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Proper Binding Condition Effects are Phase Impenetrability Condition Effects^{*}

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1. Introduction

In this paper I discuss one aspect of the so-called Proper Binding Condition (PBC), that is the grammatical principle that states that a trace must be c-commanded by its antecedent. Assuming the most standard definition of c-command in terms of first branching node and also assuming that the landing site of movement must c-command the position that precedes movement, I will focus on the configuration in (1), in which linear precedence indicates c-command.

(1) [ztx.....].....X.....tz

In (1), first the constituent X moves out of the constituent Z and reaches a position from which it c-commands its trace. However, in a later stage of the derivation the c-command configuration is destroyed because the constituent Z, which contains the trace of X, undergoes movement as well. Therefore in the final arrangement the trace of X is not c-commanded anymore by its antecedent. The question that I will address is: is (1) allowed by Universal Grammar or not? Although this question has been extensively investigated, I think that it has never been satisfactorily answered. An indication of this is that the dominant answer used to be that (1) is not allowed. This claim was based on sentences like (2), which exemplify the configuration (1) and are ungrammatical.

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- (2) *_i[Which picture of t_1]₂ do you wonder who₁ John likes t_2 ?

However, in recent times, largely based on the influential work of Richard Kayne, an increasing number of researchers have been assuming that (1) is allowed and have been proposing derivations in which this configuration is systematically exploited. The result of my investigation will be that (1) is allowed in principle but in many cases (including 2) a derivation that leads to this configuration violates the theory of phases that has been proposed by Chomsky (1998) and (1999).

Since it is convenient to have a name for them, I will call PBC effects cases like (2) that exemplify the configuration in (1) and are ungrammatical. This paper is organized as follows. In section 2, I present various examples of PBC effects and in section 3 I discuss the lack of PBC effects in contexts in which they might be expected to arise. In section 4, I summarize previous accounts that reduce PBC effects to Relativized Minimality effects and in section 5 I argue against this line. In section 6, I outline the theory of phases and present my account of PBC effects which is based on it. In section 7, I show some consequences for multiple long distance movement in Japanese and in section 8 I discuss how the theory of phases can deal with *wh* islands. Section 9 concludes the paper.

2. PBC Effects

In many cases, sentences exemplifying the configuration (1) are ungrammatical, as we saw in (2). The sentences in (3) form a minimal pair that seems to confirm this¹:

- (3a) *_i[How many chapters t_1]₂ do you remember [of which book]₁ you read?
 (3b) [Of which book]₁ do you remember [how many chapters t_1]₂ you read?

Fiengo (1977) has proposed that sentences like (3a) are out because the trace t_1 is not c-commanded and various scholars have applied the same explanation to minimal pairs that are structurally similar to (3). One famous case is scrambling in Japanese. As discussed by Saito (1985), the grammaticality of (5a) and the ungrammaticality of (5b) can be attributed to the fact that the trace t_1 is c-commanded in the former but not in the latter (both 5a and 5b are transformationally derived from 4):

- (4) Taroo-ga Hanako-ga sono hon-o yonda to itta (koto)
 Taro-NOM Hanako-NOM that book-ACC read that said fact
 'Taro said that Hanako read that book'
 (5a) *_i[Hanako-ga t_1 yonda to]₂ [sono hon-o]₁ Taroo-ga t_2 itta (koto)
 (5b) [Sono hon-o]₁ [Hanako-ga t_1 yonda to]₂ Taroo-ga t_2 itta (koto)

Cecchetto (1999a) discusses PBC effects in Clitic Left Dislocation (CLLD). (6) is a

¹ In English the choice between preposition stranding and pied piping introduces a complication. For some speakers the relevant minimal pair is (i) rather than (3). However, no matter what the personal preference between preposition stranding and pied piping is, the sentence that exemplifies the configuration (1) is much more degraded than the other member of the minimal pair.

(i)a *_i[How many chapters of t_1]₂ do you remember [which book]₁ you read?
 (i)b [Which book]₁ do you remember [how many chapters of t_1]₂ you read?

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standard (= non dislocated) Italian sentence that contains two sentential embeddings. (7a) and (7b) are transformationally derived from (6). In (7b), which is acceptable, the constituent which is dislocated in the COMP area of the matrix clause is the direct object of the most embedded sentence, which in turn is dislocated in intermediate COMP area². Crucially, in (7b) the trace of the direct object *Maria* (t_1) is c-commanded. If the order of the two dislocated constituents is switched, the sentence becomes sharply ungrammatical, as shown by (7a). The only relevant difference between (7a) and (7b) is that in the latter the DP *Maria* c-commands its trace t_1 , whereas in the former it does not.

- (6) Non credo che Gianni sia convinto di conoscere Maria
(I) NEG believe that Gianni is convinced of knowing Maria
'I don't think that Gianni is convinced that he knows Maria'
- (7a) *[Di conoscerla t_1]₂ non credo che, Maria₁, Gianni ne sia convinto t_2
Of knowing her (I) NEG believe that Maria Gianni of it is convinced
- (7b) Maria₁, non credo che, [di conoscerla t_1]₂, Gianni ne sia convinto t_2
Maria₁ (I) NEG believe that of knowing her Gianni of it is convinced

3. Lack of PBC Effects

In (8), the trace of *John* within the preposed VP is not c-commanded by its antecedent. Therefore, (8) exemplifies the configuration (1), but, contrary to what we have previously observed, the output is grammatical.

- (8) [Fired t_1 by the company]₂ John₁ indeed was t_2

The acceptability of sentences like (8) is a serious problem for the hypothesis that the configuration (1) is not allowed by Universal Grammar. Furthermore, postulating some special device operating on the subject trace would not be help since there are grammatical sentences that exemplify (1) in which the trace which is not c-commanded is not a subject trace. An example is remnant topicalization in German, illustrated by (9):

- (9) Gelesen hat Hans das Buch nicht
Read has Hans the book NEG

As discussed by Den Besten and Webelhuth (1990), the most plausible derivation for (9) is the one sketched in (10). In (10) first the direct object *das Buch* scrambles out of the VP and, second, the VP which contains the trace of the direct object moves to Spec,CP.

