

# Hierarchies of Features vs. Hierarchies of Projections

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**Abstract:** Grammatical theory countenances two apparently distinct notions of hierarchy:

Hierarchies of syntactic features, as proposed in many theories

Ex: 1<sup>st</sup> pers > 2<sup>nd</sup> pers > 3<sup>rd</sup> pers (Zwicky 1977)

nom/abs > dat > acc > gen > erg (Silverstein 1976)

$\theta_{\text{AGENT}} > \theta_{\text{THEME}} > \theta_{\text{GOAL}} > \dots$  (Jackendoff 1972, Carrier -Duncan 1985, a. m. o. )

Hierarchies of syntactic projections, as proposed in syntactic cartography

Ex: [FORCE [TOP [FOC [TOP [FIN [TENSE [ ... ]]]]]]] (Rizzi 1997)

[HABITUAL [REPETITIVE [FREQ [VOLITION [CELERATIVE [ANTERIOR [ ... ]]]]]]] (Cinque 2000)

[SIZE [LENGTH [HEIGHT [SPEED [DEPTH [WIDTH [ ... ]]]]]]] (Scott 2002)

Are both notions required? If not, how might reduction be made and in what direction? Here I explore these questions in the domain of  $\theta$  -roles. I begin by reviewing Li's (2014) theory of argument realization for the Mandarin verb phrase based on a cartographic -style "hierarchy of  $\theta$  -projections" :

[ag v [VP time Lv<sub>temp</sub>[VP loc Lv<sub>loc</sub>[VP instr Lv<sub>inst</sub>[VP theme V ]]]]]

In considering Li's account, I note two important problems arising for it: (i) the problem of non -canonical argument orders in Mandarin and (ii) the problem of non -consistent argument orders in other languages (e. g., English). I then develop an alternative based on Larson (2014), which recasts  $\theta$  -roles as syntactic  $\theta$  -

features and  $\theta$ -role assignment as  $\theta$ -feature agreement, and which controls syntactic projection via a hierarchy of  $\theta$ -features. This accounts for the data considered in Li (2014) and even yields a structure resembling hers, but does so without either of the two problems noted above.

**Keywords:** hierarchies, syntactic features, syntactic projections,  $\theta$ -projections

Grammatical theory currently deploys two apparently distinct sorts of hierarchies. Many theories employ hierarchies of syntactic features like those in (1). Syntactic cartography embraces a robust commitment to hierarchies of syntactic projections, like those in (2):

- (1) a. 1<sup>st</sup> pers > 2<sup>nd</sup> pers > 3<sup>rd</sup> pers (Zwicky 1977)  
 b. nom/abs > dat > acc > gen > erg (Silverstein 1976)  
 c. trial > dual > plural (Greenberg 1972)
- (2) a. [<sub>FORCE</sub> [<sub>TOP</sub> [<sub>FOC</sub> [<sub>TOP</sub> [<sub>FIN</sub> [<sub>TENSE</sub> [ . . . ] ] ] ] ] ] ] (Rizzi 1997)  
 b. [<sub>HABITUAL</sub> [<sub>REPETITIVE</sub> [<sub>FREQ</sub> [<sub>VOLOTION</sub> [<sub>CELERATIVE</sub> [<sub>ANTERIOR</sub> [ . . . ] ] ] ] ] ] ] (Cinque 1999)  
 c. [<sub>SIZE</sub> [<sub>LENGTH</sub> [<sub>HEIGHT</sub> [<sub>SPEED</sub> [<sub>DEPTH</sub> [<sub>WIDTH</sub> [ . . . ] ] ] ] ] ] ] (Scott 2002)

Are both sorts of hierarchy truly necessary? If not, in what direction might reduction be made?

In this paper I explore these questions in the domain of  $\theta$ -roles and  $\theta$ -hierarchies. I begin by reviewing a theory of argument realization for the Mandarin VP based on a cartographic -style “hierarchy of  $\theta$ -projections” proposed by Li (2014), noting certain problems that arise for the approach. I proceed to sketch an alternative view developing ideas in Larson (2014), which recasts  $\theta$ -roles as syntactic  $\theta$ -features and  $\theta$ -role assignment as  $\theta$ -feature agreement, and which controls syntactic projection via a hierarchy of  $\theta$ -features. I draw an important general conclusion about recasting of hierarchies of projections as hierarchies of features under this strategy: viz., that there must always be a single head bearing the features underlying the projection hierarchy that raises successively through its shells.

## 1. A Hierarchy of $\theta$ -projections for Mandarin (Li 2014)

Li (2014) offers a theory of argument realization in Mandarin based on the cartographic -style hierarchy of vP/VP projections in (3):

(3) [ agent/exp *v* [<sub>VP</sub> time  $L_{v_{temp}}$  [<sub>VP</sub> loc  $L_{v_{loc}}$  [<sub>VP</sub> instr  $L_{v_{inst}}$  [<sub>VP</sub> theme V ]]]]]

In this theory, *v* assigns those  $\theta$  -roles born uniquely by “canonical subjects” (Agent/Experiencer). The sequence of light verbs ( $L_{v_{\alpha}}$ ) assigns various circumstantial  $\theta$  -roles like time, place and instrument. And the core predicate (V) assigns the theme -role, which thus projects lowest. “Canonical” objects, e. g., *niu -rou mian* ‘beef noodle’ in (4a), are licensed by the lexical V *chi* ‘eat’ (4a’). By contrast “non -canonical” objects, e. g., *dawan* ‘big bowl’ in (4b), are licensed by an  $L_v$  (4b’). The pairs in (4c/c’) and (4d/d’), involving locative and temporal arguments (resp. ), are similar. <sup>①</sup>

(4) a. Wo chi niu -rou mian.                      a’ . [Wo *v* [<sub>VP</sub> niu -rou mian chi ]]

I    eat    beef    noodle

‘I eat beef noodle’

① For extensive discussion of non -canonical objects in Mandarin, see Lin (2001), Barrie and Li (2012, 2014) and Zhang (2005). All these authors note that non -canonical objects show “conventionalization” / “contextualization” effects. Thus *da -wan*, seems to be conventionally associated with *chi* in (4b) insofar as it cannot be freely substituted with any nominal signifying a potential instrument of eating. Compare (4b) to (i) below (due to Zhang Chong (p. c. )):

(i) \* Wo chi da panzi/daoचा/zang shouzhi/mu kuaizi.

