

## CHAPTER 4

### BINDING CONDITION C IN ANTECEDENT-CONTAINED DELETION CONSTRUCTIONS

#### 4.1 Introduction

It is widely assumed that the effects of LF operations such as Quantifier Raising (QR) and LF *wh*-movement do not affect Binding Theory. The most important evidence for this assumption comes from the contrast below.

- (1) Which picture that John<sub>i</sub> took did he<sub>i</sub> like t?
- (2) a. \*He<sub>i</sub> liked every picture that John<sub>i</sub> took.  
b. \*Who knows he<sub>i</sub> likes how many pictures that John<sub>i</sub> took?

Two main approaches to the distinguishing between (1) and (2a-b) have been proposed since the 1980s.

One is to specify the level at which Binding Theory, especially Binding Condition C, applies. For example, Chomsky (1981) and Aoun and Li (1990) assume that the object phrases in (2a-b) have undergone LF movement, yielding the structures in (3a-b).

- (3) a. \*[[Every picture that John<sub>i</sub> took]<sub>j</sub> [he<sub>i</sub> like t<sub>j</sub>]]  
b. \*[[[How many pictures that John<sub>i</sub> took] who] [t knows he<sub>i</sub> likes t]]?

The structures in (3a-b) do not differ from that in (1), in which the R-expression *John* is not c-commanded by the coindexed pronoun *he*; Binding Condition C is therefore assumed not to be violated in (3a-b).<sup>1</sup>

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<sup>1</sup> Belletti and Rizzi (1988) and Pesetsky (1995) claim that Binding Condition A may be satisfied earlier than S-structure or LF. This claim gets support from the psych-verb construction, as shown below.

- (i) Questi pettegolezzi su di s<sub>i</sub> preoccupano Gianni<sub>i</sub> pi di ogni altra cosa. (Italian)  
These gossip about himself worry Gianni more than any other else  
'The gossip about himself<sub>i</sub> worries Gianni<sub>i</sub> more than anything else.'
- (ii) Pictures of himself<sub>i</sub> give John<sub>i</sub> the creeps.

Thus, they argue (1) can be distinguished from (2a-b) in not violating Binding Condition C if Binding Condition C is assumed to apply at S-structure.

The other approach is assumed in Hornstein and Weinberg (1991) and Chomsky (1995a), who suggest that LF movement may affect only the QP or determiner of a QNP, but must not pied-pipe. Assuming this non-pied-piping analysis, in (2a-b) only *every* and *how many* (or merely *how*) will be moved in LF, deriving the LF representation in (4).

- (4) a. \*[[Every]<sub>j</sub> [he<sub>i</sub> liked t<sub>j</sub>-picture that John liked]]  
 b. \*[[[How many]<sub>j</sub> who<sub>k</sub>] [t<sub>k</sub> knows he<sub>i</sub> likes t<sub>j</sub>-picture that John<sub>i</sub> took]]?

The LF representations in (4a-b) are then ruled out by Binding Condition C, which is assumed to apply at LF.

However, Fiengo and May (1994) (henceforth F&M) discover that instances of QR in Antecedent-Contained Deletion (ACD) constructions differ from those in (2a-b) in that they do affect Binding Theory, in particular Binding Condition C. That is, QR sometimes seems to obviate Binding Theory, as the contrast between (2a) and (5) illustrates.

- (5) You bought him<sub>i</sub> every picture that John<sub>i</sub> thought you would.

In spite of this, F&M (1994) immediately notice that examples such as (6) contrast with (5) in not obviating Binding Condition C.

- (6) \*He<sub>i</sub> bought me everything that John<sub>i</sub> thought he should [<sub>VP</sub> buy me].

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As they argue, a psych-verb construction such as (i) has the unaccusative D-structure representation in (iii), in which the experiencer *Gianni* c-commands the theme.

- (iii) [<sub>VP</sub> [<sub>V</sub> preoccupano] [<sub>NP</sub> questi pettegolezzi su di s<sub>i</sub>]] [<sub>NP</sub> Gianni<sub>i</sub>]

Hence, they propose that an "anywhere"-binding version of Binding Condition A is needed. Abbreviations used in this chapter are as follows: ACD: antecedent-contained deletion; ASP: aspect; ATB: across-the-board; CL: classifier; DE: descriptive complement suffix; MCCC: Mandarin Chinese clausal comparative; QR: quantifier raising; SSO: scope shifting operation; Var: variable

Given this contrast, F&M (1994: 267-269) proposes the following generalization to describe the "environment" in which Binding Condition C is obviated by QR.

- (7) QR obviates Binding Condition C iff
- a. ACD is involved, and
  - b. the binder of the R-expression has a copy contained within the elided VP.

The purpose of this chapter is twofold. We first show that the obviation of Binding Condition C shown by the English example in (5) is also found in the Mandarin Chinese clausal comparatives (MCCCs) which can be analyzed as ACD constructions involving comparative stripping. We then consider how the two factors (7a-b) affect the nature of QR and propose a PF-Deletion analysis for MCCCs. Second, we point out that MCCCs analyzed as ACD constructions also exemplify what F&M dub Dahl's Puzzle, demonstrated in the English VP ellipsis constructions in (8)-(9).

(8) John<sub>i</sub> said that he<sub>i</sub> likes his<sub>i</sub> mother, and ...

(9) Bill did [<sub>VP</sub> ~~say that he likes his mother~~] too.

- a. Bill said that John likes John's mother. (strict, strict)
- b. Bill said that Bill likes Bill's mother. (sloppy, sloppy)
- c. Bill said that Bill likes John's mother. (sloppy, strict)
- d. \*Bill said that John likes Bill's mother. (strict, sloppy)

Namely, given VP ellipsis constructions which involve two or more anaphoric elements (or pronouns) linked to the same antecedent, the first anaphoric element cannot be interpreted via strict identity if the second one is interpreted via sloppy identity, as exemplified in (8)-(9) (cf. Dahl 1974 and F&M 1994). We further argue that a Semantically-Based Economy Condition which interacts with the Parallelism Constraint on Ellipsis (i.e., the LF Identity Condition on Ellipsis) is needed to adequately explain Dahl's Puzzle (cf. Heim 1998 and Fox 1998).

This chapter is organized as follows. In section 4.2, we argue that a certain type of Mandarin Chinese comparative can be analyzed as a clausal comparative, and is in fact an ACD construction involving comparative stripping. In section 4.3, we show a variety of the syntactic/semantic complexities of MCCCs, including LF pied-piping, the obviation of Binding Condition C, Dahl's Puzzle Effects, the Eliminative Effect, and the obviation of the effects of Dahl's Puzzle. In section 4.4, we briefly review previous literature on ACD constructions. A PF-Deletion analysis which assumes QR is then proposed in section 4.5, where we argue that the motivation for QR in MCCCs is to satisfy the LF Identity Condition on Ellipsis and that QR must be subject to Economy conditions (cf. Heim and Kratzer 1998, and Fox 1995a). This PF-Deletion analysis further explains the obviation of Binding Condition C shown by ACD constructions, especially MCCCs. In section 4.6, we argue that the effects of Dahl's Puzzle, which is a specific realization of the Eliminative Effect shown by ellipsis, follows from the interaction of two principles: Heim's (1998: 225) Coreference-or-Cobinding Rule, which Fox (1998: 129) calls the Locality Condition on Variable Binding, and the Parallelism Constraint on Ellipsis which applies to the output of the former. The conclusion is reached in section 4.7.

#### 4.2 Antecedent-Contained Deletion in Mandarin Chinese

In this section we show that a Mandarin Chinese comparative such as (10) can be analyzed as an ellipsis construction, and the elided site inside the constituent *Lisi zuotian* 'Lisi yesterday' is created by comparative stripping (cf. A. Hashimoto 1974: 91-93, and Y.-C. Fu 1978: 90-99).

- (10) Zhangsan jintian [bi [Lisi zuotian [\_\_]]] geng gaoxing.  
 Zhangsan today than Lisi yesterday more happy  
 'Today Zhangsan is happier than Lisi was yesterday.'

Furthermore, the elided site inside the LF representation of (10) must be not only syntactically local to its antecedent but also must be a copy of another constituent. We then provide evidence that argues that examples like (10) indeed involve multiple structures: a subordinate and a coordinate structure; that is, (10) is a clausal comparative construction endowed with a three-dimensional structure, as Goodall (1987) and Moltmann (1992) suggest.

#### 4.2.1 Subordination in Mandarin Chinese Comparatives

In Mandarin Chinese, comparative constructions must involve the comparative marker *bi* 'than', which is flanked by the two elements that are compared to each other along some dimension. It seems that the phrases that flank the comparative marker *bi* 'than' must belong to the same grammatical category (e.g., NP, VP, or PP), as shown by the contrasts below.<sup>2</sup>

- (11) a. Zhangsan [pp dui Lisi] bi [pp dui Wangwu] hao.  
 Zhangsan to Lisi than to Wangwu well  
 'Zhangsan<sub>i</sub> treats Lisi better than he<sub>i</sub> treats Wangwu.'
- b. Zhangsan [vp qi ma] bi [vp kai che] kuai.  
 Zhangsan ride horse than drive car good  
 'The skill of Zhangsan's horse-riding is better than that of his car-driving.'
- (12) a. ?\*Zhangsan [pp dui Lisi] bi [NP Wangwu] hao.  
 Zhangsan to Lisi than Wangwu well  
 'Zhangsan<sub>i</sub> treats Lisi better than he<sub>i</sub> treats Wangwu.'
- b. \*Zhangsan [vp qi ma] bi [NP jiao-ta-che] kuai.  
 Zhangsan ride horse than bicycle fast  
 'The speed of Zhangsan's horse-riding is faster than that of his bicycle-riding.'

Since coordination always requires conjuncts of the same grammatical category, the question arises whether Mandarin Chinese comparatives such as (11a) actually involve coordination. First, let us consider the contrast between (13a) and (13b).

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<sup>2</sup> Another possibility is to analyze (11a) as (i), in which two propositions, S<sub>1</sub> and S<sub>2</sub>, are compared along the dimension of kindness for treating friends.

(i) [<sub>S1</sub> Zhangsan<sub>i</sub> dui Lisi] bi [<sub>S2</sub> Pro<sub>i</sub> dui Wangwu] hao.  
 Zhangsan to Lisi than Pro to Wangwu good  
 'Zhangsan<sub>i</sub> treats Lisi better than he<sub>i</sub> treats Wangwu.'

According to this analysis, (11b) should have the structure in (ii).

(ii) [<sub>S1</sub> Zhangsan qi ma] bi [<sub>S2</sub> Pro kai che] kuai.  
 Zhangsan ride horse than Pro drive car fast  
 'The skill of Zhangsan's horse-riding is better than that of his<sub>i</sub> car-driving.'

However, this analysis suffers from the conceptual problem that it is quite difficult to imagine a proposition such as *Zhangsan qi ma* 'Zhangsan rides a horse' has the property of fastness.

- (13) a. Zhangsan<sub>i</sub> bi Lisi<sub>j</sub> geng dongde zai zhe-ge shihou de kezhi  
 Zhangsan than Lisi more know at this-CL moment must restrain  
 ziji<sub>i</sub>/<sub>j</sub>/taziji<sub>i</sub>/<sub>j</sub>/\*tamenziji<sub>i+j</sub>.  
 self/themselves  
 'Zhangsan is better than Lisi in understanding that at this moment each of  
 them has to restrain himself.'
- b. Zhangsan<sub>i</sub> he Lisi<sub>j</sub> (dou) dongde zai zhe-ge shihou de kezhi  
 Zhangsan and Lisi (all) know at this-CL moment must restrain  
 ziji<sub>i+j</sub>/\*taziji<sub>i</sub>/<sub>j</sub>/tamenziji<sub>i+j</sub>.  
 self/\*himself/themselves  
 'Zhangsan and Lisi do not understand that at this moment they have to self-  
 restrain/\*restrain himself/restrain themselves.'

The conjunctive reading is available for (13b) because the use of the complex reflexive *tamen-ziji* 'themselves' is allowed; however, in (13a), the conjunctive reading is impossible because the use of the complex anaphor *tamen-ziji* 'themselves' is not allowed. So, the contrast between (13a) and (13b) implies that Mandarin Chinese comparatives do not involve conjunctive coordination. Second, the contrast between (14a) and (14b) shows us that the comparative marker *bi* 'than' is not a disjunctive coordinator.

- (14) a. Zhangsan bi Lisi gaoping.  
 Zhangsan than Lisi happy  
 'Zhangsan is happier than Lisi.'
- b. Zhangsan gaoping haishi/huo Lisi gaoping.  
 Zhangsan happy or/or Lisi happy  
 'Zhangsan or Lisi is happy.'

Semantically, (14a) implies that both *Zhangsan* and *Lisi* are happy; however, in (14b), only one of the two persons (i.e., *Zhangsan* and *Lisi*) is happy. So, the comparative marker *bi* 'than' should not be considered a disjunctive coordinator.<sup>3</sup> Thus, the comparative marker *bi* 'than' should not be considered a coordinator.

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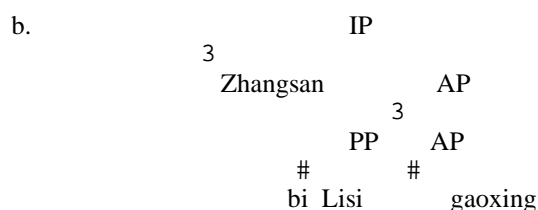
<sup>3</sup> The contrast below further shows that the comparative marker *bi* 'than' is not a disjunctive coordinator.

- (i) Zhangsan bi-bu-bi Lisi gaoping.  
 Zhangsan than-not-than Lisi happy  
 'Is [Zhangsan] or isn't Zhangsan happier than Lisi?'
- (ii) a. \*Zhangsan lai haishi-bu-haishi bu lai?  
 Zhangsan come or-not-or not come  
 'Does [Zhangsan] or doesn't Zhangsan come?'
- b. \*Zhangsan lai huo-bu-huo bu lai?  
 Zhangsan come or-not-or not come  
 'Does [Zhangsan] or doesn't Zhangsan come?'

As the ungrammaticality of (ii-a) shows, disjunctive coordinators such as *haishi* 'or' and *huo* 'or' cannot have an A-not-A form. However, the comparative marker *bi* 'than' can. Thanks for Tzong-Hong Lin for offering this contrast.

Following Lǚ et al. (1980: 62, 201 and 340), we assume that the comparative marker *bi* 'than' is a preposition. Since a preposition must take a complement, it is natural to assume that the comparative marker *bi* 'than' and the phrase that immediately follows it form a prepositional phrase which serves as a preverbal adjunct. Hence, we suggest that Mandarin Chinese comparatives involve subordination rather than coordination. Our analysis of Mandarin Chinese comparatives such as (15a) then can be depicted as in (15b).

- (15) a. Zhangsan [bi Lisi] gaoxing  
 Zhangsan than Lisi happy  
 'Zhangsan is happier than Lisi (is).'



We further propose that the *bi*-phrase is best analyzed as a degree-marked phrase which modifies the main predicate along a dimension of comparison.

As the contrast between (16a) and (16b) shows, the comparative marker *bi* 'than' cannot precede the temporal adjunct *yizhi* 'always'. Travis (1988) argues that *yizhi* 'always' is T<sup>0</sup>-licensed. So, it appears that the comparative marker *bi* 'than' is precluded from occurring inside the domain of TP.

- (16) a. Zhangsan yizhi [bi Lisi] gaoxing.  
 Zhangsan always than Lisi happy  
 'Zhangsan is always happier than Lisi is.'
- b. \*Zhangsan [bi Lisi] yizhi gaoxing.  
 Zhangsan than Lisi always happy

However, we find that the comparative marker *bi* 'than' in (17) can follow the VP-domain adverb *kuai-de* 'quickly.'

- (17) Zhangsan hen kuaide [bi Lisi] duo he-le san bei shui.  
 Zhangsan very quickly than Lisi more drink-Asp three cup water  
 'Zhangsan quickly drank three more cups of water than Lisi did.'

Therefore, we assume that, in Mandarin Chinese comparatives, the degree-marked *bi*-phrase occurs within the domain of VP as an adjunct, and that it modifies the main predicate along a dimension of comparison.

#### 4.2.2 Mandarin Chinese Clausal Comparatives

Based on the preceding discussion, we now argue that some types of Mandarin Chinese comparatives can be analyzed as elliptical comparative constructions; in other words, the clausal comparative does exist in Mandarin Chinese.

First, consider the examples in (18) (cf. A. Hashimoto 1974: 91-93, and Y.-C. Fu 1978: 90-99, and Tsao 1990).<sup>4</sup>

- (18) a. Zhangsan jintian [pp bi [Lisi zuotian]] gaoxing.  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'
- b. Zhangsan zuotian zai xuexiao [bi [jintian zai jiali]] gaoxing.  
 Zhangsan yesterday at school than today at home happy  
 'Zhangsan<sub>i</sub> was happier at school yesterday than he<sub>i</sub> is at home today.'

The string *Lisi zuotian* 'Lisi yesterday' in (18a) cannot form a syntactic constituent because there is no predicational relationship between them. Furthermore, as Travis (1988) argues, the occurrence of the temporal adverb *zuotian* 'yesterday' requires a TP projection because of the adverbial licensing requirement (cf. Cinque forthcoming).<sup>5</sup> Therefore, we suggest that there must be an empty predicate (a

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<sup>4</sup> Examples such as (i) are also argued to be clausal comparatives by A. Hashimoto (1974), Fu (1978) and Tsao (1990).

(i) Zhangsan pao-bu pao-de [bi [Lisi kai-che kai-de]] kuai.  
 Zhangsan run-step run-DE than Lisi drive-car drive-DE fast  
 The speed of Zhangsan's running is faster than the speed of Lisi's car-driving.'  
 The study of (i) is beyond the scope of this chapter.

<sup>5</sup> Following Travis (1988) and Cinque (forthcoming), we assume that adverbs are licensed by features contained in heads. Moreover, the transportability of adverbs results from feature percolation from the head to the level of the maximal projection. Adverbs thus may appear anywhere along the projection line of the licensing head (cf. Zubizarreta 1982). As Jane Tang (1990) argues, based on (i) below, the temporal adjunct *zuotian* 'yesterday', besides being licensed by T<sup>0</sup>, also gets licensed by C<sup>0</sup>.

(i) Zuotian, tanbai-de shuo, Zhangsan mei lai-guo

missing variable) inside the string [*Lisi zuotian* [\_\_\_]] [*Lisi yesterday* [\_\_\_]]; that is, the comparative marker *bi* 'than' takes a sentential complement (henceforth the *bi*-clause)).<sup>6</sup> Thus, the (abbreviated) S-structure of (18a) should be that shown in (19).<sup>7</sup>

- (19) Zhangsan jintian [pp bi [CP Lisi zuotian [\_\_\_]]] gaoxing.  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'

Second, assuming Paul's (1993) non-elliptical analysis for Mandarin Chinese comparatives such as (20), the comparative marker *bi* 'than' in (20) is thus flanked by two distinct NPs *Zhangsan* and *Lisi*, which are compared along a dimension of running speed.

- (20) Zhangsan [pp bi [NP Lisi]] pao-de kuai.  
 Zhangsan than Lisi run-DE fast  
 'Zhangsan runs faster than Lisi.'

Now, if cases like (21a) are assumed not to involve any elliptical process and have a structure equivalent to that given in (21b), then there is no way for us to explain the grammatical contrast between (20) and

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Yesterday frankly speaking Zhangsan not come-Asp  
 'Yesterday, frankly speaking, Zhangsan had not come.'  
 Since the speaker-oriented adjunct *tanbai-de shuo* 'frankly speaking' in (i) is licensed by C<sup>0</sup> rather than T<sup>0</sup>, the temporal adjunct *zuotian* 'yesterday' that can precede the speaker-oriented adjunct must be licensed by C<sup>0</sup>.

<sup>6</sup> See Pullum (1976), Kayne (1981) and Napoli (1983) about the assumption that the comparative marker *bi* 'than', which is a preposition, selects a CP as complement.

<sup>7</sup> One might suggest that example (18) can be alternatively analyzed as the structure in (i) by assuming that the comparative marker *bi* 'than' is a light verb which selects a clausal complement.

- (i) Zhangsan jintian [vp bi [CP Lisi zuotian gaoxing]].  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'

This alternative, at first sight very plausible, incorrectly predicts that (ii) is ungrammatical by assigning it the structure in (iii).

- (ii) Zhangsan mingtian hui [pp bi [CP Lisi zuotian]] zai duo he yi-bei jiu.  
 Zhangsan tomorrow will than Lisi yesterday then more drink one-CL wine  
 'Zhangsan will drink one more cup of wine tomorrow than Lisi did yesterday.'  
 (iii) \*Zhangsan mingtian hui [vp bi [CP Lisi **zuotian zai** duo he yi-bei jiu]].  
 Zhangsan tomorrow will than Lisi yesterday then more drink one-CL wine  
 'Zhangsan will drink one more cup of wine tomorrow than Lisi did yesterday.'

Since the adverb *zai* 'then' must co-occur with a temporal adverb which denotes futurity, it is impossible to represent example (i) as (iii), in which within the embedded clause, *zai* 'then' co-occurs with the temporal adverb *zuotian* 'yesterday'.

(21a), in which the comparative marker *bi* 'than' is also flanked by two distinct phrases with the same grammatical category (here, CP).

- (21) a. \*Zhangsan pao bu bi Lisi kai che pao-de kuai.  
 Zhangsan run step than Lisi drive car run-DE fast  
 'The speed of Zhangsan's running is faster than that of Lisi's driving.'
- b. \*[<sub>CP</sub> Zhangsan pao bu] [<sub>PP</sub> bi [<sub>CP</sub> Lisi kai che]] pao-de kuai.  
 Zhangsan run step than Lisi drive car run-DE fast  
 'The speed of Zhangsan's running is faster than that of Lisi's driving.'

However, if we adopt the elliptical analysis for (21a), which involves a descriptive complement, and assign it the structure given in (22), then the elided site inside (22) must be interpreted in the same way as its antecedent (denoted by underlining) because of the LF Identity Condition on Ellipsis of Heim and Kratzer (1998) (cf. Sag 1976, Sag and Hankamer 1984).<sup>8</sup>

- (22) \*Zhangsan [ [<sub>Adjunct</sub> pao-bu] [<sub>VP</sub> [<sub>PP</sub> bi [<sub>CP</sub> Lisi kai-che [\_\_\_]]] [<sub>VP</sub> pao-de kuai]]].  
 Zhangsan run-step than Lisi drive-car run-DE fast

- (23) The LF Identity Condition on Ellipsis (Heim and Kratzer 1998: 250)  
 A constituent may be deleted at PF only if it is a copy of another constituent at LF.

Following Bresnan (1973), we assume that the comparative operator *geng* 'more/-er' and the *bi*-clause, which arguably form a syntactic unit at some level, must undergo QR. Therefore, after QR of this syntactic unit, (22) has the LF reconstructed representation in (24), in which the reconstructed part is a copy of the underlined part of the main clause (cf. von Stechow 1984, Larson 1987, and Moltmann 1992).

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<sup>8</sup> We assume that there are two types of comparatives in Mandarin Chinese. One does not involve ellipsis; the other does. They are illustrated by (i) and (ii), respectively.

- (i) Zhangsan bi Lisi gao.  
 Zhangsan than Lisi tall  
 'Zhangsan is taller than Lisi.'
- (ii) Zhangsan jintian bi Lisi zuotain gaoping.  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'

Example (i) has a structure like (20); namely, the comparative marker *bi* 'than' selects an NP as complement. However, in (ii) the comparative marker *bi* 'than' takes a clausal complement which involves ellipsis.

- (24) \*[[IP [PP bi [CP Lisi [[[V<sub>1</sub> kai]-[NP che]] [V<sub>2</sub> pao]-de [t<sub>i</sub>-kuai]]]]]; [IP Zhangsan Than  
Lisi drive car run-DE fast Zhangsan  
[[[V<sub>1</sub> pao]-[NP bu]] [V<sub>2</sub> pao]-de [Result t<sub>i</sub>-kuai]]].  
run step run-DE fast

As claimed in Huang (1989) and J. Tang (1990), in a descriptive complement construction like (25), V<sub>2</sub> of the "[V<sub>1</sub>-NP]-V<sub>2</sub>-de-Result" sequence is the main verb while the "V<sub>1</sub>-NP" part serves as a deverbalized adjunct, which modifies V<sub>2</sub>. Crucially, V<sub>2</sub> must be phonologically identical to V<sub>1</sub>.

- (25) Zhangsan [Adjunct [V<sub>1</sub> qi]-[NP ma]] [V<sub>2</sub> qi]-de [Result kuai].  
Zhangsan ride horse ride-DE fast  
'Zhangsan rides a horse and rides very fast.'

However, as (21a) shows, inside the *bi*-clause, V<sub>2</sub> *pao* 'run' is not phonologically identical to V<sub>1</sub> *kai* 'drive'; therefore (21a) is ungrammatical. Thus, the ungrammaticality of (21a) indirectly provides evidence for the existence of elliptical comparatives in Mandarin Chinese.<sup>9</sup>

However, if Mandarin Chinese comparatives like (20b) indeed involve ellipsis, we are immediately confronted with determining what the elided element inside MCCC consists of.<sup>10</sup>

<sup>9</sup> The grammaticality of (i) should not be considered a counterexample to our analysis for the ungrammaticality of (21a). Example (i) differs from (21a), to which the verb-copying process applies, in that there is no verb-copying in (i).

- (i) Zhangsan pao-bu bi Lisi kai-che kuai.  
Zhangsan run-step than Lisi drive-car fast  
'The speed of Zhangsan's running is faster than that of Lisi's car-driving.'

The structure of (i) is as in (ii).

- (ii) Zhangsan [[<sub>AdvP</sub> pao-bu] [<sub>VP</sub> [bi [<sub>CP</sub> Lisi [[<sub>AdvP</sub> kai-che] [\_\_\_\_]]] [kuai]]].  
Zhangsan run-step than Lisi drive-car fast

The string *pao-bu* 'run-step' in fact is an adverb phrase which modifies the main predicate *kuai* 'fast', which is further modified by the degree phrase [*bi* [<sub>CP</sub> *Lisi* [[<sub>AdvP</sub> *kai-che*] [\_\_\_\_]]] 'than *Lisi* drive-car'. The string *kai-che* 'drive-car' inside the *bi*-clause is also an adverb phrase which modifies the missing predicate of the embedded clause.

<sup>10</sup> Proponents of a non-elliptical analysis might say that backward deletion, shown by Mandarin Chinese comparatives like (i), poses a problem for the elliptical analysis.

- (i) Lisi qi ma [bi [<sub>CP</sub> Zhangsan qi niu]] qi-de kuai.  
Lisi ride horse than Zhangsan ride cow ride-DE fast  
'The speed that Lisi rides a horse is faster than the speed that Zhangsan rides a cow.'

However, as Tsao (1990: 303) notices, the directionality of comparative deletion can be either forward or backward, as shown below.

- (ii) Ta jixing bi wo hao-de duo.  
He memory than I good-DE more  
'He is much better than I in memory.'  
(iii) Ta bi wo jixing hao-de duo.  
He than I memory good-DE more  
'He is much better than I in memory.'

### 4.2.3 Comparative Stripping in Mandarin Chinese

To identify the type of ellipsis which MCCCs involve, we shall list the characteristics of Mandarin Chinese comparatives, beginning with those exemplified in (26a-b).

