ON TWO WAYS OF EXTERNAL PAIR-MERGE*

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1 Introduction

The aim of this paper is to demonstrate that Phase Cancellation proposed by Epstein, Kitahara and Seely (EKS) (2016), which is based on Chomsky's (2015) latest framework (often referred to as POP+), has another logical possibility and, moreover, the two ways of Phase Cancellation enable us to account for behaviors of defective verbal phases (as shown in (1)) and defective clausal phases (as in (2) and (3)).

(1) Swedish
a. Det har blivit skrivet/*skrivna tre böcker om detta.
Expl have been written-Sg/written-Pl three books about this
'There have been three books written about this.'
b. Det har blivit tre böcker *skrivet/skrivna om detta.
Expl have been three books written-Sg/written-Pl about this
'There have been three books written about this.'
(Holmberg (2002: 86))

(2) a. *My friends tend the more liberal candidates to support. (Haegeman (2012: 68))
b. *I have decided your book to read. (Haegeman (2012: 68))

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(3) a.*?Gianni sembra, il tuo libro, conoscerlo bene. (Raising)
Gianni seem-3sg the your book know-it well
'Gianni seems to know your book well.'
b. Gianni pensa, il tuo libro, di conoscerlo bene. (Control)
Gianni think-3sg the your book di know-it well
'Gianni thinks that your book, he knows it well.'
(Haegeman (2012: 68))

The organization of this paper is as follows: section 2 introduces the theoretical background of this paper, overviewing three important assumptions in POP+, namely, free merger, Set-/Pair-Merge and the Labeling Algorithm. In section 3, we will review EKS's (2016) Phase Cancellation and witness that their approach needs additional assumptions to account for a problem found in the examples in (1). Section 4 proposes the main claim in this paper that there is another logical possibility in Phase Cancellation and it is named "Half" Cancellation. After outlining the derivation under "Half" Cancellation, I will demonstrate how it solves the problem concerning defective verbal phases. Furthermore, section 5 extends the analysis here to defective CPs, namely, infinitival clausal phases. Finally, section 6 concludes the discussion.

2 Theoretical Background

In this section, let us overview three important assumptions within the framework of POP+, namely, free merger, Set-/Pair-Merge and the Labeling Algorithm.

2.1 POP+: Free Merger, Set-/Pair-Merge, and the Labeling Algorithm

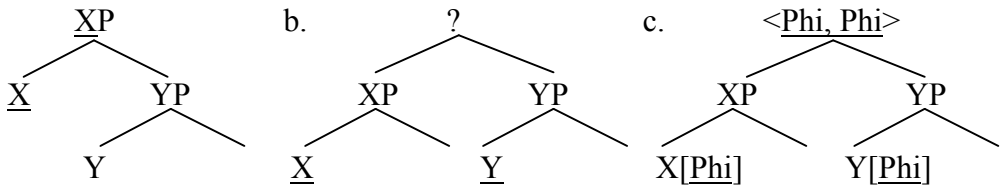
One of the most important shifts from the former framework (namely, Chomsky's (2008) framework with simultaneous A/A-bar movement within a phase) to POP+ is the introduction of free merger. Under the assumption of free merger, all merger operations including internal and external merge are freely applied when a phase is constructed, and if they produce a proper result, the derivation converges.

Moreover, Pair-Merge, which Chomsky (2004) firstly proposed, plays an important role within POP+. A "normal" merger operation is Set-Merge, which merges two items symmetrically and forms a "set" of them. On the other hand, Pair-Merge relates two items asymmetrically and produces an "ordered pair." In this paper, following Chomsky's (2004) argument, I assume that when α is Pair-Merged with β, α is attached to a "separate plane (Chomsky (2004: 118))" and, importantly, it becomes invisible within the syntax. In addition, as EKS (2016: 9) note, "there is no need to stipulate any rule-ordering of set-Merge or pair-Merge" under the concept of free merger. Thus, this paper assumes that Pair-Merge is also included in the freely available operations under free merger.

