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Syntactic cartography and the syntacticisation of scope-discourse semantics

1. Introduction.

The cartography of syntactic structures is a program which aims at drawing maps as precise and complete as possible of syntactic configurations. Cartographic studies over more than a decade have brought to light the complexity of the structure of sentences and phrases, but also the simplicity of the underlying generative mechanisms: complex representations arise from the recursive application of a very elementary combinatorial procedure ("Merge" in Minimalist terminology: Chomsky 1995) operating on the substantive lexicon (nouns, verbs, adjectives,…) and on a very rich functional lexicon (see Belletti 2004, 2009, Cinque 1999, 2002, Rizzi 1997, 2004a-b, and, for recent assessments of the cartographic projects, Cinque & Rizzi 2010, Shlonsky 2010).

While technical details of cartographic representations may look remote from the philosopher's preoccupations, the interface between syntax and interpretation, and, more generally, the systematic relation between form and meaning, is not (Mulligan 1987, 2006). So, in this paper I will concentrate on the role that cartographic representations have in the expression of interpretive properties and, in particular, in the organization of informational structures for the proper articulation of discourse and dialogues, and in the assignment of scope to operators.

I will first illustrate the duality of semantic properties that natural languages express, and the division of labor between the fundamental computational mechanisms used for their expression. I will then illustrate the criterial approach to scope-discourse semantics, an approach which implies fully transparent syntactically generated interfaces with interpretive systems, and thus is sometimes said to "syntacticize" the expression of such interpretive properties. I will then compare this approach to possible alternatives which involve more opaque interfaces and assume more complex computations in post-syntactic interpretive systems.

2. Two types of semantic properties and their expression in syntactic representations.

The interpretation of natural language expressions revolves around two broad kinds of interpretive properties:

1. Properties of argumental semantics: who does what to whom in the event referred to by a sentence, what thematic roles are expressed, etc.

2. Properties of scope-discourse semantics: the scope of operators and the expression of discourse-related properties linked to the informational organization of the sentence, such as topicality and focus.

To illustrate the first kind, consider the following sentences:

(1)a. It was raining

b. John left

c. John saw Mary

d. John gave a book to Mary

Each verb expresses a kind of event which can be depicted as a little scene involving a certain number of participants: 0 in (1)a (the subject pronoun is not referential here, it is just a place holder to satisfy the formal requirement that all sentences must have a subject: Rizzi 2006, Rizzi & Shlonsky 2007 and much related literature), 1 in (1)b, 2 in (1)c, 3 in (1)d. This is the argument structure of the verb, expressing who does what to whom. The roles of participants can be further differentiated by certain qualitative labels, the thematic roles: so John is the agent in (1)d, the participant who causes the event acting according to a conscious plan, and the experiencer in (1)c, the participant who undergoes a certain perceptive of psychological experience; Mary is the patient in (1)c (or, in other terminologies, the theme) and the goal in (1)d, etc.

Consider now the following sentences, with (2)b-c obtained from (2)a through some formal manipulations that I will go back to:

(2)a. John gave your book to Mary

b. Your book, John gave ___ to Mary

c. It is your book that John gave ___ to Mary.

These sentences share the same argument structure: there is an event of giving involving three participants, John, your book and Mary. In particular, the phrase *your book* has the same argumental status, it is the patient of *give* in the three cases. But the very same expression has different informational properties in the three cases. Such properties can be highlighted by creating little discourse contexts which enforce a particular organization of the information that is exchanged by the participants in the dialogue. *Your book* is naturally interpreted as part of the new information expressed by the predicate in (2)a, i.e., (2)a could be appropriately used to answer a question like (3):

(3)Q: What did John do? (And Bill?)

A: John gave your book to Mary (as for Bill, I don't know what he did)

(the contrast John / Bill is introduced here to make fully natural the reiteration of *John* as the subject of (2)a: if there was no such contrast, the natural choice would be to use a pronominal subject: *He gave your book to Mary*; if a contrast is present, it is natural to reiterate the proper name as a kind of contrastive topic.)

In (2)b, *your book* is interpreted as the topic of the sentence, taking up and making salient a referent already given in the discourse. So, (2)b could appropriately answer a question like (4), which introduces a certain book in the discourse context (again, the contrast is introduced to make the overt expression of the topic in the answer non-redundant):

(4)Q What did John do with my book? (and with Bill's?)