- (10) [CP [VP t_1 Gelesen]₂ hat [TP Hans ... [das Buch]₁ ... nicht... t_2]]

I take (8) and (9) to be conclusive evidence that the configuration (1) is allowed in principle. Of course, this opens the problem of explaining the ungrammaticality of the

² In Italian CLLD constructions, CPs and DPs can be dislocated only if they are matched by a clitic pronoun. In (7) the clitic that matches the left dislocated non finite CP is *ne* (literally "of it"). The DP *Maria* is matched in (7) by the clitic *la* ("her"). See Cecchetto (2000) for a more precise analysis of CLLD sentences.

sentences discussed in section 2 that seem to show (1) is *not* allowed. The remaining part of the paper is devoted to this problem.

4. Reducing PBC Effects to Relativized Minimality Effects

An empirical generalization, that to the best of my knowledge has been first independently proposed by Müller (1993) and Takano (1993), can trace back the difference between sentences that display a PBC effect and sentences that do not to a unique factor. To illustrate this generalization, let's go look again at the configuration (1). In all the ungrammatical cases the movement of X and the movement of Z are of the same type. For example, in (3) there are two instances of *wh*-movement, in (5) there are two instances of scrambling and in (7) there are two instances of Clitic Left Dislocation. However, in the grammatical cases the movement of X and the movement of Z belongs to different types. In (8) the movement of X is A-movement towards the subject position, while the movement of Z is a case of VP preposing (arguably an A-bar movement) and in (9) the movement of X is scrambling while the movement of Z is the kind of topicalization that displaces a constituent in the position before the verb in V-2 languages. Based on this observation, various authors, including Fox (1999), Fukui (1997), Müller, (1998), Kitahara (1997), Koizumi (1995), Sauerland (1999) and Takano (1994), have suggested that PBC effects (where they are attested) should be reduced to Relativized Minimality (in the sense of Rizzi 1990) or to the similar locality condition called Minimal Link Condition or Shortest Attract (cf. Chomsky 1995). Although the implementation differs somewhat from author to author, the main idea can be summarized as follows. In classical cases of Relativized Minimality, the intervention effect is triggered by an element that c-commands the attractee but is c-commanded by the attractor. For example, in (11) the attractor, the matrix COMP, does not attract the closest element that can satisfy its requirements (the *wh* phrase "which book") but attracts a farther element (the *wh* phrase "why"). The sentence is out because Shortest Attract is violated.

- (11) *Why₁ do you wonder which book John read t₁ ?

The extension of the approach based on Relativized Minimality to PBC effects consists in defining intervention in terms of containment (in addition to the classical definition in terms of c-command). For example, the authors listed above claim that, if Z contains X, Z acts an intervener between X and any position outside Z. To illustrate, let's go back to sentence (2). Assume that the derivation is strictly cyclic and that it has reached a point in which the embedded interrogative COMP has been merged. At that point, potentially there are two attractees for C^o: the *wh* phrase 1 ("who") and the *wh* phrase 2 ("which picture of who"). However, if intervention is defined as containment, only the *wh* phrase 2 can be attracted. If the *wh* phrase 1 is attracted, as it happens (2), a minimality effect is triggered because the *wh* phrase 2 is closer to the attractor than the *wh* phrase 1. This account of (2) straightforwardly extends to the other cases of PBC effects that we have observed. As the reader can verify, in all the relevant cases, the ungrammaticality can be attributed to the fact that a constituent X is extracted out of a constituent Z that should be attracted instead of X, because it is closer to the attractor. This account can also explain why (8) and (9) are grammatical. Take (8) as an illustration. The relevant step of the derivation is one in which the INFL node attracts an element to fill the subject position.

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Since the VP does not qualify as a suitable attractee, the DP *John* can be attracted.

5. Against Reducing PBC effects to Relativized Minimality Effects

In this section, I discuss the problems that affect the analysis that reduces PBC effects to Relativized Minimality effects. I see three main difficulties. The first two arise from the expectation that, if PBC effects and classical cases of Relativized Minimality effects are equated, one should observe Relativized Minimality effects in all those contexts that trigger PBC effects and conversely all the contexts that trigger Relativized Minimality effects should trigger PBC effects as well. Unfortunately neither of these predictions is borne out. Let us start from the expectation that Relativized Minimality effects ought to arise in all those contexts that trigger PBC effects. This means that if extraction of X out of Z is blocked (cf. 12), Z should also create an intervention effect whenever it c-commands the trace of X and is c-commanded by the landing site of X (cf. 13 in which linear precedence indicates c-command). So, whenever the configuration in (12) is out, the one in (13) should be out as well.

(12) * X.....[zt_x.....].....

(13) * X..... Z t_x

That this prediction is not borne out is shown by scrambling in Japanese and CLLD in Romance. PBC effects do arise with scrambling and CLLD (cf. 5 for scrambling in Japanese and 7 for CLLD) but, as is well known, Relativized Minimality effects are *not* attested either in scrambling or in CLLD³. Therefore in scrambling and CLLD the configuration (12) is out whereas the configuration (13) is acceptable. I take this to be the first serious problem for the theory that reduces PBC effects to Relativized Minimality.

A second problem for this theory is raised by the fact that, as classical cases of Relativized Minimality effects show, a feature of the relevant type creates an intervention effect even if it has already been checked. For example, in (14) the interrogative phrase *when* and the embedded COMP enter in a checking configuration and, as a consequence, the *wh*-feature of *when* is checked. Nonetheless, the *wh* phrase *when* creates a clear intervention effect. The strong ungrammaticality of (14) is due to the fact that the chain affected by the intervention is headed by an aggressively non-D linked *wh* phrase.

