0. Introduction

A typical tree structure for the clause, as assumed around the mid-1980, for instance in Chomsky 1986 (also assumed, with very few modifications, in much main-stream minimalist literature):

(1)  
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CP
   Spec
      C
       IP
          DP
            I
               VP
                  DP
                    V
                      XP
```

Three zones in the syntactic tree, specialized in the expression of different elements of meaning. There is a division of labor between the structural layers that form the clause: the VP layer expresses properties of **argumental semantics** (who does what to whom, the thematic roles); the IP system expresses properties expressed by verbal inflections in the Indoeuropean (and other) languages, properties of **modality-tense-aspect semantics** as well as properties of the **case-agreement** system; the CP system expresses properties of **scope-discourse semantics**: illocutionary force, or clausal type (declarative, interrogative, exclamative, imperative, etc.), scope of operators, and discourse-related properties (topicality, focus,...).

(2) The splitting of the inflectional space, linked to a systematic syntacticisation of inflectional morphology and a new attention to adverb syntax (Pollock 1989 and much related work) determined a very fast growth of the assumed functional structure, leading to progressively more complex and richer representations.

(3) Cartographic studies identified the complexity of syntactic representations as an autonomous research topic: drawing maps as precise as possible of syntactic structures, and particularly of the functional structures, is an important endeavour worth pursuing on its own (Cinque & Rizzi 2010, Rizzi & Cinque 2016).

(4) The cartography of syntactic structures:
- each layer in (1) is an abbreviation for a much richer structural zone, involving a functional sequence, a sequence of elements drawn from the functional lexicon;
- the building block is always the same: a head projects into a phrase by taking complements and specifiers through recursive applications of the X-bar schema (or Merge);
- ... but the system of functional heads is much richer than previously thought. The functional lexicon is richer, and it gives rise to functional sequences which are relatively stable cross-linguistically.

1. Splitting the IP

Pollock (1989): IP can be split into finer components, each of which corresponds to a particular morphosyntactic feature. This gives a more transparent morphological analysis, and creates space for locating adverbials, thus permitting a more principled approach to adverbial and verbal syntax. In particular I can be split into T proper, the expression of tense, and Agr, the expression of agreement with the subject in person, number (and, in some languages, gender):

(2) a X ne X pas X complètement comprendre la théorie…
(to) not completely understand the theory…

b X ne X pas comprendre X complètement X la théorie…
(to) not completely understand X the theory…

c X Il ne comprend pas X complètement X la théorie
he understands not completely X the theory

d Ne comprend-il X pas X complètement X la théorie?
Understands he not completely X the theory?

(3) … T … Agr … V …

(3’) … Agr … T …. V …

(Pollock 1989)

(Belletti 1990)
(4) njuchi zi -na -wa -lum -a alenje (Chicewa)
   'bees AgrS-Past-AgrO-bite-ASP hunters’

(5) Parl-o parl-av-o parl-er-ò
    Parl-i parl-av-i parl-er(i)-i
    Parl-a parl-av-a parl-er-à

(6) Mirror Principle: the order of affixes in morphology reflects the order of syntactic heads and is the
    mirror image of it (the most internal affix is the lowest one in syntax) Baker (1988)

(7) … AgrS … T … AgrO … Asp …V

NB: AgrO never appears in the English verbal morphology. In Romance, it may appear as past
    participle agreement with the object, e.g., in clitic constructions:

(8)a Maria aveva comprato i libri
    ‘Maria had bought the books’

   b Maria li aveva comprati
    ‘Maria them had bought+AgrO

(9) Maria AgrS T V AgrO Asp V DP
    -a -ev- av- -i -t- compra-li

In formal French, agreement with the object takes place when the object is moved, e.g. in relatives:

(10)a J’ai repeint la chaise
    ‘I have repainted the chair’

   b Voilà la chaise que j’ai repeinte __
    ‘Here is the chair that I have repainted(fs) __’

Italian is more restricted: agreement is triggered only when the object is cliticized. If the object remains
    in situ (in object position), AgrO is not expressed. So, here we have an element of variation wrt
    Chicewa. Nevertheless, certain dialectal varieties, e.g., Salentino, have participial agreement with the
    object also when the object is not moved:

(11) T’ a lavate le mani (It: Ti sei lavato le mani)
    ‘You to-yourself have washed(fp) the hands’ (Calabrese 1984, Loporcaro 1998)

With unaccusative verbs (in some Romance languages), both AgrS and AgrO appear, agreeing with the
    same element:

(12) Gli amici sono arrivati
    ‘The friends have+AgrS arrived+AgrO
2. Cinque (1999)

(13) Cinque (1999) Properties of

- modality (possibility, necessity, obligation,…),

- tense (present, past, future),

- mood (indicative, subjunctive; realis, irrealis,…),

- aspect (refers to how a given event unfolds in time: perfect, progressive, habitual,…)

- voice (active, passive, middle,…)

may be expressed by different morphosyntactic means (adverbs, preverbal particles, affixes), but they reflect a hierarchy which is fundamentally uniform across languages.