A: Your book, John gave ___ to Mary (as for Bill's book, I don't know)

A natural interpretation of the cleft construction in (2)c is that *your book* is the contrastive focus, correcting an assumption that the speaker imputes to the hearer, for instance because the latter just expressed it (on the syntax and interpretation of clefts see Belletti 2008 and references quoted there). Consider for instance the following dialogue between speakers A and B:

(5)A: I know that John gave Peter's book to Mary…

B: (no,) it's your book that John gave to Mary (, not Peter's)

Here speaker B corrects speaker A by uttering (2)c, possibly making the contrast explicit through the negative tag.

So, the same phrase, always holding the same argumental role, can assume very different informational roles and function differently in discourse depending on the position in which it is pronounced.

In addition to expressing distinct informational properties, the patient of *give* can acquire operator-like status in other constructions in which it does not appear in its canonical thematic position after the verb, but is dislocated to the front in relatives or interrogatives (or other left peripheral constructions):

(6)a. The book that John gave ___ to Mary (is very nice)

b. Which book did John give ___ to Mary?

These sentences will have logical forms roughly like the following:

(7)a. The unique entity x, x a book, such that John gave x to Mary (is very nice)

b. For which x, x a book, John gave x to Mary?

(where uniqueness in (6)a is of course restricted to the relevant books in the discourse context).

In conclusion: an element bearing a particular role of argumental semantics can assume different discourse or operator functions which typically correspond to particular positions in the clausal structure. These are the properties that Chomsky (2000, 2004) calls "properties of scope-discourse semantics", and which I will refer to later on with the technical term "criterial properties". How can the properties of argumental and scope-discourse (criterial) semantics be expressed formally?

3. Merge and Move.

Words are strung together to form phrases which are hierarchically organized. So, for instance, in

(8) John will give a book to Mary

[A book] and *[to Mary]* form phrases which can be manipulated as units (for instance, can be focused in the cleft construction: *It is [a book] that John will give ___ to Mary, It is[to Mary] that John will give a book* ___), while *give a* and *Mary to* do not form phrasal units. There must be an

algorithm building the hierarchical structure of the sentence, an algorithm endowed with recursive properties (because we can indefinitely expand a sentence: (8) can be part of a larger sentence like *Peter thinks that John will give a book to Mary*, etc.). A number of rather different recursive structure building algorithms have been considered in the history of generative grammar: generalized transformations, phrase structure rules, X-bar schemata,…. The minimalist program (Chomsky 1995) has come to the conclusion that the structure building algorithm is the simplest combinatorial rule one can imagine:

(9) Merge: take two elements A and B and string them together to form the phrase [A B]

Merge can take two elements from the lexicon, say *hit, Bill*, to form the verb phrase *[hit Bill]*. It can recursively reapply to string together the structure just formed with another element taken from the lexicon, e.g. *will*, to form the phrase *[will [hit Bill]]*, and then reapply again to form *[John [will [hit Bill]]]*, and so on.

Merge is intimately related to the expression of argument structures and the assignment of thematic roles. So, a verb like *hit* has two roles to assign, agent and patient. When *hit* is merged with a nominal expression like *Bill* to form the verb phrase *[hit Bill]*, the patient role is discharged to *Bill*. The structure thus created can be further merged with another nominal expression, *John*, forming the expression *[John [hit Bill]]*; here *John* receives the remaining role of agent. We can think that all the assignment of thematic roles works like that: Merge creates the local configurations between assigners and assignees for the expression of argumental semantic properties. So a head assigning thematic roles (typically a verb, but in fact any lexical item can be an assigner) assigns the roles specified in its lexical representation to its immediate dependents, in the local configurations created by repeated applications of Merge. So, thematic assignment is strictly local, with the relevant local configurations provided by Merge.

Consider now the assignment of scope-discourse semantic properties. One could think that such properties as topic - focus etc. are superimposed to the hierarchical structures created by Merge. This may indeed happen in some cases (e.g., if an element can be focalized *in situ*, without being displaced from its argument position), but this is by no means the typical procedure. What typically happens is what we have already seen in (2)b-c, and also in (6)a-b: the element is displaced from its thematic position to another position, typically in the initial periphery of the sentence, where it receives its appropriate scope-discourse property: topic, contrastive focus, relative or interrogative operator.

So, displacement, or movement, is systematically used by natural languages for assigning the two kinds of interpretive properties to an element. The element is merged in a position in which it receives its argumental status, a thematic role; then it is moved to another position dedicated to a particular scope-discourse property.