I eat big plate/knife and fork/dirty fingers/wooden chopsticks

“I eat with a big plate/with a knife and a fork/with my fingers/with wooden chopsticks”

Barrie and Li (2012) compare these restrictions to ones found with noun incorporation. Lin (2001) takes them to be purely pragmatic and determined by context. A comparison combining both views might be to English noun compounding, which, although free, shows both conventionalization and pragmatic contextualization effects (Aronoff 1980). I will not address this aspect of non -canonical objects in this paper, but rather will refer readers to the work cited above.

- b. Wo chi da -wan.                      b' . [Wo v [<sub>VP</sub> da -wan Lv<sub>inst</sub>[<sub>VP</sub> chi ]]]  
 I eat big -bowl  
 'I eat with/using a big bowl'
- c. Wo chi guanzi.                      c' . [Wo v [<sub>VP</sub> guanzi Lv<sub>loc</sub>[<sub>VP</sub> chi ]]]  
 I eat restaurant  
 'I dine at a restaurant'
- d. Wo chi xiauwu.                      d' . [ Wo v[<sub>VP</sub> xiauwu Lv<sub>temp</sub>[<sub>VP</sub> chi ] ] ]  
 I eat afternoon  
 'I dine in the afternoon'

With a canonical subject present, at most one post -verbal object of the sort shown in (4) is possible, as illustrated in (5a -f).<sup>②</sup>

- (5) a. \* Wo chi da -wan niu -rou mian 'I eat beef noodle with a big -bowl'  
 b. \* Wo chi guanzi niu -rou mian 'I eat beef noodle in a restaurant'  
 c. \* Wo chi xiauwu niu -rou mian 'I eat beef noodle in the afternoon'  
 d. \* Wo chi xiauwu guanzi 'I eat in a restaurant in the afternoon'  
 e. \* Wo chi xiauwu guanzi da -wan niu -rou mian  
 'I eat beef noodle with a big -bowl in a restaurant in the afternoon'

In Li's account, this constraint is plausibly linked to case. If *v* can assign acc (6a) but Lv's cannot, then additional objects will simply be case -less (6b):

- (6) a. [Wo v [<sub>VP</sub> niu-rou mian chi]]  
           └──────────┬          ACC  
                   ↑
- b.\* [Wo v [<sub>VP</sub> da-wan Lv<sub>inst</sub>[<sub>VP</sub> niu-rou mian chi]]]  
       └──┬──┬──────────┬          ACC    └──────────┬          ACC  
           ↑          ↑                                  ↑  
           ACC  ACC

By contrast with a canonical subject absent, more possibilities arise. Li (2014) discusses alternations like (7) (10), in which the order of arguments

<sup>②</sup> Example (5a) has an (irrelevant) partitive reading 'I eat a large bowl of beef noodles' on which it is well-formed.

appear to invert.

- (7) a. xiao bei he lücha INSTRUMENT>THEME  
 small cup drink green. tea  
 ‘Use the small cup to drink the green tea.’
- b. lücha he xiao bei THEME>INSTRUMENT  
 green. tea drink small cup  
 ‘Green tea is drunk with small cups.’
- (8) a. da dianyingyuan kan dongzuo pian;  
 big theater watch action film;  
 xiao dianyingyuan kan katong pian.  
 small theater watch cartoon film  
 ‘Big theaters are for watching action films; small theaters are for watching cartoons’  
 LOCATION>THEME
- b. dongzuo pian kan da dianyingyuan;  
 action film watch big theater;  
 katong pian kan xiao dianyingyuan.  
 cartoon film watch small theater  
 ‘Action films are to watch in big theaters; cartoons are to watch in small theaters.’  
 THEME>LOCATION
- (9) a. wanshang mai lubiantan. TIME>LOCATION  
 evening sell street. stall  
 ‘Sell at street stalls in evenings.’
- b. lubiantan mai wanshang. LOCATION>TIME  
 street. stall sell evening  
 ‘Sell at street stalls in evenings.’
- (10) a. zaoshang qie zhe -ba dao. TIME>INSTRUMENT  
 morning cut this -cl knife  
 ‘Cut with this knife in the morning.’

b. zhe -ba dao qie zaoshang.

INSTRUMENT>TIME

this -cl knife cut morning

‘This knife is to cut with in the morning.’

Li (2014) analyzes these data as in (11). In brief, whenever an agent/exp (*vP* Spec) is projected, it raises to sentence subject position (11a). However when an agent/exp is not projected, the subject position becomes available to arguments with other roles. Occupants of Spec of VP raise in either thematic (11b) or contra-thematic order (11c):

(11)

- a.  $[\alpha [_{VP} \alpha v [_{VP} \dots V ]]]$  vP Spec raises
- b.  $[\beta [_{VP} \beta \dots [_{VP} \dots V ]]]$  VP Spec raises (“thematic order”)
- c.  $[\gamma [_{VP} \beta \dots [_{VP} \gamma \dots V ]]]$  VP Spec raises (“contra-thematic order”)

Li (2014) suggests that basic thematic order in Mandarin is revealed empirically through ellipsis phenomena. She proposes that object deletion is possible in thematic order, but blocked in contra -thematic order. Thus (12a) exhibits for Li the thematic argument order TIME>LOCATION and allows ellipsis of the locative object in the second clause; by contrast, (12b) exhibits the contra -thematic order LOCATION>TIME and blocks object ellipsis:

(12) a. wanshang mai lubiantan hen hao; zaoshang mai \_\_ bu hao.

evening sell street stall very good; morning sell \_\_ not good

‘It’s good to sell at street stalls in the evening, but not good to sell (at street stalls) in the morning.’

