

Order in Narrow Syntax and PF: Toward a Theory of Word Order Variations*

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1. Introduction

This paper addresses the question of how syntactic structures are linearized in a language, focusing on the three schematic structures in (1).

- (1) a. $[XP \dots X^0 [YP \dots Y^0 [ZP \dots Z^0 \dots]]]$: Consistently head-initial order
b. $[XP \dots [YP \dots Y^0 [ZP \dots Z^0 \dots]] X^0]$: Mixed order
c. $[XP \dots [YP \dots [ZP \dots \dots Z^0] Y^0] X^0]$: Consistently head-final order

The structure in (1a) schematizes languages like Italian, and the one in (1c) Japanese. The one in (1b) is found in Chinese languages like Mandarin and Taiwanese. (1b) is particularly interesting given the Head Parameter, since in this structure, XP seems to be head-final, whereas YP and ZP seem to be head-initial.

Recently, several researchers have argued that the surface head-final structures in Chinese languages are derived by the underlying head-initial structures (see Simpson and Wu 2002, Lin 2006 and Takita 2007b, among others). Furthermore, claiming that the head-final type C^0 is the head of higher CP in the multiple-CP layers (Rizzi 1997), and that the surface head-final order is derived by movement of the lower CP to the Spec of the higher CP, Hsieh (2006) and Hsieh and Sybesma (2007) propose an analysis which employs Moro's (2000) idea of Dynamic Antisymmetry. To be more specific, assuming that each C^0 in the multiple CP is a phase (Chomsky 2000, 2001), they propose the Max spell out principle, which states that the entire phase is spelled out if all the uninterpretable features have been checked within it, and it forces the lower CP to be an "atom," which is invisible to the computational system. When this atom is Merged with the higher C^0 , the "point of symmetry" emerges, so the lower CP moves for

“symmetry-breaking.” Let us call this the Dynamic Antisymmetry (DA)-analysis. The basic tenet of the DA-analysis is that Syntactic Objects (SOs) are not ordered in narrow syntax, and linear order is determined by some linearization procedure like the LCA (Kayne 1994) on the way to the PF-interface.

Given the DA-analysis, an interesting question arises; how to explain the ordering in (1a) and (1c)? According to the DA-analysis, a head-final structure signals that there is a point of symmetry, i.e., a phase. If so, the following consequence should be obtained; the consistent head-directionality in (1a) and (1c) suggests that there is no phase in (1a) and that each maximal projection is a phase in (1c). This is both theoretically and empirically undesirable, given that phase heads are restricted to C^0 and v^0 (Chomsky 2000, 2001). Furthermore, recent studies argue that something like the Head Parameter is necessary (see Saito and Fukui 1998 for a comparison of English and Japanese; for Mandarin and Japanese, see Lin, Murasugi and Saito 2006 and Takita 2007a). In this paper, we try to explain the three ordering patterns in (1) unifying the insight of the DA-analysis with the theory which incorporates the effects of the Head Parameter.

This paper is organized as follows. In Section 2, we point out that Italian seems to be a counterexample to the DA-analysis, but it can be dealt with by parameterizing the “symmetry breaker.” Then, Section 3 shows that Japanese is a real counterexample, and argues for Saito and Fukui’s (1998) formulation of Merge. Finally, to reconcile the two analyses, we propose that it should be parameterized whether Merge determines the order. Section 4 is a conclusion.

2. Ordering in PF: Chinese and Italian

2.1. DA-analysis of Chinese

First, let us clarify the DA-analysis of Chinese. Hsieh (2006) and Hsieh and Sybesma (2007) discuss that Chinese languages have two types of C^0 :

(2) *Head-initial CP* (Hsieh 2006: 3)

- a. wo zhidao [_{CP} (**shuo**) [_{TP} ni shi Taiwan ren]] (Mandarin)
 I know COMP you be Taiwan people
 ‘I know that you are Taiwanese.’

- b. hit-king hothelu b.etang [CP *(**kong**) [TP ciann kui]] (Taiwanese)
 that-CL hotel NEG.can COMP very expensive
 ‘That hotel is not likely to be very expensive.’

