Edges in Syntax

Scrambling and Cyclic Linearization

HEEJEONG KO

Edges in Syntax

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General preface

The theoretical focus of this series is on the interfaces between subcomponents of the human grammatical system and the closely related area of the interfaces between the different subdisciplines of linguistics. The notion of 'interface' has become central in grammatical theory (for instance, in Chomsky's Minimalist Program) and in linguistic practice: work on the interfaces between syntax and semantics, syntax and morphology, phonology and phonetics, etc. has led to a deeper understanding of particular linguistic phenomena and of the architecture of the linguistic component of the mind/brain.

The series covers interfaces between core components of grammar, including syntax/morphology, syntax/semantics, syntax/phonology, syntax/pragmatics, morphology/phonology, phonology/phonetics, phonetics/speech processing, semantics/pragmatics, and intonation/discourse structure, as well as issues in the way that the systems of grammar involving these interface areas are acquired and deployed in use (including language acquisition, language dysfunction, and language processing). It demonstrates, we hope, that proper understandings of particular linguistic phenomena, languages, language groups, or interlanguage variations all require reference to interfaces.

The series is open to work by linguists of all theoretical persuasions and schools of thought. A main requirement is that authors should write so as to be understood by colleagues in related subfields of linguistics and by scholars in cognate disciplines.

The notion of cyclicity has been fundamental since the 1960s in generative grammar, requiring syntactic rules to apply within cyclic domains, usually identified as clauses and noun phrases. Over the years, however, how cyclic domains interact with the structures that embed them became equally important and wide-ranging theories of movement relations came to depend on this. Chomsky's suggestion in the early 2000s that cyclic domains have the syntactic properties they do because they are points where syntactic information connects with semantic and phonological systems provided a new set of research questions about these domains and their role at the interfaces. In the current volume, Heejeong Ko addresses some of these questions, arguing that cyclic domains can be identified by a fundamentally semantic notion (the subject–predicate relation) but that they also govern the linear order of elements. Her proposals throw new light on the intricate connection between semantic predication, syntactic locality, and linear order.

David Adger
Hagit Borer

Preface

I first started to look at the syntax of edges when I wrote my syntax term paper at MIT in 2003. There are still many questions left for future research, but I believe that this is a good time to 'Spell-out' my thoughts so far on syntactic edges.

Some ideas developed in this book have their origins in my MIT doctoral dissertation, 'Syntactic edges and linearization' (Ko 2005a). After I finished my thesis, however, a number of interesting proposals on cyclic syntax were published, and I have naturally been influenced by the development of the field. In writing this book I have incorporated novel ideas on cyclic syntax, and subsequently the book has turned into a substantially different work from my thesis both in fundamental content and in organization. Most notably, this book adopts the research program that a predicational structure in general constitutes a Spell-out domain. Such a possibility was not considered in any depth when I wrote my thesis. The idea that a predicational structure matters in cyclic Spell-out was first inspired by a series of special lectures by Marcel den Dikken given at the 2007 Seoul International Conference on Generative Grammar, and it has become a major part of this book. Chapters 1, 4, and 5, in particular, extensively discuss this issue.

In my previous works on floating quantifiers (Ko 2005a; 2007; Ko and Oh 2012), I have suggested that some floating quantifiers must be considered as adnominal, whereas some must be categorized as adverbial. I remained silent, however, about which factors might contribute to the different types of floating quantification. In this book, I provide some principled reasonings on how adnominal floating quantifiers differ from adverbial floating quantifiers in their syntax and semantics. In Chapter 3, in particular, I have incorporated Fitzpatrick's (2006) theory of floating quantification and É. Kiss's (2010) theory of focus into my proposals on syntactic edges and linearization. In my previous works on secondary predication (Ko 2005a; 2011), I had not considered the role of anti-locality for linearization. In this book, I explore the issue in depth and derive an interesting correlation between predicate fronting and order-preservation effects within non-primary predicational domains. The discussion on Subject-to-Object Raising and Sentential Predication is also newly added. Chapters 3, 4, and 5, in particular, are composed of new material that presents my perspectives on these issues.

An earlier version of parts of Chapter 2 (sections 2.1–2.4) appeared in *Linguistic Inquiry* 38 as a paper entitled 'Asymmetries in scrambling and Cyclic Linearization' (Ko 2007), and parts of section 4.2 and sections 5.1–5.3 are based on my article 'Predication and Edge effects', which appeared in *Natural Language and Linguistic Theory* (Ko 2011). In this book, however, I present a perspective that derives the

peculiar properties of subject scrambling and object scrambling discussed in Ko (2007; 2011) from a general proposal regarding syntactic edges. I also extend the empirical coverage of the core proposal to sub-extraction in Russian in Chapter 2. In addition, I have incorporated into Chapter 5 some discussion on ditransitive verbs which is not available in Ko (2011). The general discussion of cyclic syntax has also undergone extensive revisions so that the book may provide a better theoretical backdrop for the reader. This book includes new chapters providing critical reviews on current debates regarding cyclic Spell-out and evaluating my proposals against other general theories of cyclic syntax (see Chapters 1 and 6).

