

[Article]

The Licensing of the Parasitic Gap Operator*

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1. Introduction

The purpose of this paper is to focus on one particular syntactic mechanism found in partial movement (PM) constructions in German and argue that the mechanism is also operative in the derivation of parasitic gap (PG) constructions in English. Examples of these two types of constructions are shown below.

- (1) Was glaubst du [_{CP} wen_i Maria t_i getroffen hat]?
what think you whom M. met has
'Who do you think Maria has met?' (Felser 2001: 5)
- (2) Which articles did John file __ without reading __? (Engdahl 1983: 5)

The PM construction in (1) shows that the lower *wh*-phrase stays at the embedded [Spec, CP] even though the matrix verb *think* only selects a non-interrogative complement clause (see McDaniell 1989). Following the insights of previous studies, I assume that the lower *wh*-phrase stays there because of the occurrence of the other *wh*-phrase *was* in a higher position. Specifically, I assume the feature

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transmission mechanism under which the [+Q] feature of the higher *wh*-phrase is transmitted down to the lower head that licenses the presence of a *wh*-phrase in its Spec position. In this paper, I claim that this feature transmission mechanism can be extended and is adopted in PG constructions like the one in (2). To make this extension possible, I propose that adjunct phrases are not inherently opaque. Thus, in (2), the operator is allowed to stay at the edge of the adjunct phrase because of the occurrence of a higher *wh*-phrase.

This paper argues that the current proposal can be derived. Specifically, the structural effects of pair-Merge come from the combination of set-Merge and head movement. This is a theoretically welcome result because we can dispense with the pair-Merge operation as an independent operation.

The organization of this paper is as follows. Section 2 briefly reviews some previous analyses of PG constructions and PM constructions. Section 3 presents the proposal of this paper, which predicts that the analysis of the PM constructions should be applied to other constructions. As a specific extension, I discuss the PG constructions. Section 4 shows the way in which PG constructions are analyzed under the current proposal. Section 5 discusses the anti-c-command constraint, which I argue is not a necessary theoretical construct and that the ungrammaticality of sentences with parasitic gaps is reduced to the absence of necessary c-command relations. Section 6 offers theoretical considerations concerning PG constructions, discussing the structure-building mechanism of adjuncts. Section 7 concludes the discussion.

2. Previous Analyses

2.1. Parasitic Gap Constructions in English

PG constructions have attracted significant attention in the generative studies (see Engdahl 1983, Chomsky 1981, 1982 and see also Culicover 2001 for a summary of the intriguing properties of PG constructions). One important syntactic property of PG constructions is that a single *wh*-phrase seems to sanction the presence of two gaps in a sentence, as seen in (2), where the *wh*-phrase *which article* works as both the complement of the matrix verb *file* and that of

the embedded verb *reading*.

Chomsky (1986) offers an insightful approach to PG constructions. Specifically, he argues that overt *wh*-movement occurs within a matrix clause, and, at the same time, a different operator moves in an embedded adjunct phrase, and he further proposes a mechanism called the chain composition. I show (3), which is a simplified structure of (2), and I also cite (4), which is the definition of the chain composition.

(3) Which articles_i did John file t_i [Op_i without reading pg_i]?

(4) If $C=(\alpha_1, \dots, \alpha_n)$ is the chain of the real gap and $C'=(\beta_1, \dots, \beta_m)$ is the chain of the parasitic gap, then the “composed chain” $(C, C')=(\alpha_1, \dots, \alpha_n, \beta_1, \dots, \beta_m)$ is the chain associated with the parasitic gap construction and yields its interpretation. (Chomsky 1986: 56)

The chain composition analysis elegantly accounts for the presence of two gaps. The sentence in (3) has two sets of chain relations: one is the relation between the *wh*-phrase *which article* and t_i , and the other is the one between Op_j and t_j . According to (4), these two sets of chains are composed into a single chain, resulting in the composite chain (*which article*, t_i , Op_j , t_j). The chain composition operation creates a one-to-two relation between a single overt *wh*-phrase and two (or more) gaps (see Ross 1967 for instances of multiple parasitic gaps).

However, this approach poses a serious theoretical problem because (4) exclusively applies to PG constructions. The analysis cannot be extended to other constructions/syntactic phenomena, and there are no other constructions to which (4) applies. As such, (4) does not have any theoretical significance and is merely a factual description of a property of PG constructions.¹

In this paper, I focus on a syntactic mechanism used in PM constructions. I offer a proposal that the mechanism is extended and it works to generate PG constructions. However, before presenting the current proposal, let me review the syntactic properties of PM constructions in the next subsection.

2.2. Partial Movement Constructions in German

This subsection focuses on German because PM constructions are well-studied in German compared to other languages. To begin with, in German, *wh*-phrases usually move to a sentence-initial position, as seen in (5).

- (5) Wen_i glaubst du [_{CP} t_i' dass Maria t_i getroffen hat]?
who think you that M. met has
'Who do you think Maria has met?' (Felser 2001: 5)

The *wh*-phrase in (5) originates in the complement position of the participial verb *getroffen* 'met,' and moves to the initial position. The copies left behind by the movement are phonologically deleted. However, we can observe cases where the *wh*-phrase *wen* can stop at its "intermediate" landing site, as in (6).

- (6) Was glaubst du [_{CP} wen_i Maria t_i getroffen hat]?
what think you whom M. met has
'Who do you think Maria has met?' (Felser 2001: 5)

Sentences like (6) are called PM constructions because the movement of the *wh*-phrase seems incomplete or partial in the sense that the *wh*-phrase fulfills the only part of the necessary movement task.

Note that the "final" landing site is occupied by the different *wh*-phrase *was*, which is semantically vacuous and simply satisfies the syntactic requirement for the initial position to be occupied by some phonetic item. On the other hand, the lower *wh*-phrase *wen* works as a real *wh*-phrase, showing the *wh*-scope over the embedded CP.