However, free merger itself is "so free" that it can produce any kind of results. Here, the Labeling Algorithm proposed by Chomsky (2013) plays a crucial role. The central idea behind the proposal is that if a resulting constituent is not labeled, it is not readable in the CI interface and thus Full Interpretation is violated. Therefore, the derivation converges only when the necessary items are properly labeled. Moreover, Chomsky (2013) proposes a detailed mechanism

for labeling: a minimal computation-based algorithm named "Labeling Algorithm." The Labeling Algorithm searches for the nearest head within a syntactic constituent and determines the head as the label of the constituent. The simplest case is the X-YP situation, where a head and a phrase are merged as in (4a); since the nearest head is X in this case, X is chosen as the label of the constituent. A complicated case is merger of phrases (sometimes referred to as the XP-YP situation). Because both of the heads are equidistant from the outside, the Labeling Algorithm cannot determine the label of the constituent as is shown in (4b). Hence, either of the phrases should move, or some prominent features should be shared between the heads (the prominent feature sharing option) as in (4c), in order to label the constituent.[1]

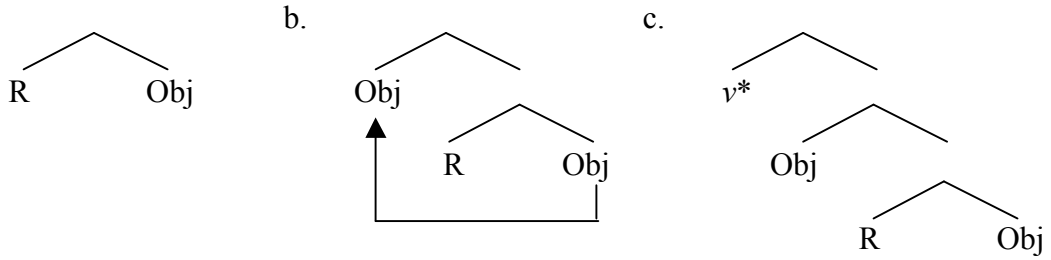
(4) a. b. c.



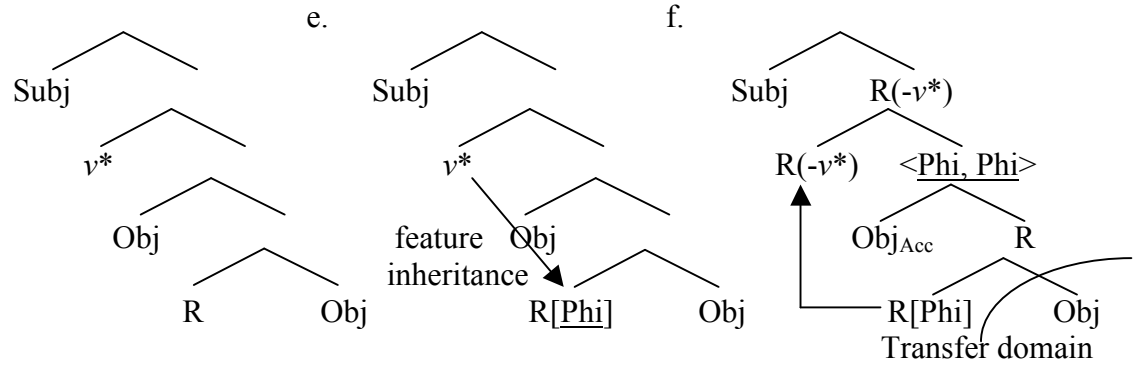
2.2 The Derivation of *v**P Phase within POP+

To illustrate how a phase is constructed, let us observe the convergent derivation of *v**P phase within the framework of POP+.

(5) a. b. c.



d. e. f.



Firstly, R and the DP are Set-Merged as in (5a). Then, the DP is internally Set-Merged as shown in (5b) and *v** is Set-Merged as in (5c). When the *v**P phase is formed, a set of operations are triggered: Feature Inheritance from *v** to R and the Labeling Algorithm, which determines the

[1] This paper utilizes tree diagrams and the traditional notations such as "XP," but let me emphasize that they are simply used for purposes of illustration.

<Phi, Phi> label in (5e). After all of the operations, transfer is triggered. Importantly, however, before transfer, R undergoes head movement to *v** and, as a result, *v** is Pair-Merged with R thorough the process. Due to Pair-Merge, *v** becomes invisible within the syntax and loses its status as a phase head (the parentheses enclosing *v** in (5f) indicate that *v** is invisible). Hence, the lower copy of R begins to act as a phase head and it transfers its complement as in (5f).

The characteristics of *v**P phase can be summed up as in (6).

