An Explanation for CED Effects from the Derivational Perspective*

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Abstract

This paper proposes an analysis for CED effects on the basis of the Phase Impenetrability Condition (PIC) proposed by Chomsky (2001a). According to the PIC, there is an important distinction between edge positions of a phase and its domain. The former is accessible to the computational system in the next strong phase, while the latter is not. For instance, the C head in CP can access the edge positions in vP, but not the elements in VP. In this way, edge positions of a phase function as 'an escape hatch' in the framework of Chomsky (2001a). Uriagereka (2002: Chapter 3 & 4), on the other hand, defines the accessibility to the computation in terms of the Multiple Spell-out. He argues that once Spell-out is applied to a syntactic object XP, it is no longer accessible to the computational system. Thus, after Spell-out applies to a complex DP subject, the internal elements in the DP can no longer be accessed by the computation. Based on this assumption, he explains the ungrammaticality observed in extraction out of complex subjects or adjunct phrases. Taking account of these authors' viewpoints, then, I will propose a condition on Spell-out and show that this condition makes correct predictions for not only CED effects but also other extraction phenomena in Modern German.

Keywords: Condition on Extraction Domain (CED), Linear Correspondence Axiom, Command Unit, Multiple Spell-out, Phase Impenetrability Condition, phase edges, Scrambling.

1. Introduction

In this paper, I will focus on the so-called CED effects which are illustrated below:

(i) a. *Who$_i$ did he say that [$_\alpha$ for Bill to marry t_i] was a surprise?
b. *Who$_i$ do you think [$_\alpha$ pictures of t_i] would please John?

(ii) *Which class did you fall asleep [$_\alpha$ during t_i]?

(iii) *Who$_i$ did John come back [$_\alpha$ before I had a chance to talk to t_i]?

The sentences in (i) indicate that the extraction out of a complex subject is impossible, while those in (ii) and (iii) show that extraction is also impossible from within an adjunct phrase.

To explain these facts, Huang (1982) proposes the following condition on extraction

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domains:

(iv) *Condition on Extraction Domain (CED)*
A phrase A may be extracted out of a domain B only if B is properly governed.

According to this condition, all the sentences in (i)-(iii) are correctly ruled out: the sentences in (ia-b) are excluded because *who* in these examples leaves a trace within a subject, which is not properly governed. Similarly, the sentences in (ii) and (iii) are ungrammatical, since the wh-phrase in these examples leaves a trace within an adjunct, which is also not properly governed. In this way, within the GB framework, Huang (1982) captures the ungrammaticality in (i)-(iii) on the basis of the condition in (iv).

In this paper, then, I will try to capture CED effects in the current Minimalist framework, on the basis of the Phase Impenetrability Condition (PIC) proposed by Chomsky (2001a). Before going into details, however, I first survey the analysis by Uriagereka (2002: Chapter 3 & 4), who also explains CED effects in derivational terms based on the Multiple Spell-out.

2. Previous Analysis: Uriagereka (2002: Chapter 3 & 4)

2.1. Command Unit

First, consider the concept of "Command Unit", which plays an important part in his analysis. Command Unit is the structure which results from successive applications of Merge within a single derivation. To understand this notion, then, consider the following two structures in (1a) and (1b) below:

(1) a. $\{\alpha, \{\gamma, \{\alpha, \{\alpha, \{\beta \ldots\}\}\}\}\}$

$\gamma \rightarrow \uparrow \leftarrow \{\alpha, \{\alpha, \{\beta \ldots\}\}\}$

$\alpha \rightarrow \uparrow \leftarrow \{\beta \ldots\}$

b. $\{\alpha, \{\{\gamma, \{\gamma, \{\delta \ldots\}\}\}, \{\alpha, \{\alpha, \{\beta \ldots\}\}\}\}\}$

$\{\gamma, \{\gamma, \{\delta \ldots\}\}\} \rightarrow \uparrow \leftarrow \{\alpha, \{\alpha, \{\beta \ldots\}\}\}$

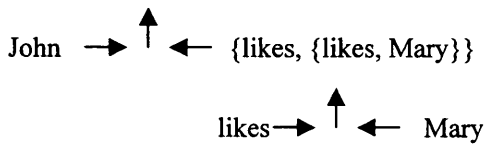
$\gamma \rightarrow \uparrow \leftarrow \{\delta \ldots\}$ $\quad$ $\alpha \rightarrow \uparrow \leftarrow \{\beta \ldots\}$

In (1a), although the operation Merge is applied two times, they are performed within a single derivation. So, the resulting structure $\{\alpha, \{\gamma, \{\alpha, \{\alpha, \{\beta \ldots\}\}\}\}\}$ constitutes a Command Unit. On the other hand, in (1b) there are two separate Merge operations in its first application to form the two separate derivational "cascades" (i.e. $\{\gamma, \{\gamma, \{\delta \ldots\}\}\}$ and $\{\alpha, \{\alpha, \{\beta \ldots\}\}\}$), with the consequence that the resulting structure $\{\alpha, \{\{\gamma, \{\gamma, \{\delta \ldots\}\}\}, \{\alpha, \{\alpha, \{\beta \ldots\}\}\}\}\}$ does not constitute a Command Unit.[1]

Now, let's look at the following sentence (2) and its derivation (3):

(2) John likes Mary.

(3) {likes, {John, {likes, {likes, Mary}}}}



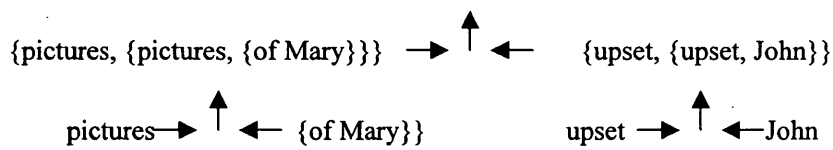
In (3), the operation Merge is applied two times within a single derivation, so the resulting structure {likes,{John, {likes, {likes, Mary}}}} forms a Command Unit.

Next, consider the following sentence in (4):

(4) Pictures of Mary upset John.

