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The Cartography of Syntactic Structures: Locality and Freezing Effects on Movement *

Luigi Rizzi

1. Introduction

In this paper I address two fundamental topics of contemporary formal syntax: structures and movement. The two topics cannot be separated: movement takes place on syntactic structures, and at the same time it contributes to building them. In the first part of the paper I will focus on movement, identifying some properties of this process as they emerge from recent syntactic research. In particular, I will discuss how movement can be reduced in part, in recent versions of the Minimalist Program, to the fundamental structure-building operation, Merge. The analysis of the causes of movement will lead us to the criterial view of scope-discourse semantics, and to the cartographic projects.

Half a century of formal syntactic studies has brought to light the complexity and richness of syntactic structures. The cartography of syntactic structures is the line of research which addresses this topic: it is the attempt to draw maps as precise and detailed as possible of syntactic configurations. The cartographic projects started around the mid 1990's, as an attempt to provide fine descriptions of certain zones of the syntactic tree in some Romance and Germanic languages, but they immediately showed a universal dimension, and were quickly extended to many other language families.

In the central part of the paper I would like to illustrate some of the results of the cartographic studies in connection with the left periphery of the clause, and discuss the implications of this line of research for the Minimalist Program and for the study of the interfaces connecting syntax with the systems of sound

and meaning. In the last part I will show how cartographic maps of the left periphery interact with classical topics of syntactic research such as the theory of locality and the freezing effects.

2. Nature and Causes of Movement

Movement is the expression of a dependency between an element and a gap. For instance, in (1a) if we want to properly interpret the structure we must understand that the expression *which book* is a thematic argument of the verb *buy*, it must be interpreted as the patient of *buy*, whose canonical object position is empty. Such a dependency between a clause-initial element and an empty slot somewhere in the structure can hold at an indefinite distance, as in (1b):

(1)a. Which book did Mary want to buy ___ ?
b. What did you say .... John believed .... Mary wanted .... to buy ___ ?

We can give a very general characterisation of movement, or the displacement property, as is indicated in (2):

(2) Elements are often pronounced in positions different from the positions in which they are interpreted.

Or, perhaps more precisely, an element is often pronounced in a position different from the position in which it receives its role as a thematic argument: as we will see in a moment, also the final target position of movement is linked to special interpretive properties. Broadly construed in this way, movement is a constitutive property of natural language, no theory of language aiming at empirical adequacy can do away with the postulation of some mechanism to express this fundamental kind of dependency.

Recent research in syntax has highlighted some important properties of movement. Let us consider them in some detail.

(3) Some properties of movement:
a. Movement is more pervasive than previously thought;
b. Movement is generated by the fundamental structure-building operation, Merge;

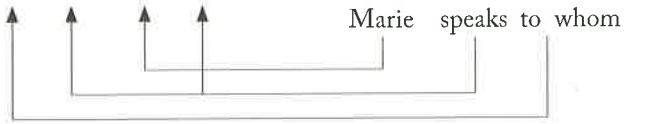
c. Movement is triggered, motivated by interface effects;
d. Movement is local and delimited.

As for the first, purely observational, property: in many linguistic structures everything seems to move. Consider for instance the derivation of a French sentence like the following:

(4) A qui parle Marie? (French)
'To whom speaks Marie?' = To whom does Marie speak?

Even under very weak assumptions, it appears to be inevitable to conclude that everything moves here from the initial thematic nucleus, the VP [Mary speaks to whom]. The thematic subject moves to subject position (Spec of I in this simplified representation) to pick up case (and possibly also for interpretive reasons: see the final part of the paper), the verb moves to the inflectional system and then to the complementizer system, the wh-phrase moves to the initial position:

(5) [___ C [___ I ..... [VP Marie parle à qui]]]
Marie speaks to whom



As a consequence we get a complete reversal of the word order (French is SVO), and the thematic nucleus is completely vacated. The state of affairs in which everything moves from its initial position turns out to be more and more common, as analyses get refined and sharpened.

The second property is a significant result of the Minimalist Program (Chomsky 1995 and much subsequent work). Minimalism assume that the fundamental structure building process is the simplest combinatorial rule one can imagine, Merge, which puts together two elements A and B to form the more complex element [A B]:

(6) Merge: A B → [A B] (Chomsky 1995)

Chomsky has observed that movement can be considered a particular case of Merge. We thus have two subcases: External Merge when A and B are

autonomous syntactic objects, for instance a verb and a noun taken from the lexicon and merged to form a verb phrase like [*meet Mary*]; and Internal Merge when A is taken from within B, and merged with it, as in (8):

(7) External merge: A and B are autonomous syntactic objects
Internal merge: A is taken from within B and merged with B
(Chomsky 2000)

(8) [B ... A ...] ➔ [A [B ... ___ ...]]

In fact, the notation in (8) is somewhat misleading as it suggests a different operation from (6). In fact, what varies is the preliminary search of the two elements undergoing Merge, and the search can indeed be external or internal; but once the two candidates are identified the same exact operation applies. So, we have a single operation, Merge, which puts together two elements identified through a search operation; search may be of two kinds, external or internal; internal search followed by merge is what is traditionally called movement.

The fact that movement is subsumed under Merge is important for many reasons. In his thesis, Joseph Emonds had observed that the core instances of movement are "structure preserving", which, in the terminology and formalism of the time, meant that transformations (like movement) create structures which can be independently generated by the phrase structure component (Emonds 1970, 1976). This discovery raised an interesting conceptual question: why is it that two distinct rule systems should converge to generate exactly the same structures? This consideration led many scholars to explore the possibility that movement transformations may be dispensed with as an independent rule system in favour of the fundamental structure-building mechanism. This is now fully achieved: movement is structure-preserving because it is a subcase of the fundamental structure building operation, Merge.

