How to Numerate and What to Compute; An Alternative Approach to Solve the Late Merge of Adjunct

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Im, Chegyong. 2009. How to Numerate and What to Compute; An Alternative Approach to Solve the Late Merge of Adjunct. *The Linguistic Association of Korea Journal.* 17(3). 1-24. The purpose of this paper is to suggest an alternative way to solve the problem of late merge of adjunct. The concepts of Numeration and Computation suggested in the Minimalism-based works should be reconsidered for the appropriate explanation of the structure. Revising Stroik and Putnam (2006)'s recent suggestion of "Survive and Remerge", we argue that adjunct is late merged under the assumption that the operation "Select" is possible all the way before Transfer.

Key Words: Numeration, Computation, Late Lexical Insertion, Adjunct, Survive, Remerge, Select, Transfer

1. Introduction

Chomsky (2000: 99) argues that in formal complexity theory, "operative complexity" that enters into the cognitive science should normally be disfavored. He compares language processing to an automobile and if an automobile has to carry along a petroleum-processing plant, that would amount to adding bounded "complexity", resulting in "a poor design".

One of his assumptions in the minimalist framework is that none of the operations of the computational system require reference-set comparisons. To keep his "Bare Output Condition", you have to produce only what is selected from the Lexicon, nothing else. Once you select a lexical array from LEX, then map LA to expressions, you are doomed to dispense with further access to LEX; you cannot recourse to Lex. He asserts that if the derivation accesses LEX at every point, it must carry along this huge beast, rather like cars that have to replenish fuel supply constantly (Chomsky 2000; 100).

This paper challenges the traditional notions of Numeration and Computation of the Minimalist Program with some instances found in Stroik (1999), Stroik and Putnam (2006) and Putnam (2006) plus Reinhart (2006)'s argumentation that interpretation-based reference-set comparisons are needed to replenish the shortage of the (contextual) interface convergence.

We agree, as assumed in the Minimalist Program, that the cognitive system consists of a computational system and a lexicon. The lexicon specifies the elements that a computational system selects and integrates to form linguistic expressions--(PF, LF) pairings. The lexicon, whether the categories are substantive or functional, should provide the information that is required for a computational system.

The traditional concepts of Numeration and Computation, however, can be challenged if we consider the later process of derivation. Though once-and-for-all selection from the lexicon and the Merge of the selected items cost nothing as argued in Chomsky (1995, 2000, 2001), the computed syntactic objects cannot sometimes reach the interfaces intact; they have to Move somewhere (as the Last Resort) to satisfy output conditions at the PF and LF interfaces. Or some constructions have to be reconstructed at LF to get the proper interpretation (Fox and Nissenbaum (2002)'s proposal for adjunct constructions, among other things).

Stroik (1999), Stroik and Putnam (2006) and Putnam (2006), in their version of Minimalism called "Survive", assert that the optimal Minimalist syntax will have only strictly local Merge operations that map elements from the Numeration onto the Derivation. For them, there are only two such types of syntactic operations: Merge, which concatenates, in D, two elements from N (what actually gets merged are copies of elements of N--the originals of which continue to be contained in N); and Remerge, which remerges into D syntactic objects SOs in N that have already been merged but still have concatenative features that must be checked (these features have "survived" previous applications of Merge). They argue that to maximally simplify processing, these operations will not have look-back or look-ahead properties, eliminating Attract or Agree operation and Internal Merge operations.

Our assumptions on Numeration and Computation start with the notion of Selection. We do not believe that derivations make a one-time selection of a lexical array from Lex, and then map LA to expressions, dispensing with further access to Lex. Rather, we believe that all the syntactic operations happen in the sphere of Lex, selecting a lexical item when necessary. We also assume that the bare LIs with their primitive, underspecified phonological, semantic and syntactic features come into computation (e. g., Merge), producing a set of expressions. As they Merge, the syntactic relations provide the possible places where each LI can occur. There could be more than one place for the occurrences of the same item. So there needs to be a principle that decides the most appropriate candidate to guarantee the legitimacy at the interfaces. We argue the principle of "The Most Specified Survival" suggested in Im (2007, 2008a, b) ensures the legitimacy as well as the final concatenation of word order. The final operation which the merged LIs should go through is DRESS, so called because the bare LIs are provided with the appropriate morphemes according to the features specified during the process of Merge. The operation DRESS ensures the legitimate structure for the legibility at SM interface.

2. Select and Compute

2.1 Basic assumptions

What Chomsky (1995) assumed in his Minimalist Program is that a linguistic expression (π, λ) must be based on the same lexical choices to satisfy the compatibility at the PF and LF interfaces. For that purpose, mapping of some array of lexical choices to the pair (π, λ) is necessary. Numeration is assumed to be a set of pairs (LI, i), where LI is an item of the lexicon and i is its index, the number of items that LI is selected.

The operation Select is a procedure that selects a lexical item from the numeration, reducing its index by 1, introducing it into the derivation as SOn+1.

If Select does not exhaust the numeration, no derivation is generated and no question of convergence or economy arise. Chomsky argues that the syntactic objects formed by distinct applications of Select to LI must be distinguished; two occurrences of the same pronoun *he* in "He thinks that he is right." for example, may have entirely different properties at LF. The initial array is needed not only to express the compatibility relation between π and λ but also to fix the reference set for determining whether a derivation from A to (π, λ) is optimal.

