

The Copy Theory and Economy of Derivation

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0. Introduction

The goals of the linguistic theory would be eventually the goals of the scientific inquiry which constitute the investigation of optimal operations of the organic systems¹. In what follows, I will limit myself here to rather informal observations on economy of derivation with special reference to movement. In the Minimalist Program (MP) now in progress (CF. Chomsky (1995), (1998), (2000a,b) among others), the operations may produce the maximal outcomes with the minimal effort, based primarily on the economy principles. The system of any form consisting of various contents independently exists. These contents self-organize at the point when the system itself activates the self organization of the subsystems to organize the higher and larger system in the sense of the complexity approach in physics².

1. The Copy Theory — an Economical Consequence

In the Minimalist Program, instead of postulating Move- α in the principles-and-parameters model consisting of a set of general principles and parameters in UG, there are operations or a set of operations for features and derivations of structures. These operations are Merge, Copy, Attract and Move. Note that Merge is an independent operation, on the other hand, Copy and Attract are parts of operation, Move. Under the Copy theory³ of movement, Move is an operation composed of Attract/Copy/Merge (Set Merge), which turns out to be heavier and costly in the sense of economy consideration. Thus, the operation, Move is a Last Resort manipulating displacement of elements to lead imperfection to perfection in computation of human language, C_{HL} .

The Operation, Move is conducted as follows: Feature set in some Head, H as Attractor, A_r forms a chain between it and Attractee, A_e which shares a set of features of A_r . A chain is formed to create paths between the attractee and its target, T , actually SPEC position of attractor in Head domain satisfying locality conditions such as the Minimal Link Condition among others. If a chain is not properly formed, say, violating some locality conditions, at this point, the derivation crashes and cannot proceed any further operations. On the contrary, a chain is formed satisfying locality conditions, then, it creates paths from the position in which the attractee originally appears to the target position to which the attractor attracts the attractee phrase for feature checking. Note that some features are to be checked between Attractor and Attractee elements. Under the Copy theory of Movement, the follow-

ing chain is postulated:

$$(1) (\alpha_1, \alpha_2, \dots, \alpha_i, \dots, \alpha_{n-1}, \alpha_n)$$

Where α_1 = the Head and α_n , its tail. A Feature set in α_n is copied to α_{n-1} , and it is copied to another members satisfying locality conditions cyclically up to the head, α_1 . As has been mentioned above, the chain is formed under the condition of locality, thus, the formed chain is uniform and perfect in the sense of derivation. As a consequence, it is not impossible to reduce the chain into a simple chain only consisting of the head and its tail as in (2):

$$(2) (\alpha_1, \alpha_2)$$

In (2), α_1 = Head, α_2 = Tail.

This renormalization is a short cut path for economy. α_1 is a clone of α_2 , which is a trace of α_1 in classical model of generative grammar. Trace is in fact a set of features including FF, semantic features, ϕ -features among others⁴. In the Copy theory, traces are visible at (narrow) LF, while they are invisible at PF⁵. By visible, we mean that traces can be seen as a set of features in the original position to subsequent intermediate positions in a cyclic derivations at LF. At PF we can only see the head of a chain, thus, cannot see traces consequently. (Cf. Chomsky 2000a.) Note that the trace of the tail possesses a set of full features (a bundle of features) satisfying the FI. On the other hand, intermediate traces are not necessarily a set of full features. Intermediate members of a chain ($\alpha_2, \dots, \alpha_{n-1}$) may or may not lack some features of the trace of the tail of a chain as long as the chain is uniform. It follows that the intermediate members of a chain must be uniform. If the intermediate members of the chain possess different features as such a case that some traces possess a feature, which other members of the traces do not possess, then the chain in question would no longer maintain uniformity. Thus, the derivation crashes.