(16) Cinque (1999): Languages fundamentally use three devices to overtly express the functional structure of the clause:

- particles (autonomous words) like modal will, can, etc
- affixes (attracting the verb) like -erà, -ato in Italian
- adverbs in specifier position.

The three devices are distinct manifestations of the same underlying hierarchy.

EVIDENTIAL MOD > EPISTEMIC MOD

(17)a Evidently, he probably was caught
   b * Probably, he evidently was caught

(18) Evidentemente, Gianni probabilmente ha deciso di partire
    * Probabilmente, Gianni evidentemente ha deciso di partire

(19) Ku pwun-i caphi - si - ess-ess - keyss - sup – ti - kka ? (Korean)
    ‘The person catchPASS AGR ANTPast EPIST AGR EVID Q
    ‘Did you feel that he had been caught? Was it evident to you that it was possible that…
    = evidently, he could have been caught’

(20) …. [ Spec1 EVID …. [Spec2 EPIST …

HABITUAL ASP > FREQUENTATIVE ASP

(21)a John is usually often obliged to stay home  (habitual > frequentative)
    b * John is often usually obliged to stay home  (frequentative > habitual)
(22)a Gianni abitualmente è spesso costretto a rimanere a casa
   b * Gianni spesso è abitualmente costretto a rimanere a casa

(23)a Yareba (Papuan): yau - r - edib - eb - a - su
   'sit CM FREQ HAB PRES 3ms' = he habitually repeatedly sits down
   b Rapanui (Austronesian): Pura varu tu’u mai a Nau
   ‘HAB FREQ come toward Pers. Sing Nau’

(24) …. [Spec1 HAB …. [Spec2 FREQ …

NB: Yareba also illustrates the ordering of affixes for aspect, tense, AgrS

(25) V+…AspFREQ+AspHab+T+AgrS

Which, under the mirror principle, illustrates the order of heads

(26) AgrS T … AspHab AspFreq … V

3. Cinque’s hierarchy of adverbials and functional heads

(29) Frankly > fortunately > allegedly > probably > once > then > perhaps > necessarily > possibly >
   willingly > inevitably > cleverly > usually> again > often > quickly > already > no longer > still
   > always > just > soon > briefly > characteristically > almost > completely > tutto > well >
   fast/early > completely > again > often

(30) [Frankly Moodspeech act [fortunately Moodevaluative [allegedly Moodevidential [probably Modepistemic
   [once T(Past) [then T(Future) [perhaps Moodirrealis [necessarily Modnecessity [possibly Modpossibility
   [willingly Modvolition [inevitability Modobligation [cleverly Modability/permission [usually Asphabitual [again
   Asp repetitivel(I) [often Asp frequentativel(I) [quickly Asp celerativel(I) [already T(Anterior) [no longer
   Aspterminativel(I) [still Aspcontinuous [always Aspperfect(?)] [just Aspretrospective [soon Asproximativel
   [briefly Asppreterminativel(I) [characteristically (?) ]? Aspgeneric/progressive [almost Asprospectivel(completely
   Asp completivel(I) [tutto Asp celerativel(II) [completely Asp completamente(I) [again Asp completivel(II) [often Asp
celerativel(II) …

(31) Da allora non hanno X_T di solito X_Hab mica X_Neg più X_Term sempre X_Cont completamente
   rimesso+X_Compl tutto *X_Q bene *X_Voice in ordine  (Cinque 1999)
4. Transitivity arguments for ordering

If A > C and C > B, even if A and B cannot co-occur, one may conclude that A > B: a transitivity argument.

