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Merge and Form Copy: Building Structures and Assigning *Copy* Relations*

Hisatsugu Kitahara

1. Defining Merge

Over the last few years, due in large part to a series of lectures and papers of Noam Chomsky (see, among others, Chomsky 2019a,b, 2021a,b, and Chomsky et al. 2019), Merge has undergone an important reconceptualization.

The concept of *workspace* WS is formally recognized as the place where syntactic computation happens. It specifies the current derivational stage, and provides just the information needed to carry the derivation forward. The WS is a set of *syntactic objects* SOs, those available for computation. The notion *Copy* is formally recognized as the relation not created by Merge, but established by *Form Copy* FC, an operation that assigns the relation *Copy* to structurally identical inscriptions.

With these clarifications in place, Chomsky (2021b) proposes the following general definition of Merge:

(1) Merge(X_1, ... , X_n, WS) = WS' = {{X_1, ... , X_n}, W, Y}, satisfying SMT and LSCs.

* What follows is a shorter version of the handout used for the presentation at the Keio Study Group of Generative Grammar, held on March 26, 2022. I would like to thank all the participants for their very helpful comments and suggestions. This handout contains materials based on the intensive discussions with a group formed by the late Samuel D. Epstein, and I would like to thank the group members, Noam Chomsky, T. Daniel Seely, Riny Huijbregts, Sandiway Fong, Andrew McInnerney, Yushi Sugimoto, and Bob Berwick, for very insightful and stimulating ideas. All remaining errors are, of course, my own.

In (1), Merge is reformulated as an operation that applies to the WS and yields a new WS, satisfying general 3rd factor principles under *the strong minimalist thesis* SMT and *language-specific conditions* LSCs, in particular, the principles of *theta theory* TT.

In this paper, tracing the Merge-based framework outlined by Chomsky (2021b), we examine how Merge builds structures, and FC assigns *Copy* relations to structurally identical inscriptions. We identify the search algorithm that Merge adopts, and clarify how applications of Merge are restricted to *External Merge* EM and *Internal Merge* IM, while all other extensions of Merge are excluded as illegitimate applications. We also demonstrate how FC applies to structurally identical inscriptions and takes them to be copies that are interpreted in exactly the same way. Finally we examine the four core cases discussed in Chomsky 2021b, and explain how they receive a principled analysis under current assumptions.

2. Subjecting to SMT and LSCs

Merge is defined as (1), but given SMT, Merge builds structures in the simplest fashion. What is minimally needed for building structures is two objects, and by parsimony, two is enough (unless necessary on empirical grounds). Thus, n=2, and Merge forms $\{X_1, X_2\}$ and added to WS'.

What else besides $\{X_1, X_2\}$ appears in WS'? W is whatever is unaffected by the operation, hence it must be carried over if nothing is fully eliminated in the simplest computation (Chomsky 1986). Thus, WS' includes every term of WS as its term (where α is a term of β if α is a member of β or a member of a term of β). Y is null if Merge adds just one new accessible term, namely $\{X_1, X_2\}$, to the WS; hence, accessibility increases by only one from WS to WS'; thereby limiting the search space for further operations (see also Fong et al. 2019). This condition is called *Minimal Yield* MY.

Given these conditions of computational efficiency, Chomsky (2021b) shows that Merge, defined as (1), naturally comes out as (2) (where $Y \in \{ \dots \}$ if $Y \in$ WS and Y is neither P nor Q):

(2) Merge(P, Q, WS) = WS' = {{P, Q}, ... }, satisfying SMT and LSCs.

In (2), Merge searches the WS, selects P and Q, forming {P, Q}, and yields a new WS'. There are two steps involved in the search of P and Q. Given SMT, the first step searches the WS and selects its member. The second step has two options: searching into the selected member or returning to the WS. The former yields IM, and the latter EM. If both are available, the least search option, namely IM, is forced.

Chomsky (2021b) argues that the simplest search naturally allows EM and IM, but no other extensions of Merge. Take a concrete case, WS = {P, {Q, R}}, and ask whether Merge, applying to the WS, can yield a new WS' ={{P, Q}, {Q, R}}.