What is movement? The traditional view directly implements the metaphor of physical displacement: the element is taken from its original position, which is vacated, and moved to a higher position in the syntactic tree. But there are other views of movement which are less faithful to the physical metaphor. For instance, in Minimalism "movement" involves 1. the identification of a candidate (through a search operation which I will go back to later on), and 2. an application of Merge remerging the identified candidate with the structure created so far. The position identified as a candidate is not physically displaced: it continues to host a complete but silent (unpronounced)

copy of the remerged phrase. For instance, the derivation of a sentence containing a topicalized phrase like (2)b is as follows. Starting from a structure like

(10) [John gave [your book] to Mary]

Search identifies the phrase to be topicalized *your book*. Then the phrase is merged with the whole structure and the original position remains filled by an unpronounced copy of the phrase (notated through the angled brackets in (11)):

(11) [your book] [John gave .<your book> to Mary]

Representation (11) expresses well the way in which the language assigns the dual semantic properties to the phrase *your book*: it occurs twice, once in the argumental position and once in the scope-discourse position, and thus it picks up the thematic role "patient" and the status of topic. In this view, movement reduces at least in part to Merge: the common terminological practice distinguishes between "External Merge" (9), and "Internal Merge", which still involves two elements A and B which are strung together; the difference with External Merge is that here the two elements are not external to each other before the operation, but rather one of them is internal to the other. So, we could depict the operation of Internal Merge as follows:

(12) $[_B \ldots A \ldots] \rightarrow [A [_B \ldots \langle A \rangle \ldots]]$

Where A is first selected by Search within B as a candidate for movement, then A is remerged with the whole structure B, with the original occurrence of A becoming the silent copy <A>. In fact, Merge performs exactly the same operation in (9) and (12), creating the structure [A B]. So, it would perhaps be more appropriate to say that there is a fully unified operation Merge, but the Search operation identifying the candidates for the application of Merge can be external (looking at elements that are external to each other, for instance two lexical items) or internal (looking at an element internal to the other element, as in (12)). In any event, we will continue to use the standard terminology, keeping in mind that the unification of movement and structure-building under Merge may be even more complete than the terminology suggests.

4. The Criterial approach to Scope-discourse semantics.

We can now come to the key issue. What does it mean that a position is "dedicated" to a certain kind of interpretive property? In the case of argumental semantics, things are rather uncontroversial: thematic assignment is a matter of local head-dependent relation, a verb assigns its thematic roles to its immediate dependents (its specifier and complement, in the traditional terminology of the X-bar notation). So the structure created by Merge expresses immediately and transparently that in *[John [hit Bill]]* John is the "hitter" and Bill is the "hittee", or the agent and patient, respectively (some current systems use explicit thematic labels like agent and patient, others do not, but I don't see more than a notational decision in this choice: any system must express the notional content of agent, patient, etc. somewhere in the system, whether or not explicit thematic labels are used).

More controversial is the syntactic expression of scope-discourse semantic properties. Consider the following constructions expressing distinct scope-discourse properties:

(13)a. Your book, John will give ___ to Mary

b. It is your book that John will give ___ to Mary, not Peter's book

c. The book that John will give ___ to Mary (is interesting)

d. Which book will John give ___ to Mary?

e. What a nice book John gave ___ to Mary!

How does the nominal expression including the lexical specification *book* receive its interpretation of topic, contrastive focus, relative operator, interrogative operator, exclamative operator, respectively?

Here I will present the Criterial approach, a view that has been largely assumed and supported by cartographic studies, and will then briefly compare this approach with possible alternatives. According to the Criterial view, the assignment of scope-discourse properties is done on a strictly structural basis, much as the assignment of argumental properties. The approach assumes a set of functional heads which populate the initial periphery of the clause. Such heads, Top(ic), Foc(us), Rel(ative), Q(uestion), Exc(amative) have a dual function, internal to syntax and relevant for the interfaces with sound and meaning:

1. They attract a phrase to their specifier (in terms of the Minimalist approach to movement, they activate a search of a candidate phrase, which then undergoes internal Merge);

2. They trigger specific interpretive routines at the interfaces, determining the interpretation on the meaning side, as well as the assignment of the special, marked intonantional contours which make such constructions easily detectable for the hearer.

In terms of the syntactic representations involved, the approach claims that sentences like (13) have representations like the following (in which the copy theory of traces is adopted; NB: *that* is separated from Foc and Rel for clarity in (14)b-c, but it may very well be a particular morphological realization of the criterial heads here; analogously, Q in (14)d may well be the position targeted by the inverted auxiliary *will*):

(14)a. [Your book] **Top** [John will give <your book> to Mary]

b. It is [your book] **Foc** [that John will give <your book> to Mary], not Peter's book

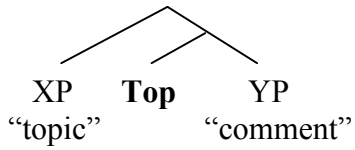
c. [The book] **Rel** [that John will give <the book> to Mary] (is interesting)

d. [Which book] **Q** [will John give <which book> to Mary]?

e. [What a nice book] **Excl** [John gave <what a nice book> to Mary] !