(38)a  *Ils n’ont pas plus téléphoné  
      They haven’t not any longer telephoned 

b *Ils n’ont plus pas téléphoné  
      They haven’t any longer not telephoned

It could be that pas and plus compete for the same position; or that the cooccurrence is prohibited for some other reason. In the latter case, transitivity arguments can give evidence on the underlying order:

(39)a  Si tu n’as pas déjà mangé, tu peux le prendre  
      ‘If you have not already eaten, you can take it’ 

b * Si tu n’as déjà pas mangé, tu peux le prendre  
      ‘If you have already not eaten, you can take it’

(40)a  A l’époque, il ne possédait déjà plus rien  
      ‘At the time, he did not possess already any longer anything’ 

b * A l’époque, il ne possédait plus déjà rien  
      ‘At the time, he did not possess any longer already anything’

Through transitivity, pas > déjà, déjà > plus, therefore pas > plus. Independent evidence:

(41)a  *Ne dormir pas  

b   Ne pas dormir

(42)a  Ne dormir plus  

b   Ne plus dormir

(43)    [   [ pas   [ plus … dormir ]] ]

        *          OK

NB: this analysis requires that adverbials don’t simply pile up as adjuncts to projections in a fixed order: they must be specifiers of functional heads, which may be the target of verb movement.

Independent comparative evidence from Italian:

(44)a  Gianni non è mica più partito  
      ‘Gianni has not any longer left’ 

b * Gianni non è più mica partito  
      ‘Gianni has any longer not left’
Independent difference: both Italian and French are negative concord languages: multiple negative elements can cooccur with a single negative meaning

(45)a  Non dirò niente a nessuno  
       I will not say anything to anyone

b  Je ne dirai rien à personne

But in French, concord cannot include the clausal negation pas, whereas in Italian it can include the clausal negation non:

(46) * Je n’ai pas parlé à personne  
       I have not spoken to noone

Italian *Mica*, contrary to French *pas*, can cooccur with a negative element:

(47)a  non ho mica visto nessuno

b * Je n’ai pas vu personne

So the ordering constraint *mica* più is immediately observable in (44), whereas the ordering *pas* plus in French can be detected only indirectly, via a transitivity argument.

**Splitting the IP**

5. VP as vP+VP

(49) VP-internal subject hypothesis (Kuroda 1988, Koopman & Sportiche 1991)

(50)a Gianni ha visto Maria
     b ___ ha [Gianni visto Maria]
     c Gianni ha [ ___ visto Maria]

(51)a John will meet Mary
     ___ will [John meet Mary]
     c John will [ ___ meet Mary]

The VP-internal subject hypothesis permits a natural analysis of Q-float as Q-stranding (Sportiche 1988):

(52)a [ tutti [ gli amici]] hanno [ ___ visto Maria ]
     b [ gli amici ] hanno [ [ tutti ___ ] visto Maria ]

If the subject is merged in a predicate-internal position, and structures are binary, one needs more space within the predicate for tri-argumental verbs. This leads to a hierarchical analysis of the double object construction:

(53) Bill gave John a book

(55) [ Bill [ v [John [ V a book]]]] (Larson 1988)

i.e., something like “Bill MADE John POSSESS a book”, “Bill MADE every boy SEE his father”

Some binding evidence for this hierarchical structure:

(56)a Bill showed [every boy]; i [his; father]
            c * Bill showed [his; boy ] [every father]; (in the relevant interpretation: Barss & Lasnik 1988)

(57)a I showed Bill; himself;
            b * I showed himself; Bill;
6. The structure of the DP and Greenberg’s Universal 20

(60) Greenberg (1963) Universal 20: “When any or all of the items (demonstrative, numeral, and descriptive adjective) precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite.” (p. 87)

(61) Cinque (2005), based on Greenberg’s (1963) Universal 20:

a. Dem Num Adj N
   These three nice books
   (very common: Romance, Germanic,…)

b. * Adj Num Dem N
   Nice three these books
   (Not attested)

c. N Adj Num Dem
   books nice three these
   (very common: Cambodian, Javanese, Thai, Gungbe,…)

d. N Dem Num Adj
   books these three nice
   (rare: Kikuyu,…)

(62) A restatement of the universal:

1. when N is final, the order is always the same: Dem>Num>Adj>N

2. when N is initial, two options are found:
   a. The mirror image of 1.: N>Adj>Num>Dem (frequent)
   b. The same order as 1., except that N is initial: N>Dem>Num>Adj (rare)

These are the extreme cases. N can also be somewhere in the middle of the sequence, and in that case some of the a priori possible orders are frequent, some are rare, and some are not attested.

(63) [ Dem [ Num [ Adj NP ] ] ]
Cinque’s hypothesis: (63) is the initial order (the order of merge), and the engine to change the order is movement of the NP: if NP moves, it can take along other elements (an operation called “pied-piping”: Ross 1967), or not.

Analysis:
- Nothing moves from (63): (61)a is derived;
- NP moves to the Spec of the next higher head (Adj), and then it pied-pipes the whole AdjP to the Spec of Num, etc. This produced the reversal of ordering (snowballing movement): (61)c.
- NP moves to Spec Adj, and continues to move Spec to Spec without pied-piping any constituent: this produces the ordering in (61)d.