A question concerning (6) is what makes it possible for *wen* in (6) to stay in the embedded clause even though the *wh*-clause is selected by the verb *think*, whose complement must be non-interrogative. In featural terms, the verb *think* only selects *that*-clauses, which are of [-Q] in its semantic type, and thus, a *wh*-phrase should not appear in the Spec position.

To analyze PM constructions like the one in (6), I follow the insights of

Felser (2001, 2004). Specifically, she offers (7) as the derivational structure of (1).

(7) [CP was_i glaubst_k [IP D_{du} t_k [VP t_i t_k [CP_[+wh] wen_j Maria t_j getroffen hat]]]]
 (cf. Felser 2001: 28)

As (7) shows, within the embedded CP, the *wh*-phrase moves to [Spec, CP]. This CP is “licensed” by the other matrix *wh*-expletive *was*, which is externally Merged with the matrix object position and then, moves up to the matrix [Spec, CP].

A question concerning Felser’s analysis is how exactly “licensing” takes place to allow the *wh*-phrase *wen* to stay at the embedded [Spec, CP]. Felser (2001, 2004) proposes the interrogative concord, which is similar to the case concord. As a result of the interrogative concord, the complement CP is capable of having the [+wh] feature. However, in this paper, I assume a different mechanism. Specifically, I assume that the *wh*-expletive *was* has the ability to search for a lower head in the c-command domain and change the head to the one with [+Q].

In passing, it seems that the syntactic effect of the higher *wh*-phrase on the lower head can be considered as an instance of the feature inheritance proposed by Chomsky (2008) for two reasons: first, because the one syntactic object must be in the c-command domain of the other, and second, because the syntactic relation must be established within a local domain. If this is on the right track, it seems reasonable to assume that some “unstable” status in the grammatical judgments of PG constructions comes from the “long distance” nature of feature transmission.² However, the discussion of this possibility is beyond the scope of this paper and will thus not be discussed further.

Instead, this paper adopts the term “transmission” as a theoretically neutral term to capture the relation between the *wh*-expletive *was* and the lower affected head. Therefore, I can offer the following as a licensing mechanism of the PM constructions in German:

- (8) A higher *wh*-phrase (*was* here) transmits [+Q] to a lower head in a **complement** clause.

With (8) in mind, consider the derivational structure in (7) again. The *wh*-expletive *was* is externally Merged with V' and then, it copies the [+Q] feature and transmits it to the lower head C (see Ouali 2008). Due to this process, the embedded C comes to possess the [+Q] feature. Owing to the presence of [+Q], C becomes capable of containing the *wh*-phrase in its Spec position.

Note here that some type of anti-locality is at work. The closest head to *was* is the matrix V when it is introduced into the derivation, but the positional relation between the V and *was* is too local and thus, the transmission of [+Q] needs to target a lower head than the V. I describe this restriction as follows:

- (9) The *wh*-phrase in [Spec, XP] cannot transmit [+Q] to X.

I also assume the standard locality constraint based on the phase boundary: the transmission of [+Q] cannot go beyond a phase boundary, the Phase Impenetrability Condition (PIC). Specifically, I follow the definition of the PIC in Chomsky (2000), which is shown below.

- (10) In phase α with head H, the domain of H is not accessible to operations outside α , only H and its edge are accessible to such operations.

(Chomsky 2000: 108)

Having reviewed the syntactic properties of PM constructions in German, I present the proposal of this paper in the next section.

3. Proposal and Predictions

In this section, I present the current proposal regarding adjunct phrases. It has been assumed that adjuncts constitute opaque domains, which means that it is not possible for any syntactic operations to apply into adjunct phrases

(Chomsky 1986, 2004).

However, in contrast to this widely held assumption, I propose (11).

(11) Adjuncts are not inherently opaque.

(11) shows that syntactic operations can apply to an item within adjunct phrases.³

Importantly, (11) is not a mere stipulation but can be derived from the combination of set-Merge and head movement. However, I will defer this discussion to Section 6. It suffices here to state that, just like complement clauses, adjunct phrases constitute transparent domains.

If the proposal of the current paper is on the right track, we expect that the feature transmission mechanism used in PM constructions reviewed above can be extended to other constructions. Specifically, it should be possible to apply the [+Q] transmission in (8) to adjunct phrases. The expected relation is shown in (12).

(12) A higher *wh*-phrase transmits [+Q] to a lower head in an **adjunct** clause.

(12) is plausible when we take into consideration the proposal in (11) claiming for the non-opacity of adjunct phrases. Nothing should prevent a syntactic object from having access to lower heads in adjunct clauses.

Note, finally, that there are many syntactic and morphological differences between PM constructions in German and PG constructions in English. Admitting the differences, however, the current paper emphasizes the workings of the feature transmission shared by both these two types of constructions. I assume that the differences between the two follow from other properties of these two languages.⁴

4. An Analysis of Parasitic Gap Constructions

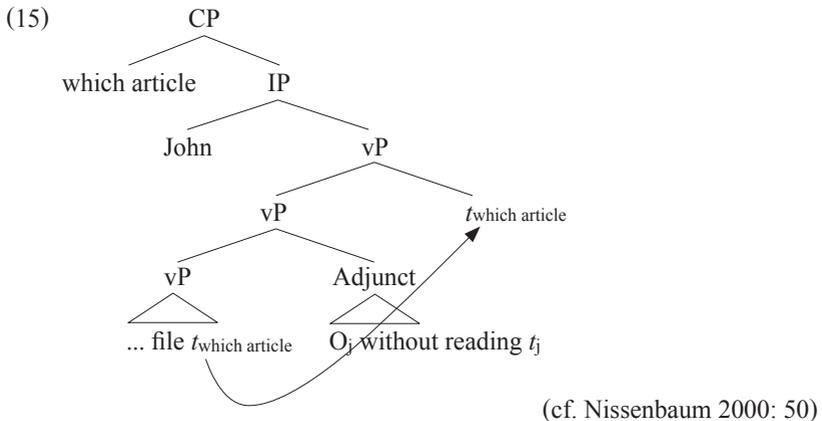
This section discusses the derivational properties of PG constructions, some of which are seen in (13) and (14) (henceforth, I use the notation “__” to

indicate the positions of real gaps and parasitic gaps, even if the data I cite use some other notations such as *t*, *rg*, and *pg*, to specify these positions).

