

On post-syntactic chain formation and intermediate movement

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A standard assumption regarding syntactic movement nowadays is the *Last Resort* condition. However, applying this idea to intermediate/cyclic movement has proven to be challenging. I argue that theories assuming that intermediate movement is triggered by uFF have problems to account for certain asymmetries on reconstruction. To explain these data, it will be proposed that intermediate movement is *licensed* by independently motivated conditions on chain formation applying at the interfaces.

1. Successive-cyclic movement: looking for the trigger

It is usually assumed that syntactic movement is triggered by the need of satisfying a requirement on some constituent. This idea is captured by the *Last Resort* condition.

(1) *Last Resort* (Collins 1997:9)

An operation OP involving α may apply only if some property of α is satisfied.

However, a problematic case for (1) involves explaining *cyclic movement*. It is generally accepted that long distance movements involve intermediate steps (cf. Chomsky 1973, Barss 1986, McCloskey 2000, among many others).

(2) $[_{CP} [\text{What book}]_i \text{ does John } [_{VP} t_i \text{ think } [_{CP} t_i \text{ Mary } [_{VP} t_i \text{ read } t_i]]]]$

A *direct and straightforward* way of implementing (1) for cyclic movement involves assuming that a checking process takes place in each intermediate position. This kind of approach has been proposed by Chomsky (2000), who assumes that an EPP-feature in each phase-head is necessary to account for successive-cyclic movement.

(3) *Successive feature checking in intermediate attracting heads*

- a. $[_{VP} DP_{WH} [_{V'} V_{EPP} \dots t_i]]$
- b. $[_{CP} DP_{WH} [_{C'} C_{EPP} [_{VP} t_i [_{V'} V_{EPP} \dots t_i]]]]$
- c. $[_{VP} DP_{WH} [_{V'} V_{EPP} \dots [_{CP} t_i [_{C'} C_{EPP} [_{VP} t_i [_{V'} V_{EPP} \dots t_i]]]]]]$
- d. $[_{CP} DP_{WH} [_{C'} C_{uFF} \dots [_{VP} t_i [_{V'} V_{EPP} \dots [_{CP} t_i [_{C'} C_{EPP} [_{VP} t_i [_{V'} V_{EPP} \dots t_i]]]]]]]]$

As Bošković (2007) points out, the first problem with this approach is *look-ahead*: to derive the sentence in (2), for example, it is necessary first to get to the derivational point K depicted in (4), but at this point it is impossible to know whether assigning an EPP-feature to the embedded C will be necessary since the interrogative complementizer has not been selected yet.

(4) $K = [_{CP} [\text{What book}]_i [_{C'} \text{ that}_{EPP} [_{TP} \text{ Mary read } t_i]]]]$

Also, as Boeckx (2003) and Bošković (2007) argue, there are some patterns showing that no feature checking takes place in intermediate positions. For example, Bošković (2007), following Lobeck (1990) and Saito & Murasugi (1990), observes that only functional heads undergoing spec-head agreement can license ellipsis.

(5) John met someone but I don't know $[_{CP} \text{ who}_i [_{C'} C [_{TP} \text{ John met } t_i]]]]$

(6) *John met someone but I don't know who_i Peter said $[_{CP} t_i [_{C'} C/\text{that} [_{TP} \text{ John met } t_i]]]]$

Since Last Resort does not seem to explain straightforwardly intermediate movement, some other alternatives have been proposed attempting to compatibilize both notions.

One first alternative is due to Takahashi (1994) and Boeckx (2003). The idea here is that the Last Resort condition is evaluated on a single movement operation: *Form Chain*. Movement is motivated by a strong-feature in the final landing-site, but since the resulting chain needs to obey the *Minimize Chain Links Condition* (i.e., distance between elements forming a chain must be as short as possible), the moving constituent stops in intermediate positions while it climbs.

(7) *Probing*

$[_{CP} C_{uWH} \dots [_{VP} v \dots [_{CP} C [_{VP} v \dots DP_{WH}]]]]$

(8) *Movement to Spec, C*

$[_{CP} DP_{WH} [_{C'} C_{uWH} \dots [_{VP} t_i [_{V'} v \dots [_{CP} t_i [_{C'} C [_{VP} t_i [_{V'} v \dots t_i]]]]]]]]$

The problem with this analysis is *that it is not strictly cyclic* since it violates the *Extension Condition* (Chomsky 1993): intermediate movement in this case does not extend the tree.

A third and final approach to successive-cyclic movement is offered by Bošković (2007). According to Bošković, an uFF in the moving element triggers successive cyclic movement. Since Agree operates only in one way, the moving element requires reaching a position where it c-commands a matching head. Thus, the constituent with the uFF is going to move through every phase edge until it reaches its objective.