- (61)b is not derivable: if NP does not move, no reordering is allowed.

The frequency of (61)c compared to the rarity of (61)d suggests that movement with pied-piping is favoured in this particular context over movement without pied-piping.

That movement with pied piping is favoured over movement without in the nominal system is independently suggested by the necessity of pied-piping the whole nominal structure in many clear cases of further movement to the left periphery:

(67)a  [Which books] did you read __?
       b  * Which did you read [ __ books]?

(68)a  [How many books] did you read __?
       b  * How many did you read [ __ books]?

This preference for pied piping still is in need of a precise formal treatment, a point which we will not develop for the moment.
7. Why is N movement the engine?

One outstanding question is: why is N movement the engine of this system? Why should the nominal part move in the first place? I think a hint for an answer can be found in selection. A verb selects an object with certain semantic properties: for instance *eat* requires a concrete (and possibly edible) object:

(69)a  John eats apples  
     b # John eats ideas

These selectional properties hold across the functional structure of the DP:

(70)a  John wants to eat these three nice apples  
     b # John wants to eat these three nice ideas

So, the noun must somehow be accessible to the higher selector, across the functional structure. How can this be done? One simple solution is movement: N moves up, so that it becomes accessible to the higher selector, the V.

The alternative is that V may access N through a series of agreement relations:

(71) These three nice apples

A reflex of these relations is the morphological agreement in number between these and apples. The morphological reflex is even more visible in Romance, with agreement in gender and number throughout the DP:

(72) Queste tre belle mele  
     TheseF PL threeF PL niceF PL applesF PL

So, the N can be made accessible to a higher selector via a sequence of agreement relations, or by agreement and movement. Languages can choose one or the other device. There is an analogy between wh-movement languages and wh-in situ languages, the former implying agreement and movement, the latter implying simple agreement. Both options are illustrated by French:

(73)a  Qu tu as vu qui?  
     ‘Qu You saw who?’

     b Qui Qu tu as vu __?  
     ‘Who Qu you saw __?’

So, English opts for the agree only option, whereas Thai opts for the agree and movement option.
8. A more refined analysis

If one takes into account all the possible orders that Dem, Num, Adj, N can take, and not just N-final and N-initial, the picture gets more complicated.

There are a priori 24 orders of the four elements (factorial 4): some are attested and frequent, some are attested and rare (or very rare), some are not attested:

(74)

a. Dem Num A N F
b. Dem Num N A F
c. Dem N Num A R
d. N Dem Num A R
e. * Num Dem A N *
f. * Num Dem N A *
g. * Num N Dem A *
h. * N Num Dem A *
i. *A Dem Num N *
j. *A Dem N Num *
k. A N Dem Num R
l. N A Dem Num R
m. *Dem A Num N *
n. Dem A N Num R
o. Dem N A Num F
p. N Dem A Num R
q. *Num A Dem N *
r. Num A N Dem R
s. Num N A Dem R
t. N Num A Dem R
u. *A Num Dem N *
v. *A Num N Dem *
w. A N Num Dem R
x. N A Num Dem F

(75) External Merge order:

Dem Num A N
(76) N (or NP) movement is the engine which determines variations from the external merge order: there is no other way to reorder elements.

(77) Then, Three movement options:

 i. Movement with pied-piping of the whose picture type. This is unmarked: the Q feature is already on the Spec of the structure.

(78)a  You saw [whose\textsubscript{Q} picture] \rightarrow \text{Internal Merge}

 b  [Whose\textsubscript{Q} picture] did you see?

 ii. Movement with pied-piping of the Picture of whom type. This is marked: the Q feature is expressed on a lower element, so some operation must apply to copy the feature on the head of the moved unit:

(79)a  You saw [ the picture of whom\textsubscript{Q} ] \rightarrow \text{Operation}

 b  You saw [ the\textsubscript{Q} picture of whom\textsubscript{Q} ] \rightarrow \text{Internal Merge}

 c  ? [the\textsubscript{Q} picture of whom\textsubscript{Q} ] did you see ___?

 iii. Movement without pied-piping. This is marked when the moved phrase is of the same kind as the phrase containing it, e.g., a nominal expression, as in whose picture, which requires pied-piping in languages like English (while other languages, e.g., Slavic, allow the splitting in such case)s:

(80) a  You saw [whose\textsubscript{Q} picture] \rightarrow \text{Internal Merge}

 b  * Whose\textsubscript{Q} did you see [___ picture]

So the system offers a fine-grained analysis not only of the possible and impossible cases, but also of the more or less marked character of possible cases.