(14) *[What the hell]₁ do you wonder when you bought t₁ ?

Since a checked feature creates a minimality effect when intervention is defined in terms of c-command (cf. 14), the expectation is that it should also create a minimality effect when intervention is defined in terms of containment. The acceptability of the Italian sentence (15b) shows that this prediction is incorrect. (15a) is a control sentence that

³ Examples that show that Japanese scrambling and Romance CLLD do not obey Relativized Minimality abound. One scrambling case is i) in note 8 below. Italian CLLD sentences i) and ii) illustrate the same point. i) and ii) are both grammatical even if the topic PP *con Gianni* has crossed over the topic DP *il libro* in i) and the other way around in ii).

i) Con Gianni credo che il libro lo dovremmo discutere
With Gianni (I) think that the book (we) it should discuss

ii) Il libro credo che con Gianni lo dovremmo discutere
The book (I) think that with Gianni (we) it should discuss

shows that also in Italian a checked feature creates a minimality effect when intervention is defined in terms of c-command.

- (15a) *[Cosa cavolo]₁ ti domandi quando hai comprato t₁ ?
 What the hell do you wonder when (you) have bought
 (15b) [Di quale cavolo di libro]₁ ti domandi [quanti capitoli t₁]₂ hai letto?
 Of what the hell of a book do you wonder how many chapters (you) have read

Consider how (15b) can be derived. The derivation that obeys the cycle is one in which, after the movement of the interrogative phrase *quanti capitoli di quale cavolo di libro* to the embedded COMP, the aggressively non-D linked *wh* phrase *di quale cavolo di libro* moves out of it towards the main COMP. However, if intervention is defined in terms of containment and a feature creates a minimality effect even if it has already been checked, the movement of *di quale cavolo di libro* out of the superphrase *quanti capitoli di quale cavolo di libro* should be blocked because the superphrase is closer to the main COMP than the *wh* phrase contained in it. Furthermore, the intervention effect should be strong because the relevant chain is headed by an aggressively non-D linked *wh* phrase. To summarize, the second drawback of the theory that reduces PBC effects to Relativized Minimality is that it incorrectly predicts that sentences like (15b) should be out⁴.

The third problem for this theory arises from the fact that it assumes that Relativized Minimality blocks attraction of an element X from within an element Z only if X and Z share *exactly* the same feature which is attracted. For example, to explain why remnant topicalization is possible in (9) above, it is necessary to assume that a constituent that needs to check a scrambling feature (the DP *das Buch*) can be extracted from a constituent that needs to check a topicalization feature (the VP in which *das Buch* is generated). This assumption leads the theory to make the wrong predictions in at least three unrelated contexts. The first one is the interaction between scrambling and Japanese Right Dislocation (JRD). I refer to Cecchetto (1999b) for a presentation of JRD. For our purposes, it suffices to focus on two features of this construction. First, a JRD sentence requires a non neutral informational pattern that is not required in the case of scrambling (roughly speaking, a right dislocated element is interpreted as an "afterthought"). It is for this reason that, as observed by Haraguchi (1973), *wh* elements cannot be right dislocated even if they can be scrambled. The second feature of JRD which is relevant for us is that a constituent can only be dislocated to the right periphery of the main sentence. To capture the root character of the construction, I assume that a right dislocated constituent is right adjoined to the (matrix) CP. Let us now consider the following sentences:

- (16a) John-ga Bill-ga kono mura-ni sundeiru to omotteiru
 John-NOM Bill-NOM this village-in lives that thinks
 'John thinks that Bill lives in this village'

⁴ The proponents of the theory that reduces PBC effects to Relativized Minimality effects discuss possible solutions for the problem raised by the fact that a checked *wh* feature creates an intervention effect in classical cases of Relativized Minimality but does not do that in PBC configurations (cf. Kitahara 1994, who suggests that a single violation of the Minimal Link Condition causes only a small degree of marginality and Sauerland 1999, who proposes that an intervening checked and interpretable feature causes a smaller degree of markedness than an unchecked one). However, these treatments do not extend to cases like (15b) because in this type of sentence the PBC effect should be strong under the proposed theory, given the aggressively non D linked character of the *wh* chain affected by the intervention effect.

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- (16b) [Bill-ga t₁ sundeiru to]₂ John-ga t₂ omotteiru [kono mura-ni]₁
 (16c) *[kono mura-ni]₁ John-ga t₂ omotteiru [Bill-ga t₁ sundeiru to]₂

(16b) and (16c) are both transformationally derived from (16a). In the grammatical case (16b) the embedded clause is scrambled and the PP *kono mura-ni*, which originates in the subordinate clause, is right dislocated. Assuming that the right dislocated PP sits in a position adjoined to the matrix CP and that the scrambled embedded clause sits in the periphery of the matrix IP, the trace of the PP is c-commanded by its antecedent. In (16c) the order of scrambling and right dislocation is switched: the embedded clause is right dislocated and the PP is scrambled. Therefore, the trace of the PP is not c-commanded and the sentence is ungrammatical. The pattern in (16) is in all relevant respects similar to the other cases of PBC effects that we have seen in this paper. Therefore, it is clearly desirable for the analysis of PBC effects to be able to carry over to (16). However, this extension is not available if Relativized Minimality is taken to block the attraction of an element X from within an element Z only if X and Z share *exactly* the same feature which is attracted. As a matter of fact, even if one makes the (dubious) assumption that Japanese scrambling is feature triggered, the conclusion is inevitable that right dislocation and scrambling are triggered by two different features, since one operation (scrambling) is semantically vacuous while the other (JRD) is not. Therefore, the analysis that reduces PBC effects to Relativized Minimality effects wrongly predicts that a sentence like (16c) should be grammatical. In the relevant stage of the derivation of (16c), the PP *kono mura-ni* can be attracted by whatever head is responsible for scrambling because the embedded clause that contains the PP does not qualify as an intervener.

