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Cyclic Linearization and Edge Effect: A Comparative Analysis Using English and Korean

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Ko, Hoonjoo. (2023). Cyclic linearization and edge effect: A comparative analysis using English and Korean. *The Linguistic Association of Korea Journal*, *31*(2), 81-99. This paper provides a comparative analysis of two syntactic approaches, Cyclic Linearization (CL) theory and Edge effect, in the context of English and Korean syntax. We focus on their application to data sets involving structures with multiple specifiers, where the relative status of specifiers is crucial for determining further movement possibilities. The analysis reveals that only the highest edge is available for further syntactic operations. We illustrate our analysis with examples of English and Korean sentences, showing that the extraction of elements from multiple edges is governed by specific syntactic factors. Both CL theory and Edge effect offer explanations for this behavior, but we show that CL theory has limitations in handling certain syntactic structures. In contrast, Edge effect emerges as a more robust and versatile approach, offering a satisfactory explanation for a broader range of syntactic structures across languages. By comparing the applicability and explanatory power of CL theory and Edge effect, this paper contributes valuable insights to the field of syntax, ultimately advocating for Edge effect as a more suitable and economical approach in understanding the mechanisms governing multiple edge extraction and syntactic phenomena across languages. Our findings shed light on the debate over the applicability of these approaches, and we hope that they can inform future research in syntax. The comparative analysis presented in this paper provides a comprehensive understanding of the syntactic behavior of multiple edge extraction in English and Korean, and its implications for syntactic theory.

Key Words: extractability, multiple edges, cyclic linearization theory, order preservation, edge effect

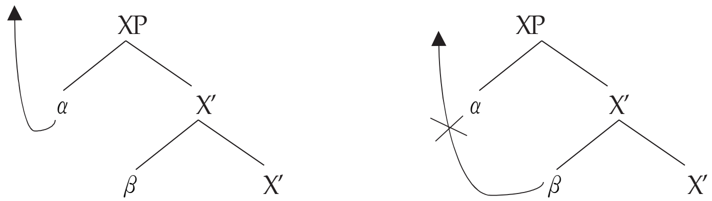
1. Introduction

This paper presents a comparative analysis of Cyclic Linearization (CL) and Edge effect in the context of English and Korean syntax. The study focuses on their application to data sets, especially where multiple specifiers are formed. In addition, it highlights a specific structure where Edge effect approach yields more accurate results than CL.

Chomsky's (2000, 2001) phase-based framework introduces the Phase Impenetrability Condition (PIC), which posits that only the material at the edge of a phase remains accessible for movement. In later work, Chomsky (2008) refines this view, considering the specifier of a CP as an edge permitting extraction. However, other researchers (e.g., Boskovic 2013; Yoo 2019) contend that not all specifiers of a phase can be treated as phasal edges for the PIC. When multiple specifiers coexist within a phase, lower specifiers are often treated as non-phasal edges, unable to move past the highest edge element. This relative status of specifiers is crucial for determining further movement possibilities. Assuming a structural configuration with two syntactic elements, α and β, in the specifiers of a phase as in (1) below, the context of the edge appears to dictate whether syntactic movement into a higher phase is possible.

(1) Movement from the edges of a phase

a. licit movement b. illicit movement



(1) suggests that the context of the edge seems to determine whether or not syntactic movement into a higher phase is possible when the edge is occupied by multiple elements (e.g., α, β), apparently demonstrating this by showing that: in (1a), the element α in the highest edge moves out of its phase, but in (1b), the element β cannot be extracted when it is blocked by α, which is located in the highest edge. Based on the structural framework presented in (1), we can make the generalization in (2) that only the highest edge is available for further syntactic operations:

(2) Generalization on movement from multiple specs of phase
For elements α and β in the specifiers of the same phase,
(i) if α is in the highest SpecCP, it can move out of its phase; but
(ii) if β is blocked by the highest edge α, it cannot move.

Through this system of movement, we can clearly see which syntactic elements can move on to the next stage when they reach the edge position of its phase.

In order to support the structural framework presented in (1) and (2), this paper attempts to provide two different theoretical accounts: Cyclic Linearization (CL) theory (Fox & Pesetsky, 2005) and Edge effect (Bošković, 2016). The CL theory suggests that linearization occurs at the completion of each phase, with strict constraints on the ordering of elements within a phase. On the other hand, the Edge effect approach posits that syntactic elements can move out of their phase if they reach the edge of the phase, regardless of their position in the previous phase in terms of linear ordering. By applying these two theories to various structural phenomena later in this paper, we can determine which theory is more flexible in a theoretical sense, allowing it to be applied to a wider range of structural phenomena.