And this sentence has the following derivation in (5):

(5) {upset {{pictures, {pictures, {of Mary}}}, {upset, {upset, John}}}}



In (5), there are two separate applications of Merge: one is to form the structure {pictures, {pictures, {of Mary}}} and the other is to construct {upset, {upset, John}}. So the resulting structure {upset {{pictures, {pictures, {of Mary}}}, {upset, {upset, John}}}} does not constitute a Command Unit.

Thus, according to Uriagereka, if complex DPs like *pictures of Mary* occur in subject

[1] More precisely, the two derivational cascades in (1b) are as follows: one is the one which has the label "α", namely, {α, {{γ, {γ, {δ...}}}, {α, {α, {β...}}}}}, and the other is the one which has the label "γ", namely, {γ, {γ, {δ...}}}. And in this paper, I call the former (which contains a main verb) "a main (derivational) cascade".

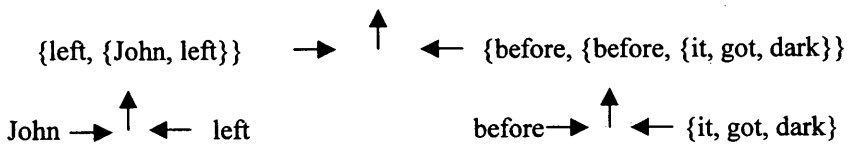
positions, the derivation for that sentence necessarily involves two separate applications of Merge, as a result of which the resulting structure for that derivation does not constitute a Command Unit.

In addition to complex DP subjects like *pictures of Mary*, the derivation which contains adjunct phrases like *before it got dark* also cannot form a Command Unit:

(6) John left before it got dark.

And the derivation of (6) is as follows:

(7) {left {{left, {John, left}}, {before, {before, {it, got, dark}}}}}



In (7), there exist two separate derivations, one of which is to form the structure {left, {John, left}}, and the other of which is to form the adjunct phrase {before, {before, {it, got, dark}}}. Therefore, the resulting structure {left {{left, {John, left}}, {before, {before, {it, got, dark}}}}} does not constitute a Command Unit.

Summarizing, unlike those which contain a complement, the derivations which involve complex DP subjects or adjuncts cannot form a Command Unit, since two separate applications of Merge are required to form them. In this way, Uriagereka (2002: Chapter 3) captures the complement-noncomplement distinction in derivational terms.

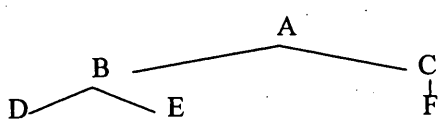
In the next section, I first contrast the LCA proposed by Kayne (1994) with that proposed by Uriagereka & Nunes, and then focus on the notion of Multiple Spell-Out.

2.2. Linear Correspondence Axiom (LCA)

Kayne (1994) proposes that a hierarchical structure determines the linear order of terminal nodes, and further that the structural relation "asymmetric c-command" is responsible for linearization.

Now, to understand this structural relation, look at the following tree structure

(8)



Here, the node C c-commands the nodes D and E, but D and E do not c-command C. So the node C asymmetrically c-commands D and E.

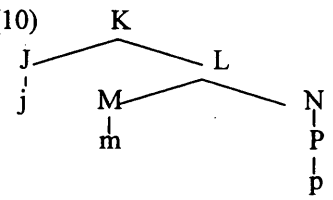
And Kayne (1994) defines the LCA on the basis of this structural (hierarchical) relation (for a given phrase marker *P*, with *T* the set of terminals):

(9) *Linear Correspondence Axiom*
d(A) is a linear ordering of T.

Here, *d* corresponds to the nonterminal-to-terminal dominance relation, and this relation *d* is a many-to-many mapping from nonterminals to terminals. *A* is the maximal set which contains all pairs of nonterminals such that the first asymmetrically c-commands the second (cf. Kayne (1994)).

To see how the LCA works in practice, let us begin with the simple phrase marker in (10):

(10)



In this phrase marker, the pairs that constitute the set A (i.e. the pairs of nonterminal nodes such that the first asymmetrically c-commands the second) are the following:
<J, M>, <J, N>, <J, P>, <M, P>. Since, in this simple case, J, M , N and P all dominate just one terminal element, d(A) is easy to exhibit fully: namely, <j, m>, <j, p>, <m, p>. These three ordered pairs do constitute a linear ordering of the set {j, m, p}, given that (1) transitivity holds, (2) antisymmetry is respected, and (3) the ordering is total, in that for every pair of terminals an ordering is specified.

This is the outline of the LCA proposed by Kayne (1994).

Next, look at the version of LCA, which is reformulated by Uriagereka & Nunes:

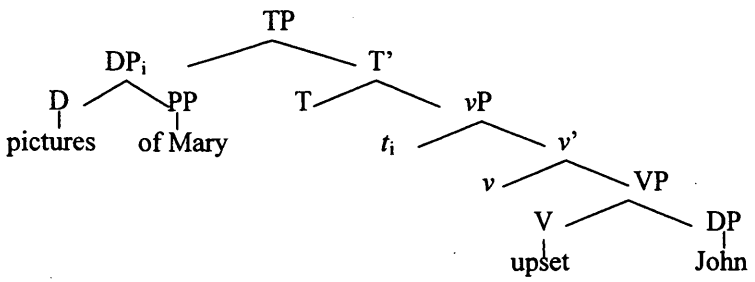
(11) *Linear Correspondence Axiom*
A lexical item α precedes a lexical item β iff α asymmetrically c-commands β.

This version of LCA makes a different prediction than (9) in the treatment of a sentence which contains, for instance, a complex DP subject like the following:

(12) Pictures of Mary upset John.

This sentence has the following structure in (13):

(13)



Here, the non-terminal node DP_i in the subject position in (13) asymmetrically c-commands the non-terminal node VP. So, according to the LCA in (9), it follows that all the terminal nodes dominated by DP_i precede all the terminal nodes dominated by VP. In this way, under the LCA in (9), all the terminal elements in (12), can be linearized without any problem.