- (26) a. Zhangsan jintian [pp bi [Lisi zuotian [\_\_]]] gaoxing.  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi yesterday was.'
- b. Zhangsan [Adjunct [V1 qi]-[NP niu]] [VP [pp bi [Lisi [Adjunct [V1 qi]-[NP  
 Zhangsan ride-cow than Lisi ride-  
 ma]] [\_\_]] [V2 qi]-de [Result kuai]].  
 horse ride-DE fast  
 'The speed of Zhangsan's cow-riding is faster than that of Lisi's horse-riding.'

First, neither a verb nor an auxiliary can occur inside the *bi*-clause. Since elliptical sentences involving either VP ellipsis (VPE) or null complement anaphora (NCA) deletion must contain verbal remnants in the conjunct housing the elided site, the elliptical process involved in (26a) must not be either VPE or NCA Deletion (cf. Hankamer and Sag 1976).

Second, as the contrast between (27a) and (27b) indicates, the elided site must be local to its antecedent in some sense; otherwise, an elliptical comparative like (27b) will be ungrammatical.

- (27) a. Jiangdao kai-che de sudu, Zhangsan jintian [bi [Lisi zuotian [\_\_]]  
 Talk-about drive-car DE speed Zhangsan today than Lisi yesterday  
 hai kuai.  
 more fast  
 'Talking about driving speed, Zhangsan drives faster today than Lisi did yesterday.'
- b. \*Jiangdao kai-che de sudu, Zhangsan jintian [bi wo kandao [Lisi  
 Talk-about drive-car DE speed Zhangsan today than I see Lisi zuotian  
 [\_\_]] hai kuai.  
 yesterday more fast  
 'Talking about driving speed, Zhangsan drives faster today than I saw Lisi did yesterday.'

Third, the ungrammaticality of (28b) falls out from the requirement that the missing part in MCCCs must be a copy of another constituent in the main clause.

- (28) a. Zhangsan [Adjunct [V1 qi]-[NP niu]] [VP [PP bi [Lisi [Adjunct [V1 qi]-[NP  
 Zhangsan ride-cow than Lisi ride-  
 ma [\_\_\_]]] [V2 qi]-de [Result kuai]].  
 horse ride-DE fast  
 'The speed of Zhangsan's cow-riding is faster than that of Lisi's horse-  
 riding.'
- b. \*Zhangsan [Adjunct [V1 qi]-[NP niu]] [VP [PP bi [Lisi [Adjunct [V1 pao]-[NP  
 Zhangsan ride-horse than Lisi run-  
 bu ]]] [V2 qi]-de [Result kuai]].  
 step ride-DE<sub>2</sub> fast

That is, in the *bi*-clause of (28b), *pao* 'run' of the string *pao bu* 'run step' could exist only as a copy of the verb *pao* 'ride' of a *pao-de X* 'run-DE X' string; therefore, the only thing that could be elided here is *pao-de X* 'run-DE X' not another *qi-de kuai* 'ride-DE fast' string. So, the LF Identity Condition on Ellipsis is violated.

Fourth, the *bi*-clause in (19) contains only a subject NP plus a clausal-level (temporal) adverb. According to Hankamer and Sag (1976: 409), stripping is a rule that deletes everything in a clause under identity with corresponding parts of a preceding clause except for one constituent (and sometimes a clause-internal adverb or negative). Based on the characteristics of MCCCs which we have shown above, we propose that the elliptical process involved in MCCCs is in fact comparative stripping (cf. McCawley 1988).<sup>11</sup>

<sup>11</sup> T.-C. Tang (personal communication) reminds me of the possibility that the stripped element could be regarded as a pronominal-like element akin to *pro*. An analysis along this line has been proposed by Hoji (1990) for Japanese stripping constructions like (i).

- (i) a. John-ga Bill-o syootaisita (tte)  
 John-nom Bill-acc invited (I heard)  
 'John invited Bill (I heard).'
- b. Paul-mo da (yo)  
 Paul-also be  
 'Paul too.'

Assuming Reinhart's (1986) observation on stripping, Hoji (1990) suggests that stripping must obey conditions on movement and that stripping sentences have the following characteristics.

- (ii) a. Sloppy reading is possible for those categories that can be construed as bound variables.  
 b. Sloppy reading is possible, precisely in those configurations in which bound variable construal is possible (the *c*-command sensitivity).

However, Hoji (1990) points out that the Japanese stripping construction in (i) differs from English stripping constructions in the following ways. First, in contrast with its English counterparts (iii), the Japanese stripping construction (iv) seems to be relatively acceptable.

- (iii) a. People who make French cuisine come here often.  
 b. ?\*Italian cuisine, too.
- (iv) a. [<sub>NP</sub> [<sub>S</sub> pro<sub>i</sub> furansu ryoori-o tukuru] hito]-ga yoku koko-ni kuru  
 French cuisine-acc make people-nom often here-to come  
 'People who make French cuisine come here often.'  
 b. Itariya ryoori-mo da.  
 Italian cuisine-also be  
 'Italian cuisine, too.' ('People who make Italian cuisine (also) come here often.')

Second, in Japanese stripping constructions like (v), the pronoun *kare* which, as widely assumed by Japanese linguists, cannot be construed as a bound variable, seems to be compatible with the sloppy reading which is possible for those categories that can be construed as bound variables.

- (v) a. John<sub>i</sub>-ga [<sub>NP</sub> [<sub>S</sub> pro<sub>i</sub> {pro<sub>j</sub>/kare<sub>j</sub>}-o butta] otoko<sub>i</sub>]-o uttaeta (tte)  
 John-nom pro pro/he-acc hit man-acc sued (I heard)  
 'John<sub>i</sub> sued the man who hit him<sub>i</sub> (I heard).'  
 b. Bill/Mary-mo da (yo).  
 Bill/Mary-also be  
 'Bill/Mary too.' (The sloppy reading seems possible with *kare* as well as with *pro*.)
- (vi) a. Daremo<sub>i</sub>-ga [<sub>S</sub> John-ga {pro<sub>i</sub>/zibun<sub>i</sub>/\*kare<sub>i</sub>}-o butta to] itteiru.  
 Everyone-nom John-nom pro/self/he-acc hit COMP is saying  
 'Everyone<sub>i</sub> is saying that John hit him<sub>i</sub>.'  
 b. Daremo<sub>i</sub> [<sub>NP</sub> [{pro<sub>i</sub>/zibun<sub>i</sub>/\*kare<sub>i</sub>}-ga pro<sub>j</sub> tukutta] susi<sub>j</sub>]-o tabenakatta.  
 'No one<sub>i</sub> ate the sushi that he<sub>i</sub> made.'

Third, it further appears that the 'c-command requirement' need not be satisfied for the sloppy reading to obtain in Japanese stripping constructions like (vii).

- (vii) a. [<sub>NP</sub> [<sub>S</sub> ec<sub>k</sub> hitome pro<sub>i</sub> mita] hito<sub>k</sub>]-ga John<sub>i</sub>-o sukininatta (tte).  
 one glance saw person-nom John-acc fell-in-love  
 'The person who took a glance at him<sub>i</sub> fell in love with John<sub>i</sub>.'  
 b. Bill-mo da (yo)  
 Bill-also be  
 'Bill too.'

Given these differences between English and Japanese stripping constructions, Hoji (1990) proposes that Japanese stripping constructions like (i) should be analyzed as in (viii).

- (viii) pro Paul-mo da (yo)

He further says that the structure in (viii) is identical to (ix), with which it can alternate, given the assumption that Japanese has an empty pronominal and that it may be referential, just as *sore* may, as proposed in Kuroda (1965).

- (ix) Sore-wa NP(-mo) da.  
 That-top NP(-also) be  
 'That is true of NP (as well).'

However, Hoji (1990) immediately notices that, besides the type of stripping constructions shown by (i), there is another type of stripping constructions in Japanese, as shown below.

- (x) a. [<sub>NP</sub> [<sub>S</sub> pro<sub>i</sub> furansu ryoori-o tukuru] hito]-ga yoku koko-ni kuru  
 French cuisine-acc make people-nom often here-to come  
 'People who make French cuisine come here often.'  
 b. \*Itariya ryoori-o-mo da.  
 Italian cuisine-acc-also be  
 'Italian cuisine, too.' ('People who make Italian cuisine (also) come here often.')

As (xb) shows, if *Itariya ryoori* 'Italian cuisine' is Cased-marked, then the sentence becomes unacceptable. Furthermore, the NP-Case can occur in the stripping construction only when the phrase that corresponds to it in the first conjunct (or in the utterance preceding it) is not in a syntactic island.

- (xi) a. Mary-{wa/ga} [<sub>S</sub> Yamada-ga Chomsky-ni atta to] itteita (yo).  
 Mary-top/nom Yamada-nom Chomsky-dat met that was saying

#### 4.2.4 The Multiple-Structure Characteristic of MCCCs

Since stripping applies only to coordinate structures and comparative stripping is a type of stripping, our assumption that the elliptical process which MCCCs involve is comparative stripping immediately challenges our initial assumption that MCCCs involve subordination (see section 4.2.1). This question brings us back to the issue of the categorical status of the Mandarin Chinese comparative marker *bi* 'than' as well as that of *than* in English.

According to Napoli (1983) and Moltmann (1992), clausal comparatives have two distinct simultaneous syntactic structures throughout the derivation: a coordinate structure and a subordinate structure. Their argument is based on the observation that clausal comparatives behave like coordinate structures in allowing for both across-the-board (ATB) movement, as shown in (29a), and Right Node Raising, as shown in (29b).<sup>12</sup>

- 
- (xii) b. 'Mary was saying that Yamada had met Chomsky.'  
 Halle-ni-mo da (yo).  
 Halle-dat-also be  
 'Halle, too.'
- (xii) a. Bush-wa [<sub>S</sub> Nakasone-ga [<sub>S</sub> Nihon-ga Amerika-ni noo-to yuubekida to] itta to]  
 Bush-top Nakasone-nom Japan-nom America-dat "NO" should say that said that  
 omotteiru (yo).  
 thinks  
 'Bush thinks that Nakasone said that Japan should say "NO" to the United States.'
- b. Furansu-ni-mo da (yo).  
 France-dat-also be  
 'To France, too.'

Hence, Hoji (1990) proposes the structure (xiii) for stripping constructions with Case-marked NP's.

(xiii) [<sub>S</sub> ...] NP-CASE(-mo) da

He further assumes that the structure inside [<sub>S</sub> ...] is reconstructed by means of a copying operation, analogous to Williams' (1977) and F&M's (1994) treatment of VPE in English. However, Mandarin Chinese stripping constructions must be subject to conditions on movement and requires a linguistic antecedent obligatorily, as the contrast between (xvii) and (xviii) shows.

- (xvi) a. Zhangsan jintian [bi [Lisi zuotian [\_\_\_]]] gaoxing.  
 Zhangsan today than Lisi yesterday happy  
 'Today Zhangsan is happier than Lisi was yesterday.'
- b. \*Zhangsan jintian [bi [<sub>NP</sub> [<sub>S</sub> wo renwei [Lisi zuotian [\_\_\_]]]-de shuofa] gaoxing.  
 Zhangsan today than I think Lisi yesterday DE claim happy

Thus, the Mandarin Chinese stripping construction like (xvi) belongs to the same category as the Japanese NP-Case stripping construction; therefore, a pro analysis is implausible for Mandarin Chinese stripping constructions.

<sup>12</sup> Moltmann (1992) further argues that the coordinate structure of clausal comparatives exists only at LF.

- (29) a. A man who John hates t more than Mary admires t.  
 b. More people admire than love this woman I met yesterday in the park.

Like the English comparative in (29a), Mandarin Chinese elliptical comparatives also show ATB movement, as the examples in (30) illustrate.

- (30) a. Na-ge [[Op<sub>i</sub> [t<sub>i</sub> jintian qi-niu [bi [t<sub>i</sub> zuotian qi-ma [\_\_\_]]] qi-de kuai]  
 That-CL today ride-cow than yesterday ride horse ride-DE fast  
 de] ren<sub>i</sub>] daodi shi shei?  
 DE person the-hell is who  
 'Who the hell is that person<sub>i</sub> whose speed in today's cow-riding is faster  
 than that of his<sub>i</sub> speed in yesterday's horse-riding?'  
 b. Na-ge [[Op<sub>i</sub> [Zhangsan jintian [bi [Lisi zuotian [\_\_\_]]] geng yanli-de  
 That-CL Zhangsan today than Lisi yesterday more sternly  
 piping-guo t<sub>i</sub> de] ren<sub>i</sub>] daodi shi shei?  
 criticize-ASP DE person the-hell is who  
 'Who the hell is that person who yesterday Zhangsan criticized more  
 sternly than Lisi does today?'

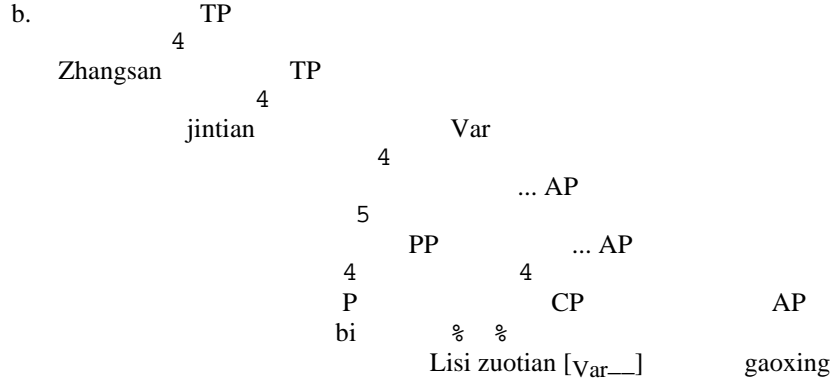
If Napoli (1983) and Moltmann (1992) are on the right track, then MCCCs, as in (19), may have two distinct syntactic structures, a coordinate structure and a subordinate structure, at the same time.<sup>13</sup> This multiple-structure characteristic of elliptical comparatives explains why comparative stripping is allowed in MCCCs.

To sum up, an MCCC, as we have argued, is in fact a stripping construction in which everything in the *bi*-clause under identity with its antecedent occurrence, except for one constituent (with a clause-internal adverb), must be stripped. The stripped portion in the *bi*-clause must be a copy of another constituent of the main clause at LF because of the LF Identity Condition on Ellipsis (cf. Heim and Kratzer 1998: 250). The stripped site and its antecedent must be local to each other in some sense. Thus, under our analysis, the structure of MCCCs like (31a) can be depicted as in (31b).<sup>14, 15</sup>

<sup>13</sup> Based on this idiosyncratic property of comparatives, Moltmann (1992) proposes a Three-Dimensional analysis for clausal comparatives in English.

<sup>14</sup> Examples like (31a) provide no evidence for the constituency of the elided material. Hence, we assume that what is elided in examples like (31a) is a variable (i.e., Var) (cf. Hankamer 1973).

- (31) a. Zhangsan jintian [<sub>AP</sub> [<sub>PP</sub> bi [<sub>Lisi</sub> zuotian [<sub>\_\_\_</sub>]]] [<sub>AP</sub> gaoxing]].  
 Zhangsan today than Lisi yesterday happy  
 'Today, Zhangsan is happier than Lisi was yesterday.'



Furthermore, comparative stripping cannot involve literal copying all of the elements in the main clause into the elided site; otherwise, an infinite regress will result, as shown by (32), in which the underlined part is the literally copied part (cf. May 1985, Larson 1987, and Moltmann 1992).

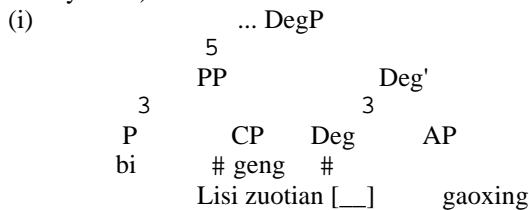
- (32) Zhangsan jintian [<sub>Var</sub> [<sub>AP</sub> [<sub>PP</sub> bi [<sub>Lisi</sub> zuotian [[<sub>Var</sub> [<sub>AP</sub> [<sub>PP</sub> bi [Lisi zuotian [...]]]] [<sub>AP</sub> gaoxing]]]]]] [<sub>AP</sub> gaoxing]].

In this respect, MCCCs behave exactly the same way as ACD constructions with quantified NPs and VPE, as in (33a), which yields (33b) by literal copying.

- (33) a. John read every book that Bill did [<sub>VP</sub>\_\_\_].  
 b. John read every book that Bill did [<sub>VP</sub> read every book that Bill did [<sub>VP</sub>\_\_\_]].

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<sup>15</sup> MCCCs like (31a) can be alternatively analyzed as (i), in which the comparative operator *geng* 'less/more' is the head of the degree phrase (DegP). The *bi*-clause is base-generated in [<sub>Spec</sub>, DegP] (cf. Abney 1987).



We leave this option for future research.

Thus, MCCCs like (34) can be analyzed as ACD constructions involving comparative stripping; namely, sentences like (34) involve a null variable (i.e., Var/elided site) that is located within its antecedent at surface form (cf. Bouton 1970, Sag 1976, May 1985, and Larson 1987).<sup>16</sup>

- (34) Zhangsan jintian [<sub>Var</sub> [bi [Lisi zuotian [<sub>Var</sub>\_\_\_]]] gaoxing].  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'

The null variable inside the *bi*-clause thus cannot be interpreted unless we can somehow remove it out from under the variable that it is anaphorically related to; otherwise, a problem of infinite regress will result.

So, reconstruction of the elided site inside MCCCs becomes a question which we have to address. Since the 1980s, a variety of ways with different assumptions on how to move the null variable out from its antecedent have been proposed to avoid the infinite regress problem (cf. May 1985, Baltin 1987, Moltmann 1992, and Hornstein 1995). All of these analyses except Baltin (1987) assume LF pied-piping; however, according to Chomsky (1995a: 265), only PF convergence forces anything beyond features to raise. Within the Minimalist Program, the possibility of LF movement of quantificational constituents, for example, the *bi*-clause in MCCCs, seems to be blocked. The problem of infinite regress remains. Before we face this problem however, we must first consider the syntactic/semantic structure of MCCCs, which turns out to be extremely complicated. In the next section, we shall see some of these complexities.

### 4.3 The Syntactic/Semantic Complexity of MCCCs

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<sup>16</sup> As Hornstein (1995) suggests, English comparatives like (i) can be analyzed as in (ii), in which *as quickly as Bill did* is generated outside the VP shell as a manner adverbial; therefore, no problem of infinite regress arises.

- (i) John worded the letter as quickly as Bill did.  
 (ii) John [<sub>VP</sub> [<sub>VP</sub> worded the letter] [as quickly as Bill did [<sub>VP</sub>\_\_\_]]].

However, this analysis cannot be applied to MCCCs like (30a). If it is, then (31a) should have the structure in (iii).

- (iii) Zhangsan jintian [<sub>AP</sub> [<sub>PP</sub> bi [Lisi zuotian [<sub>AP</sub>\_\_\_]]] [<sub>AP</sub> gaoxing]].

As (iii) shows, the elliptical process in (31a) is AP deletion rather than comparative stripping. In Mandarin Chinese, since an AP deletion construction requires the occurrence of the verb *shi* 'be', we would expect (31a) to be ungrammatical, contrary to fact. Also see section 4.4.4 for discussion on Hornstein's (1995) A-movement of ACD constructions.

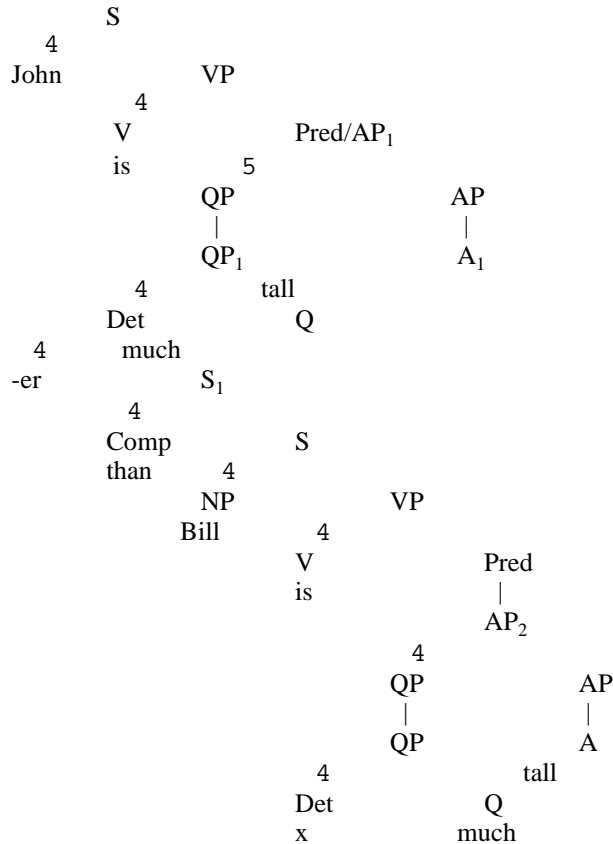
In this section, we shall demonstrate the syntactic/semantic complexity of MCCCs as they pertain to the following issues: LF pied-piping, the obviation of Binding Condition C, Dahl's Puzzle Effects, the Eliminative Effect, and the obviation of Dahl's Puzzle Effects. Discussion of these issues will help us crystallize the nature of the problems we are dealing with, which will then lead to our proposal in section 4.5.

### 4.3.1 LF Pied-Piping Or Not?

According to Bresnan (1973), the comparative morpheme *-er* and the *than*-clause, as shown in (35a), form a syntactic unit, as in (35b), at some (syntactic) level and this unit further undergoes QR at LF.<sup>17</sup> So, (35a)

<sup>17</sup> According to Bresnan (1973: 276), underlying every comparative is a partitive or quantifier-like element *much*, *many*, *little*, or *few*. And the derivation of (i), as Bresnan (1973) suggests, is as follows.

- (i) John is taller than Bill is.  
(ii)



After AP<sub>2</sub> inside S<sub>1</sub> is deleted, S<sub>1</sub> is extraposed and adjoined to the right-hand side of AP<sub>1</sub>. Later, *much* of QP<sub>1</sub> is deleted and *-er* is attached to A<sub>1</sub> *tall*. Thus, example (i) *John is taller than Bill is* is derived.

has the LF representation in (35c) (cf. Cresswell 1976, Hellen 1982, von Stechow 1984, Heim 1985, May 1985, Larson 1988b, and Moltmann 1992).

- (35) a. John is tall-er than [Bill is [\_\_\_]].  
 b. John is tall [-er than [Bill is [\_\_\_]]].  
 c. [-er than [Bill is [\_\_\_]]]<sub>i</sub> [John is t<sub>i</sub>-tall].

As the representation in (35b) shows, the constituent [-er than [Bill is [\_\_\_]]] combines with an adjective denotation (i.e.,  $\langle e, t \rangle$ ) to yield a function from noun phrase denotations (i.e.,  $\langle e, t \rangle$ ) to truth-values (i.e.,  $\langle t \rangle$ ). The constituent [-er than [Bill is [\_\_\_]]] thus has the logical type  $\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$ . In other words, comparative phrases like [-er than [Bill is [\_\_\_]]] denote sets of sets, namely, quantifiers in the sense of Barwise and Cooper (1982) (cf. Larson 1988b), and have the same logical type as quantifying determiners (cf. Heim and Kratzer 1998). Therefore, it is plausible for us to assume that the constituent [-er than [Bill is [\_\_\_]]] in (35) can be compared to the determiner part of quantified phrases like *every man* or *some man*, namely, EVERY or SOME.<sup>18</sup>

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<sup>18</sup> We do not think that there is agreement in the literature as to which semantic analysis is the better analysis. In addition, we neither know of an ultimately decisive argument against one or the other, nor want to argue against any of them. What is important to us here is the general point: the comparative morpheme *-er* and the *than*-clause form a constituent which denotes a degree at LF. In the following, we just briefly summarize the major semantic analyses on comparatives: the definite description analysis, the maximal-degree analysis, the quantificational analysis and the non-degree analysis, and show the advantages and shortcomings of each of them. First, the two representative cases of the DEFINITE DESCRIPTION ANALYSIS are Russell (1905) and Heim (1985). According to this approach, all comparative clauses involve *wh*-movement of a non-overt *wh*-element whose closest overt analogue is *what*. Semantically, they involve binding of a degree variable by a definite description operator (*t*). Following Cresswell (1976), Heim (1985) further assumes that the comparative operator *-er* forms a semantic constituent with the *than*-clause, and that this constituent is, in essence, an indefinite degree-description, meaning "a degree exceeding the one denoted by the *than*-clause". This indefinite description is interpreted as binding a degree variable in the surface position of the *-er*, so that the full LF representation of (ia) would be (ib), with the intended interpretation in (ic).

- (i) a. The desk is higher than the door is wide.  
 b. [-er (than) [wh<sub>i</sub>: the door is t<sub>i</sub> wide]]<sub>j</sub> [S the desk is t<sub>j</sub> high]  
 c.  $\exists y[[y > \lambda x[\text{the door is } x\text{-wide}]] \text{ and } [\text{the desk is } y\text{-high}]]$

According to Heim (1985), the semantics of the English comparative morpheme *-er* can be formalized as follows.

- (ii) For any degree *d* and any function of type  $\langle d, t \rangle$ , [-er](*d*)(*f*) = 1 iff there is a degree *d'* > *d* such that *f*(*d'*) = 1.

In other words, *-er* expresses a 2-place relation between a degree-property (a function from degrees to truth values) and a degree. The full LF representation of (iiia) therefore would be (iiib), with the intended interpretation of (iiic).

- (iii) a. John is taller than Bill is.

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b. [-er (than) [[wh<sub>i</sub>: John is t<sub>i</sub> tall]]<sub>j</sub> [<sub>S</sub> Bill is t<sub>j</sub> tall]

c.  $\exists y[[y > \text{t}[\text{Bill is } x\text{-tall}]] \text{ and } [\text{John is } y\text{-tall}]]$

The problems of the definite description approach will be discussed when we talk about the modified Russellian approach, namely, the maximal-degree approach, proposed by von Stechow (1984).

Second, von Stechow (1984) modifies the definite description approach, proposed by Russell (1905), and proposes the MAXIMAL-DEGREE ANALYSIS. As von Stechow (1984) argues, the formula *tall*(x)(d) is a relation between an individual and his exact height. And *[-er/more]* is a four-place relation which has two degrees among its arguments, as shown by (ivb).

(iv) a. Ede is at least 6 inches taller than Otto is.

b.  $(d_1)[d_1 \geq 6 \text{ inches and Ede is } d_1+d_2\text{-tall in } w \text{ and } d_2 = \text{the maximal } d \text{ such that Otto is } d\text{-tall in } w]$

von Stechow (1984) further proposes that the *than*-clause refers not to a unique degree, as argued in Russell (1905) and Heim (1985), but to the maximal degree. According to his analysis, (va) has the interpretation in (vbb).

(v) a. Paula is taller than [<sub>IP</sub> every boy is].

b.  $\exists d[\text{Paula is } d\text{-tall and } d > \text{the maximal } d' [\text{every boy is } d'\text{-tall}]]$ .

According to von Stechow (1984), (vb) is correct even under the interpretation that Paula is taller than every boy, in case all the boys are equally tall. There is also the interpretation of (va) in (vi), which does not require the boys to be the same height.

(vi)  $\forall x[\text{boy}(x) \rightarrow \exists d[\text{Paula is } d\text{-tall and the maximal } d'[x \text{ is } d'\text{-tall}]]]$ .

However, the existence of a wide scope universal reading for (va) is surprising, given that overt movement is disallowed.

(vii) \*Who<sub>i</sub> is Paula taller than [<sub>IP</sub> t<sub>i</sub> is].