List of abbreviations

A	adjective
Abs	absolutive
Acc	accusative
adnFQ	adnominal floating quantifier
Adv	adverb
advFQ	adverbial floating quantifier
AdvP	adverbial phrase
Agr	agreement head
AgrO-P	object agreement phrase
AP	adjectival phrase
Appl	applicative head
Appl-E	event applicative head
ApplP	applicative phrase
C	complementizer
Cl	classifier
CL	Cyclic Linearization
ClP	classifier phrase
Cop	copula
CP	complementizer phrase
Dat	dative
Dec	declarative particle
Dep	depictive head
DistP	distributive phrase
DM	delimiter
DO	direct object
DP	determiner phrase
EA	external argument
ec	empty category
ECM	Exceptional Case Marking
EG	Edge Generalization
EPP	Extended Projection Principle

Erg	ergative
Exclam	exclamation
F	functional category
Fem	feminine
FNQ	floating numeral quantifier
Foc	focus head
FocP	focus phrase
FP	functional phrase
FQ	floating quantifier
Fut	future tense
Gen	genitive
GS	grammatical subject
H-adv	high-adverb
H-ApplP	high applicative phrase
Hon	honorific
IA	internal argument
Imp	imperative
IO	indirect object
IP	inflectional phrase
J	Japanese
K	Korean
L-adv	low-adverb
L-ApplP	low applicative phrase
LF	Logical Form
LFG	Lexical Functional Grammar
Loc	locative
M	mood
Masc	masculine
MNC	Multiple Nominative Construction
N	noun
Neg	negation
NNP	non-neutral phrase
Nom	nominative
nP	little n phrase
NP	noun phrase

Npst	nonpast
NQ	numeral quantifier
NumP	numeral phrase
Obj/O	object
ODP	object-oriented depictive phrase
P	preposition/postposition
Pass	passive
Past	past tense
PBC	Proper Binding Condition
Perf	perfective
PF	Phonological Form
PIC	Phase Impenetrability Condition
Pl	plural
PP	prepositional phrase/postpositional phrase
Pr	predicational head
PredP	predicational phrase
Pres	present tense
Prog	progressive
Prt	particle
Q	quantifier
QP	quantifier phrase
Ques	question particle
R	relator
Rel	relativizer
Rep	repetitive
Res	resultative
Rest	restitutive
RP	relator phrase
RS	resultative subject
SDP	subject-oriented depictive phrase
Sing	singular
SOR	Subject-to-Object Raising
Spec	specifier
SS	subject of a small clause
Subj/S	subject

T	tense head
Top	topic head
TopP	topic phrase
TP	tense phrase
Transl	translative
V	verb
v	light verb
v⋆	transitive light verb
VP	verbal phrase
*v*P	light verb phrase
v⋆P	transitive light verb phrase
WCO	Weak Cross-Over

Introduction

This book provides an in-depth discussion of cyclic syntax by examining the characteristics of syntactic edges and their interactions with linearization and movement. In particular, the book contributes to the current debate over how cyclic Spell-out affects the (re)ordering of elements in scrambling. Contrary to previous attempts to view syntactic edges as a designated escape hatch or predetermined opaque domain, I argue that the nature of syntactic edges can be derived from a conspiracy of independently motivated principles in the grammar.

In particular, this book is built on three research programs in cyclic syntax. The first one concerns the consequences of cyclic Spell-out for the linearization of syntactic structures. I argue with Fox and Pesetsky (2005a; 2005b) that syntactic structures undergo cyclic Spell-out and linearization at the PF–syntax interface. I provide a wide range of evidence for the claim that as a result of Cyclic Linearization, the linear orderings of a syntactic unit are fixed after Spell-out, as stated in (1). In doing so, I defend the claim that edges must be spelled out together with the complement, contra Chomsky's influential claim that edges are designated escape hatches.

(1) *Consequence of Cyclic Linearization* (Fox and Pesetsky 2005a; 2005b)
    The linear ordering of syntactic units is affected by Merge and Move within a Spell-out domain, but is fixed once and for all at the end of each Spell-out.

The second agenda concerns the domain of cyclic Spell-out. I propose that a predicational structure undergoes cyclic Spell-out and linearization, as stated in (2). My proposal in (2) has been inspired by the pioneering works of den Dikken (2006a; 2007a; 2007b) on phase extension and predication. Adapting den Dikken (2007a), I argue for the thesis that a predicational structure in general constitutes one cyclic unit in syntax. In the implementation of this idea, however, I depart from the original proposal by den Dikken (2007a) in some significant ways. Most importantly, I develop the proposal in (2) from the perspective of the Cyclic Linearization model. In this book, I attempt to establish robust theoretical and empirical challenges against Chomsky's proposition-based phase system, which assumes that transitive v^*Ps and CPs are the only cyclic domains.