The crucial elements of such structures are the functional heads Top, etc., which mediate between the two constituents isolated by the brackets. Such heads have the syntactic function of attracting the topic, the focus, etc. in clause initial position, and carry interpretive routines used on the other side of the interface. For instance, Top goes with the following

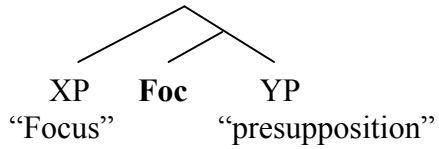
(15)



(15) expresses the Topic – Comment articulation: the phrase attracted to the specifier position of Top is interpreted as the topic, designating a referent chosen between the entities familiar from the previous context, made salient, and about which something is said, i.e., a comment is made. YP, the complement of Top, expresses the comment, which typically contains the new information (more fine-grained analyses on the typology of topic positions and their interpretations are offered in Benincà & Poletto 2004, Bianchi & Frascarelli 2009, Frascarelli & Hinterhoelzl 2007).

Analogously, the Foc head triggers an interpretive routine which expresses the Contrastive Focus – Presupposition articulation:

(16)



So, in (14)b *your book* is interpreted as (contrastive) focal information, an information which the speaker assumes to be new, and also somehow falling outside the expectations of the speaker (which can be explicitly expressed and corrected by the negative tag); this against the background of presupposed, shared knowledge. In other words, when I utter (14)b I assume that my interlocutor shares the knowledge that John will give something to Mary, and I assert that this something, contrary to my interlocutor's expectations, is your book (the exact interpretation of left peripheral focus positions is parametrized in part: e.g., Cruschina (2008) shows that the Sicilian dialect uses the left peripheral position to express simple new information focus).

The parallel with the assignment of argumental semantic properties of this "structuralist" approach to scope-discourse semantics should be clear: Top attributes the status of Topic and Comment to its specifier and complement much as *hit* attributes agent and patient to its dependents. The parallel holds with some systematic differences separating the two cases:

1. Thematic assignment is typically done by a lexical head (primarily, a verb), while scope-discourse assignment is done by a functional head;

2. The relevant syntactic configuration is created by external Merge for thematic assignment, and by internal Merge (movement) for scope-discourse assignment.

So, there is a systematic division of labour between the functional and substantive lexicon, and between external and internal Merge in expressing the duality of semantic properties that characterize the interpretation of natural language expressions.

What arguments can be given in favour of such a structuralist view of assignment of scope-discourse semantic properties? A straightforward argument is offered by the fact that in some languages the system of functional heads assumed here is expressed by overt morphemes. Consider the following cases:

(17)a Ik weet niet [wie *of* [Jan ___ gezien heeft]] (Dutch varieties, Haegeman 1996)
'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 '

In many dialectal varieties of Dutch, wh-elements in embedded questions can co-occur with the question marker *of* (if), as in (17)a, and also with the complex form *of*+*dat*. While *dat* is not specific to questions (e.g. it can also introduce declaratives), *of* is specific, so it appears to be a good candidate for an overt realisation of the Q head attracting the wh element to its Spec. The examples (17)b-c from the African language Gungbe illustrate the case, quite frequently cross-linguistically, of a language using overt topic and focus markers (*yà* and *wè*, respectively), good candidates for the overt expression of the Top and Foc heads of (15), (16). The Bavarian dialect illustrates a property rather commonly found in dialectal varieties of German, with the locative wh elements *wo* specialized to introduce relatives; in this variety *wo* can also co-occur with the relative pronoun *den*, which sits in its Spec.

Standard Italian generally disallows cooccurrence of a preposed operator and a complementizer particle, except in exclamatives, as in (17)e. The particle here is *che*, a complementizer morpheme which clearly is not specialized for exclamatives (as it can also introduce simple declaratives). Still the possible cooccurrence with the operator is specific to exclamatives in the standard variety. So, questions and exclamatives are disambiguated by the presence or absence of this element (and of course, the intonantion pattern is very different in the two cases, both on the operator and in the clause defining its scope domain):

(18)a Che macchina hai comprato? (only question)
'What car did you buy?'
b Che macchina *che* hai comprato! (only exclamative)
'What (a) car you bought!'