Given the numeration, CHL computes until it forms a derivation that converges at PF and LF with the pair (π, λ), after reducing N to zero. The obvious proposal of Chomsky is that derivations make a one time selection of a lexical array from LEX, then map LA to expressions, dispensing with further access to LEX. He asserts that if the derivation accesses LEX at every point, it must carry along this huge beast, rather like cars that have to replenish fuel supply constantly (Chomsky 2000; 100).

A first operation Merge takes two syntactic objects (α, β) and form K(α, β) from them. A second operation Agree establishes a relation (agreement, Case checking) between an LI α and a feature F in some restricted search space. A third operation is Move, combining Merge and Agree.

2.2 Mechanisms to sanction the theory and counter examples

Given the basic operation of Merge, we need a condition to reduce too much computational complexity under the spirit of economy; Inclusiveness Condition (Chomsky 1995: 228);

> [A]ny structure formed by the computation is constituted of elements already present in the lexical items selected for N; No new objects are added in the course of computation apart from rearrangements of lexical properties.

This "rearrangement" is the only operation permitted in the course of derivation. Once the features of a syntactic object are selected, they should be checked without inducing new objects before they reach the interfaces. So the Last Resort they have to choose is the movement operation till they meet another object which can check the features not yet valued or specified[1]. Why, we can ask, is Move possible, if Agree and Merge preempt Move? The answer would be: pure Merge in Θ-position is required of arguments. That is, pure Merge of arguments in non-Θ-position is barred and correspondingly restricts Move to such position. (Chomsky 2000: 106)

If we inspect the output conditions, we find that items commonly appear "displaced" from the position in which the interpretation they receive is otherwise represented at the LF interface. To solve "the imperfection" of the dual semantic interpretation (the former enters into determining quasi-logical properties such as entailment and Θ-structure, the latter such properties as topic-comment, presupposition, focus, specificity, new/old information, agentive force, and others), dislocation property is required to mark the difference in some systematic way (Chomsky 2000: 121).

Among many questions we can raise on the vulnerability of the Minimalist mechanisms, the most highlighted one would be: Can we do without "movement" including LF reconstruction?[2]

As asserted in Im (2007), the necessity of providing constraints to prevent improper movement as well as the spirit of movement has been succeeded by the Minimalist Program (MP) in which the brutal operation of government is replaced by more human operation of Agree for the licensing of movement. Still, we have to Probe down the field to find a Goal to Agree with each other during the derivation which is assumed to be strictly cyclic, with the phase level playing a crucial role. Besides, movement is possible only if an element has uninterpretable features to be checked or Agreed (Activation Condition, See Chomsky 2000, 2001, for detail).

Whatever mechanism is employed, movement presupposes moving an element from one domain (one local area or phase) to another domain, which

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1) The operation Move establishes agreement between α and F and merges P(F) to αP, where P(F) is a phrase determined by F and αP is a projection headed by α. P(F) becomes the specifier of α. Move of P to [Spec, Φ] is A-movement, where Φ is an agreement feature (Φ-feature); other cases of Move are A'-movement.

2) The scholars working on HPSG or LFG have been skeptical about the necessity of the movement operation. They argue that the operation does not yield as much profits as problems.

must obey Phase Impenetrability Condition to reduce the burden of retaining earlier stages of derivation in the phonological component (Chomsky 2001: 10). Besides, as long as the movement itself is induced by some other mechanisms or human language properties such as Case, EPP or some semantic change (in the sense of semantic dualism, (eg. Object Shift, among other things), the movement is ego-centric.

2.3 LF Reconstruction

One example of semantic movements to guarantee the convergence at C-I interface is Scope Reconstruction of QP at LF suggested in Fox and Nissenbaum (2002). The two scope possibilities in (1) yielding different semantic interpretations (2) might guarantee LF-reconstruction analysis

(1) Someone from New York is likely t to win the lottery
(2) a. It is likely that there will be someone from New York who wins the lottery
b. There is someone from New York who is likely to win the lottery.

Fox and Nissenbaum (2002) argue that the choice of scope for the QP is determined by its position in the LF-specifically, the QP takes its sister as its scope. This means that scope reconstruction requires LFs in which the QP does not appear in its surface position but rather occupies a pre-movement position.

(3) Syntactic reconstruction of (1)
is likely [[someone from New York] [to win the lottery]]

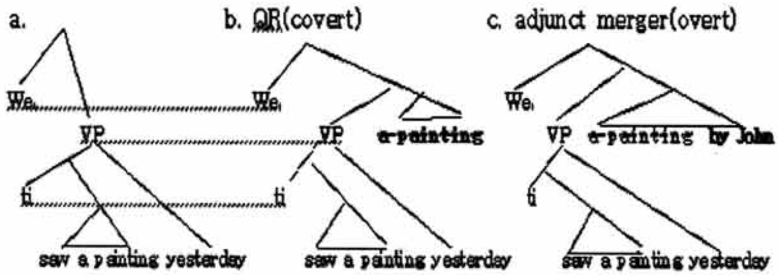
They argue that Condition A of the binding theory can serve as an additional ground for syntactic reconstruction. Compare the following two constructions.