On the other hand, according to the LCA in (11), which requires the asymmetrical c-command relation among lexical items themselves to determine precedence relations, the terminal elements of DP_i in (13) cannot be linearized with respect to those in VP, since such a relation does not hold among these elements here.[2]

Thus, the two versions of LCA differ crucially in treating the sentences which contain, for instance, a complex DP subject like (12).

2.3. Multiple Spell-out

As I mentioned above, according to the LCA in (11), the terminal elements in (12) cannot be linearized. To address this problem, Uriagereka & Nunes proposes that the complex DP subject in (12) *pictures of Mary* is subject to the operation Spell-out independently of the rest of the structure; that is, the Spell-out applies to *pictures of Mary* before it is merged with *v*'. In other words, the Spell-out first applies to the structure {{pictures, {pictures, {of Mary}}}}, and then the structure {{pictures, {pictures, {of Mary}}}} becomes [$_{\text{pictures}}$ <pictures, of, Mary>].[3] After that, it is merged with *v*':

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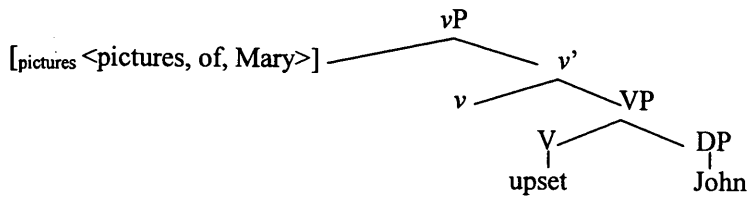
[2] Note here that the linear order between V (='*upset*') and its complement (='*John*') can be determined, because these two elements constitute a single Command Unit.

[3] I follow Uriagereka & Nunes in using the following notations: if Spell-out applies to a syntactic object K = {γ, {α, β}}, then the resulting structure is represented as K = [$_\gamma$ <α, β>].
So, "[$_{\text{pictures}}$ <pictures, of, Mary>]" in the text is the form resulting from applying Spell-out to the syntactic object "{{pictures, {pictures, {of Mary}}}}". Furthermore, the subscript "γ" in a spelled-out form K = [$_\gamma$ <α, β>] stands for the label of K.

(14)



The structure [$_{pictures}$ <pictures, of, Mary>], which is the form after which the Spell-out has applied to {{pictures, {pictures, {of Mary}}}}, behaves as a single compound word, with the consequence that its internal elements are no longer treated as a syntactic object. Therefore, any syntactic operation cannot be applied to any of the internal materials, namely, *pictures*, *of*, and *Mary*. In this way, the structure [$_{pictures}$ <pictures, of, Mary>], which occupies the [Spec,*v*P] in (14), is regarded as a single compound word, and therefore, as a unit, can asymmetrically c-command the terminal elements within VP, namely, *upset* and *John*. On the basis of the LCA in (11), then, the precedence relation between a compound [$_{pictures}$ <pictures, of, Mary>] and the terminals in VP can be determined without any problem.

This is the outline of the operation, Multiple Spell-out, proposed by Uriagereka (2002: Chapter 3 & 4).

Now, I will focus on the way Uriagereka & Nunes explain CED effects in terms of this Multiple Spell-out operation. First, consider the sentence in (15), which involves the extraction out of a complex DP subject:[4]

(15) *Which politicians$_i$ did [pictures of t_i] upset the voters?

(Uriagereka (2002: 69))

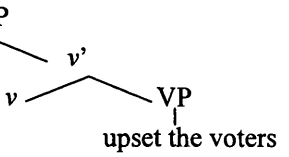
And the *v*P structure of (15) is completed by merging K and L below:

(16) a. K = [$_{vP}$ upset the voters]
b. L = [pictures of which politician]

If the LCA is as simple as in (11), the complex syntactic object resulting from the merger of K and L in (16) would not be linearizable, because the constituents of K would not enter into a c-command relation with the constituents of L. Therefore, the computational system applies Spell-out to L, allowing its constituents to be linearized in the phonological component, and merges the spelled-out structure L' with K, as illustrated in (17):[5]

[4] In this paper, I assume the copy theory of movement. So, the notation 't_i' in all the examples in this paper is used only for convenience.
[5] Throughout this paper, L' corresponds to the spelled-out structure of L.

(17) L' = [$_{pictures}$ <pictures, of, which, politician>]



Further computations involve the merger of the Aux *did* and movement of L' to [Spec,TP]. Assuming the copy theory of movement, this amounts to saying that the computational system copies L' and merges it with the assembled structure, yielding the structure in (18):

(18) [$_{TP}$ [$_{pictures}$ <pictures, of, which, politician>] [$_{T'}$ did [$_{vP}$ [$_{pictures}$ <pictures, of, which, politician>] [$_{v'}$ upset the voters]]]

In the next steps, the interrogative complementizer Q merges with TP, and the Aux *did* is raised and adjoined to Q, yielding (19):

(19) [$_{CP}$ did+Q [$_{TP}$ [$_{pictures}$ <pictures, of, which, politician>] [$_{T'}$ did [$_{vP}$ [$_{pictures}$ <pictures, of, which, politician>] [$_{v'}$ upset the voters]]]]

In (19), there is no element that can check the strong wh-feature of Q: crucially, the wh-element of either copy of L' = [$_{pictures}$ < pictures, of, which, politician>] became unavailable to the computational system after L was spelled out. Thus, the derivation crashes. Under this view, there is no way for the computational system to yield the sentence in (15), if derivations proceed in a strictly cyclic fashion, as we are assuming here. To put it in more general terms, extraction out of a subject is prohibited, because, at the relevant derivational point, there is literally no syntactic object within the subject that could be copied.

Similar considerations hold in the sentence in (20), which illustrates the impossibility of the extraction out of an adjunct clause:

(20) *Which paper$_i$ did you read Don Quixote [before filing t_i]?