(2) *Spell-out domains* (cf. den Dikken 2007a for 'inherent phases')
    A Spell-out domain is a 'predication' (subject–predicate structure).

The third agenda is about locality conditions in movement. I assume with Chomsky (2000; 2001) that movement is triggered by a probe which searches and agrees with a

goal in its c-command domain. In particular, I consider the consequences of the probe-goal theory (3) for the (re)orderings of elements merged on syntactic edges. I show that under the probe-goal theory, the elements externally merged on the edge must be temporarily frozen *in situ*, and that this results in peculiar ordering restrictions for sub-extraction out of edges. Furthermore, I show that (sub-)extraction out of multiple edges is subject to more severe restrictions than movement out of a single edge, although both edges are accessible to movement in principle. I propose that the rigidity of syntactic edges can be captured by the interactions between the probe-goal theory (3) and the monotonicity of linearization (1) at the interface.

(3)   *Probe-goal theory of movement* (Chomsky 2000; 2001)
       A probe may search a goal in its c-command domain.

In this book, we will observe various types of ordering puzzle in syntactic edges. I show that sub-extraction out of syntactic edges is severely restricted in comparison to sub-extraction out of complements. Given a number of previous studies on extraction from within subject and adjunct positions, it may not be so surprising to us that syntactic edges should be opaque domains for extraction in syntax (see e.g. Boeckx 2003a; Chomsky 2008; Gallego 2007; Gallego and Uriagereka 2007; Jurka 2010; Lasnik and Saito 1992; Lohndal 2011; Müller 2010; Polinsky et al. 2013; Rizzi 2006; Stepanov 2007; Surányi 2009 for a ban on extraction out of subject domains). Crucially, however, this book does not argue for a general ban on (sub-)extraction out of edges. It is shown that sub-extraction out of syntactic edges is in principle possible, but restricted only in the domain to which the edges are externally merged.

I propose that the peculiarity of syntactic edges can be captured under a general theory of cyclic syntax developed in this book—which is a consequence of interactions of the three major factors addressed above. Specifically, the probe-goal theory of movement restricts certain types of movement out of edges: movement from an inner edge to an outer edge of the same head is impossible. I argue that this ordering restriction for syntactic edges is preserved in the later stages of derivations due to cyclic Spell-out and linearization at PF. I furthermore argue that the edges of a predicational structure in general show the same ordering restrictions, which can be best captured under the thesis that a predicational unit undergoes cyclic Spell-out.

Evidence for my proposal is drawn from sub-extraction and (re)ordering patterns out of edges in various types of predicational domains. This includes a primary predicational domain *v*P, small clause complements, infinitival complements, Sentential Predication, adjunct small clauses (subtypes of resultative phrases and depictive phrases), and hidden small clauses within a decomposed VP. I provide empirical support for my proposal by closely examining a wide range of scrambling data in Korean and Japanese (with some reference to Russian in Chapter 2). In particular, the consequences of cyclic Spell-out for (sub-)scrambling, types of quantifier floating, predicate fronting, and predicational structures are examined in this book.

This book is composed of five substantial chapters, preceded by this brief introduction and followed by a concluding remark in Chapter 6. In Chapter 1, I lay out theoretical foundations for my proposals on syntactic edges. I explain why multiple Spell-out is important in the current Minimalist Program, and discuss the three major agenda addressed in (1)–(3). I explain in what aspects the proposal based on Cyclic Linearization makes different predictions from the phase model proposed by Chomsky (2000 and subsequent works). I then consider which syntactic unit must be considered as a proper cyclic domain. I critically review the proposition-based model by Chomsky, and present my own perspective. I propose that a general predicational structure undergoes cyclic Spell-out and linearization. In this chapter, I also introduce a probe-goal theory of movement by Chomsky (2000; 2001), and consider its consequences for the linearization of multiple edges. The chapter presents various types of prediction that follow from the research programs in (1)–(3) at an abstract level, which lead to my main arguments in the following chapters.

In Chapter 2, I investigate the consequences of Cyclic Linearization for syntactic edges in primary predicational domains, with special attention to scrambling and quantifier stranding. I start the discussion by introducing a long-standing puzzle concerning a subject–object asymmetry in licensing floating numeral quantifiers in Korean and Japanese, which I call the Subject Puzzle. I show that previous accounts that rely on a mutual c-command condition (Miyagawa 1989) or a ban on subject scrambling (Saito 1985) do not solve the puzzle properly. I propose that the Subject Puzzle is derived from a general ordering restriction predicted for syntactic edges. In particular, I show that interactions of Cyclic Linearization and constraints on domain-internal movement explain the Subject Puzzle. This argument is further supported by a variety of other asymmetries between subject scrambling and object scrambling. I extend my claims for Korean to scrambling in Japanese and subextraction in Russian. Important theoretical challenges against the model based on the Phase Impenetrability Condition (Chomsky 2000) are also discussed. Concluding the chapter, I show that the puzzles concerning sub-extraction out of a subject can be subsumed under one and the same generalization concerning syntactic edges—the Edge Generalization (EG).

