBJ in locative structures. It also follows that the PRED 'pro' value of *de* must be optional, as noted above: the locative co-head has a PRED value of its own.

Above I argued that the MOD position must be annotated with a functional uncertainty equation ( $\uparrow DF$ ) = ( $\uparrow DF$ ) COMP\* GF). Since the locative noun and *de* are functional co-heads, the OBJ of the lexical noun is also the OBJ of *deP*. Therefore the same functional uncertainty equation that links the modifying clause to an adjunct GF in RC structures will link NP1 to an OBJ function in locative structures. The resolved value of the equation would be ( $\uparrow MOD$ ) = ( $\uparrow OBJ$ ), resulting in the structural analysis illustrated in (38) below.

(38) Constituent structure:



Functional structure



Not only is this analysis of locative structures *consistent* with the analysis of RC structures it virtually falls out as an inevitable option within that analysis.

As for predicates like *fāzhǎn* they must introduce a GF, because that GF is clearly linked to the 'modifier' in an associative structure. However the GF must be somehow distinct from that generally assigned to the sister of N. Whether this is because locative nouns actually assign a GF other than OBJ, or *de*-verbal nouns like *fāzhǎn* introduce a different GF is left for future research to resolve.

## 7 Conclusion

To conclude, it has been demonstrated that *de* is a functional head that selects an initial specifier which bears a DF Mod. When *de* is followed by a predicate, that predicate is its lexical co-head. Otherwise nominals that follow *de* are specifiers and bear a DF, focus. In locative and other structures headed by predicates the Mod DF is linked to a core GF within the lexical NP. In RC structures it is linked to an Adjunct GF, and the Focus DF is linked to a core GF within RC. In all other associative structures both DFs are linked to independent Adjunct GFs. This analysis based as it is on functional uncertainty equations, can readily accommodate Mandarin RC and Associative structures of any kind, including those for which a movement analysis is not plausible.

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