(Uriagereka (2002: 70))

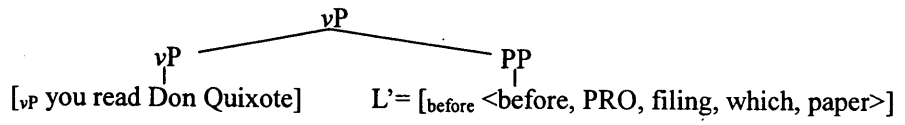
Before entering into the TP level, this sentence consists of the following two constituents:

(21) a. K = [$_{vP}$ you read Don Quixote]
b. L = [$_{PP}$ before PRO filing which paper]

Once K and L in (21) have been assembled, Spell-out must apply to L, before K and L merge; otherwise, the lexical items of K could not be linearized with respect to the lexical

items of L. After L is spelled out as L', it merges with K, yielding the following structure in (22):[6, 7]

(22)



As mentioned above, the adjunct clause in (22) has been already spelled out in order that it can be linearized with respect to the constituents in *v*P. Therefore, the wh-element within in it (= *which paper*) cannot be extracted in the course of the derivation.

In the next step of the derivation, the Aux *did* is merged with *v*P, and then the subject *you* is raised to [Spec,TP] to get Nominative Case. After that, the interrogative complementizer Q is merged with TP, with the Aux *did* being raised and adjoined to Q, yielding (23):

(23) [CP did+Q [TP you [vP [vP read Don Quixote] [before <before, PRO, filing, which, paper>]]]]

In (23), there is no element that can check the strong wh-feature of Q, because as mentioned above, the adjunct clause has been already spelled out. Thus, the uninterpretable feature in Q remains, leading to a non-convergent derivation.

This is the outline of the analysis proposed by Uriagereka (2002: Chapter 3 & 4). In the next section, then, I extend this analysis and try to explain CED effects in derivational terms in the framework of Chomsky (2000, 2001a).

3. Proposal

In this section, I will propose an analysis for CED effects in derivational terms on the basis of the PIC in Chomsky (2001a). Before entering into particulars, however, I will make clear the key assumptions adopted in this paper on the operation Spell-out. Following Uriagereka (2002: Chapter 3 & 4), I assume the following two points on the application of Spell-out:

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[6] In the phonological component, then, the operation "Linearize" applies to the lexical items of L', and the resulting sequence will be later plugged in the appropriate place, after the whole structure is spelled out. The linear order between the lexical items of L and the lexical items of K will then be (indirectly) determined by whatever fixes the order of adjuncts in the grammar (cf. Uriagereka (2002)).

[7] I follow Uriagereka & Nunes in assuming that the temporal adjunct clause in (20) is adjoined to *v*P.

(i) Spell-out can be applied multiply.

(ii) Spell-out can be applied independently to a syntactic object α only if it cannot be linearized otherwise.

The assumption in (i) is shared, for instance, by Chomsky (2001a) where it is considered that Spell-out is applied at each strong phase level. The assumption in (ii), however, is original to Uriagereka. Note that according to (ii) Spell-out cannot be applied independently to a word, since it can be linearized without any problems by the LCA in (11).

On these assumptions, then, I make a concrete analysis for CED effects based on the PIC. Chomsky (2001a), for instance, defines the PIC as follows (HP in (24) is a strong phase, and H is its head):[8]

(24) The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations.

(Chomsky (2001a: 13))

Now, consider the following structure:

(25) HP = [α [H β]]

In (25), β is the domain of H and α (a hierarchy of one or more Specs) is its edge (cf. Chomsky (2000: 108)). Furthermore, H and its edge are accessible only up to the next strong phase,[9] under the PIC in (24). In (26), thus, elements of HP are accessible to operations within the smallest strong ZP phase but not beyond:

(26) $[_{ZP}$ Z ... $[_{HP}$ α [H β]]]

Suppose that the computation L, operating cyclically, has completed HP and moves on to a stage Σ beyond HP. L can access the edge α and the head H of HP. But the PIC in (24) now introduces an important distinction between Σ = ZP and Σ within ZP, for example, Σ = TP. The probe T can access an element of the domain β of HP; the PIC in (24) imposes no restriction on this. But with Σ = ZP (so that Z = C), the probe Z cannot access the domain β (cf. Chomsky (2001a)).

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[8] In Chomsky (2000), on the other hand, the PIC is defined as follows:

(i) In phase α with head H, the domain of H is not accessible to operations outside α, only H and its edge are accessible to such operations. (Chomsky (2000: 108))

An important difference between the PIC in (i) and that in Chomsky (2001a) is that in the former a strong/weak distinction is not made in the type of phases. This is one of the reasons I adopt the PIC in Chomsky (2001a) in this paper.

[9] According to Chomsky (2001a), CP and *v*P are considered to be a strong phase.

This is the outline of the PIC proposed by Chomsky (2001a).

Now, from these statements by Chomsky, we can say as follows regarding the accessibility of a maximal syntactic object XP to the computational system (in (27) below, HP stands for a strong phase):

(27) A (maximal) syntactic object XP in edge positions of HP is accessible to the computation in the next strong phase.

As shown in (27), Chomsky considers that a syntactic object XP is accessible to the computation in the next strong phase, only if it moves to edge positions of HP (= a strong phase).

On the other hand, in Uriagereka (2002: Chapter 4), the accessibility to the computation is defined in terms of the operation Spell-out:

(28) A spelled-out element is no longer accessible to the computation.

Now, if we restate (27) in terms of (28), we can claim as follows:

(29) A (maximal) syntactic object XP in edge positions of HP is not spelled out in the next strong phase.

Based on (29), then, I will propose the following condition on Spell-out:

(30) *A Condition on Spell-out*
A (maximal) syntactic object XP in edge positions of HP is not spelled out in the next strong phase: otherwise, Spell-out is applied to XP, except for the cases where it is within the main cascade of a derivation.[10]

Following Uriagereka & Nunes, I further assume that a derivational system obeys strict cyclicity, and take general economy considerations to determine the number of applications of Spell-out. So, I consider that this condition is applied only if terminal elements within a complex syntactic object cannot be linearized with respect to the rest of the structure.[11, 12]

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[10] The reason why Spell-out is not applied to XP if it is within a main derivational cascade is that it forms a single Command Unit with a main verb in this configuration. Therefore, there is no need to apply Spell-out to it independently. Thus, the complement position of main verbs is not subject to Spell-out, because it forms a single Command Unit with them in the main cascade of a derivation.

