Hierarchies of Features vs. Hierarchies of Projections

Richard Larson (Stony Brook Univ.)

Grammatical theory currently countenances two apparently distinct notions of hierarchy:

- **Hierarchies of syntactic features**, proposed in many theories
  - Ex: 1st pers > 2nd pers > 3rd pers (Zwicky 1977)
  - NOM/ABS > DAT > ACC > GEN > ERG (Silverstein 1976)
  - $\theta_{AGENT} > \theta_{THEME} > \theta_{GOAL} > \ldots$ (Jackendoff 1972, Carrier-Duncan 1985, a.m.o.)

- **Hierarchies of syntactic projections**, proposed in syntactic cartography
  - Ex: [FORCE [TOP [FOC [TOP [FIN [TENSE [...]]]]]]] (Rizzi 1997)
  - [HABITUAL [REPEATED [FREG [ECTION [CELEBRATIVE [ANTERIOR [...]]]]]]] (Cinque 1999)
  - [SIZE LENGTH HEIGHT SPEED DEPTH WIDTH [...]] (Scott 2002)

Are both notions necessary? If not, in what direction might reduction be made? Here I explore these questions using the domain of $\theta$-roles and $\theta$-hierarchies.

Specifically, I:

- review a theory of argument realization for the Mandarin VP based on a cartographic-style "hierarchy of $\theta$-projections," noting some questions that arise,
- sketch an alternative view developed 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,
- draw a general conclusion about recasting hierarchies of projections as hierarchies of features under the strategy sketched above: viz., that there must always be a single head bearing the features underlying the projection hierarchy that raises successively through its shells,
- illustrate this point in another domain looking at hierarchies of adjectival and left-peripheral projections.

1.0 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 (1):

\begin{equation}
\text{[AGENT/EXP} V [VP TIME LV_{temp} [VP LOC LV_{loc} [VP INSTR LV_{inst} [VP THEME} V]]]
\end{equation}

$v$ assigns $\theta$-roles born uniquely by "canonical subjects" (Agent/Experience). The sequence of light verbs (LV$_v$) assign various circumstantial $\theta$-roles. The core predicate (V) assigns the THEME-role, which thus projects lowest.

"Canonical" objects, e.g., niu-rou mian 'beef noodle' in (2a), are licensed by the lexical V $\text{chi 'eat'}$ (2a).

"Non-canonical" objects, e.g., dawan 'big bowl' in (2b), are licensed by an LV (2b).

(2) a. Wo chi niu-rou mian.
   I eat beef noodle
   'I eat beef noodle'

   b. Wo chi da-wan.
   I eat big-bowl
   'I eat with/using a big bowl'

   c. Wo chi guanzi.
   I eat restaurant
   'I dine at a restaurant'

   d. Wo chi xiawu.
   I eat afternoon
   'I dine in the afternoon'

With a canonical subject present at most one post-verbal object is possible (3a-f). This constraint plausibly relates to case. If $v$ can assign ACC (4a) but LV's can't, additional objects will be case-less (4b).

(3) a. *Wo chi da-wan niu-rou mian i.e., beef noodle with a big-bowl
   b. *Wo chi guanzi niu-rou mian i.e., beef noodle in a restaurant
   c. *Wo chi xiawu niu-rou mian i.e., beef noodle in the afternoon
   d. *Wo chi guanzi da-wan niu-rou mian i.e., beef noodle in a restaurant
   e. *Wo chi xiawu da-wan niu-rou mian i.e., beef noodle in the afternoon

(4) a. [Wo v [vp niu-rou mian chi]]
   ACC

   b. *[Wo v [vp da-wan lv_{inst} [vp niu-rou mian chi]]]
   ACC

With a canonical subject absent, more possibilities arise. Li (2014) discusses alternations like (5)-(8), where orderings of arguments appear to flip.