(4) a. *[.. NP1 .. [Local binding domain .. [NP2 ... anaphor1 ..]..]]
b. *I asked [John and Mary]1 if Bill liked [NP2 pictures of each other1]
(5) a. [... NP1 .. [NP2 .. anaphor1 ..][Local binding domain .. t2 ..]]

b. I asked [John and Mary]1 [NP2 which pictures of each other1] Bill liked t2

In Fox and Nissenbaum (1999), they argue that adjunct extraposition is derived by post QR merger of the adjunct based on the two observations: First, the extraposed constituent in adjunct extraposition shows no sign of that it has moved. Second, in adjunct extraposition, the NP with which the extraposed constituent is associated shows every indication that it has undergone QR.

(6) We saw a painting yesterday by John



They propose that adjunct extraposition is derived by two different operations, the first covert and the second overt. First the NP with which the EC is associated (the source NP) undergoes covert movement (QR) to a position (in this case to the right) in which it can be interpreted, and then the EC is adjoined to the source NP[3].

Chomsky (2001) suggests an alternative approach called "qualifications" or "afterthoughts" as in (8).

(7) I gave him [NP a painting] yesterday [ADJ from John's collection]

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3) Chomsky (2001: 19), criticizing the post-cyclic approach of Fox and Nissenbaum (1999), poses a number of problems in their proposal;

One is that late-merge is employed. Possibly the analysis can be reconstructed in terms of cyclic adjunction, but even if so, other problems remain. Dissociation of Spell-Out of adjunct and host is required, but that is problematic. It is also unclear why QR is to the right; a covert operation should have no ordering properties. ... There is also a conceptual question: apart from serving as an empty bearer of adjunction, QR typically does not feed Φ. It should, then, not be part of NS, just as ordering is not.

(8) I gave him [NP a painting] yesterday, (more precisely,) a painting (one) [ADJ from John's collection]

'[H]ere (8) *a painting* is destressed in the adjoined phrase and can undergo ellipsis in the normal way, yielding (7). The scopal and other properties of (7) follow without recourse to QR or countercyclic Merge.' Although the problem of late-Merge or reconstruction can be resolved in his "afterthought" operation, we still need to decide when this "afterthought" operation is applied. If "afterthought" is another form of INSERT, it would be an operation on the way to PF or LF after TRANSFER to satisfy Φ or Σ. The operation, however, implies that it contains the attitude of a speaker as the jargon itself manifests.

Another instance of reconstruction caused by Condition C violation involves the DPs contained in the bracketed wh-phrases in the following constructions.

(9) [which picture of Bill that John likes] did he buy?
*Bill…he/Ok John…he
(10) a. he likes [everything that John writes] *John…he
b. [everything that John writes] he likes Ok John…he

To account for asymmetries such as those in (9) and (10), Chomsky (1993), Lebeaux (1995), Rubin (2003), and Fox (2004) propose two different applications of the Merge operation;.one that applies cyclically and one that applies non-cyclically (i.e., after the application of Move or Remerge operation). Besides positing two applicational platforms of Merge, these theorists also stipulate that all arguments must be merged cyclically, while adjuncts can be merged cyclically or non-cyclically.

These assumptions, together with Chomsky's (1993) Copy theory of movement, will generate the following derivation for (9).

(11) a. he did buy [which picture of Bill] — wh-movement→
b. [which picture of Bill] did he buy [which picture of Bill] – adjunct Merge →
c. [which picture of Bill [that John likes]] did he buy [which picture of Bill]

Importantly, this derivation allows us to explain the co-referential relations in (9): the DP *Bill* in (11c) cannot be co-referential with the pronoun *he* because the pronoun c-commands the most embedded DP copy *Bill*, whereas the DP *John* can be co-referential with the pronoun because the late merger of the relative clause prevents the pronoun from ever c-commanding the DP.

This sort of analysis can account for the data in (9) and (10), but it comes at a cost. In particular, having non-cyclical operations dramatically complicates processing since such operations force derivations to return to, and re-compute, structures already built. In an attempt to simplify processing, Chomsky (2001) eliminates all (expensive) non-cyclical Merge operations. However, purging non-cyclical Merge leaves Chomsky with the problem of how to account for the reconstruction asymmetries in (9).

To solve this problem, Chomsky (2001) proposes that the narrow syntax must have two separate, cyclical Merge operations: argument-Merge (Set Merge) and adjunct-Merge (Pair Merge). Although these two Merge operations are both cyclical, they differ in their structural properties-the output of the adjunct-Merge operation is not structurally visible until it is converted to a Set Merge output via an operation called Simpl. Hence, for Chomsky, the relative clause in (9) is merged into the derivation, as in (12a), but it remains invisible until the derivation reaches (12b). (In (12) the italicized clause is syntactically invisible.)

(12) a. he did buy [which picture of Bill *that John likes*] -- wh-movement →
b. [which picture of Bill that John likes] did he buy [which picture of Bill *that John likes*] -- Simple-operation →
c. [which picture of Bill that John likes] did he buy [which picture of Bill *that John likes*]

It is the structural invisibility of the most embedded relative clause in (12a) and (12b) that keeps the DP John from being c-commanded by the pronoun. Though Chomsky explains the coreferential relations in (9), we should note the fact that to account for these coreferential data, without appealing to non-cyclical Merge operations, Chomsky must complicate his system of operations, in a rather bizarre way, by adding a non-simple adjunct operation (Pair Merge) and a Simp operation that later undoes (makes simple) the output of the adjunct operation.