This paper begins by presenting illustrative examples of English and Korean sentences and demonstrates how movement occurs from multiple edges, and it highlights the importance of the relative status of specifiers in section 2. In Section 3, we analyze the data using cyclic linearization and edge effect approaches, showing that both approaches yield a unified outcome for the given data. Section 4 presents a comparative analysis of the behavior of multiple *wh*-elements in English and Korean Raising-to-Subject (RTS) structures, showing that only edge effect applies in certain cases, and discussing the implications for the syntactic application of Cyclic Linearization and Edge effect approaches. In the concluding section, we summarize our findings and offer our thoughts on the subject. We discuss the implications of our analysis for future research in syntax and advocate for Edge effect as a more versatile and robust approach in understanding the mechanisms governing multiple edge extraction and syntactic phenomena across languages.

By comparing the flexibility and explanatory power of CL theory and Edge effect in a cross-linguistic context, this study aims to contribute to a more comprehensive understanding of the mechanisms governing multiple edge extraction and syntactic phenomena in different languages.

2. Multiple edges and movement

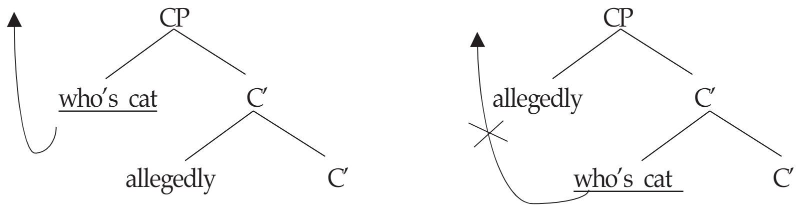
2.1. Multiple Edges in English: Possessor Extraction (PE)

In this section, we will examine Possessor Extraction (PE) in English and demonstrate that only the highest specifier of a phase can be moved, as presented in (1) and (2).

(3) a. [$_{CP}$ Who$_k$ did you say [$_{CP}$ [______$_k$'s cat]$_j$ allegedly John found ______$_j$]?
b. *[$_{CP}$ Who$_k$ did you say [$_{CP}$ allegedly [______$_k$'s cat]$_j$ John found ______$_j$]?
(Davis, 2021:10)

(3a) provides an example of PE in colloquial English, as discussed in Davis's (2021) work. PE involves extracting the possessor out of the whole possessed DP. Davis argues that the stranded Saxon genitive morpheme *['s]* and the remaining elements of the possessed phrase in the intermediate path suggest that the entire DP was once located in the specifier of the embedded CP. Consistent with the generalization we made earlier, the ungrammaticality of (3b) suggests that the extraction of the possessor is blocked when it is located in the lower specifier of the embedded CP. It is surprising that the adverb *allegedly* blocks the extraction. To explain this phenomenon, Davis (2021) adopts the Cyclic Linearization (CL) theory, which proposes that the adjunct may interfere with the extraction of the target element due to its conceptual properties. In the following section, we will discuss a more detailed analysis of PE under the CL theory. Before that, we need to examine the extraction site in syntax, as multiple edges are assumed to be formed when the target element is extracted, as shown in sentences (3).

(4) Movement from multiple edges (i.e., specifiers) of phase in PE
a. licit movement in (3a)　　　　b. illicit movement in (3b)



The example in (4) demonstrates the significance of the relative location of the possessor in relation to the high adverb for the mobility of the possessor in PE.

Specifically, when the possessed phrase is higher than the high adverb *allegedly* in SpecCP, successful PE is possible, as in (4a), and there are no obstacles to further movement. However, in the configuration of (4b), the high adverb located in the higher SpecCP blocks PE. Attempting to cross over the adverb results in illegal movement, as in (4b). This evidence from English PE highlights the importance of multiple edges in the intermediate CP phase and their relative positions for subsequent syntactic operations.

In addition to English PE, cross-linguistic data also demonstrate the significance of multiple edges formed at a point where the target element can potentially be extracted. The following section will examine these data in further detail.