(3) *Head-final CP* (Hsieh and Sybesma 2007: 4)

- a. dàodǐ shì shénme dōngxi **ne**? (Mandarin)
 in.the.end be what thing SFP
 ‘What on earth is it then?’
- b. i ma b.o huantui **ma honn** (Taiwanese)
 s/he too NEG.have objection SFP SFP
 ‘(you know,) s/he did not have any objection, either, right?’

The complementizer-type C^0 *shuo* and *kong* in (2) precede the embedded clauses, whereas the sentence-final particles (SFPs) *ne*, *ma*, and *honn* in (3), which express speaker-oriented information (see also Li 2006), follow the clauses. Besides, in some circumstances they can occur in a same clause (Hsieh 2006: 4):

- (4) a. [CP **ruguo shuo** [TP ni bu chi-fan] **de-hua**], ... (Mandarin)
 IF_{ADV} COMP you NEG eat-meal IF
 ‘If you don’t eat, (then) ...’
- b. [CP **kong** [TP abing pat li] **la**] (Taiwanese)
 COMP p.n. know Chinese character SFP
 ‘(I am surprised that) Abing knows (how to read) Chinese character!’

Notice that these examples instantiate the schematic structure in (1b).

To explain them uniformly, the DA-analysis proposes that Chinese languages have the underlying structure in (5a), and that CP_2 moves to Spec, CP_1 , as in (5b).

- (5) a. [$CP_1 C_1^0$ [CP_2 ... C_2^0 [TP ...]]],
 where C_1 = SFPs and C_2 = complementizer types.
- b. [CP_1 [CP_2 ... C_2^0 [TP ...]] [C_1^0 C_1^0 t_{CP_2}]]

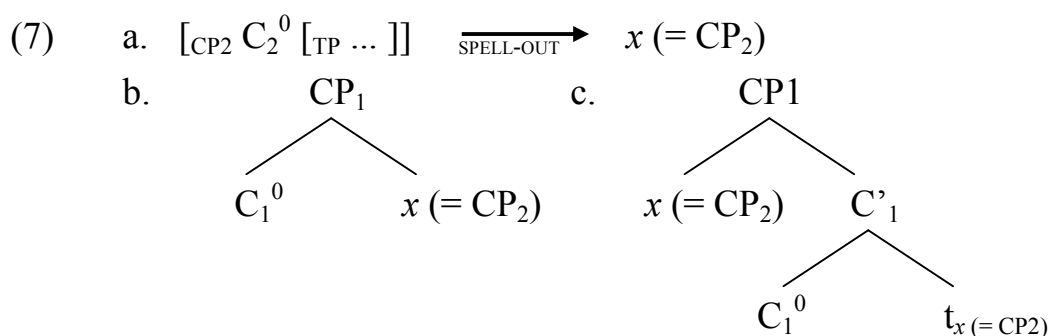
Thus, C_1^0 s always appear sentence-finally, even if C_2^0 is morphologically null.

The reason why CP_2 moves comes from the combination of the Max spell out

principle in (6) and the theory of symmetry-breaking.

- (6) *Max Spell Out* (Hsieh and Sybesma 2007: 10)
 Always spell out the entire phase. Phases are spelled out as soon as all uninterpretable features have been removed.

Given (6), phases are spelled out once it has completed, rendering its internal structure inaccessible. Thus, CP₂ in (7a) turns into an atom *x*, or a “giant lexical compound” in the sense of Uriagereka (1999). At the next step in (7b), the atom *x* is Merged with C₁⁰. Given the LCA, (7b) is unlinearizable since *x* and C₁⁰ mutually c-command each other. One way to rescue the structure is to move *x* to Spec, CP₁, creating an asymmetric c-command relation, as in (7c). This movement is called symmetry-breaking movement.



Given that traces are not counted for linearization, (7c) is linearizable. In this way, they solve the mysterious mixed ordering in Chinese languages.