2. The Optimal Derivations of Relative Clauses

As is well known, there exist two types of relative clauses (RC): one is an external headed RC, which has two variants with regard to the position of the head, either head-initial or head-final as in (3a, b), while the other is an internally headed RC as in (3c):

- (3) a. DP [RC e] (Head-Initial RCs)
 b. [RC e] DP (Head-Final RCs)
 c. [RC DP] α (Head-Internal RCs)

Where DP is a head (antecedent) of RCs in each structure and *e* shows a gap which associates with its antecedent. The structure as in (3a) is an instance for the head initial language, while the one like (3b), an example for the head final language. A special attention goes to (3c). The structure is that of the head-internal relative clauses, which is not compatible with the classification of the head position of the language. Furthermore, the structure of this type also contains an element, α that follows the RC, which at PF appears to be an allomorpheme with the determiner overtly or covertly dependent upon languages. Or the element turns out to be a category similar to a nominal marker (nominalizer) as is observed in Japanese (*no*).

Under the Copy theory, the structures in (3) would be as follows:

- (4) a. DP [_{RC} γ [. rel- β ]] (Head-Initial RCs)
 b. [_{RC} [. rel- β ] γ] DP (Head-Final RCs)
 c. [_{RC} rel-DP] α (Head-Internal RCs)

The feature set of β is copied to γ with the overt/covert category of relative feature indicating as *rel-* in (4). Thus, some informal expressions of (4a-b) would be as follows:

- (5) a. DP [_{RC} rel-DP [. rel-DP]]
 b. [_{RC} [. rel-DP] rel-DP] DP

The feature, *rel-* can be realized as a relevant syntactic form subject to the respective languages. English for example, uses relative pronouns which are coincidentally paralleled to interrogative pronouns as are the cases in most of the European languages. Note also that English uses covert relative pronouns informally explained as the deletion of relative pronouns at PF. (3c) would be a structure as (6):

- (6) [_{RC} rel-DP] rel-DP

Hindi RC structures are very peculiar as standard relativization in that there are three types of RCs, which include all of the above mentioned types. Hindi relativization undergoes in such a way that the relative pronoun appears with a demonstrative pronoun which is called a correlative pronoun or marker of relative pronoun *jo*. Both relative and correlative pronouns can change their respective forms according to number and Case, but not gender. Let us consider the following examples:

(7)

- a. [*jo mera: bha:i: daftar se der se lauta:] vah kal ra:t bilkul nahi: soya:*
 rel my brother office from late returned correl last night at all not slept
 "My brother who returned late from the office did not sleep at all last night."

- b. [jo: mera: bha:i: daftar se der se lauta:] ϕ kal ra:t bilkul nahi: soya:
 c. vah mera: bha:i: [jo: daftar se der se lauta:] ϕ kal ra:t bilkul nahi: soya:
 d. vah mera: bha:i: [jo: daftar se der se lauta:] vah kal ra:t bilkul nahi: soya:
 e. mera: bha:i: [jo: daftar se der se lauta:] ϕ kal ra:t bilkul nahi: soya:
 f. mera: bha:i: [jo: daftar se der se lauta:] vah kal ra:t bilkul nahi: soya:

In (7a-b), the head is internalized in the relative clause and the correlative appears in the rightmost position immediately dominated by DP. These two examples are quite similar to the structure of internally headed RCs. Hindi has relative pronoun, *J* which must precede and properly c-command the head of RC. The only difference between (7a) and (7b) is that in (7b), the correlative pronoun, *U* (or determiner in the sense of Williamson (1987)) is phonetically null, presumably a kind of empty categories. (7c) and (7e) are both a head initial head (antecedent) type RCs which may be innovative structures in Hindi. The difference between the two examples is that in (7c) the determiner *vah* appears in the head DP while in (7e) the determiner does not show up. It follows that *vah* represents the restrictive clause while in (7e) *vah* is not introduced. Then, it leads to be non-restrictive. note that Masica (1972) mentions that the unmarked instances as (7a-b) show non-restrictive. (7d) and (7f) are similar constructions in which *vah* appears as a correlative.

Let us consider the following example which is also possible in Hindi:

- (8) [ra:m ne jo xari:di:] vah kita:b bahut mahangi: thi:
 Ram ag. rel bought correl book very expensive was
 "The book which Ram bought was very expensive."

