

Movement and Derivation: Eliminating the PBC*

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1. Introduction

Movement is a distinctive property of human language. Various proposals have attempted to constrain movement. One of the most important conditions on movement is the c-command on movement landing site, namely, the PROPER BINDING CONDITION (PBC) in (1).

- (1) PROPER BINDING CONDITION (PBC)
Traces must be bound. (cf. Fiengo 1977, Saito 1985)

The strict interpretation of the PBC prohibits:

- (2) a. Downward and sideward movement
b. Head movement
c. Remnant movement

Downward movement and sideward movement necessarily leave a trace that is not c-commanded by the head of the chain and hence violate the PBC. Under a strict interpretation of the PBC, head movement is also banned because the head of the chain in head movement cannot c-command its trace. Likewise, remnant movement would be never permissible, because it leaves an unbound trace within a remnant category (cf. Müller 1996).

Importantly, there has been no uncontroversial case of downward and sideward movement attested in human language. It is much less controversial, however, that human language apparently does allow remnant movement in some restricted context, as well as head movement. Thus the PBC in the form of (1) needs to be reconsidered.

The aim of this paper is to show that there is some redundancy between the scope of the PBC and the derivational theorizing in the minimalism, and that the PBC should be eliminated and can be reduced to a derivational property of the computational system, CYCLIC SPELL-OUT, on both empirical and conceptual grounds.

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Conceptually, there are several reasons for eliminating the PBC; it is a highly representational condition, which is incompatible with the recent derivational theorizing. Furthermore, under the minimalism, such a condition on movement itself must be called into question.

As Epstein et. al (1998) argue, a strictly derivational system, in which all operations take place cyclically and derivationally, naturally excludes lowering and sideward movement. The more significant question that they do not ask concerns remnant movement. Remnant movement is not excluded in principle in a strictly derivational system, since it is perfectly upward and cyclic. It has been observed in the literature, however, that remnant movement is heavily constrained.

This paper proposes a simplest condition on movement (3), which is derived from the cyclic/derivational nature of the structure-building (cf. Chomsky 2000, 2001a, b, Collins 2001).

(3) Movement is triggered only by the probe/locus in the derivation.

The immediate difference between the PBC (1) and (3) is that whereas the PBC is a condition on syntactic chain formation (i.e. representation), (3) is a condition on movement trigger. That is, (3) requires all movement to be triggered cyclically by the probe/locus in the derivation. (3) naturally follows from the derivationalism (cf. Extension Condition, Earliness Principle, Cyclicity etc.). Under (3), remnant movement becomes licit rather than illicit. Then, the important question is how to constraint remnant movement.

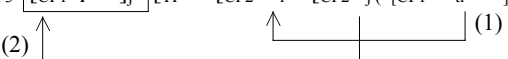
The structure of this paper is as follows. Section 2 first quickly reviews the previous theories of the PBC and points out a new set of data that resists explanation under any of the existing theories. Section 3 proposes an Edge-baed theory of Cyclic Spell-Out as an alternative to the PBC and shows that it is conceptually and empirically superior to the previous theories of the PBC. Section 4 discusses some consequences of the proposed theory of the PBC.

2. A PBC Riddle

2.1 A Very Brief Overview of the History of the PBC

The PBC is alleged to correctly explain the ungrammaticality of long-distance scrambling followed by remnant movement in Japanese. There have been many proposals about how to derive/reduce the PBC (cf. Saito 1985, 2002, Lasnik and Saito 1992, Collins 1994, Takano 1995, Müller 1996, Ki-

tahara 1997). For example, (4c) is derived from the PP-scrambling (4a) followed by the remnant CP-scrambling (4b) and is ungrammatical. The schematic derivation (4d) is out because the trace t_i violates the PBC (1).