2.2. An Apparent Counterexample and a Solution

As mentioned above, however, Italian poses a problem to the analysis. Since Rizzi’s (1997, 1999) works, Italian is also proposed to have the following highly structured CP (Top = topic, Int = interrogative, Foc = focus, and Fin = finiteness):

- (8) *Fine Structure of the Left Periphery* (adapted from Rizzi 1999: 3)
 [Force [(Top*) [Int [(Top*) [Foc [(Top*) [Fin [IP ...]]]]]]]]]]]]
che ‘that’ *se* ‘if’ *di* ‘of’

The examples in (9) and (10) illustrate that *che* ‘that’ must precede both Clitic Left Dislocated (CLLD, Cinque 1990) topics which are in Spec, TopP (indicated by underlines) and Contrastive foci which are in Spec, FocP (indicated by capitals). Hence, ForceP is assumed to be the structurally highest, as in (8).

- (9) *Relative Order of che ‘that’ and CLLDed Topics* (Rizzi 1999: 1)
- a. Maria crede **che**, il tuo libro, lo potrà leggere.
 ‘Maria believes **that**, your book, she will be able to read it.’
- b. *Maria crede, il tuo libro, **che** lo potrà leggere.
 ‘Maria believes, your book, **that** (she) will be able to read it.’
- (10) *Relative Order of che ‘that’ and Contrastive Foci* (Rizzi 1999: 2)
- a. Credo **che** QUESTO avreste dovuto dirgli (non qualcos’altro).
 ‘I believe **that** THIS you should have said to him, not something else.’
- b. *Credo QUESTO **che** avreste dovuto dirgli (non qualcos’altro).
 ‘I believe THIS **that** you should have said to him, not something else.’

On the other hand, as shown in (11), the head of FinP *di* ‘of’, which selects an infinitival as its complement, cannot precede a CLLDed topic.

- (11) *Relative Order of di ‘of’ and CLLDed Topics* (Rizzi 1999: 1-2)
- a. *Maria crede **di**, il tuo libro, poterlo leggere.
 ‘Maria believes **of**, your book, to be able to read it.’
- b. Maria crede, il tuo libro, **di** poterlo leggere.
 ‘Maria believes, your book, **of** to be able to read it.’

Thus, FinP is claimed to be the lowest in the hierarchy.¹

Finally, it can be confirmed by the examples in (12) and (13) that the head of IntP *se* ‘if’, which introduces an embedded yes/no-question, is located in-between *che* ‘that’ and *di* ‘of’, and is structurally higher than FocusP.

- (12) *Relative Order of se ‘if’ and CLLDed Topics* (Rizzi 1999: 3)
- a. Non so **se**, a Gianni, avrebbero potuto dirgli la verità.
 ‘I don’t know **if** to Gianni, they could have said the truth.’

- b. Non so, a Gianni, **se** avrebbero potuto dirgli la verità.
 ‘I don’t know, to Gianni, **if** they could have said the truth.’
- (13) *Relative Order of se ‘if’ and Contrastive Foci* (Rizzi 1999: 2)
- a. Mi domando **se** QUESTO gli volessero dire (non qualcos’altro).
 ‘I wonder **if** THIS they wanted to say to him, not something else.’
- b. *Mi domando QUESTO **se** gli volessero dire (non qualcos’altro).
 ‘I wonder THIS **if** they wanted to say to him, not something else.’

By transitivity, the fact that both orderings of *se* ‘if’ and a CLLDed topic are possible in (12) suggests that *se* ‘if’ occupies a position higher than *di* ‘of’ and lower than *che* ‘that’. Meanwhile, the position has to be higher than FocP, which hosts focused phrases, because *se* ‘if’ cannot follow the focused phase. Based on these facts, Rizzi (1997, 1999) proposes the structure in (8).

Recall that under the DA-analysis, if there are multiple-CP layers, the lower CP has to move, rendering the higher C^0 sentence-final. Given that “the complementizer system minimally consists of a specification of force, accessible to higher selection, and a specification of finiteness, selecting a finite (or non-finite) IP” (Rizzi 1997: 325), at least two C^0 s, i.e., $Force^0$ and Fin^0 , have to be projected in a non-truncated structure. Therefore, in Italian, *che* ‘that’ and *se* ‘if’ should follow the entire clause, contrary to the facts:

- (14) *Order of C_1^0 and its Complement in Italian*
- a. ... [$CP_1 C_1^0$ [$CP_2 C_2^0$ [TP ...]]] ← unexpected under the DA-analysis
- b. *... [CP_1 [$CP_2 C_2^0$ [TP ...]]] C_1^0 ← expected under the DA-analysis

Note that the fact that only (14a) is attested in Italian cannot be attributed to the fact the lower C_2^0 is morphologically null because the higher C_1^0 in Chinese also follows its complement even if C_2^0 is null (see (3)). Another possible explanation is to claim that the lower C_2^0 in Italian is not a phase. If so, however, it is unclear why C_2^0 is a phase in Chinese and it is not in Italian.