In view of such contrasts as (18)a-b, this particular occurrence of *che* may be seen as a particular lexicalization of the Excl head, attracting the exclamative operator to its Spec, and contrasting in this respect with the Q head, null in Italian (alternatively, *che* may lexicalize a lower position, possibly Fin in the system of Rizzi 1997, but its presence in the C system is contingent upon the presence of a higher Excl head, a contingency expressible, e.g., through a kind of agreement – or search --operation across heads in the C-system).

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In English the difference between questions and exclamatives is also signaled, although more indirectly, as the Q particle attracts the auxiliary and inversion occurs (in main questions), while the Excl particle does not trigger inversion (*What car did you buy?* Vs. *What (a) car you bought!*).

In sum, the widespread existence of cases like (17) across languages provides very simple evidence for representations like (14), (15), (16), etc., as in (17) such heads as Top, Foc, Q, Rel, Excl are overtly expressed. We may thus assume that in languages like English the interface with scope-discourse semantics also involves representations of this kind, except that the relevant heads are left unpronounced, a familiar and widespread kind of low level parametric option (for instance, e.g., proper names occur without determiner in standard Italian or standard German, but appear with the determiner in many local varieties: *la Maria, der Hans*, etc: again, a low level parametrisation on the overt / non-overt character of a functional item seems to be involved, and such cases are innumerable).

Why are such heads, and the relevant configurations, called "criterial"? The term is an extension of Chomsky's (1981) Theta-criterion for argumental semantics, and refers to the Specifier – head configuration which must be created with such constructions, e.g. the structures in (15)-(16): in a sense, the criterial heads act as "scope markers" for the phrases they attract to their Specs. The relevant configuration defines a "Criterion", The Q Criterion (in fact, originally called Wh Criterion) was initially proposed some 20 years ago (Rizzi 1991), and then the approach was extended to the whole family of left peripheral movements (Focus Criterion, Topic Criterion, etc.). Aboh (2010) has rephrased the criterial approach in terms of the minimalist program. We thus have criterial features (Q, R, Top, Foc, Excl) which act as attractors of phrases endowed with matching features, and trigger certain interpretive routines on both interfaces:

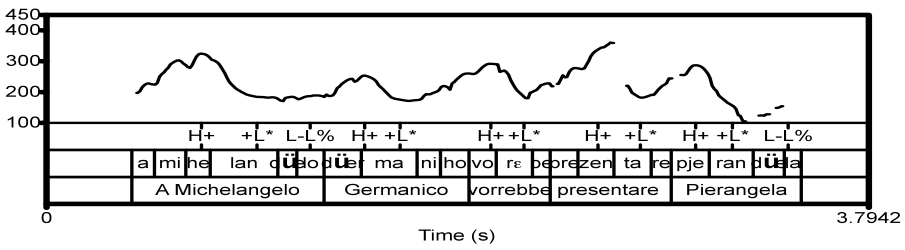
(19)a X_{CritF} is part of the numeration, triggers an internal search for XP_{CritF}; the XP_{CritF} thus identified undergoes internal merge to the Spec of X_{CritF}, for CritF = Q, R, Top, Foc, Excl,….

b X_{CritF} carries explicit instructions concerning how its dependents (Spec and complement) must be interpreted by the interface systems dealing with sound and meaning.

(Rizzi 1991, Aboh 2010)

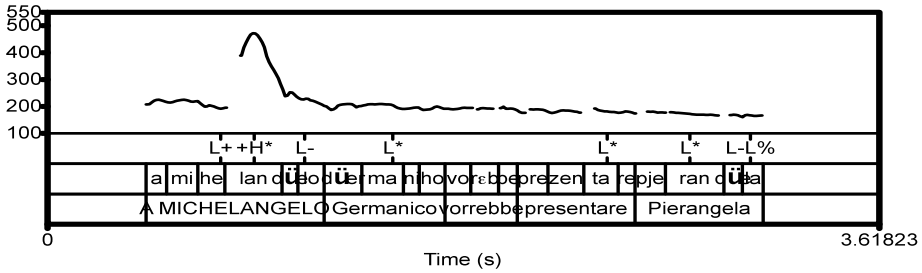
At the interface with semantics and pragmatics, the routines take the shape of (15) and (16), indicating which phrase must be interpreted as topic, comment, etc. There are also significant effects on the interface with sound, as criterial configurations are often highlighted by very salient special prosodic contours, easily detectable from the signal. Bocci (2009) has conducted a theoretical and experimental study on such contours in Italian. The typical contours associated with topic – comment and (contrastive) focus – presupposition in Italian are the following:

(20) Pitch contour of "Topic – Comment" in Italian (from Bocci 2009



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

(21) Pitch contour of "Focus – Presupposition" (from Bocci 2009)

