

## Antisymmetry

MIT, 24.951, We 10 Sep 2003

### Fundamental Implications

- (1) a. What is the ontological status of  $X'$ -Theory? Is  $X'$ -Theory a primitive of grammar or a set of constraints that can be, and that should be, derived from deeper principles?
- b. What is the nature of the relationship between hierarchical structure (syntax) and the linear order of words (time)? NB: The former is an abstract construct that is only indirectly inferrable whereas the latter seems more concrete and directly observable.
- c. What is the locus of cross-linguistic variation vis-à-vis word order (e.g., how to derive the differences between, say, English and Japanese)?
- d. Specific analyses:
- Heavy NP shift
  - Relative-clause formation
  - Relative-clause extraposition
  - Coordination
  - The “head-finality” of Japanese—are  $X^0$ 's complements, which precede  $X^0$ ,  $X^0$ 's sisters (under  $X'$ )?
  - Is Dutch SOV (Koster 1975) or SVO (Zwart 1993)?

### The theoretical background

**The symmetry of  $X'$ -Theory:**

$$(2) \quad \begin{array}{l} X' = X^0/X' \quad Y'' \\ X'' = X'/X'' \quad Z'' \end{array}$$

- (3) a. The schema in (2) constraints hierarchical structure and category labels only—the schema in (2) defines a “mobile”.
- b. Linear order is divorced from hierarchical structure.

### Antisymmetric evidence—puzzles for symmetric $X'$ -Theory

- (4)
  - CP
  - PP
  - Head-movement
  - Greenbergian universals

### Antisymmetries in the CP

- (5) a. Are  $[_{CP} \text{ Spec } C' ]$  and  $[_{CP} C' \text{ Spec } ]$  equally available?  
 b. Are  $[_{CP} \text{ wh-XP } \dots ]$  and  $[_{CP} \dots \text{ wh-XP } ]$  equally attested?

*Greenberg on CP-related asymmetries*

- (6) a. No *wh*-movement to the right.  
 b. More generally, no unbounded movement to the right.  
 c. *Wh*-movement generally to the left (i.e., to a leftward Spec(CP)).

*Solutions?*

- (7)  $[_{CP} \text{ Spec } C' ]$  vs. \*  $[_{CP} C' \text{ Spec } ]$   
 (8) Clause-typing?

### Antisymmetries in the PP

*Dutch PPs (van Riemsdijk 1978)*

- (9) a. ... P DP ... usually.  
 b. ... DP P ... with certain directional meanings and/or with certain pronouns.  
 c. Some Ps are exclusively prenominal.

- (10) a. *de weg in het bos* (Koopman 2000)  
 the road in the forest  
 “the road in the forest”  
 b. *de weg het bos in*  
 the road the forest in  
 “the road into the forest”

- (11)  $[_{PP} DP_i [_{P'} P^0 t_i ] ]$

*Does “HCTUD” exist (cf. (9))?*

- (12) a. ... DP P ... usually.  
 b. ... P DP ... with certain directional meanings and/or with certain pronouns.  
 c. Some Ps are exclusively postnominal.

- (13) \*  $[_{PP} [_{P'} t_i P^0 ] DP_i ]$

*Solution?*

(14) [PP Spec [P' P<sup>0</sup> DP ] ] vs. \* [PP [P' DP P<sup>0</sup> ] Spec ]

*Navajo agreeing PPs*

(15) a. Agreeing *post*-positions: DP<sub>φ<sub>x</sub></sub> P<sub>φ<sub>x</sub></sub>

b. No agreeing *pre*-positions: \* P<sub>φ<sub>x</sub></sub> DP<sub>φ<sub>x</sub></sub>

[Also see Hungarian which allows ... P DP ... only with non-agreeing prepositions.]

(16) a. [AgrP DP<sub>φ<sub>x<sub>j</sub></sub> [Agr' P<sub>φ<sub>x<sub>i</sub></sub> [PP ... [P' t<sub>i</sub> t<sub>j</sub> ] ] ] ] ]</sub></sub>

b. No movement, no agreement.

(17) a. *Jean a repeint les tables*

John has repainted the tables

*Jean les<sub>FEM+PL</sub> a repeint+es<sub>FEM+PL</sub>*

“John has repainted them”

(18) a. “Agreement between a preposition and its lexical complement is possible only in a V ... S ... language” (Kayne 1994:50)

b. ... P<sub>φ<sub>x</sub></sub> DP<sub>φ<sub>x</sub></sub> ... in Jacaltec which also displays VSO (Craig 1970).

c. Analysis same as in (16) + extra head-movement of P<sub>φ<sub>x</sub></sub> across agreeing DP<sub>φ<sub>x</sub></sub>, out of AgrP.