We claim that Italian is NOT a counterexample, however. In fact, we argue that Italian completes the DA-analysis. First, let us reconsider what moves in Chinese and why it moves. (15) schematically illustrates the derivation of the

relevant Chinese examples (see also (7)).

(15) *Derivation of C_1^0 -final Structures*

- a. $[\text{CP}_2 \text{C}_2^0 [\text{TP} \dots]] \xrightarrow{\text{SPELL-OUT}} x (= \text{CP}_2)$: CP_2 turns into an atom x .
- b. $[\text{CP}_1 \text{C}_1^0 x]$: C_1^0 Merges with x , rendering the structure unlinearizable.
- c. $[\text{CP}_1 x [\text{C}'_1 \text{C}_1^0 t_x]]$: Movement of \underline{x} breaks the symmetry.

Here, $x (= \text{CP}_2)$ moves to linearize the structure. That is, CP_2 is a “symmetry breaker.” Notice that there is another way to break the symmetry; to move C_1^0 .

(16) *Derivation of C_1^0 -initial Structures*

- a. $[\text{CP}_2 \text{C}_2^0 [\text{TP} \dots]] \xrightarrow{\text{SPELL-OUT}} x (= \text{CP}_2)$: CP_2 turns into an atom x .
- b. $[\text{CP}_1 \text{C}_1^0 x]$: C_1^0 Merges with x , rendering the structure unlinearizable.
- c. $[\text{CP}_1 \text{C}_1^0 [\text{C}'_1 t_{\text{C}_1^0} x]]$: Movement of $\underline{\text{C}_1^0}$ breaks the symmetry.

This derivation results in consistently head-initial structures in (1a). Thus, we propose that the difference between Chinese and Italian can be captured by proposing the following parameter:

(17) *Symmetry Breaker Parameter*

If a structure contains a point of symmetry, break it by

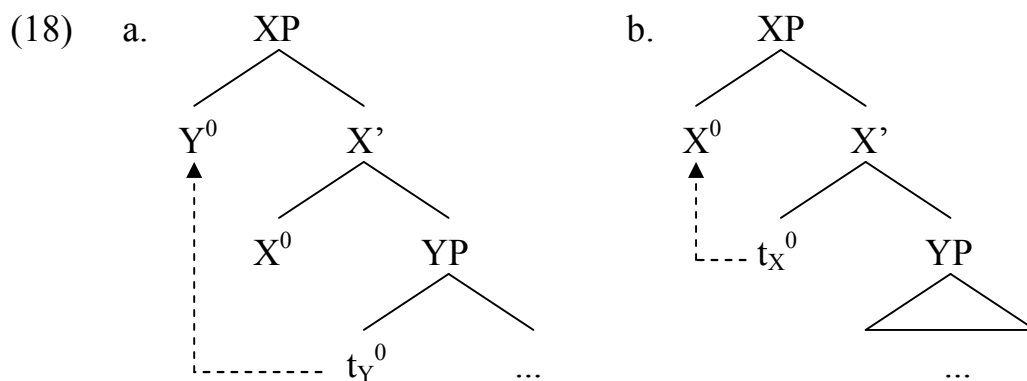
- a. moving a phrasal atom (= Chinese), or
- b. moving a head atom (= Italian).

This parameter is natural since it exhausts all the logical possibilities. Otherwise, it has to be explained why only the phrasal atoms can break the symmetry.

One may claim that the reason why a head cannot be a symmetry breaker is due to the ban on Head-to-Spec movement. If this is correct, however, the difference between Chinese and Italian is left unexplained. Besides, the ban itself is subject to a question (see Matushansky 2006 and references cited therein).