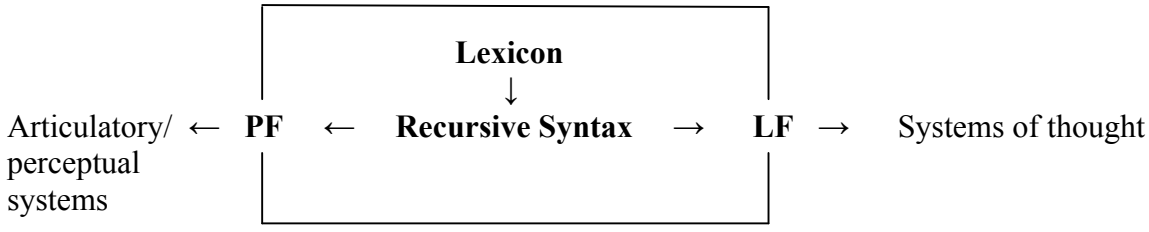


A MICHELANGELO (Foc) Germanico vorrebbe presentare Pierangela (, non a Piero)
'TO MICHELANGELO (Foc) Germanico would want to introduce Pierangela (,not to Piero)

The topic is marked by a certain prosodic prominence, followed by a "hilly" contour of the comment, as in (20). The contrastive focus is marked by a more pronounced prominence, followed by the complete flattening of the contour of the presupposition, as in (21). Bocci (2009) determined such contours experimentally, and proposed a system of prosodic rules at the phonological interface which "read" the structures passed on from the syntax and, capitalizing on the criterial heads and features, proceed to assign the appropriate contours.

The criterial view has been characterized as the attempt to "syntacticise" as much as possible aspects of scope-discourse semantics, in that fundamental scope-discourse interpretive properties are traced back to basic syntactic configuration in a transparent and straightforward manner. Syntax wears interface properties on its sleeves, as it were. In fact, not only scope-discourse semantics, but also the prosodic properties are transparently read off from syntactic representations in this approach, as we have just seen. One important characteristic of this system is that the two interfaces are solely connected by syntax, any other connecting device directly relating, say, intonation and pragmatics can be dispensed with. I.e., no other connecting line is required on top of the minimal connections expressed by the following classical articulation:

(22)



The box of linguistic computations includes a lexicon (divided into two components: contentive and functional) and recursive syntax. The system computes representations of Phonetic Form (PF) and Logical Forms (LF), to be understood as partial representations of sound and meaning inasmuch as such properties are grammatically determined. Such representations are further elaborated by other (language independent) systems on both sound and meaning sides, which use grammar-determined representations for communication, socialization, the expression of thought, play, art, and whatever use humans make of their linguistic abilities. In the approach I have

presented, sound and meaning are solely mediated by syntax, also as far as scope-discourse properties are concerned. The uniqueness of the syntactic connection is uncontroversially assumed for argumental semantics: nobody questions the fact that, say, the subject of a passive sentence (*John was hit by Bill*), pronounced at the beginning of the clause, is interpreted as the patient through the mediation of syntax (movement to a position distinct from the thematic position), and no syntax-independent link between PF and LF must be established to express this property. This mediating role of syntax applies fully to scope-discourse semantics as well, under the criterial approach.

The "syntacticization" effect is immediately visible by looking at diagram (22): under the criterial approach, very little computation is needed after the LF interface to establish such properties as topicality and focus, as the properties are already transparently expressed by syntactic representations in the format of (15)-(16), etc.. This economy of post-syntactic computation is a hallmark of the criterial approach: other systems would inevitably require a more structured set of post-syntactic interpretive rules to ensure the proper interpretation of syntactic configurations which, in such alternative systems, would be (more) opaque in the syntactic expression of scope-discourse interpretative properties.

5. An alternative.

In conclusion, let us focus for a moment on such alternative systems, and see what their consequences are. A non-cartographic, non-criterial approach would try to get away with more impoverished syntactic representations. For instance, instead of postulating a structured left periphery of the clause, populated by a system of well-differentiated functional heads, one could go back to the traditional assumption that topicalisation, focalization, and simple preposing of an adverbial (neither properly topical nor focal: see below) have essentially the same syntactic representation, for instance involving the adjunction of the preposed element to the clausal category (labeled TP here, as in much minimalist practice):