2.2. Multiple edges in Korean: ECM/Scrambling

This section explores the potential for movement out of multiple edges through an examination of the interaction between Exceptional Case Marking (ECM) construction and scrambling in Korean. Interestingly, ECM and scrambling can co-occur in Korean, which creates multiple edges in the embedded CP, as shown in (5):

(5) a. Mary-lul$_i$ John-i [$_{CP}$ t$_i$ kong-ul cal chanta-ko] sayngkakhanta.
Mary-ACC John-NOM ball-ACC well kick-C think
b. *Kong-ul John-i [$_{CP}$ Mary-lul t$_i$ [cal chanta-ko] sayngkakhanta.
ball-ACC John-NOM Mary-ACC well kick-C think
(Yoo, 2019)

The ungrammaticality of (5b) suggests that the embedded object cannot undergo movement that crosses over the ECMed subject at the edges of the embedded CP. However, the ECMed subject appears to be able to move out of the embedded CP, as in (5a). Another interesting observation is that the embedded object in the non-ECM construction can be extracted into the matrix clause, as in (6). These facts demonstrate that the ECM construction creates multiple edges in the embedded CP, allowing certain movements while blocking others. The interaction of ECM and scrambling in Korean offers an excellent context for exploring the interplay of multiple edges and movement possibilities, which will be the focus of the next section.

(6)

Kong-ul$_j$	John-i	[$_{CP}$ Mary-ka	t_j	cal	chanta-ko]	sayngkakhanta.
ball-ACC	John-NOM	Mary-NOM		well	kick-C	think

(Yoo, 2019)

As we have seen, the movement of the ECMed subject and the embedded object in Korean ECM constructions involves multiple edges, and their relative positions are crucial for successful movement. However, before we discuss the relative locations of these two arguments, we need to determine the position of the ECMed subject in the embedded CP prior to movement.

There are two competing proposals regarding the location of the ECMed subject in the ECM construction. According to the subject-to-object raising approach (also known as the "obligatory raising approach") proposed by Hong (1990), the ECMed subject must be situated in the matrix vP to receive Accusative case from v. On the other hand, Hiraiwa (2001) argues that multiple clefting with an ECM subject provides strong evidence that the ECMed subject is generated at the base of the embedded SpecCP, as shown in (7):

(7) a.

John-i	[t_i t_j cekhaphata-ko]	sayngkakha-n	kes-un
John-NOM	suitable-C	think-REL	C-TOP
Mary-lul$_i$	ku	cikep-ey$_j$	ita.
Mary-ACC	that	job-DAT	cop

Intended: 'John thinks that Mary is suitable for that job.'

b.

*[t_i	[Mary-lul	t_j cekhapata-ko]	sayngkakha-n	kes-un]
	Mary-ACC	suitable-C	think-REL	C-TOP
John-i$_i$	ku	cikep-ey$_j$	ita.	
John-NOM	that	job-DAT	cop	

(Hiraiwa, 2001; Yoo, 2019, 2021)

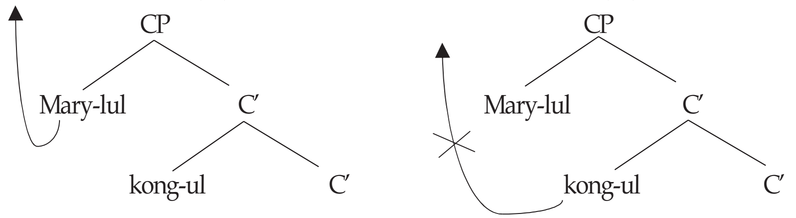
The multiple clefting construction has a requirement known as the "clause-mate condition," which states that the clefted elements must come from the same clause (Koizumi, 1995). Therefore, (7b) is ungrammatical because the matrix subject *John* and the embedded element *ku cikep* are not from the same clause. The clause-mate condition only allows (7a) because it is the only one in which both elements in the embedded clause (i.e., the ECMed subject *Mary* and the embedded element *ku cikep*) are clefted. This supports Hiraiwa's claim that the ECMed subject comes from the embedded clause. In his argument, it has been claimed that the ECMed subject can take on the accusative case from the matrix verb through the AGREE operation (see Hiraiwa 2001, 2005), so it must be positioned in the specifier of the embedded CP.