Other two cases, parallel to the Japanese one that we have just considered, confirm the problematic character of the requirement that only strict identity of features creates intervention effects. They are the following cases of interaction between *wh*-movement and topicalization in Italian and English respectively (17a is discussed by Müller 1998 and 17b is discussed by Longobardi 1995). The source of the ungrammaticality of (17a) and (17b) must be the fact that the *wh*-trace in the constituent XP that is displaced is not c-commanded. However, these sentences are predicted to be grammatical by the theory under consideration, because the superphrase XP that contains the unbound *wh* trace does not check a *wh* feature and, consequently, should not count as an intervener.

- (17a) *[_{XP} Ready to marry t₁]₂ I wonder [_{CP} [who]₁ C° John is t₂]
 (17b) *[_{XP} A sposare t₁]₂ non so [_{CP} [quale ragazza]₁ C° Gianni sarebbe disposto t₂]
 To marry (I) NEG know which girl Gianni would be willing

Summarizing, if only strict identity of features triggers a PBC effect, remnant movement is explained but the data in (16c), (17a) and (17b) remain mysterious. If any intervening A' position blocks A' movement, the data in (16c), (17a) and (17b) are explained but the account of remnant movement is lost. All in all, the theory that reduces PBC effects to Relativized Minimality cannot cover all the data concerning PBC that we have observed.

6. Reducing PBC Effects to Phase Impenetrability Condition Effects

The empirical generalization that naturally suggests a treatment in terms of Relativized Minimality for PBC effects is one that states that the configuration (1) is unacceptable

when the movement of X and the movement of Z are of the same type. However, there is another generalization that is descriptively more adequate and, as I am going to argue, can also lead us to a better explanation of the relevant facts. I will give a precise formulation of the alternative generalization at the end of this section, after introducing the basic concepts of Chomsky's (1998) and (1999) theory of phases. However, the following rough characterization can be preliminarily given: the configuration (1) is unacceptable unless the movement of X is very local, where "very local" means that it can only target a position inside the first IP level that it encounters.

My summary of Chomsky's (1998) and (1999) theory is simplified in many aspects that are irrelevant for the problem of explaining PBC effects. In particular, I will use the neutral label IP to indicate the maximal projection which hosts the subject in its Spec and the label VP to indicate the complete verbal projection. Important issues like the question if agreement features head their own maximal projection or the internal structure of the VP shell are irrelevant for our purposes and, accordingly, are put aside. In Chomsky's theory, the access to the lexicon is a one-time selection of a lexical array LA. To reduce the computational burden, it is also assumed that LA enters the derivation in different steps. In each step, a subarray of LA is put in active memory. Crucially, the derivation must exhaust one subarray, by forming a certain syntactic object, before returning to LA to extract another subarray (up to the moment in which LA is totally exhausted). The syntactic object which is formed when a subarray is exhausted is called by Chomsky "phase". As I understand them, the reasons that lead Chomsky to think that the derivation proceed in this way are mainly conceptual (the active memory at each step contains a very limited set of lexical items and this is an advantage if computational complexity matters), although he also offers some empirical motivations based on his theory of expletives. Chomsky argues that VPs and CPs, but crucially not IPs, are phases. His hypothesis is based on the fact that VPs and CPs have a degree of independence on the phonetic side and on the meaning side that IPs lack. For example, verbal phrases and CPs can be displaced but this not true for IPs. Similarly on the "semantic" side, a VP is the space in which theta roles are assigned and a CP is the space in which tense and force of the sentence are determined. In this sense, verbal phases and CPs are propositional. On the other hand, IPs are not propositional in any clear way.

The idea that derivations proceed by phases has consequences that are directly relevant for our problem. For example, Chomsky assumes that Spell-Out is cyclic in a way which is determined by the interacting principles (18) and (19).

(18) Evaluation for a phase is done at the level of the next highest strong phase.

(19) *Phase Impenetrability Condition (PIC)*

The complement of a strong phase α is not accessible to operations at the level of the next highest strong phase β , but only the head and the edge of α are.

In order to understand (18) and (19) some terminological points must be clarified. For our limited purposes, we can take the term "evaluation" in (18) to indicate the moment in which Spell-Out takes place. The edge of a phase referred to in (19) is a position in periphery of the phase which is either a specifier or an adjoined position. Finally, weak phases are VPs lacking an external argument (passive, unaccusatives) while strong phases are all the others phases (however, in this paper, the difference between strong and weak phases is not going to play any crucial role). It's worth illustrating how the system based

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on (18) and (19) works with a couple of examples. First, consider a case of *wh* movement of the direct object as in (20):

(20) [CP Who did [IP you [VP *t'* [VP see *t'*]]]]

(18) dictates that the spell out position of lexical items contained in the phase VP is determined at the level CP (remember that IP is not a phase, so the strong phase which is next highest with respect to VP is CP). This explains why *who* can be pronounced in its position in the CP area. (19) states that the complement of the strong phase VP (that is, the complement of the verb *see*) is not accessible to operations at the level of the next highest strong phase CP. So, if the direct object remains in situ by the time in which the phase VP is completed, it cannot be attracted by the interrogative COMP. The only legitimate derivation, illustrated in (20), is one in which the *wh* phrase moves to the edge of the VP phase and is therefore visible from the COMP position, in accordance with (19). Consider now the movement of the subject in unaccusative and passive constructions.

(21) [IP John was [VP killed *t*]]

Note that in (21) the movement of the subject does not reach the strong phase CP that is the next highest with respect to the phase VP in which the subject originates. Since (19) dictates that an element becomes invisible only at the level of the next highest strong phase, the subject *John* can be attracted by *I*^o even if it remains in the complement position of the passive verb.