3. Survive and Remerge

The Survive Principle suggested in Stroik (1999), Stroik and Putnam (2006) and Putnam (2006) radically departs from 'orthodox' minimalism in several areas. Arguably, it eliminates the mechanism known as Internal Merge/Move (Chomsky 1993, 1995, 2001 and Hornstein 2001 among a host of others). The key differences between a theoretical system employing Internal Merge and the one that makes use of the Survive Principle are presented in (20) below.

(13) a. Internal Merge: D → D
b. Survive: N → D

Whereas Internal Merge allows SOs to remain in the derivation after their initial entrance into the narrow syntax (qua External Merge), the Survive Principle incorporates copies of SOs that reside in the Numeration rather than the SOs themselves. Derivation according to Survive is thus the iterative mapping of copies of SOs that exist in the Numeration.

The advocates of this theory argue that this notion has far-reaching theoretical effects on the minimalist program; no longer are notions of the Copy Theory (cf. Chomsky 1995), look-back and/or look-ahead mechanisms, economy constraints and ontological commitments (e.g. phases) deemed conceptually necessary. All of these aforementioned 'essential' components of minimalist syntactic theory are attached to a theory of constituent distal that make use of Internal Merge/Move. The removal of Internal Merge also liberates the theory from these taxing computational constraints. As pointed out by Frampton and Gutmann (2002), look-ahead and look-back mechanisms (i.e. non-cyclic operations) in the grammar impose a massive workload on the CHL. This is clearly an undesirable result in a theory that seeks to minimize to the fullest extent all operations and constraints that function within the grammar[4].

4) The Survive Principle only employs two primitive operations (Merge and Remerge), hence

Stroik and Putnam (2006) offer a re-analysis of the reconstruction data in (16) and (17) that avoids both non-cyclical operations and Chomsky's undoing operations. They propose, in particular, that the Condition C asymmetries in (16) and (17) can be explained within Stroik's (1999, forthcoming) version of minimalism (called Survive). According to Stroik, an optimal minimalist syntax will have only strictly local Merge operations that map elements from the Numeration N onto the Derivation D. To maximally simplify processing, these operations will not have look-back or look-forward properties (this criterion rules out Attract and Agree operations, economy conditions, and Internal Merge operations). For Stroik, there are only two such types of syntactic operations: Merge, which concatenates, in D, two elements from N (what actually gets merged are copies of elements of N--the originals of which continue to be contained in N); and Remerge, which remerges into D syntactic objects SOs in N that have already been merged but still have concatenative features that must be checked (these features have "survived" previous applications of Merge). An abbreviated Survive-derivation can be seen in (14).

(14) a. Merge {hired, Sam} → hired Sam
  b. Survive {Sam}
  c. Merge {was, {hired, Sam}} → was hired Sam
  d. Remerge {Sam, {was, {hired, Sam}}} → Sam was hired Sam

The DP *Sam*, which is merged with the verb *hired* in (14a), must remerge, from N, later in the derivation (see (14d)); this is necessary to ensure that its Case and agreement features, which have survived the verb-merge, are appropriately checked. It is worth emphasizing here that (14d) has been derived without any non-cyclical operations and without any Internal Merge

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bring the theory one step closer to Frampton and Gutmann's (2002) vision of a crash-proof syntax. The Principle also threatens the virtual conceptual necessity of uninterpretable and unvalued features in both the Numeration and in the Derivation; both Merge and Remerge are not viewed as a 'checking' configuration per se, but rather as fusion process of two identical, interpretable features. Unlike the traditional notion of features, Survive only uses interpretable features that are immediately interpretable at the interfaces upon concatenation (e.g. Merge).

operations.

They argue that they can give derivations for (10a) and (10b), similar to the one in (14), adopting a version of Fox's (2004) late adjunct Merge i.e., by allowing adjuncts to merge with an SO prior to Remerge (such a merger should be permissible because the SO is in the Numeration, not in the Derivation; hence the merger will not be non-cyclical). Under this version of late Merge, (10b) could be derived as follows:

(15) a. Merge {likes, everything} → likes everything
b. Survive {everything}
c. Merge {he, {likes, everything} → he likes everything
d. Merge {everything, {John writes}} → everything John writes
e. Remerge {everything John writes, {he, {likes, everything}}} → everything John writes he likes everything

Given that the pronoun in (15a-e) never c-commands the DP *John*, it is possible for the DP and the pronoun to be coreferential. They provide equivalent derivations, and explanations, for the coreferential relations in (9) and in (10a).

Stroik (1999, forthcoming) and Stroik and Putnam (in progress) interpret the displacement of syntactic objects from their based position not necessitated by Attract or Move, but enacted by means of survival. Stroik defines this grammatical primitive as the Survive Principle:

(16) The Revised Survive Principle (based on Stroik 1999: 286)
If Y is a syntactic object (SO) in an XP headed by X, and Y has an unchecked feature [+F] which is incompatible with the feature X, Y remains active in the Numeration.