Given the debate surrounding the positions of the ECMed subject in syntax, I will adopt the view that it is base-generated in the SpecCP of the embedded clause. With this assumption, let us revisit (5) as (8):

(8) a. Mary-lul$_i$ John-i [$_{CP}$ t$_i$ kong-ul cal chanta-ko] sayngkakhanta.
Mary-ACC John-NOM ball-ACC well kick-C think
b. *Kong-ul John-i [$_{CP}$ Mary-lul t$_i$ [cal chanta-ko] sayngkakhanta.
ball-ACC John-NOM Mary-ACC well kick-C think

We can now see that the ECMed subject and the embedded object form multiple edges in the embedded CP, and that their relative locations affect their extractability. The ungrammaticality of (8b) indicates that the movement of the embedded object can be blocked when it is located in the lower edge of its phase. However, the ECMed subject can be extracted into the matrix clause as in (8a) because it is located in the highest edge of its phase.

(9) Multiple edges and movement in Korean
a. licit movement in (8a) b. illicit movement in (8b)



The Korean ECM construction exhibits a similar pattern to English PE, whereby only the higher element in multiple specifiers can potentially be extracted, as shown in (9). In (9), only the highest element *Mary-lul* can be moved, while the embedded object *kong-ul* ("ball") cannot. As in (9b), crossing over the ECMed subject by moving the embedded object is prohibited. This is consistent with the operation of PE in cases where multiple specifiers are generated, as discussed in the previous section.

Our observations in English and Korean reveal an important fact about syntactic operations: the relative locations of multiple edges facilitate further movement out of the intermediate phase. These cross-linguistic observations provide crucial insights into the structural properties that govern syntactic movement and edge accessibility. In order to thoroughly investigate this phenomenon and address the underlying mechanisms governing the interplay of multiple edges and extraction, it is necessary to lay the theoretical groundwork for understanding this structural framework. Consequently, the following section provides an in-depth theoretical examination of extraction from multiple edges, exploring the intricacies of the CL theory and its predictions concerning edge accessibility, restrictions on movement, and the possible consequences for a variety of syntactic structures. This analysis will not only shed light on the intricacies of multiple edge phenomena but also contribute to the broader understanding of phase-based syntax and its cross-linguistic manifestations.

3. The formal analyses

3.1. Extractability of multiple edges under CL

In this section, we will investigate how the Cyclic Linearization (CL) theory proposed by Fox and Pesetsky (2005) explains the extraction of elements from multiple edges of a phase. Davis (2021) argues that the CL system offers a clear account of the intricate syntactic properties of English PE, particularly in relation to movement from multiple edges, which we will examine in detail in this section.

According to Fox and Pesetsky (2005), successive-cyclic movement occurs in accordance with the ordering-preserving nature of Spell-Out within a phase. The CL theory proposes that linearization, or the arrangement of syntactic elements, takes place cyclically at the phase level. As a result, the linear order of elements within a phase is determined during the point of Spell-Out for that phase. Since Spell-Out occurs at various points throughout the derivational process, linearization information is established at the end of a Spell-Out domain and must be preserved until all phases are fully constructed. This feature is referred to as Order Preservation, as illustrated in (10).

(10) plausible successive-cyclic movement under the CL system

a. $[_{phase2} \ldots t_X\ \alpha\ [_{phase1}\ t_X\ Y\ Z]]]$

b. $[_{phase2} \ldots t_X \ldots t_Y\ \alpha\ [_{phase1}\ t_X\ t_Y\ Z]]]$

(11) illicit movement under the CL system

$[_{phase2}\ Y\ \alpha\ [_{phase1}\ X\ t_Y\ Z]]]$

Order Preservation ensures that the linear order established within each phase is maintained throughout the derivation, thereby restricting the possible reordering of elements in subsequent phases. In contrast, Order Contradiction prohibits syntactic structures in which the ordering information contradicts the ordering already established at the prior Spell-Out domain, as demonstrated in (11). This constraint prevents structures that would violate the established linear order from being generated.

According to Fox and Pesetsky (2005), Spell-Out applies to all constituents within each phase, including edges. This theoretical aspect provides evidence for the blocking effect of the adverb against movement from multiple edges of an intermediate phase, as observed in English PE. The CL theory can account for the ungrammaticality of certain sentences where movement would result in an order contradiction, as well as the restrictions on movement due to the presence of intervening elements such as adverbs.