(5) a. xiao bei he lucha small cup drink green tea
   'Use the small cup to drink the green tea.'

   b. lucha he xiao bei theme > instrument
gen green tea drink small cup
   'Green tea is drunk with small cups.'
(6) a. da dianyingyuan kan dongzuo pian; xiao dianyingyuan kan katong pian.
big theater watch action film 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; katong pian kan xiao dianyingyuan.
action film watch big theater cartoon film watch small theater
‘Action films are to watch in big theaters; cartoons are to watch in small theaters.’
THEME > LOCATION

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

b. lubiantan mai wanshang.
street.stall sell evening
‘Sell at street stalls in the morning.’

(8) a. zaoshang qie zhe-ba dao.
morning cut this-CL knife
‘This knife is to cut with in the morning.’

b. zhe-ba dao qie zaoshang.
this-CL knife cut morning
‘This knife is to cut with in the morning.’

Li (2014) analyzes these data as in (9). Whenever AGENT/EXP (VP Spec) is projected, it raises to sentence subj position (9a); but when AGENT/EXP is not projected, args with other roles (Spec of VP) raise in thematic (9b) or contra-thematic order (9c):

(9) a. [ [ α θ ] VP α V [VP … V ]] ]
   VP Spec raises

b. [ β [VP β ... [VP ... V ]] ]
   VP Spec raises (“thematic order”)

c. [ γ [VP β ... [VP γ ... V ]] ]
   VP Spec raises (“contra-thematic order”)

How is thematic order determined? Ellipsis. Li claims object deletion is possible in thematic order but blocked in contra-thematic order (10):

(10) a. wanshang mai lubiantan han 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 han hao; baihuo-gongsi 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).’
LOCATION > TIME

Some general questions for Li’s broader “cartographic” approach to argument realization:

A. What is the basis of the projection hierarchy in (1)?
In cartographic analyses, it must come from selection: V selects \(L_{voc}\) selects \(L_{temp}\) selects \(L_{inst}\) selects \(V\).
Since V’s and \(L_{voc}\)’s are f-cats, this is f-selection, i.e., a specific category of head selects a specific category of complement. This would seem to imply that every V projects the full hierarchy of θ-roles even when V notionally does not involve them (11a, a*).

(11) a. Wo chi [niu-rou mian].
   a*. [Wo v [VP [L_{temp} [VP ... [VP ... L_{inst} [VP niu-rou mian chi]]]]]]
   Is this plausible? What is the interpretation of (2a*)?

B. How general is the projection hierarchy?
The cartographic program aspires to universal orders. But the specific ordering proposed by Li (2014) conflicts with other proposed θ-hierarchies.

\[ \theta_{AGENT} > \theta_{TIME} > \theta_{LOC} > \theta_{INSTR} > \theta_{THEME} \]

Li (2014)

Duncan (’85)

Jackendoff (’72), Carrier-Duncan (’85)

(12) [Col. Mustard] killed [the victim] [with a knife] [in the conservatory] [at midnight].

C. How are contra-hierarchical orders derived?
In the MP, a head a bearing an edge feature and a feature [F] that may undergo agreement probes for an [F]-bearing β in its domain (13a). Probing β, a agrees on [F], activates its edge feature and raises β to Spec (13b). The probe-goal relation respects Minimality; a cannot to probe y “through” an intervening β that is a potential [F]-bearer (13c):

(13) a. [ [α [β ... [β ]] ] ]...[β ... [β ]] ]
   [F] → probes → [F]

b. [ [α β ... [β ] ...[β ]] ]...[β ... [β ]] ]
   [F] → probes → X → → [F]

Given the possibility of (9b), (9c) plainly violates Minimality. The higher probe must agree with y through the intervening β.