(13) Which articles did John file __ without reading __? (=2)

(14) Here is the paper that John read __ before filing __. (Engdahl 1983: 14)

In analyzing sentences like (13) and (14), I assume the operator movement analysis following Chomsky (1986). A point to note, however, is that the widely held assumption under the operator movement analysis is that operators only appear within “island” environments. This assumption does not hold under the current analysis because this paper claims that adjuncts do not constitute islands (see (11)). It then follows that an overt *wh*-phrase and its corresponding operator can appear interchangeably. The importance of this interchangeability becomes clear as we discuss specific derivations. I also follow the analysis of Nissenbaum (2000), who examines PG constructions and argues for a particular hierarchical relation between *wh*-phrases and adjuncts. Specifically, when *wh*-phrases move to the edge of vP, they must move across the adjunct phrases, as illustrated in (15) with the arrow attached to the relevant movement.

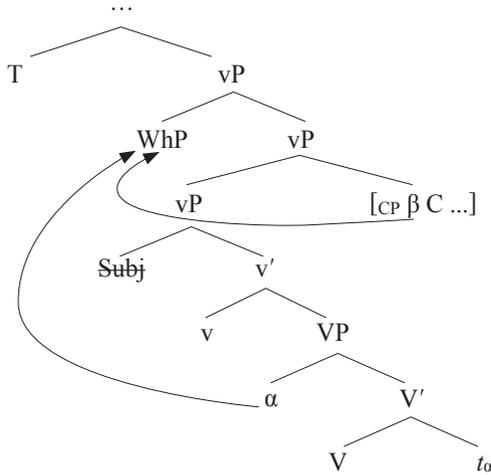


I do not repeat the arguments for the hierarchical configuration in (15). However,

I take the derivation to be correct. (I show how the current analysis captures Nissenbaum’s generalization in Section 6.)

At this point, we can make clear how the feature transmission works in PG constructions in English. Specifically, (14) has the following derivational structure (henceforth, *wh*-phrases are abbreviated as WhP in derivational structures):

(16) OK



(16) shows that the adjunct CP is adjoined to vP. Since a *wh*-phrase and an operator occur interchangeably, we have two possible derivations to consider: the trace of WhP is α or β . Either case results in a convergent derivation. First, consider $\alpha = t_{WhP}$ and $\beta =$ an operator position. In this case, the *wh*-movement takes place from [Spec, VP], which is the canonical object position under the recent Minimalist framework (Chomsky 2008, 2013, 2015). Once the *wh*-phrase drops by [Spec, vP], it transmits [+Q] to the adjunct C, which in turn allows the operator to stay in its Spec position. The derivation creates a legitimate structure at the interfaces. On the other hand, suppose that the *wh*-phrase moves out of the adjunct CP (that is, $\beta = t_{WhP}$ and the operator is in α). In this case, the *wh*-phrase makes use of [Spec, CP] as an escape hatch and moves to the matrix [Spec, vP]. Importantly, the movement is possible because adjunct clauses are not opaque domains. After reaching [Spec, vP], WhP transmits [+Q] to V, and

the V comes to be eligible for containing the corresponding operator in its Spec position. This alternative derivation also produces the structure legitimate at the interfaces.⁵

One notable difference from Nissenbaum's analysis is that the current paper assumes that the *wh*-movement is possible out of adjunct phrases. Thus, the *wh*-extraction in (16) is a specific instance of permissible *wh*-extractions out of adjunct clauses. The importance of the difference between the current analysis and Nissenbaum's one becomes clear in the following sections.

As a final remark in this section, I point out a theoretical advantage of the current analysis over Chomsky's (1986) chain composition analysis. Recall that his analysis applies to no other constructions. By contrast, under the current analysis, PG constructions are not unique constructions to which one particular analysis applies. Rather, they are grouped together with PM constructions in that these two types of construction undergo the same [+Q] transmission operation by a higher *wh*-phrase to a lower head.

5. Anti-C-Command Condition

5.1. Real Gaps and Subject Positions

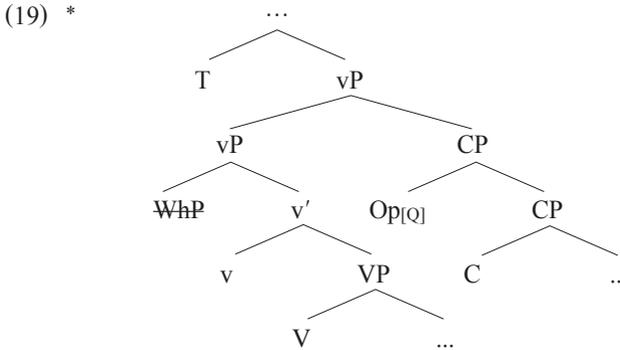
Chomsky (1982) and Engdahl (1983) claims that real gaps should not c-command parasitic gaps; otherwise, sentences become ungrammatical. The current paper calls this restriction the anti-c-command constraint, and the alleged cases of the violation of this constraint are seen in (17) and (18).

- (17) a. *Which articles __ got filed by John without him reading __?
b. *Which articles did you say __ got filed by John without him reading __?
(Engdahl 1983: 20)
- (18) *a woman who __ called John an idiot as often as __ called him a cretin.
(Chomsky 1982: 53)

It is true that the real gaps in (17) and (18) c-command the parasitic gaps. However, I argue in this section that the anti-c-command constraint is not a

necessary theoretical construct and that the sentences in (17) and (18) are ungrammatical for a different reason that is related to the [+Q] transmission.