Despite this, suppose that Head-to-Spec movement is generally illicit. Even so, the proposed Head-to-Spec movement can be licit, however. Let us reconsider why Head-to-Spec movement has been prohibited in the literature. The structures

in (18a) and (18b) schematize two possibilities of Head-to-Spec movement.



In (18a), Y^0 moves to Spec, XP, whose head is distinct from Y^0 . Under the Bare Phrase Structure theory (Chomsky 1995), projections are defined relationally. Thus, in (18a) Y^0 is maximal in its landing site, but it is not in its original position. Hence, this movement is illicit, violating the Uniformity Condition on Chains (Chomsky 1995), which requires each link of a chain to be uniform. On the other hand, in (18b), X^0 moves to the Spec of itself, and this is what happens in (16c). In this case, X^0 can be a maximal projection in the both positions, because both positions are dominated by XP. Therefore, this movement can be licit.

Summarizing this section, we first reviewed the DA-analysis briefly, and pointed out that Italian seems to be problematic. Then, by proposing the Symmetry Breaker Parameter, we argued that the problem can be solved.

3. Ordering in Narrow Syntax: Japanese

As we have shown above, out of the three types of ordering in (1), (1a) and (1b) can be captured by the revised DA-analysis. This section discusses the ordering in (1c), i.e., the Japanese-type, arguing that the revised DA-analysis fails to explain this pattern unless it assumes that T^0 is also a phase head. To capture this ordering, we claim that Saito and Fukui's (1998) formulation of Merge is necessary. Meanwhile, to maintain the revised DA-analysis of Chinese and Italian-type languages, we also propose a parameter that distinguishes Japanese from Chinese/Italian, which we call the Ordering Merge Parameter.

3.1. A Real Counterexample

The Japanese example in (19) instantiates the consistently head-final order in (1c) under the standard analysis of Japanese syntax.²

- (19) a. Taroo-ga [CP [TP Hanako-ga [vP hon-o **kat**] -ta] to] it-ta.
 p.n.-NOM p.n.-NOM book-ACC buy -PAST COMP say-PAST
 ‘Taro said that Hanako bought a book.’
 b. ... [CP ... [TP ... [vP ... V⁰] T⁰] C⁰] ...

What is crucial here is that T⁰ -ta and C⁰ to follow vP and TP respectively. Let us consider how this ordering is analyzed under the revised DA-analysis.

If we assume that phase heads are only C⁰ and v⁰, and an uninterpretable Case feature [CASE] on a subject is checked by T⁰, the derivation proceeds as follows:

- (20) a. [vP Subj_[CASE] ... V⁰]: vP is not spelled out because of [CASE]
 b. [TP Subj_[CASE] T⁰ [vP t_{subj} ... V⁰]]: T⁰ is Merged with vP.
 c. [CP C⁰ [TP Subj_[CASE] T⁰ [vP t_{Subj} ... V⁰]]]: C⁰ is Merged with TP.

Max spell out does not allow the whole vP to be spelled out in (20a), since [CASE] on the subject is not checked. As a result, its internal structure is visible when T⁰ is Merged with it, so that T⁰ can asymmetrically c-command its interior. Therefore, the structure can be linearized with T⁰-V⁰ order, contrary to the fact. The same thing happens when C⁰ and TP are Merged, since T⁰ is not a phase by assumption, so that C⁰ can asymmetrically c-command inside of TP.

Suppose that vP can be spelled out in some way. The fact that T⁰ follows vP suggests that in Japanese, a phrasal atom breaks the symmetry. If so, however, the fact C⁰ follows TP suggests that T⁰ is also a phase head. This is obviously undesirable under the view of restricting the phase candidates. Besides, if TP is also a phase, why C₂⁰ precedes TP in Chinese-type languages is left unexplained.

3.2. Solution and Consequence

Recall that the DA-analysis crucially assumes that SOs are not ordered within narrow syntax, but they are ordered on the way to the PF-interface by the LCA.

This assumption is natural since Merge is an operation on sets, creating an unordered set, and linear order does not play any role in the LF-interface. In this model, the PF-interface is equipped with some kind of a linearization procedure, which is applied to the otherwise unpronounceable output of narrow syntax.