Suppose Merge, searching the WS, finds its member P, and then returning to the WS, finds its member {Q, R} (yielding EM). Then, the search terminates, because Merge finds two items, enough to form a binary set. Suppose Merge, searching the WS, finds its member {Q, R}, and then searching into {Q, R}, finds its term Q (yielding IM). Then, the search terminates, because Merge finds two items, enough to form a binary set. Thus, given the simplest search, EM and IM naturally follow, while all other extensions of Merge do not survive.

Turning to LSCs, Chomsky (2021b) formulates *the Duality of Semantics* as a constraint on Merge: for A-positions, EM and EM alone fills a θ-position. If the next step is to fill a θ-position, then, by definition, EM, not IM, carries out this task. The Duality of Semantics simplifies the computational process by restricting the application of Merge.

3. Understanding Form Copy

The notion *Copy* is formally recognized as the relation not created by Merge, but established by FC that assigns the relation *Copy* to structurally identical inscriptions. But how does FC work?

In propositional calculus, for example, FC applies to all structurally identical inscriptions, and the relation *Copy* is guaranteed, meaning there is no repetition. But

in I-language, FC optionally applies to those structurally identical inscriptions in certain configurations; hence, there are repetitions. In other words, what is unique about I-language is the presence of repetitions (not copies). In I-language, regardless of whether EM or IM, Merge can create structurally identical inscriptions, but unless FC assigns the relation *Copy* to them, they are interpreted as repetitions.

With these notions in place, Chomsky (2021b) proposes that FC, applying at the phase level, assigns the *Copy* relation to those structurally identical inscriptions X, Y, located in the c-command configuration, accessible by *Minimal Search* MS, and visible under *the phase-impenetrability condition* PIC.

FC is free to apply, and when it applies, it takes those structurally identical inscriptions to be copies, and they are interpreted in exactly the same way, in compliance with another LSC, called the principle of univocality. Suppose τ assigns a θ-role to structural position P(τ). Then X is θ-linked to P(τ) if a copy of X occupies P(τ) (where *Copy* is taken to be reflexive). With these notions, Chomsky (2021b) formulates the principle of univocality as follows: A θ-assigner τ assigns one and only one θ-role to elements θ-linked to P(τ).

If FC creates a *Copy* relation that violates the principle of univocality, it will be an intolerable situation for interpretation. But as long as the principle of univocality is met, whether such inscriptions are formed by EM or IM does not matter, and they are interpreted as copies.

4. Building Structures and Assigning *Copy* Relations

Finally let us examine the four core cases (where X, Y, Z are structurally identical inscriptions), discussed in Chomsky 2021b:

(3) X [see Y]

In (3), *see* assigns one θ-role to X and another to Y. The Duality of Semantics forces EM to introduce X and Y to the θ-positions. FC does not apply to X, Y; hence, they are interpreted as repetitions, as in *many people saw many people*. If FC applied to them, that would violate the principle of univocality, an intolerable situation for

interpretation.

(4) X [seem [Y to win]]

In (4), *win* assigns a θ-role to Y, while *seem* does not assign a θ-role to X. The Duality of Semantics forces EM to introduce Y to the θ-position, and the efficient computation requires IM to introduce X to the non-θ-position. FC applies to X, Y; hence, they are interpreted as copies, as in *John seems to win*. If FC did not apply, that would leave X linked to no θ-position (a residue of the θ-criterion violation).

(5) X [try [Y to win]]

In (5), *try* and *win* assign θ-roles to X and Y, respectively. The Duality of Semantics forces EM to introduce X and Y to the θ-positions. FC applies to X, Y; hence, they are interpreted as copies, as in *John tried to win*. If FC does not apply, they are interpreted as repetitions, as in *John tried John to win*, a case grammatical but unacceptable in externalization.

(6) X [[arrive Y] and [Z [meet Bill]]]

In (6), *arrive* and *meet* assign θ-roles to Y and Z, respectively. The Duality of Semantics forces EM to introduce Y and Z to the θ-positions, and the efficient computation requires IM to introduce X to the non-θ-position. It does not matter whether IM selects Y or Z, because whichever choice is taken, what comes out is the same. FC applies to X, Y, and X, Z; hence, they are interpreted as copies, as in *John arrived and met Bill*. If FC did not apply, that would leave X linked to no θ-position (a residue of the θ-criterion violation).

As shown above, the four core cases receive a principled analysis under the Merge-based system with FC, satisfying SMT and LSCs.

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