[11] As mentioned above, Spell-out is never applied to a word independently, because it can be linearized without any problems by the LCA in (11).

[12] In Chomsky (2001a), it is assumed that Spell-out is applied only at each strong phase level. So, it

Assuming this much, then, I first analyze the case of extraction out of a complex subject DP, which is illustrated below (I repeat (15) as (31) here):

(31) *Which politicians$_i$ did [pictures of t_i] upset the voters?

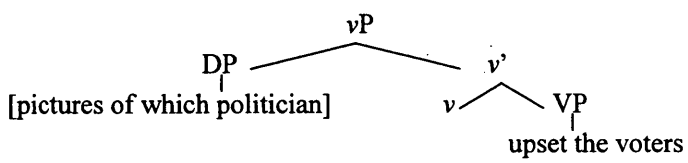
And the *v*P structure in (31) consists of the following two constituents:

(32) a. K = [$_{vP}$ upset the voters]
b. L = [pictures of which politician]

K in (32) is the constituent which consists of the verb *upset* and its complement *the voters*, while L in (32) is the (*v*P-internal) subject, which is going to be merged with K, to complete the *v*P structure in (31).

The following (33) is the structure which results from merging K and L in (32):

(33)



According to (30), DP = [pictures of which politician] is not spelled out in this structure, since [Spec,*v*P] is a phase edge. At the next stage of the derivation, then, T merges with *v*P, and DP = [pictures of which politician] moves to [Spec,TP], which does not correspond to a phase edge. Therefore, DP = [pictures of which politician] is spelled out in this position:

(34) [$_{TP}$ [$_{pictures}$ <pictures, of, which, politicians>]$_i$ [$_{T'}$ did [$_{vP}$ t_i [$_{v'}$ *v* [$_{VP}$ upset the voters]]]]]

In (34), the DP = [pictures of which politician] has been raised to [Spec,TP] to receive Nominative Case and has been spelled out there, so that it is treated as a single compound. At

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cannot be applied independently to, say, a complex subject like 'pictures of John'. This is an important difference between Uriagereka (2002: Chapter 3 & 4) and Chomsky (2001a), and accordingly these two works make different predictions for certain extraction phenomena. For instance, there arises a disparity between these two works in dealing with the case of extraction from within complex subjects. As already seen in this paper, Uriagereka explains it convincingly in terms of the Multiple Spell-out, assuming that a complex subject is subject to Spell-out in isolation. In the framework of Chomsky (2001a), however, it cannot be accounted for without making additional assumptions. This is because in his framework a subject in [Spec,TP] is never spelled out until its containing (smallest) CP has been constructed, whether it has a complex internal structure or not. So under his analysis it is predicted that wh-extraction out of it will be possible, since the internal elements in it are accessible to the computation until CP has been completed (cf. Chosmky (2001a)). For these reasons, a condition like (30) is independently needed in the framework of Chomsky (2001a).

the next stage of derivation, the interrogative complementizer Q, which has an uninterpretable wh-feature, merges with TP. However, the wh-element *which* within the complex subject DP cannot be accessed, because Spell-out has already been applied to the complex DP. That is, it is regarded as a single compound, and therefore no extraction out of it can be permitted. Thus, the uninterpretable wh-feature of Q remains unchecked, so the derivation crashes:[13]

(35) *[$_{CP}$ Q[*u*wh] [$_{TP}$ [$_{pictures}$ <pictures, of, which, politicians>]$_i$ [$_{T'}$ did [$_{vP}$ t_i [$_{v'}$ *v* [$_{VP}$ upset the voters]]]]]]

Next, consider the extraction out of adjuncts, which is illustrated below (I repeat (20) as (36) here):

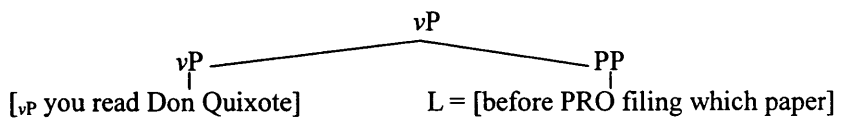
(36) *Which paper$_i$ did you read Don Quixote [before filing t_i]?

As in (32), this sentence also contains two separate Command Units as indicated below:

(37) a. K = [$_{vP}$ you read Don Quixote]
b. L = [$_{PP}$ before PRO filing which paper]

Assuming that an adjunct is adjoined to *v*P, we obtain the following structure:

(38)



In (38), the right-adjoined position is not a phase edge, so the syntactic object L = [before PRO filing which paper] is, according to (30), spelled out in this position. As a result, the computational system cannot access any of its constituents. Therefore, at the derivational point where the interrogative Q is merged with TP, the wh-element *which* within the adjunct cannot be extracted, because it has already been "frozen" in this position. Then, the derivation crashes, since the uninterpretable wh-feature of Q remains unchecked:

(39) *[$_{CP}$ did+Q[*u*wh] [$_{TP}$ you [$_{vP}$ [$_{vP}$ read Don Quixote] [$_{before}$ <before, PRO, filing, which, paper>]]]]

Next, consider the case of extraction out of a passivized subject DP, which is illustrated below:

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[13] Throughout this paper, [*u*wh] stands for an uninterpretable wh-feature.