2.0 θ-projections from θ-features (Larson 2014)

Larson (2014) offers an account of projection that analyzes θ-roles as syntactic features and θ-role assignment as feature agreement, and controls projection via a θ-feature hierarchy.
In simplest form: assume θ-features [AG], [TH], [GL], [LOC], etc. born by preds and args that undergo agreement at the point of external merge:

(14)  
\[
\begin{align*}
\text{kiss} & \quad \text{John} \\
[\text{AG}[2]] & \quad [\text{TH}[1]] \\
\end{align*}
\Rightarrow
\begin{align*}
\text{kiss} & \quad \text{John} \\
\text{VP} & \\
\end{align*}
\]

Assume a feature hierarchy [AG] > [TH] > [GL] > [LOC] > … and constraint (15):

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

Then the hierarchy of θ-features will determine the hierarchical projection of args:

(16)  
\[
\begin{align*}
\text{Mary} & \quad \text{VP} \\
[\text{AG}[2]] & \quad [\text{TH}[1]] \\
\text{kiss} & \quad \text{John} \\
\text{V'} & \\
\end{align*}
\]

Given [AG] > [TH] and (15), [TH] must merge first!

### 2.1 Syntactic Features

Syntactic theory now distinguishes instances of features F according to whether they are **interpretable**, valued or neither (i.e., **uninterpretable-unvalued**).

(17)  
\[
\begin{align*}
\text{a.} & \quad [\text{IF}][] & \text{interpretable} & \text{F, associated with a “meaning”} \\
\text{b.} & \quad [\text{Fval}][] & \text{valued} & \text{F, associated with visible marking} \\
\text{c.} & \quad [\text{F}][] & \text{uninterpretable-unvalued} & \text{F, concordial} \\
\end{align*}
\]

Unvalued features ([IF][] or [F][]) probe their c-command domain seeking to agree with another instance of F. For F to be licensed, it must have both interpretable and valued instances linked by agreement. Thus (18a-c) will be licensed, but (19a-e) will not:

(18)  
\[
\begin{align*}
\text{a.} & \quad [\text{IF}][n] \ldots [\text{Fval}][n] \\
\text{b.} & \quad [\text{IF}][n] \ldots [\text{F}][n] \ldots [\text{Fval}][n] \\
\text{c.} & \quad [\text{IF}][n] \ldots [\text{F}][n] \ldots [\text{Fval}][n] \\
\end{align*}
\]

(19)  
\[
\begin{align*}
\text{a.} & \quad [\text{IF}][] \\
\text{b.} & \quad [\text{IF}][n] \ldots [\text{F}][n] \\
\text{c.} & \quad [\text{Fval}][] \\
\text{d.} & \quad [\text{F}][n] \ldots [\text{Fval}][n] \\
\text{e.} & \quad [\text{IF}][] \ldots [\text{Fval}][] \\
\end{align*}
\]

This refinement obliges us to decide where θ-features are interpretable and where valued: on args vs. on preds.

(21)  
\[
\begin{align*}
\text{a.} & \quad \text{VP} \\
\text{Mary} & \quad [\text{AG}[2]] \\
\text{kiss} & \quad [\text{TH}[1]] \\
\text{V'} & \\
\text{AGREE!} & \quad [\text{TH}[1]] \\
\end{align*}
\]

\[
\begin{align*}
\text{b.} & \quad \text{VP} \\
\text{Mary} & \quad [\text{AGval}[2]] \\
\text{kiss} & \quad [\text{THval}[1]] \\
\text{John} & \quad [\text{TH}[1]] \\
\text{AGREE!} & \quad [\text{THval}[1]] \\
\end{align*}
\]

### 2.2 Further Refinements

Larson (2014) proposes:
- θ-features are interpretable on arguments
- θ-features are valued on V’s, V’s and P’s
- if a bears a set of features of the same type, then **at most one can be valued**.