Now, let us explore how the CL theory can explain the extractability of multiple edges of an intermediate phase. The sentences from (3) are repeated below as (12):

(12) a. $[_{CP}$ Who$_k$ did you say $[_{CP}$ [____$_k$'s cat]$_j$ allegedly John found ____$_j$]?

At the embedded CP: who < 's < cat < allegedly

At the matrix CP: who < 's < cat < allegedly

b. *$[_{CP}$ Who$_k$ did you say $[_{CP}$ allegedly [____$_k$'s cat]$_j$ John found ____$_j$]?

At the embedded CP: allegedly < who < 's < cat

At the matrix CP: who < allegedly < 's < cat

The availability of English PE in (12) can be explained in terms of the CL theory's Order Preservation/Contradiction. The CL system allows (12a), where the ordering information established in the embedded CP (i.e., *who* < *'s* < *cat* < *allegedly*) is preserved in the matrix CP. However, (12b) is unacceptable because the linear order in the matrix CP (i.e., *who* < *allegedly* < *'s* < *cat*) contradicts the ordering established earlier in the embedded CP (i.e., *allegedly* < *who* < *'s* < *cat*), resulting in an order contradiction that blocks the possessor's further movement into the matrix SpecCP. This order contradiction arises from the blocking effect of the high adverb's precedence over the possessed DP. The CL system applies extensively to all constituents of each phase, in contrast to the general assumption that adverbs cannot block syntactic argument movement.

Next, we will examine an additional case in Korean to evaluate whether the CL theory can explain the extractability of multiple edges. Let us take another look at (5), repeated here as (13):

(13) a. Mary-lul$_i$ John-i [$_{CP}$ t$_i$ kong-ul cal chanta-ko] sayngkakhanta.
Mary-ACC John-NOM ball-ACC well kick-C think
At the embedded CP: Mary-lul < kong-ul
At the matrix CP : Mary-lul < John-i < kong-ul

b. *Kong-ul John-i [$_{CP}$ Mary-lul t$_i$ cal chanta-ko] sayngkakhanta.
ball-ACC John-NOM Mary-ACC well kick-C think
At the embedded CP: Mary-lul < kong-ul
At the matrix CP: kong-ul < John-i < Mary-lul

(13) demonstrates that the CL system still operates in the Korean ECM construction as it only allows (13a), where the ordering information (i.e., *Mary-lul* < *kong-ul*) remains consistent throughout the entire syntactic process, satisfying the notion of Order Preservation. Since the matrix subject NP *John*-i is added at the matrix CP level after the embedded CP is spelled out, it does not affect the linearization already established at the embedded CP. However, (13b) violates Order Preservation as the ordering statement produced at the matrix CP (i.e., *kong-ul* < *John-i* < *Mary-lul*) contradicts the statement produced at the embedded CP (i.e., *Mary-lul* < *kong-ul*), which is in principle prohibited by the CL system.

As we have observed in the examples of English and Korean, the extractability of multiple edges of a phase largely depends on the property of Order Preservation, and the CL theory provides a compelling theoretical explanation for the blocking effect of the adverb in English PE. The CL theory not only captures the core syntactic patterns that arise when dealing with multiple edge phenomena but also offers insights into the underlying constraints that govern the possible structures that can be derived in these languages. Nevertheless, it is important to consider alternative theoretical approaches that may offer different perspectives on the syntactic mechanism of extracting elements from multiple edges of a phase in English and Korean. By exploring other theoretical frameworks, we can further enrich our understanding of the complex syntactic properties of multiple edge phenomena and potentially uncover new empirical generalizations that may not be readily apparent within the CL theory alone.

In the following section, we will introduce the Multiple Edge Effect approach as a different theoretical perspective for explaining the extraction of elements from multiple edges of a phase in English and Korean. We will discuss the key tenets of this approach, compare its predictions with those of the CL theory, and evaluate the extent to which it can account for the empirical patterns observed in these languages. By doing so, we aim to shed light on the relative merits of the two approaches and contribute to a more comprehensive understanding of the syntactic mechanisms governing multiple edge extraction.

