Eliminating the Phase Impenetrability Condition

Sandra Stjepanović and Shoichi Takahashi
Kanda University of International Studies
sandra@cba.att.ne.jp and fwgg5639@mb.infoweb.ne.jp

1 Introduction

In this squib we attempt to eliminate the Phase Impenetrability Condition (PIC) proposed in Chomsky (1999) and stated in (1) based on the configuration in (2), where ZP and HP are strong phases.

(1) The domain of H is not accessible to operations at ZP, but only H and its edge.

(2) $[_{ZP}\ Z\ldots\ [_{HP}\ \alpha\ [H\ YP]]]$

As stated, PIC prevents operations at a strong phase ZP from accessing the domain YP of HP in (2), and allows access only to the head H of HP and its edge α.

We will argue here, however, that PIC should be eliminated from the grammar. We will show the effects of PIC for Move can be derived from independently necessary computational mechanisms, in particular Multiple Spell-Out and a property of Pied-Piping. Furthermore, if PIC is not a part of grammar, one would expect to find languages with instances of long-distance (cross-phasal) agreement. We will show that this is really the case, thus supporting our conclusion that PIC should be eliminated from the grammar.

The squib is organized in the following way. In Section 2, we first outline PIC, its effects and Chomsky's motivation for it. Then, we argue for the elimination of PIC from grammar by showing how its effects for Move can be derived from Multiple Spell-Out and Pied-Piping, and why PIC should not constrain Agree. Section 3 is a conclusion.

2 The Phase Impenetrability Condition and Long-Distance (Cross-Clausal) Agreement

2.1 PIC and its Merits

As briefly mentioned above, PIC is designed to prevent the complement domain of a head of a strong phase from being accessed by operations at the next strong phase, and allows only the head of the strong phase in question and its edge (either specifiers or adjoined material) to be accessed. For Chomsky (1999), strong phases are CP and *v**P, where *v**P stands for a verb phrase with full argument structure (i.e., transitive), but not unaccusative and passive.

Specifically, PIC predicts that if in (2), ZP and HP are strong phases, and if ZP = CP, Z = C, HP = *v**P and H = *v**, the probe C cannot access YP, but can access the edge α of *v**P and the head *v**.

Chomsky's (1998, 1999) motivation for introducing PIC into grammar is to enable what Chomsky (1998) calls "indirect feature movement" (the non-final stages of successive cyclic movement) in a way that strengthens the notion of cyclic derivation. Furthermore, under PIC phonological component can "forget" about earlier stages of derivation, which further contributes to reducing computational burden.

Although the end result of PIC seems to be in tune with minimalist tendencies towards an optimal computation, the formulation of this condition is rather stipulative; it is only stipulated that certain domains are inaccessible to operations from other domains, and there is no real insight into

why this would be so. If, however, this insight can be provided, or even better if it can be shown that the effects of PIC could be derived from other already necessary computational mechanisms, with the result of eliminating PIC from the grammar, our theory would gain in its explanatory power, a desirable effect in the minimalist program. Here, we will argue that this is indeed possible. We will first show that the effects of PIC with respect to intermediate steps of successive cyclic movement, for which reason PIC was primarily postulated, can be derived from Multiple Spell-Out and Pied-Piping. This will take care of the effects of PIC with respect to Move. As far as the operation Agree is concerned, we will show that our system without PIC has a welcome empirical result in that it does not prevent Agree from accessing domains which would be rendered impenetrable by PIC, thus allowing long-distance (cross-phasal) agreement cases, discussed in Ura (1994), among others and Landau (1999).

2.2 Pied-Piping + Multiple Spell-Out = PIC Out!

As hinted above, one of the major effects of PIC is enabling successive cyclic movement. There is evidence showing that movement in human languages is successive cyclic (see Boeckx 1999, McCloskey to appear, among others), but given early minimalist assumptions, successive cyclicity was very difficult to account for. PIC, incorporated into grammar in Chomsky (1998, 1999), together with other assumptions such as Multiple Spell-Out and derivation by phase, was meant to lend some help to this end. Roughly, in Chomsky's (1999) terms, if an element is within a strong phase to be spelled-out and this element needs to move further, PIC ensures that the relevant element has to be at the edge of this phase before it is spelled-out, or otherwise it will be frozen in place, since, as discussed above, PIC would prevent any kind of access to it.

Thus, PIC guarantees that elements undergoing movement have to move in "small steps," rather than in "one fell swoop," or more precisely, successive cyclically at each strong phase. However, we will show that this state of affairs can be derived without PIC, given some assumptions independently necessary for computational system.