Furthermore, the maximal-degree approach encounters an insurmountable problem related to non-monotonic quantifiers, as shown below.

(viii) a. Bill is taller than [<sub>IP</sub> exactly 5 (other) suspects are].

b.  $\exists d[\text{Bill is } d\text{-tall and } d > \text{the maximal } d'[\text{exactly 5 suspects are } d'\text{-tall}]]]$ .

For example, in situation 1, there are 9 suspects: 3 are 5'6", 5 are 5'7" and Bill is 6'. Bill is actually taller than 8 suspects, so (viiiia) is false, but (viiiib) is true. Now consider (ix) under situation 2, in which there are 6 suspects: 3 are 5'6". 2 are 5'7" and Bill is 6'.

(ix) Exactly 5 suspects  $(\lambda x \exists d [\text{Bill is } d\text{-tall and } d > \text{the maximal } d'[x \text{ is } d'\text{-tall}]]]$ .

In situation 2, (viiiia) is true and (ix) is true. In situation 1, (viiiia) is false and (ix) is false. Moreover, comparative clauses may quantify over sets of numbers that lack a maximal element, as in (x), as noted by Pinkal (1989).

(x) 2 is greater than any rational lower approximation of the square root of 2.

In order to account for (x) within the maximal-degree approach, 'maximal element' would be replaced by 'least upper bound' in the logical form of a clausal comparative construction. But then the same problem arises with comparative clauses that quantify over a set of numbers which does not include the least upper bound such as (xi).

(xi) W is greater than any finite number is.

(xi) comes out as false if the comparative clause would denote the least upper bound of the set of finite numbers.

Third, Cresswell (1976) and subsequent works such as Moltmann (1992) propose the QUANTIFICATION ANALYSIS which argues that comparatives should semantically be treated as universal quantifiers over degrees. The semantic representation of (xiia) is given in (xiib), where *[-er]* denotes a relation between degrees *d* and *d'* such that *d* is greater than *d'*. Adjectives such as *tall* denote relations between individuals *x* and degrees *d* such that *tall* holds between *x* and *d* iff *x* is tall to the degree *d*, where *d* is *x*'s actual height.

(xii) a. John is taller than he was.

b.  $\forall d[\text{was tall}([\text{John}], d) \rightarrow \exists d'([\text{-er}](d, d') \text{ and is tall}([\text{John}], d'))]$

As von Stechow (1984) points out, this approach will yield the wrong result for sentences like (xiii), which involves a possibility operator  $\times$  (i.e., an existential operator).

(xiii) A polar bear could be bigger than a grizzly bear could be.

The universal quantificational approach like Cresswell (1976) and Moltmann (1992) will have (xvi) as the interpretation for (xiii).

Hence, we propose that in MCCC's such as (36b) the constituent [*pp bi* [*CP Lisi zuotian* [\_\_\_]]] 'than *Lisi* yesterday [\_\_\_]' can be considered the counterpart of the determiner part of a quantified phrase, that is, *bi*-clauses are counterparts to generalized quantifiers such as *every* in (36a). The compositional process of the constituent [*bi* [*Lisi zuotain* [\_\_\_]]] '[than [*Lisi* yesterday [\_\_\_]]]' is illustrated by the annotated tree (36b) (cf. Heim and Kratzer 1998: 146).

- (36) a. S, t  
4  
DP, <<e, t>, t> VP, <e, t>

(xvi)  $(\forall d_1, d_2)[\mathbf{x}(\text{A polar bear is } d_1\text{-big}) \text{ and } \mathbf{x}(\text{A grizzly bear is } d_2\text{-big}) \rightarrow d_1 > d_2]$   
 However, the truth condition of (xvi) is too strong. We only have to find a polar bear which is smaller than a grizzly bear in order to falsify this proposition.

Fourth, apart from all other major semantic analyses on comparatives fundamentally, Klein (1980, 1991) and Larson (1988b) propose an ANALYSIS WITHOUT THE NOTION OF DEGREES. Klein's analysis comes from the contrast between (xva) and (xvb).

- (xv) a. John is taller than Mary.  
 b. John's height exceeds Mary's height.

In contrast with (xvb), which states a relation between John's height and Mary's height (i.e., between two degrees), (xva) gives us the concrete feeling that it states a relation between John and Mary, two concrete objects. Thus, it seems desirable to develop an analysis that does not involve the notion of degree for sentences like (xva). According to Klein (1980), an adjective like *tall* has to be interpreted relative to a *comparison class*, called *context*. If *c* is a context, *tall* divides *c* into the definitely tall things (if there are any), the definitely not-tall things (if there are any) and those thing which are neither definitely tall nor definite not-tall. Thus sentence (xvi) is true with respect to *c*, if Mary is among the definitely tall things in *c* with respect to *c*, false if she is among the definitely not-tall things in *c* with respect to *c*, and truth-valueless otherwise.

(xvi) Mary is tall.

The sentence (xvii) is true with respect to *c* iff (xviii) holds:

(xvii) John is taller than Mary.

(xviii)  $(c' \sqsubseteq c)(\text{John is taller is true with respect to } c' \text{ and } \sim(\text{Mary is tall is true with respect to } c'))$

In Klein's theory, (xviii) is equivalent with (xix).

(xix) John is tall is true with respect to {John, Mary} and  $\sim(\text{Mary is tall is true with respect to } \{\text{John, Mary}\})$

Assumption: *tall* (x)(d) means 'x is at least d-tall'. If John is 6 feet tall, he is also 5 feet tall.

- (xx) a. Mary is taller than Sue.  
 b.  $\exists d[\text{Mary is } d\text{-tall and } \sim\text{Sue is } d\text{-tall}]$  (Larson 1988b)

However, Hoepelman (1982) remarks that Klein's theory has the consequence that (xxia-b) are treated alike, given Klein's interpretation rules for the connectives (cf. Klein 1980: 11).

- (xxi) a. Mary is tall and short.  
 b. Mary is neither tall nor short.

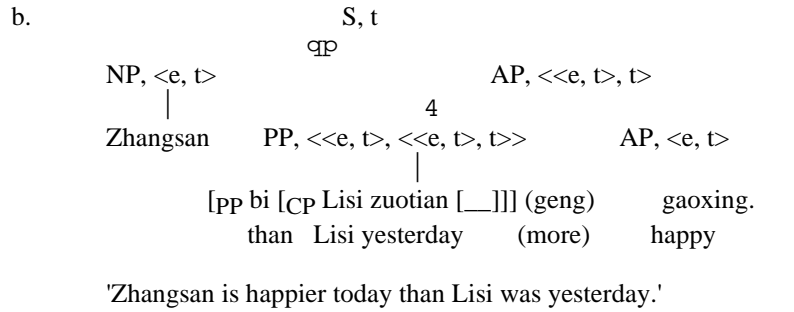
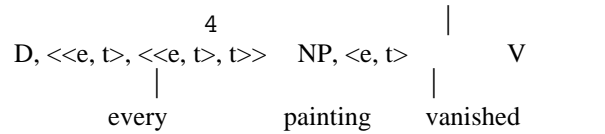
But, as Hoepelman notices, there is an intuitively given difference: (xxia) is always false whereas (xxib) is contingent. Hoepelman's criticism assumes the same meaning for not tall and short. Indeed, if short is the same as not tall, then (xxib) would mean the same as (xxii).

(xxii) Mary is not tall and she is not not-tall.

Of course, this cannot be true. Although Klein may defend his analysis by stipulating that the extensions not tall and not short can overlap because otherwise (xxiii) cannot be true, examples like (xxiv) cannot be incorporated into Klein's theory.

(xxiii) Mary is not tall and she is not short.

(xxiv) John is six inches taller than Mary.



The parallel status of the determiner part of quantified phrases, as in (36a), and the comparative constituent [-er than [Bill is [\_\\_\\_\\_\\_\\_]]], as in (35a), therefore raises an important question about the theory of QR; namely, whether QR is needed in MCCCs or not.

Since Cheng (1991), it has been claimed that scope shifting operations (SSOs), that is, Quantifier Raising and Quantifier Lowering, are restricted by Economy considerations. In the past few years, different theories have been proposed to investigate the content of this claim.

First, according to Fox (1995a: 284), an SSO can apply only if it yields a semantic interpretation which would be impossible without its application; in other words, SSOs are allowed only when necessary (as a last resort) to achieve a designated interpretation. Now consider example (31a), repeated as (37).

- (37) Zhangsan jintian [AP [pp bi [Lisi zuotian [\_\\_\\_\\_\\_\\_]]] [AP gaoxing]].  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'

Given that, in (37), there is only one quantified phrase, namely, the *bi*-clause, the interpretation of (37) can be obtained without QR under Fox's (1995a) assumption. So, if Fox (1995a) is correct, then no QR is needed for (37).

Second, given the curious characteristic of reconstruction which is always held to follow LF movement, Chomsky (1995a: 202-210) proposes the copy theory of movement and suggests that (38b) is a notational abbreviation for (38a).

- (38) a. (guess) [[*wh* in which house] John lived *t*]  
 b. [*wh* in which house] John lived [*wh* in which house]

The LF component then converts the phrase *wh* to either (39a) or (39b) by an operation akin to QR, as Chomsky (1995a) suggests.

- (39) a. [which house] [*wh* in *t*]  
 b. [which] [*wh* in [*t* house]]

For convergence at LF, an operator-variable structure is needed. Chomsky (1995a: 203) hence proposes that, in the operator position, everything but the operator phrase must delete; therefore, the phrase *wh* of (39a-b) deletes. However, in the trace position, the copy of what remains in the operator positions deletes, leaving just the phrase *wh*. Consequently, it is necessary to add a Preference Principle for reconstruction: Do it when you can (i.e., try to minimize the restriction in the operator position). Hence, it is reasonable for us to assume that, given the Preference Principle, it is the determiner part of quantified phrases that undergoes QR at LF. Therefore, in clausal comparatives, it is the constituent [*-er than [...]*] that undergoes QR at LF. Thus, (40a) has the LF structure (40b), in which the elided AP is reconstructed by copying its main-clause counterpart.

- (40) a. John is tall-er than [Bill is [\_\_\_]].  
 b. [-er than [Bill is [<sub>AP</sub> *t*<sub>i</sub>-tall]]]; [John is [<sub>AP</sub> *t*<sub>i</sub>-tall]].

This approach to clausal comparatives implies that LF pied-piping is necessary in clausal comparatives like (40a).

Third, since QR is a covert operation, Chomsky (1995a: 377) suggests that it must consist of feature raising only; namely, a quantificational feature [quant] raises to adjoin to some  $X^{0max}$  that is a

potential host (presumably T or  $\nu$ , which might have optional affix features allowing them to host [quant]).<sup>19</sup> If this feature-raising approach is chosen, then it is only the quantificational feature [quant] that raises. In other words, LF pied-piping is not allowed. If so, then (40b) must not be the LF representation for (40a).

We have argued that MCCCs like (40a) contain one and only one quantified phrase, the *bi*-clause. So, the first puzzle related to MCCCs is whether QR is needed or not. If it is, the further question of whether LF pied-piping is needed arises. Thus we have two options, the Preference-Principle approach and the feature-raising approach; but which one is preferable? If LF pied-piping is needed, is it subject to any conditions?

#### 4.3.2 The Obviation of Binding Condition C

Chomsky (1981) claims (see also Lasnik 1999) that the effects of QR are invisible to Binding Theory; in particular, QR (as well as LF *wh*-movement) does not rescue Binding Condition C violations. This assumption was based on the observation that (41a-b), whose LF representations (if Binding Theory could see the effects of QR) are represented as (42a-b) respectively, are ungrammatical (cf. May 1985).

- (41) a. \*/?Bill bought him<sub>i</sub> every picture that John<sub>i</sub> liked.  
 b. \*He<sub>i</sub> bought Bill every picture that John<sub>i</sub> liked.
- (42) a. [IP [every picture that John<sub>i</sub> liked]<sub>j</sub> [IP Bill bought him<sub>i</sub> t<sub>j</sub>]].  
 b. [IP [every picture that John<sub>i</sub> liked]<sub>j</sub> [IP he<sub>i</sub> bought Bill t<sub>j</sub>]].

However, F&M (1994: 296) and Fox (1995b: 111) argue that certain instances of QR do affect Binding Theory by providing cases like (43a-b).

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<sup>19</sup> The affixal feature of the functional categories is optional, therefore, chosen only if it "makes a difference", assuming that the economy condition, as shown below, holds for this case (cf. Reinhart 1993 and Fox 1995a).

(i)  $\alpha$  enters the numeration only if it has an effect on output.

- (43) a. You **sent him<sub>i</sub>** [everything that John<sub>i</sub> expected you would [\_\_\_]].  
 b. You **introduced him<sub>i</sub> to** [everyone John<sub>i</sub> wanted you to [\_\_\_]].

In other words, in ACD constructions like (43a-b), QR seems to obviate Binding Condition C. However, F&M (1994) notice that examples like (44) show a contrast with (43a-b) in not obviating Binding Condition C.

- (44) \*He<sub>i</sub> bought me everything that John<sub>i</sub> thought he<sub>i</sub> should [buy me].

Given this contrast, F&M (1994) and Fox (1995b) suggest that the difference in grammaticality between (43a-b) and (44) lies in the syntactic position of the binder of the R-expression. That is, in (44), the binder (i.e., the third person pronoun) is not contained within the constituent that has to be reconstructed (i.e., the underlined part). Hence, F&M (1994: 267-269) reaches the generalization in (45).<sup>20</sup>

- (45) Quantifier Raising obviates Binding Condition C iff  
 a. ACD is involved, and  
 b. the binder of the R-expression has a copy contained within the elided VP.

However, it is far from obvious how the two factors in (45) could determine whether or not QR obviates Binding Condition C in cases like (46a-b) (cf. Fox 1995b). Like English examples (43a-b), the MCCC (46), which, as we have argued, can be analyzed as an ACD construction involving comparative stripping, also shows the obviation of Binding Condition C by QR.

- (46) Huaishi, wo jiao ta<sub>i</sub> [bi [Lisi<sub>i</sub> jiao wo [\_\_\_]]] duo zuo-le san-ci.  
 Wrongs I ask him than Lisi ask me more do-ASP three-times  
 'As for wrongs, I asked Lisi<sub>i</sub> to do three more times than he<sub>i</sub> asked me to do.'

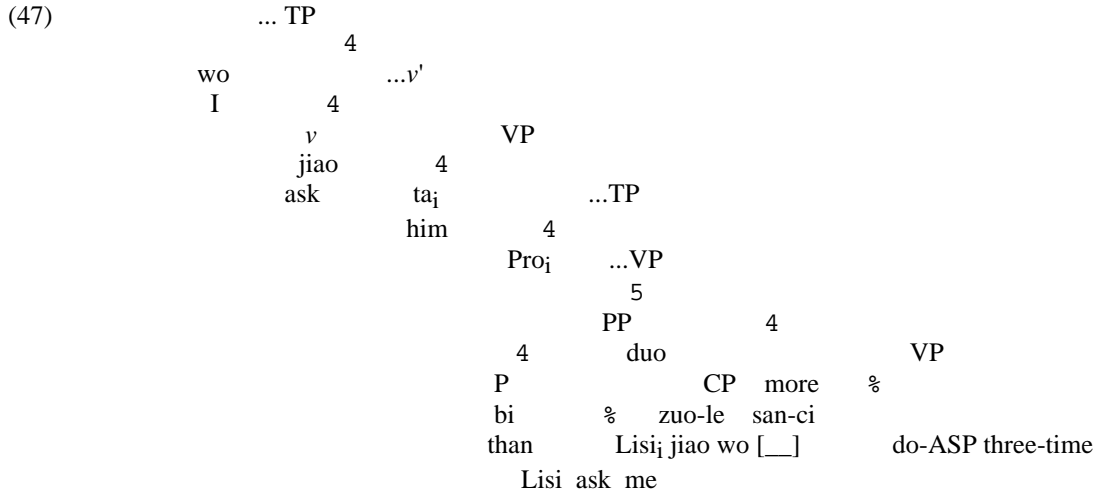
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<sup>20</sup> F&M's (1994) generalizations as shown by (45a-b) immediately predicts that there is contrast between (ia) and (ib) (cf. Fox 1995c: 106).

- (i) a. You introduced him<sub>i</sub> to everyone John<sub>i</sub> wanted her to [VP\_\_\_].  
 b. ??/\*You introduced him<sub>i</sub> to everyone John<sub>i</sub> wanted to meet [NP\_\_\_].

However, Kennedy (1997: 687-686) questions this judgment by saying that of 13 native speakers interviewed, only 1 judged (ib) unacceptable on the intended reading.

As the structure of (46) given in (47) shows, although the pronominal object *ta* 'him', which is coreferential with the embedded subject *Lisi* of the *bi*-clause, c-commands *Lisi*, (46) is still grammatical; namely, Binding Condition C is not contravened in (46).



More interesting here is the fact that in (47) coreference between the c-commanding pronominal object *ta* 'him' and the R-expression *Lisi* is unexpectedly allowed even though the binder of the R-expression *Lisi*, namely, the pronominal object *ta* 'him', does not have a copy contained within the elided part. That is, (46) does not conform to (45b).<sup>21</sup>

However, (48), which has the structure in (49), differs from (46) in that the obviation of Binding Condition C is not allowed (cf. Huang 1989 and Tang 1990).

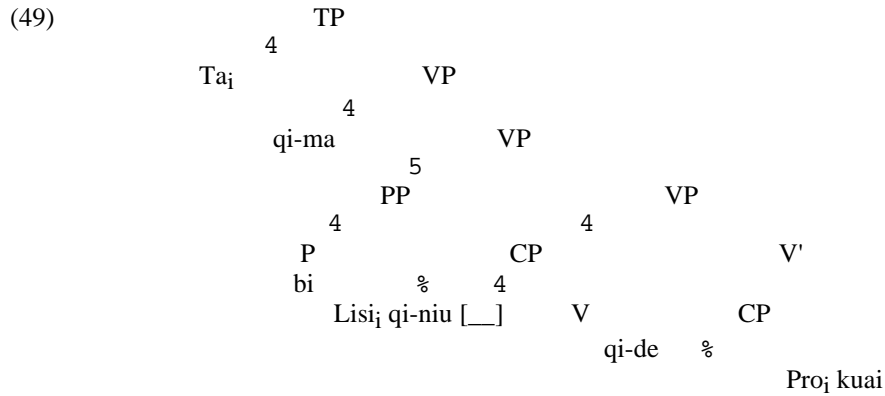
(48) \**Ta<sub>i</sub> qi ma [[bi [Lisi<sub>i</sub> qi niu [ ]]] [qi-de kuai].*

<sup>21</sup> As Jim Huang (personal communication) points out to me, what is [ ] inside (46)? The [ ] inside (46) might be (a) *zuo-le* 'do-ASP' or (b) *zuo-le san-ci* 'do-ASP three times'. The meaning should be (a). So, how do we fit it? We would suggest that within (46) the measure phrase *san-ci* 'three-times', which quantifies over the doing action, can be considered a degree phrase modifying the verb *zuo* 'do'. Following Bresnan (1973) and von Stechow (1984), we further assume that the *bi*-clause (i.e., the *than*-clause) determines a property of degree. Therefore, it is plausible for us to say that in (46) both the *bi*-clause and the numeral part of the measure phrase *san-ci* 'three times' form a discontinuous constituent at LF, where this newly formed constituent undergoes QR, as shown in (i).

(i) ... [[[bi [Lisi<sub>i</sub> jiao wo [ ]]]<sub>j</sub>-san] [wo jiao ta<sub>i</sub> zuo-le t<sub>j</sub>-ci].  
 than Lisi ask me three I ask him do-ASP time

Given the LF Identity Condition on Ellipsis (cf. (22)), the [ ] inside the *bi*-clause as in (46) should be *zuo-le t<sub>j</sub>-ci* 'do-ASP t<sub>j</sub>-time' too.

He ride horse than Lisi ride cow ride-DE fast  
 '\*The speed of his<sub>i</sub> horse-riding is faster than that of Lisi<sub>i</sub>'s cow-riding.'



In other words, in (48), although the pronominal subject *ta* 'he' c-commands its coindexed R-expression *Lisi* as the pronominal object *ta* 'him' in (46) does, (48) is unexpectedly ungrammatical, presumably because of the violation of Binding Condition C.

Hence, the second puzzle related to MCCCs is how to explain the contrast between (46) and (48).

### 4.3.3 Dahl's Puzzle Effects and the Eliminative Effect

In this section, we shall discuss binding in ellipsis constructions, especially MCCCs, and two binding phenomena shown by MCCCs will be discussed. One is Dahl's Puzzle (or Dahl's generalization), which restricts the distribution of strict and sloppy ambiguities in ellipsis constructions. The other is that Dahl's Puzzle in fact is a specific realization of the Eliminative Effect shown by ellipsis.

As F&M (1994: 129) argue, the effect of ellipsis on anaphora is not conserving but ELIMINATIVE. This effect is clearly shown in ellipsis constructions such as (51), which is in contrast with non-elliptical constructions in (50).

- (50) Max said he saw his mother, and Oscar said he saw his mother too.
- a. Max said Max saw Max's mother, and Oscar said Max saw Max's mother. (strict, strict)
  - b. Max said Max saw Max's mother, and Oscar said Oscar saw Oscar's mother. (sloppy, sloppy)

- c. Max said Max saw Max's mother, and Oscar said Oscar saw Max's mother. (sloppy, strict)
  - d. Max said Max saw Max's mother, and Oscar said Max saw Oscar's mother. (strict, sloppy)
- (51) Max said he saw his mother, and Oscar did [\_\_\_], too.
- a. Max said Max saw Max's mother, and Oscar said Max saw Max's mother. (strict, strict)
  - b. Max said Max saw Max's mother, and Oscar said Oscar saw Oscar's mother. (sloppy, sloppy)
  - c. Max said Max saw Max's mother, and Oscar said Oscar saw Max's mother. (sloppy, strict)
  - d. \*Max said Max saw Max's mother, and Oscar said Max saw Oscar's mother. (strict, sloppy)

The distinction between (50) and (51) is that all four possible readings are available in the non-elliptical example (50) when both overt pronouns are anaphorically related to the matrix subject *Max*. However, under the same condition, the natural readings of the elliptical example (51) are those where the elided pronouns are read "across-the-board": either both are understood strictly (...and Oscar said Max saw Max's mother), or both are understood sloppily (...and Oscar said that Oscar saw Oscar's mother). Besides these two readings, (51) allows a third reading (i.e., (51c)), under which the first pronoun is understood as sloppy and the second as strict (...and Oscar said that Oscar saw Max's mother). Although the "mixed" reading (51c), as Dahl (1974) first noticed, is usually perceived as marginal and somewhat marked relative to the "across-the-board" readings, this reading contrasts sharply with another "mixed" reading (i.e., (51d)), in which the pronouns would be understood in the opposite manner: the first as strict and the second as sloppy (... and Oscar said that Max saw Oscar's mother). The "mixed" reading in (51d) is precluded for all speakers. According to this reading, the first pronoun cannot be interpreted by strict identity if the second pronoun is interpreted by sloppy identity. This kind of restriction on the distribution of strict and sloppy ambiguities in constructions which involve two or more pronouns linked to the same

antecedent thus is named Dahl's Puzzle (though it is also dubbed the Many-Pronouns Puzzle in previous literature).<sup>22</sup>

Like its English counterpart in (51), the Mandarin Chinese VP ellipsis construction in (52), which is in contrast with its non-elliptical counterpart in (53), shows Dahl's Puzzle Effects as well.

- (52) Zhangsan shuo [ta bu xihuan ta-de laoban], Lisi ye shi [VP\_\_].  
 Zhangsan say he not like his boss Lisi also is
- a. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Zhangsan does not like Zhangsan's boss.' (strict, strict)

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<sup>22</sup> F&M (1994: 150-151) develop a notion of identity of indexical dependency shown by (i), interacting with a dependency theory, to explain the Eliminative Effect that shows up in the Many-Pronouns Puzzle.

- (i) Indexical dependencies *ID* and *ID'* are *i-copies* if and only if *ID* and *ID'* vary from each other in at most the value of *I*. In other words, indexical dependencies are *i-copies* if and only if they have the same elements and the same structural descriptions.

According to F&M's (1994) dependency theory, there are two distinct types of occurrences of indices: an  $\alpha$ -occurrence of indices and a  $\beta$ -occurrence of indices. An  $\alpha$ -occurrence of an index under their analysis is equivalent to a free occurrence of an index, while a  $\beta$ -occurrence of an index corresponds to a bound occurrence of an index. Assuming that VP ellipsis is only possible if the VP in question is identical in relevant respects to its antecedent, F&M (1994) suggest that the only candidate representations for (50) which have a possibility of satisfying this restriction are thus (ia-c) (cf. Sag 1976, Sag and Hankamer 1984, and Heim and Kratzer 1998).

- (i) a. Max<sub>1</sub> <sup>$\alpha$</sup>  said he<sub>1</sub> <sup>$\alpha$</sup>  saw his<sub>1</sub> <sup>$\alpha$</sup>  mother and Oscar<sub>2</sub> <sup>$\alpha$</sup>  said he<sub>2</sub> <sup>$\alpha$</sup>  saw his<sub>2</sub> <sup>$\alpha$</sup>  mother too.  
 b. Max<sub>1</sub> <sup>$\alpha$</sup>  said he<sub>1</sub> <sup>$\beta$</sup>  saw his<sub>1</sub> <sup>$\beta$</sup>  mother and Oscar<sub>2</sub> <sup>$\alpha$</sup>  said he<sub>2</sub> <sup>$\beta$</sup>  saw his<sub>2</sub> <sup>$\beta$</sup>  mother too.  
 c. Max<sub>1</sub> <sup>$\alpha$</sup>  said he<sub>1</sub> <sup>$\beta$</sup>  saw his<sub>1</sub> <sup>$\alpha$</sup>  mother and Oscar<sub>2</sub> <sup>$\alpha$</sup>  said he<sub>2</sub> <sup>$\beta$</sup>  saw his<sub>1</sub> <sup>$\alpha$</sup>  mother too.  
 d. \*Max<sub>1</sub> <sup>$\alpha$</sup>  said he<sub>1</sub> <sup>$\alpha$</sup>  saw his<sub>1</sub> <sup>$\alpha$</sup>  mother and Oscar<sub>2</sub> <sup>$\alpha$</sup>  said he<sub>1</sub> <sup>$\alpha$</sup>  saw his<sub>2</sub> <sup>$\beta$</sup>  mother too.

They attribute the strict versus sloppy distinction (i.e., (ia) vs. (ib)) to properties of indexical types, that is, to whether an index is taken as dependent or independent. In other words, either both the pronouns are  $\alpha$ -occurrences, or both are  $\beta$ -occurrences. (ib) represents the sloppy reading, licensed by the dependencies in (iia-b) which are *i-copies*.

- (ii) a. <(Max, he, his), 1, <NP, V, NP, V, NP>>  
 b. <(Oscar, he), 2, <NP, V, NP, V, NP>>

Hence, VP ellipsis is allowed. The mixed reading (ic), in which the first elided pronoun is understood as sloppy but the second as strict, has the representations as in (iii), in which a  $\beta$ -occurrence precedes an  $\alpha$ -occurrence.

- (iii) a. <(Max, he), 1, <NP, V, NP>>  
 b. <(Oscar, he), 2, <NP, V, NP>>

Since (iia-b) are *i-copies*, a sloppy reading of the first of the two elided pronouns is allowed. Finally, as for the unavailability of (id), F&M (1994: 151) suggest that the left-hand clause must encode a dependency that is an *i-copy* of (iv).