To investigate the reason why (17) and (18) are ungrammatical, we need to examine a derivational structure of these sentences. Consider (19), which is a partial structure shared by (17) and (18).



We have already observed the necessity of the c-command relation between higher *wh*-phrases and affected lower heads (see (7), (15), and (16)). However, in (19), it is not possible for WhP to transmit [+Q] to C because the head C is not in the c-command domain of the *wh*-phrase. Therefore, the ungrammaticality of (17) is reduced to the lack of an appropriate c-command relation for the [+Q] transmission. Put it in more general terms, when a *wh*-phrase stands in the subject position, the necessary c-command relation cannot be established.

One might adhere to the hierarchical relation in (19) by assuming that the *wh*-phrase moves up across the adjunct CP and is adjoined to vP, resulting in the highest Spec of v. If this movement were possible, the *wh*-phrase would c-command the C head. However, this is not allowed because this movement takes place from [Spec, vP] to [Spec, vP] in the same vP domain, violating the anti-locality constraint, which Grohmann (2003) defines as follows:

- (20) Movement must not be too local. (Grohmann 2003: 26)

Therefore, we have no way of establishing an appropriate c-command relation when a *wh*-phrase occurs in a subject position, as in (19).⁶

Suppose that, differently from (19), the *wh*-phrase moves out of the adjunct phrase, specifically from [Spec, CP] to [Spec, vP]. In this case, the trace of the *wh*-phrase lies in [Spec, CP] and the corresponding operator is in [Spec, vP]. The movement from [Spec, CP] to [Spec, vP] itself is possible, but the derivation is not convergent due to the too local transmission of the [+Q] feature. I repeat (9) here as (21).

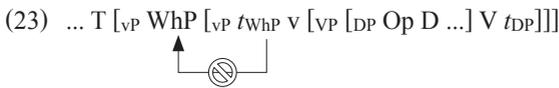
(21) The *wh*-phrase in [Spec, XP] cannot transmit [+Q] to X.

In the derivation under consideration, WhP in [Spec, vP] needs to transmit [+Q] to v. However, the transmission violates (21), and WhP cannot transmit [+Q] to v. Therefore, the movement from [Spec, CP] to [Spec, vP] cannot produce a convergent derivation.

Note here that in (17) and (18), the clauses that contain parasitic gaps are adjunct clauses. Given the claim of this paper that the anti-c-command constraint has no relevance to PG constructions, the current analysis needs to show how to rule out (22) without recourse to the anti-c-command constraint.

- (22) a. *Who __ sent a picture of __?
- b. *Who __ remembered talking to __?
- c. *Who __ remembered that John talked to __? (Engdahl 1983: 20)

Engdahl (1983) offers these sentences with the parasitic gaps in the complement clauses as specific examples of a violation of the anti-c-command constraint. However, I argue that (22) is not relevant to the constraint. First, consider the following simplified structure of (23a):



Recall that the object DP stands in [Spec, VP]. Within the DP, the operator is at the edge of the DP. Given this, the D head needs to receive the [+Q] feature from the *wh*-phrase *who* and to allow the operator to stay there. However, the *wh*-phrase cannot move to the higher edge of vP because the movement is too local. Therefore, (23) does not have any convergent derivation.⁷

(23) has another derivation to consider. Specifically, suppose that the *wh*-phrase originates within the object DP and moves out of the DP to reach the outer edge of vP. This movement is possible. In this case, however, the transmission of [+Q] needs to apply to *v*. This transmission of the feature violates (21). Therefore, whether a *wh*-phrase be in [Spec, vP] or [Spec, DP], (23) never produces any legitimate structure at the interfaces.

Here, one might wonder why the *wh*-phrase in (23) must move to the outer edge of vP rather than stay at the in-situ position for the [+Q] transmission. A reason is related to the old observation that A-movement does not license parasitic gaps. Observe the ungrammaticality of the following sentences:

- (24) a. *John_i was killed ___ by a tree falling on ___.
 b. *Mary_i seemed ___ to disapprove of John's talking to ___.
- (Engdahl 1983: 13)

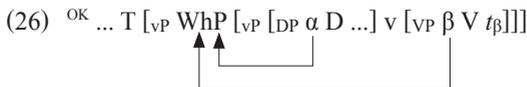
The sentences in (24) show that A-movement does not license a parasitic gap. Therefore, we can say that, at any point in the derivation, the [+Q] transmission cannot apply from A-positions. This is why, in (23), WhP must move to the outer edge of vP from which the [+Q] transmission applies. More generally, we can say that the [+Q] transmission must take place from A'-positions.

We have so far observed cases where the subject phrase itself is a *wh*-phrase. I have focused on the point that the anti-locality constraint works as the blocker in the establishment of the appropriate [+Q] transmission relation.

The current analysis expects that when the movement is not “too local,” sentences with parasitic gaps turn out to be better. The expectation is borne out by sentences where the gap is embedded within the subject phrase. Specific examples are shown in (25).

- (25) a. Which boy did Mary's talking to __ bother __ most?
 (Engdahl 1983: 5)
- b. That was the rebel leader who_i rivals of __ shot __.
 (Chaves 2012: 472)

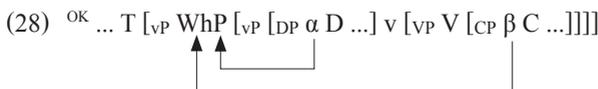
(25) shows the sentences that contain a gap embedded within the subject phrase. I show the partial derivational structure in (26).



(26) has two types of derivation to consider. First, consider that the *wh*-phrase occurs within the subject phrase ($\alpha=t_{whP}$). It can move out of the DP via [Spec, DP] without violating the anti-locality constraint. Reaching the outer edge of vP, it transmits [+Q] to the V. This V allows the operator to stay at β (= [Spec, VP]). This is a convergent derivation. Furthermore, the other derivation is also convergent. The object is a *wh*-phrase. When the *wh*-phrase moves to [Spec, vP], [+Q] is transmitted to the D head within DP. The D head allows the operator to stay in [Spec, DP].