(6) The *v**P phase

Feature Inheritance	u-Phi Features	Case Valuation	LA	Transfer
✓	✓	✓	✓	✓

3 EKS's (2016) Phase Cancellation

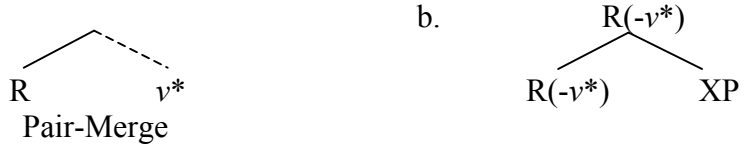
Within the framework of POP+, EKS (2016) point out a possible situation where *v**P phase is canceled. That is, if *v** is Pair-Merged with R before it enters the main stream of the derivation, the phase-head status of *v** disappears before it acts as a phase head. In this case, *v**P phase cannot be formed and, consequently, a phase is "canceled."

Moreover, EKS (2016) claim that the characteristics of weak-phase head "*v*," which Chomsky (2001) proposed to account for the passive/unaccusative constructions, are derived from Phase Cancellation. Therefore, we need not assume *v* any longer within this framework.

3.1 The Derivation of EKS's (2016) Phase Cancellation

The derivation of EKS's (2016) Phase Cancellation for (what Chomsky (2001) calls) weak-phase *v*P is as follows:

(7) a. b.



As we can see in (7a), *v** is Pair-Merged with R and it loses the status as a phase head. Thus, when R(-*v**) is Set-Merged with a DP, *v**P phase is not formed (Phase Cancellation). As a result, the Phi features on *v** also become invisible within the syntax, Feature Inheritance does not occur, and the DP cannot receive its case value.

The status of the canceled *v**P is shown in (8). Note that all of the characteristics that the normal *v**P phase has (see (6) above) disappear here.[2]

[2] Strictly speaking, the term "canceled *v**P" is not appropriate since under Phase Cancellation, *v**P does not project. Note that the expression "canceled *v**P" is utilized only for expository purposes here and in what follows.

(8) The Canceled *v**P phase

Feature Inheritance	u-Phi Features	Case Valuation	LA	Transfer
*	*	*	*	*

3.2 A Question in Phase Cancellation

This section points out one question under EKS's Phase Cancellation. Let us take a look at the well-known examples in (9).

(9) Swedish
a. Det har blivit skrivet/*skrivna tre böcker om detta.
Expl have been written-Sg/written-Pl three books about this
'There have been three books written about this.'
b. Det har blivit tre böcker *skrivet/skrivna om detta.
Expl have been three books written-Sg/written-Pl about this
'There have been three books written about this.'
(Holmberg (2002: 86))

As we can see in (9), in some Scandinavian languages (here exemplified with Swedish instances), an inflection appears at the end of past participles and the inflection shows agreement with a DP when the DP undergoes movement. The situation can be schematized as in (10).

(10) a. Expl Part-infl$_{\underline{\text{default}}}$ DP
b. Expl DP Part-infl$_{\underline{\text{agree}}}$

Although this phenomenon was explained in terms of the Spec-Head relation in the early minimalist era, Chomsky's (2001) introduction of the Agree operation, which is based on the c-command-based Probe-Goal relation, rendered the explanation based on the Spec-Head relation untenable. Thus, we have needed some additional assumptions, such as EPP features (in Chomsky (2001)), OCC features (in Chomsky (2004)), and Edge features (in Chomsky (2008)), to account for the examples in (9). This implies the significance and the difficulty of the discussion on this topic.

Now, notice that (10a) is readily explained based on EKS's Phase Cancellation: u-Phi features are invisible in the canceled *v**P phase and thus agreement with the DP, which is derived from u-Phi feature checking, cannot occur. However, when it comes to (10b), we need another derivational possibility, given that u-Phi features must exist since agreement with the DP is observed.[3]

[3] Obata (2016) and Kitahara (2017) propose other ways to derive agreement based on EKS's (2016) Phase Cancellation. In this paper, I will not pursue these possibilities.

4 A Proposal

Section 4 proposes the "missing" derivation for (9b) above. The derivation is related to another logical possibility of EKS's (2016) Phase Cancellation shown in the following subsection.

4.1 Another Logical Possibility

Recall that while Set-Merge is a symmetric operation, Pair-Merge is an asymmetric one. Therefore, when it comes to Set-Merge, there is no difference between *α is Set-Merged with β* and *β is Set-Merged with α*: both are the same, *α and β are Set-Merged*. However, when considering Pair-Merge, we have to distinguish *α is Pair-Merged with β* from *β is Pair-Merged with α*. As was touched on in 2.1, in the former case, where α is Pair-Merged, α becomes invisible within the syntax and β remains visible in the derivation. On the other hand, in the case where β is Pair-Merged with α, β is rendered syntactically invisible and syntactic operations can target only α in the later derivation.