(9) *Successive movement through phase edges until checking*

- a. $[_{VP} DP_{uWH} [_{v'} v \dots t_i]]$
- b. $[_{CP} DP_{uWH} [C' C [_{VP} t_i [_{v'} v \dots t_i]]]]$
- c. $[_{VP} DP_{uWH} [_{v'} v \dots [_{CP} t_i [C' C [_{VP} t_i [_{v'} v \dots t_i]]]]]]$
- d. $[_{CP} DP_{WH} [C' C_{WH} \dots [_{VP} t_i [_{v'} v \dots [_{CP} t_i [C' C [_{VP} t_i [_{v'} v \dots t_i]]]]]]]]$

A first and obvious problem with this derivation is that it does not comply strictly with the definition of Last Resort in (1) since intermediate steps are not satisfying any property on the DP. Thus, this kind of system requires assuming a weaker economy condition¹.

(10) *Greed (Chomsky 1994:14)*

Move raises α to a position β only if morphological properties of α itself would not otherwise be satisfied in the derivation.

Of course, this is not a real argument against Bošković's approach². I am only trying to show that every analysis of intermediate movement in the minimalist literature attempts to provide a trigger for it in line with the Last Resort condition.

In this paper I propose that cyclic movement is not triggered as a Last Resort kind of mechanism, but *Licensed* at the interfaces. Basically it will be advanced that intermediate steps of movement are basically *free*, constrained only by conditions on chain formation independently required.

2. Chain Formation and reconstruction

The most important property of a movement chain under *Copy Theory* (Chomsky 1993) is *Non-Distinctiveness*: all the links in the chain should be the "same" in some relevant way. However, defining Non-Distinctiveness in a principled manner is not easy (cf. Chomsky 1993, Nunes 1995, 2004, Leung 2007, Neeleman & van de Koot 2010).

In a nutshell, ***most approaches to Copy Theory assume indexes or some other kind of marking mechanism to distinguish between real copies and occurrences of the same lexical item***. This, of course, violates the *Inclusiveness Condition* (Chomsky 1995).

It is usually assumed that a principled explanation of Non-Distinctiveness involves (featural) *Identity* (i.e., two elements are copies when their features are identical), it

becomes difficult to explain why both copies of John are "the same" in the following sentence³.

- (11) John_K was kissed John_{uK}

And if we assume, for example, that formal features are not computed for Identity, we face the problem of explaining why the occurrences of the lexical item *John* are different in (12).

- (12) John_{NOM} kicked John_{ACC}

Thus, it seems that (featural) *Identity* is not going to be useful to define Non-Distinctiveness. Nunes (1995, 2004) also observes this.

If lexical items are sets of features and phrases are sets of lexical items, then the Non-Distinctiveness relation must be based on some kind of relation between sets. Identity is, in fact, one of these relations; but it is not the simplest one since it is possible to define Identity in terms of *Inclusion*.

- (13) *Identity*
Two sets A and B are identical if A is a subset of B and, at the same time, B is a subset of A (if $A \subseteq B$ and $B \subseteq A$, then $A = B$).

Basically, then, part of the proposal involves defining Non-Distinctiveness as an Inclusion relation between the features of two syntactic objects in certain structural configuration.

- (14) *Chain Linking*
Two constituents α and β are linked in a chain if
- a. α c-commands β .
 - b. The features of β are a (non-proper) subset of the features of α .
 - c. There are no intervening linking-candidates between α and β .

I will also assume that ***chains are not part of narrow syntax*** (basically, because they are not *Terms* in the sense of Chomsky 1995), ***but they are created post-syntactically at the interfaces according to (14)***. The idea is that chains are created from the output syntactic representation without any reference to the derivational generative process.

There are several ways of implementing the mechanism in (14) depending on particular assumptions on the inner workings of narrow syntax. For example, if we take that *Goals* of *Agree* carry uninterpretable or unvalued features (uFF), it is possible to assume that uFF

¹ In Bošković's (2007:610) words: "Last Resort should be formulated as follows: X undergoes movement iff without the movement, the structure will crash (with crash evaluated locally)".

² Unless you consider, as Collins (1997), that (10) involves *Global Economy* since it would require comparing two different derivations.

³ If it is assumed that features of copies are "a unit" (cf. Chomsky 1995), then it is hard to explain how the occurrences of *John* are different in the sentence (i):

(i) $[John_{NOM} [_T T [_{VP} John_{NOM} said [_{CP} that [_{TP} John_{NOM} [_T was [_{VP} kissed John_{NOM}]]]]]]]$

are “invisible” at LF and PF (that would be what “uninterpretable” means). Thus, for the syntactic representations in (15a) and (16a), the interfaces would “see” something as (15b) and (16b), and the chains in (15c) and (16c) would be formed according to (14)⁴.