Even this very sketchy presentation of the theory of phases is sufficient to see how it can be applied to explain PBC effects. Take (3a) and (3b) as representatives. A derivation that, if possible, would have (3a) as its output is given in (22a)-(22e). In my analysis, I do not consider the plausible assumption that also DPs are phases because the problem that leads the derivation to crash is independent from the possible phase nature of DPs. First the *wh* phrase "of which book" moves to the periphery of the embedded VP which is a strong phase (cf. 22b). From this position, it can be attracted by the embedded interrogative COMP (cf. 22c). Then the derivation proceeds up to the moment in which the matrix interrogative COMP is merged (cf. 22e). This is the step of the putative derivation of (3a) which is not legitimate: in (22e) if the matrix COMP attracts the *wh* phrase "how many chapters", PIC is violated⁵.

(22a) [IP you *I*^o [VP read [how many chapters [of which book]₁]₂]]

(22b) [IP you *I*^o [VP [of which book]₁ [VP read [how many chapters *t*₁]₂]]]

(22c) [CP [of which book]₁ C^o [IP you *I*^o [VP *t'*₁ [VP read [how many chapters *t'*₁]₂]]]]

⁵ It's worth pointing out that the derivation in (i)-(v) is not a possible derivation for (3a) either, because in the step (v) the sequence of words "how many chapters" that should move in order to produce the word order that is observed, under standard assumptions, is not a constituent.

(i) [IP you *I*^o [VP read [how many chapters [of which book]₁]₂]]

(ii) [IP you *I*^o [VP [how many chapters [of which book]₁]₂ [VP read *t*₂]]]

(iii) [CP [how many chapters [of which book]₁]₂ C^o [IP you *I*^o [VP *t'*₂ [VP read *t'*₂]]]]

(iv) [CP C^o [IP you *I*^o [VP remember [CP [how many chapters [of which book]₁]₂ C^o [IP you *I*^o [VP *t'*₂ [VP read *t'*₂]]]]]]

(v) *[CP C^o [IP you *I*^o [VP remember [CP [how many chapters [of which book]₁]₂ C^o [IP you *I*^o [VP *t'*₂ [VP read *t'*₂]]]]]]

- (22d) [_{IP} you I° [_{VP} remember [_{CP} [of which book]₁ C° [_{IP} you I° [_{VP} t'₁ [_{VP} read [how many chapters t'₁]₂]]]]]
- (22e) [_{CP} C° [_{IP} you I° [_{VP} remember [_{CP} [of which book]₁ C° [_{IP} you I° [_{VP} t'₁ [_{VP} read [how many chapters t'₁]₂]]]]]

The legitimate derivation of (3b) is in (23a)-(23f). At each step of (23) PIC is obeyed.

- (23a) [_{IP} you I° [_{VP} read [how many chapters [of which book]₁]₂]]
- (23b) [_{IP} you I° [_{VP} [how many chapters [of which book]₁]₂ [_{VP} read t₂]]]
- (23c) [_{CP} [how many chapters [of which book]₁]₂ C° [_{IP} you I° [_{VP} t''₂ [_{VP} read t'₂]]]]
- (23d) [_{IP} you I° [_{VP} remember [_{CP} [how many chapters [of which book]₁]₂ C° [_{IP} you I° [_{VP} t''₂ [_{VP} read t'₂]]]]]
- (23e) [_{IP} you I° [_{VP} [of which book]₁ [_{VP} remember [_{CP} [how many chapters t₁]₂ C° [_{IP} you I° [_{VP} t''₂ [_{VP} read t'₂]]]]]
- (23f) [_{CP} [of which book]₁ do [_{IP} you I° [_{VP} t''₁ [_{VP} remember [_{CP} [how many chapters t'₁]₂ C° [_{IP} you I° [_{VP} t''₂ [_{VP} read t'₂]]]]]

This explanation based on PIC straightforwardly extends to the cases of PBC effects illustrated by (7). It can also extend to PBC effects that are illustrated in (5a), (16c), (17a) and (17b). Take (5a) as an illustration. Since long distance scrambling in Japanese is known to have A-bar properties like *wh*-movement, it's useful to compare a derivation in which long distance *wh*-movement occurs and the one in which long distance scrambling takes place⁶. Let us start from the former. A sentence like (24a) is derived as illustrated by (24b). PIC forces the *wh* phrase to pass through the edge of the embedded VP, of the embedded CP and of the matrix VP:

- (24a) Who do you think that John saw?
- (24b) [_{CP} Who₁ do [_{IP} you [_{VP} t''₁ think [_{CP} t''₁ that [_{IP} John [_{VP} t'₁ saw t₁]]]]]]]

Given the similarities between *wh*-movement and long distance scrambling, I assume that a long distance scrambled constituent, like a *wh* phrase in Spec,CP, sits at the edge of the strong phase that is the next highest with respect to VP. So, in order to reach its final landing site in the left periphery of the matrix sentence, a long distance scrambled constituent must pass through the edge of the matrix VP in order to become visible. With this in mind, let us look at the stage of the derivation of (5a) in which the scrambled constituent *sono hon-o* has reached its position in the periphery of the matrix clause while the embedded clause in which it originates is still in situ (in 25 I have indicated only the traces of *sono hon-o* that are relevant for our discussion).

- (25) [[sono hon-o]₁ [_{IP} Taroo-ga [_{VP} t''₁ [_{VP}..... [_{CP} Hanako-ga t'₁ yonda to] itta]] I°]]

The final landing site of *sono hon-o*, like Spec,CP, marks the edge of the phase which is the next highest with respect to the matrix VP. Therefore *sono hon-o* must pass through

⁶ For the fact that short distance (roughly, clause internal) scrambling can be A movement whereas long distance scrambling must be A-bar see Saito (1992) and references cited therein. One of Saito's argument is that short distance scrambling of a potential binder creates a configuration in which an anaphor is bound, while long distance scrambling of a potential binder does not alleviate the Principle A violation.