In what follows I give the simplified derivation of a wh-interrogative sentence in English. It starts with internal Merge creating the VP in which the verb and its thematic arguments are assembled (9c); then, after the modal is externally merged, the sequence of applications of Internal Merge starts, ultimately yielding the complete sentence (9g).

(9)a. say ➔ Ext. Merge
b. [say what] ➔ Ext. Merge
c. [Mary [say what]] ➔ Ext. Merge
d. [could [Mary [say what]]] ➔ Int. Merge
e. [Mary [could [___ [say what]]]] ➔ Ext. Merge
f. [C [Mary [could [___ [say what]]]]] ➔ Int. Merge
g. [could+C [Mary [___ [___ [say what]]]]] ➔ Int. Merge
h. [what [could+C [Mary [___ [___ [say ___]]]]]]

The third property (3c) deals with the teleological and mechanical causes of movement. The teleological cause, the reason of being of movement, is that it must produce a configuration useful for interpretation. This is sometimes expressed by an economy principle stating that there is no free, totally optional application of movement: movement (and in fact Merge more generally) must be justified by the fact that it must produce some relevant interpretive effect:

(10) Movement as last resort : Movement must determine some interface effect (Chomsky 1986, Reinhart 2006)

The feature-triggered character of movement is the mechanical counterpart of the teleological principle (10). We don't want to postulate an entity external to the step by step computation, a "homunculus" supervising derivations and throwing out those that globally fail to satisfy the last resort principle: so a mechanical implementation is needed to obtain the result without postulating an external supervisor. This is what feature-based mechanisms do, of the kind to be discussed in some detail in the following section.

Language is sound with meaning, and possessing a language is possessing the capacity to generate an infinity of sound-meaning pairs. In current models, the generative heart of the system is recursive syntax, basically reducing to recursive Merge in minimalist models, which can generate an infinity of structures which are transferred to the interfaces with the systems dealing with sound and meaning:

(11) PHON ← SYNTAX → SEM

Syntax is the generative heart of the system, the mechanism that makes it possible

to generate an infinity of potential messages, but it is also ancillary to the needs of the interface systems, a fact that is underscored by principle (10): syntax is there for the expression of complex meanings, utilizable for the articulation and communication of thought.

3. The Criterial Approach to Scope-Discourse Semantics

One should now be more specific about the nature of interpretive effects that may be expressed by movement, and which make movement legitimate under (10). For one important class of cases of movement, displacing elements to the initial periphery of the clauses, so-called A-bar (or A') movement chains, things are rather straightforward:

(12) A' chains are a way to associate two kinds of interpretive properties to elements: properties of *argumental semantics* (thematic positions for arguments and, more generally, S-selection positions), and properties of *scope-discourse semantics* (Chomsky 2004).

Consider some typical A'-constructions in English, such as the following clauses:

(13)a. Which book should you read ___?
b. This book, you should read ___
c. (It is) THIS BOOK (that) you should read ___ (rather than something else)
d. The book which you should read ___ is here
e. What a nice book I read ___!

It is intuitively clear what movement to the front does in these cases. In (13a) it dislocates an interrogative operator, the wh-phrase, in its proper scope position to yield the appropriate logical form "for which x, x a book, [you should read x]"; similarly, the moved element is interpreted as a relative operator (the book x such that [you should read x]) and as an exclamative operator (with a somewhat less straightforward logical form), respectively, in (13d) and (13e). So, in these cases the relevant syntactic element *which book*, etc. receives two interpretive properties: the argumental thematic role of patient of *read*, and the scope over the whole clause. Cases (13b) and c are slightly different: here the preposed

element receives the discourse-related property of topic or focus, respectively, a property relevant for the informational organisation of the structure, and its usability in discourse. Putting together all these cases under a synthetic label, we will follow Chomsky and call the interpretive properties associated to the initial position properties of "scope-discourse" semantics: the scope of operators and the discourse-related properties expressing the informational articulation of the structure. So, these cases of movement connect two positions: one dedicated to argumental semantics, the thematic role, or, more generally, the position in which an element is semantically selected (or S-selected: for instance, a time adverbial is S-selected by a T head, an aspectual adverbial is S-selected by the appropriate Asp head, etc., properties that are transparently expressed in the detailed cartography of the inflectional space in Cinque 1999); and one dedicated to scope-discourse semantics.

What does it mean that a position is "dedicated" to a certain interpretative property? In the case of argumental semantics this is straightforward: argumental roles are assigned by certain lexical heads, typically verbs, to their immediate dependents. So, the verb *read* assigns the role "patient" to its complement and the role "agent" to its specifier. As for scope-discourse semantics, I would like to assume an approach which generalizes the same basic mechanism to it: there is a dedicated system of functional heads, typically in the left periphery of the clause, which assigns to its dependents such properties as "scope of such and such type of operator", "topic", "focus", etc.. So the assignment of both kinds of interpretive properties is uniformly a matter of head-dependent relations. This is sometimes called the "criterial view" of scope-discourse semantics:

(14) The criterial view of scope-discourse-semantics: there is a system of dedicated heads signalling to the interface components the basic scope-discourse properties.
(Rizzi 1991, 1997, ed., 2004b, Cinque, ed. 2002, Belletti, ed. 2004c, 2009).

