

## Phase Theory, Linearization and Zig-zag movement

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### The three main ingredients

- Phase Theory (enriched with the theory of feature valuation developed by Pesetsky & Torrego, 2004);
- Two general and plausible restrictions on overt movement;
- Successive cyclic linearization (Fox & Pesetsky 2004).

When combined, these three ingredients generate a series of restrictions that are at odds with empirical data from Italian sign language (LIS) and other signed and spoken languages.

### Things under discussion

- zig-zag movements: movements from the edge of a Phase to the opposite edge of the next Phase.
- The operation of Pied-piping & the EPP.

### Area 01 Exploring the three ingredients

#### Phase theory

- Assume Chomsky (2000 and successive works)
- The syntax of valuation: a feature (or a set of features) may either come with a specific value, or acquire it after the Agree operation has applied with a compatible valued feature.

Example:

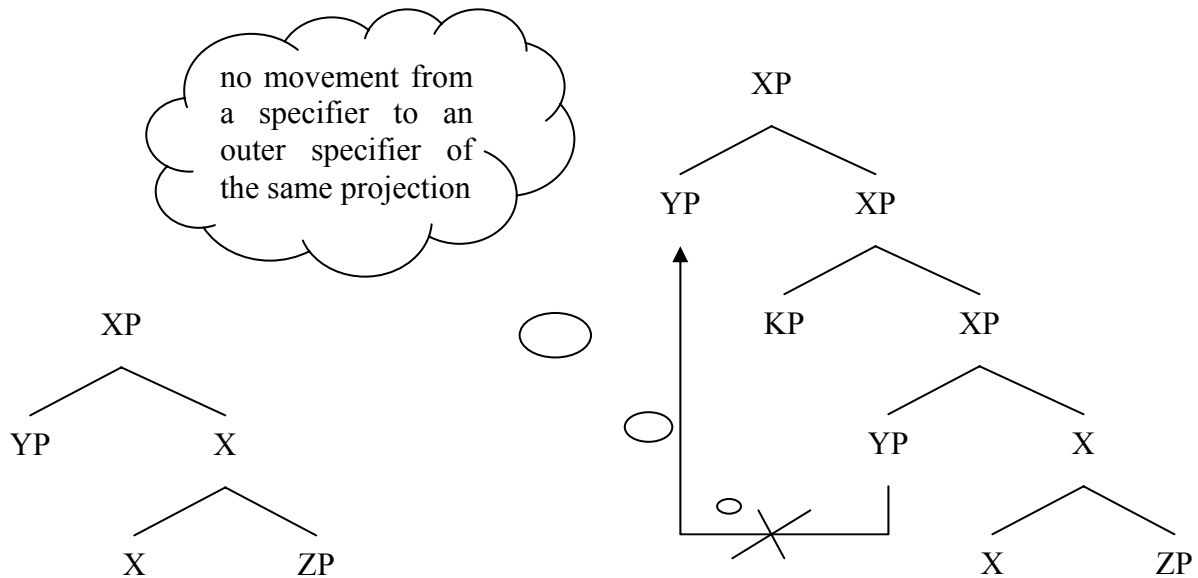
- $\phi$  features on nouns have their own values (as property of the lexical entry); while  $\phi$  features on verbs do not have their own value;
- $\phi$  features on verbs get valued once the head of I-V Agrees with its subject.

(1)  $[\text{VP } [\text{NP John}] [\text{sleep}]] \text{ Agree } \rightarrow [\text{IP John sleep-s}]$   
 $\phi F_{[\alpha]} \quad \phi F_{[]}$                        $\phi F_{[\alpha]} \quad \phi F_{[\alpha]}$

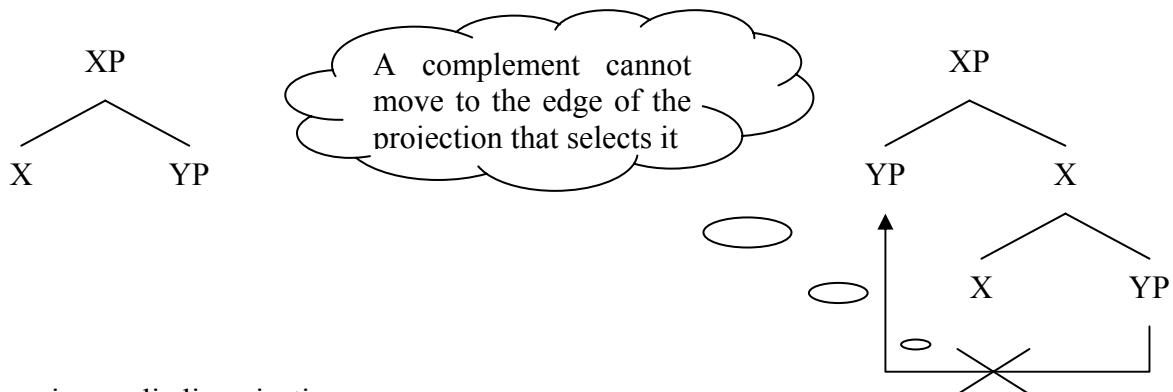
Once the head of I-V agrees with its subject, the  $\phi$  features of I get the same value of the feature of the NP. The value of a feature is, conventionally, indicated between square brackets.