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the edge of the matrix VP to reach its final position. Note that, under PIC, the embedded clause is not visible in the configuration illustrated in (25) and is frozen in place. In fact, (5a) might only be derived if the embedded clause could use the edge of the matrix VP as an escape hatch to become visible. However, this position is not available because it is already occupied by the trace of *sono hon-o*. As for the derivation of (5b), it is not problematic, since the embedded clause first moves to its scrambling position in the left periphery of the main clause (possibly passing through the edge of the matrix VP) and at this point the direct object *sono hon-o* can scramble out of scrambled embedded clause.

Note that my explanation for the contrast between (5a) and (5b) presupposes that there is just one escape hatch from the VP that can be used by constituents that target a phase-external position, that is a position which is outside IP (if there were two edges, the explanation for the ungrammaticality of 5a would be missed because the embedded clause might use one of them to move to its surface position at the stage of the derivation illustrated in 25). The next section is devoted to the consequences of this assumption.

In this section I have claimed that the following empirical generalization can capture the selective distribution of PBC effects: the configuration (1) does not trigger PBC effects if X does not go as far as targeting the edge of the phase that is next highest with respect to the phase in which X originates. This generalization can be seen as a theorem of the theory of phases.

7. Some Consequences for Japanese

If in Japanese there is just one VP edge that can be used by a constituent that moves from within the VP to a landing site outside the phase in which the VP is located, in general the movement outside the IP level of the material generated inside the VP should be severely constrained. In particular, only one constituent should be able to escape the VP to target a IP external position. *Prima facie*, this is a wrong prediction because cases of multiple long distance scrambling out of the same VP (cf. 27), multiple right dislocation out of the same VP (cf. 29), and multiple clefting out of the same VP (31) are attested. In fact, in (27), (29) and (31) the two constituents that are displaced seem to have escaped the embedded CP and the matrix VP, as well (in each of the following pair, the second sentence is transformationally derived from the first one).

- (26) John-ga [_{CP} Mary-ga sono hon-o Bill-ni watasita to] itta (koto)
 John-NOM Mary-NOM that book-ACC Bill-to handed that said (fact)
 'John said that Mary handed that book to Bill'
- (27) [_{NP} sono hon-o] [_{PP} Bill-ni] John-ga [_{CP} Mary-ga t_{NP} t_{PP} watasita to] itta (koto)
- (28) John-ga [_{CP} Bill-ga sono mura-ni sundeiru to] omotteiru
 John-NOM Bill-NOM that village-in lives that believes
 'John believes that Bill lives in that village'
- (29) John-ga [_{CP} t_{NP} t_{PP} sundeiru to] omotteiru [_{PP} sono mura-ni] [_{NP} Bill-ga]
- (30) John-ga [_{CP} Mary-ga Bill-ni ringo-o 3-tu ageta to] itta
 John-NOM Mary-NOM Bill-to apple-ACC three(CLASS) gave that said
 'John said that Mary gave three apples to Bill'

- (31) John-ga [_{CP} Mary-ga t_{PP} t_{NP} ageta to] itta no-wa [_{PP} Bill-ni] [_{NP} ringo-o 3-tu] da⁷
 John-NOM Mary-NOM gave that said NL-TOP Bill-to apple-ACC three(CL) be
 (LIT. "It is three apples to Bill that John said that Mary gave") NL=Nominalizer
 CL=classifier TOP=topic marker

However, it would be too quick to conclude that what happens in (27), (29) and (31) is genuine multiple long distance movement. An important observation is that the kind of movement illustrated by (27), (29) and (31) is possible only if the two (or more) constituents that undergo the long distance movement are generated in the same clause. This clause-mate condition is shown by the ungrammaticality of (33) (transformationally derived from 32) for long distance scrambling, by the ungrammaticality of (34) (transformationally derived from 28) for multiple right dislocation and by the ungrammaticality of (36) (transformationally derived from 35) for multiple clefting.

- (32) [_{IP} John-ga Bill-ni [_{CP} Mary-ga sono mura-ni sundeiru to] itta]]
 John-NOM Bill-to Mary-NOM that village-in lives that said
 'John told Bill that Mary lives in that village'
 (33) ?* [_{PP} Bill-ni] [_{PP} sono mura-ni] [_{IP} John-ga [_{VP} t_{Bill-ni} [_{CP} Mary-ga t_{sono mura-ni}
 sundeiru to] itta]]⁸
 (34) * t_{NP} [_{CP} Bill-ga t_{PP} sundeiru to] omotteiru, [_{PP} sono mura-ni] [_{NP} John-ga]
 Bill-NOM lives that believes that village-in John-NOM
 (35) Mary-ga Bill-ni [John-ga ringo-o 3-tu katta to] itta
 Mary-NOM Bill-to John-NOM apple-ACC three(CL) bought that said
 'Mary said to Bill that John bought three apples'
 (36) *Katta to itta no-wa [Mary-ga Bill-ni John-ga ringo-o 3-tu] da
 bought that said NL-TOP Mary-NOM Bill-to John-NOM apple-ACC three(CL) be
 LIT. "It is [Mary Bill John three apples] that said that bought"

The clause mate condition illustrated by the ungrammaticality of (33), (34) and (36) has been explained in two different ways in the literature but, crucially, both the available

⁷ In (31), the focalized material is located between the topic marker *wa* and the copula *da*.