- (4) a. $[_{TP}$ Taro-ga $[_{CP2}$ **gakusei-to**_i Hanako-ga $[_{CP1}$ Jiro-ga t_i
 Taro-NOM student-with Hanako-NOM Jiro-NOM
 at-ta to] omotte-iru to] it-ta].
 meet-PST C think-PRES C say-PST
 ‘Taro said that Hanako thought that Jiro met with students.’
- b. $[[_{CP1}$ **Jiro-ga** **gakusei-to** **at-ta** **to**]_j
 Jiro-NOM student-with meet-PST C
 $[_{TP}$ Taro-ga $[_{CP2}$ Hanako-ga t_j] omotte-iru to] it-ta].
 Taro-NOM Hanako-NOM think-PRES C say-PST
- c. * $[_{CP3}$ $[_{CP1}$ **Jiro-ga** t_i **at-ta** **to**]_j $[_{TP}$ Taro-ga $[_{CP2}$ **gakusei-to**_i
 Jiro-NOM meet-PST C Taro-NOM student-with
 $[_{CP2}$ Hanako-ga t_j omotte-iru to]] it-ta]]
 Hanako-NOM think-PRES C say-PST
- d. * $[_{CP3}$ $[_{CP1}$ t_i]_j $[_{TP}$ $[_{CP2}$ α_i $[_{CP2}$ $t_j (= [_{CP1} t_i])$]]]]]]
- (2) 

It should be noted that the PBC cannot be literally right since otherwise (5) is wrongly ruled out (cf. Lasnik and Saito 1992, Takano 1995).

- (5) a. $[_{TP}$ Taro-ga_i $[_{v*P}$ t_i Hanako-wo tataki]-sae si-ta].
 Taro-NOM Hanako-ACC hit]-even do-PST
 ‘Taro even hit Hanako.’
- b. $[_{TP}$ $[_{v*P}$ t_i **Hanako-wo tataki]**-sae_j $[_{TP}$ Taro-ga_i t_j si-ta]].
 Hanako-ACC hit]-even Taro-NOM do-PST
 ‘(Even) Hit Hanako, Taro did.’

Kitahara (1997), building on Müller’s (1996) generalization (6), proposes that the PBC reduces to the MLC.

(6) MÜLLER’S GENERALIZATION (MG)

Remnant XPs cannot undergo a certain type of movement if the antecedent of the unbound trace has undergone the same type of movement.

In Müller-Kitahara theories, (4) is illicit because both operations are scrambling and hence violates MG /MLC, whereas (5) is licit because the first op-

eration is A-movement and the second operation is scrambling, each of which has a different trigger and hence there is no MG/MLC violation.

These approaches, however, suffer empirical problems. As (7) shows, even if one of the two operations is replaced with topicalization and hence MG/MLC violation is obviated, the sentence is still ungrammatical, contrary to expectation.

- (7) *_{[CP3} [_{CP1} **Jiro-ga** t_i **at-ta** **to**]_j(-wa) Taro-ga
 Jiro-NOM meet-PST C-TOP Taro-NOM
 _{[CP2} **gakusei-to**_i(-wa) _{[CP2} Hanako-ga t_j omotte-iru to]
 students-with-TOP Hanako-NOM think-PRES C
 it-ta]]
 say-PST
 ‘John said that Hanako thought that Jiro met with students.’

Furthermore, Saito (2002) shows that the PBC cannot be reduced to the MLC. Consider the object control examples in (8).

- (8) a. Taro-ga Hanako-ni _{[CP} PRO Boston-e iku koto]-wo meiji-ta.
 Taro-NOM Hanako-DAT Boston-to go C-ACC order-PST
 ‘Taro ordered Hanako to go to Boston’
- b. Taro-ga _{[v*P} **Boston-e**_j Hanako-ni _{[CP} PRO t_j iku
 Taro-NOM Boston-to Hanako-DAT go
 koto]-wo meiji-ta].
 C-ACC order-PST
- c. _{[CP} **PRO** **Boston-e** **iku koto**]_i-ga Taro-ni yotte
 Boston-to go C-NOM Taro-by
 Hanako-ni t_i meiji-rare-ta
 Hanako-DAT order-PASS-PST
 ‘That (she) should go to Boston was ordered to Hanako by Taro.’
- d. *_{[TP} [_{CP} **PRO** t_i **iku koto**]_i-ga _{[v*P} **Boston-e**_i(-wa)
 go C-NOM Boston-to (-TOP)
 Hanako-ni Taro-ni-yotte t_j meiji-rare-ta]].
 Hanako-DAT Taro-by order-PASS-PST
 ‘(Lit.) To go to Boston was ordered to Hanako by Taro.’

(8a) is the base sentence. The ungrammatical sentence (8d) is derived by applying scrambling of the PP (8b) and then A-movement of the CP (8c), respectively. Under the MG/MLC account, however, (8d) is wrongly pre-

dicted to be well-formed just as (5) is good. This is because the triggers of the two operations are different and do not cause any MG/MLC violation.