TIME>LOCATION

b. lubiantan mai wanshang hen hao; \* baihuo -gongsì mai \_\_ bu hao.

street. stall sell morning very good department -store sell \_\_ not good

‘It’s good to sell at street stalls in the evening, but not good to sell at department stores (in the morning).’

Li's analysis of Mandarin argument alternations raises both broad questions applying cartography generally as well as narrower ones pertaining to her analysis in particular.

## 1.1 Rigidity of Projection

To begin with we might ask what is the basis of the projection hierarchy in (3)?

In cartographic analyses, it must come from selection:  $v$  selects  $L_{V_{temp}}$  selects  $L_{V_{loc}}$  selects  $L_{V_{inst}}$  selects  $V$ . Furthermore, since  $v$  and all  $L_v$ 's are functional categories, this must constitute functional selection, that is, a specific category of head selects a specific category of complement (Abney 1987). Given the rigid one-head/one-complement character of functional selection, Li's proposal would seem to imply that every verb ( $V$ ) projects the full hierarchy of  $\theta$ -roles, even when  $V$  would not seem to involve them. Thus (13a) would seem to require a structure as in (13b), which includes an instrument  $L_v$ . Note that if unexpressed structure is interpretable via null arguments (13c), this means that (13a) logically entails the existence of an instrument in the action of flower-selling.

(13) a. Wo mai hua.

“I sell flowers”

b. [Wo  $v_{[VP - L_{V_{temp}}[VP - L_{V_{loc}}[VP - L_{V_{inst}}[VP$  hua mai ]]

c.  $\exists x \exists y \exists z \exists e$  [ selling (e) & Agent (e, I) & Theme (e, f) & Time (e, x) & Loc (e, y) & Instr (e, z) ]

This seems implausible, to say the least.

## 1.2 Universality of Projection

We might also inquire about the generality of Li's projection hierarchy. The cartographic program aspires to universal orders with cross-linguistic validity. But the specific ordering proposed by Li (2014) directly conflicts with other proposed  $\theta$ -hierarchies. Compare Li's (14a), derived by her ellipsis data,

with the  $\theta$  -hierarchy (14b), proposed by Carrier -Duncan (1985) and Baker (1988, 1997), and apparently instantiated by English examples like (14c):

- (14) a.  $\theta_{\text{AGENT/EXP}} > \theta_{\text{TIME}} > \theta_{\text{LOC}} > \theta_{\text{INSTR}} > \theta_{\text{THEME}}$  Li(2014)  
 b.  $\theta_{\text{AGENT}} > \theta_{\text{THEME}} > \theta_{\text{INSTR}} > \theta_{\text{LOC}} > \theta_{\text{TIME}}$  Carrier-Duncan(1985), Baker(1988)  
 c. [Col.Mustard]killed[the victim][With a knife][in the conservatory][at midnight].
- 

The obvious disparity begs to be addressed, although Li (2014) is silent on the point.

### 1.3 Permutations of Projection

Finally, we might question how contra -hierarchical orders are derived formally in Li (2014). In the account of movement developed within the Minimalist Program (Chomsky 1995), a head  $\alpha$  bearing an edge feature and a feature [F] that may undergo agreement probes for an [F] -bearing item  $\beta$  in its c -command domain (15a). Upon probing  $\beta$ ,  $\alpha$  agrees with it on [F], activates its edge feature and raises  $\beta$  to its specifier position (15b). Importantly on this account the probe -goal relation is taken to respect Minimality. Thus in (15c), the head  $\alpha$  cannot probe an [F] -bearing item  $\gamma$  “through” an intervening  $\beta$  that is a potential [F] -bearer:

- (15) a. [<sub>αP</sub> α ...[... β ...]]  
           [F] → probes → [F]  
 b. [<sub>αP</sub> β α ...[... β ...]]  
           ↑  
 c. [<sub>αP</sub> α ...[... β ...[... γ ...]]]  
           [F] → probes → X → ... → [F]

But this raises immediately problems for Li’s (2104) analysis of non-canonical subjects in Mandarin. Given the possibility of (11b) (repeated below) for the thematic ordering of arguments, Li’s analysis of contra -thematic ordering (11c) plainly violates Minimality since it would require a higher probe to agree with  $\gamma$  “through” the intervening  $\beta$  that is itself a potential target of agreement/



movement.

(11b)  $[\beta [_{VP} \beta \dots [_{VP} \dots V]]]$  VP Spec raises (“thematic order”)

(11c)  $[\gamma [_{VP} \beta \dots [_{VP} \gamma \dots V]]]$  VP Spec raises (“contra-thematic order”)

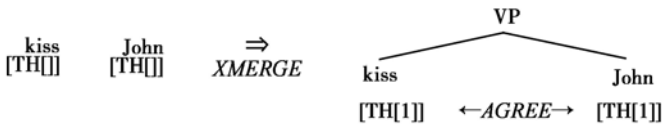
Given both the broad and specific problems apparent in Li’s 2014 analysis, it is worth considering alternatives.

## 2. Projection from $\theta$ -features (Larson 2014)

Larson (2014) offers an account of projection that analyzes  $\theta$ -roles as syntactic features and  $\theta$ -role assignment as feature agreement, and controls projection via a  $\theta$ -feature hierarchy.