- (iv) <(Oscar, his), 2, <NP, V, NP, V, NP>>

As they argue, there are three possibilities to consider.

- (v) a. <(he, his), 1, <NP, V, NP>>  
 b. <(Max, his), 1, <NP, V, NP, v, NP>>  
 c. <(Max, he, his), 1, <NP, V, NP, V, NP>>

Since all of these three are not *i-copies* of (iv), the mixed reading (id) is excluded.

- b. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Lisi does not like Lisi's boss.' (sloppy, sloppy)
- c. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Lisi does not like Zhangsan's boss.' (sloppy, strict)
- d. \*'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Zhangsan does not like Lisi's boss.' (strict, sloppy)
- (53) Zhangsan shuo [ta bu xihuan ta-de laoban], Lisi ye shuo [ta bu xihuan ta-de  
Zhangsan say he not like his boss Lisi also say he not like his  
laoban].  
boss
- a. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Zhangsan does not like Zhangsan's boss.' (strict, strict)
- b. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Lisi does not like Lisi's boss.' (sloppy, sloppy)
- c. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Lisi does not like Zhangsan's boss.' (sloppy, strict)
- d. 'Zhangsan said that Zhangsan does not like Zhangsan's boss, and Lisi also said that Zhangsan does not like Lisi's boss.' (strict, sloppy)

As expected, besides the two "across-the-board" readings: (strict in (52a) and sloppy in (52b)), the "mixed" (sloppy/strict) reading (52c), though it is somewhat marginal, is still acceptable for most native speakers of Mandarin Chinese. In contrast, the "mixed" (strict/sloppy) reading (52d) is excluded by all native speakers.

Although it is impossible to construct a non-elliptical counterpart for an MCCC, the MCCC (54) indeed shows the same ambiguities as (51) does, as (54a-e) illustrate.

- (54) Zhangsan jintian [bi [Lisi zuotian [\_\_\_]] geng qingchude biao ming-le [ta bu  
Zhangsan today than Lisi yesterday more clearly claim-ASP he not  
xihuan tade laoban].  
like his boss
- a. Today Zhangsan claims that Zhangsan does not like Zhangsan's boss more clearly than the way that Lisi claimed that Zhangsan did not like Zhangsan's boss yesterday. (strict, strict)
- b. Today Zhangsan claims that Zhangsan does not like Zhangsan's boss more clearly than the way that Lisi claimed that Lisi did not like Lisi's boss yesterday. (sloppy, sloppy)

c. Today Zhangsan claims that Zhangsan does not like Zhangsan's boss more clearly than the way that Lisi claimed that Lisi did not like Zhangsan's boss yesterday. (sloppy, strict)

d. \*Today Zhangsan claims that Zhangsan does not like Zhangsan's boss more clearly than the way that Lisi claimed that Zhangsan did not like Lisi's boss yesterday. (strict, sloppy)

Thus, it is plausible for us to say that MCCCs like that in (54) also show Dahl's Puzzle Effects: when an elliptical construction involves two or more pronouns linked to the same antecedent, the first pronoun cannot be interpreted via strict identity if the second pronoun is interpreted via sloppy identity. The effect of this puzzle, as F&M (1994) suggests, can be considered a more generalized effect, namely, the Eliminative Effect.

MCCCs also show a variety of Eliminative Effects. First, consider (55), in which the complex anaphor *ta-ziji* 'himself' can refer to either the subject NP or the indirect object NP.

(55) Zhangsan<sub>i</sub> jintian [bi [Lisi<sub>k</sub> zuotian [\_\_\_]] duo gei-le Wangwu<sub>j</sub> yi-zhang  
Zhangsan today than Lisi yesterday more give-ASP Wangwu one-CL taziji-de  
zhaopian.  
himself-DE picture

a. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Zhangsan's pictures that Lisi gave to Wangwu yesterday.

(strict reading): Zhangsan<sub>i</sub>-Wangwu<sub>k</sub>-taziji<sub>i</sub> vs. Lisi<sub>j</sub>-Wangwu<sub>k</sub>-taziji<sub>i</sub>

b. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday.

(sloppy (subject) reading): Zhangsan<sub>i</sub>-Wangwu<sub>k</sub>-taziji<sub>i</sub> vs. Lisi<sub>j</sub>-Wangwu<sub>k</sub>-taziji<sub>j</sub>

c. The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday.

(sloppy (indirect object) reading): Zhangsan<sub>i</sub>-Wangwu<sub>k</sub>-taziji<sub>k</sub> vs. Lisi<sub>j</sub>-Wangwu<sub>k</sub>-taziji<sub>k</sub>

d. \*The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday.

(mixed (subject/indirect object) reading): Zhangsan<sub>i</sub>-Wangwu<sub>k</sub>-taziji<sub>i</sub> vs. Lisi<sub>j</sub>-Wangwu<sub>k</sub>-taziji<sub>k</sub>

e. \*The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday.

(mixed (indirect object/subject) reading): Zhangsan<sub>i</sub>-Wangwu<sub>k</sub>-taziji<sub>k</sub> vs.  
Lisi<sub>j</sub>-Wangwu<sub>k</sub>-taziji<sub>j</sub>

As (55) shows, besides the strict reading in (55a), among the other four logically possible readings in (55b-e), only the two "across-the-board" sloppy readings, (55b) and (55c), are allowed. The other two "mixed" readings are totally unacceptable.

Second, consider (56), in which the complex anaphor *ta-ziji* 'himself' cannot refer to the plural pronominal subject *tamen* 'they' because of feature-mismatch.

(56) Tamen<sub>i</sub> jintian [bi [Lisi<sub>k</sub> zuotian [\_\_\_]] duo gei-le Wangwu<sub>j</sub> yi-zhang  
They today than Lisi yesterday more give-ASP Wangwu one-CL  
taziji-de zhaopian.  
himself-DE picture

a. \*The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday.

b. The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday.

As (56) shows, in the main clause the coreference between the complex reflexive *ta-ziji* 'himself' and the matrix subject *tamen* 'they' is impossible because the matrix subject *tamen* 'they' and the complex reflexive *ta-ziji* 'himself' do not match each other in  $\phi$ -features. Therefore, the reflexive *ta-ziji* 'himself' can refer only to the indirect object *Wangwu*. The significant point here is that, in the *bi*-clause, the complex reflexive *ta-ziji* 'himself' is not allowed to refer to the embedded subject, namely, *Lisi*, even though *Lisi* matches with the complex reflexive *ta-ziji* 'himself' in  $\phi$ -features.

Thus, in MCCCs, the effect of comparative stripping, like that of VP ellipsis, can be considered ELIMINATIVE. That is, comparative stripping no longer preserves anaphoric possibilities; instead, it restricts their realization. Furthermore, when an MCCC involves two or more pronouns linked to the same antecedent, Dahl's Puzzle Effects will come out. Thus, we are forced to derive the Eliminative Effect, especially Dahl's Puzzle Effects shown by MCCCs.

#### 4.3.4 The Obviation of Dahl's Puzzle Effects

In this section we shall point out that, in a certain environments, Mandarin Chinese VP ellipsis constructions as well as MCCCs, though they contain two or more anaphoric elements linked to the same antecedent, do not show Dahl's Puzzle Effects. In particular, in certain environments, the first anaphoric element can be interpreted via strict identity even though the second one is interpreted via sloppy identity. Now consider sentences like (57), in which both the pronominal embedded subject *ta* 'he' and the anaphoric embedded object *ziji* 'self' are linked to the same antecedent *Zhangsan*, under the context: The brothers *Zhangsan* and *Lisi* were asleep. During their sleep, *Zhangsan* rolled over, and his hand hit his own leg and *Lisi's* head; and *Lisi* rolled over, and his hand hit his own leg and *Zhangsan's* head. The process of their hitting each other was video-taped by their father. Later, they were shown this video. When they were watching the video, we might use (57) to describe the watching-event.

(57) Zhangsan<sub>i</sub> kandao [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
 Zhangsan see he one roll-over then hit-ASP self  
 Zhangsan<sub>i</sub> found that he<sub>i</sub> rolled over and hit himself<sub>i</sub> .'

(57) is two-ways ambiguous, depending on how the reflexive *ziji* 'self' is interpreted. Since the embedded clause of (57) refers to an environment in which the hitter is unconscious to the hitting event, *ziji* 'self' must be in *de re* use when it is locally bound by the pronominal embedded subject *ta* 'he', which is further linked to the matrix subject *Zhangsan*. In contrast, when *ziji* 'self' is long-distance (or directly) bound by the matrix subject *Zhangsan*, only the *de se* reading is obtained.<sup>23</sup> The semantic representations of these two readings, as Chierchia (personal communication) suggests to me, can be illustrated as in (58a-b), respectively.

(58) a. kandao (Zhangsan,  $\lambda x(x \text{ hit } x)$ ) attitude *de se*  
 b.  $\lambda x(\text{kandao}(x, x \text{ hit } x))$  (Zhangsan) attitude *de re*

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<sup>23</sup> Following Heim (1998), we assume that a variable *x* cannot be bound by an antecedent  $\alpha$  in cases where a more local antecedent  $\beta$  could bind *x* and yield the same semantic interpretation. In (57), the locally-bound *ziji* 'self' differs from the non-locally-bound *ziji* 'self' in that the former is in *de re* use while the latter is in *de se* use. So, in (57) *ziji* 'self' is allowed to be directly bound by the long-distance antecedent *Zhangsan*.

Here, the *de se* reading represents a relation between an individual  $x$  and the property  $Q$  (i.e.,  $\lambda x(x \text{ hit } x)$ ) while the *de re* reading represents a relation between an individual  $x$  and a proposition (i.e.,  $\text{kandao}(x, x \text{ hit } x)$ ) (cf. Chierchia 1989). Now consider the coordinate construction (59), which does not involve ellipsis in the second conjunct.

- (59) Zhangsan<sub>i</sub> kandao [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>],  
 Zhangsan see he one roll-over then hit-ASP self  
 Lisi<sub>j</sub> ye kandao [ta yi fanshen jiu dadao-le ziji].  
 Lisi also see he then roll-over then hit-ASP self  
 'Zhangsan found that he rolled over and hit himself, and Lisi also found that he rolled over and hit himself.'

Under the designated context, besides the "across-the-board" strict and the "across-the-board-sloppy" readings (i.e., (60bi-ii)), the strict-sloppy "mixed" reading (60biii) is also available in the second conjunct which does not involve ellipsis (i.e., (60b)).<sup>24</sup>

- (60) a. Zhangsan<sub>i</sub> kandao [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
 Zhangsan see he one roll-over then hit-ASP self  
 'Zhangsan<sub>i</sub> found that he<sub>i</sub> rolled over and hit himself<sub>i</sub>.'
- i.  $\text{kandao}(\text{Zhangsan}, \lambda x(x \text{ hit } x))$  attitude *de se*
- ii.  $\lambda x(\text{kandao}(x, x \text{ hit } x))$  (Zhangsan) attitude *de re*
- b. Lisi<sub>j</sub> ye kandao [ta yi fanshen jiu dadao-le ziji]  
 Lisi also see he one roll-over then hit-ASP self
- i. Lisi<sub>j</sub> also found that Zhangsan rolled over and hit Zhangsan.  
 (strict, strict)
- ii. Lisi<sub>j</sub> also found that Lisi<sub>j</sub> rolled over and hit Lisi<sub>j</sub>.  
 (sloppy, sloppy)  
 $\lambda x(\text{kandao}(x, x \text{ hit } x))$  (Lisi) attitude *de re*
- iii. Lisi<sub>j</sub> also found that Zhangsan rolled over and hit Lisi<sub>j</sub>.  
 (strict, sloppy)

<sup>24</sup> The sloppy-strict mixed reading (60biv) is independently ruled out by either Binding Condition A or the Logophoric Constraints. When the reflexive *ziji* 'self' is in anaphoric use, it must be bound by the local antecedent (i.e., the embedded subject *Lisi*); however, in fact it is not. So, the reflexive *ziji* 'self' should be in logophoric use. We then would expect the logophor *ziji* 'self' to take the matrix subject *Lisi* which is the pivot of communication as antecedent. But in fact it does not. According to Chomsky (1986a), each lexical item of a sentence must be fully interpreted. In (60biv), the reflexive *ziji* 'self' does not get interpreted either anaphorically or logophorically; therefore, the sloppy-strict reading (60biv) is unavailable.

kandao (Lisi,  $\lambda x(\text{Zhangsan hit } x)$ ) attitude *de se*

- iv. \*Lisi<sub>j</sub> also found that Lisi<sub>j</sub> rolled over and hit Zhangsan.'  
(sloppy, strict)

Further, even when the second conjunct involves VP ellipsis, the strict-sloppy "mixed" reading, though it is perceived as marginal and somewhat marked relative to the "across-the-board" readings, is still available, as (61b) illustrates.

- (61) a. Zhangsan<sub>i</sub> kandao [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
Zhangsan see he one roll-over then hit-ASP self  
Zhangsan<sub>i</sub> found that he<sub>i</sub> rolled over and hit himself<sub>i</sub>.'
- i. kandao (Zhangsan,  $\lambda x(x \text{ hit } x)$ ) attitude *de se*
- ii.  $\lambda x(\text{kandao } (x, x \text{ hit } x))$  (Zhangsan) attitude *de re*
- b. Lisi<sub>j</sub> ye shi [VP\_\_].  
Lisi also is  
'Lisi did, too.'
- i. Lisi<sub>j</sub> also found that Zhangsan rolled over and hit Zhangsan.'  
(strict, strict)
- ii. Lisi<sub>j</sub> also found that Lisi<sub>j</sub> rolled over and hit Lisi<sub>j</sub>.'  
(sloppy, sloppy)  
 $\lambda x(\text{kandao } (x, x \text{ hit } x))$  (Lisi) attitude *de re*
- iii. Lisi<sub>j</sub> also found that Zhangsan rolled over and hit Lisi<sub>j</sub>.'  
(strict, sloppy)  
kandao (Lisi,  $\lambda x(\text{Zhangsan hit } x)$ ) attitude *de se*
- iv. \*Lisi<sub>j</sub> also found that Lisi rolled over and hit Zhangsan.'  
(sloppy, strict)

The availability of the strict-sloppy reading in (61b) becomes clearer if we have (61a-b) compared with (62a-b), in which the two anaphoric elements *ta* 'he' and *ziji* 'self' are linked to the same antecedent *Zhangsan*. Given the occurrence of the agent-oriented adverb *guyi* 'intentionally', the embedded clause of (62a) provides an environment in which the simplex anaphor *ziji* 'self', regardless of whether it refers to the embedded subject *ta* 'he' or the matrix subject *Zhangsan*, can reflect only attitude *de se*. Therefore, (62a) has the semantic representation as in (62ai).

- (62) a. Zhangsan<sub>i</sub> shuo [ta<sub>i</sub> guyi da-le ziji<sub>i</sub> yi-xia].

Zhangsan say he intentionally hit-ASP self one-time  
'Zhangsan said that he intentionally hit himself one time.'

i. shuo (Zhangsan,  $\lambda x(x \text{ guyi da-le } x \text{ yi-xia})$ ) attitude *de se*

ii.  $*\lambda x(\text{shuo}(x, x \text{ guyi da-le } x \text{ yi-xia}))$  (Zhangsan) attitude *de re*

b. Lisi<sub>j</sub> ye shi [VP\_\_].  
Lisi also is  
'Lisi did, too.'

i. Lisi<sub>j</sub> also said that Zhangsan intentionally hit Zhangsan one time.'  
(strict, strict)

ii. Lisi<sub>j</sub> also said that Lisi<sub>j</sub> intentionally hit Lisi<sub>j</sub> one time.'  
(sloppy, sloppy)

iii.  $*\text{Lisi}_j$  also said that Zhangsan intentionally hit Lisi<sub>j</sub> one time.'  
(strict, sloppy)

iv.  $*\text{Lisi}_j$  also said that Lisi<sub>j</sub> intentionally hit Zhangsan one time.'  
(sloppy, strict)

To sum up, the contrast between (61a-b) and (62a-b) shows that when local binding and non-local binding yield different semantic interpretations, the strict-sloppy reading is available; that is, Dahl's Puzzle would be obviated.

A contrast completely parallel to that between (61a-b) and (62a-b) in the availability of the strict-sloppy reading is also found in MCCCs, as the contrast between the MCCC (63) and the MCCC (64) shows.

(63) Zhangsan<sub>j</sub> jintian [bi Lisi<sub>j</sub> zuotian [\_\_]] geng qingchu-de kandao-le [ta<sub>j</sub> yi  
Zhangsan today than Lisi yesterday more clearly see-ASP he one  
fanshen jiu dadao-le ziji<sub>j</sub>].  
roll-over then hit-ASP self  
'Zhangsan<sub>j</sub> today saw that he<sub>j</sub> rolled over and hit himself<sub>j</sub> more clearly than

i. Lisi<sub>j</sub> yesterday ~~saw that Zhangsan<sub>j</sub> rolled over and hit Zhangsan<sub>j</sub>.~~'  
(strict, strict)

ii. Lisi<sub>j</sub> yesterday ~~saw that Lisi<sub>j</sub> rolled over and hit Lisi<sub>j</sub>.~~'  
(sloppy, sloppy)

iii. Lisi<sub>j</sub> yesterday ~~saw that Zhangsan rolled over and hit Lisi<sub>j</sub>.~~'  
(strict, sloppy)

iv.  $*\text{Lisi}_j$  yesterday ~~saw that Lisi<sub>j</sub> rolled over and hit Zhangsan.~~'  
(sloppy, strict)

- (64) Zhangsan<sub>i</sub> jintian [bi Lisi zuotian [\_\_\_]] geng mingque-de shuochu [ta<sub>i</sub> Zhangsan  
 today than Lisi yesterday more clearly say he  
 guyi da-le zij<sub>i</sub> yi-xia].  
 intentionally hit-ASP self one-time  
 'Zhangsan<sub>i</sub> today said that he<sub>i</sub> intentionally hit himself<sub>i</sub> one time more clearly than
- i. Lisi<sub>j</sub> yesterday ~~said that Zhangsan<sub>i</sub> intentionally hit Zhangsan<sub>i</sub> one time.~~  
 (strict, strict)
  - ii. Lisi<sub>j</sub> yesterday ~~said that Lisi<sub>j</sub> intentionally hit Lisi<sub>j</sub> one time.~~  
 (sloppy, sloppy)
  - iii. \*Lisi<sub>j</sub> yesterday ~~said that Zhangsan intentionally hit Lisi<sub>j</sub> one time.~~  
 (strict, sloppy)
  - iv. \*Lisi<sub>j</sub> yesterday ~~said that Lisi<sub>j</sub> intentionally hit Zhangsan one time.~~  
 (sloppy, strict)

The availability of the strict-sloppy reading in (61b) and (64iii) shows that Dahl's generalization is too strong in stating that when two pronouns are linked to the same antecedent, the first pronoun cannot be interpreted via strict identity if the second one is interpreted via sloppy identity. So, the question of why (61a-b) and (62a-b) differ from each other in terms of anaphoric/pronominal binding, especially the availability of the strict-sloppy reading, immediately arises.

So far, we have shown how complex the syntactic/semantic structure of MCCCs is by pointing out five issues involved: LF pied-piping, the obviation of Binding Condition C, Dahl's Puzzle, the Eliminative Effect, and the obviation of Dahl's Puzzle Effects. The question that arises now is how to explain the syntactic/semantic complexity of MCCCs.

#### 4.4 Previous Analyses on Clausal Comparatives

Four major syntactic analyses on ACD constructions have been proposed, namely, the Quantifier Raising analysis (May 1985 and Larson 1987), the Extraposition analysis (Baltin 1987), the Vehicle Change analysis (Moltmann 1992), and the Minimalist (Case Checking) analysis (cf. Takahashi 1993, Hornstein 1995, and Lasnik 1999). In this section, we shall briefly review and show inadequacies of each of these analyses.

#### 4.4.1 The Quantifier Raising (QR) Analysis of Larson (1987)

Larson's (1987) Quantifier Raising analysis of comparatives such as (65) consists of two major assumptions. First, a clausal comparative like that in (65) is analyzed as an ACD construction involving comparative ellipsis.

(65) John is [<sub>AP1</sub> tall-er [<sub>CP</sub> [<sub>C</sub>' than [<sub>IP</sub> Bill is [<sub>AP2</sub>—]]]]].

As (65) shows, the elided AP [<sub>AP2</sub>—] is located within its antecedent at surface form and cannot be interpreted unless we can somehow remove it out of AP<sub>1</sub>, to which it is anaphorically related; otherwise, the problem of infinite regress will occur (cf. Bouton 1970 and May 1985).

Second, assuming that NP and CP complements have the same logical type, Larson (1988b) argues that comparative phrases like *taller than Bill is* denote sets of sets, namely, quantifiers in the sense of Barwise and Cooper (1981). More precisely, the comparative morpheme *-er* (or *more*) combines with an adjective denotation (for example, *tall* in (65)) to yield a function from noun phrase denotations (for example, the CP complement in (65)) to a function from noun phrase denotations (for instance, *John* in (65)) to truth-values.<sup>25</sup> Hence, a comparative AP such as *taller* in (65) can be regarded as a generalized

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<sup>25</sup> The assumption that comparative phrases are quantifiers is motivated by a number of semantic characteristics shown by comparative clauses. Among them, most important are the behavior of comparative constructions with respect to negative polarity items and the interpretation of connectives in the comparative clause. First, comparative clauses can license negative polarity items, as illustrated by (ia-b).

- (i) a. John is taller than any other student.  
b. John is happier than he has ever been.

The occurrence of *any* as in (ia) cannot be reduced to a free choice occurrence of *any* because comparatives allow for negative polarity items that lack a free choice reading, for instance, *ever* as in (ib). Second, the behavior of the connective *or* in comparative clauses provides evidence for the claim that comparative clauses involve universal quantification over degrees. It has often been noted that the connective *or* behaves specially in comparative clauses (cf. von Stechow 1984, Larson 1988b, and Pinkal 1989). The relevant observation is that *or* in comparative clauses may have the reading of *and*. For instance, (ii) may mean either (iia) or (iib). However, *or* in comparatives may also have a wide scope disjunctive reading according to which (ii) means (iic).

- (ii) John is taller than Bill or Joe is.  
a. John is taller than Bill and Joe.  
b. John is taller than Bill and John is taller than Joe.  
c. John is taller than Bill is or John is taller than Joe is.

quantifier. Following Klein (1982: 1991), Larson (1988b) further suggests that *taller* has the interpretation in (66), in which the notion of degree is not involved.<sup>26</sup>

(66) *Taller* →  $\lambda X\lambda Y\exists N[\sim X(N\{\wedge\text{'tall'}\}) \text{ and } Y(N\{\wedge\text{'tall'}\})]$

The interpretation of (65) then is like (67), which involves an existential quantification; that is, if John is taller than Bill, then there is some extent (potentially expressible by a degree modifier) to which John is tall, but to which Bill is not.

(67)  $\exists d[\sim[\text{Bill is } d\text{-tall}] \text{ and } [\text{John is } d\text{-tall}]]$

Thus, under Larson's (1987) Quantifier Raising analysis, (68a) in fact is nothing more than an antecedent-contained I' deletion construction. In other words, (68a) has the underlying structure as in (68b), where the subordinate S contains an empty I' (= predicate phrase).

- (68) a. John grew taller than his father.  
 b. John grew [<sub>AP</sub> taller [than his father [<sub>I'</sub>\_\_\_]]]  
 c. [<sub>S</sub> [<sub>AP<sub>i</sub></sub> taller than his father [<sub>I'</sub>\_\_\_]] [John [<sub>VP</sub> grew [<sub>AP<sub>i</sub></sub>\_\_\_]]]]  
 d. [<sub>S</sub> [<sub>AP<sub>i</sub></sub> taller than his father [<sub>I'</sub> Past [<sub>VP</sub> grew [<sub>AP<sub>i</sub></sub>\_\_\_]]]]] [John [<sub>VP</sub> grew [<sub>AP<sub>i</sub></sub>\_\_\_]]]]

Assuming that headed comparatives, like their free counterparts in *however*, are quantificational, the AP *taller than his father* [<sub>I'</sub>\_\_\_], as Larson (1988b) argues, moves and adjoins to S at LF, yielding the structure in (68c). The empty I' in the preposed phrase can then be reconstructed from the overt I' in the main S.<sup>27</sup>

<sup>26</sup> Here 'N' is a variable over functions of the kind denoted by degree-modifying expressions like *every* or *moderately*. X and Y are variables of type <<e, t>, t>, namely, variables over noun phrase denotations.

<sup>27</sup> Brame (1983) provides some interesting examples which challenge Larson's (1987, 1988b) assumption that (67a) is derived from (67b). First, there is a clear difference in meaning between (ia) and (ib).

- (i) a. John is taller than no one.  
 b. #John is taller than no one is.

Example (ia) naturally means that *everyone else is taller than John*; however, (ib) means something quite different (i.e., No one is tall and John is taller than that). What (ib) denotes is a strange comparison. The difference between (ia) and (ib) is unexpected under the assumption that (ia) is derived from (ib). Second, (iia) differs from (iib) in grammaticality.

- (ii) a. Who is taller than who?

Larson's (1987) Quantifier Raising analysis, which has QR as prerequisite, not only avoids the infinite regress problem but also provides an appropriate answer to the question of why Binding Condition C is obviated by QR in MCCCs such as (69a), which has the LF representation in (69b).<sup>28, 29</sup>

b. \*Who is taller than who is?

The difference in grammaticality between (iia) and (iib) is also unexpected under the assumption that (iia) is derived from (iib). Also see Hoksema (1983) for the distinction between clausal comparatives and phrasal comparatives.

<sup>28</sup> Liu (1996) provides evidence to argue for the hypothesis that, at some level, the *bi*-clause and *geng* 'more' in MCCCs form a syntactic unit which can be regarded as a universal quantifier. First, like the English clausal comparatives, the negative polarity item *ban-di jiu* 'half-CL wine' gets licensed inside the *bi*-clause, as shown below.

(i) Zhuzi kaihua [bi [Lisi he-guo ban-di jiu] geng chang fasheng  
Bamboo blossom than Lisi drink-Asp half-CL wine more often happen  
'Bamboos blossom more often than Lisi drinks any wine.'

Second, MCCCs allow the disjunctive coordinator *huo* 'or' to have the conjunctive reading, as shown in (ii).

(ii) Zhangsan [bi Lisi huo Wangwu] geng gaoxing  
Zhangsan than Lisi or Wangwu more happy  
a. 'Zhangsan is happier than both Lisi and Wangwu.'  
b. 'Zhangsan is happier than either Lisi or Wangwu.'  
c. 'Zhangsan is happier than Lisi and Zhangsan is happier than Wangwu.'

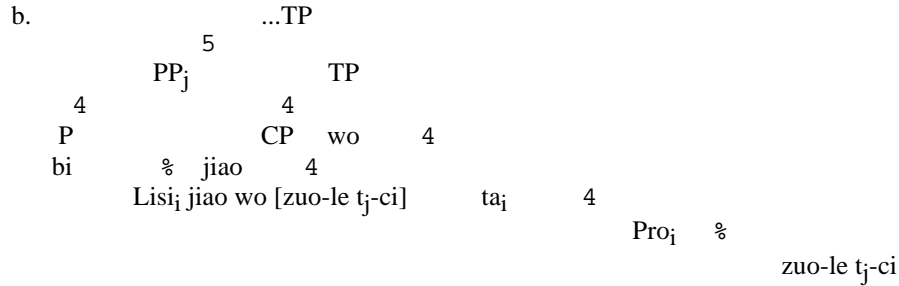
As claimed in Ladusaw (1979) and subsequent works like Larson (1987, 1988) and Moltmann (1992), comparative constructions constitute the restriction of a universal quantifier, which forms a downward entailing environment. Therefore, the negative polarity item *ban-di jiu* 'half-CL wine' gets licensed and the conjunctive reading of the disjunctive coordinator *huo* 'or' is derived (cf. Pinkal 1989 and Moltmann 1992).