Saito (2002) proposes a new theory of the PBC (9).

(9) CONSTRAINT ON MERGE (Saito 2002)

Merge applies to only complete constituents.

- a. α is subject to Merge only if α is a complete constituent.
- b. α is a complete constituent =_{def.} if β is a term of α and β is a member of a chain γ , then every member of γ is a term of α .

(9) prohibits movement of a constituent which contains a trace/copy but not the head of the chain. This rules out (4c) because the remnant movement of the CP contains a trace of the PP but not its head. Saito crucially assumes with Lasnik (1999) that A-movement does not leave a trace/copy, whereas scrambling does. Therefore, (5) does not show any PBC effects because the moved remnant constituent v^*P does not contain a trace/copy of the subject DP A-chain. On the other hand, (9) correctly rules out (8d), because the remnant CP contains a trace of the scrambled PP but not its head of the chain, and therefore cannot undergo Merge/Move.

2.2 A PBC Riddle

Saito's theory suffers conceptual and empirical problems. First, the newly proposed condition (9) inherits the same conceptual problems as the original PBC; Saito's Constraint on Merge (9) is essentially representational in the sense that it refers to a presence/absence of a trace in certain domain/category. More importantly, (9) begs a fundamental question why it exists and how it is derived. Since the aim of this paper is to eliminate an independent condition and reduce it to a more general property of human language, we do not adopt his theory.

More significantly, however, there is a set of data that cannot be explained under Saito's theory and any of the proposed theories of the PBC that we have seen above. Consider the examples of Raising-to-Subject (10) and Raising-to-Object (11).

- (10) a. [_{TP} **Taro-ga**_i minna-ni [_{CP} t_i baka-da to]
 Taro-NOM everyone-DAT foolish-PRES C
 omow-arete-iru].
 think-PASS-PRES.
 'Taro is considered to be stupid by everyone.'

b. $[\text{CP } t_i \text{ baka-da } \text{to}](-\text{wa})_j$ $[\text{TP } \text{Taro-ga}_i \text{ minna-ni}$
 foolish-PRES C-TOP Taro-NOM everyone-DAT
 t_j omow-arete-iru].
 think-PASS-PRES

(11) a. $[\text{TP } \text{Taro-ga}$ $[\text{v}^*\text{P } \text{Hanako-wo}_i \text{ kokorokara}$ $[\text{CP } t_i$
 Taro-NOM Hanako-ACC sincerely
 baka-da $\text{to}]_j$ omot]-ta].
 foolish-PRES C think-PST
 ‘Taro sincerely considered Hanako to be a fool.’¹

b. $*[\text{CP } t_i \text{ Baka-da } \text{to}](-\text{wa})_j$ $[\text{TP } \text{Taro-ga}$ $[\text{v}^*\text{P } \text{Hanako-wo}_i$
 foolish-PRES C-TOP Taro-NOM Hanako-ACC
 (kokorokara) t_j omot]-ta].
 sincerely think-PST
 (cf. Kuno 1976. Hiraiwa 2002)

What is significant here is the sharp grammatical contrast between the remnant CP movements in (10b) and (11b). In both derivations, the first operation is A-movement/raising into [Spec, TP] and [Spec, v*P], respectively. Thus, Saito’s theory wrongly predicts (11b) to be as grammatical as (10b) and (5). Likewise, the MG/MLC expects (11b) to be as grammatical.

Thus we are left with a paradox under any of the previous theories of the PBC. (12) summarizes the results.

(12) Syntactic Operations	PBC Effect
Scrambling followed by remnant Scrambling	*
Scrambling followed by remnant Topicalization	*
Scrambling followed by remnant A-movement	*
A-movement followed by remnant Scrambling	* _{OBJ} / $\sqrt{\text{SUBJ}}$
A-movement followed by remnant Topicalization	* _{OBJ} / $\sqrt{\text{SUBJ}}$
A-movement followed by remnant A-movement	* ²

¹ Cf. Kuno (1976), Hiraiwa (2002) for extensive arguments for ‘(optional) raising’ in RTO in Japanese. Notice that RTO in Japanese cannot be control; (8c) shows that true control is free from the PBC effects. See the latter for evidence that the raising in (11a) is not a scrambling.