To provide an illustration of the Survive Principle in action, consider the following sentence in (17) with its derivational history following in (18) (data taken from Stroik (forthcoming): 79-80).

(17) Who snores?
(18) a. Merge {who, snores} → who snores

b. Survive {who}
c. Merge {T, {who, snores}} → T who snores
d. Remerge {who, {T, {who, snores}}} → who T who snores
e. Survive {who}
f. Merge {C, {who, {T, {who, snores}}}} → C who T who snores
g. Remerge {who, {C, {who, {T, {who, snores}}}}} → who C who T who snores

Upon the concatenation of a syntactic object with a head both bearing the matching feature δ through the operation Merge the syntactic object will survive and remain active in the lexicon if the syntactic object bears any additional features not present on the immediately governing head. In the derivation above the wh-item *who* will be mapped into the vP to check its Θ-feature. At this point in the derivation a link is established signaling to the external interfaces (e.g. LF, PF) the thematic identity associated with this concatenate structure. Immediately after the concatenation of <who, snores> (18a) *who* survives from this position due to the additional features it possesses that must be properly licensed through iterative applications of Merge and Remerge in the course of the derivation. In steps (18d) and (18g) *who* remerges from the lexicon in order to properly discharge its agreement and Q-features. Perhaps the term 'discharge' is a bit of a misnomer, because the true motivation behind the sequence of Merge-Survive-Remerge is to generate concatenate structures that are interface interpretable. In this view, the mapping of copies of lexical items into the narrow syntax rather than the objects themselves eliminates the need for Copy Theory and "movement" a priori from the theory, thus providing a purely derivational account of syntactic operations rather than a view of mixed theory that is weakly representational[5].

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5) They argue that the iterative application of Merge-Survive-Remerge also provides a straightforward account to long-distance wh-movement previously unattainable in minimalism.

(i) What$_i$ do [TP t_i you think [CP t_i John likes t_i]]?
(ii) *What$_i$ do [TP t_i you think [CP that John likes t_i]]?

Now let's see how their proposal applies to example (9) again in (19).

(19) a. [which picture of Bill that John likes] did he buy?
*Bill⋯ he/OK John⋯he
b. He bought [a picture of Bill that John likes].
*he⋯Bill/*he⋯John

Both the application of Late Merge and the Simpl operation are untenable options in explaining these Condition C inconsistencies. Late Merge (as currently formulated) requires the "tucking in" of the adjunct [that John likes] into the wh-items which in itself is an undesirable result, while the "peek-a-boo" effects of Simpl cloak the adjunct through some of the derivation and make it visible for syntactic operations and effects later on. Although it is an attractive alternative solution for (9=19), it does not hold up when we consider other adjunct constructions such as the following[6].

In (i) the wh-item *what* must move to the left periphery of the embedded CP, TP and then to its final destination in the matrix CP. Example (ii) shows that *what* must strictly adhere to cyclic movement or else the system will ultimately crash. Any theory of syntax employing either a Move or Attract model of constituent construal must delay the final feature-evaluation and subsequent checking or valuing process until the final C enters the derivation. Furthermore, successive cyclicity is an unsubstantiated formative in these models, i.e. it is a necessary component of the theory although we have little if any proof why it exists. Stroik and Putnam (2006)'s XP-displacement under the Merge-Survive-Remerge mechanism forces the evaluation of the feature identity of all lexical items upon the merger of every head into the narrow syntax. In example (i), after concatenating with V, the wh-item *what* immediately survives (due to its remaining [Q] feature) and remains active in the lexicon for further operations. This syntactic object is an eligible candidate to remerge into the syntax at any time; however, it can only do so when a head with a matching feature appears. Upon every application of head merger an evaluation process takes place within the computation system.

6) The adjunct will be syntactically invisible in the embedded VP in (20b), where it is Pair-Merged. Now we face a problem. We need to move the adjunct from its embedded position into its displaced position in the matrix sentence (20a). However this adjunct can't get a free ride the way the adjunct in (19a) does. While the adjunct (19a) is contained within a wh-constituent that gets displaced by the wh-movement, the adjunct in (20a) can't get a free ride; it will have to move on its own accord. Since the adjunct should be visible for the IM operation, it will have to undergo SIMP. Now it should be impossible to have

(20) a. [after Pat wakes up] I want her to leave
b. I want her to leave [after Pat wakes up]

In a Survive-based model of syntactic derivation, they can avoid tucking the adjunct (qua Merge) to the complex wh-item by arguing that the adjunct resides in the Numeration and adjoins to the wh-item *[what picture of Bill]* prior to its remerging into the syntax since it survives and returns back to the lexicon due to its [Q]-features which must be checked in CP. Call this operation Late Num Merge. Stroik and Putnam (2006) maintain that two points must be clarified to understand the conceptual advantages of their approach to a minimalist, derivational approach to generate syntax: First, the adjunction of *[that John likes]* is a syntactic object in the Numeration, therefore its concatenation with *[what picture of Bill]* will not be non-cyclic and therefore does not fall victim to "tucking in". Second, the cyclic application of their reformulation of Late Merge forces the adjunct *[that John likes]* to be visible in the syntax for all operations. This fact allows them to abandon the now unnecessary Simpl operation on the grounds of virtual conceptual necessity. Since the DP *John* was not a part of the original complex wh-item *[what picture of Bill*] that merged into the VP prior to its repulsion there is no point in the derivation during which the pronoun *he* could potential c-command *John*, thus explaining how *John* and *he* can be co-referential in (19a). The derivational history in (21) below highlights the pivotal steps in the composition of (19a).