<sup>29</sup> However, our analysis suffers from one potential problem, namely, the clause boundedness restriction of QR (cf. Larson and May 1990), if QR is clause-bounded (cf. Cheng 1991). In cases like (69a), repeated as (i), given the clause boundedness restriction of QR, the *bi*-clause, which functions as a universal quantifier, should not be quantifier-raised out of the embedded clause, namely, TP<sub>2</sub>, and then be adjoined to the matrix TP (i.e., TP<sub>1</sub>). Instead, it should be adjoined to the embedded TP<sub>2</sub>, yielding (ii) rather than (i) (i.e., (69b)).

(i) ...TP<sub>1</sub>  
4  
wo 4  
V 4  
jiao ta<sub>i</sub> ... TP<sub>2</sub>  
4  
Pro<sub>i</sub> 4  
QP 4  
# duo 4  
bi [Lisi jiao wo [\_\_\_]] V #  
zuo-le san-ci  
(ii) Huaishi<sub>i</sub> [<sub>TP1</sub> wo [<sub>VP1</sub> jiao ta<sub>i</sub> [<sub>TP2</sub> [bi [<sub>Op</sub><sub>j</sub> [Lisi jiao wo [<sub>zuo-le</sub> t<sub>j</sub>-ci]]]]]]]<sub>k</sub> [<sub>TP2</sub> Pro<sub>i</sub> [<sub>VP2</sub> zuo-le t<sub>k</sub>-ci]]]]].

However, this incorrectly predicts that the obviation of Binding Condition C is not allowed in (69a), contrary to fact. In order to explain the obviation of Binding Condition C, we have to assume that the *bi*-clause must be quantifier-raised to the TP<sub>1</sub>-adjoined position. We argue that this kind of apparent counterexample to the clause boundedness restriction of QR has its root in the idiosyncratic properties

- (69) a. Huaishi, wo jiao ta<sub>i</sub> [[bi [Lisi<sub>i</sub> jiao wo [\_\_]]] dou zuo-le san-ci].  
 Wrongs I ask he than Lisi ask I more do-ASP three-times  
 'As for wrongs, I asked him<sub>i</sub> to do three more times than the times which  
 Lisi<sub>i</sub> asked me to do.'



As (69b) shows, the violation of Binding Condition C is mitigated by quantifier-raising the *bi*-clause, as the pronominal object *ta* 'him' no longer c-commands the R-expression *Lisi*<sub>i</sub>; therefore, coindexation between them becomes possible.<sup>30</sup>

However, the Quantifier Raising analysis proposed by Larson (1987) incorrectly predicts that (70a), whose LF representation in (70b) is derived by adjoining the *bi*-clause in TP-adjoined position, should be the same as (69a) in showing the obviation of Binding Condition C by QR.

- (70) a. \*Ta<sub>i</sub> qi ma [[bi Lisi<sub>i</sub> qi-niu [\_\_]] [qi-de kuai]].  
 He ride-horse than Lisi ride-cow ride-DE fast  
 '\*The speed of his<sub>i</sub> horse-riding is faster than that of Lisi<sub>i</sub>'s cow-riding.'

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of the matrix verb. According to Roberts (1992), verbs like *want*, *used to*, *have to*, etc., do not display boundedness effects because these verbs are restructuring verbs. The distinctive feature of restructuring verbs is that they unify the domains of the embedded and restructuring verb into one complex predicate (cf. Rizzi 1982 and Aissen and Perlmutter 1983). This licenses local A-movement across sentential boundaries in the form of clitic climbing and scrambling in languages such as Italian, Old French, and Dutch. In restructuring contexts, the object moves to the higher [Spec, AgrO], the one associated with the restructuring verb. Roberts (1992) further points out that this movement is overt in languages such as Italian, Dutch, and Old French, as shown below.

- (iii) Et s'il **la terre**<sub>i</sub> ne veult vuidier **t<sub>i</sub>**.

And if he the land not wants to empty

We, following Hornstein (1995), assume that in restructuring contexts a quantifier phrase inside the embedded clause always undergoes QR and moves out from under both the embedded VP and the embedded clause. We further assume that the verb *jiao* 'ask/want,' as in (i), can be regarded as a restructuring verb. This assumption then allows the *bi*-clause, as in (ii), to be quantifier-raised and adjoined to the matrix TP (i.e., the TP<sub>1</sub>-adjoined position).

<sup>30</sup> Following Chomsky (1995a), we assume that Binding Theory applies at LF.



The blocking effect therefore is expected to occur in (71); but in fact it does not. Hence, the sloppy reading in (71b) is readily available.<sup>31</sup>

#### 4.4.2 The Vacuous Movement Analysis of Baltin (1987)

Baltin (1987) observes that ACD examples with a relative clause in sentence-internal position are often rather weak, as illustrated by the contrast below.

- (73) a. John will find [everyone [that Bill finds [\_\_]]] easy to work with, easy to work with as well.  
 b. ??John will find [everyone [that Bill does [VP\_\_]]] easy to work with.

Given this contrast, Baltin (1987) proposes a Vacuous Movement analysis for ACD constructions. On this view, ACD does not exist at surface form but rather the empty category uniformly occurs within a clause that has undergone string-vacuous movement (or extraposition). Crucially, this movement does not create traces (or the trace can be deleted). Hence, the final surface structure of (74a) is (74b), where [VP\_\_] stands outside the VP that is its antecedent.

- (74) a. [TP John PAST [VP [VP see [NP everyone [CP<sub>i</sub>\_\_]]] [CP<sub>i</sub> that you PAST [VP\_\_]]]].  
 b.
- |      |   |    |          |                      |
|------|---|----|----------|----------------------|
|      |   | TP |          |                      |
|      | 4 |    |          |                      |
| John |   |    | ...VP    |                      |
|      |   | 4  |          |                      |
|      |   | VP |          | CP                   |
|      | 4 | \$ |          |                      |
| V    |   |    | NP       | that you PAST [VP__] |
| see  |   |    | 4        |                      |
|      |   |    | everyone |                      |
|      |   |    |          | CP                   |
|      |   |    |          |                      |
|      |   |    |          | ∅                    |

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<sup>31</sup> As Jim Huang (personal communication) suggests to me, this might not be a strong argument against Larson's QR analysis. For example, alphabetic variance is always assumed to be allowed in cases like (i).

(i) John<sub>α</sub> saw himself and Bill<sub>β</sub> did [t<sub>i</sub> see himself<sub>i</sub>] too.

However, the assumption that alphabetic variance is allowed implies that vehicle change is needed somehow (cf. Fiengo and May 1994). See section 4.4.3 for discussion on vehicle change.

Baltin's (1987) Vacuous Movement analysis, which does not appeal to QR, therefore differs from the Quantifier Raising analysis in the process responsible for breaking up antecedent containment and the level at which this process applies. However, Larson and May (1990) argue that the Vacuous-Movement analysis has the following theoretical and empirical problems.

First, the Vacuous Movement analysis would predict that relative clauses in ACD constructions should look internally like extraposed relatives; in contrast, the QR account predicts that they will look like in situ relatives. It has been widely observed that in situ relatives allow a *wh*-form, a complementizer, or no "clause introducer", as shown by (75a-c), respectively; but the last possibility is excluded with their extraposed counterparts, as illustrated by (76c).

- (75) a. I visited a man who John mentioned recently.  
 b. I visited a man that John mentioned recently.  
 c. I visited a man [ $\emptyset$  John mentioned] recently.
- (76) a. I visited a man recently who John mentioned.  
 b. I visited a man recently that John mentioned.  
 c. ?\*I visited a man recently [ $\emptyset$  John mentioned].

Assuming Stowell's (1981) analysis that the ungrammaticality of (76c) results from the adjunct status of the extraposed relative, which prevents the trace of a deleted complementizer from being properly governed, Larson and May (1990) argue that the Vacuous Movement (Extraposition) analysis would incorrectly exclude the null form in (75c) from containing ACD. In contrast, the Quantifier Raising analysis predicts that the full range of complementizer possibilities will show up in ACD constructions. This fact suggests that the Quantifier Raising analysis is preferred over the Vacuous Movement analysis.

Second, Baltin (1987) cites the contrast between (77a) and (77b) to support his Extraposition analysis by assuming that, under the Vacuous Movement analysis, right adjunction for the relative clause containing [*VP*\_\_\_] requires a right-peripheral position.

- (77) a. John will find [everyone [that Bill finds [\_\_\_]]] easy to work with, easy to work with as well.
- b. ??John will find [everyone [that Bill does [VP\_\_\_]]] easy to work with.

However, Larson and May (1990), after closely inspecting the data related to (77b), argue that the data should be divided into two distinct classes: one class that yields ill-formedness absolutely, and the other class for which judgments of ill-formedness vary according to the length of the material intervening between the gap and right periphery. These two distinct classes of data are illustrated by examples in (78)-(79), respectively.

- (78) a. \*I expect (that) everyone you do [VP\_\_\_] will visit Mary.
- b. \*John believed (that) everyone you did [VP\_\_\_] was a genius.
- c. \*I find (that) everyone you do [VP\_\_\_] is qualified.
- (79) a. I gave everyone that you did [VP\_\_\_] two dollars.
- b. Max considers everyone that you do [VP\_\_\_] smart.
- c. Tommy put everything he could [VP\_\_\_] in his mouth.

The separation in grammaticality judgments between these two classes is quite sharp, as shown by examples that differ only in the finiteness of their complements.

- (80) a. \*I expect (that) everyone you do [VP\_\_\_] will visit Mary.
- b. ?I expect everyone you do [VP\_\_\_] to visit Mary.

So, if the Vacuous Movement analysis permits only ACD examples with a right-peripheral relative clause, then it will flatly exclude acceptable cases like (80b).

Third, as Larson and May (1990) point out, examples like (81a) permit a *de dicto* and a *de re* reading of the quantified NP *every city you do [VP\_\_\_]*. These readings correspond to the two scopes that the NP *every city you do [VP\_\_\_]* may assume vis-<sup>^</sup>-vis the intensional verb *want*.

- (81) a. John wants to visit every city you do [VP\_\_\_].

- b. John wants to visit every city you visit [NP\_\_].

In other words, (81a) is ambiguous with respect to how the elided VP, [VP\_\_], is understood. (81a) shares not only the *de dicto* reading of (81b) - according to which John has a general desire to visit all cities that you visit - but also the *de re* reading of (81b) - on which John has a desire to visit *x*, for each specific city *x* you also visit. The *de dicto/de re* ambiguity shown in (81a) is expected under the QR analysis. However, under the Vacuous Movement analysis, we expect that a derivation in which the quantified NP remains within the embedded clause would force the elided VP in (81a) to take the lower VP as antecedent. Therefore, the quantified NP could have only the *de dicto* reading, contrary to fact.

Fourth, the extraposed structures provided by the Vacuous Movement analysis cannot represent the meaning of ACD constructions adequately without QR. Consider the extraposed structure in (82b), corresponding to (82a).

- (82) a. John saw everyone that you did.
- b.
- |      |   |    |          |                                     |
|------|---|----|----------|-------------------------------------|
|      |   | TP |          |                                     |
|      | 4 |    |          |                                     |
| John |   |    | VP       |                                     |
|      |   | 4  |          |                                     |
|      |   | VP |          | CP                                  |
|      | 4 | \$ |          |                                     |
| V    |   |    | NP       | O <sub>i</sub> that you PAST [VP e] |
| see  |   |    | everyone |                                     |

If the reconstruction is made directly from this source, the result of copying VP will be (83), which is completely ill-formed.

- (83) \*John saw [everyone [CP O<sub>i</sub> that you [VP saw everyone]]].

Based on the inadequacies presented above, Larson and May (1990) find the Vacuous Movement analysis implausible.

#### 4.4.3 The Vehicle Change Analysis of Moltmann (1992)

Following F&M's (1994) Vehicle Change analysis on ellipsis, Moltmann (1992, 1993) proposes that comparative deletion could also be accounted for without invoking QR. For example, the constituent *[more books than Mary did [\_\_]]* in (84a) can be vehicle-changed into the degree variable of *x-many books* (cf. Bresnan 1973). The derived constituent *x-many books* can then be copied into the comparative deletion site, as (84b) shows.

- (84) a. John read [more books than Mary did [\_\_]].  
 b. John read more books than Mary [read x-many books].

According to F&M (1994), the Vehicle Change analysis on ellipsis consists of two main components. First, Binding Theory applies to indices and it can apply to an index, *i*, only when all instances of *i* are present in the structure. In other words, Binding Theory would fail to apply to the ACD construction in (85a), in which an instance of the index *i* is absent (i.e., it is "present" only in the elided VP). In (85a), since QR is necessary for the LF copying of the elided VP which contains the absent index *i* in (85a), the application of Binding Theory has to wait until QR has applied. Therefore, Binding Theory can apply only to the LF representation in (85b), in which Binding Condition C is obviated by QR (cf. Fox 1995b).

- (85) a. You [<sub>VP1</sub> introduced him<sub>i</sub> to [everyone [John<sub>i</sub> wanted you to [<sub>VP2</sub> \_\_]]]].  
 b. [everyone [John<sub>i</sub> wanted you to [<sub>VP2</sub> introduce him<sub>i</sub> to t<sub>j</sub>]]];  
 [You [<sub>VP1</sub> introduced him<sub>i</sub> to t<sub>j</sub>]].

This assumption further implies that Binding Theory applies only after reconstruction.

However, as F&M (1994) notice, this analysis incorrectly predicts that both (86a-b) are ungrammatical, as in the LF counterparts to both, given in (87a-b), Binding Condition C is violated:

- (86) a. Mary introduced John<sub>1</sub> to everyone that he<sub>1</sub> wanted her to.  
 b. \*Mary introduced John<sub>1</sub> to everyone that she wanted him<sub>1</sub> to.

- (87) a. [Everyone that he<sub>1</sub> wanted her to introduce John<sub>1</sub> to t] Mary introduced John<sub>1</sub> to t.  
 b. \*[Everyone that she wanted him<sub>1</sub> to introduce John<sub>1</sub> to t] Mary introduced John<sub>1</sub> to t.

Therefore, F&M (1994) add a second component to their Vehicle Change analysis of ellipsis, and claim that reconstruction does not always imply exact copying. The copying of any personal feature is optional whenever a conflict may arise as a result of copying (cf. Kitagawa 1990). F&M (1994: 218-220) call this aspect of reconstruction Vehicle Change, by which the syntactic form that expresses a given argument is in some sense altered among the tokens of the reconstruction. They notice that two sorts of Vehicle Change can be discerned.

First, names and variables are nondistinct for reconstruction. For example, in (88) the name and the trace, which is properly bound by the *wh*-word, have identical indexical structure, as required for  $\alpha$ -occurrences (cf. footnote (22)).

- (88) Dulles suspected Philby $\square$ , who Angleton **suspected e** $\square$ .

The second sort of Vehicle Change is indiscernibility of values within syntactic feature paradigms, for example, agreement features and the *some/any* alternation, as shown by (89a-b), respectively.

- (89) a. I turned in my assignment, but most of the other students didn't.  
 b. Max talked to someone, but Oscar didn't.

In the context of (89a), we understand that the elided pronoun, if overt, would be third person plural, as opposed to the antecedent occurrence, which is first person singular. In (89b), the elided VP, if overt, would be *talk to anyone* rather than *talk to someone*.

Thus, the conception of Vehicle Change, as F&M (1994) suggest, allows for free adjustment of feature values, with indexical type held constant. The effect of Vehicle Change on features can be seen from the puzzle posed by the sentence (90).

(90) Mary loves John, and he thinks that Sally does, too.

It is quite clear that (90) can mean that *John thinks that Sally loves him, John*. However, it would seem that the LF representation of (90) would be (91) with the reconstructed VP *loves John<sub>i</sub>*.

(91) Mary loves John<sub>i</sub>, and he<sub>i</sub> thinks that Sally **loves John<sub>i</sub>**.

But the LF representation (91) is ill-formed, since it violates Binding Condition C. However, if we allow for Vehicle Change, this result will follow. That is, although proper names have the feature [-pronoun], this feature can just as well be realized as [+pronoun] because of Vehicle Change. Let us call this product of Vehicle Change the pronominal correlate of the name. By this reasoning, (86a-b) can be alternatively realized as their pronominal correlates, as shown below.

(92) a. [Everyone that he<sub>i</sub> wanted her to **introduce PJohn<sub>i</sub> to t**] Mary introduced John<sub>i</sub> to *t*.

b. \*[Everyone that she wanted him<sub>i</sub> to **introduce PJohn<sub>i</sub> to t**] Mary introduced John<sub>i</sub> to *t*.

Since the reconstructed NP is pronominal, (92a-b) are subject to Binding Condition B rather than Binding Condition C. In (92a), the pronominal correlate *PJohn<sub>i</sub>* is properly free in its governing category, and the structure is well formed. But, in (92b), the correlate *PJohn<sub>i</sub>* is bound in this domain and hence violates Binding Condition B.

Recall that, according to F&M (1994), Binding Theory applies to indices, and it can apply to an index, *i*, only when all instances of *i* are present in the structure. But, as Fox (1995b) points out, F&M's (1994) Vehicle Change analysis of ellipsis will incorrectly predict a generalization somewhat different from the generalization they in fact propose, as shown below.

(93)=(7) Quantifier Raising obviates Binding Condition C iff

a. ACD is involved, and

b. the binder of the R-expression has a copy contained within the elided VP.

According to (93), the binder of the R-expression must have a copy within the elided VP. All that is needed for Binding Condition C obviation is that there be an instance of the relevant index within the elided VP. Now consider the sentences in (94).

- (94) a. \*He<sub>i</sub> bought his<sub>i</sub> brother [everything John<sub>i</sub> wanted to [buy his<sub>i</sub> brother t]].  
 b. \*He<sub>i</sub> introduced his<sub>i</sub> brother to [everyone John<sub>i</sub> wanted to [introduce his<sub>i</sub> brother to t]].

In these sentences, the binder of the R-expression, the matrix subject, does not have a copy within the elided VP; therefore, Binding Condition C is not obviated in these sentences, in accordance with the generalization in (93). However, there is an instance of the index, *i*, within the elided VP. According to F&M (1994), Binding Theory applies to an index *i* only when all instances of *i* are present in the structure. Therefore, F&M (1994) would incorrectly predict that Binding Condition C is obviated in (94a-b). As a result, Moltmann's (1992) analysis on clausal comparatives which assumes Vehicle Change is immediately challenged by this theoretical difficulty.

Furthermore, Moltmann's (1992) account also suffers from overgeneration, as MCCCs like (95a) would also be incorrectly allowed.

- (95) a. \*Wo jintian [[bi [ta<sub>i</sub> zuotian [\_\_\_]] geng ji-zhe qu jian Zhangsan<sub>i</sub>-de didi].  
 I today than he yesterday more urgent go see Zhangsan's brother  
 '\*Today, I want more urgently than he<sub>i</sub> wanted yesterday to see  
 Zhangsan<sub>i</sub>'s younger brother.'  
 b. \*Wo jintian [bi [Op<sub>j</sub> [ta<sub>i</sub> zuotian [t<sub>j</sub>-ji-zhe qu jian <sup>P</sup>Zhangsan<sub>i</sub>-de didi]]] geng  
 ji-zhe qu jian Zhangsan<sub>i</sub>-de didi.  
 c. Ta<sub>i</sub> zuotian ji-zhe qu jian ta<sub>i</sub>-de didi.  
 He yesterday urgent go see his brother  
 'Yesterday, he<sub>i</sub> wanted urgently to see his<sub>i</sub> younger brother.'

After reconstructing the comparative deletion site, (95a) has the LF representation (95b), in which the proper name *Zhangsan* undergoes featural vehicle change and is realized as its pronominal correlate <sup>P</sup>*Zhangsan<sub>i</sub>*. Thus, the *bi*-clause in (95b) can be regarded as in (95c), in which the corresponding

coindexation is allowed. So, according to F&M's (1994) analysis on ellipsis, neither Binding Condition B nor Binding Condition C is violated in (95b); therefore, (95a) is predicted to be grammatical, contrary to fact.

#### 4.4.4 The A-Movement (Minimalist) Analysis of Hornstein (1995)

Contrary to the Quantifier Raising analysis, proponents of the A-Movement analysis claim that ACD constructions do not involve movement of a quantified phrase to an (adjoined) A-bar position outside of the VP, but rather A-movement to a VP external specifier position (i.e., [Spec, Agr<sub>OP</sub>]) for checking Case features (cf. Takahashi 1993, Hornstein 1995, and Lasnik 1999). The arguments come from theory-internal and empirical sources.

Given (theory-internal) Economy Principles and the goal of enforcing grammatical constraints only at the interface levels (LF & PF), Chomsky (1995) proposes that operators, including *wh*-words and quantificational determiners, are moved to scopal positions at LF, while their restrictions remain in-situ. Hence, the LF representations of (96a-b) are those in (97a-b), which show Binding Condition C violations.

(96) a. \*Who<sub>i</sub> said that he<sub>i</sub> read how many articles about John<sub>i</sub>?

b. \*He<sub>i</sub> read every article about John<sub>i</sub>.

(97) a. [who<sub>k</sub> how many<sub>j</sub>] [e<sub>k</sub> said that he<sub>i</sub> read [e<sub>j</sub> articles about John<sub>i</sub>]]

b. [every<sub>j</sub>] [he<sub>i</sub> read [e<sub>j</sub> article about John<sub>i</sub>]]

This proposal, as Hornstein (1995) and Lasnik (1999) argue, is incompatible with an account of ACD constructions in terms of QR. In particular, if QR moves only the determiner of a quantificational argument, then the relative clause which contains the elided VP in an ACD configuration remains inside the antecedent VP at LF. Consequently the infinite regress problem will again rear its ugly head (cf. Bouton 1970, and May 1985). Hornstein (1995) suggests that, whereas LF A-bar movement may move only an operator, LF A-movement must move an entire DP. Since the only A-movement allowed at LF is movement to satisfy some featural requirement of a DP, he assumes in a more specific way that internal

arguments must move to [Spec, Agr<sub>OP</sub>] at LF to satisfy Case requirements. The resulting configuration thus is one in which the DP containing the elided VP is no longer in the antecedent VP; therefore, the infinite regress problem is eliminated.

On the empirical side, Hornstein (1995) discusses two types of data that bear on the question of whether ACD constructions involve QR, both of which involve the apparent absence of certain readings of ACD constructions that are predicted by the QR account.

The first set of data relates to the Boundedness Restriction on ACD constructions and was originally noticed by Baltin (1987). Namely, if multiple *wh*-questions are interpreted by a process of absorption, which requires that all non-D-linked *wh*-phrases occupy [Spec, CP] at LF, then the LF of a sentence like (98a) should be that in (98b).

- (98) a. Who thought that Fred read how many books that Bill did [\_\_]?
- b. [CP who<sub>i</sub> [how many books that Bill did [\_\_]]<sub>j</sub> [IP e<sub>i</sub> [VP<sub>1</sub> thought that Fred [VP<sub>2</sub> read e<sub>j</sub>]]]]

Baltin claims that since the elided VP in (98b) is not contained in either the embedded or matrix VPs after movement, it should be possible to copy either VP<sub>1</sub> or VP<sub>2</sub> into the position of the elided VP site. (98a) therefore should be ambiguous between a reading in which VP<sub>1</sub> is copied and a reading in which VP<sub>2</sub> is copied; however, according to Baltin (1987), (98a) is not ambiguous. (98a) has only a reading like (99a), in which VP<sub>2</sub> is copied, rather than a reading like (99b), in which VP<sub>1</sub> is copied.

- (99) a. Who thought that Fred read how many books that Bill read?
- b. Who thought that Fred read how many books that Bill thought that Fred read?

To account for the Boundedness Restriction on ACD constructions, Hornstein (1995) adopts Chomsky's (1995) Case-checking theory and assumes that, in ACD constructions like (98), the object NP *how many books that Bill did [\_\_]* can be moved only to [Spec, Agr<sub>OP</sub>] of the embedded clause. Any further A-movement will be blocked by Economy considerations. Thus, VP<sub>2</sub> is the only VP that the object NP *how*

*many books that Bill did* [\_\_\_] has been moved out of, and only VP<sub>2</sub> can be copied into the elided site without running into the infinite regress problem.

The second set of data involves adjunct ACDs, namely, constructions in which ACD is contained in an adjoined constituent. Among adjunct ACD constructions, Hornstein (1995) further distinguishes ACD constructions in objects of prepositions, as in (100a), from ACD constructions in VP adjuncts like (100b).

- (100) a. John talked to everyone that Bill did.  
b. John worded the letter as quickly as Bill did.

For (100a), Hornstein (1995) suggests that some PPs are subject to Case checking at LF and that they raise out of the VP at LF to [Spec, Agr<sub>O</sub>P] position (cf. Jackendoff 1972). Therefore, (100a) has the LF representation in (101).

- (101) John [<sub>Agr<sub>O</sub>P</sub> [to everyone that Bill did [<sub>VP</sub> e]<sub>i</sub>] ... [<sub>VP</sub> talked t<sub>i</sub>]]

In contrast, in (100b), *as quickly as Bill did*, Hornstein (1995) argues, is generated outside the VP shell as a manner adverbial; hence the problem of infinite regress does not arise. Given that Minimalism dispenses with D-structure, it is possible to adjoin the manner adverb *as quickly as Bill did* to VP (or some higher projection) and still meet its selection requirements by leaving selection to the semantics and removing it entirely from the syntax (cf. Jackendoff 1972). Based on these assumptions, (100b) has the structure in (102), in which the elided VP\* can be interpreted as VP<sub>2</sub> without inducing an infinite regress.

- (102) John [<sub>VP1</sub> [<sub>VP2</sub> worded the letter] as quickly as Bill did [<sub>VP\*</sub> \_\_\_]]

However, the A-Movement analysis, independently proposed by Takahashi (1993), Hornstein (1995), and Lasnik (1999), has the following theoretical and empirical difficulties.

First, one advantage of Hornstein's (1994) A-movement analysis is that it provides a straightforward explanation of the Boundedness Restriction. However, the ambiguity of (103) raises an

important question for the A-movement analysis. For the sake of explaining the ambiguity of (103), Hornstein (1994) resorts to Roberts's (1992) assumption that *wants* in (103) is a restructuring verb.

(103) Tim wants to visit every city Bill does.

Namely, "restructuring" unifies "the domains of the embedded and restructuring verb into one complex" (cf. Hornstein 1994: 468); therefore, the local movement across sentential boundaries becomes possible.

However, as noted by Rizzi (1982: 39-40), restructuring is blocked by multiple embedding (cf. Aissen and Perlmutter 1983). So, the A-movement analysis predicts that matrix readings of embedded ACDs as in (104) are impossible, contrary to fact (cf. Kennedy 1997: 673).

(104) Now that we're both in therapy, Marie wants to start to make the same changes in lifestyle that I do.

In other words, it is possible to interpret the embedded ACD in (104) as *want to start to make*.

Second, as originally noted by Sag (1976), whenever an ACD embedded under an intensional predicate has a matrix interpretation, the quantifier's restriction (which is partially provided by the deleted VP) must be interpreted *de re*, that is, outside the scope of the intensional predicate. This fact is shown by (105), which has only the *de re* interpretation (106a): Everyone Bill wants to answer these questions is such that John wants him to answer them. However, the *de dicto* interpretation in (106b) is unavailable (cf. Larson and May 1990 and Kennedy 1997: 675).