This amounts to saying that sentences (13) should have representations like the following, with heads such as Q, Top, etc., which attract the wh-operator, the topic, etc. to their specifier (in these representations I have expressed the gap left by movement as a full unpronounced copy of the moved phrase: this is the so-called "copy theory of traces", which I will adopt henceforth):

(15)a. Which book Q should you read <which book> ?
b. This book Top you should read <this book>
c. THIS BOOK Foc you should read <this book>
d. The book which R you should read <the book>
e. What a nice book Excl I read <what a nice book> !

In English these heads are silent, do not correspond to any overt morpheme (except for the fact that Q in main questions attracts the functional verb, in case of (15a) the modal, so that the position ends up being pronounced in this case).

There is straightforward comparative evidence which makes the hypothesis expressed by (15) immediately plausible: in many languages this system of left peripheral heads is pronounced, expressed by an overt particle:

(16)a. Ik weet niet [wie *of* [Jan ___ gezien heeft]]
(Dutch varieties, Haegeman 1994)
'I know not who Q Jan seen has'
b. Un sè [do [dan lo *yà* [Kofi hu ì]]]
(Gungbe, Aboh 2004)
'I heard that snake the Top Kofi killed it'
c. Un sè [do [dan lo *wè* [Kofi hu ___]]]
(Gungbe, Aboh 2004)
'I heard that snake the Foc Kofi killed'
d. Der Mantl [den *wo* [dea Hons ___ gfundn hot]]
(Bavarian, Bayer 1984)
'The coat which R the Hans found has'
e. Che bel libro che [ho letto ___] ! (Italian)
'What a nice book Excl I read'

(16a) shows that the Q head is overtly expressed as *of* in certain (non-standard) varieties of Dutch. The topic and focus heads are expressed by the particles *yà* and *wè*, respectively, in Gungbe. Relative clauses are marked in Bavarian by the special complementizer *wo*, homophonous to the wh-element for *where*, and which takes the relative operator in its Spec.

Each head of this system attracts an element endowed with a matching feature (Q, Top, Foc, etc.) to its Spec, to yield the criterial (Spec-head) configuration:

(17) XF and XP_F must be in a Spec-head configuration, for F = Q, R, Top, Foc, Excl,... (Rizzi 1991/96)

This is the syntactic content and role of the criterial heads. But such heads have another and equally important function: they are visible to the interface systems of sound and meaning to signal in a transparent manner the interpretive properties of scope-discourse configurations. So, for instance, the criterial head Top goes with an interpretive instruction of the following kind:

(18) [XP [Top YP]]
Topic Comment

i.e., "my Spec is to be interpreted as the topic, and my complement as the comment made about it", where a topic is a referent selected among those familiar from context, and about which a comment is predicated (with the possibility of further subspecifications, characterizing a possible family of topics). Similarly for the Foc head:

(19) [XP [Foc YP]]
Focus Presupposition

i.e., "my Spec is focus and my complement is the presupposition", where focus means that the relation borne by XP in the state of affairs expressed by the presupposition is new information, information assumed not to be shared by the interlocutor. Here too, there can be additional specifications which define different types of foci, for instance contrastive focus as opposed to simple new information focus. E.g., when I utter (13c), I assume non only that you know that you should read something (presupposition), and that the thing you should read is this book (new information), but also that this information falls outside what I assume to be your natural expectations, with which the new information I am giving is contrasted. Clearly, languages assign distinct focal properties to different positions, in ways that are parametrized in part. In Romance languages like Standard Italian, the clause-initial focal position is dedicated to contrastive focus, while in the Sicilian dialect and in the regional variety of Italian spoken in Sicily the initial focus can be used for simple new information focus (Cruschina 2008).

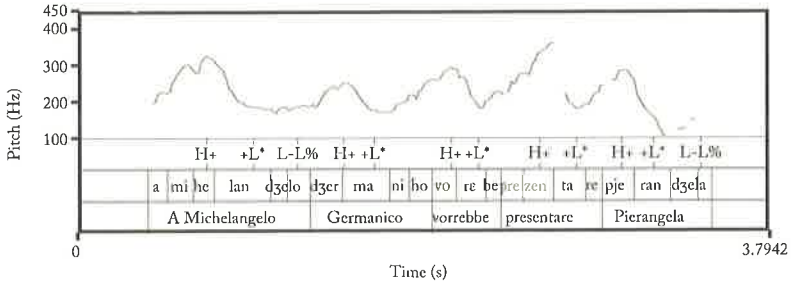
In many languages, topic and focus can co-occur, and they often do so in a fixed order, illustrated by the following Gungbe example:

(20) ...do Kofi *ya* gankpa me *we* kponon le su i do
'...that Kofi Top PRISON IN Foc policemen Pl shut him there'
(Gungbe: Aboh 2004)

Hence, cartographic issues arise at this point: we want to know what global configurations the left periphery of the clause can assume, and what properties remain constant across languages and what other properties are submitted to parametric variation. Let's us defer the discussion of these issues to the next section.