The first assumption is Multiple Spell-Out. Multiple Spell-Out means that the material from syntax is handed to phonology in a cyclic fashion. This idea was first developed by Bresnan (1971), and revived in Uriagereka (1999), Epstein et al (1998) and Chomsky (1998, 1999), among others. Chomsky (1998, 1999) argues that Spell-Out is cyclic at the phase level, and in particular Chomsky (1999) argues that it applies at a strong phase level. Roughly, the idea is that features deleted in the cyclic computation remain until a strong phase level, at which point the whole phase is handed over to phonological component. At that point, phonological features and features deleted in the course of the derivation are taken away from the narrow syntax by Spell-Out, allowing convergence at LF, and possibly having phonetic effects. The second assumption concerns Pied-Piping, as a part of the complex operation Move. Chomsky (1999) proposes that Pied-Piping requires phonological content.

If these two mechanisms (Multiple Spell-Out at a strong phase level and Pied-Piping requiring phonological content) are already a part of computational system, then PIC is not necessary to render successive cyclic movement. Here is why: When Spell-Out applies, phonological and other relevant features are taken from the narrow syntax. So, what is left in narrow syntax is the same element but lacking phonological features and deleted features, which is necessary to achieve convergence at LF. For all intended purposes, it is what Chomsky (1999) calls a trace.[1] Now, Chomsky (1999) distinguishes between an active and an inactive trace. An active trace is a trace visible to Agree, which means that it contains an uninterpretable feature.[2] An inactive trace, having no uninterpretable features, is invisible to Agree. Both an active trace and an inactive trace are immune to Pied-Piping, as they have no phonological content, thus preventing Move. This entails that

once an element is spelled out, it cannot be moved any more. Therefore, if an element is in the domain of a strong phase which is to be spelled out when Spell-Out applies and it needs to move further, the relevant element has to escape this phase, in order to remain visible to Pied-Piping, as a part of the complex operation Move. Crucially, no PIC is necessary to render this result.

To see the difference between Chomsky's and our system with respect to how successive cyclic movement is achieved, let us consider two logically possible derivations for the sentence in (3).

(3) What did John buy?

Let us concentrate on the derivation in (4) first.

(4)a. [$_{v*P}$ John *v** [$_{VP}$ buy what]] ---> Spell-Out at *v**P

b. [$_{CP}$ C^0 [$_{TP}$ $John_1$ T^0 [$_{v*P}$ t_1 *v** [$_{VP}$ buy what]]]]]

The spelled-out element cannot move.

Suppose that the derivation proceeds to the *v**P level illustrated in (4a), and that the object *wh*-phrase remains in-situ (i.e., the *v** head is not assigned an optional EPP feature attracting the object *wh*-phrase). At the *v**P strong phase level, Spell-out applies, as discussed above. Chomsky (1999) assumes that at a phase level, only the complement domain of a phase head is actually spelled out, and not the whole phase. In this paper, we keep to this assumption, and all other assumptions of Chomsky's system, except that we claim that the PIC is not necessary to achieve the goals for which it has been proposed. So, at this point in the derivation, VP is spelled out with the object *wh*-phrase in it, as this object *wh*-phrase has not moved yet. At the next phase level, the interrogative complementizer with an EPP feature tries to attract the *wh*-phrase. However, the object *wh*-phrase has

already been spelled-out at the *v**P phase level and has lost its phonological content. This means that it cannot be pied-piped since Pied-piping requires phonological material. Given that Pied-piping is a part of the composite operation of Move, this means that the *wh*-phrase cannot move further, that is, it is stuck in place. Consequently, the derivation in (4) crashes because the EPP feature of the interrogative complementizer remains unchecked. On the other hand, if an optional EPP feature is assigned to the *v** head, and the *wh*-phrase moves to the edge of the phase before it is spelled-out, as in an alternative derivation in (5) for the same sentence, the *wh*-phrase still has its phonological material even after the complement domain is spelled-out as in (5b).