(105) John wants everyone Bill does to answer these questions.

(106) a.  $\text{every}_x [\lambda y. \text{want}(y, \wedge \text{answer}(x, \text{these questions}))(\text{Bill})] [\lambda z. \text{want}(z, \wedge \text{answer}(x, \text{these questions}))(\text{John})]$

b.  $\text{*want}(\text{John}, \wedge \text{every}_x [\lambda y. \text{want}(y, \wedge \text{answer}(x, \text{these questions}))(\text{Bill})] [\text{answer}(x, \text{these questions})])$

Particularly interesting here is the issue that this restriction on interpretation does not hold in examples like (107), which does not involve ACD.

(107) John wants everyone Bill wants to interrogate to answer these questions.

Namely, (107) is ambiguous between a *de re* interpretation, in which John's desire concerns particular individuals, and a *de dicto* interpretation, in which John's desire concerns any individual who meets the requirements imposed by the restriction. Assuming that ECM subjects must move to the specifier of the matrix AgroP, a position which immediately dominates the VP headed by *want*, to receive Case, the A-movement analysis expects the *de dicto* reading to be available for (105); however, the fact does not bear out this expectation.

So far, we have reviewed previous literature on ACD constructions. The Quantifier Raising analysis proposed by Larson (1987) not only incorrectly excludes certain sloppy readings but also fails to explain certain contrasts in the obviation of Binding Condition C. The Vehicle Change analysis which, besides suffering from the insurmountable problem pointed out by Fox (1995b), has the problem of overgeneration. The A-Movement analysis fails to explain why in some cases which involve non-restructuring verbs the matrix reading is still available, and additionally incorrectly predicts the *de dicto* reading when the ACD is embedded under an intensional predicate.

#### **4.5 A PF-Deletion Analysis**

In this section, we shall propose a PF-Deletion analysis based on the combination of (1) the insight of Rooth's (1992) observation of the relationship between prosodic redundancy marking (i.e., deaccenting) and ellipsis; and (2) the LF Identity Condition on Ellipsis (cf. Sag 1976, Sag and Hankamer 1984, Heim and Kratzer 1998, and Chomsky and Lasnik 1991). We first argue that ellipsis is not an extreme case of deaccenting (contra Tancredi 1992). Second, we argue that, for the sake of satisfying the LF Identity Condition on Ellipsis, QR in LF pied-piping fashion is required in MCCCs even under a PF-Deletion analysis of ACD constructions. Since the phonetic bare output of MCCCs implies that the LF Identity Condition on Ellipsis must be satisfied, we then suggest that LF pied-piping is subject to the Bare Output Condition (cf. Chomsky 1995a). Third, we provide empirical evidence to show that QR must be restricted by Economy considerations.

#### 4.5.1 Prosodic Redundancy Marking versus Ellipsis

Tancredi (1992) suggests that a parallelism truly exists between restrictions on interpretation in VP deletion and VP deaccenting environments, as the contrast below shows.<sup>32</sup>

- (108) a. John likes flying planes and Bill does, too.  
b. John likes flying planes and Bill *likes flying planes*, as well.

In (108b), since the VP *likes flying planes* in the second conjunct is neither presentationally nor contrastively focused, it is allowed to be prosodically deaccented. However, at issue here is the matter pertaining to the interpretation of the VP *likes flying planes*. That is to say, in (108a-b), the VP *likes flying planes* in the first conjunct is two-ways ambiguous between what we could refer to loosely as an activity reading of *flying planes* and what could be called an object reading of that phrase. Further, both the deleted VP in (108a) and the deaccented VP in (108b) are ambiguous in precisely the same way. That is, ambiguities do not multiply in the elided material. Thus, the second conjunct must resolve the ambiguity in the same way as the first conjunct does; and the interpretation of a deleted second-conjunct VP, as in (108a), as well as a deaccented second-conjunct VP, as in (108b), is dependent on that of the first-conjunct VP. Therefore, both (108a-b) are two-ways ambiguous.

Chomsky and Lasnik (1991: 125-126), following Tancredi (1992), suggest that the parallelism shown in (108a-b) derives from constraints on deaccenting, and that VP deletion is no more than an extreme case of prosodic redundancy marking (i.e., deaccenting).

Conversely, Rooth (1992: 10) argues that ellipsis and prosodic redundancy marking have nothing to do with each other. They are two distinct theories, related only in that they are both expressions of redundancy. A semantic redundancy requirement is operative in both ellipsis and prosodic reduction; ellipsis is distinguished by the presence of a second, representationally sensitive redundancy requirement. Thus, Rooth (1992) argues for the first half of Chomsky and Lasnik's (1991) analysis, according to which parallelism derives from constraints on deaccenting, but argues against the second half of their analysis which reduces VP deletion directly to VP deaccenting. Rooth argues that ellipsis is not a very extreme

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<sup>32</sup> We use italics as a notation for phonological deaccenting.

form of prosodic reduction, where all phonetic content is totally reduced. The evidence that Rooth (1992) provides to support his argument is as follows.

First, Rooth (1992: 4-8) points out that the sloppy reading of non-pronominals is impossible in ellipsis because ellipsis is at least partially sensitive to the representation of information, perhaps to syntax, as shown below.

- (109) a. 5 is (obviously) less than or equal to *itself*, and (of course) 7 is, too.  
 (√sloppy)
- b. 5 is (obviously) less than or equal to 5, and (of course) 7 is too. (×sloppy)
- c. 5 is (obviously) less than or equal to 5, and (of course) *the same is true of* 7. (√strict/√sloppy)

Since sloppy readings for ellipsis are impossible if a non-anaphoric element such as a proper name is substituted for the pronoun, (109b), where a coreferential numeral 5 is substituted for *itself*, has no sloppy reading. However, such non-ambiguity is not observed with all devices expressing redundant predication (i.e., prosodic redundancy). For example, in (109c), the phrase *the same is true of*, which expresses redundant predication at least in a broad sense, allows for both strict and sloppy readings.

Second, as Rooth (1992: 8-9) points out, an (implicationally bridged) entailment relation can be implicated in licensing prosodic redundancy marking but not in licensing ellipsis, as the contrast between (110a) and (110b) illustrates.<sup>33</sup>

- (110) a. First John told Mary about the budget cuts, and then Sue<sub>F</sub> *heard about them*.
- b. First someone told Mary about the budget cuts, then Sue<sub>F</sub> *did*.

Significantly, (110b) does not have the reading *Sue heard about the budget cuts*. According to Rooth's (1992) Alternative Semantics for focus, (110a) has the representation in (111a), in which the operator ~ expresses the redundancy of its left (overt) argument (i.e., *Sue heard about them*) with respect to its right

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<sup>33</sup> In Rooth's (1992) theory of focus interpretation, the subscript F indicates prominence which is the correlate of a syntactic focus feature on the prominent NP.

argument (i.e.,  $P_1$ ), nonredundant material being marked by focus. In (111a), the argument  $P_1$  is a proposition variable and the index (i.e., 1) indicates that an implicational relation is built into the semantics of  $\sim$  by employing a notation in which the argument of  $\sim$  (i.e.,  $P_1$ ) is co-indexed with the syntactic phrase  $[_S \text{ John told Mary about the budget cuts}]_1$ . The implicational bridging is supported by the axiom (111b): *if a tells b about c, then b hears about c.*

- (111) a. First  $[_S \text{ John told Mary about the budget cuts}]_1$ , and then  $[_S [_S \text{ Sue}_F \text{ heard about them}] \sim P_1]$
- b. Presupposed axiom: if a tells b about c, then b hears about c.

While the kind of redundancy present in (110a) is sufficient to license contrastive focus (prosodic redundancy), it is not sufficient to license ellipsis because of the lack of the reading *Sue heard about the budget cuts* in (110b).

So Rooth (1992) proposes that the redundancy constraints on ellipsis are in some respect stricter than the redundancy constraints on contrastive focus and a theory of ellipsis is to some degree representationally sensitive. Parallelism has two independent components. One component is relevant for both ellipsis and prosodic redundancy remarking (i.e., deaccenting) and the other is relevant only for ellipsis (cf. Fox 1995b). Although prosodic redundancy marking and ellipsis are restricted by similar parallelism requirements, the requirements are stricter when applied to ellipsis. The division between ellipsis and prosodic redundancy marking is illustrated by the contrast between (112a), which allows only (112ai), and (112b-c).

- (112) a. John told Mary that it will rain, and Sue did, too.
- i. <tell Mary that it will rain>
- ii. <\*hear that it will rain>
- b. John told Mary that it will rain, and Sue *told Mary that it will rain*, too.
- c. John told Mary that it will rain, and Sue *heard that it will rain*, too.

As (112b-c) indicate, a phonologically deaccented phrase must receive a structure parallel to the structure of its antecedent, where parallelism makes reference to notions from the theory of focus (cf. Rooth 1992).<sup>34</sup> By contrast, an elided phrase, as we can see in (112a), not only must receive a parallel structure from the perspective of the theory of focus, but must also be sensitive to the representation of information, perhaps to syntax.<sup>35</sup>

As a consequence, we suggest as the first component of our analysis that ellipsis is not a very extreme case of prosodic redundancy marking (deaccenting) (contra Chosmky and Lasnik 1991). The redundancy constraints on ellipsis are in some respect stricter than the redundancy constraints on prosodic redundancy marking. The second component of our analysis is the claim that the comparative-stripped materials in MCCCs, which must be strictly syntactically controlled, also must not only receive a parallel

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<sup>34</sup> According to Rooth's (1992) theory of focus interpretation, a deleted element must be part of a clause which contrasts appropriately with a clause that contains the antecedent element. His idea can be formalized in the way that  $\phi$  contrasts appropriately with  $\psi$  iff the proposition expressed by  $\psi$  is an element of the focus value of  $\phi$ . The focus value of a clause is the set of propositions obtained by substituting alternatives for the denotations of the focused constituents. For example, the proposition expressed by *John<sub>F</sub> left* is 'that John left'. The focus value of *John<sub>F</sub> left* is {that John left, that Mary left, that Bill left, ...} (i.e. {that x left: x is an individual}). The proposition expressed by *John left<sub>F</sub>* is 'that John left'. The focus value of *John left<sub>F</sub>* is {that John left, that John stayed, ...} (i.e., {that John has P: P is a property}). So, *John<sub>F</sub> left* contrasts appropriately with *Mary left*, but not with *John stayed*. *John left<sub>F</sub>* contrasts appropriately with *John stayed*, but not with *Mary left*.

<sup>35</sup> Fox (1995b: 116), following Rooth (1992), suggests that an elided phrase must also receive a parallel structure from the perspective of the theory of focus, but it must also be comprised of identical lexical items to those of the antecedent (perhaps modulo F&M's 1994 Vehicle Change). However, Rooth (1992) argues that the Parallelism Constraint cannot be syntactic identity, based on examples like (i).

(i) First someone told the girls<sub>1</sub> that I was **bad-mouthing them**<sub>1</sub>, then the boys<sub>2</sub> heard I was [bad-mouthing them<sub>2</sub>].

Rooth points out that the change in index is not permitted under F&M's (1994) *i-copy* condition because the syntactic material between *girls*<sub>1</sub> and *them*<sub>1</sub> in the antecedent is not identical to the syntactic material between *boys*<sub>2</sub> and *them*<sub>2</sub> in the target. Hence, Rooth (1992) suggests a semantic redundancy condition to replace the syntactic *i-copy* relation. This would allow example (i) as a result of implicational bridging: from "someone told the girls X," it follows that "the girls heard X." Furthermore, as Hardt (1992: 16) points out, Rooth's semantic redundancy condition is also too restrictive. This is illustrated by examples like (ii).

(ii) If Tom<sub>i</sub> was having trouble in school, I would **help him**<sub>i</sub>.

On the other hand, if Harry<sub>j</sub> was having trouble, I doubt that I would [help him<sub>j</sub>].

Example (ii), as Hardt (1992) argues, violates F&M's (1994) *i-copy* condition because the material intervening between *Tom*<sub>i</sub> and *him*<sub>i</sub> cannot be syntactically identified with the corresponding material intervening between *Harry*<sub>j</sub> and *him*<sub>j</sub>. This example also violates Rooth's (1992) semantic identity condition because *I would* and *I doubt that I would* are semantically different.

structure from the perspective of the theory of focus, but must also be sensitive to the representation of information, perhaps to syntax.

#### 4.5.2 LF Pied-Piping and the Bare Output Condition

Since Sag (1976), it has been widely assumed that the PF deletion operation that yields ellipsis constructions is evidently not allowed to delete arbitrary elements in arbitrary environments (cf. Williams 1977). The level where the PF deletion operation applies must be one which is fully disambiguated with respect to interpretation, namely, LF. Mere identity of representations at some pre-LF stage of the derivation is not sufficient to license ellipsis. Ellipsis must be subject to the LF Identity Condition on Ellipsis (cf. Sag 1976, Sag and Hankamer 1984, and Heim and Kratzer 1998).

- (113) The LF Identity Condition on Ellipsis  
 A constituent may be deleted at PF only if it is a copy of another constituent at LF.  
 (Heim and Kratzer 1998: 250)

Hence, it is reasonable for us to assume that, in MCCCs, comparative stripping, which is a type of ellipsis, must also be subject to the LF Identity Condition on Ellipsis. We therefore adopt a PF-Deletion analysis for MCCCs and assume that, at some stage of the derivation, (114a) has the structure in (114b), and comparative stripping applies to the *bi*-clause in the PF component (cf. Chomsky and Lasnik 1991).

- (114) a. Zhangsan jintian [pp bi [CP Lisi zuotian [\_\_]]] gaoxing.  
 Zhangsan today than Lisi yesterday happy  
 'Zhangsan is happier today than Lisi was yesterday.'
- b. Zhangsan jintian [pp bi [CP Op<sub>i</sub> [Lisi zuotian t<sub>i</sub>-gaoxing]]] gaoxing.  
 Zhangsan today than Lisi yesterday happy happy

Following Chomsky (1977), we assume that comparatives involve *wh*-movement of a degree operator, as shown in (114b). Further, given the LF Identity Condition on Ellipsis, the stripped part (i.e., the underlined part) in the *bi*-clause in (114b) must be another copy of the antecedent occurrence in the main clause (i.e., *Zhangsan jintian gaoxing* 'Zhangsan is happy today') at LF. However, there is no operator-variable relation in the main clause of (114b). So the LF Identity Condition on Ellipsis is not satisfied in (114b), but

the BARE OUTPUT of (114b), namely, (114a), indicates that comparative stripping does apply to (114b). Therefore, somehow an operator-variable relation must be created for the main clause of (114b). As we have argued, the *bi*-clause can be considered as a generalized quantifier with the logical type  $\langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$ ; therefore, it is plausible for us to assume that the *bi*-clause undergoes QR and LF pied-pipes to an appropriate position, for example, a TP-adjoined position, in order to allow (114b) to satisfy the LF Identity Condition on Ellipsis. After quantifier-raising the *bi*-clause to a TP-adjoined position, (115) is derived.

(115)  $[_{TP} [_{bi} [_{CP} Op_i [_{Lisi} zuotian [_{var} t_i \text{-gaoxing}]]]]]_j [_{TP} Zhangsan jintian [_{var} t_j \text{-gaoxing}]]]$ .

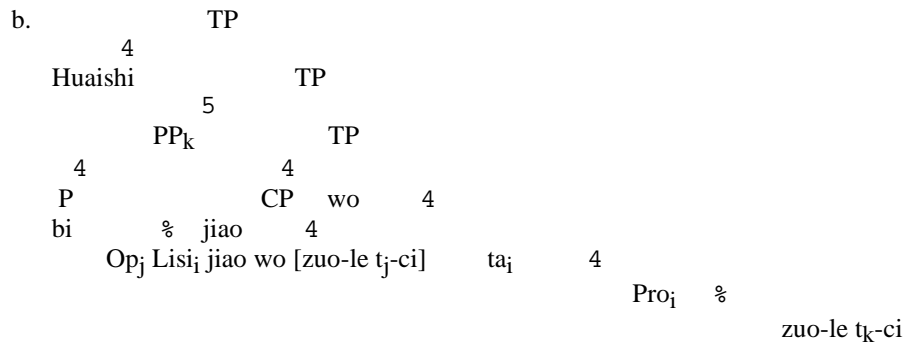
In the LF representation in (115), the "stripped" site, *t<sub>i</sub>-gaoxing* 't<sub>i</sub>-happy', in the *bi*-clause, is identical to its antecedent occurrence in the main clause; therefore, the LF Identity Condition on Ellipsis is satisfied. The PF-Deletion process, comparative stripping, then applies and the BARE OUTPUT (114a) is derived. Hence, the motivation for the LF pied-piping of the *bi*-clause in (115) is to create an LF representation in which the stripped part is a copy of the antecedent occurrence in the main clause. So, we assume that in MCCCs, operations like LF pied-piping enter the computational system only if they have an effect on the output (for example, the phonetic form (114a), which is created by comparative stripping under satisfaction of the LF Identity Condition on Ellipsis). Further, we may rephrase this assumption by positing that a "special" feature [quant], which induces LF pied-piping, may enter the numeration only if it has an effect on output. In this way, the whole *bi*-clause LF pied-pipes to some  $X^{\max}$  that is its potential host.

Chomsky (1995a: 377) assumes that either T or *v* may have optional affix features allowing them to host [quant]. This assumption is reminiscent of May's (1985) theory of QR; that is, we might take LF-movement as more closely approximating "Move  $\alpha$ ". So, QR, as May (1985: 42) suggests, is allowed to attach to nodes other than S only if such movement is consistent with proper binding, the  $\theta$ -Criterion, the ECP, etc. So, QR is allowed to be VP-adjunction, as shown below (cf. Williams 1977).

(116) [<sub>S</sub> Who<sub>3</sub> [<sub>S</sub> e<sub>3</sub> [<sub>VP</sub> everything<sub>2</sub> [<sub>VP</sub> bought e<sub>2</sub> for Max]]]]

Hence, QR might be achieved through either TP-adjunction or vP adjunction. So, the question of how to make a choice between these two adjunction sites immediately arises, as we have argued that MCCCs involve QR. Let us consider the TP-adjunction option first. If the TP-adjunction option is assumed, one significant consequence of our PF-Deletion analysis is that the QR of the *bi*-clause to a TP-adjoined position explains the obviation of Binding Condition C shown by (117a), which has the LF representation (117b).

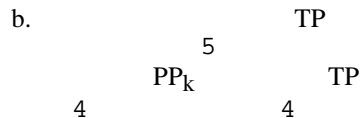
(117) a. Huaishi, wo jiao ta<sub>i</sub> [bi [Lisi<sub>i</sub> jiao wo [\_\_\_]]] duo zuo-le san-ci.  
 Wrongs I ask him than Lisi ask me more do-ASP three-time  
 'As for wrongs, I asked Lisi<sub>i</sub> to do three more times than he<sub>i</sub> asked me to do.'



In (117b), after quantifier-raising of the *bi*-clause, the pronominal indirect object *ta* 'him' no longer c-commands the embedded subject *Lisi* in the *bi*-clause; therefore, Binding Condition C is not violated in (117a). Hence, Binding Condition C is obviated by QR.

However, if we assume that the *bi*-clause is also quantifier-raised to a TP-adjunction position in (118a), we would incorrectly predict that (118a) is grammatical, as Binding Condition C can likewise be obviated by QR here.

(118) a. \*Ta<sub>i</sub> qi ma [[bi [Lisi<sub>i</sub> qi niu [\_\_\_]]] [qi-de kuai].  
 He ride horse than Lisi ride cow ride-DE fast





Even though we know that  $\nu$ P-adjunction can explain the difference between (117a) and (118a) with regard to the obviation of Binding Condition C, we still have not solved the problem of choosing between TP-adjunction and  $\nu$ P-adjunction.

In the following, we shall argue that QR must be subject to the Principle of Economy of Derivation; that is, QR in a longer derivation (i.e., TP-adjunction) is allowed only when its application has a semantic effect different from that of a shorter (i.e.,  $\nu$ P-adjunction) derivation (cf. Cheng 1991 and Fox 1995a).

#### 4.5.3 QR and Economy: The Obviation of Condition C

According to the theory of Economy of Derivation, shorter derivations are always chosen over longer ones when the results of the two are the same (cf. Chomsky 1995a: 139). Along this line of argumentation, Cheng (1991: 169) suggests that the Principle of Economy of Derivation does not rule out a longer derivation, for example, QR in TP-adjunction fashion, if it derives a different legitimate structure from the shorter one, namely, QR in  $\nu$ P-adjunction (cf. Reinhart 1998). The idea that the landing site of QR is the  $\nu$ P-adjunction position rather than the TP-adjunction position when two instances of QR yield the same interpretation is further developed by Fox (1995a), drawing on considerable empirical evidence.<sup>37</sup>

As Fox (1995a) and others notice, the examples in (120) differ from those in (121) in that (120a-b) are different from each other in interpretation when the subject has scope over the object and when the scopal relation is reversed, but that in (121a-b) the interpretations are truth-conditionally the same regardless of the scopal relations.

- (120) a. A boy loves every girl.  
b. Many boys love every girl.
- (121) a. John loves every girl.  
b. Every boy loves every girl.

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<sup>37</sup> Actually, Cheng's (1991) assumption still differs from Fox's (1995a) in that Fox assumes that when there is no semantic shift, QR is unnecessary.

By comparing the effects of Economy of Derivation on (120a) and (121a), Fox (1995a) points out two significantly interesting issues.

First, (120a) has different interpretations when the subject has scope over the object (i.e., the interpretation  $M_S$ ) and when the scopal relation is reversed (i.e., the interpretation  $M_O$ ). If the reference set is constructed with  $M_S$  as the designated interpretation, the optimal derivation will be the one ending with the LF in (122a). If the reference set is constructed with  $M_O$  as the designated interpretation, there will be no way of avoiding QR over the subject and the optimal derivation will be the one ending with the LF in (122b).

- (122) a. [TP a boy<sub>1</sub> ... [VP every girl<sub>2</sub> [VP t<sub>1</sub> loves t<sub>2</sub>]]]  
 b. [TP every girl<sub>2</sub> ... [TP a boy<sub>1</sub> [VP t<sub>1</sub> loves t<sub>2</sub>]]]

Second, in contrast to (120a), (121a) will have the same interpretation  $M$  under its two possible scopal relations, as shown in (123a-b).

- (123) a. [TP John<sub>1</sub> ... [VP every girl<sub>2</sub> [VP t<sub>1</sub> loves t<sub>2</sub>]]]  
 b. \*[TP every girl<sub>2</sub> ... [TP John<sub>1</sub> [VP t<sub>1</sub> loves t<sub>2</sub>]]]

Since every interpretable LF that might result from (121a) will have  $M$  as its interpretation, we need to consider only one reference set (the one constructed with  $M$  as the designated interpretation). Although this reference set includes the derivations resulting in the LFs in (123), Economy considerations prefer (123a) over (123b), and the latter is blocked (hence, the asterisk in (123b)). In other words, the scope shifting operations (henceforth SSOs) - Quantifier Raising and Quantifier Lowering - are blocked when their application does not have semantic effect.

We have argued that in MCCCs, the *bi*-clause and the degree word *geng* 'more' form a syntactic unit, which functions as a generalized quantifier over degrees and has to undergo QR at LF (cf. Moltmann 1992).<sup>38</sup> Since there are no other quantifiers (or quantified phrases) inside (117a) and (118a) (i.e., no

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<sup>38</sup> Of course not all generalized quantifiers have to undergo QR. Here we assume that clausal comparatives involve QR because of the LF Identity Condition on Ellipsis (or the Bare Output Condition).

significant semantic shifts occur), the *bi*-clause in both (117a) and (118a) must undergo QR and adjoin to the *v*P-adjoined position in LF pied-piping fashion to satisfy the LF Identity Condition on Ellipsis. More precisely, as we have argued, the motivation of QR here is to create an LF representation in which the stripped part is a copy of the occurrence of its antecedent in the main clause because of the LF Identity Condition on Ellipsis (i.e., the Parallelism Constraint) rather than the quantificational force of a universal quantifier (cf. Kennedy 1997).<sup>39</sup> In other words, only if the LF Identity Condition on Ellipsis is satisfied can the application of the PF deletion operation (i.e., comparative stripping) be allowed in MCCCs, and then an effect on the PHONETIC OUTPUT (i.e., the stripped site in MCCCs) results. So, under our PF-Deletion analysis, QR has an INDIRECT PF EFFECT on the output (contra Chomsky 1995a: 377). This assumption can be rephrased as follows: LF pied-piping enters the computational system only if it has an effect on output (i.e., on the phonetic form in (115a)). Hence, under our analysis, the application of LF pied-piping must be subject to the Bare Output Condition (cf. Chomsky 1995a: 377).<sup>40</sup>

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<sup>39</sup> Following May (1991: 335), Kennedy (1997: 684-685) proposes (i), which, as he argues, is a more general version of the condition: move just enough material for convergence, to explain the LF pied-piping shown by ACD constructions.

(i) A derivation  $\langle S_1, S_2, \dots, S_n \rangle$  converges only if  $S_n$  is a logical form.

As Kennedy (1997) argues, (i) has its root in May's (1991: 335) proposal that a logical form is a representation of "those formal properties which are required to ensure the proper application of the semantic rules. Namely, LF - a level of linguistic representation - will be a logical form ... only if it manifests those properties." If a linguistic representation does not manifest the formal properties that are required to ensure the application of semantic rules, then it is not a logical form. Thus, under Kennedy's (1997) analysis, QR of enough material is forced by the formal requirements imposed by quantificational determiners. However, our analysis differs from Kennedy (1997). In order to deal with the ACD constructions like (iia), Kennedy (1997) suggests that QR targets both a quantificational determiner and its restriction.

(ii) a. John recognized every suspect that Bill did [<sub>VP</sub>\_\_].  
 b. [ every suspect that Bill did [<sub>VP</sub> recognize [<sub>NP</sub>\_\_]]] [<sub>IP</sub> John did [<sub>VP</sub> recognize [<sub>NP</sub>\_\_]]].

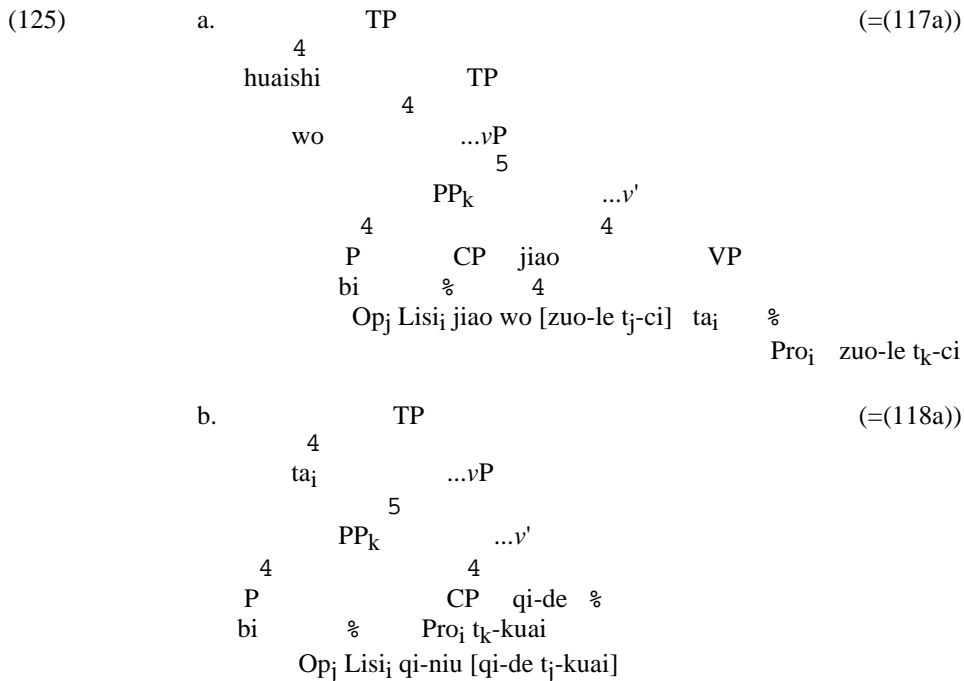
In (iia), both the determiner and the restriction have to be quantifier-raised to create the convergent derivation shown in (iib). However, if we regard the constituent [*(geng) bi [Lisi zuotian [\_\_]]*] as the degree modifier of APs, then the constituent [*(geng) bi [Lisi zuotian [\_\_]]*] should be considered "a determined part". If so, then what is quantifier-raised in MCCCs is only the determiner part, not including the restriction part. Namely, no extramaterial can be moved; what is moved is just enough material for convergence.