(40) * who$_i$ was [$_\alpha$ a picture of t_i]$_k$ taken t_k by Bill

(Uriagereka (2002: 71))

In (40), α and the verb *taken* forms a Command Unit in the position t_k which is the base position of α, but Accusative Case cannot be assigned to this base position, because the sentence in (40) is a passivized one. So, α = [$_\alpha$ a picture of who] must move into [Spec,TP] to receive Nominative Case. According to Chomsky (2000, 2001a), however, [Spec,TP] does not correspond to a phase edge, so α = [$_\alpha$ a picture of who] is spelled out in this position. Consequently, the wh-element *who* within α cannot be accessible to any syntactic operation, so the uninterpretable wh-feature of Q is unchecked, resulting in a non-convergent derivation:

(41) *[$_{CP}$ Q[*u*wh] [$_{TP}$ [$_a$<a, picture, of, who>] [$_{T'}$ was [$_{VP}$ taken [a, picture, of, who] by Bill]]]]

Now consider the following sentence which constitutes the minimal pair with (40):

(42) who$_i$ did Bill take [$_\alpha$ a picture of t_i]

(Uriagereka (2002: 71))

The sentence in (42) has the following structure in (43) as its base form, before the wh-movement is applied to *who*:[14]

(43) Bill took [$_\alpha$ pictures of who]

In (43), α is assigned Accusative Case in this position, so it does not have to move to [Spec,TP]. Therefore, after C(=Q) is merged with TP, *who* in α can be raised to [Spec,CP] without any problem, because α is not spelled out in the complement position of *took*:

(44) [who [$_{C'}$ Q[~~*u*wh~~] [$_{TP}$ Bill [$_{T'}$ T [$_{VP}$ took [pictures, of, who]]]]]]]

4. Further Evidence

In this section, I will focus on the cases of *wh*-extraction in Modern German, to see whether the analysis in this paper makes correct predictions on these cases, and I will start the discussion with the case of extraction out of scrambled objects.

So far, it has been argued in the literature that there is some evidence that scrambling may not be a unitary phenomenon in the Germanic languages — that it may involve at least

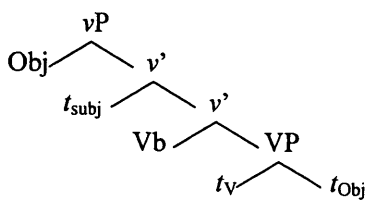
[14] In (43), the verb *took* and its complement *pictures of who* forms a Command Unit, so the linear order between these two constituents are determined without using Spell-out.

two landing sites. In this connection, then, look at the following pair of sentences, which show that German Scrambling and Danish (pronominal) OS can look very similar (cf. Vikner (1994)):

(45) a.	I går	læste	han	**dem**$_i$	ikke	t_i	(Danish)
b.	Gestern	las	er	**sie**$_i$	nicht	t_i	(German)
	yesterday	read	he	them	not		

In (45a), *dem* (='them') is shifted across the negation *ikke* ('not') and moves out of VP, whereas *sie* ('them') in (45b) is scrambled across the negation *nicht* ('not') and moves out of VP. According to Chomsky (1995), for instance, the pronominal objects in these sentences are considered to move into the outer Spec of *v*P, as shown below:

(46)



(Chomsky (1995: 360))

For convenience, then, I call this type of Scrambling "Short-Scrambling" in this paper.

There is some evidence, however, that Scrambling may move elements "higher" than Scandinavian OS normally does. This is especially true for German (cf. Grewendorf and Sternefeld (1990), Czepluch (1990)):[15]

(47) ...	dass	Jens	**das Buch**$_i$	gestern	t_i	gekauft	hat.
	that	John	the book	yesterday		bought	has
'... that John bought the book yesterday.'							

(48) ...	dass	**den Lehrer**$_i$	die Antwort	nicht	t_i	überzeugt.
	that	the teacher-ACC	the answer-NOM	not		convince
'...that the answer does not convince the teacher.'						

In (47), the scrambled object *das Buch* ('the book') moves across the sentential adverb *gestern* ('yesterday') in the IP level, while that in (48) (=*den Lehrer*) is moved across the subject *die Antwort* ('the answer'). Following Diesing (1992) and Müller & Sternefeld (1994), I assume in this paper that the scrambled objects in (47) and (48) are adjoined to TP(IP), and I call this type of Scrambling "Long-Scrambling". On these assumptions, then,

[15] Following Diesing (1992) etc., I assume in this paper that German is a head-final language.

the sentence in (48), for instance, has the following structure:

(49) [$_{CP}$ [$_{C'}$ dass [$_{TP}$ den Lehrer$_i$ [$_{TP}$ die Antwort [$_{T'}$ [$_{VP}$ nicht [$_{VP}$ t_i überzeugt]]]]]]]

Assuming these two types of Scrambling, then, let us first consider the case of extraction out of Long-Scrambled objects in German. As the following examples show, a contrast is observed in grammaticality depending on the position of object DPs (the following examples are taken form Diesing (1992)):[16]

(50) Was$_i$ hat Otto immer [$_{DP}$ t_i für Romane] gelesen?
What has Otto always for novels read
'What kind of novels has Otto always read?'

(51) *Was$_i$ hat Otto [$_{DP}$ t_i für Romane]$_j$ immer t_j gelesen?
What has Otto for novels always read

In (50), the wh-element *was* (='what') is extracted from the object DP in the base position, while that in (51) is extracted from the object DP in the scrambled position. The important point here is that Scrambling in (51) is Long-Scrambling because the object DP is moved across the sentential adverb *immer* ('always').

Now, how can we capture the contrast in grammaticality in these sentences? First, consider the structure of (50):

(52) [$_{CP}$ Was$_i$ [$_{C'}$ hat [$_{TP}$ Otto immer [$_{VP}$ [$_{DP}$ t_i für Romane] gelesen]]]]?

As mentioned above, *was* ('what') in (52) is extracted from the object DP in the base position. Notice here that according to the condition in (30), the object DP in (52) is not subject to Spell-out in this position, since it is within the main derivational cascade with the verb *gelesen* ('read'). Therefore, the extraction of *was* out of the object DP here causes no problem.

Next consider the derivation of (51). The following structure in (53) represents the point of the derivation in (51) where the wh-element *was* is still within the object DP:[17]

(53) [$_{CP}$ [$_{C'}$ hat [$_{TP}$ Otto [$_{TP}$ [$_{DP}$ was für Romane]$_j$ immer [$_{VP}$ t_j gelesen]]]]]?

---

[16] The phrase '*was für DP*' in German is translated as '*what kind of* DP' in English.
[17] I follow Diesing (1992: 192) in assuming that the scrambled object (= [$_{DP}$ *was für Romane*]) is adjoined to TP(IP) in (53).

