# Unstable structures and labelling algorithm

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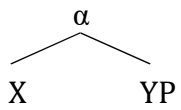
**A twofold goal:** To extend the Dynamic Asymmetry (DA) framework of Moro (1997b, 2000, 2009) in two directions: **(A)** to interpret the instability of symmetric structures as a failure in labelling rather than linearization. **(B)** to expand the analysis of head symmetries and explore its consequences. The latter goal bears on the inevitable first step of any derivation, called "ignition", and allows us to derive basic head-initial and head-final typologies from the "repair" options predicted by DA.

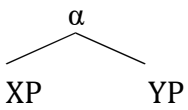
## 1. Symmetric Merge.

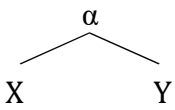
Merge was originally designed to be an inherently asymmetrical operation (Chomsky 1995), namely one where either element merged projected the label of the resulting constituent. Moro (1997b, 2000) proposed that without ad hoc requirements Merge can be successfully applied to symmetrical items yielding the following more parsimonious definition of this basic operation:

(1.1) Maximally simple formulation of Merge (Moro, 1997b, 2000, Chomsky 2013, 2015):
Merge (X, Y) = {X, Y}

Since X and Y must be either maximal or minimal (i.e. they either result from a prior operation of Merge or they don't), prior to linearization the output of (1.1) can be visualised as one of the structures in (1.2) or their mirror notational variants:

(1.2)a. 


b. 


c. 


In order to be legible at the interfaces, a structure must be stable. A structure is stable iff it is:

> **<u>Linearisable at PF:</u>** it must be LCA-compliant/legible so that the terminals can meet the requirements for a locally total linear ordering (Kayne 1994);
> **<u>Labellable throughout the derivation:</u>** without labels, syntactic objects cannot be "seen" by the operations of the system see Chomsky (2013, 2015).

Of the three structures in (1.2), only (1.2a) (and its identical counterpart modulo linearization) meets these requirements.

**The core proposal of Dynamic Antisymmetry is that whenever an unstable, qua symmetrical, structure is generated, movement intervenes to rescue it.**

***Theoretical differences compared to the standard view:***

- The trigger for movement is not based on quasi-morphological factors (feature-checking, valuation, agreement).
- The trigger for movement is "reversed": movement is as a *push-chain* phenomenon rather than a *drag-chain* phenomenon.
- *Ad hoc* restrictions on Merge are avoided, since it can be applied to items belonging to the same type, namely $X^{min}$ and $X^{max}$.

## 2. Symmetric XP XP structures

A first type of symmetric structure is given in (1.2)b reproduced here as (1.3)a involving two items of the type $X^{max}$. There can be two repair strategies, namely (1.3)b and (1.3)c:

(1.3) a. * [ XP YP ] (linear order irrelevant)
b. XP … [ ~~XP~~ YP ] (repair strategy I)
c. YP … [ XP ~~YP~~ ] (repair strategy II)

Movement of either $X^{max}$ simultaneously solves both the LCA and the LA related problems: first, because phonologically null elements do not need to be linearized; second, because labels cannot be provided by discontinuous constituents (Moro 2009, Chomsky 2013, 2015).

This analysis bears on "EPP" effects. Consider first Chomsky's (2015: 9) analysis of the subject position:

(1.4) **non *pro*-drop languages:**

$[_{\alpha}\ T_{[\varphi weak]}\ [_{vP}\ EA\ VP\ ]] \rightarrow [_{\varphi P}\ EA\ T_{[\varphi weak]}\ [_{vP}\ \sout{EA}\ VP\ ]]$

Here T's weak φ-features cannot label α, forcing movement of the EA:
➔ DP-raising is required, hence SpecTP is always filled (the original Extended Projection Principle, Chomsky 1982:10)
➔ "free inversion" is impossible and subject-extraction across a complementiser impossible (assuming extraction over a "complete" C-field is always impossible: Rizzi & Shlonsky 2007, Bošković 2015, Douglas 2017).

(1.5) ***pro*-drop languages (or null-subject languages: "NSLs"):**

$[_{\alpha}\ T_{[\varphi strong]}\ [_{vP}\ EA\ VP\ ]] \rightarrow [_{\varphi P}\ T_{[\varphi strong]}\ [_{vP}\ EA\ VP\ ]]$

Here T's strong φ-features can label α, giving:
➔ DP-raising to SpecTP is not required.
➔ SpecTP can remain unfilled, the EA can remain in a low position allowing "free inversion" (see Belletti 2004).
➔ long-distance extraction is possible from the low position, giving rise to surface complementiser-trace violations (Rizzi 1982).