<sup>40</sup> The idea that the application of LF pied-piping must be restricted is also suggested by Moritz and Valois (1994). They suggest that the notion of specifier-head agreement plays a crucial role in a theory of LF pied-piping. In particular, LF pied-piping allows the part of the structure that should behave like an island to move as a whole to the specifier of a Negation Phrase if those maximal projections are marked with the proper feature. The stages of the LF derivation of (ia) are given in (ib) through (id).

(i) a. Lise n'a rencontr• [<sub>DP</sub> le fr re de [<sub>DP</sub> l'ami de personne]].  
 Lise NEG-has met the brother of the-friend of nobody

- (124) The Bare Output Condition (i.e., The Economy Condition)  
 $\alpha$  enters the numeration if and only if it has an effect on output.

Our assumption that, in MCCCs, QR is motivated by the Bare Output Condition is still compatible with Fox's (1995a) theory of the economy of QR, which assumes that QR is allowed only when it has an effect on output. In the cases provided by Fox (1995a), the effect is "the semantic shift" (or an LF effect), while in MCCCs, as we have argued, the effect is "the application of PF-Deletion rule" (or a PF effect). Thus, under our PF-Deletion analysis, (117a) and (118a) have LF representations in (125a-b), respectively.




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'Lise did not meet anybody's friend's brother.'

- b. Lise n'a rencontr• [DP le fr re de [DP **personne**<sub>i</sub> [D' l'ami t<sub>i</sub>]]].  
 c. Lise n'a rencontr• [DP [DP **personne**<sub>i</sub> l'**ami** t<sub>i</sub>]<sub>k</sub> [D' le fr re t<sub>k</sub>]].  
 d. Lise [NegP [DP [DP **personne**<sub>i</sub> l'**ami** t<sub>i</sub>]<sub>k</sub> [D' le fr re t<sub>k</sub>]]<sub>x</sub> [Neg' n'a rencontr• t<sub>x</sub>]].

(ia) involves multiple instances of both pied-piping and specifier-head agreement at LF. First, in (ib), *personne* 'nobody' moves to the specifier position of the DP headed by *ami* 'friend', and the DP is marked [+neg] by specifier-head agreement. Then, in (ic), the movement of the DP headed by *ami* to the specifier position of the DP headed by *fr re* 'brother' causes the latter to be with marked [+neg] by specifier-head agreement. The DP complement of *rencontrer*, finally, moves as a whole to [Spec, NegP] and Neg<sup>0</sup> is licensed. As shown in (ib-c), all maximal projection through which LF pied-piping proceeds are marked [+neg] by specifier-head agreement. Thus, under Moritz and Valois's (1994) analysis, LF pied-piping of XP is restricted to cases where XP is marked with the proper feature.



Condition. Third, QR must be restricted by Economy considerations. This PF-Deletion analysis has the following theoretical and empirical consequences.

First, the problem of infinite regress in ACD constructions, first pointed out by Bouton (1970) and subsequent researches such as May (1985), does not arise under our PF-Deletion analysis. Rather, our analysis raises the problem of the LF Identity Condition on Ellipsis (i.e, Parallelism) (cf. Fox 1995b), as discussed already in section 5.2.

Second, according to our PF-Deletion analysis, the application of LF pied-piping is subject to the Bare Output Condition:  $\alpha$  enters the numeration only if it has an effect on output. This assumption essentially differs from the LF Pied-Piping Hypothesis proposed by Choe (1987), Pesetsky (1987), and Nishigauchi (1990). According to the latter, in cases where a non-D-linked *wh*-phrase appears to violate Subjacency or the Condition on Extraction Domain, the relevant LF movement pied-pipes the entire island in which the *wh*-phrase occurs but does not move it out of the island.<sup>41</sup> A piece of interesting evidence comes from the fact that a question with a *wh*-phrase in a complex NP is often not given an answer that specifies the value of the *wh*-word alone, but requires one that at least repeats the other material in the island. This requirement is also found in Mandarin Chinese examples such as (127), taken from Fiengo, Huang, Lasnik, and Reinhart (1988: 83).

- (127) a.       Ni xihuan [shei xie de shu]?  
          You like    who write DE book  
          Lit: 'You like the book that who wrote?'
- b.       Zhangsan xie de (shu).  
          Zhangsan write DE book  
          Lit: 'Books that Zhangsan wrote'
- c.       ??Zhangsan.

However, the LF pied-piping movement as proposed by Choe (1987), Pesetsky (1987), and Nishigauchi (1990) does not have any effect on the output (either semantic shifting or phonetic form change).<sup>42</sup> So, it

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<sup>41</sup> See Fiengo, Huang, Lasnik and Reinhart (1988) for more discussion on the LF Pied-Piping Hypothesis.

<sup>42</sup> However, as Jim Huang (personal communication) points out to me, in the spirit of Fiengo, Huang, Lasnik and Reinhart (1988), one can say that pied-piping in QR does make a semantic difference. For

is not compatible with Chomsky's (1995: 265) assumption that only PF convergence forces anything beyond features to raise. In contrast, we have argued that in MCCCs, the effect of QR in LF pied-piping has an indirect effect on output, namely, the application of comparative stripping which results in a phonetic form change. Thus, LF pied-piping is allowed/required in MCCCs.

Third, our assumption that the satisfaction of the LF Identity Condition on Ellipsis (or the Bare Output Condition) is a possible motivation for LF pied-piping can go through only if we assume that Binding Theory cannot of itself be a motivation for LF pied-piping (or QR).

Fourth, according to Chomsky (1995a), the workings of the computational system are not affected by the workings of later performance systems which interpret its output. In particular, the workings of the syntax are not affected by the semantics; that is, syntax is autonomous. However, here we claim that syntax is not completely autonomous. For example, in MCCCs, PF deletion (i.e., comparative stripping) applies only if the LF Identity Condition on Ellipsis is satisfied. Therefore the application of PF processes like comparative stripping should "see" certain aspects of computational system (i.e., LF). Thus, it is necessary to allow the PF component to have direct access to the LF component.<sup>43</sup>

Fifth, our analysis predicts that (128), in which we have a deep anaphor like the pro-form *nage yangzi* 'that manner' in the stripped site, should be ungrammatical (cf. Chao 1968, and Hankamer and Sag 1976).<sup>44</sup>

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example, *every boy* is a restrictive quantifier over boys. *Everybody's pictures* may be a quantification over sets of pictures, each set belongs to one person.

<sup>43</sup> However, that does not mean the total abandonment of the autonomy of syntax. Rather, it motivates a very local amendment, similar to what Fox (1995a: 287-289) argues.

<sup>44</sup> As Y.-R. Chao (1968) notices, the Mandarin Chinese demonstrative *nage (yangzi)* 'that-manner' can be used as a predicate anaphor. This predicate anaphor neither has to be locally bound nor requires an overt linguistic antecedent. These properties shown by *na-ge yangzi* 'that manner' are illustrated below.

- (i) Zhangsan hen jiaohua, keshi [ta-de didi yidian ye bu hui nage yang(zi)].  
Zhangsan very mean but his brother a-little-bit-of also not will that-CL that-manner  
'Although Zhangsan is very mean, his brother is not that-manner.'
- (ii) Zhangsan hen jiaohua, keshi [wo renwei [ta-de didi yidian ye bu hui nage yang(zi)]].  
Zhangsan very mean but I think his brother a-little-bit-of also not will that-manner  
'Although Zhangsan is very mean, I think that his brother is not that-manner.'
- (iii) Zhangsan zhen-de hen nage.  
Zhangsan really very that-CL  
'Zhangsan is really that-manner.'

- (128) \*Huaishi, wo jiao ta; [bi [Lisi; jiao wo [nage yang(zi)]]] duo zuo-le san-ci.  
 Wrongs I ask him than Lisi ask me that manner more do-ASP three-times  
 Lit: '\*As for wrongs, I asked him; to do three more times than Lisi; asked me to do so.'

That is, the presence of the deep anaphor *nage yangzi* 'that manner', which is pragmatically controlled, implies that (128) does not involve any ellipsis. Therefore, the LF Identity Condition on Ellipsis is ineligible to motivate the QR of the *bi*-clause in (128). Thus, Binding Condition C is not obviated in (128), as the pronominal indirect object *ta* 'him' c-commands the embedded subject *Lisi*. Hence, (128) is ungrammatical.<sup>45</sup>

Thus far, we have proposed a PF-Deletion analysis in which LF pied-piping is required and is subject to the Bare Output Condition (contra Chomsky and Lasnik 1991). We further argued that QR must be subject to the principles of Economy. Namely, when two instances of QR yield the same interpretation, the longer one is blocked by Economy considerations. The interaction between QR in LF pied-piping fashion and principles of Economy provides explanation for the obviation of Binding Condition C shown by MCCCs. Under our analysis, the infinite regress problem posed by ACD constructions does not arise; instead, the question of Parallelism becomes an important issue under our analysis. However, the Parallelism Effect shown by elliptical sentences is much more complex than what we expect. Recall that MCCCs show not only Eliminative Effects including Dahl's Puzzle Effects but also the obviation of Dahl's Puzzle Effects. In the following, we shift our attention to these semantic issues.

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Hence, pro-forms like *na-ga yangzi* 'that manner' can be regarded as deep anaphors (cf. Hankamer and Sag 1976). We would expect the long-distance "binding" between a stripped site and its antecedent to be possible if the stripped site is replaced by the pro-form *na-ge yangzi* 'that manner'. Our expectation is confirmed by the contrast between (iv) and (v).

- (iv) \*Jiangdao kai-che de sudu, Zhangsan jintian [bi wo kandao [Lisi zuotian [\_\_\_]]] hai kuai.  
 Talk-about drive-car DE speed Zhangsan today than I see Lisi yesterday more fast  
 'Talking about driving speed, Zhangsan drives faster than I saw the way that Lisi did yesterday.'
- (v) Jiangdao kai-che de sudu, Zhangsan jintian [bi wo kandao [Lisi zuotian na-ge yangzi]]  
 Talk-about drive-car DE speed Zhangsan today than I see Lisi yesterday that-manner  
 hai kuai.  
 more fast  
 'Talking about driving speed, Zhangsan drives faster than I saw the way that Lisi did yesterday.'

<sup>45</sup> I am indebted to Akira Watanabe for reminding me of this point.

## 4.6 Binding in Ellipsis Constructions

In section 4.6.1, we argue the Eliminative Effect that shows up in MCCCs, whereby certain logical possibilities for anaphoric interpretations are excluded, follows from the interaction of (1) the Parallelism Constraint (i.e., the LF Identity Condition on Ellipsis in (113)); (2) limiting the reference set for optimality; and (3) the effects of the cycle at LF. In section 4.6.2, we propose that Dahl's Puzzle, which states the restriction on the distribution of strict identity and sloppy identity ambiguities, follows from the interaction of two factors: Heim's (1998) Locality Condition on Variable Binding and the Parallelism Constraint on Ellipsis. Furthermore, we shall show that the Locality Condition on Variable Binding makes a prediction: in environments in which the Locality Condition on Variable Binding allows non-local binding, Dahl's Puzzle will be obviated.

### 4.6.1 Parallelism and Bottom-Up LF Mapping

As we have pointed out, the effect of comparative stripping in MCCCs is construed as ELIMINATIVE, and this Eliminative Effect can be shown in two different ways.

First, in cases like (129), among the five logically possible readings (129a-e), the two mixed readings (129d-e) are excluded (cf. Dahl 1974 and F&M 1994).

(129) Zhangsan jintian [bi [Lisi zuotian [\_\_\_]] duo gei-le Wangwu yi-zhang (=55))  
Zhangsan today than Lisi yesterday more give-ASP Wangwu one-CL  
taziji-de zhaopian.  
himself-DE picture

- a. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Zhangsan's pictures that Lisi gave to Wangwu yesterday. (strict) Wangwu
- b. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday. (sloppy/subject versus subject)
- c. The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday. (sloppy/indirect object versus indirect object) Wangwu

d. \*The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday. (mixed/subject versus indirect object)

e. \*The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday. (mixed/indirect object versus subject)

Besides the strict reading in (129a), only two sloppy readings (i.e., those in (129b-c)) are allowed. Under the sloppy reading in (129b), when the complex anaphor *ta-ziji* 'himself' in the main clause refers to the matrix subject *Zhangsan*, the complex anaphor *ta-ziji* 'himself' in the *bi*-clause must refer to the embedded subject *Lisi* in a parallel fashion. Similarly, in (129c), when the complex anaphor *ta-ziji* 'himself' in the main clause refers to the indirect object *Wangwu*, the complex anaphor *ta-ziji* 'himself' in the *bi*-clause also has to refer to the indirect object *Wangwu*. In contrast, the two mixed readings in (129d-e), which do not show parallelism in anaphoric interpretation, are excluded. Thus, as (129d) shows, when the complex anaphor *ta-ziji* 'himself' in the main clause refers to the matrix subject *Zhangsan* but the complex anaphor *ta-ziji* 'himself' in the *bi*-clause refers to the indirect object *Wangwu*, the reading is not allowed. Similarly, as (129e) shows, when the complex anaphor *ta-ziji* 'himself' in the main clause refers to the indirect object *Wangwu* but the complex anaphor *ta-ziji* 'himself' in the *bi*-clause refers to the embedded subject *Lisi*, the reading is not available. In other words, the examples in (129) show that ambiguities do not multiply; that is, in (129), besides the strict reading in (129a), only the two sloppy readings (129b-c) are allowed.

Second, as we have noticed, when the matrix subject does not match the complex anaphor *ta-ziji* 'himself' in  $\phi$ -features, the complex anaphor *ta-ziji* 'himself' in the *bi*-clause cannot be coindexed with the embedded subject, even though they share the same set of  $\phi$ -features. This restriction on anaphoric binding in ellipsis constructions is illustrated by (130).

(130) Tamen<sub>i</sub> jintian [bi [Lisi<sub>k</sub> zuotian [\_\_\_]] duo gei-le Wangwu; yi-zhang (=56)  
 They today than Lisi yesterday more give-ASP Wangwu one-CL  
 taziji-de zhaopian.  
 himself-DE picture

a. \*The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday.

b. The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday.

In the following, we shall argue that the Eliminative Effect shown by examples (129)-(130) follows from the interaction of the Parallelism Constraint and the Bottom-Up LF Mapping which requires the reference set for optimality which, as Chomsky (1995a: 294) suggests, should be redetermined for each step in the derivation should be further limited to derivations with a designated meaning for the minimal clause containing D (cf. Fox 1995a).

(131) Let N be a set of lexical items (those are the items designated to be selected from the lexicon throughout the derivation) and D a structure at a point in the derivation. The *reference set* for N and D,  $R_{N,D}$ , is the set of possible transformations D' of D such that D' is derived from D using only elements from N, and that D' is further extendible to a converging derivation using the remaining elements of N.

Let us start formalizing the Parallelism Effect under the idea of Economy by considering the LF representations of (133) and (132), shown in (134a-b), respectively.

(132) Zhangsan jintian [bi [Lisi zuotian [\_\_]] duo gei-le Wangwu yi-zhang Zhangsan today  
 than Lisi yesterday more give-ASP Wangwu one-CL  
 taziji-de zhaopian.  
 himself-DE picture

a. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Zhangsan's pictures that Lisi gave to Wangwu yesterday. (strict)

b. The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday. (sloppy/subject versus subject)

c. The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday. (sloppy/indirect object versus indirect object)

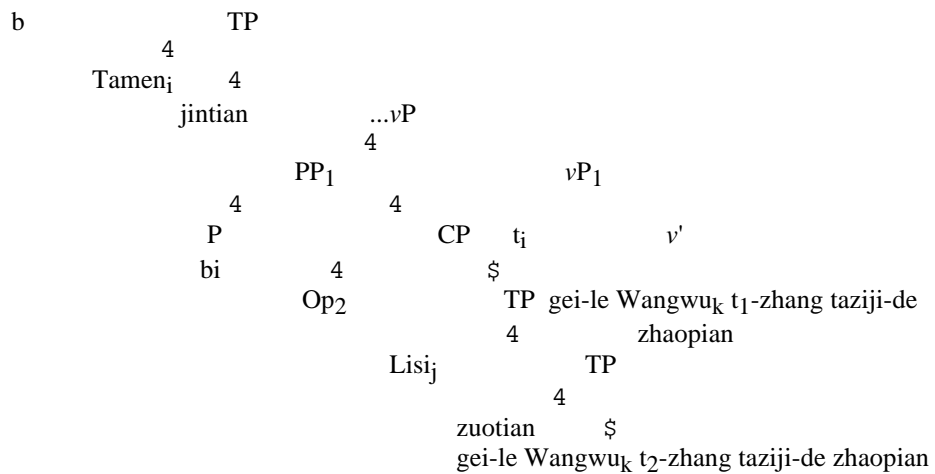
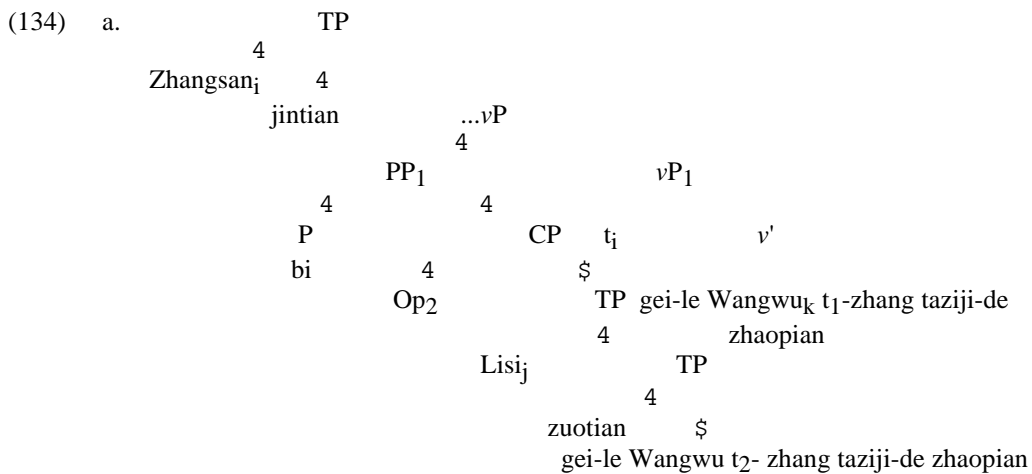
d. \*The number of Zhangsan's pictures that Zhangsan gives to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday. (mixed/subject versus indirect object)

e. \*The number of Wangwu's pictures that Zhangsan gives to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday. (mixed/indirect object versus subject)

(133) Tamen<sub>i</sub> jintian [bi [Lisi<sub>k</sub> zuotian [\_\_\_]] duo gei-le Wangwu<sub>j</sub> yi-zhang They today  
 than Lisi yesterday more give-ASP Wangwu one-CL  
 taziji-de zhaopian.  
 himself-DE picture

a. \*The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Lisi's pictures that Lisi gave to Wangwu yesterday.

b. The number of Wangwu's pictures that they give to Wangwu today is one more than the number of Wangwu's pictures that Lisi gave to Wangwu yesterday.



In (134a), the matrix vP<sub>1</sub>, which is c-commanded by PP<sub>1</sub>, is ambiguous, as the complex anaphor *ta-ziji* 'himself' can refer to either the indirect object *Wangwu* or the matrix subject *Zhangsan* (i.e., the trace *t<sub>i</sub>*). In contrast, in (134b) the matrix vP<sub>1</sub>, though it is c-commanded by PP<sub>1</sub>, is not ambiguous; the complex anaphor *ta-ziji* 'himself' can refer only to the indirect object *Wangwu*.

The contrast between (134a) and (134b) further shows two interesting points. One is that the anaphoric interpretation of the *bi*-clause always imitates that of the matrix  $vP_1$  in MCCCs. Second, in MCCCs, the matrix  $vP_1$ , which determines the anaphoric interpretation of the *bi*-clause, must be c-commanded by  $PP_1$ , in which the *bi*-clause is further embedded.

These two phenomena are reminiscent of Fox's (1995a: 293) Ellipsis Scope Generalization and derivational notion of computation. As is widely known, a construction involving multiple quantification such as (135a), which would normally show scopal ambiguity, sometimes loses this ambiguity when it serves as an antecedent for ellipsis, as illustrated by (135b).

- (135) a. Some boy admires every teacher. (ambiguous)  
 b. Some boy admires every teacher and Mary does [ $vP$ \_\_] too. (unambiguous)

That is, (135b) does not allow the object NP *every teacher* in the first conjunct to have wide scope with respect to the subject NP *some boy*. However, the same construction, that is, (135a), retains the scopal ambiguity when it serves as an antecedent in cases such as (136).

- (136) Some boy admires every teacher and some girl does [ $vP$ \_\_] too.

As Fox (1995a: 293) argues, the relevant difference between (135b) and (136) in fact has to do with whether or not the second conjunct is semantically ambiguous. Namely, scopal ambiguity is once more possible in the first conjunct only when a similar ambiguity is possible in the second conjunct (cf. Hirschbühler 1982). Fox (1995a: 293) reaches the following generalization for scopal interaction in ellipsis constructions.

- (137) The Ellipsis Scope Generalization (ESG):  
 The relative scope of two quantifiers, one of which is in an antecedent VP of an ellipsis construction, may differ from the surface c-command relation only if the parallel difference will have semantic effects in the elided VP.

Fox (1995a) further argues that the ESG consists of two parts. One part follows from a well-known constraint which requires parallelism between elided/reconstructed material and its antecedent.

That is, in ellipsis constructions an elided VP and its antecedent must receive parallel interpretations. For example, in (138), the interpretation of pronouns in the elided VP must receive interpretations parallel to the corresponding pronouns in the antecedent VP. Although the pronoun in the antecedent and in the elided VP must receive the same referential value, sameness in reference is not always required, as exemplified in (139a-c).

(138) John like his mother, and Bill does [VP\_\_] too.

- (139) a. John likes his mother.  
           └──────────┘  
       Bill likes John's mother.  
       (Same reference value)
- b. John likes his mother.  
           └──────────┘  
       Bill likes his mother.  
           └──────────┘  
       (Identical dependency)
- c. \*John likes his mother.  
           └──────────┘  
       Bill likes Max's mother.  
       (No parallelism)

As for (138), parallelism can be achieved either by letting the pronouns have an identical referential value, as represented in (139a) (i.e., strict identity), or by letting them be linked to their respective antecedent by identical dependencies, as represented in (139b) (i.e., sloppy identity). Other options, such as (139c), are ruled out by the Parallelism Constraint.

The other part follows from principles of Economy; that is, the object quantified phrase can be moved by QR over the subject quantified phrase only if the movement yields an interpretation which would be unavailable otherwise. In other words, the Parallelism Constraint and Economy considerations conspire to require the object to be quantifier-raised over the subject in one of the conjuncts if and only if a parallel instance of QR applies in the other conjunct. Fox's (1995a) analysis on ellipsis constructions is illustrated in the contrast which shows up in potential LF derivations for (135b) and (136), given below in (140) and (141), respectively.

- (140) a. Some boy [every teacher<sub>1</sub> [admire t<sub>1</sub>]] and  
Mary [every teacher<sub>1</sub> [admire t<sub>1</sub>]]
- b. \*every teacher<sub>1</sub> [Some boy [admire t<sub>1</sub>]] and  
[every teacher<sub>1</sub> [Mary admire t<sub>1</sub>]]
- c. \*Some boy [every teacher<sub>1</sub> [admire t<sub>1</sub>]] and  
[every teacher<sub>1</sub> [Mary admire t<sub>1</sub>]]
- d. \*every teacher<sub>1</sub> [Some boy [admire t<sub>1</sub>]] and  
Mary [every teacher<sub>1</sub> [admire t<sub>1</sub>]]
- (141) a. Some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admire t<sub>2</sub>]] and  
Some girl<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admire t<sub>2</sub>]]
- b. every teacher<sub>2</sub> [Some boy<sub>1</sub> [t<sub>1</sub> admire t<sub>2</sub>]] and  
every teacher<sub>2</sub> [Some girl<sub>1</sub> [t<sub>1</sub> admire t<sub>2</sub>]]
- c. \*Some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admire t<sub>2</sub>]] and  
every teacher<sub>2</sub> [Some girl<sub>1</sub> [t<sub>1</sub> admire t<sub>2</sub>]]
- d. \*every teacher<sub>2</sub> [Some boy<sub>1</sub> [t<sub>1</sub> admire t<sub>2</sub>]] and  
Some girl<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admire t<sub>2</sub>]]

Among the four potential LF representations in (140), the Parallelism Constraint rules out the non-parallel scopal relations shown in (140c-d). (140b), as Fox (1995a) argues, should be ruled out because QR in the second conjunct does not generate a new meaning within that conjunct. However, in (141), since the two conjuncts are ambiguous, Economy allows QR in both. Therefore, the two parallel readings in (141a-b) are allowed. In contrast, the two non-parallel readings in (141c-d) are ruled out by the Parallelism Constraint.

Therefore, Fox (1995a) assumes that QR should be allowed only if it generates *within the minimal clause in which it takes place* a meaning which would not be available otherwise. QR thus should not be allowed in one clause in order for it to be applicable in another. Hence, Fox (1995a: 331) proposes that there must be some constraint on the size of the constituents that the computational system can look at when it tries to decide whether movement is allowed. Given this, Fox (1995a) modifies Chomsky's (1995a) definition of the reference set for optimality, as given above as (131), into (142), in which the reference set is further limited to derivations with a designated meaning for the minimal clause containing D.

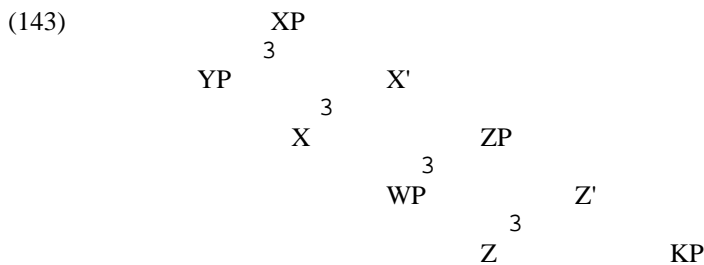
(142) Let  $N$  be a set of lexical items,  $M$  a meaning of a clause, and  $D$  a structure at a point in the derivation.

The *reference set* for  $N$ ,  $M$  and  $D$ ,  $R_{N,M,D}$ , is the set of possible transformations  $D'$  of  $D$  such that  $D'$  is derived from  $D$  using only elements from  $N$ , and that  $D'$  is further extendible to a converging derivation using the remaining elements of  $N$  and having  $M$  as the meaning of the minimal CP dominating  $D$ .