(22)  
\[
\begin{align*}
\text{VP} & \\
\text{Mary} & \quad [\text{AG}[2]] \\
\text{kiss} & \quad [\text{TH}[1]] \\
\text{V'} & \\
\text{AGREE!} & \quad [\text{THval}[1]] \\
\end{align*}
\]

\[
\begin{align*}
\text{Monotransitive} & \\
\text{Valuation by V and v} \\
\text{AGREE!} & \quad [\text{TH}[1]] \\
\text{VP} & \\
\text{Mary} & \quad [\text{AGval}[2]] \\
\text{kiss} & \quad [\text{THval}[1]] \\
\text{John} & \quad [\text{TH}[1]] \\
\text{AGREE!} & \quad [\text{THval}[1]] \\
\end{align*}
\]

(23)  
\[
\begin{align*}
\text{VP} & \\
\text{Mary} & \quad [\text{AG}[3]] \\
\text{v} & \quad [\text{TH}[2]] \\
\text{give} & \quad [\text{THval}[2]] \\
\text{Fido} & \quad [\text{GL}[1]] \\
\text{V'} & \\
\text{AGREE!} & \quad [\text{GL}[1]] \\
\text{PP} & \\
\text{Mary} & \quad [\text{AGval}[3]] \\
\text{v} & \quad [\text{THval}[2]] \\
\text{give} & \quad [\text{THval}[2]] \\
\text{to} & \quad [\text{GL}[1]] \\
\text{John} & \quad [\text{GL}[1]] \\
\text{AGREE!} & \quad [\text{GL}[1]] \\
\end{align*}
\]

These refinements retain the basic picture in (16): θ-feature hierarchy determines the hierarchical projection of args. Additional elements (v’s, P’s) enter the picture to enable the valuation that V cannot accomplish on its own.

### 2.3 Some Comparisons between Li (2014) and Larson (2014)

- Both involve hierarchical projection via θ-roles
- Both involve a stipulated hierarchy
v carrying an edge feature and valued [GL] feature is merged. Give raises to v and agrees on [GL] (4b). This yields agreement between v and John on [GL], without a probe-goal relation. John can thus raise to Spec of v without violating Minimality (4c). Raising of give to v allows v and John to agree “by transitivity,” without intervention by Fido.

(25)

Note again the importance of a single head (here V) that carries agreement with various arguments as it raises through the shells.

3.1 Mandarin Again

This account can apply directly to the Mandarin cases discussed by Li (2014). Transitives with canonical subjects and objects work just like English (22) (cf. 26a):

(26) a.

Non-canonical objects involve valuation by v carrying a θ-feature, with object raising:

(27) a.
Examples with circumstantial θ-roles and inversions are also accommodated, with feature assignment of depending on the hierarchy assumed. Suppose [LOC] > [TEMP] (contra Li 2014). Then (10a,b) are derived as in (28a,b) (resp):

3.2 Some Comparisons between Li (2014) and Larson (2014)

Regarding Minimality: none of the derivations in (27) or (28) incur violation, for the reasons discussed. Regarding Universality of θ-hierarchy: Li’s θ-hierarchy for Mandarin conflicts with other proposals and rests on her claim that obj deletion occurs only in canonical θ-order. Li offer’s an “Economy of Derivation” account. 2 points:

- Li’s account involves comparing derivations with different numerations, which is illicit in economy accounts.
- The derivations in (28a,b) suggest alternative views of when object deletion is possible. E.g., (28a) involves nested paths (LIFO); (28b) doesn’t.

4.0 Other Projection Hierarchies

The general approach developed above is potentially applicable to other cartographic projection hierarchies.

4.1 Adjectival Ordering

It has been proposed that observed orderings of adjectival modifiers be analyzed via a cartographic projection hierarchy:

\[
\text{[SIZE [LENGTH [HEIGHT [SPEED [DEPTH [WIDTH […]]]]]]]} \quad \text{(Scott 2002, Cinque 2010)}
\]

Assume:
- a head D bearing a subset of features from ([ISC], [RES], [SIZE], [LEN], [MAT], [SRC], …)
- a feature hierarchy [SC] > [RES] > [MAT] > [SRC] > …

3.2 Some Comparisons between Li (2014) and Larson (2014)

Regarding Minimality: none of the derivations in (27) or (28) incur violation, for the reasons discussed. Regarding Universality of θ-hierarchy: Li’s θ-hierarchy for Mandarin conflicts with other proposals and rests on her claim that obj deletion occurs only in canonical θ-order. Li offer’s an “Economy of Derivation” account. 2 points:

- Li’s account involves comparing derivations with different numerations, which is illicit in economy accounts.
- The derivations in (28a,b) suggest alternative views of when object deletion is possible. E.g., (28a) involves nested paths (LIFO); (28b) doesn’t.