3.2. Extractability of Multiple Edges Under Edge Effect

This section explores Bošković's (2016) Multiple Edge effect, which offers an alternative approach to the Cyclic Linearization (CL) theory by focusing on the contextual nature of phasal edges to account for movement from multiple edges of a phase in English PE and Korean ECM. The Multiple Edge effect proposes that the phasal edge, which serves as an escape hatch for movement, is determined by the syntactic context. In cases where multiple syntactic elements occupy the edges of a phase, only the highest edge can move out of the phase. This view suggests that the hierarchical structure of the phase plays a crucial role in determining which syntactic element can be extracted. Moreover, Bošković argues that when a phase is completed, the highest edge functions as a "real" edge for the purposes of the Phase Impenetrability Condition (PIC). This means that the highest edge element is available for further movement, while lower edge elements are effectively trapped within the phase due to the context-sensitive nature of the phasal edge.

Using Bošković's assumptions regarding edges and movement, we can revisit the English PE sentences given in (3), which are repeated in (14):

(14) a. [$_{CP}$ Who$_k$ did you say [$_{CP}$ [_____$_k$'s cat]$_j$ allegedly John found _____$_j$]?
b. *[$_{CP}$ Who$_k$ did you say [$_{CP}$ allegedly [_____$_k$'s cat]$_j$ John found _____$_j$]?

The Bošković edge effect predicts that (14b) is ungrammatical because the high adverb *allegedly* is positioned in a higher edge than the possessive DP *who's cat*, which functions as a "real" edge of the embedded CP. This blocks extraction of the possessor in the non-phasal edge position due to the PIC. In contrast, in (14a), the possessive DP *who's cat* in the highest edge can potentially move out of its phase.

Based on this, we can predict that the edge effect in English PE also applies to instances of Korean ECM. Let us again consider the following examples:

(15) a.	Mary-lul$_i$	John-i	[$_{CP}$ t_i	kong-ul	cal	chanta-ko]	sayngkakhanta.
	Mary-ACC	John-NOM		ball-ACC	well	kick-C	think
b.	*Kong-ul	John-i	[$_{CP}$ Mary-lul	t_i	[cal	chanta-ko]	sayngkakhanta.
	ball-ACC	John-NOM	Mary-ACC		well	kick-C	think

The results of (15) show that, in line with the edge effect, only the highest edge can move out of its phase. For example, extracting the embedded object *kong-ul* into the matrix CP leads to ungrammaticality, as demonstrated in (15b). In contrast, the ECMed subject *Mary-lul* in the highest edge of the embedded CP can move into the matrix CP, as seen in (15a). Notably, both *Mary-lul* and *kong-ul* can move out of the embedded CP, as shown in (16):

(16)	Mary-lul$_i$	kong-ul$_j$	John-i	[$_{CP}$ t_i [$_{CP}$ t_j	[cal	chanta-ko]]]	sayngkakhanta.
	Mary-lul	ball-ACC	John-NOM		well	kick-C	think

Bošković argues that traces do not act as phasal edges and do not serve as interveners. Since the trace in this case is a non-edge, it cannot prevent the embedded object from moving. Therefore, it is likely that the embedded object will move into the matrix clause immediately following the movement of the ECMed subject.

Despite their different theoretical foundations, both the Cyclic Linearization theory and the Multiple Edge effect approach offer satisfactory explanations for the behavior of multiple edges and their extractability, leading to the same predictions in the cases we have studied. However, it is essential to investigate whether there are any situations where their predictions diverge in terms of grammaticality, which would help establish the superiority of one approach over the other.

In the following section, we will introduce more examples from both English and Korean to further examine the applicability of these two theoretical accounts. By analyzing these instances, our goal is to identify potential inconsistencies in their predictions and assess their relative explanatory power. Furthermore, we will evaluate their adaptability and strength in addressing a broader range of syntactic phenomena, ultimately contributing to a more comprehensive understanding of the mechanisms governing multiple edge extraction across different languages.

4. Expanding the Analysis

So far, we have examined multiple edges and their movement into another phase from two different theoretical perspectives, both of which consistently predict this phenomenon. It is reasonable to expect that our analysis could be extended to other structural phenomena to determine its applicability in those cases as well. In this section, we will explore the potential implications of our analysis on such structures and investigate how the previously discussed theories may account for the behavior of multiple wh-elements in English and Korean Raising-to-Subject (RTS). This will provide us with an opportunity to further assess the explanatory power of the Cyclic Linearization (CL) theory and the Multiple Edge Effect approach in a broader context, ultimately contributing to a more comprehensive understanding of syntactic mechanisms at play.