This model, however, is not free from objections. Saito and Fukui (1998) propose the following definition of Merge, which incorporates the effects of the Head Parameter (Saito and Fukui 1998: 452):

- (21) $K = \{\gamma, \langle \alpha, \beta \rangle\}$, where $\gamma \in \{\alpha, \beta\}$
- a. $\gamma = \alpha$: head-initial, left-headed
 - b. $\gamma = \beta$: head-final, right-headed

That is, Merge directly specifies the order of a selector and a selectee. Note that under this definition of Merge, we call it Ordering Merge, SOs have been already ordered in narrow syntax. Hence, the input to the LF-interface also has an order.

Following Saito and Fukui (1998), suppose that Japanese selects the value of (21b). This choice correctly derives the structure in (19b) with the required order. Note that the troublesome symmetry-breaking movement of vP and TP, which should be unavoidable under the DA-analysis, is no longer necessary under the Ordering Merge analysis. It is not necessary because symmetry-breaking movement takes place is to make the structure linearizable, but the structure has already been linearizable via Ordering Merge. Hence, no movement is required.

The next question, then, is whether it is possible to reconcile these two analyses. Let us consider the following two points; (i) relations between linear orders and the LF-interface, and (ii) points of linearization in the grammar.

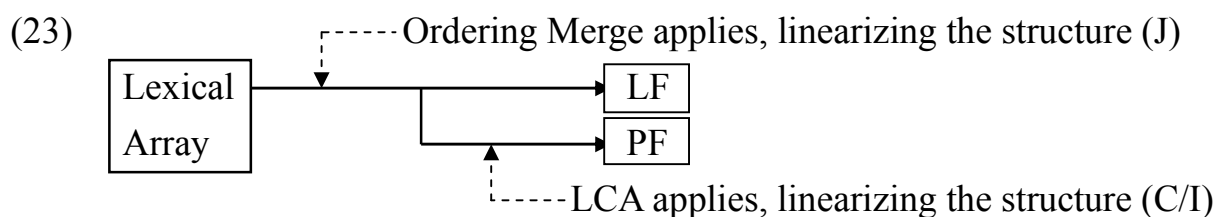
For the first point, the DA-analysis assumes that linear order plays no role, and it does not even under the Ordering Merge analysis. The crucial difference is whether the input to the LF-interface has linear order or not. Meanwhile, in both analyses, the input can have the hierarchical structure. This input can be computed if what semantics cares about is the hierarchy of elements alone and if it can ignore linear order. Stated differently, the idea is that for semantics, [*John [love Mary]*] crucially differs from [*Mary [love John]*], but [*John [love Mary]*] does not differ from [*John [Mary love]*]. If so, the two analyses are compatible.

Concerning the second point, under the DA-analysis, linearization takes place after spell out, while it is before spell out under the Ordering Merge analysis. Here, we propose the following parameter to avoid this contradiction:

(22) *Ordering Merge Parameter*

- a. Merge directly specifies linear order (= Japanese), or
- b. Merge does not specify linear order (= Chinese/Italian).

If (22a) is chosen, Ordering Merge applies, directly specifying linear order within narrow syntax (varying whether a selector precedes a selectee or not), while if (22b) is chosen, the LCA linearizes the otherwise unpronounceable output of narrow syntax after spell out. The idea is that given that SOs eventually have to be linearized until the PF-interface, and that semantics can ignore it, it should be possible to determine linear order within narrow syntax or on the way to the PF-interface. (23) roughly visualizes this idea (multiple spell out is omitted here).



In this way, we can unify the two analyses into one model.

One consequence of this unified analysis is that it can capture the unexpected lack of the Subject Condition effect in Japanese, maintaining Nunes and Uriagereka's (2000) explanation of the CED-effect. They propose that subjects and adjuncts, which are indicated by shading, have to be spelled out before they are Merged with the clause, unless they become LCA-incompatible with respect to the rest of the clause (slightly modified from Nunes and Uriagereka 2000: 21):

- (24) a. * $[_{CP} [\text{which politician}]_i \text{ did } [_{IP} [\text{pictures of } t_i] \text{ upset the voters}]]?$
- b. * $[_{CP} [\text{which paper}]_i \text{ did } [_{IP} \text{ you read } \textit{Don Quixote} [_{PP} \text{ before filing } t_i]]]?$

Since the interior of them has become opaque, i.e., turned into an atom by spell

out, nothing can be extracted from inside.