⁸ Sentence i), which is identical to (33) but for the switched order of the scrambled PPs, is grammatical. This difference between i) and (33) can be explained by my theory. In i), as in (33), both *sono mura-ni* and *Bill-ni* must escape the matrix VP to reach their superficial position. However, in i) the movement of *Bill-ni*, which takes place before the movement of *sono mura-ni*, is a case of short distance scrambling in which a constituent adjoins to the closest IP level that dominates its base position. Therefore it qualifies as a phase internal movement and, under PIC, does not need to use the edge of the matrix VP, which can be used by *sono mura-ni*.

i) [_{PP} sono mura-ni] [_{PP} Bill-ni] [_{IP} John-ga [_{VP} t_{Bill-ni} [_{CP} Mary-ga t_{sono mura-ni} sundeiru to] itta]]
 in that village to Bill John-NOM Mary-NOM lives that said

A similar derivation is blocked in (33) because the movement of *sono mura-ni*, which takes place before the movement of *Bill-ni*, is a case of long distance scrambling and as such marks the edge of the phase. The movement of *Bill-ni*, which targets a position higher than the one occupied by *sono mura-ni*, qualifies as phase external movement and *sono mura-ni* and *Bill-ni* compete for the unique edge of the matrix VP.

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explanations assume that genuine multiple long distance movement of the kind that violates PIC does *not* exist, despite of the appearances⁹.

The first type of explanation is the remnant movement account. According to this account, what moves in (29) is the VP that contains *sono mura-ni* and *Bill-ga* as well as the trace of the verb (a similar explanation can be applied to 27 and 31). Given the remnant movement account, the clause mate condition is derived from the fact that the largest constituent that can undergo remnant movement is IP (in turn, this follows from the fact that the verb cannot move outside IP).

The second account of the clause-mate condition re-analyses long distance multiple movement as oblique movement. Oblique movement is the configuration independently attested in Japanese (cf. Saito 1994) in which, instead of having X and Y moving separately out of a constituent Z, there is a single instance of movement out of Z of an element that is formed by the adjunction of X to Y¹⁰. For example, the oblique movement account takes (38) (rather than 37) to be the configuration that underlies a case of apparent multiple long distance right dislocation like (29):

(37) [CP [IP [VP t_Y ... t_X]] X...Y]

(38) [CP [IP [VP t_{X+Y}]] [X+Y]]

Crucially, oblique movement is known to be clause bound, so, if apparent multiple long distance movement is oblique movement, the clause-mate condition comes for free. We do not need to choose one of these two explanations for the clause-mate condition. The important point for us is that both of them have to assume that the mechanism which is proposed (remnant VP movement or oblique movement) is the only one which can generate apparent cases of multiple long-distance movement. So, they both presuppose that genuine multiple movement of the type that violates PIC is blocked. My analysis for PBC effects explains why this type of movement is blocked. It is blocked because it would be a violation of PIC. Summarizing, PIC makes right predictions in areas of Japanese syntax that are unrelated to the cases of violation of PBC that initially motivated it. In particular, PIC correctly predicts that multiple long distance scrambling, multiple long distance right dislocation and multiple clefting are all impossible.

⁹ One explanation (the remnant movement account) has been proposed by Koizumi (1995) and Kuwabara (1996) for multiple clefting and by Kitahara (1994) and Koizumi (1995) for multiple long distance scrambling. The other explanation (the oblique movement account) has been proposed by Takano (1999) for multiple foci and by Cecchetto (1999b) for multiple right dislocation.

¹⁰ Oblique movement has been proposed to explain cases like the following. In Japanese, a language that allows *wh* phrases *in situ*, the *wh* phrase *naze* ("why") cannot appear in a strong island:

i) *John-wa [_{NP} [_{IP} sono hon-o naze katta] hito]-o sagasiteru no
John-TOP that book-ACC why bought person-ACC looking-for Q
'Q John is looking for a person that bought that book why'

The strong ungrammaticality of i) is usually described as a case of ECP violation triggered by LF movement of the *wh* phrase. Interestingly, the sentence significantly improves if the direct object *sono hon-o* ("that book") is replaced by the *wh* argument *nani-o* ("what"):

ii) ??John-wa [_{NP} [_{IP} nani-o naze katta hito]-o sagasiteru no
John-TOP what-ACC why bought person-ACC looking-for Q
'Q John is looking for a person that bought what why'

Saito (1994) attributes the improvement of ii) to the fact that at LF, first the adjunct *naze* locally (=internally to the island) adjoins to the argument *nani-o* and then the syntactic object created by this local adjunction escapes the island. The adjunction of *naze* to *nani-o* is an occurrence of oblique movement.

8. The Theory of Phases, *Wh* Islands and the Left Periphery

The assumption that there is just one edge for each strong phase proves to be valid for the Japanese constructions analyzed in section 7 but is too strong in other circumstances. One case is the interaction between topicalization and *wh*-movement. The Italian sentence (39) illustrates this. In (39), both the subject *wh* phrase and the left dislocated direct object originate in the embedded clause (an accusative clitic matches the dislocated direct object, as in other CLLD sentences). As a consequence, they must have somehow escaped the embedded CP in which they originate.

- (39) [Quel libro]₁, chi₂ [_{IP} hai detto [_{CP} che t₂ l'ha letto t₁]] ?
 That book who (you) said that it has read
 'Who did you say read that book'

If the embedded CP were a strong phase with a unique edge, (39) would be ungrammatical, contrary to fact. I see two ways to fix this problem. The first one is assuming that CLLD is the result of base-generation of the topic phrase, along the lines suggested by Cinque (1990). If this is assumed, (39) stops being problematic because the only constituent that has to escape the embedded CP is the *wh* phrase. I won't adopt this strategy, though. I have argued elsewhere (Cecchetto 2000) that CLLD is a case of movement of the topic phrase out of a clitic doubling configuration. More relevantly for my goals in this paper, in CLLD PBC effects are observed (cf. 7a above) and I have reduced them to PIC effects. Therefore, by assuming that a topic phrase is base generated in its superficial position, I would miss an explanation for the pattern in (7a).

