Immediate-local MERGE as pair-Merge*

Jun Omune

Kansai Gaidai University

Introduction

In this paper, I eliminate pair-Merge and propose that its desirable effects are deducible from how MERGE applies in the course of a derivation. To fulfill this purpose, in Section 1, I will propose immediate-local MERGE (IL-MERGE), whose name describes the immediately successive application of internal MERGE. Then, in Section 2, I will further discuss why it is not conceptually desirable to postulate the primal operation pair-Merge and why IL-MERGE is a possible solution. In Section 3, inaccessibility, one crucial property of adjunct structures, is discussed under IL-MERGE. Finally, the theoretical and empirical results of IL-MERGE are shown in Section 4. Section 5 concludes the paper.

1. Set-Merge, pair-Merge, MERGE

In the minimalist model by Chomsky (2004, 2013, 2015), syntactic structures are built by two independent operations:

(1) a. (Set-)Merge (a, b) = {a, b}

b. Pair-Merge (a, b) = <a, b>

(1a) yields the unordered set while (1b) forms the ordered pair, which ensures the asymmetric property of adjunction, and they are assumed to apply freely. However, Chomsky (2019a, b, c) argued that Merge is not completely free by revising Merge to MERGE. He examined the nature of the workspace (WS) and how freely Merge applies under general conditions, demonstrating that “parallel Merge, late Merge, and other extensions of Merge do not surface.” MERGE maps WS onto WS' and applies as follows:

(2) For any accessible terms P, Q in WS, MERGE (P, Q, WS) = [{P, Q}, $X_1,...,X_n$] = WS', where

(i) $Y \in WS$ and $Y \neq P, Q \rightarrow Y \in \{X_1,...,X_n\}$

*Some ideas of this paper are first presented as a workshop proposal at ELSJ 12th international spring forum and then at ALC 13. I would like to express my gratitude to Masayuki Oishi, Hisatsugu Kitahara, and Masashi Nomura who accepted to be the presenters of the ELSJ workshop. I am also grateful to the very valuable feedback of Takashi Toyoshima, Sandiway Fong, the members of the 2018–19 Keio Minimalist Syntax Group, the audience at the spring forum and ALC 13, and the anonymous reviewers of this paper.

(ii) accessible terms appear only once in WS'

(iii) $\{X_1,...,X_n\}$ minimal, where "minimal" means n minimal and each X_i minimal

(Chomsky 2019a, b, c; Chomsky et al. 2019; Komachi et al. 2019)

This MERGE-based analysis strongly implies that pair-Merge, which is an independent operation forming an ordered pair (see (1b)), motivated by the asymmetric property of adjunction, is no longer available, provided that forming an ordered pair is a departure from the simplest Merge (1a). Given evolvability, the elimination of pair-Merge is conceptually desirable, (see Chomsky et al. (2019: 249)), but it poses a serious empirical problem: we must find a way to explain the ubiquitous phenomena of adjunction under MERGE. [1]

In set theory, ordered pairs are, by definition, derived from unordered sets as follows:

(3) a. <a, b> = {a, {a, b}}

b. <a, b> = {{a}, {a, b}}

Following Chomsky (2019a, b), I assume that the singleton set {a}, which is a syntactic object, is equivalent to a in syntactic theory. That is, {a} = a where a and {a} are terms of WS. Namely, (3a) and (3b) state exactly the same thing in syntactic theory. The other imaginable unordered sets for the definitions of <a, b> cannot be formed by MERGE or are far more "complex" than {a, {a, b}}. Therefore, it is quite rational that the asymmetric property and structure of an adjunct, which is standardly represented as <a, b>, is ensured by {a, {a, b}}; b in {a, {a, b}} is the adjunct (see also Section 3). Following (3a), I argue that immediate-local application of MERGE, which is just the double application of MERGE, ensures the same effect as pair-Merge.

(4) *Immediate-local MERGE as pair-Merge (see also Omune (2018a, b)):*

Yielding the asymmetric property of adjunction without pair-Merge:

WS = [a, b, X_1, ... X_n] (where P=a, Q=b)

MERGE (a, b, WS) = [{a, b}, X_1, ... X_n] = WS'

MERGE (a, {a, b}, WS') = [{a, {a, b}}, X_1, ... X_n] = WS"

The rest of this paper will show how immediate-local MERGE (IL-MERGE) is conceptually and empirically motivated under the current minimalist framework.

[1] Chomsky (2019a, b) postulates pair-MERGE as an independent structure-building operation.