To illustrate with a simplified case, assume formal syntactic  $\theta$ -features  $[AG]$ ,  $[TH]$ ,  $[GL]$ ,  $[LOC]$ , etc. born by predicates and arguments and that undergo agreement at the point of External Merge (XMerge). Assume also that English *kiss* carries a  $\theta$ -feature  $[TH]$  and undergoes agreement with an argument bearing the same feature when the two merge. In (16) agreement is indicated by conindexing.

(16)



Now assume the feature hierarchy  $[AG] > [TH] > [GL] > [LOC] > \dots$  together with the constraint (17):

(17) **Constraint:** a feature in a set can undergo agreement only if there are no lower -ranked, unagreed features in the set.

Assume further more that *kiss* bears both an agent and a theme feature. The



Under the theory of features in Pesetsky and Torrego (2007), unvalued instances of features ([ iF[ ] ] or [ F[ ] ]) probe their c -command domain seeking to agree with another instance of F. In order for a feature F to be “legible” at the interfaces, it must have both interpretable and valued instances linked by agreement. Thus all of (20a -c) will constitute legible features since they all represent a set of instances linked by agreement (signified by “n” ) and all contain an interpretable instance of F and a valued instance of F. By contrast (20a -e) will not constitute legible features since one or more of the required conditions -presence of an interpretable instance, presence of valued instance, linking by agreement -fails to hold:

- (20) a. iF[n] ... Fval[n]  
 b. iF[n] ... F[n] ... Fval[n]  
 c. iF[n] ... F[n] ... F[n] ... Fval[n]
- (21) a. iF[ ]  
 b. iF[n] ... F[n]  
 c. Fval[ ]  
 d. F[n] ... Fval[n]  
 e. iF[ ] ... Fval[ ]

As a concrete illustration of these proposals in the domain of case, consider (22a) below from German, containing the transitive verb *küssen* ‘kiss’ and an object showing accusative agreement. Chomsky (1995) analyzes *v* as the source of accusative case. Under Pesetsky and Torrego (2007), *v* is analyzed more precisely as bearing an interpretable, unvalued accusative feature (iACC) that probes for a valued, uninterpretable instance of the same feature (ACC val) on the object noun (*Mädchen*). The determiner (*das*) and the adjective (*hübsche*) are concordial for this feature, i. e., they bear instances of [ACC] that are neither interpretable nor valued. Assuming that derivation proceeds bottom -up, [ACC] on *hübsche* first probes [ACCval] on *Mädchen* and, upon merge, agrees with it (1). [ACC] on *das* then probes [ACC] on *hübsche* and agrees with it on merger (2). Finally [iACC] on

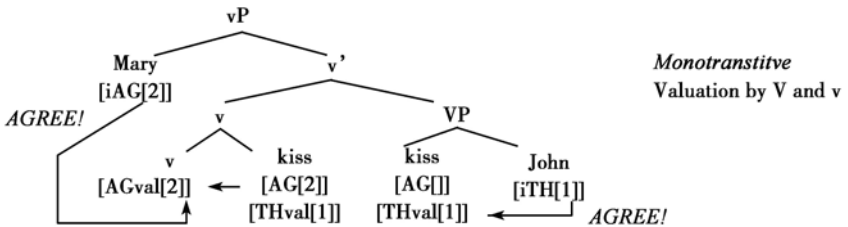


set can be valued.

Applied to  $\theta$ -features, (24) entails that a predicate bearing a set of  $\theta$ -features like  $\{[AG], [TH]\}$  or  $\{[AG], [TH], [GL]\}$  can have at most one of these features valued. Note that this immediately excludes the view of transitive structure projection in (23a), since this assumes *kiss* to bear two valued  $\theta$ -features ( $[AGval]$  and  $[THval]$ ). Evidently under (24), an additional source of valuation for one of the two features will need to be found. Likewise assuming a ditransitive like *give* bears the set of  $\theta$ -features  $\{[AG], [TH], [GL]\}$  only one of which can be valued, and an additional source of valuation for two of the three features will need to be found.

Larson (2014) proposes that  $v$  and P are additional sources of valuation for  $\theta$ -features. In an active monotransitive, V bears the valued theme feature ( $[THval]$ ) and  $v$  bears the valued agent feature ( $[AGval]$ ). The derivation proceeds as in (25), where the theme first merges with V agreeing with it on  $[TH]$ , the lowest ranked feature in the set born by *kiss*.  $v$  bearing the valued agent feature ( $[AGval]$ ) then merges with VP, raising the verb (*kiss*) and agreeing with it on  $[AG]$ . Finally the agent phrase (*Mary*) merges in Spec of  $v$ , agreeing with  $v$  on  $[AG]$ .

(25)

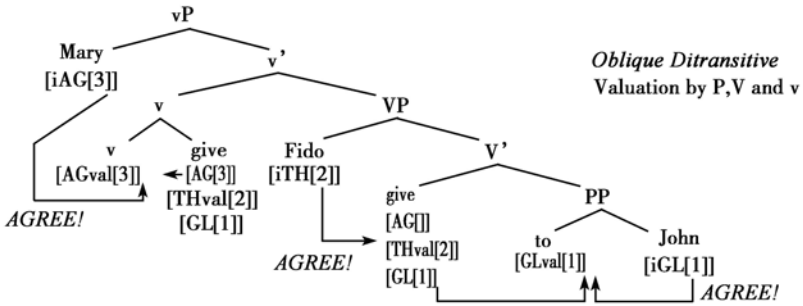


Note that in the resulting structure, both  $\theta$ -features ( $[AG]$  and  $[TH]$ ) involve interpretable and valued instances linked by agreement, as required.