Similar points are observed in (27). Consider (28) where CP appears in the complement position.

- (27) a. Who did you say John's criticism of __ would make us think __ was stupid?
 (Engdahl 1983: 21)
- b. She is the kind of person that everyone who meets __ ends up falling in love with __.
 (Chaves 2012: 472)
- c. Robin is someone who even good friends of __ believe __ likes power entirely too much.
 (Levine and Sag 2003: 253)



Note the two positions of α and β . Suppose that α is a gap in [Spec, DP] and β

is a gap in [Spec, CP]. Importantly, a *wh*-phrase can successfully move to the outer Spec of *v* from either α or β without violating the anti-locality condition. Therefore, either α or β can work as a real gap.

If the current analysis is on the right track, the expectation is that some speakers take α to be the position for the real gap, whereas other speakers judge β to be such a position. This prediction is borne out by the following observation:

- (29) a. ?Which portrait of himself_i do [people who see ___ for the first time] usually think Picasso_i spend the most time on ___?
 b. *Which portrait of herself_i do [people who know Gertrude Stein_i hated ___] usually think Picasso spent a lot of time on ___?
 (Nissenbaum 2000: 41)
- (30) a. *Which picture of herself_i did [every boy who_i saw ___] say Mary liked ___?
 b. Which picture of himself_i did [every boy who_i saw ___] say Mary liked ___?
 (Munn 1994: 407)

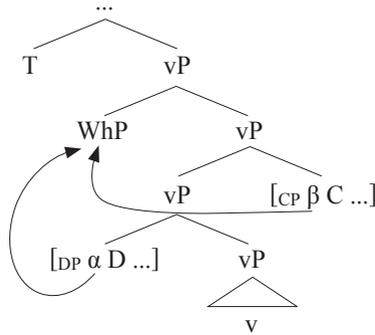
Some speakers agree with the contrast in (29) where the real gaps are in the CP complement. The reflexive anaphor can be bound by *Picasso*. On the other hand, other speakers are consonant with the contrast in (30), which indicates that the real gaps reside in the subject position. The binding relation is established between *himself* and *every boy*. Thus, returning to (28), we can conclude that either α or β serves as a real gap (or to be precise, a trace of WhP). Each speaker chooses α or β for a real gap as a permissible mental computation.

The current paper assumes that *wh*-movement is possible out of subject phrases, as well as adjunct phrases. Therefore, it is expected that sentences are fine if multiple gaps are all within the subject/adjunct phrases. This expectation is borne out by (31) and (32). Specifically, consider (33) as the derivation of (31).⁸

- (31) a man who(m) [everyone who meets ___] knows [someone who likes ___]
 (Chomsky 1982: 57)

(32) What kinds of books do author of __ argue about royalties after writing __?
 (Levine and Sag 2003: 243)

(33) OK



(33) shows that either α or β can work as a trace of a *wh*-phrase. Suppose that the movement of the *wh*-phrase takes place from [Spec, DP] to [Spec, vP]. This movement is not an instance of a violation of the anti-locality constraint. Furthermore, after the movement, the [+Q] feature is transmitted to the C head, which is in turn allowed to contain the operator in its Spec position. The other legitimate derivation is the β as a trace of WhP. After the movement from β to WhP, the [+Q] transmission takes place from WhP to the D head within the subject DP.

The conclusion that we can draw is that the anti-c-command constraint is not an independent primitive constraint. Rather, the ungrammaticality of the putative cases of a violation of the anti-c-command constraint comes from either (i) the violation of (20), the prohibition of the subject phrases from moving to the outer edge of v, or (ii) the violation of (21), the too local transmission of [+Q]. Therefore, the many alleged cases of anti-c-command constraints can be reduced to the anti-locality constraint in (20) and (21).

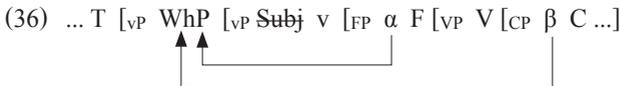
5.2. Real Gaps and Indirect Object Positions

We have so far observed the relation between the real gaps and subject positions. Let us turn to indirect objects. A gap can occur in the indirect object positions. Observe the sentences in (34) and (35).

- (34) Who did you tell __ that we were going to vote for __?
 (Engdahl 1983: 11)
- (35) Which man did the police warn __ that they would arrest __.
 (Culicover 2001: 41)

An important structural property shared by (34) and (35) is that one gap is in the indirect object positions and the other gap is in the complement clauses. These sentences indicate that the anti-c-command constraint does not hold, which is consistent with the claim of the current analysis that the constraint is not a necessary theoretical construct.

Given that the indirect objects c-command the *that*-clauses in double complement constructions like (34) and (35) (Kiss 1985: 45), their derivational structure should be as follows:



Under this derivation, a real gap can be α or β . First, consider one legitimate derivation under which the *wh*-phrase occurs as the indirect object, that is, [Spec, FP]. In this case, the *wh*-phrase can move to the outer edge of vP, and [+Q] is transmitted to C. The derivation is judged as being legitimate at the interfaces. Next, consider the other legitimate derivation where the *wh*-phrase occurs within CP and moves first to the embedded [Spec, CP] and then to the outer edge of vP. After landing there, it transmits [+Q] to F, and the head F licenses the occurrence of the operator in [Spec, FP]. This derivational structure is also legitimate.