4.1. Multiple Wh-phrases Within a Single Phase in English

For instance, let us consider a structure containing multiple wh-elements within a single phase, as in (17):

(17) a. What$_2$ did you wonder [$_{CP}$ who$_1$ t_1 saw t_2]?
b. *Who$_1$ did you wonder [$_{CP}$ what$_2$ t_1 saw t_2]?

(17) demonstrates that two movement paths can overlap, but are constrained by the Path Containment Condition (PCC) proposed by Pesetsky (1982), which states that if two

movement paths overlap, one must be nested inside the other. This constraint affects the acceptability of (17a-b) and provides a structurally possible path configuration as shown in (18):

(18) Path configurations and PCC

a. Nested-Paths type movement

$[_{CP}\ \beta \quad \alpha \quad [_{vP} \quad t_{\alpha} \quad ... \quad t_{\beta}\ ]]$

b. *Crossing-Paths type movement

$[_{CP}\ \alpha \quad \beta \quad [_{vP} \quad t_{\alpha} \quad ... \quad t_{\beta}\ ]]$

Path configurations on the concept of PCC presented in (18), we can predict that (17a) is grammatical due to the presence of nested paths, while (17b) is ruled out by PCC, as it involves crossing-paths movement. It is worth considering whether the predictions of CL and edge effects for (17) align with those of PCC.

According to CL, a syntactic element moves out of its phase via the linear edge, and the ordering information must be preserved in subsequent phases of the derivation. Applying this idea to (17), we can linearize it as shown in (19):

(19) a. Linearization of (17a)
At lower vP: $t_1 < t_2$
At matrix CP: $t_2 < t_1$

b. Linearization of (17b)
At lower vP: $t_1 < t_2$
At matrix CP: $t_1 < t_2$

If we assume that Order Preservation holds, we would predict that (17a) is grammatical because the wh-phrase *what*$_2$ maintains its relative order with respect to *who*$_1$ when it moves from the lower vP to the matrix CP, as shown in (19a). On the other hand, we would expect (17b) to be ungrammatical, as the movement of *who*$_1$ disrupts the linear order with *what*$_2$ as illustrated in (19b). However, the facts do not align with these predictions; (17a) is indeed grammatical, but (17b) is ungrammatical despite the fact that it preserves the linear order between *who*$_1$ and *what*$_2$. This observation suggests that the CL approach, which relies on Order Preservation, fails to account for the ungrammaticality of (17b) and generally struggles with structures that involve nested-paths type movement.

In light of the PCC, what predictions can we make regarding Bošković's edge effect for (17)? Given that PCC holds, we expect that the only possible derivation for (17) involving nested-paths is as shown in (20):

(20) Nested-Paths movement under PCC and Edge effect
[$_{CP}$ What$_2$ did you wonder [$_{CP}$ t$_2$ who$_1$ ..... [$_{vP}$ t$_1$ saw t$_2$]]]?

The derivation in (20) clearly illustrates the positioning of each multiple *wh*-phrase in the intermediate edges right after exiting the vP phase. Notably, *who*$_1$ is located lower than *what*$_2$ in the edges of the embedded CP phase. However, due to the operation of PCC, *what*$_2$ must be situated at the highest edge of the embedded CP phase, thereby qualifying it to serve as a phasal edge for PIC. Accordingly, Bošković's Edge effect correctly predicts that *what*$_2$ can subsequently undergo movement into the matrix clause, yielding the structure of (17a), which is compatible with PCC. Overall, the structure depicted in (20) constitutes compelling evidence in favor of the Bošković's edge effect.

4.2. Raising-to-Subject (RTS) in Korean

Now let us look into whether the data in Korean still support this observation, as in (21):

(21) a. [$_{CP2}$ [$_{TP2}$ Mary-ka$_i$ motu-ekey [$_{CP1}$ t$_i$ yepputa-ko]
Mary-NOM everyone-DAT pretty-C
sayngkaktoyecita.]]
think.pass
'Mary is thought to be pretty by everyone.'
CP$_1$: t$_i$ (Mary) < yepputa-ko
CP$_2$: Mary-ka$_i$ < yepputa-ko

b. [$_{CP2}$ [$_{CP1}$ t$_i$ yepputa-ko] [$_{TP2}$ Mary-ka$_i$ motu-ekey
pretty-C Mary-NOM everyone-DAT
sayngkaktoyecita.]]
think.pass
'Mary is thought to be pretty by everyone.'
CP$_1$: t$_i$ (Mary) < yepputa-ko
CP$_2$: yepputa-ko < Mary-ka$_i$