Here, the object DP is adjoined to TP(IP) as a result of Long-Scrambling. Note that this adjoined position does not correspond to a phase edge. Therefore, according to the condition in (30), the object DP is spelled out in this position, as shown below:

(54) $[_{CP}$ $[_{C'}$ hat $[_{TP}$ Otto $[_{TP}$ <$[_{DP}$ was für Romane$]_j$> immer $[_{VP}$ t_j gelesen]]]]]?

Consequently, this object DP is treated as a single compound, so the computation can no longer access the wh-element *was* within it. Then, the derivation crashes because the uninterpretable wh-feature in Q cannot be deleted in this derivation:

(55) *$[_{CP}$ $[_{C'}$ hat+Q[*u*wh] $[_{TP}$ Otto $[_{TP}$ <$[_{DP}$ was für Romane$]_j$> immer $[_{VP}$ t_j gelesen]]]]]?

Next consider the case of extraction out of Short-Scrambled objects:[18, 19]

(56) [Von wem]$_i$ hat Peter ja doch $[_{DP}$ das Bild t_i] aufgenommen?
Of whom has Peter yes quite the picture taken

(57) [Von wem]$_i$ hat Peter $[_{DP}$ das Bild $t_i]_j$ ja doch t_j aufgenommen?
Of whom has Peter the picture yes quite taken
'Who did Peter certainly take the picture of ?'

In (56), as the position of the VP adverb *ja doch* (='certainly') indicates, Scrambling is not applied to the object DP *das Bild vom wem* ('the picture of whom'), so it remains in situ in the complement position of the verb. Therefore, just as in the English counterpart (43), the object is within the main derivational cascade with the verb *aufgenommen* ('taken'), so that the object DP *das Buch von wem* need not be spelled out, independently of the rest of the structure. Then, the computational system can have access to its constituents, and the extraction of *von wem* ('of whom') is done without any problem.

In (57), on the other hand, judging from the position of the VP adverb, it is clear that Scrambling (Short-Scrambling) has been applied. So, if we consider along the same line as (46), its *v*P structure is as follows:

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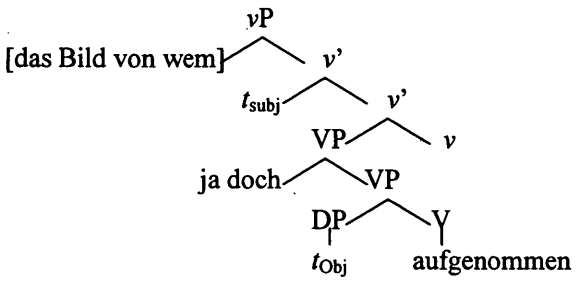
[18] The grammaticality judgments of the following examples are mainly based on those by my informants, among others, Armin von Stechow, Wolfgang Sternefeld and Felser Claudia.

[19] Preposition-stranding is not permitted in German, so the preposition *von* in (56) and (57) cannot be stranded in the base position.

(58)



Here, the object *das Buch von wem* has been short-scrambled from its base position to the outer Spec of *v*P, which corresponds to a phase edge position. So, according to (30), the object *das Buch von wem* is not spelled out in this position.

At the next stage of the derivation, T is merged with *v*P and the subject *Peter* in the inner Spec of *v*P raises to [Spec,TP]. And further computations involve merging TP with the interrogative complementizer C(Q) which has an uninterpretable wh-feature, with the Aux verb *hat* (='has') being moved to the C(Q) position. Then, *von wem* (='of whom') is pied-piped to [Spec,CP] to check the uninterpretable wh-feature of Q. This movement of *von wem* to [Spec,CP] is possible, because its containing DP *das Buch von wem* is not spelled out in the course of the derivation, so its constituents are accessible to the computational system:

(59) $[_{CP}$ [Von wem]$_k$ $[_{C'}$ hat+Q[~~uwh~~] $[_{TP}$ Peter$_i$ $[_{T'}$ $[_{vP}$ $[_{DP}$ das Bild $t_k]_j$ $[_{v'}$ t_i $[_{v'}$ $[_{VP}$ ja doch $[_{VP}$ [t_j aufgenommen]]]]]]]]]]

In this way, the analysis in this paper can capture the contrast in the possibility of extraction out of Long-Scrambled objects and Short-Scrambled ones. Note that the contrast observed here cannot be accounted for under the analysis by Uriagereka & Nunes. In their analysis, moved elements with complex internal structure are necessarily subject to Spell-out in the landing site, for the purpose of linearization. Therefore, both (51) and (57) are predicted to be ungrammatical under their analysis. Thus, consider the point of the derivation in (57) where the object DP has been moved to the outer Spec of *v*P as a result of Short-Scrambling:

(60) $[_{CP}$ $[_{C'}$ hat $[_{TP}$ Peter$_i$ $[_{T'}$ $[_{vP}$ $[_{DP}$ das Bild von wem$]_j$ $[_{v'}$ t_i $[_{v'}$ $[_{VP}$ ja doch $[_{VP}$ [t_j aufgenommen]]]]]]]]]

As just mentioned above, in their analysis, moved elements with a complex internal structure are necessarily subject to Spell-out in the landing site, so the object DP in (60) is spelled out in the outer Spec of *v*P, as shown below:[20]

[20] For instance, consider the following structure:

(61) [$_{CP}$ [$_{C'}$ hat [$_{TP}$ Peter$_i$ [$_{T'}$ [$_{vP}$ <[$_{DP}$ das Bild von wem]$_j$> [$_{v'}$ t_i [$_{v'}$ [$_{VP}$ ja doch [$_{VP}$ [t_j aufgenommen]]]]]]]]]

As a result, this object DP is treated as a single compound, so the computation can no longer access the wh-element *vom wem* within it. Then, the derivation crashes because the uninterpretable wh-feature in Q remains unchecked throughout the derivation:

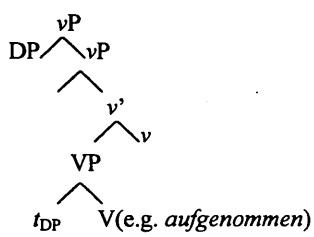
(62) *[$_{CP}$ [$_{C'}$ hat+Q[*u*wh] [$_{TP}$ Peter$_i$ [$_{T'}$ [$_{vP}$ <[$_{DP}$ das Bild von wem]$_j$> [$_{v'}$ t_i [$_{v'}$ [$_{VP}$ ja doch [$_{VP}$ [t_j aufgenommen]]]]]]]]]

In this way, the contrast between (51) and (57) cannot be explained in the analysis by Uriagereka & Nunes. And this is an important difference between my analysis and theirs.