When we turn to *to*-dative constructions, we face some intriguing issues. Observe the following pair:

- (37) a. *Which slaves did Cleopatra give __ to __? (Engdahl 1983: 23)
 b. Which girl did you send pictures of __ to __? (Engdahl 1983: 16)

The contrast in (37) is similar to the one between (22) and (25). The latter contrast shows that when the subject phrases have complex structures, the sentences become much better. We have already seen the derivational structure in (26). Turning to (37), we can observe a similar contrast, which indicates that a similar line of account is possible. Specifically, just like the subject phrases (that originate on the phase-edge), the (direct) objects in *to*-dative constructions stand on the phase-edge, as seen in (38) where the curved line indicates the phase boundary.

$$(38) \left[\left(\text{Subj } v_1 \right) \left[\text{V}_{1\text{P}} \text{ V}_1 \left(\text{Obj}_{(\text{Theme})} v_2 \right) \left[\text{V}_{2\text{P}} \text{ Dat}_{(\text{Goal})} \text{ V}_2 \right] \right] \right]$$

The gist of the structure in (38) is that, just as v_1 is a phase head, v_2 is a phase head and thus, a *wh*-phrase needs to move to the outer edge of $v_2\text{P}$.

(38a) has the structure where a *wh*-phrase is introduced as the Theme object. This *wh*-phrase needs to move to the outer edge of $v_2\text{P}$. However, this movement is too local, and so the derivation does not converge. This excessively local movement makes (38a) ungrammatical. On the other hand, suppose that, like (38b), the *wh*-phrase originates within the Theme object, the movement to the outer edge of v_2 is then possible.

Importantly, (38) differs from (36) in that the former has a more complex structure than the latter due to the presence of the phase projection. We have a suggestive piece of evidence for the complex structure of (38). Consider the binding relations in (39), which is originally from Burzio (1986: 199, 203):

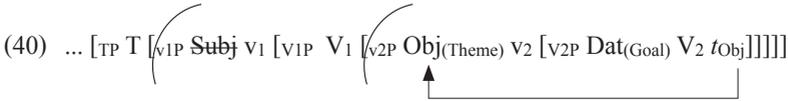
- (39) a. Sue showed John and Mary to each other's friends.
 b. Sue showed each other's friends to John and Mary.

(Pesetsky 1995: 222)

(39) shows that the binding relations can be established in a mutual way. Specifically, in (39a), the binding relation is established in a linear fashion. By contrast, in (39b), the reciprocal anaphor precedes its antecedent.

From the considerations of the binding relation in (39), it follows that the

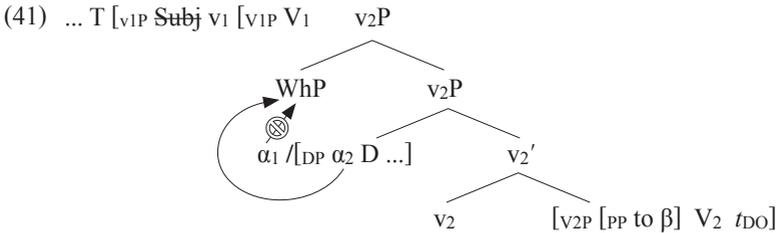
verbal structure of *to*-dative constructions is more complex than it appears. Specifically, I assume that the movement of the Theme object needs to be added to (38), resulting in the following structure:



(40) shows that the prepositional *to*-dative object (Dat) originates in a higher position than the Theme object, and then, the latter moves across the former, reversing their hierarchical positions. Therefore, the dative object can bind the copy left behind by the movement of the object.

Importantly, binding relations show that the *to*-dative constructions have a verbal structure that is more complex than the sentences in (34) and (35), which do not show any vP-internal movement of argument XPs.

Given the structure of the *to*-dative constructions, the contrast in (37) is derivationally illustrated in (41).



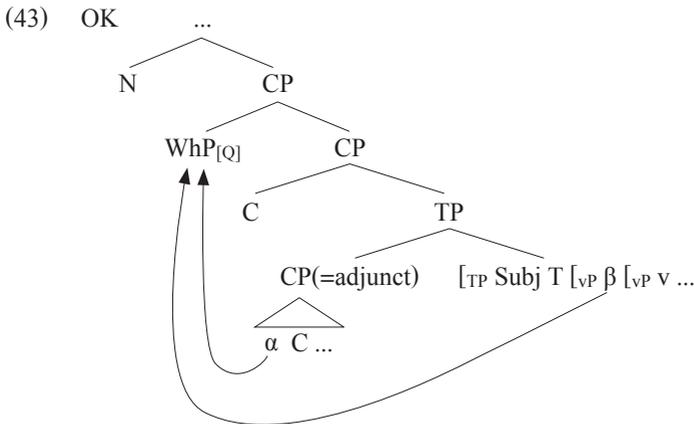
First, consider the derivation of the ungrammatical sentence in (37a). In this case, the *wh*-phrase is supposed to move from either α_1 or from β , but we have no way to attain a permissible structure. Specifically, the movement from α_1 induces the violation of the anti-locality constraint. Moreover, the movement from β leads to the too local transmission of the [+Q] feature, inducing the violation of (21). By contrast, (37b) is grammatical. In this case, WhP moves from either α_2 or β . The resulting structures are identified as being legitimate at the interfaces.

5.3. Fronted Adverbial Clauses

There is another relevant set of data to be discussed in relation to the anti-c-command constraint. Haegeman (1984) shows that if adverbial clauses are fronted, sentences with parasitic gaps turn out to be fine, as seen in (42).

- (42) a. *a note which __ will ruin our relationship unless we send back __
 b. a note which [unless we send back __] __ will ruin our relationship
 (Haegeman 1984: 231)

Haegeman attributes the ungrammaticality of (42a) to the anti-c-command constraint. (42b) is grammatical because the constraint is not violated, according to Haegeman (1984). However, I have already accounted for the ungrammaticality of (42a): the absence of the c-command relation between the *wh*-phrase and the C head in the adjunct clause (see the structure in (19)). Therefore, the task at hand is to show the grammatical status of (42b). I argue that the reason is related to the transmission of the [+Q] feature. Specifically, the derivation of (42b) is as follows:



In (43) the adjunct CP is adjoined to TP after the movement from the lower position. The *wh*-phrase, which moves from either α or β , should go as high

as the outer edge of CP because the *wh*-phrase has to c-command the adjunct CP. Nothing blocks the *wh*-movement from taking place from α or β , and the sentence in (42b) is grammatical.