² A-movement followed by A-movement is also ungrammatical, although it is not illustrated in this paper for reasons of space. It is, however, excluded by locality/defective intervention (cf. Hiraiwa 2001) independently of the PBC effects and hence is not relevant to the present purpose of this paper.

Topicalization followed by remnant Scrambling	*
Topicalization followed by remnant Topicalization	*
Topicalization followed by remnant A-movement	*

Close scrutiny, thus, reveals that remnant movement is heavily constrained in Japanese. The generalization is that only A-movement of the subject DP obviates PBC effects. Thus we reach the generalization (13).

- (13) Movement of β to the periphery of CP/ ν P blocks subsequent movement of the remnant α containing the trace/copy of β , but A-movement of α to the periphery of TP does not.

3. Eliminating the PBC and Multiple Spell-Out

The generalization (13) immediately reminds us of a phase theory of Multiple Spell-Out proposed in Chomsky (2000, 2001a, b), in which phrase markers are sent to the LF/PF interfaces by Transfer/Spell-Out phase-by-phase, where, phases are CP and ν P, but crucially not TP. Consequently, Cyclic Spell-Out creates a generalized derivational island, reducing computational complexity. This effect is dubbed PHASE IMPENETRABILITY CONDITION (PIC) (cf. Chomsky 2000, 2001a, b).

- (14) PHASE IMPENETRABILITY CONDITION (PIC)
 In phase P with head H_p , the domain of H is not accessible to operations outside P, only H and its edge are accessible to such operations.

The leading idea that I pursue here is (15).

- (15) PBC reduces to Cyclic Spell-Out.

The question is at which derivational point the operation Transfer/Spell-Out applies. Chomsky (2000) and Nissenbaum (2000) propose that Transfer/Spell-Out applies at the completion of the strong phases (CP/ ν P), whereas Chomsky (2001a, b) weakens the Cyclic Spell-Out and assumes that Transfer/Spell-Out applies at the next strong phase level. Thus, I propose a stricter derivational interpretation of Cyclic Spell-Out (16).

- (16) Transfer/Spell-Out applies to a phase P_h as soon as its edge is extended.

Building on (16), I define the EDGE-EXTENSION OPERATION (EEO) and propose the Edge-Based Theory of Cyclic Spell-Out (18).

(17) **EDGE-EXTENSION OPERATION (EEO)**

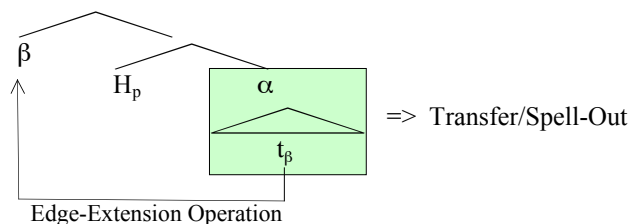
An EDGE-EXTENSION OPERATION (EEO) is a syntactic operation that Merges β with a constituent consisting of a phase head H_p and its complement α .

$\{\beta \{H_p \alpha\}\}$

(18) a. EEO triggers TRANSFER/SPELL-OUT immediately.³

$\{\beta \{H_p \alpha\}\}$

b.

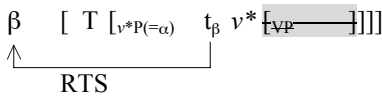


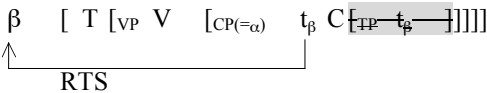
It follows from (18a) that at a phase head H_p , Transfer/Spell-Out applies to the complement domain of H_p cyclically, immediately after its edge (i.e. a specifier of H_p or a new head γ) is created via (Internal/External) Merge (cf. (18b)).⁴ In other words, the complement domain of H_p ($=\alpha$) becomes inaccessible by the PIC as soon as Merge extends the H_p .

Let us illustrate how the EEO-based Cyclic Spell-Out eliminates the PBC and reduces its effects to derivationalism. First, Long-distance Scrambling (LDS) has been known to be a movement to the edge of the clause (cf. Saito 1985, Sakai 1994, Miyagawa 1997). Likewise, topicalization is also movement to the edge of CP. Thus if the first movement of β is LDS or topicalization, it counts as an EEO and the complement of $C2(=TP)$ is immediately Transferred/Spelled-Out. Hence the remnant $CP1(=\alpha)$ is inaccessible by the PIC. Note that the proposed analysis exactly explains the PBC effects without postulating the PBC as an independent condition.