Under the Copy theory of traces, all the variants illustrated in (7) - (8) would be reduced into the expressions as in (8' a-b) respectively:

- (8')
 a. [*J*- mera: bha:i: daftar se der se lauta:] *U*- mera: bha:i: kal ra:t bilkul nahi:
 rel my brother office from late returned correl last night at all not
 soya:
 slept
 "My brother who returned late from the office did not sleep at all last night."
 b. [ra:m ne *J*- kita:b xari:di:] *U*- kita:b bahut mahangi: thi:
 Ram ag. rel-book bought correl book very expensive was
 "The book which Ram bought was very expensive."

Example (8' a) shows that the head noun of RC may appear just as Japanese RCs exemplified as in (9) below. Yet notice that the main difference between (8' a) and its

Japanese equivalent in (9) is that the relative pronoun may stay in-situ in the subordinate clause in Hindi, while there is no explicit relative pronoun in Japanese.

- (9) [Ramu-ga katta] hon-ga taihen takakat-ta
 Ram Nom bought book Nom very expensive-past
 "The book which Ram bought was very expensive."

It is unlikely to involve movement regardless of overt/covert displacement, in relativization in Japanese. Thus, under the Copy theory of relativization, the relevant derivation of (9) would be illustrated in (10):

- (10) [Ramu-ga *rel*-hon-o katta] hon-ga taihen takakat-ta
 Ram Nom bought book Nom very expensive past

As we have observed earlier, there could exist three types of relative clauses in terms of the head (antecedent): they are head initial RCs and head final RCs which are both familiar in various languages in connection with fixing the value of the head parameter. The third one is a rather peculiar construction whose head is in the subordinate clause. As mentioned in the previous section, such RCs can be observed in various languages and we call them "internally headed" RCs, to which we will return in the next section. Among the consequences of Hindi relativization in addition to other languages such as Lakhota, Japanese, the internally headed RCs reveal the problematic case of the head parameter. The head parameter fails to account for the internally headed RC constructions simply by fixing the value of + or -, hence the parameter seems to be suspicious in its existence.

3. Diachronic Observation on Relativization

As has been assumed in the literature, Hindi relativization does not involve *wh*-type movement as is the case in English. Basically as has been observed in the previous section, Hindi relativization is constituted by the relative-correlative structure, i. e. the relative pronoun seemingly appears in RCs while correlative pronoun appears in the main clauses at the right edge of the RC. This strategy of relativization is not unique but is widely spread in languages across the language families. (Cf. Bianchi (1999) and references cited there for Mandingo, Latin, Sanskrit, Old English and Hindi, for which also see Imai (1981), (1989), and Williamson (1987) for Lakhota). Notice that the relative-correlative constructions are possible in Old English. Let us consider the following Old English examples:

- (11) [CP [DP *thone stan*]_i the tha wyrntan awurpon], [*thes*_i is
 the-ACC stoneACC that the workers rejected, thatNOM is

gewerdet on thaere hyrnan heafod]

become on the corner head (Bianchi 1999:36)

“The stone that the workers rejected has become the corner-stone.”

(12) ure Drihten araerede [_{DP} anes ealdormannes [_{NP} [_{NP} dohtor]

our Lord raised an aldormanGEN daughterACC

[_{CP} seo the laeg dead]]

whoNOM that lay dead

(Bianchi 1999: 37)

“Our Lord raised an aldorman’s daughter who lay dead.”

In (11) - (12), the relative element is in fact a determiner merging the NP head (antecedent). And the correlative element, which is anaphorically bound by the head NP merged with the relative morpheme/pronoun in the subordinate clause, appears in the main clause. Thus, the correlative structure version of relativization is actually an internally headed RC.

Following Kayne (1994), Bianchi (1999), we will assume that relativization involves in the raising operation of the head NP rather than the adjunction of CP to the head noun of RC.