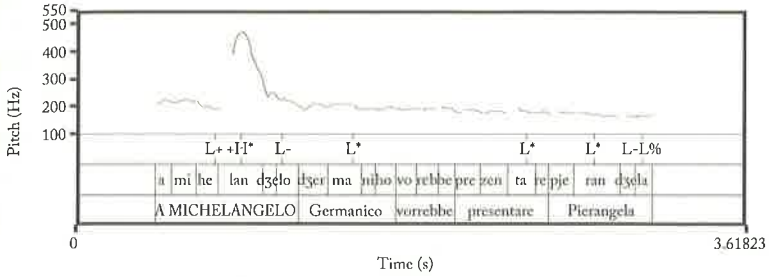
Criterial heads also guide the interpretation of the sentence at the interface with the sound system, much as they guide the interpretation at the interface with semantics and pragmatics. Consider for instance the careful experimental study of the pitch contour of Italian topic and focus constructions conducted by Bocci (2009):

(21) Pitch contour of Topic – Comment (from Bocci 2009)
A Michelangelo (Top), Germanico vorrebbe presentare Pierangela



'To Michelangelo (Top), Germanico would want to introduce Pierangela'

(22) Pitch contour of Focus – Presupposition (from Bocci 2009)
A MICHELANGELO (Foc) Germanico vorrebbe presentare Pierangela



'TO MICHELANGELO (Foc) Germanico would want to introduce Pierangela'

The pitch contour of topic and focus are distinct, and the contour of comment and presupposition are sharply different, with a complete flattening of the contour of the presupposition in (22), which contrasts with the highly articulated contour of the comment in (21). Again, we can think of the criterial heads as giving instructions to the prosodic component to yield the different types of contours associated with the different discourse functions, much as they do in the interpretive components on the meaning side, as in the model that Bocci (op. cit.) adopts and develops.

In conclusion, criterial heads have a syntactic function, attracting elements to the periphery of the clause, and interpretive functions on both interfaces with sound and meaning, triggering certain semantic-pragmatic routines expressing the informational organization of the clause, and the assignment of specific pitch contours which will make the relevant interpretive properties salient and immediately detectable from the speech signal.

This way of looking at the expression of scope-discourse properties has several advantages over imaginable alternatives.

On the one hand, rather than assuming a proliferation of different mechanisms, it assumes a uniform mechanism to hold across languages: scope-discourse properties are expressed by a system of dedicated functional heads acting upon their immediate dependents, much as thematic properties are expressed by a system of lexical heads acting upon their immediate dependents. The fundamental parametrisation has to do with whether such heads are overt, expressed

by pronounced morphemes, or not (essentially the same kind of trivial parametrisation which has been assumed for Case systems ever since the theory of syntactic Case in GB); there are of course other parameters of familiar kinds (overt or covert movement to the criterial heads, etc.), but the system dealing with the syntax-pragmatic interface can be assumed to be essentially uniform across languages.

On the other hand, movement to a topic or focus position is like other kinds of movement, internal merge triggered by certain morphosyntactic features, like object movement in passive, wh-movement, etc. There is no need to postulate a separate, special category of "prosodically driven" movement, hence no reason to enlarge the class of formal options admitted by Universal Grammar. And there is no need to postulate a direct link between intonational structure and pragmatics: the connection is fully mediated by syntax, as is the case for other properties of sound and meaning.

4. The Cartography of the Left Periphery

The observation that dedicated scope-discourse positions can co-occur, often in fixed orders as in (20), was one of the triggering factors of the cartographic projects. Around the mid-nineteen eighties the clausal structure was assumed to result from the hierarchical organisation of three X-bar layers headed by the verb, the inflection node, and the complementizer:

(23) [CP ... C ... [IP ... I ... [VP ... V ...]]] (Chomsky 1986)

But it soon became very clear that this picture was oversimplified. Structures like (20) show that more elements can co-occur in the left peripheral pre-subject position of the clause, and the rigidity of certain orders suggested that admitting the possibility of multiple adjunctions to the IP was not the right way to go, as a multiple adjunction analysis would typically predict free ordering (an assumption which in any event would be at odds with the existence of overt Top and Foc heads in languages like Gungbe). Similar consideration of word order, cooccurrence of different kinds of elements, and properties of the morpho-syntax had already led to the splitting of the I node into more elementary components (Pollock 1989, Belletti 1990). These considerations led to the conclusion that each layer of (23) is an abbreviation for a much richer structural zone. The cartography of syntactic

structures is the attempt to build detailed maps of each structural zone.

If the structural zones may be complex, the structural atoms are remarkably simple and uniform: the structures are built through successive applications of Merge, through which a head is combined with a complement and a specifier, thus projecting a phrase. If the fundamental geometry of the building block is always the same, the richness of the system is due to the richness of the inventory of functional heads: the functional heads are much more numerous than one would have assumed twenty years ago, and the possible functional structures are correspondingly more articulated.

(24) The cartography of syntactic structures:
- each layer in (23) is an abbreviation for a much richer structural zone;
- the building block is always the same: a head projects into a phrase by taking complements and specifiers through recursive applications of Merge;
- ... but the system of functional heads is much richer than previously thought.

Cartographic projects started with detailed descriptions of the IP and CP systems in some Romance and Germanic languages, but they quickly showed a general dimension, triggering much work on different language families: see, e.g., Rizzi (1997, 2004a-b), Belletti, (2004a-b, 2009), Poletto (2000), Laenzlinger (1998), Cinque (2002), Beninca' and Munaro (2008) on Romance, and Grewendorf (2003), Haegeman (1994) on Germanic; and then, Roberts (2004) on Celtic, Krapova & Cinque (2004) on Slavic, Puskas (2000) on Finno-Ugric, Shlonsky (2000) on Semitic, Frascarelli and Puglielli (2010) on Cushitic, Aboh (2004), Biloa (2012), Bassong (2010), Torrence (2012) on African languages, Durrleman (2008) on Creole, Jayaseelan (2008) on Dravidian, Tsai (2007), Paul (2005), Endo (2007), Saito (2010) on East Asian, Pearce (1999) on Austronesian, Speas & Tenny (2003) on American Indian, Legate (2002) on Australian aboriginal languages, in addition to much work in Romance and Germanic dialectology (e.g. Cruschina 2012), and on Classical languages and diachrony (Salvi 2005, Danckaert 2012, Benincà 2006, Franco 2009), etc. See Cinque & Rizzi 2010, Shlonsky 2010 for general overviews.