The current analysis differs from Nissenbaum's (2000) analysis in that under the latter analysis, the only relevant domain is the vP level in licensing the parasitic gap operator. However, the current analysis assumes that the CP level is also relevant.

We can see evidence for the analysis claiming that when adjunct clauses are fronted, real gaps can reside either in the adverbial clauses or in the main spines. A piece of evidence comes from the binding relation in the sentences in (44).

- (44) a. There were pictures of herself which, once Mary finally decided she liked __, John would have to put __ into circulation.
 b. There were pictures of himself which, once Mary finally decided she liked __, John would be able to put __ into circulation.

(Levine and Sag 2003: 241)

The sentence in (44a) shows that reconstruction takes place into the fronted adverbial clauses. Specifically, *herself* is bound by the subject in the temporal adverbial clause. On the other hand, in (44b), reconstruction must take place into the main spine and *John* binds the reflexive anaphor. The data here support the current analysis under which *wh*-extraction is possible either out of the adverbial clauses or out of the matrix spine.

In this section, I have argued the reduction of the anti-c-command constraint to c-command relations between the higher *wh*-phrases and the lower heads, based on which the transmission of [+Q] takes place.

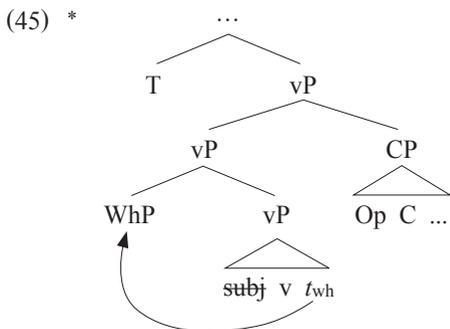
6. From the Minimalist Perspective

6.1. On Nissenbaum's Generalization

I have based our analysis of PG constructions on Nissenbaum's general-

ization: *wh*-phrases move across adjunct phrases (see (15)). The purpose of this subsection is to show how the current analysis accounts for this generalization.

One might assume that adjuncts are in a different derivational plane and that they can be introduced at any point of the derivation. If this were correct, the following hierarchical relation should be possible in PG constructions:



I assume that the resulting hierarchical relation itself is possible because adjuncts are relatively less restricted in being allowed to join the derivational structure at any point. However, this relation is not observed in PG constructions, as Nissenbaum correctly points out.

One reason that can be offered under the current analysis is that under (45), the C heading the adjunct clause cannot receive [+Q] because the C is not in the c-command domain of the *wh*-phrase. In addition, it is not possible for the *wh*-phrase to move up again to be the highest vP-edge because it induces the violation of the anti-locality constraint. Therefore, the hierarchical relationship is due to the [+Q] feature transmission, under which the C head needs to be in the c-command domain of WhP.

6.2. Deriving the Current Proposal

The main thesis of this paper is that adjuncts are not inherently opaque. However, it is quite common to assume that, under the Minimalist framework, the opacity of adjuncts comes from the way they are introduced into the deriva-

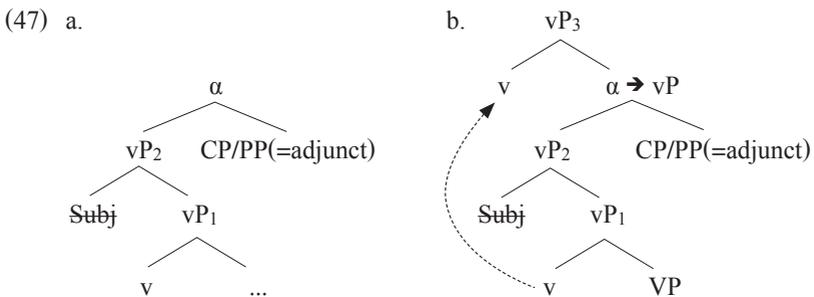
tion. The purpose of this subsection is to argue that the structural configuration of adjuncts comes from the combination of set-Merge and head movement, and thus, the non-opacity of adjuncts can be derived.

The approach that I would like to adopt here is the reprojection approach (see Koenenman 2000, Fanselow 2004, Surányi 2005, among others). First, consider (46) from Surányi (2005).



In (46), the head H projects K (=HP). Here, I assume that a head projects soon after it is Merged (Bošković 2016). Note that under the reprojection approach, the head H can undergo head-movement to be Merged with K and projects HP.⁹

To see exactly how adjunction structures are created, take a look at (47a).



(47a) is a vP structure where CP or PP is set-Merged with vP. This structure creates a so-called {XP, YP} structure, inducing a labeling problem.

At this point, I assume that the movement of v into a higher position solves the {XP, YP} problem, as seen in (47b). In (47b), the head v moves up to be merged with the unlabeled alpha. After the movement, the v works as a labeling

head, and the whole structure is labeled vP.¹⁰

Here, an important assumption that I make is that the label of α becomes vP as well because the α is sandwiched between two vP projections. Let me formalize this idea as follows:

(48) In the following structure, the label LB becomes XP at the interfaces:

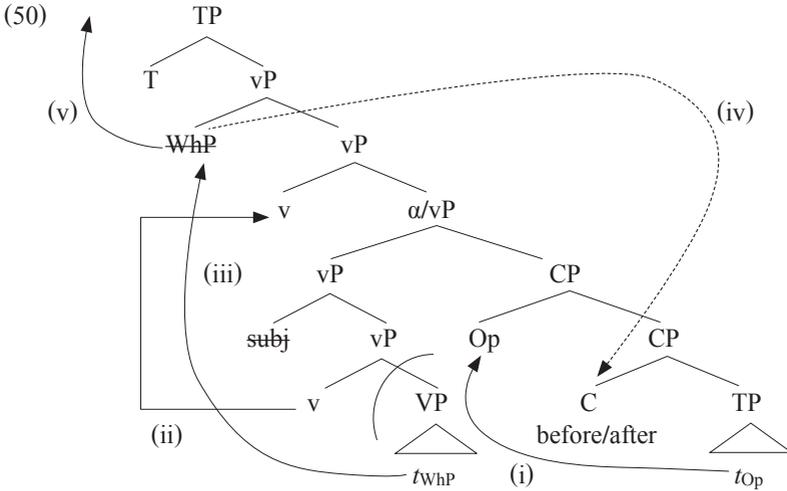
... [XP [LB [XP ...