³ Cf. Fukui and Speas' (1986) notion that a specifier 'closes off' the projection, which derives the effect that a given projection has one and only one specifier. (18) derives a derivational edge uniqueness for phase heads. One prima facie problem is how to deal with v^*P with an external argument and a shifted object. One possible way out is to shift the object first and Transfer/Spell-Out the VP first and then apply External Merge of the subject to v^*P (possibly with tucking-in).

⁴ Note that under label-free theorizing (Collins 2001), the notion of 'edge-extension' is not restricted to the creation of a specifier for H_p ; External Merge of a new head also counts as edge-extension.

(22) a. $[_{TP} \beta \quad [T \quad [_{v^*P(=\alpha)} t_\beta \quad v^* \quad [_{VP} \text{---}]]]]]$ (cf. (5b))


b. $[_{TP} \beta \quad [T \quad [_{VP} V \quad [_{CP(=\alpha)} t_\beta \quad C \quad [_{TP} t_\beta \text{---}]]]]]$ (cf. (10b))


In summary, I have proposed to eliminate the PBC. Instead, I have adopted the simple and natural theory of movement (3) and demonstrated that the “PBC effects” reduce to the derivational mechanism of the computational system, namely, the EEO-based Cyclic Spell-Out. In other words, the “PBC effects” arise when a remnant category is extracted from the domain that has already been Transferred/Spelled-Out to the interfaces, which is simply impossible. It has been shown that my approach is both conceptually and empirically superior to the previous theories of the PBC.

4. Some Consequences and Implications

4.1 Another Riddle Resolved: The Generalized Islands Effects

The proposed theory resolves another riddle. Consider the contrast between (23a) and (23b).

(23) a. **Reezooko-kara_i(-wa)** Taro-ga Hanako-ni $[_{CP}$ Jiro-ga t_i
 fridge-from(-TOP) Taro-NOM Hanako-DAT Jiro-NOM
 ringo-wo nusun-da to] iituke-ta.
 apple-ACC steal-PST C tell-PST
 ‘Taro told Hanako that Jiro stole some apples from the fridge.’

b. *?Hanako-ni_j **reezooko-kara_i(-wa)** Taro-ga t_j $[_{CP}$ Jiro-ga
 Hanako-DAT fridge-from(-TOP) Taro-NOM Jiro-NOM
 t_i ringo-wo nusun-da to] iituke-ta.
 apple-ACC stole-PST C tell-PST

Under the standard assumption that (long-distance) scrambling is a free operation, the contrast in (23) is a puzzle; in the grammatical (23a), the LDSed element is at the edge of the matrix CP, whereas in the ungrammatical (23b), the LDSed element is under the clause-internally scrambled element.

As I claimed in Section 3, if we assume that LDS targets the edge of the phase (CP/vP), then the riddle is partly resolved; (23b) may be ungrammati-

cal because the LDS does not target the edge of CP there. This account, however, leads to a new question: then why can't the LDSed element first target the edge of CP, followed by a clause-internal scrambling of the dative element to the front of the former?

Significantly, our theory gives a straightforward answer to this question. Crucially, the first LDS to the edge of CP counts as an EEO and hence the subsequent clause-internal scrambling of the dative element over the LDSed element is blocked. Thus the proposed theory provides a unified account for the PBC effects and the generalized island effects.

4.2 Derivational Simultaneity and Multiple Edges

An apparent problem with our theory is LDS of multiple elements. As (24) shows, such a derivation is grammatical.

- (24) **Reezooko-kara_i** **ringo-wo_j** Hanako-ni_k Taro-ga t_k
fridge-from apple-ACC Hanako-DAT Taro-NOM
[_{CP} Jiro-ga t_i t_j nusun-da to] iituke-ta.
Jiro-NOM steal-PST C tell-PST
‘Taro told Hanako that Jiro stole some apples from the fridge.’

Given the EEO-based Cyclic Spell-Out (18), apparently, the derivation of (24) is incompatible with the EEO-based Cyclic Spell-Out theory, since the matrix TP is Transferred/Spelled-Out as soon as one element undergoes LDS to extend the edge of C, prohibiting LDS of another element.