In other words, Economy seeks to reduce the cost associated with Scope Shifting Operations (SSOs):

Quantifier Raising and Quantifier Lowering. Simply put, an SSO can apply only if it yields a semantic interpretation which would be impossible without its application; that is, SSOs are allowed only when they are necessary (as a last resort) for achieving a designated interpretation.

In order to derive the Eliminative Effect, Fox (1995a: 332) further argues that some version of LF cycles is necessarily operative to explain the semantic parallelism requirement between two conjuncts in interpretation (cf. Bures 1993, Bobaljik and Jonas 1997, Tsai 1994, among others). That is, after the point at which the derivation branches out to PF, a new LF cycle begins. In particular, at LF the computation proceeds in reverse to the c-command relation. As such, it operates on the complement of a head before it can operate on its specifier. Suppose that at Spell-Out we had a structure such as (143); the LF computation starts out by considering KP. It then moves in turn to consider  $Z'$ ,  $ZP$ ,  $X'$  and  $XP$  in turn. From such a cycle it follows, for example, that LF operations apply to  $WP$  before they can apply to  $YP$ .



This notion of LF cycles, together with a derivational construction of the reference set as in (142), explains why (135b) is unambiguous. To understand clearly this lack of ambiguity, consider (140a-d) repeated below as (144a-d):<sup>46</sup>

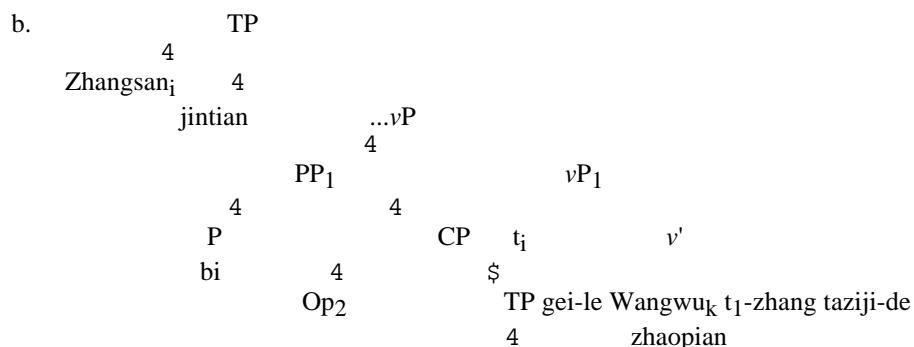
<sup>46</sup> Following Larson (1990), Moltmann (1992) and Kayne (1994), Fox (1995a) assumes that there is an inherent asymmetry in coordination; that is, in coordination, the first conjunct always asymmetrically c-commands the second. This means that in LF cycles, by the time QR is considered in the first conjunct,  $D$  already includes the second conjunct.

- (144)=(140)
- a. Some boy [every teacher<sub>1</sub> [admire t<sub>1</sub>]] and Mary [every teacher<sub>1</sub> [admire t<sub>1</sub>]]
  - b. \*every teacher<sub>1</sub> [Some boy [admire t<sub>1</sub>]] and [every teacher<sub>1</sub> [Mary admire t<sub>1</sub>]]
  - c. \*Some boy [every teacher<sub>1</sub> [admire t<sub>1</sub>]] and [every teacher<sub>1</sub> [Mary admire t<sub>1</sub>]]
  - d. \*every teacher<sub>1</sub> [Some boy [admire t<sub>1</sub>]] and Mary [every teacher<sub>1</sub> [admire t<sub>1</sub>]]

At the point in the derivation in which QR in the second conjunct is considered, D consists only of the second conjunct before QR. Since the meaning of the minimal clause containing D is the same whether QR applies or not, there is one reference set,  $R_{N,M,D}$ , that includes both the second conjuncts of both (144a) and (144b), and the two conjuncts have the same meaning M. The more economical derivation in (144a) is preferred. In other words, by the time the cycle reaches the first conjunct, the position to which the quantifier moves is determined by the structure of the second conjunct. The Parallelism Constraint forces the quantifier in the first conjunct to imitate the operation which took place in the second conjunct; all other derivations crash.

Assuming Fox's (1995a) proposal that, in ellipsis constructions, SSOs must be subject to Economy considerations, let us return to MCCCs which involve comparative stripping and consider examples such as (145a) and its LF representation in (145b).

- (145) a. Zhangsan<sub>i</sub> jintian [bi [Lisi<sub>j</sub> zuotian [\_\_\_]]] duo gei-le Wangwu<sub>k</sub>  
 Zhangsan today than Lisi yesterday more give-ASP Wangwu  
 yi-zhang taziji-de zhaopian.  
 one-CL himself's picture





|\_\_\_\_\_|

Given that the anaphoric interpretation of the complex anaphor *ta-ziji* 'himself' in the *bi*-clause is determined by that of the matrix  $\nu P_1$  (i.e., the matrix clause), in the *bi*-clause the anaphoric interpretation of the complex anaphor *ta-ziji* 'himself' must obey the Parallelism Constraint with respect to the parallel complex anaphor *ta-ziji* 'himself' in the matrix clause. For instance, in (145a), the possible ways of interaction between the Parallelism Constraint and the Bottom-Up LF Mapping can be shown as in (149a-e).

- (149) a. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
           |\_\_\_\_\_|  
       Op<sub>2</sub> Lisi<sub>j</sub> zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang Zhangsan-de zhaopian  
       (referential parallelism/strict)
- b. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
       |\_\_\_\_\_|  
       Op<sub>2</sub> Lisi<sub>j</sub> zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
       |\_\_\_\_\_|  
       (structural parallelism/sloppy)
- c. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
       |\_\_\_\_\_|  
       Op<sub>2</sub> Lisi<sub>j</sub> zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
       |\_\_\_\_\_|  
       (structural parallelism/sloppy)
- d. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
       |\_\_\_\_\_|  
       Op<sub>2</sub> Lisi<sub>j</sub> zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
       |\_\_\_\_\_|  
       (does not obey the (Structural) Parallelism Constraint)
- e. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
       |\_\_\_\_\_|  
       Op<sub>2</sub> Lisi<sub>j</sub> zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
       |\_\_\_\_\_|  
       (does not obey the (Structural) Parallelism Constraint)

Consider (149a) first. Here the complex anaphor *ta-ziji* 'himself' obeys referential-parallelism with the complex anaphor *ta-ziji* 'himself' in (149a); therefore, the strict reading (149a) is allowed.

Next consider (149b). It is easy to see that the complex anaphor *ta-ziji* 'himself' in the *bi*-clause obeys the structural-parallelism with the parallel complex anaphor *ta-ziji* 'himself' in the matrix clause; that is, when the complex anaphor *ta-ziji* 'himself' is linked to the subject *Lisi* in the *bi*-clause, the parallel

complex anaphor *ta-ziji* 'himself' in the matrix clause is linked to the matrix subject *Zhangsan*. Thus, the sloppy reading (149b) is allowed.

The complex anaphor *ta-ziji* 'himself' in (149c) is linked by an identical dependency to that which links the parallel complex anaphor *ta-ziji* 'himself' to its antecedent (i.e., the indirect object *Wangwu*). Thus, the structural-parallelism is obeyed. So, the sloppy reading (149c) is available.

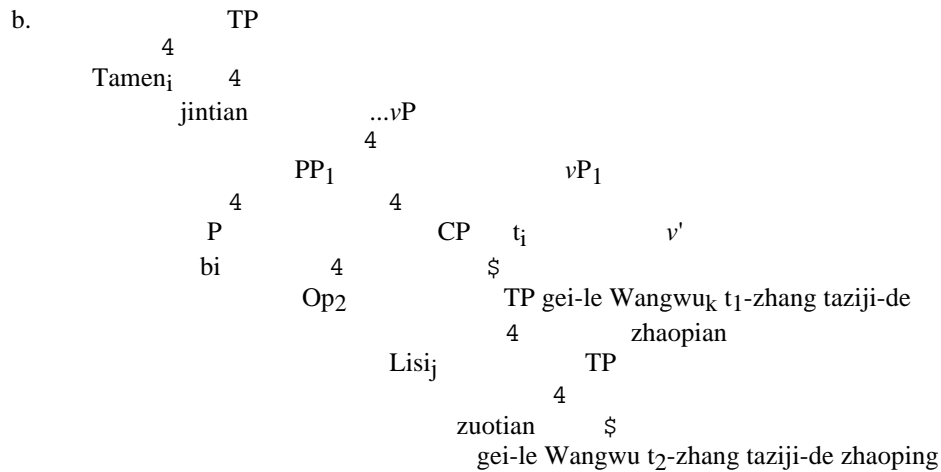
As for (149d), in the *bi*-clause the complex anaphor *ta-ziji* 'himself' is linked to the indirect object *Wangwu* while the complex anaphor *ta-ziji* 'himself' in the matrix clause is linked to the matrix subject *Zhangsan*. Therefore, structural-parallelism is not obeyed in (149d), and the mixed reading in (149d) is unavailable.

Finally, let us consider (149e). In the *bi*-clause, the complex anaphor *ta-ziji* 'himself' is linked to the embedded subject *Lisi* while the parallel complex anaphor *ta-ziji* 'himself' in the matrix clause is linked to the indirect object *Wangwu*. Structural-parallelism is not followed in (149e); therefore, the mixed reading (149e) is excluded.

In sum, the Parallelism Constraint (i.e., the LF Identity Condition on Ellipsis in (113)) - which requires an elided part and its antecedent to be parallel to each other in semantic interpretation - distinguishes the grammatical readings in (149a-c) from the ungrammatical readings in (149d-e). The Eliminative Effect shown by MCCCs is thus naturally derived under our analysis.

By the same reasoning, in (150b) (i.e., the LF representation of (150a)), the anaphoric interpretation of the complex anaphor *ta-ziji* 'himself' in the *bi*-clause is also determined by that of its parallel complex anaphor in the matrix  $vP_1$ , as  $vP_1$  is c-commanded by  $PP_1$  at LF.

- (150) a. Tamen<sub>i</sub> jintian [bi [Lisi<sub>j</sub> zuotian [\_\_\_]]] duo gei-le Wangwu<sub>k</sub>  
 They today than Lisi yesterday more give-ASP Wangwu  
 yi-zhang taziji-de zhaopian.  
 one-CL himself's picture



The logically possible ways of interaction between the Parallelism Constraint and the Bottom-Up LF Mapping for (150a) are shown below.

- (151) a. \*Op<sub>1</sub> tamen<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
 \_\_\_\_\_  
 \*Op<sub>2</sub> Lisij; zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang tamen-de zhaopian  
 (referential parallelism/strict)
- b. Op<sub>1</sub> tamen<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
 \_\_\_\_\_  
 Op<sub>2</sub> Lisij; zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
 (structural parallelism/sloppy)
- c. \*Op<sub>1</sub> tamen<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
 \_\_\_\_\_  
 \*Op<sub>2</sub> Lisij; zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
 (structural parallelism/sloppy)
- d. \*Op<sub>1</sub> tamen<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
 \_\_\_\_\_  
 \*Op<sub>2</sub> Lisij; zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian  
 (does not obey the Parallelism Constraint)
- e. Op<sub>1</sub> Zhangsan<sub>i</sub> jintian gei-le Wangwu<sub>k</sub> t<sub>1</sub>-zhang taziji-de zhaopian.  
 \_\_\_\_\_  
 \*Op<sub>2</sub> Lisij; zuotian gei-le Wangwu<sub>k</sub> t<sub>2</sub>-zhang taziji-de zhaopian



Along the line of Fox (1998), we shall suggest that the Parallelism Constraint on ellipsis constructions must apply to the output of Heim's (1998) Locality Condition on Variable Binding. This interaction between the Parallelism Constraint and the Locality Condition on Variable Binding explains both Dahl's Puzzle Effects and the obviation of Dahl's Puzzle Effect shown by MCCCs.

First, we assume that parallelism is a general constraint which ensures that, in ellipsis constructions, an elided VP and its antecedent must receive parallel interpretations. For example, in (152), the interpretation of pronouns in the elided VP must receive interpretations parallel to the corresponding pronouns in the antecedent VP. Although the pronoun in the antecedent and in the elided VP must receive the same referential value, sameness in reference is not always required, as exemplified in (153a-c).

(152) John likes his mother. Bill does [VP\_\_] too.

- (153) a.        John likes his mother.  
                   └──────────┘  
                   Bill likes John's mother.  
                   (Same reference value)
- b.        John likes his mother.  
                   └──────────┘  
                   Bill likes his mother.  
                   └──────────┘  
                   (Identical dependency)
- c.        \*John likes his mother.  
                   └──────────┘  
                   Bill likes Max's mother.  
                   (No parallelism)

As for (152), parallelism can be achieved either by letting the pronouns have an identical referential value, as represented in (153a) (i.e., strict identity), or by letting them be linked to their respective antecedent by identical dependencies, as represented in (153b) (i.e., sloppy identity). Other options, such as (153c), are ruled out by the Parallelism Constraint.

Second, we assume Heim's (1993) Locality Condition on Variable Binding which states that a variable  $x$  cannot be bound by an antecedent  $\alpha$  in cases where a more local antecedent  $\beta$  could bind  $x$  and yield the same semantic interpretation. In other words, the Locality Condition on Variable Binding is an optimality condition which prefers representations in which a pronoun is locally bound over

representations in which binding is more distance. For example, according to linking theory, example (154a), in which the two pronouns are linked to the same antecedent, could be the result of two distinct representations, as (155a-b) illustrate.

- (154) a. John<sub>i</sub> said that he<sub>i</sub> likes his<sub>i</sub> mother.  
 b. Bill did [VP\_\_] too.

- (155) a. John said that he likes his mother.  
 b. \*John said that he likes his mother.

Since the two pronouns in (155a-b) refer to the same antecedent, (155b), which involves a non-local binding, is ruled out by the Locality Condition on Variable Binding. Therefore, (156a-c) are distinguished from (156d) because (156d) does not obey the Parallelism Constraint.

- (156) a. Strict/Strict (referential parallelism)  
 John said that he likes his mother.  
 Bill did [VP say that John likes John's mother].  
 b. Sloppy/Sloppy (structural parallelism)  
 John said that he likes his mother.  
 Bill did [VP say that Bill likes Bill's mother].  
 c. Sloppy/Strict (structural parallelism)  
 John said that he likes his mother.  
 Bill did [VP say that Bill likes John's mother].  
 d. \*Strict/Sloppy (doesn't obey the Parallelism Constraint)  
 John said that he likes his mother.  
 Bill did [VP say that John likes Bill's mother].

Consider (156a) first. Here the NP *John* obeys referential-parallelism with the first pronoun in (155a). In addition, the second pronoun in (156a) is linked by an identical dependency to that which links the parallel pronoun in (155a) to its antecedent. Therefore, (156a) obeys structural-parallelism, too.

Next consider (156b). It is easy to see that both pronouns obey structural-parallelism with the parallel pronouns in (155a). So, the sloppy reading is available.

In (156c), the first pronoun obeys structural-parallelism with the first pronoun in (155a); therefore, the sloppy-strict reading is allowed.

Finally, consider (156d), in which the second pronoun *his* not only receives a different referential value from that of the parallel pronoun in (155a) but also is linked by a different dependency. The strict-sloppy reading (156d) thus is excluded. Therefore, Dahl's Puzzle Effects are accounted for.

By the same reasoning, the unavailability of the strict-sloppy reading of (54), repeated as (157), can also be explained.

(157) Zhangsan jintian [bi [Lisi zuotian [\_\_\_]] geng qingchude biaoming-le [ta bu xihuan ta-de laoban].  
 than Lisi yesterday more clearly claim-ASP he not  
 xihuan ta-de laoban].  
 like his boss

- a. Strict/Strict (referential parallelism)  
 Zhangsan jintian qingchude biaoming-le [ta bu xihuan ta-de laoban].  
 Lisi zuotian qingchude biaoming-le [Zhangsan bu xihuan Zhangsan-de laoban].
- b. Sloppy/Sloppy (structural parallelism)  
 Zhangsan jintian qingchude biaoming-le [ta bu xihuan ta-de laoban].  
 Lisi zuotian qingchude biaoming-le [Lisi bu xihuan Lisi-de laoban].
- c. Sloppy/Strict (structural parallelism)  
 Zhangsan jintian qingchude biaoming-le [ta bu xihuan ta-de laoban].  
 Lisi zuotian qingchude biaoming-le [Lisi bu xihuan Zhangsan-de laoban].
- d. \*Strict/Sloppy (doesn't obey the Parallelism Constraint)  
 Zhangsan jintian qingchude biaoming-le [ta bu xihuan ta-de laoban].  
 Lisi zuotian qingchude biaoming-le [Zhangsan bu xihuan Lisi-de laoban].

Since non-local binding does not yield a semantic interpretation different from that of local binding, non-local binding is not allowed. Therefore, the strict-sloppy reading in (157d) is excluded by the Parallelism Constraint.

This account of the effects of Dahl's Puzzle crucially depends on the hypothesis that non-local binding in cases like (154) was impossible due to the Locality Condition on Variable Binding (cf. Fox 1998 and Heim 1998). This condition, as Fox (1998) observes, makes a predication; that is, in environments where the Locality Condition on Variable Binding allows non-local binding, Dahl's Puzzle Effects will be obviated. In the following, we shall argue that the Mandarin Chinese example (59), repeated in (158), in which both the pronominal embedded subject *ta* 'he' and the anaphoric embedded object *ziji* 'self' refer to the same antecedent, empirically supports this prediction.

- (158) a. Zhangsan<sub>i</sub> kandao [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>], (=59a)  
 Zhangsan see he one roll-over then hit-ASP self  
 'Zhangsan<sub>i</sub> found that he<sub>i</sub> rolled over and hit himself<sub>i</sub>.'
- i. kandao (Zhangsan,  $\lambda x(x \text{ hit } x)$ ) attitude *de se*
- ii.  $\lambda x(\text{kandao}(x, x \text{ hit } x))$  (Zhangsan) attitude *de re*
- b. Lisi<sub>j</sub> ye kandao [ta yi fanshen jiu dadao-le ziji]. (=59b)  
 Lisi also see he one roll-over then hit-ASP self
- i. 'Lisi<sub>j</sub> also found that Zhangsan<sub>i</sub> rolled over and hit Zhangsan<sub>i</sub>.'  
 (strict, strict)
- ii. 'Lisi<sub>j</sub> also found that Lisi<sub>j</sub> rolled over and hit Lisi<sub>j</sub>.'  
 (sloppy, sloppy)  
 $\lambda x(\text{kandao}(x, x \text{ hit } x))$  (Lisi) attitude *de re*
- iii. Lisi<sub>j</sub> also found that Zhangsan rolled over and hit Lisi<sub>j</sub>.'  
 (strict, sloppy)  
 kandao (Lisi,  $\lambda x(\text{Zhangsan hit } x)$ ) attitude *de se*
- iv. \*Lisi<sub>j</sub> also found that Lisi rolled over and hit Zhangsan.'  
 (sloppy, strict)

Now consider (158a) carefully. The embedded clause of (158a) provides a context in which the embedded subject hit himself unconsciously. So, the anaphoric relation between the embedded subject *ta* 'he' and the anaphor *ziji* 'self' can be considered a *de re* reading which just refers to a specific entity unconsciously. In

contrast, when the bare reflexive *ziji* 'self' refers to the matrix subject *Zhangsan*, *ziji* 'self' is in logophoric use, a use which we argued in chapter two requires the referent of *ziji* 'self' (i.e., *Zhangsan*) to be conscious of the event. As argued in chapter two, the long-distance anaphoric relation is in fact a *de se* reading. These two distinct interpretations of (158a) can be represented as in (159a-b) in terms of linking theory.

- (159) a. Zhangsan shuo [ta yi fanshen jiu dadao-le ziji].  
 (the real identity without self-consciousness)
- b. Zhangsan shuo [ta yi fanshen jiu dadao-le ziji].  
 (the real identity with self-consciousness)

Now let us consider the logically possible ways of interaction between the Parallelism Constraint and the Bottom-Up LF Mapping of (158a-b), as illustrated in (160a-d), respectively.

- (160) a. Strict/Strict (referential parallelism)  
 Zhangsan shuo [ta yi fanshen jiu dadao-le ziji],  
 Lisi shuo [Zhangsan yi fanshen jiu dadao-le Zhangsan].
- b. Sloppy/Sloppy (structural parallelism)  
 Zhangsan shuo [ta yi fanshen jiu dadao-le ziji].  
 Lisi shuo [Lisi yi fanshen jiu dadao-le Lisi].
- c. \*Sloppy/Strict (ruled out by the Full Interpretation Principles)  
 Zhangsan shuo [ta yi fanshen jiu dadao-le ziji].  
 Lisi shuo [Lisi yi fanshen jiu dadao-le Zhangsan].
- d. Strict/Sloppy (structural parallelism)  
 Zhangsan shuo [ta yi fanshen jiu dadao-le ziji].  
 Lisi shuo [Zhangsan yi fanshen jiu dadao-le Lisi].

Consider (160a) first. The pronoun *ta* 'he' obeys referential-parallelism with the parallel pronoun in (159a) (i.e., *ta* 'he') by having the same reference value *Zhangsan*. In addition, the anaphor *ziji* 'self' in

(160a) is further linked by an identical dependency to that which links the parallel anaphor in (159a) to its antecedent. Thus, the structural-parallelism is obeyed.

Next, consider (160b). Here it is easy to see that both the pronoun *ta* 'he' and the anaphor *ziji* 'self' obey structural-parallelism with their counterparts in (159a).

The sloppy-strict reading in (160c) is independently ruled out by either Binding Condition A or the Logophoric Constraints (cf. Sells 1987). That is, if *ziji* 'self' in (160c) is in anaphoric use, then it must be bound by the local antecedent (i.e., the embedded subject *Lisi*); however, in fact it is not. So, the reflexive *ziji* 'self' should be in logophoric use. We then would expect the logophor *ziji* 'self' to take the matrix subject *Lisi*, which is the pivot of communication as antecedent. But the fact does not bear out this expectation. According to Chomsky's (1986a) Full Interpretation Principle, each lexical item of a sentence must be fully interpreted. In (160c), the reflexive *ziji* 'self' does not get interpreted either anaphorically or logophorically. Therefore, the sloppy-strict reading in (160c) is impossible.

Finally, in (160d), the pronoun *ta* 'he' obeys referential-parallelism with the parallel pronoun in (159b). In addition, the long-distance bound anaphor *ziji* 'self' in (160d) obeys the Parallelism Constraint because the non-local binding was allowed in (159b). So, the strict-sloppy reading is allowed and Dahl's Puzzle is obviated.

The same reasoning explains the availability of the strict-sloppy reading in (161) and the obviation of Dahl's Puzzle Effects there.

(161) Zhangsan<sub>i</sub> jintian [bi Lisi<sub>j</sub> zuotian [\_\_\_]] geng qingchu-de kandao-le [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
 Zhangsan today than Lisi yesterday more clearly see-ASP he one  
 fanshen jiu dadao-le ziji<sub>i</sub>.  
 roll-over then hit-ASP self  
 'Zhangsan<sub>i</sub> saw that he<sub>i</sub> rolled over and hit himself<sub>i</sub> today more clearly than Lisi did yesterday.'

- a. Strict/Strict (referential parallelism)  
 Zhangsan jintian kandao-le [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
 Lisi zuotian kandao-le [Zhangsan<sub>i</sub> yi fanshen jiu dadao-le Zhangsan<sub>i</sub>].
- b. Sloppy/Sloppy (structural parallelism)  
 Zhangsan jintian kandao-le [ta<sub>i</sub> yi fanshen jiu dadao-le ziji<sub>i</sub>].  
 Lisi zuotian kandao-le [Lisi<sub>i</sub> yi fanshen jiu dadao-le Lisi<sub>i</sub>].

- |-----| |-----|
- c. \*Sloppy/Strict (ruled out by the Full Interpretation Principles)  
 Zhangsan jintian kandao-le [ta yi fanshen jiu dadao-le ziji].  
 |-----| |-----|  
 Lisi zuotian kandao-le [Lisi yi fanshen jiu dadao-le Zhangsan].  
 |-----|
- d. Strict/Sloppy (structural parallelism)  
 Zhangsan jintian kandao-le [ta yi fanshen jiu dadao-le ziji].  
 |-----|  
 Lisi zuotian kandao-le [Zhangsan yi fanshen jiu dadao-le Lisi].  
 |-----|

The strict-strict reading (161a) is allowed because in the *bi*-clause both the pronoun *ta* 'he' and the anaphor *ziji* 'self' obey referential parallelism with their counterparts in the matrix clause. In (161b), both the pronoun *ta* 'he' and the anaphor *ziji* 'self' in the *bi*-clause obey structural-parallelism with their parallel counterparts in the matrix clause; therefore, the sloppy-sloppy reading (161b) is obtained. Like (160c), (161c) is independently ruled out by the Full Interpretation Principle. Further, in (161) the non-local binding which semantically differs from the local binding is allowed in both the matrix clause and the *bi*-clause; therefore, the strict-sloppy reading (161d) becomes available.

So far, we have argued for Heim's (1998) Locality Condition on Variable Binding, as it provides a solution for Dahl's Puzzle. Stated differently, our argument is based on the following generalization for binding in ellipsis constructions.

(162) The Ellipsis Binding Generalization (EBG) (cf. Fox 1998: 150)

In an ellipsis construction, a reflexive can have a non-local antecedent only if binding by a local antecedent can yield a different interpretation, both in the sentence that includes the elided constituent and in the sentence that includes the antecedent constituent.

The explanation of the EBG, as Fox (1998) suggests, is based on an interaction between the Locality Condition on Variable Binding and the Parallelism Constraint. The Locality Condition on Variable Binding must apply before the Parallelism Constraint. If non-local binding is semantically distinct from local binding in both conjuncts, the two options will not be compared by the Locality Condition on Variable Binding. Then non-local binding in both conjuncts is allowed and parallelism is maintained. However, if non-local binding is semantically indistinguishable from local binding in the conjunct which is computed first in the post-cyclic anti-c-command LF mapping, the Locality Condition on Variable

Binding will not allow non-local binding. Consequently, the Parallelism Constraint will not allow non-local binding in the other conjunct, either.

#### 4.7 Concluding Remarks

The current analysis on ACD constructions can be summarized as follows. Ellipsis is not a very extreme case of prosodic redundancy marking (deaccenting). The redundancy constraints on ellipsis are in some respect stricter than the redundancy constraints on prosodic redundancy marking. The problem of infinite regress in ACD constructions does not arise under our PF-Deletion analysis; instead, our analysis raises the problem of parallelism. Since comparative stripping in MCCCs must satisfy the LF Identity Condition on Ellipsis, we suggest that QR in LF pied-piping fashion is needed for ACD constructions such as MCCCs. Furthermore, QR either in LF-pied-piping or non-LF-pied-piping fashion must be subject to Economy considerations.

According to our PF-Deletion analysis on ACD constructions, LF operations like QR will affect Binding Theory, especially Binding Condition C, but only when the Bare Output Condition would be violated otherwise. More specifically, the obviation of Binding Condition C can be considered a side-effect of QR in LF pied-piping fashion. We further show that Heim's (1993) Locality Condition on Variable Binding, interacting with the Parallelism Constraint in elliptical constructions, provides explanation for Dahl's Puzzle, which is a specific realization of the Eliminative Effect. This analysis further predicts that when the Locality Condition on Variable Binding allows non-local binding in XP, Dahl's Puzzle will be obviated, a prediction clearly borne out.