- (15) a. [TP John_K [T' was [vP kissed John_{uK}]]]
 b. [TP John_{K,D,masc,sing,3} [T' was [vP kissed John_{D,masc,sing,3}]]]
 c. CH = (John_{K,D,masc,sing,3}, John_{D,masc,sing,3})
- (16) a. [TP John_K [T' T [vP John_{uK} [v' kicked John_K]]]]
 b. [TP John_{Nom,D,masc,sing,3} [T' T [vP John_{D,masc,sing,3} [v' kicked John_{Acc,D,masc,sing,3}]]]]
 c. CH₁ = (John_{Nom,D,masc,sing,3}, John_{D,masc,sing,3}); CH₂ = (John_{Acc,D,masc,sing,3})

This system may be used, among other things, to offer a cyclic explanation of the reconstruction asymmetries regarding A-movement⁵. It has been observed, for instance, that A-movement typically bleeds Condition C (cf. Chomsky 1995).

- (17) [The claim that John_i was asleep]_j seems to him_i to be correct t_j

However, A-movement sometimes allows reconstruction of intermediate copies of A-movement (the underlined t_k is the one being interpreted).

- (18) [His_i picture of [the president]_j]_k seemed to [every man]_i t_k to be seen by him_j t_k to be t_k a real intrusion.

The general explanation for this and some other asymmetries regarding reconstruction involve *Wholesale Late Merger* (Takahashi & Hulsey 2009). In a nutshell, the idea is that some constituents may be merged *counter-cyclically* inside a phrase after moving it. Thus, a sentence as (17) requires a derivation like (19), where the NP complement of the D head is merged after A-movement:

- (19) a. *A-Movement*
 [TP [DP D] ... [DPD]]
 b. *Wholesale Late Merger*
 [TP [DP D NP] ... [DP D]]

This would entail the absence of a R-expression in the thematic position of the argument, predicting this way the lack of reconstruction in such position.

The case in (18) is a little more complex. In few words, it involves a D head in the thematic position and Wholesale Late Merger in an intermediate position (20b). This way, the R-

⁴ Identical representations would be obtained under the assumption that Goals do not carry uFF and formal features as Case are assigned (and not just checked).

⁵ See Muñoz Pérez (2015) for a sketchy but more detailed implementation.

expression inside the DP can be coreferential with *by him* and the possessive pronoun can be bound by *every man*.

- (20) a. *Intermediate A-movement*
 [TP [DP His] ... by him ... [DP his]]
 b. *Wholesale Late Merger*
 [TP [DP his [picture of [the president]_i] ... by him_i ... [DP his]]]
 c. *A-movement*
 [TP [DP his_j [picture of [the president]_i] ... every man_j ... [DP his_j [picture of [the president]_i] ... by him_i ... [DP D]]]

The obvious conceptual problem with this approach to reconstruction is counter-cyclicity. The idea that syntactic operations must observe strict cyclicity is a theoretical desideratum in generative linguistics since, at least, Chomsky (1965). Thus, it would be highly desirable being able to capture these interpretative patterns within a cyclic approach to syntax.

This can be done if we assume that the Conditions on Chain Formation in (14) applying post-syntactically. Basically, a derivation for a sentence as (17) may involve a bare D (a D head without its NP complement) in the thematic position and a base-generated full DP in subject position. Schematically:

- (21) [TP DP_{Nom,D,Per,Num,Gen} [T' T ... [... D_{D,Per}]]]

These two elements would form a chain CH = (DP_{Nom,D,Per,Num,Gen}, D_{D,Per}) at the interfaces receiving θ-role and Case. However, **no transformational operation in the syntax relates both constituents**. But since the resulting chain is interpretable, the base generated full DP is licensed.

The same idea may be applied to the sentence in (18): a full DP c-commanding a bare-D is base-generated in a position outside the domain of the pronoun *him* but within the c-command domain of *every person*. After that, A-movement applies on this full DP generating a copy of it in the subject position.

- (22) a. *Structure with a bare D*
 [T' T_{INF} ... by him ... [D_{D,Per}]]
 b. *Full DP merged in an intermediate position*
 [TP DP_{D,Per,Num,Gen} [T' T_{INF} ... by him [... D_{D,Per}]]]
 c. *A-movement*
 [TP DP_{Nom,D,Per,Num,Gen} [T' T ... every man ... [TP DP_{D,Per,Num,Gen} [T' T_{INF} ... by him [... D_{D,Per}]]]

The conditions of chain formation in (14) predict the generation of the chain CH = (DP_{Nom,D,Per,Num,Gen}, DP_{D,Per,Num,Gen}, D_{D,Per}), which, again, receives θ-role and

Case. And, again, the base generated full DP is licensed since it is part of an interpretable chain.