(5)a. $[_{v*P}$ what$_1$ $[_{v*P}$ John *v** $[_{VP}$ buy t$_1$]]] ---> "indirect" *wh*-movement

b. $[_{v*P}$ what$_1$ $[_{v*P}$ John *v** $[_{VP}$ buy t$_1$]]] ---> Spell-Out

c. $[_{CP}$ what$_2$ C^0 $[_{TP}$ John$_1$ T^0 $[_{v*P}$ t$_2$' $[_{v*P}$ t$_1$ *v** $[_{VP}$ buy t$_2$]]]]]

Thus, the *wh*-phrase can move further to the Spec of CP, as in (5c). All of this shows that elements that have to move out of a phase cannot stay inside the phase to be spelled-out and must escape it. If the relevant element does not move out of the phase, the derivation eventually crashes, because of an unchecked EPP feature, as the element that needs to check it gets stuck given properties of Multiple Spell-Out and Pied-Piping. The combination of Multiple Spell-Out and Pied-Piping thus forces the movement to proceed successive cyclically in the same manner as the PIC does. Consequently, the PIC is not necessary at least in terms of Move. However, in order to show that the PIC can be completely eliminated from the grammar, we have to see how it affects the operation of Agree.

2.3 PIC Eliminated: Implications for Long-Distance (Cross-Phasal Agreement)

In Chomsky's system, PIC constrains both Move and Agree. This means that a goal within a strong phase is inaccessible to a probe at the next higher phase via Agree, and there cannot be any movement out of a strong phase, if the next strong phase is reached. We have just seen that the effects of PIC for Move can be derived (i.e., once an element is in an already spelled-out phase, it cannot be moved any further). How about accessing a goal within a strong phase by a probe at the next strong phase via Agree? It is clear that PIC bars such a relation. However, we will show that it is not clear that this should be the case, as there seem to be cases of agreement requiring exactly such long-distance (cross-phasal) configurations. We discuss such cases in the next section.

2.4 Long-Distance (Cross-Phasal) Agreement

Inènlikèj and Nedjalkov (1973) and Mel'čuk (1988) discuss the following example from Chukchee:

(6) ənan qəlɣiɬgu ləŋərkə-nin-**et** [$_{CP}$ iŋqun pro Ø-rətəmŋəv-nen-at
he-INST regrets-3-**PL** COMP 3SG-lost-3-PL
qora-**t**].
reindeer-**PL**-NOM
'He regrets that he lost reindeers.'

In (6), the object agreement of the matrix predicate is with the embedded object *qorat* 'reindeer-pl'. Ura (1994) discusses examples similar to this one from Chukchee and Alutor and analyzes them within an early version of the minimalist program. So, for Ura (1994), the embedded object moves at

LF to the Spec of the matrix Agro across the embedded subject (in other words it undergoes covert superraising), thus inducing the Spec-Head agreement with the matrix Agro, resulting in the third person plural object agreement on the matrix predicate. Translated into the latest version of the minimalist program developed in Chomsky (1999), which dispenses with a separate LF cycle and has no LF movement of the type assumed in Ura (1994), the agreement between the embedded object and the matrix predicate is obtained through the operation of Agree between the probe *v** in the matrix clause and the goal DO in the embedded clause.

The case in (6) is particularly interesting to us, because it shows that PIC as formulated in (1) is too strict and it cannot refer to the operation of Agree.

Let us look more closely at why PIC fails with respect to the example in (6). Recall that PIC does not allow access to a goal in the complement domain of a head of a strong phase by a probe at the next strong phase. But this is exactly what goes on in the example in (6).[3, 4]

As already mentioned, in (6) the object agreement of the matrix predicate is with the object of the embedded clause. As already mentioned, in Chomsky's (1999) system, agreement between two elements is obtained through the operation of Agree. For Agree to take place, the elements in question have to be active. They are active if they contain an uninterpretable feature. One element is an active probe with uninterpretable features seeking an active goal with an uninterpretable feature. In (6), the probe is *v** of the matrix clause and the goal is the embedded clause object. The uninterpretable features of *v** are phi-features. Since the matrix *v** agrees with the embedded DO, it means that at this point of the derivation the embedded DO still must have an uninterpretable feature making it an active goal. Since Agree is obtained between the matrix *v** and the embedded DO, it means that the matrix *v** can access the embedded DO. However, PIC, as formulated in (1), bars this access, because the matrix *v**P is a strong phase, and there is at least one intervening phase between the matrix *v** and

the embedded DO, namely the embedded CP (and possibly the embedded *v**P if there is no overt object shift in this language).[5] The relevant portion of the derivation is illustrated in (7).