In an active, oblique ditransitive, V again bears the valued theme feature ( $[THval]$ ),  $v$  again bears the valued agent feature ( $[AGval]$ ) and P bears the valued goal feature ( $[GLval]$ ). The derivation goes as in (26), where P first merges with the

goal (*John*) and PP then merges with *give*, in both instances under agreement on [GL]. The theme merges in Spec of VP under agreement on [TH]. Finally *v* merges with VP, raising the verb and licensing the agent phrase in its specifier as in the monotransitive case:

(26)



Again in the resulting structure, all three  $\theta$ -features ([AG], [TH] and [GL]) show interpretable and valued instances linked by agreement.

Note that these refinements retain the basic picture in (18), where the linear  $\theta$ -feature hierarchy determines the hierarchical projection of arguments. The additional structural elements in (25) and (26) (*v*'s and P's) enter simply to enable the  $\theta$ -feature valuation that the verb cannot effect on its own, given the constraint in (24).

### 2.3 Preliminary Comparisons of Li (2014) and Larson (2014)

The theories in Li (2014) and Larson (2014) both project structure via  $\theta$ -roles; both also assume a hierarchy. But whereas Li (2014) assumes a hierarchy of functional selection (*v* f-selects  $L_{V_{temp}}$ , which f-selects  $L_{V_{loc}}$ , which f-selects  $L_{V_{inst}}$ , which f-selects V), Larson (2014) appeals to a hierarchy of  $\theta$ -features ([AG] > [TH] > [GL] > [LOC] > ...). The differences are significant.

As noted earlier, one potential consequence of Li's proposal is that all  $L_V$ 's, and hence all thematic roles, must be projected with every V. This is because functional heads rigidly f-select their complements: if one has *v* one must accordingly have  $L_{V_{temp}}$  since the former f-selects the latter, etc. As we

saw, the apparent semantic consequence of this is implausible, if not outright wrong. By contrast, under Larson (2014) lexical verbs bear only a (typically small) subset of  $\theta$ -features, and only those roles featurally associated with V are projected. Hence there is no equivalent semantic consequence of the undesirable kind.

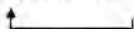
Furthermore, and more subtly, whereas both Li (2014) and Larson (2014) posit heads in structure associated with  $\theta$ -roles, the latter requires, in particular, the presence a single head (here V) bearing a single set of  $\theta$ -features whose hierarchical ranking organizes projection. In (26), the order in which the goal (*John*), theme (*Fido*) and agent argument (*Mary*) merge in the derivation directly reflects the order in which agreement occurs in the set of features {[GL], [TH], [AG]} borne by the verbal *give* as it raises through the tree.

As it turns out, this aspect of the Larson (2014) is also crucial in accommodating the apparent idiosyncrasy of Li's  $\theta$ -hierarchy as well as the possibility of argument inversion.

### 3. Contra -thematic Orders and Argument Inversions (Larson 2014)

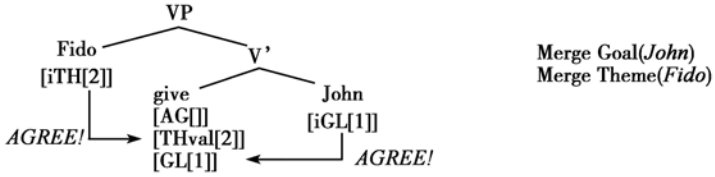
Recall that Li (2014) posits a thematic hierarchy (([AG/EXP] > [TEMP] > [LOC] > [INST] > ...) in conflict with hierarchies posited elsewhere. Recall also that Li's analysis of Mandarin contra -thematic orders encounters Minimality problems insofar as raising  $\gamma$  over  $\beta$  in (11c) (repeated below) would appear to require a higher probe that "looks past" the intervening  $\beta$ :

(11c) [  $\gamma$  [<sub>VP</sub>  $\beta$ ... [<sub>VP</sub>  $\gamma$  ... V ]]] VP Spec raises ("contra-thematic order")



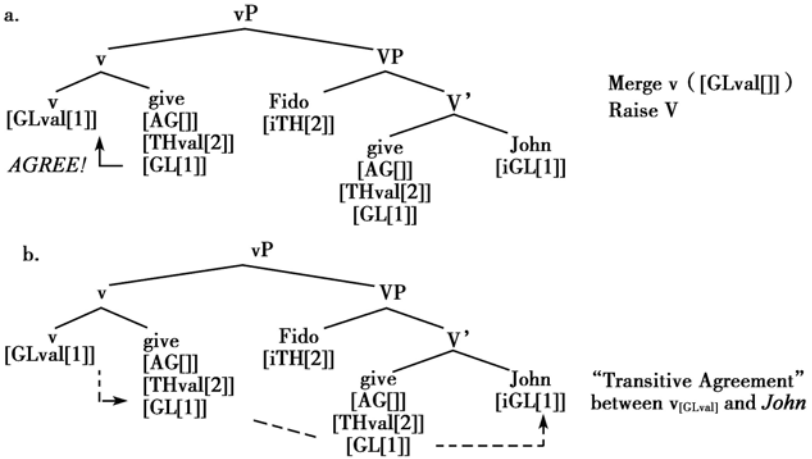
Surprisingly, the existence of a single head bearing the set of  $\theta$ -features enables argument inversion without violating Minimality. The derivation in (27) (29), for the double object example *Mary give John Fido*, shows how. Suppose, *John* is merged directly with *give* as goal, without a valuing P as in (26); suppose that *Fido* is merged next as theme (27).

(27)



Larson (2014) proposes that a *v* carrying an edge feature and a valued[GL] feature can be merged at this point. *Give* raises to *v*, agreeing with *v* on[GL] (28). Note that in virtue of *John* agreeing on[GL] with *give*, and *give* agreeing on [GL] with *v*, *John* now agrees on [GL] with *v*. This agreement is established “by transitivity” rather than by a direct probe -goal relation between *v* and *John*.