Critical empirical data about this explanation are offered by copular sentences manifesting unexpected "EPP-effects" in NSLs. Consider nominal copular sentences, i.e. copular sentences

of the kind DP $V_{cop.}$ DP. The unified theory of the copula proved that this sequence is associated to two structures stemming from a common basic one (Moro 1997a):

(1.6) a. Questa foto era [ t la causa della rivolta] (canonical copular sentence)
"This picture was the cause of.the riot"
b. La causa della rivolta era [questa foto t ] (inverse copular sentence)
"the cause of.the riot was this picture"

Both (1.6a) and (1.6b) in fact derive from the structure in (1.7) a clear case of symmetric structure of the type (1.2)b, α also described as a "Bare small clause" (Moro 1997a, Citko 2011):

(1.7) BE [$_{\alpha}$ [$_{DP}$ questa foto ] [$_{DP}$ la causa della rivolta ]]

The typology in (1.6) can be naturally analysed by DA as formally predicted in (1.3)a-c. Movement of either DP, giving rise to the two kinds of copular clauses seen in (1.6)a-b, can repair the structure, allowing α to be labelled DP by the in situ element and it also solves the LCA issues since there is no need to linearize the silent copy. In fact, inserting *pro* would not yield a grammatical construction (**pro è questa foto la causa*; is this picture the cause; cf. Moro 2009) proving that movement is not a drag chain phenomenon insofar as it is not attracted to a higher position by a feature which needs to be checked.

As a counterproof that features have been assigned by only one DP, notice that there is no need to have feature sharing by the two DPs Merged underlying a copular sentence, witness cases of mismatch like (see Moro 1997a for a discussion on feature sharing in copular constructions):

(1.8) I libri sono la mia passione.
The books.$_{MPL}$ are the my passion-$_{F.SG}$
"Books are my passion."

The traditional analysis also considered that EPP could be solved by expletive insertion in copular sentences. There is also robust evidence that the expletive *ci* (there) and its equivalents in existential sentences is moved from an underlying position within (9) (see Moro 1997a and 2018 for the proper categorial status of expletives):

(1.9) C'è una foto (in giardino).
(There.$_{CL}$.is a photo in garden)
"There's a photo (in the garden)."

(1.10) COPULA [$_{\alpha}$ [$_{DP}$ una foto] [$_{DP}$ ci]]

This movement is obviously driven by the same mechanisms explained in (1.3) and existential sentences can be regarded as cases of inverse copular sentences.

**Conclusion:**

Structures like (1.2)b are "too symmetrical" to be read at the interfaces; they are rescued by movement of XP or YP (which option is taken is a matter of indifference to the computational system unless morphological restrictions hold on the landing site; in fact, both are possible in many cases). This account of movement triggers is empirically and theoretically superior to a

"morphological" (feature-checking/valuing/agreeing) approach: among other things it eliminates the notion of "greed" as a specific property of Movement (Chomsky 1993, Lasnik 1995, Moro 2000). More generally, it affords a more parsimonious conception of UG.

Moreover, the choice of XP or YP-fronting, although a matter of indifference to the narrow syntax, gives rise to sharp differences at the interfaces, for example, it generates different informational patterns:

(1.11) Focus effects (LF): the subject of inverse copular sentences *in situ* within VP is inherently focalized (Moro 1997, 2009):

a. Queste foto non sono la origine ma la fine della rivolta/*ma le canzoni.
(These photos are not the origin but the end of the riot/*but the songs.)

b. La fine della rivolta non sono le foto ma le canzoni/*ma l'origine.
(The end of the riot are not these pictures but the songs/*the origin.)

DA also captures the fact that not all mutually c-commanding XPs constitute a point of symmetry. In fact, they can co-occur in specTP, if either one is an inherent phonologically null category or either one can project, as in the following example involving *pro*:

(1.12) Legal symmetric structures in specTP:
a. [I libri [erano la causa della rivolta]]
the.$_{MPL}$ books.$_{MPL}$ **were** the.$_{FSG}$ cause.$_{FSG}$ of.the riot
"the books were the cause of the riot."
b. [La causa della rivolta [(*pro*) [erano i libri]]
the.$_{FSG}$ cause.$_{FSG}$ of.the riot **were** the.$_{MPL}$ books.$_{MPL}$
"the cause of the riot was the books"

**A corollary:**

Given that the analysis of copular constructions in Italian forces us to reconsider the "EPP" effect as a DA phenomenon, then also (1.4) and (1.5) can be revised as follows, after the discussion on copular constructions. Assuming that EA and VP are merged yielding a SC, the corresponding point of symmetry must be rescued:

(1.13) **non *pro-drop* languages:**

a. [$_{TP}$ T$_{[\varphi weak]}$ [$_{vP}$ [$_{SC}$ EA VP ]]]
b. [$_{TP}$ EA T$_{[\varphi weak]}$ [$_{vP}$ [$_{SC}$ ~~EA~~ VP ]]]

This would also immediately derive Alexiadou & Anagnostopoulou's *in-situ* (2001, 2006)) generalization: formally, *[$_{vP}$ EA [$_{SC}$ V IA ]] and *IA … [$_{SC}$ EA [$_{VP}$ V ~~IA~~ ]], for the point of symmetry would not be rescued by this type of movement.

(1.14) ***pro-drop* languages (or null-subject languages: "NSLs"):**

a. [$_{TP}$ T$_{[\varphi strong]}$ [$_{vP}$ [$_{SC}$ EA VP ]]]
b. [$_{TP}$ EA T$_{[\varphi strong]}$ [$_{vP}$ [$_{SC}$ ~~EA~~ VP ]]]
c. [[$_{TP}$ pro T$_{[\varphi strong]}$ [$_{vP}$ [$_{SC}$ ~~EA~~ VP ]]] EA ]

Alternatively, but it is much less conservative way, one can say that there is no *pro* and that the point of symmetry in (1.14)a is just solved by letting VP move out of the SC as in 1.15 (Moro 2004):

(1.15)b $[_{TP}$ VP $T_{[\varphi strong]}$ $[_{vP}$ $[_{SC}$ EA ~~VP~~ ]]]

Or, in other words, null subject languages are those which allow VP in spec-TP, much in the same sense as causatives as in the original analysis by Guasti – Moro (2001)

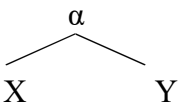
(1.16) Maria fa [ $[_{VP}$ lavare la macchina ] a [ $[_{EA}$ Gianni] $[_{VP}$ ~~lavare la macchina~~ ]]]
(Maria makes wash the car to Gianni)
"Maria makes John wash the car"

See also (2.10) below.

## 3. Symmetric X X structure

Consider again the point of symmetry (1.2)c, reproduced here as (2.1):

(2.1)

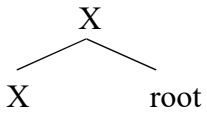



- This structure cannot be **linearised** (i.e. X and Y can't be: the "bottom-pair" problem, recognised as arising from the combination of the LCA and bare phrase structure since Chomsky 1994) or, as it stands, **labelled** (assuming X and Y are distinct categories);
- It is therefore inherently **unstable** and will crash at the interfaces.

**BUT** if only atomic syntactic elements are accessible to External Merge (the only assumption which does not implicitly sneak some syntax into the Lexicon or Numeration), **(3c) must be the first step of any and every derivation, call it "ignition".**

**The Marantz/Chomsky solution** (Marantz 1997, Chomsky 2013): one of X and Y, say Y, has no categorial feature, i.e. it's a Root, and X is a categoriser. So now we have:

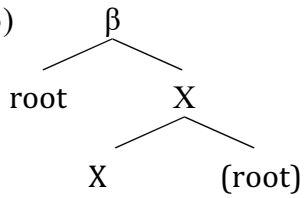
(2.2)




- (2.2) now has a label, but we still can't linearise since the lowest occurrence of X, namely $X^{min}$, and Root mutually c-command (NB on Kayne's category-based definition of c-command neither one asymmetrically c-commands the other and so they are equally unlinearisable).
- So one of them must move.

**Option 1: Move Y=root:**

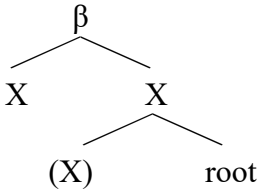
(2.3)




- here α is successfully labelled X and Y=root can be linearised as preceding X (because it asymmetrically c-commands X).
- β must be labelled X as Y=root has no categorial feature.[1]
- So $X^{min}$ is the head of β (= $X^{max}$) and Y=root is its complement.
- This is then effectively a case of rollup of the complement around the head.

**Option 2: Move $X^{min}$:**

(2.4)




- here X will label β again but this time the moved X asymmetrically c-commands Y=root and so is linearised as preceding it.
- Since $X^{min}$ moves, this counts as head-movement.

➔ Thus, the possible repairs of (2.1) give rise to rollup (option 1) and head-movement (option 2).