I suggest, building on Hiraiwa (2001, 2002b), that the role of derivational simultaneity plays a significant role in narrow syntax. That is, Multiple LDS is not a series of single scrambling operations, but rather it is a derivationally simultaneous operation.⁶ In other words, in the derivation (24) Merge of the higher LDSed element and Merge of the lower LDSed element are derivationally simultaneous and hence Transfer/Spell-Out applies only after the simultaneous multiple LDS.

4.3 Boeckx-Sugisaki's Observation

An immediate prediction of the derivational simultaneity hypothesis is that there should be “PBC/generalized island effects” when derivationally si-

⁶ See Hiraiwa (2001, 2002b) for detailed discussions on Multiple Agree. In particular see the latter for derivational simultaneity in syntax and its applications and consequences.

multaneous multiple LDS is prohibited. Significantly, this is correctly borne out by Boeckx-Sugisaki's (1999) observation.

(25) BOECKX-SUGISAKI OBSERVATION

In multiple LDS, elements undergoing LDS cannot be split by an element in the higher clause.

(26) a. **Reezooko-kara_j ringo-wo_j** Hanako-ni_k Taro-ga t_k
 fridge-from apple-ACC Hanako-DAT Taro-NOM
 [CP Jiro-ga t_i t_j nusun-da to] iituke-ta.
 Jiro-NOM steal-PST C tell-PST
 'Taro told Hanako that Jiro stole some apples from the fridge.'

b. ***Reezooko-kara_i Hanako-ni_k ringo-wo_j** Taro-ga t_k
 fridge-from Hanako-DAT apple-ACC Taro-NOM
 [CP Jiro-ga t_i t_j nusun-da to] iituke-ta.
 Jiro-NOM steal-PST C tell-PST

The grammaticality of (26a) is expected under the derivational simultaneity approach to multiple LDS in Section 4.2. What is important is the ungrammaticality of (26b). This is because there is no way for the DP 'Hanako' to intervene between the two LDSed elements, without violating the PIC; in order for the multiple LDS to be licit, it must undergo movement derivationally simultaneously. Then, the DP 'Hanako', however, gets frozen in-situ due to the EEO-based Cyclic Spell-Out theory, since the multiple LDS extends the edge of the phase head C and TP is immediately Transferred/Spelled-Out.⁷

4.4 Scope Freezing in Remnant Movement

Finally, the elimination of the PBC and the reduction of movement to the strict head-attraction (3) explain the scope-freezing in remnant v^*P movement in English etc. (cf. Huang 1993, Takahashi 2002).

(27) a. Someone hit everyone. ($\exists > \forall, \forall > \exists$)
 b. Hit everyone someone did. ($\exists > \forall, * \forall > \exists$)

Suppose that the remnant v^*P is moved to a higher specifier of the TP. Then at this point of the derivation, T can no longer access the universal quantifier

⁷ The proposed theory of the EEO-based Spell-Out may derive the same effect as Pesetsky's (1982) PATH CONTAINMENT CONDITION. The comparison with the PCC is, however, beyond the scope of this short paper.

inside the fronted v^*P . This is because the fronted v^*P is no longer in c-command domain of T and hence violates the condition (3). Thus no QR is possible and hence (27b) is unambiguous.^{8, 9}

5. Conclusion

All in all, the condition (3) correctly accounts for the absence of lowering and sideward movement in syntax. Head movement ceases to be problematic on this view, since it perfectly satisfies (3) (contra Chomsky 2000). Every remnant movement also conforms to (3). I have shown that the elimination of the PBC in favor of (3) is empirically and conceptually superior to the PBC (1) and the other existing theories of it. I have demonstrated that the “PBC effects” reduce to the derivational nature of the computational system of human language and defended the EEO-based Cyclic Spell-Out model with many consequences.

The next important task is to examine how conceptually motivated and superior the notions of phase and Cyclic Spell-Out is in comparison with the PBC (1), which is far beyond the scope of this paper.

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⁸ See Chomsky (2000, 2001a) for the elimination of the Spec-Head Agreement. Note the serious problem with the Spec-Head Agreement; if an element moved to the specifier of a head X were still accessible for X, then H would never be able to probe for another goal Y in its c-command domain, since the moved X would always count as the closest intervenor.

⁹ The clause-boundness of QR and A-movement also falls under the Cyclic Spell-Out, since the edge of TP cannot be an escape hatch for a higher H_p by the PIC.

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