2. Single first-factor operation hypothesis

Chomsky (2005) premised three factors for (I-)language, regarding the faculty of language as a module of the organism:

(5) a. 1st factor: genetic endowment

b. 2nd factor: experience

c. 3rd factor: language- (or organism-) independent principles

The first factor is, in other words, the topic of Universal Grammar (UG), and the current minimalist theory assumes that UG contains at least two formally distinguished operations: set-Merge (1a) and pair-Merge (1b). However, Occam's razor, which roughly states that the simpler explanation is usually right, suggests that simplicity requires that pair-Merge should be dispensable because postulating two operations is obviously more complex than postulating one operation. In addition, considering language evolution or evolvability, the argument for eliminating pair-Merge is more convincing. Given that humans plausibly acquired the faculty of language quite suddenly on the evolutionary timescale (see Chomsky (2017)), operations ascribed to the first factor must be reduced. That is, the number of computational operations based on the first factor must be less than two; Merge must be the single first-factor operation in syntax. This entails that there is no room for pair-Merge as a primal operation. See also Omune (2018a, b) in this view.

(6) *Single first-factor operation hypothesis:*

Only the single computational operation can build syntactic structures, which ultimately yield "language of thought."

In the current minimalist system (Chomsky 2019a, b, c, Chomsky et al. 2019), Merge is instantiated in MERGE, which applies to WS and maps WS onto WS', as briefly discussed in (2). Thus, what we can posit as the first-factor operation is not pair-Merge but MERGE. If the conceptual consideration so far is on the right track, we need to remove pair-Merge and account for how MERGE can form adjunct structures.

IL-MERGE (4) is a good solution for this aim, since it is not a formally new operation but only involves the application of MERGE. That is, internal MERGE (IM) applies immediately after the first application of external MERGE (EM). Notice that IM and EM are formally the same operation MERGE. Reconsider the definition of MERGE in (2), repeated here as (7).

(7) For any accessible terms P, Q in WS, MERGE (P, Q, WS) = [{P, Q}, $X_1,\ldots,X_n$] = WS', where

(i) $Y \in WS$ and $Y \neq P, Q \rightarrow Y \in \{X_1,...,X_n\}$

(ii) accessible terms appear only once in WS'

(iii) $\{X_1,...,X_n\}$ minimal

If P or Q is from the inside of Q or P, respectively, then the way of the MERGE application is called IM for convenience. The other case is called EM because P and Q are distinct from each other. Given (7), we also reconsider IL-MERGE (4), repeated below as (8) with slight revisions.

(8) *Immediate-local MERGE as pair-Merge:*

WS = [a, b, X_1, ... X_n] (where P=a, Q=b)

a. EM: MERGE (a, b, WS) = [{a, b}, X_1, ... X_n] = WS'

b. IM: MERGE (a, {a, b}, WS') = [{a, {a, b}}, X_1, ... X_n] = WS''

As mentioned in (3), I assume that b in {a, {a, b}} is the adjunct (see Section 3). Also, note that {a, {a, b}} is an asymmetric set simply because {a, {a, b}}≠{b, {a, b}}. Recall that the core property of adjuncts is asymmetrical, and the asymmetric property of adjuncts was represented as <a, b> originally in Chomsky (2000, 2004). That is, adopting the notation <a, b> for adjuncts is just the stipulation to denote the asymmetric property. There is conceptually no reason why we cannot stipulate {a, {a, b}} as the asymmetric relation of adjuncts. Some may be concerned that IL-MERGE adds the extra mathematical/set-theoretic axiom as in (3), which leads us to suspect that the faculty of language innately has mathematical knowledge. However, this is not the case. Adopting {a, {a, b}} as an adjunct relation is again just a stipulation and coincidently accords with the equation in (3). Thus, given the single first-factor operation hypothesis, it is conceptually better to assume that the asymmetric set {a, {a, b}} represents an adjunct structure rather than to adopt pair-Merge.

Another essential property of adjuncts is inaccessibility: the adjunction condition states that we cannot extract objects from an adjunct phrase, and “excorporation” is arguably impossible in syntax. That is, pair-merged objects become inaccessible because the objects are assumed to be on a separate plane (Chomsky 2004), although stipulating the separate plane is motivated only by empirical reasons such as the adjunction condition. Thus, if another stipulation can explain why the term b in the asymmetric set {a, {a, b}} is inaccessible, and IL-MERGE has the same empirical coverage, then the proposal is proven to be greater than adopting pair-Merge. In what follows, I will tackle this task.