Now, recall that within the derivation of (normal) *v**P in the framework of POP+, *v** loses its phase-head status as a consequence of head movement of R (see (5f) above). That is, "due to the special properties of head movement (Chomsky (2015: 12))," *v** is always Pair-Merged with R through head movement (see also Epstein (1998)). Consequently, *v** necessarily becomes invisible and there are no other derivational possibilities regarding the normal *v**P phase. Nevertheless, EKS's (2016) proposal of Phase Cancellation is based on external Pair-Merge, not on head movement. This implies that we have two logical possibilities without any stipulations to rule out either of them:

(11) a. *v** is Pair-Merged with R (EKS's (2016) Phase Cancellation).
b. R is Pair-Merged with *v** ("reverse" Pair-Merge, corresponding to (10b)).

(11a) is the exact situation EKS (2016) discuss, which we saw in 3.1. On the other hand, this paper argues that (11b) corresponds to the "missing" situation in (10b) discussed above. Let us investigate the detail of the possibility in (11b).

4.2 "Half" Cancellation of Phases

Before moving to the actual derivation, let us consider what occurs on Phi features on *v** under (11b). Note that in this case, *v** remains visible within the syntax unlike R, which becomes invisible due to Pair-Merge. This indicates that (u-)Phi features on *v** also remain visible and need to be checked.

Then, what occurs on Feature Inheritance? I claim that Feature Inheritance is not triggered in this case. Let us see the reasoning: Firstly, within the framework of POP+, Richards' (2007) theoretical argument for Feature Inheritance based on the simultaneity of checking and transfer of u-features seems to be no longer tenable due to the introduction of "phase based memory." Therefore, Feature Inheritance itself should be a "free" operation within POP+. However, since T (at least in English) and R are so weak that they cannot be a label by themselves, Phi features must be handed to them so as to strengthen them through Phi-feature-checking. In this way, Feature Inheritance is required in usual cases.

Nevertheless, note that under (11b), R becomes invisible thanks to Pair-Merge and is ignored by the Labeling Algorithm. Thus, even if Feature Inheritance does not occur, no problem arises within the derivation under (11b), owing to the invisibility of R. Rather, there is no head that can "inherit" the Phi features from *v** and hence it is not the case that Feature Inheritance is unnecessary in (11b); it is impossible. Thus, this paper concludes that Phi features must remain on *v** under the possibility of (11b). Furthermore, I claim that case checking is also impossible in this case following Epstein, Kitahara and Seely's (2012) assumption that a combination of existence of inherited Phi features and T's tense property or R's (or V's in their term) transitivity property produces the case-checking ability.

In this way, although *v** and its Phi features remain visible, Feature Inheritance does not occur. Therefore, it is plausible to say that under (11b), the phase is "halfway" canceled. That is, while (11a) is a case of "Full" Cancellation of phases, (11b) results in "Half" Cancellation of phases. The situation here is summed up in table (12).

(12) The "Half" Canceled *v**P phase

Feature Inheritance	u-Phi Features	Case Valuation	LA	Transfer
*	✓	*	✓	✓[4]

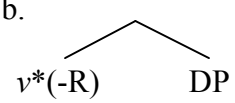
4.3 The Derivation of the "Half-Canceled" *v**P Phase

Let us now turn to the derivation of the "half-canceled" *v**P phase under (11b).

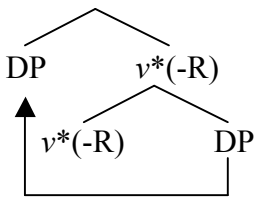
(13) Det har blivit tre böcker skrivna om detta (= (9b), Agreement & Movement).

a.

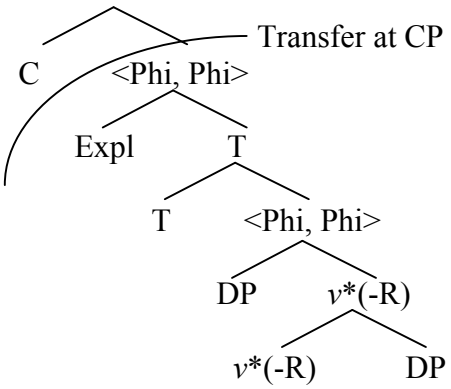
b.



c.



d.