Going back to the CP system, it appears to be delimited by two functional heads, Force and Finiteness, which define a space within which different operators and other positions dedicated to scope-discourse interpretive properties can be hosted. In some languages the overt complementizer, the element translated

as *that*, lexicalizes the higher head, Force, as in English (25); in other languages it lexicalizes Fin, and follows the string of left peripheral positions, as in Irish (26a); in other languages both positions are lexicalized by two distinct particles, with scope-discourse positions sandwiched in between, as in Welsh (26b):

(25) It is likely [*that* in a few days [they will leave]] (English)

(26)a. Is doíche [faoi cheann cúpla lá *go* [bhféadfaí imeacht]]
'Is probable at-the-end-of couple day that they could leave'
(Irish: McCloskey 2002)

b. Dywedais i [*mai* 'r dynion fel arfer *a* [werthith y ci]]
'Said I C the men as usual C will-sell the dog'
(Welsh: Roberts 2004)

Some crucial properties of the organisation of the initial periphery in Italian are illustrated by the following examples:

(27)a. Credo che, a Gianni Top QUESTO Foc , domani Mod gli dovreste dire, non qualcos'altro
'I believe that to Gianni THIS tomorrow you should say, not something else'

b. A Gianni Top, che cosa Foc possono dire?
'To Gianni, what can they say?

c. *A GIANNI che cosa possono dire, non a Piero
'TO GIANNI what can they say, not to Piero'

d.? Mi domandavo A GIANNI Foc che cosa Q potessero dire, non a Piero
'I wondered TO GIANNI what they could say, not to Piero'

e A Gianni, perché Int proprio QUESTO Foc gli hai dovuto dire?
'To Gianni, why exactly THIS you had to say?'

(27a) illustrates the occurrence of dedicated positions for topic, focus, and highlighted adverbials, the latter position being expressed by the Mod(ifier) head. (27c) shows that a wh-element and a focus cannot co-occur in main clauses, which suggests that they may compete for the same position; on the other hand a topic and a wh-element (or any other focal element) can co-occur, as (27b) shows. (27d) shows that embedded clauses differ from main clauses in that a focus and a wh-element can co-occur (at least marginally). (27e) shows that the wh-element corresponding to "why" (*perché*) differs from the other wh-elements in that it can co-occur with a lower focus position also in main clauses (and with a higher topic, as in the example), so that it appears to occur in the specifier of a higher special position, Int(errogative), higher than Foc, the position also hosting the interrogative complementizers introducing embedded yes/no questions (*if* in English). These and many other similar considerations lead to a map of the left periphery for Italian roughly like the following:

(28) ... Force ... Top ... Int ... Foc ... Mod ... Q ... Fin ...
(Rizzi 1997, 2004a)

5. On the Form of Chains: Locality and Delimitation

The backbone of A-bar chains (and perhaps also of at least certain kinds of A-chains targeting the subject position: see below) thus consists of the two interpretively relevant positions expressing S-selection and Scope-discourse (or criterial) properties:

(29) ..... $\_\_ X_{Crit}$ ..... $\_\_ X_{S\text{-}sel}$ .....
S-selectional position: dedicated to the assignment of theta roles, the assignment of modification properties and other interpretive properties of adverbials of various kinds, etc.
Criterial position: dedicated to the assignment of operator scope, and discourse-related properties like topic, focus, specificity, new/old information, etc. We may then ask questions about the general shape of the chain: can any other position occur? In particular:

(30) Three questions on the form of A' chains:
a. Is there any position lower than the s-selection position?
b. Is there any intermediate position in between criterial and s-selection positions?
c. Is there any position higher than the criterial position?

i.e., can a chain include positions like t', t", t'", in addition to the two positions

relevant for the interpretive systems?

(31) …*t'"…*t'"… ___ X_{Crit} …t"…t"… ___ $X_{S\text{-}sel}$ …*t'…*t'…

There is very strong and diverse evidence for the existence of positions like t", intermediate in between the S-selectional and criterial position. A very straightforward kind of evidence is provided by systems in which such intermediate traces are in fact pronounced, as certain varieties of colloquial German:

(32) Colloquial Adult German varieties with copy-movement, providing evidence for local successive movement steps: (Felser 2001)
Wen glaubst du [wen sie getroffen hat]?
'Whom believe you whom she met has?'
'Who do you believe she has met?'

Children typically use this trace-spell out strategy, as shown by many elicitation experiments, for instance in child English. Presumably, the pronunciation of the trace has the effect of "refreshing" the dependency, thus alleviating the burden which is put on operative memory by long-distance dependencies:

(33) Child English: a. What do you think [what's in the box]? (AJ, 5;4, from Thornton 1995)
b. Who do you think [who's under there]?
c. How do you think [how the witch went over to the hot-dog]?
d. When do you think [when the girl crossed the street]?

Anyway, the cross-linguistic evidence for the existence of intermediate positions in between the S-selection and the criterial position is diversified and compelling. Intermediate positions clearly arise in natural language computations. This is a consequence of locality: movement (internal merge) must obey strict locality principles (intervention locality, like Relativized Minimality, Rizzi 1990, 2004, and impenetrability locality, like the Phase Impenetrability Condition, Chomsky 2001), and there is no guarantee that the criterial position can be reached from the S-selectional position in a single movement step: an indefinite amount of structure can be covered by movement, but only through a succession of steps,

each of which respects locality. Therefore, there can be an indefinitely large number of intermediate traces t" connecting the two interpreted positions in (31).