Kayne (1994) proposes that relative pronouns are functionally considered to be determiners which move with the associated NP. Thus, the underlying structure for the English relative clause is as follows:

(13) the [C^o [he broke it [_{PP} with which hammer]]]

PP “with which hammer” moves to SPEC, CP, yielding a structure as in (14):

(14) the [with which hammer [C^o [he broke it [e]]]]

(Kayne 1994: (20))

In (14), the NP, hammer raises to SPEC, PP possibly via SPEC, which, then, structure (15) would be derived:

(15) the [_{CP} [_{PP} hammer_i [with which [e]_i]] C^o. . . .

(Kayne 1994: (21))

An approach to English relative clauses in terms of the raising analysis may extend to relative clauses in determinerless languages. Let us consider the following Japanese examples:

(16)

a. [Taro-ga kat-ta] hon-ga nusuma-re-ta

Taro NOM buy Past book NOM be-stolen Past

“A book which Taro bought was stolen.”

b. [Taro-ga hon-o kat-ta] no-ga nusuma-re-ta
 Taro NOM book ACC buy Past NO NOM be-stolen Past

(16a) is a standard Japanese RC while (16b) is an internally headed RC. Note that Japanese is head-final and lacks overt determiners unlike English which is head-initial and has an overt determiner system. Though Japanese, a head-final language lacks any equivalent of English or French type determiners, as I have argued (Imai (1996)), (in)definiteness of a noun could be properly manifested in Japanese. Therefore, it is not so unnatural to assume that on one hand, a null relative pronoun-like element exists and on the other hand, a null/non-null correlative pronoun-like element is utilized in the grammar of a head-final covert determiner languages like Japanese. Thus, (16a-b) will have the representations (17a-b) respectively:

(17)

a. [Taro-ga ϕ kat-ta] hon-ga nusuma-re-ta
 Taro NOM Null rel buy Past book NOM be-stolen Past
 pro

“A book which Taro bought was stolen.”

b. [Taro-ga [ϕ hon-o] kat-ta] no-ga nusuma-re-ta
 Taro NOM Null rel book ACC buy Past Correl NOM be-stolen Past
 pro

(17a) is the similar construction as Hindi counterpart (8) in which the overt relative pronoun *jo* appears, repeated here as (18):

(18) [ra:m ne jo xari:di:] vah kita:b bahut mahangi: thi:
 Ram ag. rel bought correl book very expensive was
 “The book which Ram bought was very expensive.”

(17b) corresponds to (7a), repeated here as (19):

(19)

[jo mera: bha:i: daftar se der se lauta:] vah kal ra:t bilkul nahi: soya:
 rel my brother office from late returned correl last night at all not slept
 “My brother who returned late from the office did not sleep at all last night.”

Important is the subsequent observation that the two linguistically unrelated languages employ the similar account for relativisation. Under the Copy theory of traces, this fact directly follows from the computational system in UG.

4. Concluding Remarks

What we have observed here is that the headed relative structures and correlative structures exist cross linguistically in terms of relativization. The consequence of cross linguistic facts would imply that the nature and variety of relativization in natural languages follow from the universal principles and parameters in the Faculty of Language. Considering the economy of derivation, the Copy theory well explains how the derivation takes place in an economical way, and wherever possible, the principle, "Avoid Pronoun" in Chomsky (1981) is viable in the minimalist program as a more universal principle, "Avoid Overt Element."

Notes

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1. For optimal considerations in physics, see Lemons (1997).
2. For Complexity, Complex Adaptive System, see Morowitz and Singer (1995), Gell-Mann (1994) among others, and for human language and Complex Adaptive Systems, see Hawkins and Gell-Mann (1992).
3. See Freidin (2001) for a somewhat detailed argument on Copy theory.
4. Mitsuki Uehara inspired me to consider the idea that traces are in fact a bundle of features, and consequently, empty categories as a whole must be a set of features.
5. By LF, we mean a narrow LF in the MP model, and we do not postulate the so-called LF movement (covert movement at LF). For wh-movement dispensed with LF movement, see Aoun and Li (1993a), (1993b), Chomsky (1995), Imai (1994), Li (1992), Ouhalla (1996), Shi (1994), Watanabe (1991), (1992), Yanagida (1995) among others.

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