3. Inaccessibility under occurrence

Chomsky (2000: 115) states that "an occurrence of x is a sister of x." Capitalizing on the definition, Epstein et al. (2016: 91) further state that "an occurrence of x is a sister-category merged to x by set-Merge." That is, "occurrence," which identifies positions of terms, is defined based on a sister relation created by MERGE. Following the definition, in {x, {x, y}}, two occurrences of x are y and {x, y}. But what exactly is {x, y}? The x in {x, y} is the lower copy and hence not accessible. In addition, {y} is equivalent to y under the bare phrase structure (see also Chomsky (2019a, b)). This means that {x, y}, in which x is a lower copy, is, in effect, equivalent to y when the third-factor minimal search locates x and {x, y} in {x, {x, y}}. Therefore, there are two copies of x, but there is one and only one occurrence of x in {x, {x, y}}. In other words, x derivationally merges internally but representationally does not merge internally; x "segments" and thus is "segment category." It follows that MERGE/minimal search cannot identify the occurrence of y because there is one possible segmented sister whose status is "incomplete." MERGE/minimal search cannot access y in {x, {x, y}} formed by IL-MERGE. Consequently, IL-MERGE reformulates the segment category under the definition of occurrence, which induces the inaccessibility of adjuncts. In short, the stipulations (9), (10) hold.

(9) *Segment category and adjunct:*

In {x, {x, y}}, x segments, and y is an adjunct because

i. the occurrence of y is x, two sisters of which are y and {x, y} that is in effect y when x is the lower copy, and

ii. given (i), the occurrence of x is y, meaning there are two derivational copies of x, but one and only one representational copy of x exists.

(10) *Inaccessibility of terms in the adjunct relation {x, {x, y}}:*

The term y in {x, {x, y}} is not accessible because neither MERGE nor minimal search identifies the position of y whose occurrence is x that segments.

The stipulations in (9), (10) are not newly introduced but just deduced by the already assumed notion of "occurrence," which is essential to ensure analogous effects as Chain (Chomsky 2000). Recall that we do not want to add conceptually unmotivated rules or stipulations such as pair-Merge along with a separate plane. IL-MERGE along with (9) and (10) is a reasonable consequence of conceptually motivated conceptions: MERGE and occurrence.

Note that it is obscure how to label adjunct structures under Chomsky's (2013, 2015) labeling algorithm, but the standard labeling process may occur in {x, {x, y}} because the copies of x are the only accessible candidates for the labels of {x, {x, y}} and {x, y}. Namely, the labels of them may be x.

4. Theoretical and empirical consequences

IL-MERGE implies that the so-called anti-locality hypothesis is on the right track even under the free-MERGE model since it yields adjunct structures.

(11) *Anti-Locality Hypothesis:*

Movement [that is internal MERGE] must not be too local (Grohmann 2003: 26).

The anti-locality hypothesis was motivated by feature checking in a local domain. Roughly, once x and y are merged, and the features of them are already in a maximally local checking domain, further local IM of x or y does not satisfy feature requirements. However, the feature checking system, which triggers IM for feature checking, is not tolerable because MERGE "applies freely," meaning MERGE is not a triggered operation. Therefore, anti-locality needs to be reinterpreted under freely applied local-MERGE.

(12) *ALH under IL-MERGE:*

Internal MERGE yields an adjunct structure if its application is too local.

Thus, too local movement is not banned but yields an adjunct structure that does not bear the standard interpretation of complementation. That is, IL-MERGE has consequences at the interface, creating the adjunct relation with a different interpretation (see (18)).

Adjunct structures are everywhere in linguistic expressions. I demonstrate how XP-adverbials such as topicalization, and heavy-NP shift, along with the adjunction condition, are instantiated by IL-MERGE below.

(13) *vP-adverbials (He ran quickly)*

Given WS = [vP, adv, X], MERGE (vP, adv, WS) = [{vP, adv}, X] =WS'

MERGE (vP, {vP, adv}, WS') = [{vP, {vP, adv}}, X] = WS''

Due to the adjunct relation {vP, {vP, adv}}, adv (*quickly*) is regarded as the adjunct.

(14) *Topicalization (This book, I really like)*

Given WS = [{EA, {T, {v, … IA}}}, C],

MERGE (IA, {EA, {T, {v, … IA}}}, WS) =

WS' = [{IA, {EA, {T, {v, … IA}}}}, C]

MERGE ({EA, {T, {v, … IA}}}, {IA, {EA, {T, {v, … IA}}}}, WS') =

WS'' = [{**{EA, {T, {v, … IA}}}**, {IA, **{EA, {T, {v, … IA}}}**}}, C]

= [{**TP**, {IA, **TP**}}, C]

In the structure {TP, {IA, TP}}, IA is the adjunct.