Beyond the analysis I am offering here, let's go back to the facts: In a sentence as (18), repeated in (23), t_2 can be interpreted while t_4 cannot.

- (23) [His_i picture of [the president]_j]₁ seemed to [every man]_i t_2 to be seen by him_j t_3 to be t_4 a real intrusion.

This seems to be a property of some copies of A-movement, and not something derivable from syntactic structure or interpretative principles since we know that reconstruction in A'-movement is obligatory.

- (24) *[Which argument [that John_i is a genius]]_j did he_i believe t_j ?

So, this basic idea is the following:

- (25) *The argument against Last Resort in intermediate movement*
a. What (23) seems to show is that **two members of the same chain may be different**.
a. According to a Last Resort analysis of intermediate movement, these are positions that some constituent α occupies in its way to a higher position.
c. Since the occurrences of α are copies, we must assume an additional and counter-cyclical operation modifying the structure of α .

However, *if we accept that some links in a chain may not be transformationally related (i.e., if we assume that chains are a matter of the interfaces), we can maintain our assumptions about the cyclic nature of narrow syntax*.

3. Brief summary

- We saw that most current analysis of intermediate movement attempt to provide an explanation in terms of the Last Resort condition.
- We also saw that assuming Last Resort for intermediate movement requires assuming counter-cyclical operations in some cases.
- A principled account of Non-Distinctiveness of copies was offered.
- A cyclic explanation of reconstruction in A-movement was offered in terms of chains being formed at the interfaces.

4. Appendix: conditions on chains and their predictions for cyclic movement

Somewhat adapting Boeckx's (2003) ideas⁶, it will be proposed that chains are inherently asymmetrical in nature. This is stated in (26).

- (26) *Principle of Unambiguous Chain*
A Chain CH must contain one (and only one) link containing all the features of the remaining members of the chain.

So, according to (26), only the chain in (27a) will be a well-formed chain.

- (27) a. CH = (DP_{ α , β , γ }, DP_{ α , β }, DP_{ α , β })
b. *CH = (DP_{ α , β }, DP_{ α , β }, DP_{ α , β })
c. *CH = (DP_{ α , β , γ }, DP_{ α , β , γ }, DP_{ α , β })

This principle follows from a very general assumption on chains: the more specific link in a chain (i.e., the element with more features) determines its interpretation at the interfaces. So, for example, for a sentence as (28a) with a syntactic representation like (28b), the interfaces would "see" something as (28c) and form the chain CH in (28d).

- (28) a. Who said that?
b. [CP Who_{K-Q} [C' C_{wh} [TP who_{K-uQ} [T' T [VP who_{uK-uQ} ...]]]]]
c. [CP Who_{Q,Nom,Dwh, ϕ } [C' C_{wh} [TP who_{Nom,Dwh, ϕ } [T' T [VP who_{Dwh, ϕ } ...]]]]]
d. CH = (Who_{Q,Nom,Dwh, ϕ }, Who_{Nom,Dwh, ϕ }, Who_{Dwh, ϕ })

Since the link *Who*_{Q,Nom,Dwh, ϕ } is the more specific one, it (i) determines phonological realization at PF and (ii) is interpreted as an interrogative operator at LF.

However, problems of ambiguity would arise with a hypothetical chain as (29):

- (29) CH = (Who_{Q,Nom,Dwh, ϕ }, Who_{Q,Nom,Dwh, ϕ }, Who_{Nom,Dwh, ϕ }, Who_{Dwh, ϕ })

In (29) there is no unambiguous way to determine which of the first two links will receive phonological representation. And moreover, this chain predicts the presence of two interrogative operators in the sentence (with only one variable). Since both results are not acceptable at each of the interfaces, the chain in (29) (and the syntactic representation underlying it) is ill formed.

The principle in (26) makes three strong predictions:

⁶ Boeckx's (2003) original postulation of the *Principle of Unambiguous Chain* states that a chain cannot have more than one *Strong Occurrence* (i.e., element receiving phonological representation).

- (30) *Predictions derived from Unambiguity of Chains*
- Only (non-trivial) chains with their highest member in Case-marked or *riterial* positions are allowed.
 - Given (30a), it is impossible for a moving constituent staying in an intermediate position.
 - Every intermediate movement satisfying (30a) is allowed (i.e., *free* intermediate movement if the chain is licensed at the interfaces).

The prediction in (30b) captures, for example, why the sentences in (31a) and (32a) are unacceptable: they generate ambiguous chains.

- (31) a. *Who thinks what_i that Mary bought t_i?
 b. CH = (what_{Acc,Dwh,φ}, what_{Acc,Dwh,φ})
- (32) a. *There seems [a man]_i to be t_i in the garden
 b. CH = (a man_{Acc,D,φ}, a man_{Acc,D,φ})

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