Next, consider the case of extraction out of a complex DP subject in German in (63) and its structure in (64):

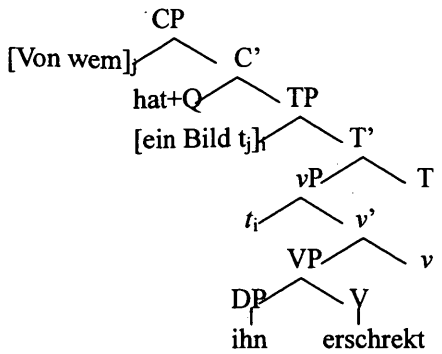
(63) *[Von wem]$_i$ hat [$_{DP}$ ein Bild t_i] ihn erschrekt.
Of whom has a picture him surprised
'Who did a picture of surprise him?'

(i)



Here, the object DP has been moved to the outer Spec of *v*P, as a result of Short-Scrambling. If the shifted object has a complex internal structure (e.g. *das Bild von wem*), then the linear order between terminal elements in VP and those in this object cannot be determined without applying Spell-out to DP. For the terminal elements in VP and those in DP do not asymmetrically c-command one another in this structure.

(64)



As expected, the sentence in (63), which involves extraction out of a complex DP subject, is ungrammatical just as in English. In (64), the subject DP = *ein Bild von wem* (= 'a picture of whom') has moved from the inner Spec of *v*P to [Spec,TP] to check the EPP of T. The base position (i.e. the inner Spec of *v*P) is a phase edge, so in this position the subject DP is not spelled out. But the derived position (i.e. [Spec,TP]) does not correspond to a phase edge, so in this position it is spelled out independently of the rest of the structure. As a result, the computational system can no longer access its constituents, leading to a non-convergent derivation with the uninterpretable wh-feature in Q being undeleted:

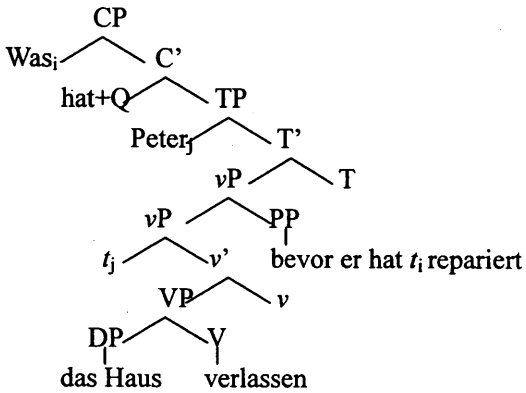
(65) *[$_{CP}$[$_{C'}$ hat+Q[*u*wh] [$_{TP}$ <[$_{DP}$ ein Bild von wem]$_i$> [$_{T'}$ [$_{vP}$ t_i [$_{v'}$ [$_{VP}$ ihn erschrect]*v*] T]]]]

Now, consider the case of extraction out of adjuncts in German in (66):

(66) *Was$_i$ hat Peter das Haus verlassen [$_{PP}$ bevor er hat t_i repariert].
what has Peter the house left before he has repaired
'What did Peter leave the house before he repaired.'

And the sentence in (66) has the following structure in (67):

(67)



Here too, as expected in this approach, the extraction out of adjuncts in German is not permitted as in English. In (67), the adjunct phrase *bevor er hat t_i repariert* (= 'before he has t_i repaired') is right-adjoined to *v*P. This right-adjoined position does not correspond to a phase edge, so in this position the adjunct is spelled out. Consequently, the computational system cannot have access to its constituents, especially to the wh-element *was* (='what'), resulting in the uninterpretable wh-feature of Q being unchecked, and the derivation crashes:

(68) *[$_{CP}$ [$_{C'}$ hat+Q[*u*wh] [$_{TP}$ Peter$_i$ [$_{T'}$ [$_{vP}$ [$_{vP}$ t_i [$_{v'}$ [$_{VP}$ das Haus verlassen] *v*]] [$_{PP}$ bevor er hat t_i repariert]] T]]]]

5. Conclusion

In this paper, I have investigated the question of how CED effects and other extraction phenomena can be explained plausibly in the current Minimalist framework. In so doing, I have first taken up the work by Uriagereka (2002: Chapter 3 & 4), who also attempts to account for those effects in the Minimalist framework. His main proposals are that the mapping between syntax and phonology (Spell-out) takes place at the various points in the course of the derivation, and that once Spell-out is applied to a syntactic object α, internal elements within it can no longer be accessed by the computation. On these assumptions, he succeeds in accounting for various cases involving wh-extractions. Then, I have followed him in assuming the following two assumptions on the operation Spell-out: (i) Spell-out can be applied multiply, and (ii) Spell-out can be applied to a syntactic object α only if it cannot be linearized otherwise. Though the analysis in this paper is based on these assumptions made by Uriagereka, it differs from his in two important respects. The first difference is that in my analysis the application of Spell-out is conditioned by (30). The second one is that the analysis in this paper is carried out in phase terms on the basis of the PIC in Chomsky (2001a), while Uriagereka makes his analysis in the framework of the Minimalist Program. Though

both these two analyses can account for CED effects without any problems, an important difference arises in treating extraction phenomena in Modern German. In Modern German, wh-extraction is possible out of short-scrambled objects while it is not out of long-scrambled objects. This contrast can be captured in my analysis in terms of the condition in (30), whereas it cannot in Uriagereka's. This is because in his analysis moved constituents with a complex internal structure are necessarily subject to Spell-out for the purpose of linearization, regardless of whatever movement they undergo. Thus, if the argument in this paper is on the right track, then CED effects and other related phenomena are plausibly explained in derivational terms on the basis of the condition in (30).

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