(15) *Heavy-NP shift (I gave to John everything that he demanded. (Larson 1988: 34))*
After IL-MERGE (abstracting away irreverent parts),
WS = [{{give to John}, {{everything that…}, {give to John}}}]

The resultant structure in (15) is coincidently equivalent to the one suggested by Larson (1988: 34). That is, IL-MERGE formally supports his suggestion.

(16) *Adjunction condition (*who did Mary cry [after John hit ~~who~~] (Huang 1982: 50))*
After IL-MERGE and subsequent applications of MERGE,
WS = [{who, {CP,…,{XP, {XP, [after John hit ~~who~~]}}}}]

Given (9) and (10), the extraction of *who* from the adjunct phrase *after John hit who* is barred: the adjunct condition is explained correctly under IL-MERGE. As Chomsky (2019a, b) also mentions, the inaccessibility of adjuncts is not crystal clear. Some (interiors of) adjuncts are accessible ((17b): Borgonovo & Neeleman 2000: 200).

(17) a. How did John hit Mary?
b. What did John arrive [$_{ADJ}$ whistling t_{wh}]?

We need further investigations to account for all phenomena of adjunction, but I assume that IL-MERGE simply does not apply in such cases. Notice that when MERGE applies is completely free, but the resultant bad structures that violate interface conditions or give rise to deviant expressions are filtered out after the structures have been transferred to interpretive systems. As (18) shows below, (18a) is ambiguous between complementation and adjunction, whereas (18b) has only one interpretation (i.e. complementation).

(18) a. John decided on the boat.
b. What did John decide on ___ ? (Chomsky et al. 2019: 249)

The analyses so far suggest that the two interpretations emerge, depending on whether IL-MERGE applies or not. That is, the complementation {decide, [on the boat]} and the adjunction {decide, {decide, [$_{ADJ}$ on the boat]}} contribute different interpretations in (18a). In contrast, IL-MERGE does not apply in (18b) because *what* is extracted from the base position.

The adjunct structure in (18a) is an example of X-YP (i.e head-phrase) adjunction while the other cases above are instantiations of XP-YP (i.e. phrase-phrase). The X-YP case has not been discussed much in the literature, but Carnie (2000: 91) observed an interesting fact shown below.

(19) a. He I-don't-cared his way out of the room.

b. She I'm-from-New-Yorked her way into the men's room.

If the verbs—*I-don't-cared* and *I'm-from-New-Yorked*—are embodiments of head-phrase adjunction, then IL-MERGE forms the following structure.

(20) Given WS = [CP, v, X,…], MERGE (CP, v, WS) = [{CP, v}, X,…] = WS'
MERGE (CP, {CP, v}, WS') = [{CP, {CP, v}}, X,…] = WS"

The WS" formed by IL-MERGE explains the non-extractability of *who* and *where* in the following examples cited from Carnie (2000: 91):

(21) a. * Who did he [~~who-~~don't-cared] his way out of the room?
b. * Where did she [I'm-from~~-where-~~ed] her way out of the room?

The adjunct relation shown in (20), which is {CP, {CP, v}}, is the example of head-phrase adjunction. In other words, {CP, {CP, v}} is one verb though it contains the entire sentence (i.e. CP). Generally, we cannot extract anything from one word, and that is why the *wh*-phrases in (21) are not extractable.

5. Concluding Remarks

The paper has discussed that IL-MERGE replaces pair-Merge under the single first-factor operation hypothesis, since IL-MERGE is not only conceptually desirable but also empirically motivated.

Notice that all the adjunct structures we have seen are built by a strictly "cyclic" application of MERGE. The remaining case we have not discussed is the head-head adjunction, and one of the well-known cases is the traditional head movement that is obviously "counter-cyclic." However, counter-cyclic movement including the traditional head movement is not tenable under MERGE (Chomsky 2019a, b; Kitahara 2019). Thus, traditional head raising cannot be implemented under IL-MERGE, although a cyclic head-head adjunction such as an external pair-Merge of heads can take place. Epstein et al. (2016) argued that bridge-verbs such as *think* had the adjunct structure <R_{think}, v> formed by an external pair-Merge of heads (where R_{think} represents the root of *think*). Let us consider the case under IL-MERGE below:

(22) Given WS = [R, v, X,…], MERGE (R, v, WS) = [{R, v}, X,…] = WS'
MERGE (R, {R, v}, WS') = [{R, {R, v}}, X,…] = WS"

The WS" can be built without violating the cyclic requirement of MERGE. Overall, IL-MERGE suggests that the same effect as external/internal pair-Merge holds as long as MERGE applies "cyclically." However, "counter-cyclic" adjunction such as the traditional head movement could be part of externalization.