(21) a. Merge {buy, [which picture of Bill] } → buy which picture of Bill
b. Survive [which picture of Bill] ([Q]-feature) →
c. Merge {he, buy [which pictures of Bill] } → he buy which picture of Bill
d. Merge {did, {he, {T, {buy [which picture of Bill] }}} → did

co-referential relations between the pronoun *her* and the DP *Pat* because the pronoun c-commands the DP in structures where the adjunct is syntactically visible. The fact that the pronoun and the DP can be co-referential suggests that the SIMP-based derivation is not viable.

he buy which picture of Bill
e. Merge {C , {did, {he, {T, {buy [which picture of Bill] }}}}
→ C did he T buy which picture of Bill
f. Late Num Merge {[which pictures of Bill] , [that John likes])
g. Remerge { [which pictures of Bill that John likes] , {C , {did, {he, {T, { buy [which picture of Bill] }}}}} → which pictures of Bill that John likes C did he T buy which picture of Bill
'Which pictures of Bill that John likes did he buy?'

Stroik and Putnam (2006) argue that the non-cyclic application of Late Num Merge (21f) in the Numeration rather than in the course of the Derivation provides a straightforward explanation of Condition C asymmetries within core minimalist desiderata.

The Survive principle, however, is not without problems. One of the most frequently asked questions is a theoretical one; if a syntactic object (SO) remains active in the Numeration ready to remerge, what's the status of the item? Is it a lexical chunk of previously merged items? If it is, the concept of "Selection" and "Lexical Array" should be modified. If merged items remain for the remerge in the Numeration, phrases or clauses as well as words would be the target of Selection. Still we need to answer the question; what kind of feature does a phrase or a clause have?

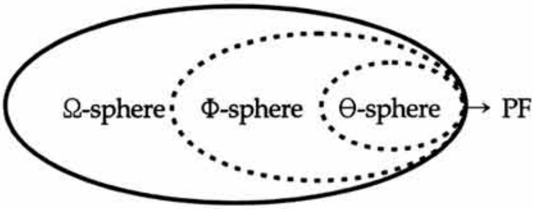
4. Occur and Survive; Late lexical insertion

The most fundamental hypothesis Multiple Spheres Hypothesis MSH assumes is that the process of derivation is not cyclic, but simultaneous. Language L contains operations that determine the phonological value as well as the semantic value of each SO by selecting the features from the lexicon that pervasively exists in three spheres: Θ-sphere, Φ-sphere and Ω-sphere[7]. Our

7) Our Hypothesis is slightly affected by Platzack's (1998) Multiple Interfaces Hypothesis. He asserted that "[L]exical entities are selected from the mental lexicon and merged into a phrase structure. This structure is expanded to the I-domain by the merge of functional

hypothesis can be roughly described as in (22).

(22)



MSH assumes that the operation called "Transfer" caused by discourse properties of TH/EX or Foc/Top are derived by the features in the Ω-sphere. We have proposed in Im (2003, 2004a, b), that when syntactic objects α and β come into numeration by Merge, they assume inherent discourse features (of information like topic, focus . . .) as well as inherent syntactic features (Φ -features, for instance) and thematic features. The parametric variation of word order among languages is determined by the features in each sphere. As is well-known, Merge is a set operation that imposes no intrinsic ordering among its members. In order for a Merger set to be linearized into strings of words at PF, we have to wait until all the features of three spheres are specified.

Contra Chomsky (1993, 1995, 1999) and many others, we don't assume one-fell swoop of lexical selection. Rather, we suggest "lexical selection all the time". So the operation would be 24hr-outlet operation whenever necessary. At the beginning of Numeration, SOs with its inherent phonological features as well as semantic features are merged each other (theta-theoretic relation or s-selection abandoned in Chomsky (2001) but assumed in Stroik (1999), Stroik and Putnam (2006) and Putnam (2006) as well as in Bowers (2005)).

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projections that attract the elements of the V-domain. The I-domain is expanded to the C-domain, once again by dual input, this time from the I-domain and the lexicon." We also adopts Grohmann's (2000, 2003) terms for Prolific Domains. His proposal is as much affected by the well-known proliferation of functional projections (Rizzi 1997) and the tripartition assumed in Platzack (1998) as ours is. Though our proposal assumes tripartite spheres (Domains in Grohmann's terms); Θ-sphere for thematic context, Φ-sphere for agreement context, Ω-sphere for discourse context, ours different from his in that we assume single Spell-Out instead of Multiple Spell-Out by Domain. He suggests that once a Prolific Domain is complete, it spells out.