4.0 Other Projection Hierarchies

The general approach developed above is potentially applicable to other cartographic projection hierarchies.

4.1 Adjectival Ordering

It has been proposed that observed orderings of adjectival modifiers be analyzed via a cartographic projection hierarchy:

\[
\text{[SIZE [LENGTH [HEIGHT [SPEED [DEPTH [WIDTH […]]]]]]]} \quad \text{(Scott 2002, Cinque 2010)}
\]

Assume:
- a head D bearing a subset of features from ([ISC], [RES], [SIZE], [LEN], [MAT], [SRC], …)
- a feature hierarchy [SC] > [RES] > [MAT] > [SRC] > …

3.2 Some Comparisons between Li (2014) and Larson (2014)

Regarding Minimality: none of the derivations in (27) or (28) incur violation, for the reasons discussed. Regarding Universality of θ-hierarchy: Li’s θ-hierarchy for Mandarin conflicts with other proposals and rests on her claim that obj deletion occurs only in canonical θ-order. Li offer’s an “Economy of Derivation” account. 2 points:

- Li’s account involves comparing derivations with different numerations, which is illicit in economy accounts.
- The derivations in (28a,b) suggest alternative views of when object deletion is possible. E.g., (28a) involves nested paths (LIFO); (28b) doesn’t.

4.0 Other Projection Hierarchies

The general approach developed above is potentially applicable to other cartographic projection hierarchies.

4.1 Adjectival Ordering

It has been proposed that observed orderings of adjectival modifiers be analyzed via a cartographic projection hierarchy:

\[
\text{[SIZE [LENGTH [HEIGHT [SPEED [DEPTH [WIDTH […]]]]]]]} \quad \text{(Scott 2002, Cinque 2010)}
\]

Assume:
- a head D bearing a subset of features from ([ISC], [RES], [SIZE], [LEN], [MAT], [SRC], …)
- a feature hierarchy [SC] > [RES] > [MAT] > [SRC] > …

3.2 Some Comparisons between Li (2014) and Larson (2014)

Regarding Minimality: none of the derivations in (27) or (28) incur violation, for the reasons discussed. Regarding Universality of θ-hierarchy: Li’s θ-hierarchy for Mandarin conflicts with other proposals and rests on her claim that obj deletion occurs only in canonical θ-order. Li offer’s an “Economy of Derivation” account. 2 points:

- Li’s account involves comparing derivations with different numerations, which is illicit in economy accounts.
- The derivations in (28a,b) suggest alternative views of when object deletion is possible. E.g., (28a) involves nested paths (LIFO); (28b) doesn’t.
It has been proposed that elements in the C domain be analyzed via a cartographic projection hierarchy:

\[
\text{[FORCE TOP [FOC TOP [FIN TENSE [\ldots]]]..]} \quad (\text{Rizzi 1997})
\]

Assume:
- a head C bearing a subset of features from \{[FOR], [TOP1], [FOC], [TOP2], [FIN]\}
- a feature hierarchy \([FOR] > [TOP1] > [FOC] > [TOP2] > [FIN]\)

### 4.2 Left-peripheral Elements

It has been proposed that elements in the C domain be analyzed via a cartographic projection hierarchy:

\[
\text{[FORCE TOP [FOC TOP [FIN TENSE [\ldots]]]..]} \quad (\text{Rizzi 1997})
\]

Assume:
- a head C bearing a subset of features from \{[FOR], [TOP1], [FOC], [TOP2], [FIN]\}
- a feature hierarchy \([FOR] > [TOP1] > [FOC] > [TOP2] > [FIN]\)

### REFERENCES