(7) [$_{v*P}$ …[$_{v*}$ ənan qəlɣiɮu ləŋərkə-nin-**et**] [$_{CP}$ iŋqun Ø-rətəmŋəv-nen-at

⇩ ⇩ ⇩

strong probe strong

phase phase

[$_{v*P}$ qora-t]]

⇩ ⇩

(a strong goal

phase if

the position of the object is in situ, and no object shift has taken place)

So, this is exactly the goal access configuration that PIC bars. If there is no PIC, however, then the fact that this kind of long-distance agreement exists in human languages is a welcome result.[6, 7]

Another kind of examples that might be showing that Agree should not be constrained by the PIC are cases of obligatory exhaustive subject and object control. Landau (1999) argues that the obligatory exhaustive subject control is analyzed as the Agree relation between the phi-features of the tense and PRO and the obligatory exhaustive object control is analyzed as the Agree relation between the phi-features of the *v** and PRO. These Agree relations are illustrated in (8) and (9), respectively.

(8) Subject control

[$_{TP}$ Subj$_1$ **T^0** [$_{v*P}$ t$_1$ *v** [$_{CP}$ C^0 **PRO** …]]]

Probe phase phase Goal

(9) Object control

$[_{TP}$ Subj$_1$ T^0 $[_{v*P}$ t_1 ***v**** Obj $[_{CP}$ C^0 **PRO** …]]]

Probe phase Goal

In addition, Landau argues that control infinitivals are CPs. Given these assumptions, in the subject control case in (9), the phase CP intervenes between the probe T and the goal PRO of the Agree relation. The phases CP and *v**P reside between the two elements in the obligatory object control construction in (9). In order to allow Agree between a goal and a probe in control structures, Landau relaxes the PIC. However, if Agree is not constrained by the PIC to start with, then there is no problem for these examples at all.

Thus, given that there is no compelling evidence that Agree should be constrained by PIC, and given that the effects of PIC for Move can be derived from other mechanisms, a natural step is to conclude that PIC does not exist in the grammar at all. And, given that our system is able to account for a wider empirical range, without recourse to a separate condition, we will conclude that it is superior to the system with PIC.

3 Conclusion

In this squib we have tried to dispense with the Phase Impenetrability Condition proposed in Chomsky (1998, 1999). We have proposed that the effects of PIC for Move (i.e., successive cyclic movement) could be derived from independently necessary computational mechanisms, in particular Multiple Spell-Out, and the requirement for Pied-Piping to affect phonological content. Furthermore, based on the long-distance (cross-phasal) agreement examples from Chukchee (and possibly from

Alutor and Tsez), we have concluded that PIC should not hold of Agree, either. Thus, we have concluded that PIC can be eliminated from the grammar.

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Notes

An earlier versions of this squib was presented at Motivating Movement Conference, January 2001. We would like to thank the audiences at the conference, especially, Idan Landau, David Pesetsky, Andrew Simpson, for their helpful comments and suggestions. We are very grateful to Cedric Boeckx, ÷eljko Bošković and Akira Watanabe for their invaluable comments and discussions.

[1] For Chomsky (1999) a trace is "an empty category EC, lacking phonological features, these having been stripped away at Spell-Out, either in the normal course of the derivation, or by the English-specific rule TH/EX prior to the strong phase level." (Chomsky 1999, p. 19).

[2] An example of an active trace can be found in Nominative object constructions in Icelandic, as illustrated in (i).

(i) Mir likuðu hestarnir.

me-DAT-SG liked-3PL the-horses-NOM-PL

'I liked the houses.'

In examples such as (i) there is Agree between T and the nominative object in-situ, but at the point when this Agree relation obtains, the nominative object is already spelled out,
which means that it is an active trace.

[3] Ura (1994) also gives similar examples from Alutor from Mel'čuk and Savina (1978) and Mel'čuk (1988):

(i) Qəmavə-nak Ø-ləʔu-tkə-**nina-wwi** [S ɣən-annə

Qamav-SG-LOC 3sg-sub-see-PRES-**3SG-OBJ-PL** you-INST

Ø-kəlɣatətkə-na-wwi qura-**wwi**].

2SG(SUB)-harness-3SG(OBJ)-PL reindeer-**PL**(NOM)

'Lit. Qamav sees (that) you are harnessing the reindeers.'

'Qamav sees you harnessing the reindeers.'

However, since this example does not contain an overt complementizer, it is not clear that the embedded clause is a CP, and therefore, it is not as clear case for our purposes as we would want it to be. However, if there is no overt object shift in this language, then this example provides an additional piece of evidence for our argument. This is so because the object in the embedded clause would be in the embedded *v**P, a strong phase, and would be attempted to be accessed by Agree from the matrix *v**P, another strong phase. This Agree relation, however, is barred by PIC, as discussed above.