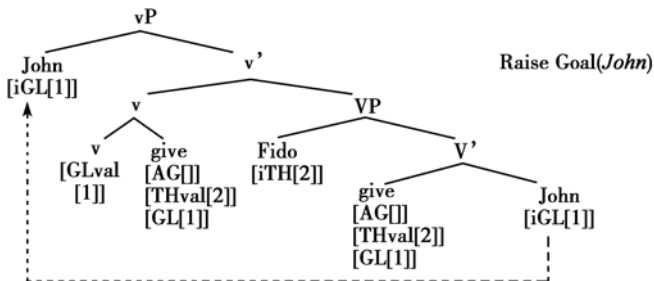
(28)



Since *v* agrees with *John* and *v* carries an edge feature, *v* can activate the latter, raising *John* to its Spec position without violation of Minimality (29).

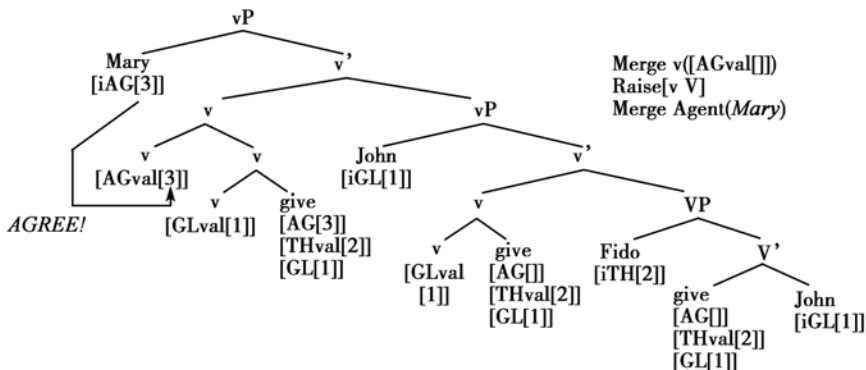


(29)



The remainder of the derivation proceeds as in (25) and (26), with  $v$  bearing  $[_{AG}]$  merged at the top, and with the agent phrase (*Mary*) merged in its specifier position (30):

(30)



Note again the importance of a single head (*give*) that raises through the  $vP/VP$  shells, here establishing agreement by transitivity among arguments and heads, thus creating the possibility of argument inversion without Minimality violation.

### 3.1 Mandarin Again

These proposals can be applied directly to the full range of Mandarin cases discussed by Li (2014).

#### 3.1.1 Monotransitives with Canonical Subjects and Canonical objects

Monotransitives with canonical subjects and canonical objects like (4a)

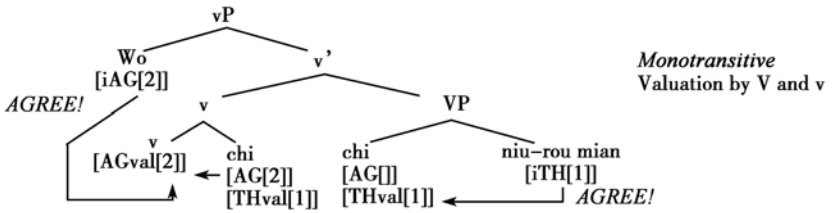
(repeated below) will work just as in the corresponding English cases (31):

(4a) Wo chi niu -rou mian.

I eat beef noodle

'I eat beef noodle'

(31)



In (31) both  $\theta$ -features ([AG] and [TH]) involve interpretable and valued instances linked by agreement, as required.

### 3.1.2 Monotransitives with Canonical Subjects and Non-canonical Objects

For monotransitives with canonical subjects and non-canonical objects like (4b) (repeated below) I propose a derivation somewhat like that of English double constructions (28) (30).

(4b) Wo chi da -wan.

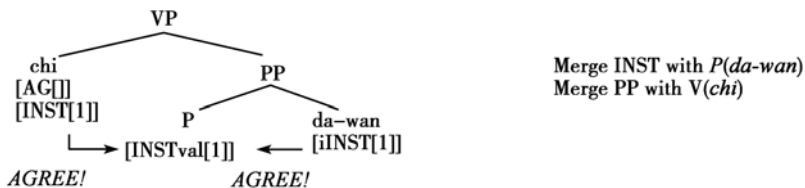
I eat big -bowl

'I eat with/using a big bowl'

Specifically, I propose that although Mandarin monotransitive verbs are permitted to bear oblique  $\theta$ -features like [GL], [LOC], [INST], [TEMP], etc., they are not permitted to bear valued versions of such features (unlike the case with [TH]). With (4b), this means that although *chi* is allowed to bear [INST], the latter must be unvalued.

If V cannot itself value a non-canonical oblique  $\theta$ -feature, only two other options remain under the proposals sketched above: valuation by P and valuation by *v*. For (4b), valuation by P would require a structure like (32), with *P* the Mandarin counterpart of English *with*.