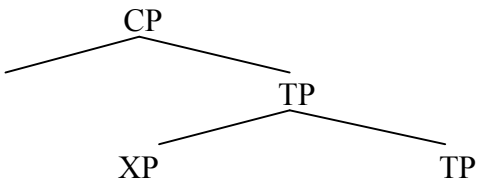
(23)a [$_{TP}$ Your book, [$_{TP}$ I will read ___ tomorrow]]

b [$_{TP}$ YOUR BOOK [$_{TP}$ I will read ___ tomorrow]] (, not Peter's)

c [$_{TP}$ Tomorrow [$_{TP}$ I will read your book]]

I.e., the three cases would share the same syntactic configuration in this syntactically impoverished approach, with the preposed element XP attached to the TP in an adjunction structure under the C(omplementizer)-system:

(24)



Cartographic analyses, on the other hand, assign three distinct representations here, geometrically analogous (they are all Merge-generated) but distinct in terms of the nature of the head defining the construction (in cartographic representations there will also be additional "space" between the

criterial layer and the TP, defined by Fin, the head delimiting the lower bound of the C-system; I omit this detail for simplicity here):

(25)a [$_{TopP}$ Your book **Top** [$_{TP}$ I will read ___ tomorrow]]

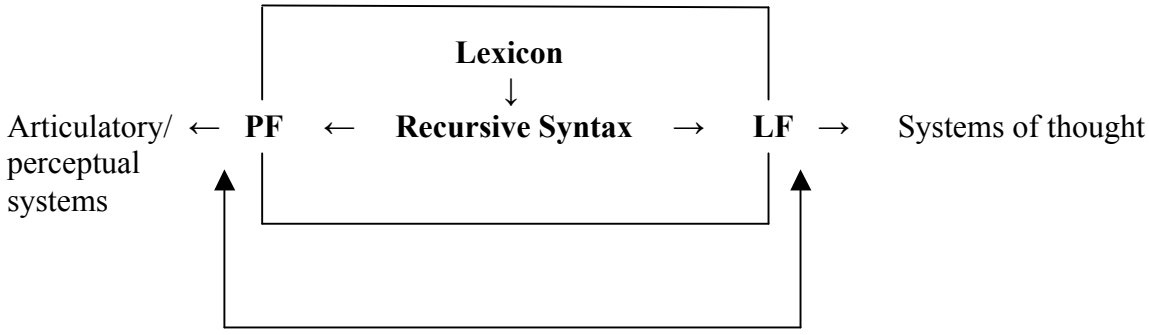
b [$_{FocP}$ YOUR BOOK **Foc** [$_{TP}$ I will read ___ tomorrow]] (, not Peter's)

c [$_{ModP}$ Next week **Mod** [$_{TP}$ I will read your book]]

Top and Foc have already been introduced; Mod(ification) in (25)c is the head which defines the position which a highlighted adverbial is moved to, a position which is neither properly topical (because the discourse context may very well lack any reference to particular weeks to ground proper topicality of the temporal adverbial) nor contrastively focal (because here *next week* is not necessarily contrasted to any particular belief that the speaker may impute to the hearer). If (25) is adopted, the interpretive properties are transparently expressed by the syntactic representation, which also directly guides the assignment of the appropriate prosodic contour through a Bocci-style rule system.

If the non-cartographic representations (23) are adopted, much of the interpretive work must be done post-syntactically: rules must be postulated which assign to uniform representations like (23) (sharing configuration (24)) the interpretation of topic-comment, focus – presupposition and adverbial highlighting. Moreover, as distinct prosodies must be assigned in these cases (as is particularly clear in the case of Focus), special direct connections must be postulated between semantics-pragmatics and phonetics to ensure the proper contour assignment: in this system syntax is too impoverished to play this connecting role, as the uniform structure (24) is assigned to (23)abc, so if the post PF component assigns a focus intonantion to the preposed phrase, this information must be transferred to the post LF interpretive component, hence an extra-syntactic connecting line must be assumed by such systems (it does not matter if the connection is from PF to LF, or vice-versa):

(26) A system with impoverished, uniform syntactic representations:



Clearly, on grounds of simplicity, the organization in (22) is preferable, all other things being equal. There are also more specific arguments in favor of cartographic representations and the criterial approach. In certain contexts, the three constructions of (23) have very different syntactic properties, a fact that is unexpected given the structural uniformity postulated by the "impoverished

syntax" approach. Consider for instance the opposite consequences that topicalisation and adverb preposing have w.r.t. so-called anti-adjacency effects. The following (27)a illustrates a that-trace effect, the fact that subject extraction is barred across an overt complementizer like *that* in standard varieties of English. As Bresnan (1977) observed, a preposed adverbial improves the acceptability considerably, as in (27)b, while an embedded topicalisation does not have a positive effect on acceptability, as in (27)c (on anti-adjacency effects, also called "adverb effects", see Rizzi 1997 and references quoted there):