### Antisymmetries in head-movement

(19) [XP ... X<sup>0</sup> [YP ... Y<sup>0</sup> ... ] ... ] vs. [XP ... [YP ... Y<sup>0</sup> ... ] X<sup>0</sup> ... ]

(20) a. Verb-second phenomena in Germanic (den Besten), Kru (Koopman), Basque (Laka), Kashmiri (Bhatt), Karitiana (Storto), etc.

b. Second-position (Wackernagel) clitics in Slavic.

(21) a. Any language with mirror-image of verb-second phenomena—verb-before-last languages (“reverse German”)?

b. Any language with mirror-image of Wackernagel clitics—penultimate-position clitics?

### Antisymmetries in general word-order (Greenbergian) facts

(22) a. SVO and SOV are more more common than VOS and OVS

OSV is “exceedingly rare” (Greenberg 1963)

b. Greenberg’s (1963) Universal #1: Subj < Obj in almost all languages of the world.

(23) a. Cross-categorially overt Spec-Head order is much more widespread than overt Head-

Spec order.

- b. There is no category for which Head-Spec is cross-linguistically dominant.
- (24) a. Spec-initial CP is overwhelmingly dominant across the world's languages  
 b. Spec-initial IP is overwhelmingly dominant across the world's languages (cf. (22)).  
 Any language with raising to the right? (Cf. *John was believed to be likely to win*)

### Interim conclusions:

- (25) a. Movement to Spec always leftward, and head-movement always leftward.  
 b. Spec is universally initial, and head is universally initial.  
 c. Conjecture:  $[X_P \text{ Spec } [X' X^0 \text{ Compl} ] ]$  — right-branching is universal.

### What about Japanese?

- (26) a. *John*  $[_{VP}$  **said**  $[_{CP}$  **that**  $[_{IP}$  *Mary*  $[_{VP}$  **went**  $[_{PP}$  **to Tokyo** ]  $[_{PP}$  **by plane**]]]]] (English)  
 b. *John-ga*  $[_{VP}$   $[_{CP}$   $[_{IP}$  *Mary-ga*  $[_{VP}$   $[_{PP}$  *plane* **by** ]  $[_{PP}$  *Tokyo* **to** ] **went** ] ] **that** ] **said** ] (Japanese)
- (27) a. Japanese appears uniformly head-final, a mirror-image of English.  
 b. English  $[X' X^0 \text{ Compl}]$  vs. Japanese  $[X' \text{ Compl } X^0]$  ?

French:

- (28) a. *Jean a mangé le chocolat*  
 John has eaten the chocolate  
 b. *Jean a tout mangé*  
 John has all eaten

German, Dutch, West Flemish

- (29) a.  $[_{CP}$  *that* DP ... V ]  
 b.  $[_{CP}$  *that* V CP ]  
 c.  $DP_{Obj_i}$  (Part) *zu/te* V  $t_i$   
 d. *das Buch mit zu bringen* (German; Kayne 2003,  
 the book with to bring  
 “to bring along the book”  
 via Asaf)
- (30) Given (25c), cross-linguistic variations in word-order are side-effects of movement, not the direct result of a “head parameter” in a symmetric X'-Theory.

<b>Theoretical issues</b>
---------------------------

- (31) a. Why should the antisymmetric order [ Spec [ Head Compl ] ] be universal?
- b. Kayne's answer: Because this order is the only one that establishes a consistent **symmetry** between "time" (i.e., the observable order in which words are pronounced) and syntax (i.e., the hierarchical structure that parses words into meaningful sentences).
- This symmetry between time and syntax is established via the LINEAR CORRESPONDENCE AXIOM (LCA).
- c. Via the LCA, Kayne tries to derive, in minimalist fashion, both the [ Spec [ Head Compl ] ] universality and the basic tenets of  $X'$ -Theory and concomitant structural constraints on movement, making  $X'$ -Theory superfluous and phrase-structure highly restrictive.

"... the grand aim of all science is to cover the greatest number of empirical facts by logical deduction from the small number of hypotheses or axioms ... " (Einstein)

LCA's consequences for learnability, processing, etc.?