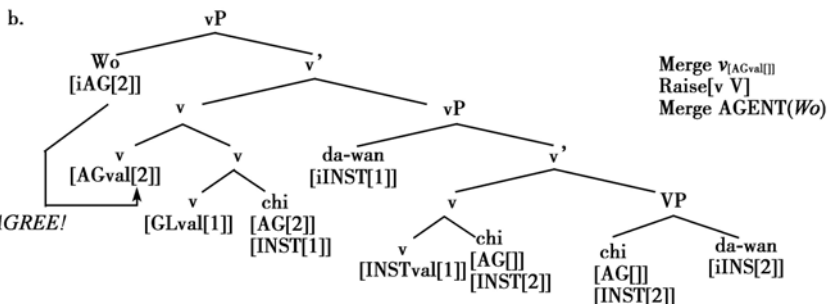
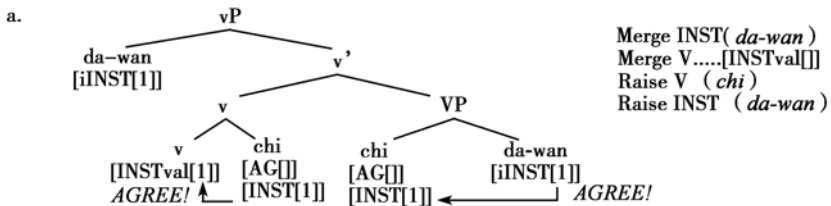
(32)



To the best of my knowledge, Mandarin contains no such prepositional form. <sup>③</sup>

(33a, b) below exhibit the alternative strategy: valuation by means of  $v_{[INSTval]}$ , with “inner object raising” to the  $v$  specifier position:

(33)



Under this proposal, non -canonical monotransitive objects in Mandarin do not occupy the same structural position as canonical monotransitive objects, surface

③ Typical Mandarin instrumental constructions like (i), employ the verb (or coverb) *yong* ‘use’:

(i) Wo yong da -wan chi niu -rou mian.

I use large -bowl eat beef noodles

I use a large bowl to eat beef noodles.’

appearances notwithstanding. Rather they are in essentially the position of applicative objects.

### 3.1.3 Monotransitives with Non -canonical Subjects and Objects

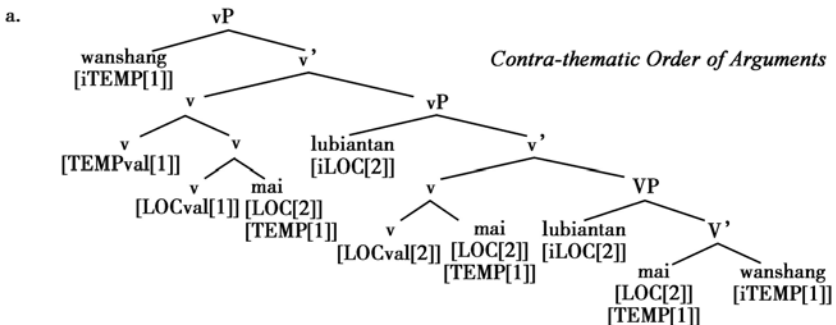
Finally, monotransitives with non -canonical subjects and non -canonical objects (9a, b) (repeated below) like can be assigned a derivation involving “double movement” .

- (9) a. wanshang mai lubiantan. TIME>LOCATION  
 evening sell street. stall  
 ‘Sell at street stalls in evenings.’
- b. lubiantan mai wanshang. LOCATION>TIME  
 street. stall sell evening  
 ‘Sell at street stalls in evenings.’

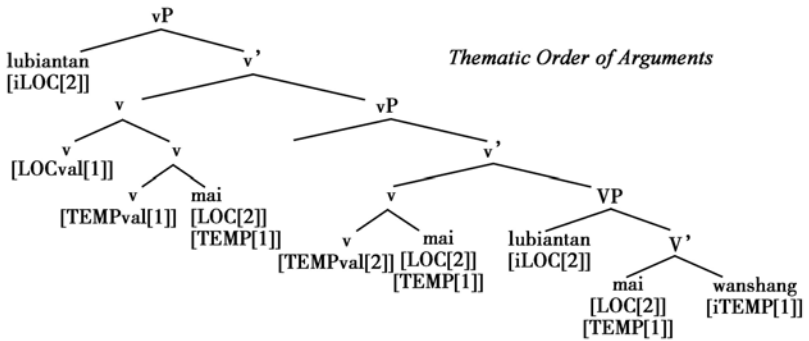
Suppose, contra Li (2014) that the  $\theta$  -hierarchy specifies  $[\text{LOC}] > [\text{TEMP}]$  . Then (9a, b) can be derived as in (34a, b) (respectively), with the surface order of arguments reflecting the order in which little *v*’s bearing  $[\text{LOC}]$  and  $[\text{TEMP}]$  are merged in the derivation.

The contra -thematic order (34a) (= 9a) is derived by first merging  $v_{[\text{LOC val}]}$  followed by  $v_{[\text{TEMP val}]}$  . The thematic order (34b) (= 9b) is derived by first merging  $v_{[\text{TEMP val}]}$  followed by  $v_{[\text{LOC val}]}$  .

(34)



b.



### 3.2 Further Comparisons of Li (2014) and Larson (2014)

As with the English derivation in (29), neither (34a) nor (34b) incurs a Minimality violation owing to the raising of V and the “transitive agreement” that it induces between a lower argument and the higher *v* head that attracts it. Thus we address a key aspect of argument permutations that is problematic on Li’s account. Note furthermore that both orders in (34) are derived from an underlying  $\theta$ -hierarchy different from Li’s (14a) (repeated below) but in line with the one more frequently assumed hierarchy in the literature (14b):

(14) a.  $\theta_{\text{AGENT/EXP}} > \theta_{\text{TIME}} > \theta_{\text{LOC}} > \theta_{\text{INSTR}} > \theta_{\text{THEME}}$  Li (2014)

b.  $\theta_{\text{AGENT}} > \theta_{\text{THEME}} > \theta_{\text{INSTR}} > \theta_{\text{LOC}} > \theta_{\text{TIME}}$  Carrier -Duncan (1985), Baker (1988)

Thus the problem of  $\theta$ -hierarchy universality is addressed as well.