If the answer to question (30)b is definitely positive, the answers to questions (30a) and c appear to be negative: no position lower than the S-selectional position (t') or higher than the criterial position (t'") seems to be allowed, so that the two interpreted positions appear to delimit the movement chain.

6. Criterial and S-selectional Positions Delimit Chains. (Rizzi 2006)

As for the lower delimitation, the following property appears to hold:

(34) An element cannot be externally merged in a lower position to satisfy some interpretive or formal requirement, and then "pick up" an S-selectional property through movement.

This is illustrated, for instance, by the fact that a reflexive action cannot be expressed by moving an element from the thematic object to the thematic subject position, as in (35b): thematic roles can't be picked up via movement, and a special anaphoric element, like a reflexive, is required to express reflexivity:

(35)a. John criticized himself.
b. *John criticized ____ .

Analogously, an element such as a temporal adverbial cannot be merged in the lower C system to fulfil the formal Verb Second requirement in a language like German (feature +F (36c), and then be moved to pick up the temporal reference in the main clause: a sentence like (36b), with embedded verb Second only allows the lower construal of the temporal wh-adverbial *wann*, hence it is S-selected by the T of the lower clause, and from this position it can move satisfying the verb second requirement. Again, an S-selectional (in this case temporal) property can't be picked up via movement:

(36)a. Wann hat Maria gesagt, dass Peter weggegangen war? (German, ambiguous)
'When has Maria said that Peter left had?'

b. Wann hat Maria gesagt, ___ war Peter weggegangen?
(not amb., only lower construal)
'When has Maria said had Peter left?'
c. ___ C+F [Peter wann weggegangen war]
Peter when left had

This property can be expressed by the following principle of lower delimitation:

(37) S-selectional Merge: S-selection is fulfilled by external merge.

As for higher delimitation, it is a well-known fact that a wh-phrase satisfying the Q-criterion of an embedded question cannot be further moved to the main C-system:

(38)a. Bill wonders [which book Q [she read ___]]
b. *Which book Q does Bill wonder [___ Q [she read ___]] ? (Lasnik & Saito 1992)

This appears to motivate a freezing principle like the following:

(39) Criterial Freezing: An XP meeting a criterion is frozen in place

One could observe that (38b) may not lead to a properly interpretable logical form, which would make the postulating of a syntactic freezing principle unnecessary. But more complex cases show that a syntactic principle is needed, e.g., when two distinct criterial features are expressed in the same complex phrase, e.g. [*quale+Q libro di Gianni+Foc*] ([which+Q book by Gianni+Foc]). Once the complex phrase satisfies the Q-criterion in the embedded interrogative, as in (40), the focus feature on *Gianni* can still trigger focal movement to the left periphery of the main clause, e.g. in the cleft construction. The PP can be subextracted from the complex wh-phrase, as in (41a), or the whole indirect clause can be pied-piped and clefted, as in (41c), but the complex wh-phrase cannot be further moved as such, as in (41b).

(40) Maria non sa ancora [[*quale libro* [*di Gianni*]] Q sia stato pubblicato]
'Maria doesn't know yet which book by Gianni has been published'

(41)a. E' [*di Gianni*] che Maria non sa ancora [[*quale libro* ___] Q sia stato pubblicato]
'It is by Gianni that Maria doesn't know yet which book has been published'
b. *E' [*quale libro* [*di Gianni*]] che Maria non sa ancora [___ Q sia stato pubblicato]
'It is which book by Gianni that Maria doesn't know yet has been published'
c. E' [[*quale libro* [*di Gianni*]] Q sia stato pubblicato] che Maria non sa ancora ___
'It is which book by Gianni has been published that Maria desn't know yet'

This is the effect of the freezing principle (39): further movement can involve less than a complex phrase satisfying a criterion (subextraction), or more than the complex phrase (heavy pied-piping), but not exactly the wh phrase which already satisfies a criterion, as in (41b). So, under principle (39), the first criterial position which is encountered delimits the chain upwards: further movement is precluded, and the criterial configuration thus obtained is immediately handed over to the interface systems for interpretation.

7. A Criterial Approach to the EPP

According to the classical GB approach the Extended Projection Principle (EPP) expresses the requirement that clauses must have a subject position, independently from the thematic properties of the predicate:

(42) EPP: Clauses must have subjects. (Chomsky 1981)

Under the VP-internal Subject Hypothesis (Kuroda 1988, Sportiche 1988), it is always the case that the thematic subject moves to the EPP position:

(43) Mary will [___ meet Bill]

This raises the question of what triggers this systematic application of internal merge in compliance with the last resort maxim (10):

(44) What justifies movement to subject position in compliance with (10)?
i. requirements of the Case-agreement system, hence the syntax-morphology interface;
ii. interpretive requirements, hence the syntax-CI interface (Subject Criterion)

A traditional answer is (44i): an element moves to subject position to satisfy properties of the Case-agreement system, i.e., to check a Case feature on the subject and the agreement features on the inflectional system.