**"LCA lite"**

- (32) a. Assume trivially that for any utterance  $U$ , pronouncing  $U$  establishes a precedence order—imposes a timed sequence—on the words in  $U$ :

$$U = w_1 w_2 \dots w_n$$

The precedence order (call it " $<$ ") is:

- total: for any pair of words  $w_i, w_j$  in  $U$ , either  $w_i < w_j$  or  $w_j < w_i$   
[i.e., for any two words in an utterance, there is always one that is pronounced before the other]
  - anti-symmetric: there is no pair of words  $w_i, w_j$  in  $U$  such that  $w_i < w_j$  and  $w_j < w_i$   
[i.e., you cannot both pronounce  $w_i$  before  $w_j$  and pronounce  $w_j$  before  $w_i$ ]
  - transitive: if  $w_i < w_j$  and  $w_j < w_k$ , then  $w_i < w_k$   
[i.e., if  $w_i$  is pronounced before  $w_j$  which in turn is pronounced before  $w_k$ , then  $w_i$  is pronounced before  $w_k$  as well]
- b. For any pair of words  $w_i, w_j$  in an utterance  $U$ ,  $w_i$  is pronounced before  $w_j$  (i.e.,  $w_i < w_j$ ) if and only if  $w_i$  is "attached higher" than  $w_j$ .

- (33) Apply the (loose) intuition in (32) to determine the unique order of Spec, Head, Compl in, say, the domain. of VP with S=*Mary*, V=*see* and O=*John*.

- Spec-Head-Compl: [<sub>VP</sub> [<sub>NP</sub> *Mary*] [<sub>V</sub> *see*] [<sub>NP</sub> *John*] ] ] ?

- Compl-Head-Spec:  $[_{VP} [_{V'} [_{NP} \text{John}] \text{see}] [_{NP} \text{Mary}] ] ?$
- Spec-Compl-Head:  $[_{VP} [_{NP} \text{Mary}] [_{V'} [_{NP} \text{John}] \text{see}] ] ?$
- Head-Compl-Spec:  $[_{VP} [_{V'} \text{see}] [_{NP} \text{John}] ] [_{NP} \text{Mary}] ] ?$

(34) a. What does “attached higher” in (32b) mean?

b.  $w_i$  is attached higher than  $w_j$  if and only there are non-terminal nodes  $\alpha, \beta$  in the parse tree such that:

1.  $\alpha$  dominates  $w_i$
2.  $\beta$  dominates  $w_j$
3.  $\alpha$  asymmetrically c-commands  $\beta$

c.  $\alpha$  asymmetrically c-commands  $\beta$  iff  $\alpha$  c-commands  $\beta$  and  $\beta$  does not c-command  $\alpha$ .

d.  $\alpha$  c-commands  $\beta$  iff:

- $\alpha$  and  $\beta$  are categories (individual segments are “invisible” to the c-command relationship)
- $\alpha$  excludes  $\beta$
- if a category dominates  $\alpha$ , then it also dominates  $\beta$

e.  $\alpha$  dominates  $\beta$  iff every segment of  $\alpha$  is an ancestor of  $\beta$ .

f.  $\alpha$  excludes  $\beta$  if no segment of  $\alpha$  is an ancestor of  $\beta$ .

### Full LCA

(35) a. **Image of a node:** For a given nonterminal  $X$ ,  $d(X)$  is the set of terminals that  $X$  dominates. Call  $d(X)$  the “image” under  $d$  of  $X$ .

b. **Image of an ordered pair of nodes:** For a pair of nodes  $\langle X, Y \rangle$ , the image under  $d$  of  $\langle X, Y \rangle$  is the Cartesian Product of  $d(X)$  and  $d(Y)$ , i.e., the set of ordered pairs  $\{\langle a, b \rangle\}$  such that  $a$  is a member of  $d(X)$  and  $b$  is a member of  $d(Y)$ .

c. **Image of a set of ordered pairs of nodes:** Set formed by taking the union of the images of each ordered pair in the original set.

d. Consider the maximal set  $A$  of ordered pairs  $\langle X_i, Y_i \rangle$ , such that for each  $i$ ,  $X_i$  asymmetrically c-commands  $Y_j$  in a phrase marker  $P$ , with  $T$  the set of terminals of  $P$ :

**Linear Correspondence Axiom:**  $d(A)$  is a linear ordering of  $T$   
(i.e.,  $d(A)$  is total, antisymmetric and transitive).

<b>Deriving X'-Theory and more</b>
------------------------------------

- (36) a. Every projection has a head  
b. Every projection has exactly one head  
c. The complement is unique  
d. Complements are maximal  
e. Intermediate projections ( $X'$ ) are “invisible” (i.e.,  $X'$  does not enter into relations defined by antecedent-government, binding, movement, etc.).  
f. Specifiers are adjoined  
g. Any projection has at most one specifier  
h. Binary branching  
i. Heads move to head positions (i.e., heads cannot adjoin to maximal projections)  
j. Maximal projections move to Spec positions (i.e., maximal projections cannot adjoin to heads)  
k. Movement (both head-movement and XP-movement) is invariably leftward
- (37) What aspects of X'-Theory is *not* derived by the LCA?