Two plausible restrictions on overt movement

- (2) **a.** An element that merges (internally or externally) to the specifier of a head cannot move further up within the same projection (Ko 2004, 2005): the specifier position is not in the search domain of the head-probe (the search domain of a head-probe is its sister).



- (2) **b.** An element that merges (internally or externally) to the complement of a head cannot move to the specifier position of the same head: a constituent may only be merged (or remerged) if the result of the operation leads to the immediate satisfaction of a previously unsatisfiable feature. Moving a constituent from the complement position of a head to its specifier does not satisfy any previously unsatisfied feature. See Abels (2003) for the whole story.



Successive cyclic linearization:

- It is a theory of the mapping between syntax and PF.
- At the end of each phase all overt elements are ordered and linearized.
- Movement of an element may revise the order within a phase (before the phase is sent to spell out) but not across phases.
- Movement from edge and non-edge positions of a relevant spell out domain is possible only if previously established orders are not disrupted.

\*\*\* Successive cyclic linearization is at work both in VO languages (English and Mainland Scandinavian languages) and OV languages like Korean and Japanese \*\*\*

## Area 02 what's important to know about LIS

### LIS is a head final language

- (3) a. STUDENT BOOK BUY “a student bought a book”  
b. STUDENT BOOK BUY CAN “a student can buy a book”  
c. STUDENT THREE ARRIVED “three student arrived”

### Rightward movement in LIS

Wh-elements and N-words (nobody and nothing) pattern alike, see Cecchetto & Zucchi (2004) and Geraci (2005). The line over the gloss indicates the spreading of the particular facial expressions (Non-Manual Marking NMM) that are co-articulated with manual signs:

- (4) a. STUDENT  $t_{\text{WHAT}}$  BUY  $\overline{\text{WHAT}}^{\text{wh}}$  “what did a student buy”  
b. STUDENT  $t_{\text{NOTHING}}$  BUY  $\overline{\text{NOTHING}}^{\text{neg}}$  “a student didn't buy anything”  
c.  $t_{\text{WHO}}$  BOOK BUY  $\overline{\text{WHO}}^{\text{wh}}$  “who bought a book?”  
d.  $t_{\text{NOBODY}}$  BOOK BUY  $\overline{\text{NOBODY}}^{\text{neg}}$  “nobody bought a book”  
e. STUDENT BUY  $\overline{\text{BOOK WHICH}}^{\text{wh}}$  “Which book did a student buy”

With complex wh- phrases, it is possible that the wh- element only appears sentence finally, while the noun remains in object position:

- (5) STUDENT BOOK BUY  $\overline{\text{WHICH}}^{\text{wh}}$  “Which book did a student buy”

However, in D-linked context, the whole wh-phrase may remain in situ. In these cases, the spreading of the NMM must occur from the position of the wh-phrase, to the right edge of the sentence. Optionally, also the n-words may stay *in situ*, and the pattern of the NMM matches that of wh- questions.

- (6) a. STUDEN  $\overline{\text{BOOK WHICH BUY}}^{\text{wh}}$  “Which book did a student buy”  
b. GIANNI  $\overline{\text{NOTHING READ}}^{\text{neg}}$  “Gianni didn't read anything”  
c.  $\overline{\text{NOBODY BOOK READ}}^{\text{neg}}$  “Nobody read the book”



## Area 04 The Pied-piping operation & The EPP feature

Movement is a complex operation, which is composed by:

- Agree (the probe-goal relation);
- Pied-piping;
- Re-merge of the goal in the specifier of the probe (required by an EPP feature on the probe).

### The Pied-Piping operation

- It determines the size of the constituent that it is going to move. However, the mechanisms that are at work with this operation are quite obscure.

### Why is the EPP feature so special?

- It triggers the re-merge operation;
- It is the only feature that does not entertain any Agree relation;
- It has no partner on the goal;
- It is not clear what its value is.

It has been proposed in the literature (see, for instance, Pesetsky and Torrego, 2004) that EPP is not an independent feature, but that it is rather a property that other features may or may not have. In this sense, EPP is somehow parasitic on the presence of other features:

- A wh- feature on C Agrees with its counterpart on a wh-element;
- the EPP property of a wh- feature on the probe requires the specifier of CP to be filled by the goal.

However, EPP seems to have much more independence.

**EPP is not** satisfied by re-merge of the goal:

- in the case of **expletive constructions**;
- in every case where **merge pre-empt move**;
- more generally in every case where **external merge** is at work (in these cases there is not any sort of Agree at all! EPP seems to play the same role of the Edge feature proposed by Chomsky, 2005).

As a **consequence** of this, we can assume that EPP has a counterpart in the element that merges in the specifier of a projection, satisfying the EPP requirement of a head.

The *status* of EPP is now quite similar to the *status* of the other features: it is not a “single” feature, but it has a “partner” with which it shares the value.

### Three questions

- Do we really need the operation of Pied-Piping?
- *External* merge may satisfy EPP by itself, is it possible to do the same with *internal* merge?
- What is the value of EPP?