References

Borgonovo, C., & Neeleman, A. (2000). Transparent Adjuncts. *Canadian Journal of Linguistics*, *45*, 199–224. doi: 10.1017/S0008413100017680

Carnie, A. (2000). On the definition of X^0 and XP. *Syntax*, *3*, 59–106. doi: 10.1111/1467-9612.00026

Chomsky, N. (2000). Minimalist inquiries: The framework. In R. Martin, D. Michaels, & J. Uriagereka (Eds.), *Step by step: Essays on minimalist syntax in honor of Howard Lasnik* (pp. 89–155). Cambridge, MA: MIT Press.

Chomsky, N. (2001). Derivation by phase. In M. Kenstowicz (Ed.), *Ken Hale: A life in language* (pp. 1–52). Cambridge, MA: MIT Press.

Chomsky, N. (2004). Beyond explanatory adequacy. In A. Belletti (Ed.), *Structures and beyond* (pp.104–131). Oxford: Oxford University Press.

Chomsky, N. (2005). Three factors in language design. *Linguistic Inquiry*, *36*, 1–22. doi: 10.1162/0024389052993655

Chomsky, N. (2013). Problems of projection. *Lingua*, *130*, 33–49. doi: 10.1016/j.lingua.2012.12.003

Chomsky, N. (2015). Problems of projection: Extensions. In E. Di Domenico, C. Hamann, & S. Matteini (Eds.), *Structures, strategies and beyond: Studies in honour of Adriana Belletti* (pp. 3–16). Amsterdam: John Benjamins. doi: 10.1075/la.223.01cho

Chomsky, N. (2017). The language capacity: Architecture and evolution. *Psychonomic Bulletin & Review*, *24*, 200–203. doi: 10.3758/s13423-016-1078-6

Chomsky, N. (2019a). MIT Lectures, April 10, 12, 2019. Retrieved from http://whamit.mit.edu/2019/0 5/06/noam-chomskys-lectures-now-online/

Chomsky, N. (2019b). UCLA Lectures, April 29, May 2, 2019. Retrieved from https://linguistics.ucla.edu/noam-chomsky/

Chomsky, N. (2019c). Some puzzling foundational issues: The Reading program. *Catalan Journal of Linguistics Special Issue*, 263–285. doi: 10.5565/rev/catjl.287

Chomsky, N., Gallego, Á., & Ott, D. (2019). Generative grammar and the faculty of language: Insights, questions, and challenges. *Catalan Journal of Linguistics Special Issue*. 229–261. doi: 10.5565/rev/catjl.288

Epstein, S. D., Kitahara, H., & Seely, D. (2016). Phase cancellation by external pair-Merge of heads. *The Linguistic Review*, *33*, 87–102. doi: 10.1515/tlr-2015-0015

Grohmann, K. K. (2003). *Prolific domains: On the anti-locality of movement dependencies*. Amsterdam: John Benjamins. doi: 10.1075/la.66

Huang, C.-T. J. (1982). *Logical relations in Chinese and the theory of grammar*. Doctoral dissertation, MIT.

Kitahara, H. (2019). *(Head-)Adjunction by pair-MERGE*. Paper presented at ELSJ 12th International Spring Forum.

Komachi, M, Kitahara, H., Uchibori, A., & Takita, K. (2019). Generative procedure revisited. *Reports of the Keio Institute of Cultural and Linguistic Studies*, *50*, 269–283. [available online]

Larson, R. (1988). On the double object construction. *Linguistic Inquiry*, *19*, 335–391.

Omune, J. (2018a). Reformulating pair-Merge of heads. *English Linguistics*, *34*, 266–301.

Omune, J. (2018b). *Reformulating pair-Merge, inheritance and valuation*. Doctoral dissertation, Kansai Gaidai University. Retrieved from http://www.kansaigaidai.ac.jp/common/pdf/info.disclosure.theses.ko60_dissertation.pdf

©Jun Omune

Kansai Gaidai University

omune@kansaigaidai.ac.jp

Coyote Papers Volume 22 (2019)