(2.5) **The second-Merge parameter (first pass):**
Move X (= head-movement → head-initial structure/order)
Move Y (= roll-up → head-final structure/order)

(2.6) The "emergentist" approach to parametric variation (Biberauer 2017, 2019, Biberauer & Roberts 2015, 2017, Roberts 2012): **parametric variation arises from the interaction of the three factors of language design** (Chomsky 2005).

(2.7) **Input Generalisation** (a third factor): for all operations O in grammar G, O applies whenever its structural description is met.

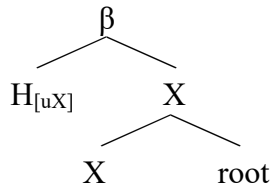
- All else equal, Input Generalisation will give rise to **fully harmonic[2] head-finality** as rollup generalises if the Y-option in (16) is taken, and to **fully harmonic head-initiality** as head-movement generalises if the X-option is taken.

[1] NB we have to partially abandon Kayne's definition of c-command here or, with β=X, Y=root won't c-command X and so linearization becomes impossible. If we adopt the simpler sisterhood+containment definition the required asymmetric relation emerges since an occurrence of X is contained in the sister of the root.

[2] By "harmonic" we mean that all head-complement pairs show the same linear order, regardless of category.

- **The typological question**: what stops IG from creating maximal head-initiality/finality everywhere, i.e. how can we account for disharmonic systems (which may be all systems: Dryer 1992, Biberauer & Sheehan 2013, Cinque 2013)?
- **Proposal**: the Move-X option is triggered by EM of a head H with a probing uX to (2.1), in relation to which X is a defective goal (i.e. has a subset of H's features; Roberts 2010). So replace (2.3) with:

(2.4)

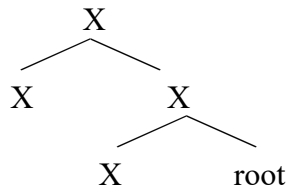



Let us adopt the following postulate:

(2.6) **Uninterpretable features (uF) cannot be labels.**

Then:

(2.7) X moves to $H_{[uX]}$ and β is labelled as X:




(2.8) **The second-Merge parameter (second pass):**
EM (of $H_{[uX]}$) → head-movement → head-initial structure/order.
IM (of Y) → roll-up → head-final structure/order.

**NB** there are no other options:

- ➔ Do nothing, and we have the unstable (2.1);
- ➔ Do both EM and IM: uneconomical/superfluous to repair requirements.
- ➔ The options can flip at any stage of the derivation, **giving the possibility of disharmonic orders** (final over initial or initial over final; FOFC follows from an independent locality condition on rollup).

**Possible typological consequence**: head-movement systems have richer probes, able to license defective goals by head-movement → rich functional structure in head-movement, i.e. head-initial systems. It has been observed that head-final languages tend to lack determiners (Sheehan 2013), that head-final relatives are always non-finite and lack relative pronouns (Hawkins 2004, Kayne 1994), etc. See also Ledgeway (2012) on head-final "XP-syntax" (Latin) vs head-initial "X-syntax" (Romance).

## 4. Generalized Dynamic Asymmetry (GDA).

From the above, the following conclusion can be derived:

(2.9) **On a par with [ $X^{\alpha max}$ $Y^{\alpha max}$ ], [ $X^{\alpha min}$ $Y^{\alpha min}$ ] are unstable**

GDA has many consequences, among others:

- → if an ergative-marked EA is frozen *in situ* → no SVO ergative languages, IA movement won't resolve the asymmetry (see (1.13)) (Mahajan's Generalisation).
- → GDA allows us to rethink A&A's *in-situ* generalization by considering the following possible derivational options:

(2.10) a. $[_{vP}$ (EA) $[_{VP}$ V IA ]] -- SVO (V-movement also an option)
b. $[_{vP}$ EA $[_{VP}$ (V) IA ]] -- this cannot be the correct analysis of VSO since symmetry is not broken by V-movement
c. $[_{vP}$ EA ($[_{VP}$ V IA ])] -- VOS/VSO (Massam 2001, etc)/free inversion (see above)
d. General rollup:
i. $[_{vP}$ EA $[_{VP}$ IA V (IA) ]]
ii. $[_{TP}$ $[_{vP}$ EA $[_{VP}$ IA V (IA) ]] T (vP) ] -- SOV
e. * $[_{vP}$ EA $[_{VP}$ V (IA) ]] -- see above

**Within a GDA approach, movement can be regarded as a repair strategy also related to the labelling algorithm and IG, by applying to the repair strategies associated to head-head symmetrical structures, gives rise to the main word-order types we observe.**

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