One immediate problem with this approach is the widespread existence across languages of "quirky subject" constructions, in which a nominal with some inherent case (dative, genitive, inherent accusative,...) appears in subject position without entering into properties of the Case-agreement system, as the verb agrees with (and checks nominative case on) the other nominal remaining in predicate internal position, e.g., in Italian examples like (45):

(45) A Gianni piacciono queste idee
'To Gianni please these ideas'

That the dative indeed is in subject position in (45), and not in topic position, is suggested by the fact that its presence does not affect the extractability of the other argument, as in (46a), while topicalized datives determine at least a slight degradation of extraction (as in (46b)):

(46)a. Le idee che a Gianni piacciono di più sono queste
'The ideas that to Gianni please most are these
b. ?(?) Le idee che a Gianni Maria raccomanda sono queste
'The ideas that to Gianni Maria recommends are these'

This leaves open option (44ii): perhaps the thematic subject moves to the clausal subject position to express some interpretive property which the subject position is dedicated to; i.e., there could be a Subject Criterion triggering movement. Now, what could be the interpretive element associated to the subject position? Consider the following:

(47) The interpretive counterpart of subjecthood: an argument is selected and taken as the starting point in the description of the event, which is presented as "being about" that argument.

An event is typically presented as being "about" a particular argument. In this sense, an active and a passive sentence, quite independently from other possible differences in informational structure (e.g., in "all new" contexts like the one created by a question like (48A)), differ in the choice of the argument "about which" the event is presented: the agent in B, and the patient in B'

(48)A : Che cosa è successo ?
'What happened ?'
B : Un camion ha tamponato un autobus
'A truck bumped into a bus'
B': Un autobus è stato tamponato da un camion
'A bus was bumped into by a truck'

This choice has consequences for the overall discourse structure. For instance, it influences possible anaphoric options: in languages like Italian, a *pro* subject typically picks up a previous subject of predication. I.e., if (49) is uttered immediately after (48B), the interpretation is that the truck left, while the bus is understood to have left if (49) follows (48B'):

(49) ... poi ___ è ripartito
(after (48B): the truck left. After (41B'): the bus left)
'... then ___ left'
(Calabrese 1986: *pro* picks out the referent of the subject of predication)

So, subjects express aboutness. As such, they share an important property with topics, which also express aboutness: the comment is about the selected topic. But topics also involve familiarity of the referent, expressed by D-linking, whereas subjects do not require any such presupposed familiarity: a subject can very well be new information, as in examples (48B, B'). We thus have:

(50) Top: [+ aboutness]
[+ D-linking]
(51) Subj: [+ aboutness]

We may assume that the canonical subject (or EPP) position is the Spec position of a functional head, which will be called Subj here, which is part of the functional backbone of the clause, much as T, and higher than T and immediately lower to the CP system, starting with Fin and its projection. We thus have:

(52) Properties of Subj:
a. ... Fin ... Subj ... T ..... (Cardinaletti 2004, etc.).
b. Subj is [+D] head which attracts a nominal [+N] element to its Spec.

Subj attracts a nominal expression (typically the closest one, the thematic subject), and then it triggers the aboutness interpretation related to the subject position. That Subj may be a D-like element attracting a nominal expression is suggested by certain systems such as many Northern Italian Dialects, in which a D-like element (homophonous to a definite determiner) in fact occurs in between the subject position and the predicate beginning with the inflected verb.

(53) Le ragazze le son venute (NID, Brandi & Cordin 1989, Poletto 2000, Manzini & Savoia 2005)
'The girls Scl have+3pl come'

So, this kind of subject clitic may be an overt realisation of the Subj head. That a D-like element may attract a nominal element is a well-documented property of the nominal systems, which often instantiate processes of N (or NP) to D movement. The speculation here is that the special D-like element which is part of the clausal backbone capitalizes on this formal property of D to attract a nominal expression to its Spec, and thus create the subject-predicate articulation.

8. Subject-Object Asymmetries: ECP Effects as Criterial Freezing (Rizzi & Shlonsky 2007)

The combined effect of the Subject Criterion and Criterial Freezing thus provides an explanation for the well-known subject-object asymmetries in extraction processes, instantiated by the that-trace effect in English:

(54)a. *Who do you think [that [___ Subj will come]]?
b. Who do you think [that [Mary Subj will meet ___]]?

The traditional analysis involves the Empty Category Principle (ECP), requiring a certain type of government relation to be satisfies by traces:

(55) ECP : t must be properly head-governed (Chomsky 1981, Rizzi 1990)

But the ECP is not easily compatible with the Minimalist Program, as it does not have a natural status within the principled typology of UG principles assumed by minimalism (it is neither an obvious economy principle, nor a principle enforced by some natural interface requirement).

The system we have proposed provides a simple alternative to an ECP-based analysis of subject object asymmetries. If there is a Subject Criterion, further movement of the subject will be generally blocked by Criterial Freezing. So, in (54a), once *who* has moved to Spec-Subj to satisfy the Subject Criterion it will be stuck there, and will be disallowed to moved further and undergo extraction by Criterial Freezing:

(56) Subject extraction is blocked by Criterial Freezing

There is empirical evidence that this alternative approach is more satisfactory than an ECP approach. On the one hand the ECP approach does not offer a natural analysis of the *for* – trace effect, the fact that a subject is not extractable across the prepositional complementizer *for*:

(57)a. *Who would you prefer [for [___ to win]]?
b. Who do you work for ___?
c. *Who would you prefer [for [___ Subj to win]]?

It is hard to see how the subject trace could fail to be properly governed by complementizer *for*, particularly in view of the fact that the minimally different preposition *for* licenses extraction, as in (57b). In terms of the alternative envisaged here the ill-formedness of (57c) is straightforward: *for* is a member of the C-system (presumably a realisation of Fin: Rizzi 1997), so the whole IP system will be developed under it, including the SubjP layer. Then (57b) involves further movement of an element which satisfies the Subject Criterion, which determines a violation of Criterial Freezing, much as in the that – trace configuration in (54a).