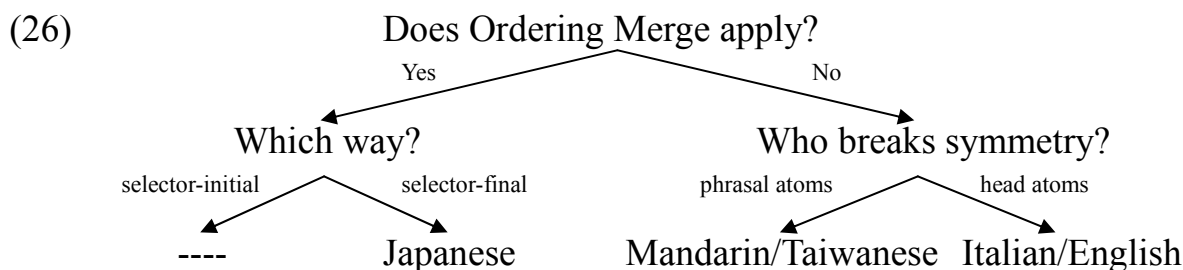
This explanation predicts that the CED-effect should hold universally. This expectation, however, is not borne out. It is observed that Japanese lacks the Subject Condition effect (see Lasnik and Saito 1992, among many others):

- (25) a. ^{??} Dare-o_i Mary-ga [_{NP} John-ga t_i tatai-ta koto]-o hihansi-ta no?
 who-ACC p.n.-NOM p.n.-NOM hit-PAST fact-ACC criticize-PAST Q
 ‘(lit.) Who_i did Mary criticize [the fact that John hit t_i]?’
- b. ^{??} Dare-o_i Mary-ni [_{NP} John-ga t_i tatai-ta koto]-ga hihans-are-ta no?
 who-ACC p.n.-by p.n.-NOM hit-past fact-NOM criticize-PASS-PAST Q
 ‘(lit.) Who_i was [the fact that John hit t_i] criticized by Mary?’

Recall that under Nunes and Uriagereka’s (2000) explanation, spell out of subjects is required unless the LCA cannot linearize them. Under our analysis of Japanese, however, subjects are not required to be turned into an atom, since their order can be determined via Ordering Merge. Meanwhile, we can maintain their insight of reducing the CED to multiple spell out by assuming that English chooses Chinese/Italian value of the Ordering Merge Parameter, i.e., (22b).³

4. Concluding Remarks: Epilogue and Prologue⁴

Let us summarize the whole picture, combining the Ordering Merge Parameter (22) with the Symmetry Breaker Parameter (17):



In this way, this paper captures the three types of ordering in (1), unifying the insight of the DA-analysis and Saito and Fukui’s (1998) idea which incorporates the Head Parameter to the definition of Merge. It is also argued that the difference

between Japanese and English in the Subject Condition effect can be captured maintaining Nunes and Uriagereka's (2000) explanation of the CED-effect.

Obviously, there are so many things to be worked out. For instance, we have to find the "reverse Japanese," which is consistently head-initial and allows only rightward movement, to fulfill the leftmost branch of (26). Another task is to compare this analysis with other theories of linearization such as Fox and Pesetsky (2005). We leave these tasks for future research.

Notes

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1 Contrastive foci cannot co-occur with *di* 'of' for an independent reason in either order. We thank Giuliano Bocci for pointing this out.

2 The position of subjects is not relevant here. We also omit the difference between V^0 and v^0 for expository purposes.

3 Yet, it is also observed that Japanese obeys the Adjunct Condition. Following Stepanov (2001), however, we assume that extraction from adjuncts is impossible because adjuncts are introduced to the derivation after the probe has searched its domain.

4 The title of this section "Epilogue and Prologue" has been borrowed from Otsu (1981).

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