(Yoo, 2019)

(21a) shows an instance of Raising to Subject (RTS) where the embedded subject *Mary* moves into the matrix SpecTP (see Hiraiwa 2005, 2010), and CL correctly predicts its grammaticality, because it satisfies Order Preservation by ensuring that the information at CP_1 and CP_2 (i.e., t_i *(Mary)* < *yepputa-ko*) are consistent. The problem arises in (21b), in that the information at CP_1 (i.e., t_i *(Mary)* < *yepputa-ko*) conflicts with the information at CP_2 (i.e., *yepputa-ko* < *Mary-ka*$_i$). (21b), which derives from (21a)[1], involves the nested-paths, as shown in (22):

(22) [$_{CP2}$ [$_{CP1}$ t_{Mary} yepputa-ko] [$_{TP2}$ Mary-ka [$_{vP}$ t_{Mary} t_{CP1} .....]]]

(Yoo, 2019)

In accordance with the edge effect, the remaining CP in (22) can move to SpecCP (Yoo, 2018) after *Mary-ka* moves to SpecTP, which becomes a trace in the derivation. As traces are not considered edges, the lower SpecvP is no longer an edge position.

4.3. Comparative Explanatory Power: Cyclic Linearization vs. Multiple Edge Effect

Throughout this paper, we have analyzed cross-linguistic data from English and Korean, highlighting the advantages of the Edge effect over the CL approach. The key difference between these two theoretical accounts is their flexibility in dealing with linearization at the Spell-out of each phase. The CL approach is rather constrained in terms of linear ordering at each phasal stage; once syntactic elements are linearized within a phase, they cannot be reordered. This rigidity hinders the CL approach from accounting for the grammaticality of certain constructions, as well as other nuanced aspects of multiple edge phenomena.

On the other hand, the edge effect does not prioritize the linearization of each phase in a sentence. Instead, it allows elements to move out of their phase if they reach the edge of the phase, regardless of their position in the previous phase with respect to linear ordering. This adaptability enables the edge effect to account for a wider variety of

1) Remnant movement of the CP from the location where RTS in (22a) occurred is possible (Yoo, 2018). The movement out of the embedded CP generates a remnant CP in this case, as in (22b).

syntactic structures, regardless of the path configuration, ultimately providing a more comprehensive explanation for multiple edge phenomena.

In light of these findings, Bošković's system proves to be more flexible and better equipped to address a broader range of structural issues, making it a more theoretically and economically appealing option for explaining various syntactic structures that the CL system cannot accommodate. This paper contributes to the field of syntax by providing a comprehensive comparison of these two competing approaches and their applicability to multiple edge phenomena in English and Korean. By demonstrating the limitations of the CL approach and advocating for the edge effect as a more versatile and economical option, we aim to advance our understanding of the syntactic mechanisms governing multiple edge extraction across languages.

5. Conclusion

In conclusion, this study has thoroughly examined the extractability of multiple edges of a phase, using examples from English PE and Korean ECM, in the context of two competing theoretical accounts: Fox and Pesetsky's (2005) Cyclic Linearization (CL) theory and Bošković's (2016) Edge effect. Although both approaches offer satisfactory explanations for extraction from multiple edges of an intermediate CP in English PE and Korean ECM, leading to consistent predictions, the rigid nature of the CL system limits its ability to provide a comprehensive explanation for various syntactic structures observed in cross-linguistic data.

In contrast, the flexibility of the Edge effect enables the accommodation of a wider range of syntactic structures, making it a more efficient option in accordance with the Principle of Economy. This paper has made significant contributions to the field of syntax by providing valuable cross-linguistic insights, identifying the limitations of the CL approach, and advocating for the multiple edge effect as a more economical and versatile alternative.

By analyzing a few examples in English and Korean, this study has laid the foundation for future research on the edge effect as a superior syntactic approach. To strengthen its position, future investigations should aim to provide more theoretical and empirical evidence in support of the edge effect, exploring its applicability to a broader range of languages and syntactic phenomena. Through such efforts, we can ultimately advance our understanding of the mechanisms governing multiple edge extraction and the underlying principles of syntax across languages.

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