(23) Numeration of bare LIs
Select bare LIs for numeration
(bare; with primitive features, primitive; with basic semantic features plus underspecified phonological features without inflectional properties)

Adopting Bower's notion of Merge, we suggest the following mechanism of Merge operation;

(24) Merge: 1) Merge by subcategorization
2) Merge by selection

For instance, in English type languages, SO begins Numeration in Θ-sphere, Merge of VB and OB (in case of the transitive verb) and VB and SUBJ by th-role assignment. In Φ-sphere, each DP takes on its Case (specification of Case feature). We assume the canonical concatenation of a sentence, (if there is one), can be completed in this sphere. The concatenation, however, can be altered when the elements of the sentence are specified with the features in Ω-sphere: wh-movement, topicalization, (de)focusing, cliticization, DISL (EX/TH), etc..

In the revised version of MSH (cf. Im 2007, 2008a, b), we agree with Zhang (2004)'s idea of occurrence OCC in that the operation of internal merge (move) is not copying an element, leaving its clone behind. But our notion of OCC is considerably different from that of hers. OCC in our theory denotes different OCC of the same token, not different tokens of the same type as assumed in the notion of Copy. The hypothesis induces the result that there is more than one OCC for an LI That is, OCC can occur wherever LIs are merged and the features are specified, ready for TRANSFER.

(25) TRANSFER (temporary)
Transfer LIs whenever merged

Now, the simple version (25) is too strong for HL. To reduce the burden of having more than one OCC of the same token, we need a principle of Economy which guarantees the proper word order.

The only principle assumed in our theory is (26), which, we hope, guarantees the biolinguistic perspective beyond explanatory adequacy. Contrary to "The Fittest Survival" which is based on the view from the environment, "The Most Specified Survival" is based on the view from the individual.

(26) The Most Specified Survival
If there exists more than one OCC, the most specified one survives.

Now that the principle (26) ensures the word order, the operation (25) should be revised like (27).

(27) TRANSFER (final)
Transfer the survived LIs whenever merged

The final operation which the merged LIs should go through is DRESS, so called because the bare LIs are provided with the appropriate morphemes according to the features specified during the process of Merge. The operation (28) ensures the legitimate structure for the legibility at SM interface.

(28) DRESS
Dress LIs with morphemes whenever the features are specified

Now, the set of SOs with its fully specified features escape the spheres into sensorimotor and conceptual-intentional systems. In the process of this Spell-Out, each SO assumes its morphological forms as well as its phonological forms to satisfy PF convergence.

Armed with all these assumptions, let's tackle the problems posited above. First of all, we argue that two predications can be found in (1): PrP1, *[∅ is likely]*, and PrP2, *[someone from New York] win the lottery]*. When the matrix verb and PrP2 merge, we get the following structure;

(29) [[Someone from New York]OCC1 is likely [[someone from New York]OCC2 win the lottery]]]

The principle (26) ensures that in (29), *someone from New York* OCC1 survives because it has [TOP] as well as [NOM] Case feature. Then why is (1=29) ambiguous? If *someone from New York* is [-specific], the whole sentence has the meaning (2a). If *someone from New York* is [+specific], the whole sentence has the meaning (2b). (Compare the non-specificity of *a man* in "A man was at the door." and the specificity of *a man* in "A man at the door spoke French.") The choice of each interpretation is decided at the moment LI comes into numeration.

To resolve the problem of the asymmetry of Condition C violation in (9), we slightly modify the notion of Late Num Merge suggested in Stroik and Putnam (2006). Our version of (21) is as follows;

(30) a. Merge in Θ-sphere
 i) {buy, [which picture of Bill] }
 ii) {he, buy [which pictures of Bill] }
b. Merge in Φ-sphere
 {he buy which picture of Bill}
c. Merge in Ω-sphere
 {C , {did, {he, {T, {buy [which picture of Bill] }}}} → [which picture of Bill]OCC1 C did he T buy [which picture of Bill]OCC2
d. Late Num Merge in Ω-sphere
 { [which pictures of Bill] , [that John likes] }
e. Remerge
 { [which pictures of Bill that John likes] , {C , {did, {he, {T, {buy [which picture of Bill that John likes] }}}}}
 → [which pictures of Bill that John likes] OCC1 C did he T buy [which picture of Bill that John likes]OCC2
f. Survive (26)
 'Which pictures of Bill that John likes did he buy?'

Note that in the process of (30a) and (30b), *he* and *Bill* cannot be co-referential. If we assume the fundamental ideas of Binding suggested in Reinhart and Reuland (1993), Reinhart and Siloni (2005) and Reuland (2001, 2005), co-referentiality of two arguments is decided in the level or sphere where their thematic roles are involved (See Im 2006 for detail.). In the process of (30d) where *John* is involved, syntactic Binding doesn't exert its power. Nothing hinders the co-referentiality between *he* and *John*.

5. Concluding Remarks

We have shown that the problem of late merged adjuncts (QPs) can be solved if we assume more than two Predications (PROPOSITIONS) merged in Ω -sphere. Without resorting to the phase based account of cyclic movement, MSH explains how each of the entities with its full features gets its place in syntax. We have also shown that the principle The Most Specified Survival can be an alternative solution for the resolution of the asymmetries found in Condition C violation in some Late Merge constructions. We cautiously suggest a possibility to eliminate one of the two basic computational operations; Internal Merge. Instead, the discourse features in Ω-sphere play a dominant role in placing the syntactic units, determining the word order of a sentence. If our proposal is successful in providing an alternative way of solving the problem of Late-Merge of adjuncts, the seemingly radical assumptions of MSH will gain more grounds for their explanatory adequacy.