When two maximal projections adjacent to LB belong to the same label of XP, the interfaces judge LB as being XP. Thus, set-Merge along with head movement produces the adjunction structure. This implies that there is no pair-Merge as an independent operation and that there is no principled reason that adjuncts are inherently opaque.

I also make clear the relationship between the PIC and head movement under the reprojection approach: specifically, the timing of the application of the PIC. I assume that the PIC applies when all edge positions are filled. In other words, the lower copy of a head cannot induce the PIC (see Gallego 2006, den Dikken 2007 for related discussions). In (47b), when the edge positions of vP₃ is filled, the complement VP becomes inaccessible and constitutes an opaque domain.

Having established the way adjuncts are set-Merged into the derivation, let us consider a more articulated derivation of PG constructions. I repeat the relevant data in (49) with the structure in (50).

(49) Which articles did John file __ without reading __ ?



To make the discussion here more concrete, suppose that the *wh*-phrase moves from the object position and the corresponding operator resides in the adjunct [Spec, CP]. The derivation proceeds in the following steps. First, in the adjunct clause, the operator moves to [Spec, CP] (as described in (i)).¹¹ Then, this CP is set-Merged with vP. At this point, the label α is not determined yet. Then, the head movement of *v* takes place (as illustrated in (ii)), which makes the label α turn to vP at the interface. Next, the *wh*-phrase moves up across the subject and the adjunct to be merged with vP (see (iii)). At this point, the transmission of [+Q] takes place (see (iv)), and the adjunct C becomes capable of accommodating the *wh*-operator Op in its Spec position. The highest projection of the verbal domain becomes vP. Once all the edge positions are filled, the transfer applies to VP. Finally, the *wh*-phrase moves to its final landing site, [Spec, CP] (as seen in (v)).

7. Conclusion

In this paper, I have focused on the feature transmission mechanism used in PM constructions in German. I have extended it to PG constructions in Eng-

lish. These two types of constructions are analyzed under the mechanism of the [+Q] transmission of a *wh*-phrase to a lower head. What makes the current analysis possible is the proposal that adjuncts are not inherently opaque.

In discussing the derivation of PG constructions, I have argued that (i) the real gaps and parasitic gaps occur interchangeably, and (ii) the CP-level as well as the vP-level is relevant in licensing the parasitic gap operators. These two claims show the prominent differences between the current analysis and many previous analyses.

Finally, the current paper has argued that the proposal of this paper can be derived. I have shown that the structural effects of pair-Merge come from the combination of set-Merge and head movement. Therefore, we can dispense with pair-Merge as an independent operation.

Notes

1. The chain composition approach to PG constructions proposed by Chomsky appeals to the notion of chain, which is not compatible with the Minimalist assumptions. I thank an anonymous reviewer for bringing this point to my attention.
2. The grammatical judgments of sentences with parasitic gaps are often difficult and unclear. For example, the following sentence is judged as being ungrammatical in Chomsky (1981):
(i) *who did you give [pictures of *t*] to *t'* (Chomsky 1981: 203)
However, in Chomsky (1982), he says, "...that was not really correct; ... (p. 37)." This reflects the "unstable status" of PG constructions.
3. As an anonymous reviewer suggests, the proposal in (10) should have a wide variety of empirical and theoretical consequences. I leave the issue for further research.
4. An anonymous reviewer wonders how PG constructions in German are derived. I leave this issue for further research.
5. If Bruening and Khalaf's (2017) observations are correct, there should still be another convergent derivation. Under the derivation, both α and β are *wh*-phrases and undergo ATB movement to the outer edge of vP. Their observations are interesting but I leave the derivational possibility for further research.
6. The other structure to be examined is the merging of the adjunct CP with v', and then, the resulting vP is merged with the subject DP. Under these derivational

steps, the adjunct CP stays lower than the subject *wh*-phrase, which can c-command the adjunct C head. However, this structure is not legitimate at the semantic interface for θ -related reasons. Specifically, the interface would take the CP to be a recipient of the Agent role. Therefore, the structure is not sanctioned as being legitimate at the interface. Note that under the general assumption that adjuncts are not visible, some additional assumptions are necessary to rule out these hierarchical derivational structures.

7. Instead, suppose that the *wh*-subject moves to [Spec, CP] without stopping by the outer edge of vP. In this case, the transmission of [+Q] to D is not permissible either, because the transmission is not local in the sense that the transmission goes beyond the phase boundary.
8. Each gap in (32) is within the so-called “island” environment, as seen in (i).
 - (i) a. ??What kinds of books do authors of malicious pamphlets argue about royalties after writing __?
 - b. ??What kinds of books do authors of __ argue about royalties after writing malicious pamphlets? (Chaves 2012: 481)
9. One might wonder how anti-locality works under the reprojection approach. I assume that a head must move across (at least) one item on its edge. Therefore, the following structure is prohibited due the anti-locality violation:
 - (i) ...[_{vP} V [_{vP} *t_v* [_{vP} *t_v* ...

In (i), the single *v* undergoes head movement, creating string vacuous vP structure. I thank an anonymous reviewer for bringing this issue to my attention.
10. In Surányi (2005), head movement takes place due to category selection. On the other hand, the current framework, Merge applies freely. Therefore, head movement takes place freely.
11. To be precise, the PG constructions in English show weak island effects, which indicates that adjunct clauses contain an inherent operator, across which the other operator moves. I abstract away details in (50).

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