Not only is an ECP account of the asymmetries too weak because of the *for*-trace effect. It is also too strong for cases like the following. (58a) illustrates the expected *que* – trace effect in French; but as the marginal acceptability of (58b) shows, the wh-specifier of the subject can be subextracted, at least at a marginal level. Now, if the subject position is not properly head-governed, a fortiori the specifier of the subject will not be. One would then expect equal ungrammatical status for (58)a-b, contrary to fact.

(58)a. *Combien de personnes veux-tu [que [___ Subj viennent à ton anniversaire]] ?
'How many people do you want that come to your birthday ?'
b.? Combien veux-tu que [[___ de personnes] Subj viennent à ton anniversaire]] ?
'How many do you want that of people come to your birthday ?'
(Obenauer 1976, Kayne 1994, thanks to P. Hirshbühler)

Again, this asymmetry follows from the Criterial Freezing approach. (58a) is a straight violation of this principle. As for (58b), it illustrates subextraction from a phrase meeting a Criterion, a process which does not violated the freezing effect and is permissible if subextraction does not violate independent locality constraints. So, the freezing approach is empirically more adequate with respect to an ECP approach.

Subject extraction is notoriously harder than object extraction across languages, but it is not banned altogether. Languages normally invent strategy to make it possible to form a question or other A-bar constructions on an embedded subject (Rizzi & Shlonsky 2007). One typical such strategy is what Rizzi and Shlonsky (op. cit.) call a skipping strategy: the language uses an expletive-like element to formally satisfy the Subject Criterion, and this allows the thematic subject to escape the freezing effect and remain accessible to extraction. A systematic utilisation of the skipping strategy is observed in Null Subject Languages. Consider the following comparative generalisation:

(59) A typological property: Null Subject Languages are not sensitive to that-trace effects
(Perlmutter 1970, Rizzi 1982, 1990, Nicolis 2005).

In fact, sentences like (60a) are fully acceptable in Null Subject Languages like Italian, Spanish, Rumanian, etc. In my work on the Null Subject Parameter from the early 1980's, I proposed that subject extraction in these languages always proceeds from a lower position, while the canonical subject position (the EPP position) is filled by an expletive occurrence of the null pronoun *pro*. Hence (60a) has a representation like (60b).

(60)a. Chi credi che verrà? (Rizzi 1982, 1990)
'Who do you think that will come?'
b. Chi credi [che [*pro* verrà ___]]?
'Who do you think that will come?'
c. Chi credi [che [*pro* Subj verrà ___]]?
'Who do you think that will come?'

In the original analysis, *pro* offered a device to avoid leaving a trace in a non-properly governed position like the subject position, hence in an illegitimate position according to the ECP. The analysis can now be immediately transposed to the Criterial Freezing approach. The representation is (60c), and *pro* formally satisfies the Subject Criterion and is frozen there, thus making the thematic subject accessible to extraction from a lower, non-Criterial position. This is just one device that languages may use to satisfy the Subject Criterion without having to move the thematic subject to the freezing position. See Endo (2007) on the role of certain clause final particles in Japanese, and the discussion in Miyagawa (2004) on ways of satisfying the EPP.

Menuzzi (2000) recently offered a new empirical argument for this kind of approach. In Brazilian Portuguese , wh-phrases can launch floating quantifiers. Now, the floating Q can be left in a lower position, as in (61a-b), but not in the EPP position, as in (61c). Under Sportiche's (1988) classical approach to Q-float, this suggests that lower positions, but not the EPP position can function as launching positions for subject extraction:

(61)a. Que rapazes o Paulo desconfia que tenham beijado *todos* a Maria?
'Which boys Paulo suspects that have kissed *all* Maria?'
b. Que rapazes o Paulo desconfia que tenham *todos* beijado a Maria?
'Which boys Paulo suspects that have *all* kissed Maria?'
c. *Que rapazes o Paulo desconfia que *todos* tenham beijado a Maria?

'Which boys Paulo suspects that *all* have kissed Maria?'

This is expected under the approach presented here: in (61a-b) the Subject Criterion is formally satisfied by expletive *pro* (which is available in Brazilian Portuguese, a semi-Null Subject Language), and subject extraction proceeds from a lower position. In (61c), the position of the floating Q shows that the subject has been extracted from the Criterial position, an option which is correctly ruled out by Criterial Freezing.

9. Concluding Remarks

Movement and structures interact in profound ways in natural language syntax. This is not surprising if movement is not an independent formal process, but a subcase of the fundamental structure-building operation, Merge. Movement interacts with structures in the sense that it is triggered by properties of structurally expressed positions, syntactic heads. We have looked at one particular kind of movement, the kind which associates two types of interpretive properties to expressions: properties of semantic selection (thematic properties for arguments) and properties of scope-discourse semantics. We have adopted the criterial view of scope-discourse semantics, which traces back the assignment of discourse and informational functions to familiar syntactic ingredients, head-dependent relations, and we have seen how this view naturally leads to the study of the cartography of syntactic structures, the study of the complex syntactic configurations created by a simple computational system, based on recursive Merge. Finally, we have looked at the system of constraints that movement must obey. Movement is local, hence it is constrained to apply on small portions of structures; but it can iterate, as a consequence of the recursive nature of Merge, hence it can cover an indefinite amount of structure through the iteration of its application. Movement is also delimited, in the sense that it must start and finish in particular structural positions: in fact the positions dedicated to particular interpretive properties have the effect of delimiting the movement chains. Delimitation is a new chapter of the classical topic of locality. By assuming principles of upward delimitation, or freezing, we can explore new generalizations, and envisage novel explanatory accounts for much-studied phenomena, such as the classical subject-object asymmetries in extraction processes.

Note

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