References

Bowers, J. (2005). Syntactic Relations. ms. Cornell U.

Chomsky, N. (1993). A miniamlsit program for linguistic theory. In K. Hale and S. J. Keyser, (Eds.), *The View from Building 20: Essays in linguistics in honor of Sylvain Bromberger*, (pp. 1-52). Cambridge, MA: MIT Press.

Chomsky, N. (1995). *The minimalist program*. Cambridge, MA: MIT Press.

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. 89-115). Cambridge, MA: MIT Press.

Chomsky, N. (2001). Beyond explanatory adequacy. *MITOPL 20*.

Chomsky, N. (2004). On phases. ms., MIT.

Dik, .S. (1989). *The Theory of Functional Grammar*. Foris Publications. Dordrecht Netherlands.

Fox, D. (2004). Condition A and scope reconstruction. *LI 35*, 475- 485.

Fox, D & J. Nissenbaum. (1999). Extraposition and scope: A case for overt QR. In *WCCFL 18: Proceedings of the 18th West Coast Conference on Formal Linguistics*. 132-144.

Fox, D & J. Nissenbaum. (2002). Condition A and scope reconstruction. ms. MIT & Harvard U.

Frampton, J. and S. Gutmann. (2002). Crash-proof syntax. In S. D. Epstein and T. Seely (Eds.), *Derivation and Explanation in the Minimalist Program*, (pp. 90-105). Oxford: Blackwell.

Grohmann, K. K. (2000). *Prolific peripheries: A radical view from the left*. Ph.D. dissertation, UMCP.

Grohmann, K. K. (2003). Successive cyclicity under (anti-)local considerations. *Syntax 6.3*.

Hornstein, N. (2001). *Move! A Minimalist Theory of Construal*. Oxford: Blackwell.

Im, C. G. (2003). Typology of multiple wh-phrases and Multiple Spheres Hypothesis. In *Proceedings, 2003 The Linguistic Association of Korea Spring Conference*, 133-142.

Im, C. G. (2004a). An alternative approach to Holmberg's stylistic movement. In *Proceedings, 2004 The Society of Modern Grammar Spring Conference*, 108-118.

Im, C. G. (2004b). Derivational economy and Multiple Spheres Hypothesis. *Journal of Linguistic Science 30*, 277-298.

Im, C. G. (2006). Interpretation vs. Generation of -self. *Studies in Modern Grammar 44*, 91-119.

Im, C. G. (2007). Move is Occur; the first step to eliminate movement. *The Linguistic Association of Korea Journal, 15-4*, 197-221.

Im, C. G. (2008a). An alternative approach to the raising analysis of split subjects. *Studies in Modern Grammar 53*, 39-56.

Im, C. G. (2008b). Late Merge; Remerge or Survival? *The Proceedings of 2008 BALLAK and NAELL joint conference*, 81-95.

Lebeaux, D. (1995). Where does the Binding Theory apply? In *University of Maryland Working Papers in Linguistics 3*, 63-88. Department of Linguistics, University of Maryland.

Platzack, C. (1998). Multiple interfaces. ms. Lund University.

Putnam, M. (2006). Eliminating Agree. ms. Michigan State U.

Reinhart, T. and E. Reuland. (1993). Reflexivity, *LI 24*, 657-720.

Reinhart, T and T. Siloni. (2005). The Lexicon-syntax parameter: reflexivization and other arity operation. *LI 36,3*.

Reinhart, T. (2006). *Interface Strategies: Reference-set Computation*. Cambridge, MA: MIT Press.

Reuland, E. (2001). Primitives of Binding. *LI 32*, 439-492.

Reuland, E. (2005). Binding conditions: How are they derived? *Utrecht institute of linguistics OTS Proceedings of the HPSG 05 Conference*.

Rizzi, L. (1997). The fine structure of the left periphery. In L. Haegeman (Ed.), *Elements of Grammar: Handbook of Generative Syntax*, (pp. 281-337). Dordrecht: Kluwer.

Rubin, E. (2003). Determining Pair-Merge. *LI 34*, 660-668.

Stroik, T. (1999). The survive principle. *Linguistic Analysis 29*, 278-303.

Stroik, T. (Forthcoming). *Locality in Minimalist Syntax*. Cambridge, MA: MIT Press.

Stroik, T. and M. Putnam. (2006). Surviving Reconstruction. To appear in K. Grohmann (Ed.), *The Proceedings of Interphases*,

Stroik, T. and M. Putnam. (in progress). Beyond Minimalism [tentative title]. ms. University of Missouri-Kansas City and University of Michigan.

Uriagereka, J. (1999). Multiple Spell-Out. In S. D. Epstein & N. Hornstein (Eds.), *Working Minimalism*. MIT Press.

Zhang, N. (2004). Move is remerge. *Language and Linguistics 5:1*, 189-209.

Zubizaretta, M. L. (1998). *Prosody, Focus, and Word Order*. Mass. Cambridge: MIT Press.

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Received: 30 July, 2009
Revised: 18 August, 2009
Accepted: 26 September, 2009