[4] When it comes to Transfer, it is not clear whether it occurs or not. Crucially, I suggest that since *v** is firstly (Pair-) merged with R, the complement of *v** (namely, the firstly-merged element of *v**) should be R, not the DP. Hence, even if Transfer is triggered, only R is transferred. I will leave detailed discussions on Transfer in this case for future studies.

As in (13a), R is externally Pair-Merged with *v** and R is rendered invisible. *v**(-R) is Set-Merged with the DP as we can see in (13b). The DP is internally Set-Merged as in (13c). This paper claims that the movement (internal Set-Merge) of DP in (13c) is necessary to check the u-Phi features on *v**(-R). Moreover, importantly, Feature Inheritance is not triggered in this case as was discussed just above and therefore case checking is prevented since we assume that Feature Inheritance licenses case checking, following EKS (2012) (see 4.2).

The derivation proceeds to the CP phase level. After T is Set-Merged, in this case, an expletive is Set-Merged.[5] When C is Set-Merged, it transmits its Phi features to T via Feature Inheritance. The Labeling Algorithm occurs and the inherited Phi features on T are checked. Consequently, all of the relevant features are checked, the necessary items are properly labeled, and the derivation converges.

5 An Extension of the Analysis

This section extends the analysis of "Half" Cancellation to the CP phase. The main claim is that the ECM/raising complements are derived through EKS's (2016) ("Full") Phase Cancellation and the control complement is generated via "Half" Cancellation. Let us firstly see the empirical data in the next subsection.

5.1 Defective Left Peripheries in Infinitival Clauses

It is widely known that argument-fronting is impossible in the infinitival complements. More specifically, argument-fronting is not allowed in either the ECM/raising constructions ((14a)) or the control construction ((14b)).

(14) a. *My friends tend the more liberal candidates to support. (Haegeman (2012: 68))
b. *I have decided your book to read. (Haegeman (2012: 68))

In (14a), "the more liberal candidates," the object of the verb "support," is fronted to the left periphery of the raising complement, which renders the sentence ungrammatical. In a similar vein, (14b) contains "your book," the object of "read," in the left periphery of the control construction and the example is also ungrammatical.

A puzzling situation is found when it comes to Clitic Left Dislocation (CLLD) in Italian. Interestingly, CLLD is impossible in the ECM/raising constructions, whereas it is observable in the control construction. Let us take a look at the examples in (15).

(15) a.*?Gianni sembra, il tuo libro, conoscerlo bene. (Raising)
Gianni seem-3sg the your book know-it well
'Gianni seems to know your book well.'

[5] It may be that the expletive has once been Set-Merged somewhere and then it is internally Set-Merged here. I will not go into the detail of the licensing mechanism for Expletives in this paper.

b. Gianni pensa, il tuo libro, di conoscerlo bene. (Control)
Gianni think-3sg the your book di know-it well
'Gianni thinks that your book, he knows it well.'

(Haegeman (2012: 68))

While in (15a) "il tuo libro" is fronted and the sentence is ungrammatical, in (15b) it is located in the left periphery of the control complement without raising any problems. Here we face an asymmetric situation. How can we explain the asymmetry between argument-fronting and CLLD?

Furthermore, Haegeman (2012) argues the syntactic behavior of the fronted element in CLLD is quite similar to that of left-peripheral adjuncts. Therefore, the asymmetry above is extended between fronted arguments and CLLD/left-peripheral adjuncts. The situation here is summed up as in (16).

(16)

	ECM/raising	Control
Arguments	*	*
CLLD/Adjuncts	*	Ok

5.2 Assumptions

In order to capture (16) within the present framework of the two Phase Cancellations, I will make the two assumptions in (17a, b).

(17) a. Discourse-related features are located on C.
b. Two possible strategies to locate Topic items in the left periphery:
(i) Internal Set-Merge and the <Topic, Topic> label determination (argument)
(ii) Direct external Pair-Merge into the left periphery (CLLD/adjunct)

Firstly, in (17a), this paper assumes that discourse-related features (including the Topic feature, which is relevant for the discussion here) are located on the C head. Therefore, when the C head is invisible, such features cannot appear in the derivation. Secondly, this paper suggests the two possible strategies for locating Topic items in the left periphery. One is an ordinary way in (17b (i)), where the relevant item undergoes internal Set-Merge and the prominent feature sharing option is applied to determine the <Topic, Topic> label. I claim that argument-fronting is derived in this way. On the other hand, the relevant item can be directly merged into the left peripheral position as in (17b (ii)). Namely, the Topic item is externally Pair-Merged with C in this case. Under this strategy, I argue that the Topic interpretation is derived in the C-I interface because the item is Pair-Merged with the C head, which has the Topic feature. This paper suggests that the strategy in (17b (ii)) is only applicable in CLLD and examples with left-peripheral adjuncts.