As we have noted, Li’s own proposed  $\theta$ -hierarchy for Mandarin rests on her claim that the possibilities for object deletion in examples like (12a, b) reflect the  $\theta$ -hierarchy. Li offers an “Economy of Derivation” account involving comparison between pairs of structures, shown schematically in (35) and (36). As I understand Li’s proposal, in the case of contra-thematic derivations, where one argument (Arg2) has raised over another (Arg1) as in (35a), deletion of Arg1 will produce a surface string whose elements will always have an alternative, structurally simpler analysis as in (35b). For example, the string produced by deletion of the object *wanshang* in (35a’) will have the competing analysis in (35b’) where *wanshang* is simply absent. In this circumstance, Li claims, the

simpler (35b) wins over (35a) by economy of derivation, essentially blocking it. Hence an object deletion analysis of the string is excluded.

- (35) a. [ Arg2<sub>i-subject</sub> +v -Lv -V ~~Arg1<sub>object</sub>~~ + t<sub>i</sub> ]  
 a.' lubiantan mai ~~wanshang~~ lubiantan.  
 b. [ Arg2<sub>i</sub> +v -V +t<sub>i</sub> ]  
 b.' lubiantan mai lubiantan.      ✓

By contrast in the case of thematic derivations (36a), where no crossing or arguments has occurred, deletion of Arg2 will produce a surface string whose elements have no simpler analysis (36b). Thus the string produced by deletion of the object *lubiantan* in (36a') will have no competing analysis in (36b') where *lubiantan* is absent: ④

- (36) a. [ Arg1<sub>subject</sub> + v -Lv -V (+t) ~~Arg2<sub>object</sub>~~ ]  
 a.' wanshang mai wanshang ~~lubiantan~~.  
 b. [ Arg1<sub>i</sub> + v -Lv -V (+t) ]  
 b.' wanshang mai wanshang. ×

Without going into further details, I make two points about Li's proposals.

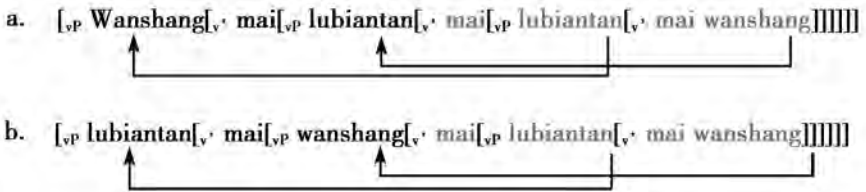
First, Li's account plainly involves comparing derivations with different numerations. (35a) contains different elements (*Lv*) than (35b); similarly for (36a) and (36b). Such comparisons are illicit, however, under economy accounts in the Minimalist Program (Chomsky 1995). What must be compared for evaluating economy is alternative derivations with the same numeration. As it stands, Li's account of the deletion facts is not so much a grammatical analysis as a processing/parsing explanation, wherein the hearer of (35a) with deletion is "garden -pathed" into a competing, simpler parse where deletion has not occurred. Whether such an account is adequate to speaker intuitions is not

④ Structure (36b) is not given in Li (2014) but rather inferred from (somewhat unclear) remarks. In fact it is not entirely clear from the exposition in Li (2014) that a simpler analysis of (36a) along the lines of (37b) would be unavailable, producing the same blocking effect as in the (35a, b) case.

clear.

Second, the alternative derivations in (34a, b) suggest an alternative view of the object deletion facts based on a genuine structural proposal.<sup>5</sup> Note that (34a), whose object is deletable, involves nested movement paths (37a), whereas (34b), whose object is undeletable, involves crossing paths (37b). Furthermore, these movements are of the same type: what are being nested or crossed are all A-movements.

(37)



Note now that a deleted surface object in (37a) (*lubiantan*) will be associable with a local copy (*lubiantan*). By contrast a deleted surface object in (37b) (*wanshang*) will be associable only with a nonlocal copy -one separated by another argument. Without trying to develop the point further here, it seems at least plausible that this structural difference is the source of acceptability of (12a) versus unacceptability in (12b): that locality with respect to the trace licenses deletion (or makes it recoverable) in the first case but not in the second.

## 4. Summary

Current cartographic projection hierarchies appeal to notions of functional selection, the theoretical basis and empirical consequences of which remain unclear. Feature hierarchies offer an alternative view of projection, one that does not appeal to differential f-selection, and whose technical implementation

<sup>5</sup> Li (2014) anticipates a path explanation somewhat like the one given here, but not equivalent since her trees do not involve the internal A-movements in (34). The uniformity of path-type in (34a, b) would in fact address some concerns Li (2014) expresses about a nested/crossing path account of the deletion facts.

appears more straightforward. In this paper I explored these points in the domain of  $\theta$ -relations, contrasting an approach to Mandarin argument structure using a projection hierarchy (Li 2014) with one using a feature hierarchy (Larson 2014). The latter appears to incur tangible benefits, including a clearer technical account of projection, potentially better compatibility with  $\theta$ -role hierarchies proposed elsewhere in the literature and an account of argument inversion that avoids Minimality violations.

The analysis developed here converts a cartographic account into a non-cartographic account via two principal moves:

- re -interpreting the head  $sh_1, h_2, h_3, h_4, \dots$  of a cartographic projection hierarchy as a set  $S$  of features  $\{[F_1], [F_2], [F_3], [F_4] \dots\}$  ordered in a feature hierarchy  $[F_1] > [F_2] > [F_3] > [F_4] > \dots$

- postulating a single head  $X$  (with light version  $x$ ) bearing a subset of features from  $S$ , and projecting a set of  $XP/xP$  shells through which  $X$  raises in the course of derivation.

It would be interesting to consider these moves in relation to other cartographic projection hierarchies that have been proposed in the literature, for example the hierarchies of nominal modifiers (Scott 2002, Cinque 2010) and left-peripheral elements (Rizzi 1997) noted at the outset of this paper. I hope to explore these areas in future work.

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