(27)a * This is the man who I think that ___ will sell his house next year

b This is the man who I think that, next year, ___ will sell his house

c * This is the man who I think that, his house, ___ will sell this year

If the representations of topicalisation and adverb preposing are structurally different, as in (25), one may capitalize on the difference to capture the opposite consequences the two constructions have in alleviating *that*-trace effects (this is the line of analysis proposed in Rizzi 2009, capitalizing on the devices for subject extraction analyzed in Rizzi & Shlonsky 2007)). If the syntactic representations are indistinguishable, as in (23), (24), then syntax does not offer any straightforward basis for capturing the contrast in (27). We thus have purely syntactic reasons for choosing the well-differentiated representations assumed by cartographic studies and the criterial approach.

In this brief comparison I have contrasted maximally different approaches like the one assuming a full-fledged cartographic representation and one assuming fully indistinguishable representations for different kinds of preposings. Comparing radically different approaches is useful because it allows us to better clarify the issues. But of course, various intermediate cases can be imagined. For instance, one could entertain an approach whereby the structural configuration is exactly the same, say an adjunction structure like (24), but the different cases of preposing are partly differentiated through the involvement of different morphosyntactic features: for instance, the T head could be optionally endowed with features of topicality, focus or modification, thus triggering the relevant adjunction to the TP projection. One could then try to appeal to such featural differences to express the observed differences in syntactic behavior, e.g., with respect to the anti-adjacency effect.

Putting aside the question of whether such differences could be naturally expressible in this way, fundamental empirical differences remains in the tree geometry between a cartography-based approach and an approach exploiting featural differences in otherwise uniform representations like (24): The cartographic approach based on criteria predicts a systematic biuniqueness between heads and specifiers, while the alternative approach allows for the possibility of a single non-dedicated head (say T) supporting several specifiers/adjoined positions with different scope discourse functions. Again, languages with overt topic-focus markers like Gungbe support the more restrictive approach. For instance, Topic and Focus can co-occur in Gungbe, but in a strict order and with each element supported by the relevant marker:

(28) … dò Kòfí *yà* gànkpá mè *wè* kpònòn lé sú - ì dó
'…that Kofi Top PRISON IN Foc policemen Pl shut him there' (Gungbe: Aboh 2004)

This is immediately expected under the cartographic approach, while the occurrence of such elements as *yà* and *wè* would require auxiliary hypotheses under a structurally uniform approach

based on TP adjunctions (how the strict ordering of projections arises is a separate issue: see Abels 2010, Haegeman 2011 for approaches involving locality principles, and Cinque & Rizzi 2010 for discussion)..

6. Conclusion.

Natural languages typically assign to expressions two kinds of interpretive properties: properties of argumental semantics and properties of scope-discourse semantics. This duality of semantic properties is reflected by dedicated mechanisms in the lexical organization (functional and contentive lexicon) and in the articulation of syntactic computations (external and internal Merge). Cartographic research has put on focus, at the same time, the elementary mechanisms appealed to by natural languages for the expressions of such properties, and the global syntactic configurations which arise from such mechanisms. What has emerged is, on the one hand, the richness of syntactic representations, which can only be captured by very detailed and refined structural maps; and, on the other hand, the very simple nature of the generating mechanisms, exploiting Merge and only requiring very simple specifications on the functional heads. Given the complex nature of the task of expressing both types of properties, natural languages thus seem to have selected mechanisms favoring local simplicity (very elementary specifier – head configurations agreeing on simple featural specifications), at the price of tolerating significant global complexity, generated by the reiteration of the computational atoms: natural languages systematically exploit movement (internal Merge), which allows an element to occur in different positions, picking up elementary interpretive properties in distinct dedicated positions. In this paper I have looked at mechanisms responsible for the expression of scope-discourse properties, expressed in terms of the criterial approach, which has turned out to be particularly congenial to cartographic research. Scope-discourse properties are directly expressed by structural configurations, much as argumental properties are: there is a set of dedicated functional heads (Top, Foc, Mod, Q, Rel, Excl,…) which undergo Merge with specifiers and complements, and trigger transparent interpretive routines at the interfaces determining the interpretations of their structural dependents as topic, comment, focus, presupposition, operator of a given kind and its scope domain, etc. This view is sometimes said to involve the "syntacticisation" of scope-discourse semantics, in that it involves the creation, in the syntax, of fully transparent syntactic interfaces, requiring only straightforward additional computation in the interpretive systems. I have discussed some conceptual and empirical properties of this approach which favor it, in my opinion, in comparison to imaginable alternatives.

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