## Area 05 The proposal

At the end of each phase:

- Elements with *unvalued* features target the edge of the phase because only the edge of a phase is visible for further syntactic operations (the solution proposed here might resemble Chomsky's Phase Impenetrability Condition. We'll see that the similarity is only apparent).

At the syntax-PF branch:

- all the elements that **do not have** *unvalued* features are linearized;
- those elements that **still have** *unvalued* features are syntactically active and for this reason ignored by the interface system (e.g. elements with *unvalued* features are not linearized).

\*\*\* an element that is not at the edge of a phase can still serve as a goal for a probe in higher phases. However, this movement will not result in the satisfaction of any feature of the goal (because all its features are already valued). \*\*\*

### Deriving zig-zag movement

(10) a. BOY BOOK BUY WHICH

b. **build vP** [vP BOY WHICH [vP BOOK BUY]]

Table of orders will contain: BOY < BOOK, BOOK < BUY

\*\*\* the wh- element is invisible for linearization \*\*\*

c. **build CP** and remerge what needs to be remerged

[CP [TP BOY t<sub>WHICH</sub> [vP t<sub>DP</sub> [vP BOOK BUY]]] WHICH]

Table of orders will contain:

*Previously ordered elements:* BOY < BOOK, BOOK < BUY

*New orders:* BUY < WHICH

### **No violation occurs, end of the journey!**

Note that at the CP phase, the wh- element *is linearized* because all its features are valued!

Once an element has valued all its feature, it becomes visible to linearization, no matter about the position it occupies (differently from PIC).

**Pop Quiz:** What triggers the cyclic movement to the edge of the intermediate phases?

(11) a. what do you think that I think that she thinks

b. [CP<sub>3</sub> what do you [vP<sub>3</sub> t<sub>what</sub> think [CP<sub>2</sub> t<sub>what</sub> that I [vP<sub>2</sub> t<sub>what</sub> think  
[CP<sub>1</sub> t<sub>what</sub> that she [vP<sub>1</sub> t<sub>what</sub> [VP thinks t<sub>what</sub>]]]]]]

**Current theories** say that:

- the head of each phase has a relevant feature that match a feature on the goal;
- an EPP feature on the head-probe requires its specifier to be filled;

In the case of (11b), every intermediate vP and CP must have an *unvalued* wh- or Q feature.

### **Do we really need a relevant feature on the head-probe?**

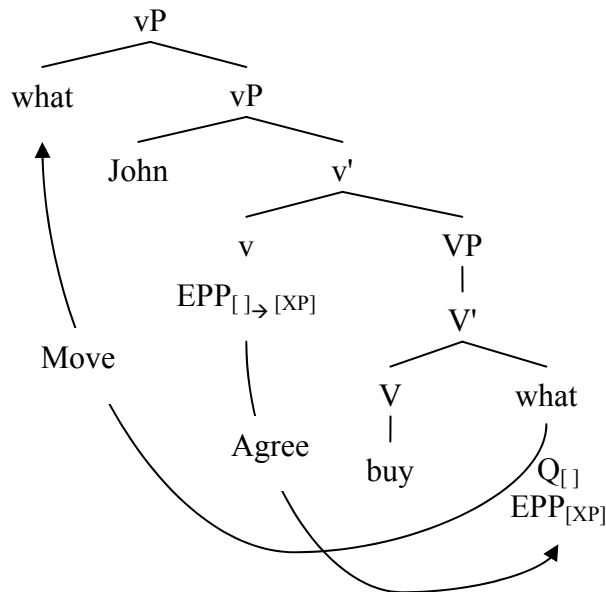
**My proposal** is that EPP alone is enough to derive the intermediate steps of cyclic movement.

EPP may be satisfied without the participation of other features in the case of:

- *external merge*, like in expletive constructions;
- *internal merge*, like in intermediate steps of cyclic movements.

## How it works

- The head of a phase has an *unvalued* EPP feature that scans its c-command domain looking for a “syntactically active” element that has a valued EPP feature to Agree with;
- Elements that still have *unvalued* feature are “syntactically active” and for this reason eligible for movement;
- The *unvalued* EPP on the head-probe **Agrees** with its valued counterpart on the “syntactically active” element;
- Re-merge applies, and the goal is now in the specifier of the phase.



## What is the value of the EPP feature on the goal?

Given that EPP is a syntactic feature, we expect its value to be strictly syntactic.

My proposal is that the value of EPP on the goal indicates the size of the constituent that is going to move:  $EPP_{[XP]}$  for maximal projections,  $EPP_{[X]}$  for heads.

## Do we really need the operation of Pied-Piping?

We are now in the position to dispense with the operation of Pied-piping, because it is the by-product of the Agree operation entertained between the EPP feature of the probe and the EPP feature of the goal.

## To conclude

The existence of zig-zag movement is documented both in signed and spoken languages. Movement of this sort creates a problem for the theory of linearization proposed by F&P. The solution to this problem allowed me to refine the part of the definition of movement that has to do with pied-piping and EPP, the former being a result of the checking operation of the latter.

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