5.3 Explanations

Based on the assumptions in 5.2, let us move to explanations. We will firstly see the case of the ECM/raising constructions.

5.3.1 The ECM/Raising Constructions

This paper claims that the ECM/raising complement is derived through external Pair-Merge of C to T, namely, EKS's (2016) "Full" Cancellation. As a result of Pair-Merge, the C head becomes invisible. Hence, based on (17a), no discourse-related features can appear in the derivation. Therefore, under this possibility, the left periphery is always completely defective. This implies that neither arguments nor adjuncts can be located in its left periphery as discourse-related items. Moreover, assuming that CLLD utilizes the Topic feature, the impossibility of CLLD is also explained through "Full" Cancellation. Consequently, "Full" Cancellation can capture the defective status of the left periphery in the ECM/raising constructions.

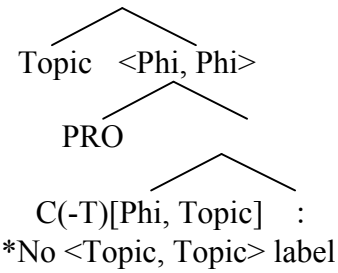
5.3.2 The Control Construction

On the other hand, this paper argues that the control complement is generated through Pair-Merge of T to C, that is, "Half" Cancellation. In this case, the C head remains visible within the syntax and, based on (17a), its discourse-related features also survive. This indicates that the left periphery of the control complement is active.

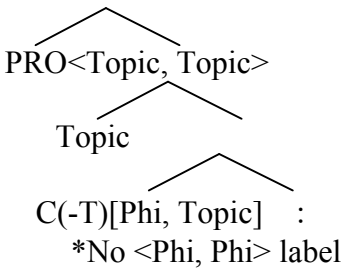
However, notice that u-Phi features on C are also visible in this case. Hence, they must be checked and the <Phi, Phi> label determination with PRO (or probably with A-trace of the matrix subject, if we adopt the Control as Movement approach pursued by e.g. Hornstein (1999), Boeckx and Hornstein (2003), and Boeckx et al. (2010) is necessary.

Then, I claim that there is no way to determine the <Topic, Topic> label and the <Phi, Phi> label at the same time. Note that in the control complement, T is Pair-Merged to C and rendered invisible. This means that there remains only one layer that can be utilized for the label determination. Hence, when the <Phi, Phi> label is determined, the <Topic, Topic> label cannot be derived (as in (18a)), whereas when the <Topic, Topic> label is decided, the <Phi, Phi> labeling fails (as in (18b)).

(18) a.



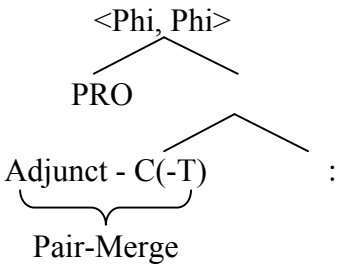
b.



As a result, there is no way to ensure the positions for fronted discourse-related elements through the strategy in (17b (i)). Consequently, arguments cannot be located in the left periphery in the control construction.

However, note that adjuncts are Pair-Merged. Importantly, Pair-Merged items are syntactically invisible and therefore they do not hinder the <Phi, Phi> label determination. Therefore, under the strategy in (17b (ii)), the derivation converges as in (19).

(19)



This indicates that adjuncts and the fronted element in CLLD can appear in the left periphery in the control complement. In this way, we can capture the asymmetry between Argument and CLLD/Adjunct concerning the left periphery of the control construction. In this section, we have observed that the framework of the two ways of Phase Cancellation can readily account for the puzzling situation summed in (16).

6 Summary

In this paper, we have witnessed that there should be two ways in Phase Cancellation: EKS's (2016) ("Full") Cancellation and "Half" Cancellation, the latter of which can accommodate passive examples with agreement. Moreover, the analysis here can be extended to the defective status of infinitival left peripheries. Through these discussions, I hope to have shown the validity of the assumption of the two types of Phase Cancellation.

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