Polinsky and Potsdam (to appear) note a similar kind of agreement for Tsez:

(ii) enir [už-ā magalu b-āc'ru-li] **b**-iyxo.
mother-DAT boy-ERG bread-**III**-ABS III-eat-PSTPRT-NMLZ **III**-know-PRES
'The mother knows the boy ate the bread.'

In the Tsez example in (ii), the matrix predicate shows class III agreement triggered by the absolutive NP *magalu* 'bread' in the embedded clause. Again, given that there is no overt complementizer in the embedded clause, it is not clear whether the embedded clause is a CP, and therefore a strong phase. However, if there is no overt object shift in this language either (as Polinsky personal communication believes is the case), this example would provide an additional support for our discussion, in the same way as the Alutor example in (i).

[4] Long-distance wh-in-situ examples such as (i) are also potential problems for Chomsky's (1999) formulation of PIC, as noted by Boeckx (1999) and Ochi (1999):

(i) Who thinks that Mary likes whom?

If the embedded object *whom* needs to agree with the matrix C in such cases, an Agree relation between the matrix probe C and the embedded goal *whom* should be barred by PIC. Chomsky (1999) recognizes such examples but observes that it is not clear whether the in-situ w*h*-phrase has an uninterpretable feature or not.

[5] There is also a problem of the intervening embedded subject and why it does not induce intervention effects here, thus preventing the matrix probe *v** from reaching the active goal DO in the embedded

clause. The intervening embedded subject is inactive, but according to Chomsky (1999), inactive nominals do induce intervention effects. We will not discuss this problem here, but just note that there must be some mechanism allowing Agree to bypass the embedded subject in what Ura (1994) calls covert superraising constructions. See footnote 7 for a possible solution as to why intervention effects are absent in the long-distance agreement cases.

[6] Mel'čuk and Savina (1978) and Ura (1994) also give an example from Alutor where an embedded clause subject agrees with the matrix predicate:

(i) Qəmavə-nak Ø-ləʔu-tkəni-**ɣət** [S ɣən-annə Ø-kəlɣatətkə-na-wwi
Qamav-SG-LOC 3SG-SUB-see-PRES-**2SG-OBJ** you-INST 2SG(SUB)-harness-3SG(OBJ)-PL
qura-wwi].
reindeer-PL-NOM
'Qamav sees that you harnessing the reindeers.'

Polinsky and Potsdam (to appear) give a similar example from Tsez:

(ii) enir [u i Ø-āy- ru-li] **Ø**-iyxo.
mohther-DAT boy-**I**-ABS I-arrive-PSTPRT-NMLZ **I**-know-PRES
'The mother knows the boy arrived.'

These examples would be additional pieces of evidence for our proposal (see footnote 2 for the relevant discussion).

[7] Cedric Boeckx (personal communication) suggested to us that the long distance (cross-phasal) agreement between probe and goal can be mediated via a head-to-head Agree, which is assumed in Chomsky (1999) for ensuring selectional relations between heads, rather than a direct Agree relation between the two elements. According to his suggestion, the long-distance agreement, in which the matrix verb agrees with an embedded object or subject, is accomplished in the following way. First, the value of the uninterpretable phi-features of *v** is determined by the value of the interpretable phi-features of an object through Agree in the embedded clause. In other words, *v** obtains the phi-features of the object. In the next stage of the derivation, T agrees with *v** with the phi-features of the object because of the selectional relation. The value of the phi-features of *v** are assigned to the uninterpretable phi-features of T. At the same time, T and a subject enter into Agree for Case/agreement reasons. This means that T in the embedded clause procures the phi-features of both the subject and the object. Again, a T-to-C agreement is carried out for selectional purposes, with the complementizer obtaining the phi-features of the two DPs. The embedded complementizer, being a strong phase head, is accessible to the next higher phase head *v** in the matrix clause even within the system with PIC. Furthermore, whether the matrix verb has agreement with the embedded subject or with the embedded object depends on which phi-features *v** in the matrix clause picks up from the embedded complementizer. As a welcome consequence of his suggestion, it naturally follows that the embedded subject does not show intervention effects even when there is agreement between the matrix verb and the embedded object. Since features of both the embedded object and subject end up on the same head (i.e., the embedded complementizer), they are equidistant from the matrix probe (i.e., the matrix *v**). We leave for future research careful comparison between the head-to-head Agree and the direct head to XP Agree approach to the long-distance agreement (see Richards 1996 and Watanabe 2000 for the discussions and ideas relevant to the former view). Although the long-distance

agreement is not incompatible with PIC in the head-to-head Agree approach, let us emphasize that there seems to be no compelling evidence for PIC in terms of Agree.