The second way-out from the problem introduced by (39) is weakening the requirement that there is always a single edge for each phase. A possibility to do that in a way which is non ad hoc is suggested by Rizzi's (1997) analysis of the left periphery. According to Rizzi, the COMP projection in Romance and English should be split into different maximal projections. One level of COMP hosts topic phrases (in Romance, Clitic Left Dislocated constituents) while another level hosts *wh*-elements. One obvious suggestion is that each of these maximal projections counts as an edge (that is, an escape hatch from the CP phase) for the XP that it normally hosts. Therefore, in (39) there would be two different CP edges, one used by *quel libro* and the other used by *chi*.

This analysis of (39) proves to be helpful in another respect. It is a well known fact that a *wh* phrase can be marginally extracted from a *wh* island only if it is D(iscourse)-linked. So, there is a contrast between (40) and (41), due to the fact that *which book* can be D-linked but an adverbial like *why* cannot.

- (40) ?[Which book]₁ do you wonder who bought t₁?
 (41) *Why₁ do you wonder who bought that book t₁?

From the point of view of the theory of phases proposed by Chomsky (1998) and (1999), the ungrammaticality of (41) is expected. The adjunct *why* cannot use the edge of the embedded CP (because it is already occupied by *who*) and, under PIC, cannot be extracted from its base position either. However, this theory in its simplest form cannot explain why (40), although marginal, is better than (41). I think that my proposal to explain the grammaticality of (39) can also take care of the contrast between (40) and

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(41). The first step to make sense of the difference between these two sentences within a theory based on PIC is capitalizing on the fact that the notion of D-linking (contextually given, or presupposed information) is reminiscent of the notion of topichood (a topic is a contextually given element). Since, as the grammaticality of (39) suggests, the layer that hosts *wh* phrases and the one that hosts topic phrases count as two distinct edges for extraction from the strong phase CP, it's only natural to think that the D-linked constituent *which book* can use, at least as a marked option, the CP layer that hosts topic phrases to escape from the embedded CP in (40) (cf. Grohmann 1998 and Rizzi 2000 for related proposals). This option is excluded in (41) because the adverbial *why* is inherently incompatible with topichood and can never sit in the COMP level that hosts topics.

This account of *wh* islands predicts that, if a topic phrase is extracted from a *wh* island, the extraction of a D-linked *wh* phrase from the same *wh* island should not be possible, because the two extracted phrases compete for the same CP edge. This prediction is borne out by the Italian minimal pair (42)-(43). (43), in which both the Clitic Left Dislocated phrase *a quel ragazzo* and the D-linked *wh* phrase *quale dei tuoi libri* are extracted from the embedded question, is clearly worse than (42) in which the only extracted constituent is the D-linked *wh* phrase.

- (42) ?Quale dei tuoi libri non sai quando hai dato a quel ragazzo?
Which of your book NEG (you) know when (you) have given to that boy
(43) *A quel ragazzo quale dei tuoi libri non sai quando hai dato?¹¹
To that boy which of your book NEG (you) know when (you) have given

Summarizing, I have proposed that the theory of phases should be modified by taking into consideration Rizzi's (1997) proposal that the COMP area in English and Romance is internally organized in different layers. Each of these layers can count as an escape edge for the XP that it is qualified to host. D-linked *wh* phrases can marginally be extracted from *wh* islands because they can use the layer specialized for topics¹².

9. Conclusion

In this paper, I have argued that, although a trace must be c-commanded by its antecedent by the moment in which movement takes place, the c-command configuration can be later destroyed in the derivation. PBC effects can be reduced to violations of PIC¹³.

¹¹ Crucially, in the absence of a *wh* island the presence of a topic does not induce any marginality, as shown by the fact that i) is perfect (the same point is confirmed by the complete acceptability of 39):

i) A quel ragazzo quale dei tuoi libri hai dato?

To that boy which of your book (you) have given

¹² Given my explanation for the ameliorating effect of (40) over (41), the complete ungrammaticality of sentence (2) above (*Which picture of do you wonder who John likes?*) indicates that a *wh* phrase like *which picture of who* can never be D-linked. The same must be true in general for *wh* phrases that contain another *wh* phrase. This is intuitively correct and directly follows from the definition according to which a *wh* phrase is D-linked when it ranges over a known set of entities (for example, *which house of John's* is D-linked because it requires that the set of houses owned by John be familiar, either because it is given in the immediate discourse context or because it is shared knowledge). Obviously, the set over which a *wh* phrase ranges cannot be known if its restriction contains another *wh* phrase.

¹³ One area in which my implementation of the theory of phases makes predictions that I hope to test in future research is multiple *wh* movement. For example, I predict that a configuration in which two *wh* phrases long distance move out of an embedded clause to reach the COMP area in the matrix clause should

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be excluded (or at least severely constrained), since the two *wh* phrases compete for the unique edge of the embedded clause in which they originate. A preliminary investigation based on data reported by Rudin (1988) shows encouraging results. In most Slavic languages that allow multiple *wh* movement (including Serbo-Croatian, Polish and Czech), although single *wh* extraction from an embedded clause is (not surprisingly) allowed, multiple *wh* extraction from an embedded clause is excluded (multiple *wh* movement is allowed in these languages only if it is clause bound). So, these languages behave as the theory of phases in its strictest form dictates. Bulgarian and Romanian are different because they allow multiple *wh* extraction, subject to various constraints. It is very tempting to extend to Bulgarian and Romanian cases of multiple *wh* extraction the oblique movement account that has been proposed for Japanese in section 7. That this line of explanation is promising is shown by Rudin's observation that adverbs and parentheticals can split a sequence of *wh* phrases in Serbo-Croatian, Polish and Czech but cannot do that in Romanian and Bulgarian. As observed by Rudin, this is clear evidence that in Romanian and Bulgarian (but not in Serbo-Croatian, Polish and Czech) the sequence of *wh* phrases is a unique constituent. In turn, this suggests to me that what takes place in Romanian and Bulgarian is oblique movement rather than genuine multiple *wh* extraction.

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