In Chapter 3, I investigate interactions between underlying constituency and orderings at syntactic edges. Developing the theory of floating quantification proposed by Fitzpatrick (2006), I argue for a hybrid approach to floating quantifiers: some floating quantifiers are adnominal and some are adverbial in base structure. It is shown that adverbial quantifiers show different distributions from adnominal quantifiers at syntactic edges, and an apparent violation of the EG can be explained by the hybrid approach. I also discuss how different types of floating quantification can be systematically correlated with a theory of exhaustive focus proposed by É. Kiss (2010). I argue that adverbial floating quantifiers carry an exhaustive reading because they are externally merged in a focus projection outside a verbal domain and bind a

variable inside the *v*P. On the basis of this proposal, I analyze how and why adverbial quantifiers behave differently from adnominal quantifiers in their syntax and semantics.

In the next two chapters, I turn to the consequences of Cyclic Linearization for non-primary predicational domains. Chapter 4 concerns ordering puzzles in complement predicational domains such as small clauses, Raising/Control infinitivals, and Sentential Predication. In particular, I focus on the distribution of the object which is interpreted as the subject of an embedded predicational domain. It is shown that the object may not undergo scrambling freely. Rather, the distribution of the object is crucially affected by the argument structure of the main verb and embedded clauses. When the object is externally merged as the subject of the complement, the distribution of the object shows the same pattern as the subject in *v*P. Strong order-preservation effects are observed for the object merged on the edge of an embedded predicational domain. By contrast, when the object is merged as a direct object or proleptic object of the main verb, order-preservation effects seem to be lifted.

In Chapter 4, I propose that a conspiracy of various factors such as the probe-goal theory, anti-locality and cyclic Spell-out leads to extremely rigid ordering not only for the edges but also for the complement when the complement is a predicate. I argue that this proposal captures seemingly complex interactions among a null subject, predicate fronting, and quantifier floating in the complement domains. I also discuss why Cyclic Linearization provides a better solution to ordering puzzles than the alternative hypotheses based on the Proper Binding Condition (Fiengo 1977) or affixal status of inflectional morphemes in Korean (cf. Chung 2007; 2011). I then explain why adverbial floating quantifiers are not compatible with predicate fronting, contrary to the common assumption that adverbials may appear rather freely. Implications of the current proposal for the theory of Subject-to-Object Raising and Sentential Predication are also discussed, with reference to J. H.-S. Yoon's (2007) work on Major Subjects in Korean.

In Chapter 5, I explore possible interactions between underlying predicational structure and ordering patterns at syntactic edges. In particular, I discuss ordering puzzles in adjuncts and secondary predicational domains, which include resultatives, depictives, and small clauses within a decomposed VP. The chapter starts with an observation that a resultative phrase headed by *-key* in Korean shows different ordering patterns from a resultative phrase headed by *-ni* in Japanese. I propose that this contrast can be captured by my overall proposals for syntactic edges, coupled with a theory of resultatives by Simpson (1983). It is shown that the space within a resultative phrase is so limited that neither the edge nor the complement predicate may move around within the resultative phrase, and this leads to rigid ordering patterns for resultatives. I also consider order-preservation effects in depictive domains in Korean and Japanese. It is argued that depictives are merged as an adjunct to a verbal projection both in Korean and in Japanese (supporting Koizumi

1994), and that a null subject must be postulated within depictive phrases. This explains otherwise surprising contrasts between resultatives and depictives in terms of (re)ordering and scrambling out of their edges.

The chapter also concerns hidden predicational units within a decomposed VP. I examine interactions between the meaning of 'again' in Korean and Japanese and the distribution of the object. I assume that the semantic ambiguity of 'again' (restitutive, intermediate, and repetitive readings) must be derived from their diverse syntactic positions (see esp. Bale 2007; von Stechow 1996). I propose that hidden small clauses within a VP undergo cyclic Spell-out, and argue that this explains why the ambiguity of 'again' can be obtained only with certain types of orderings at the edge. My proposal for small clauses is extended to ditransitive constructions, with some interesting consequences for the possible position of applicative arguments.

In Chapter 6, I evaluate my proposals against the other influential model of cyclic syntax reviewed in Chapter 1. In particular, I consider the impact of my arguments for Chomsky's proposition-based phase model (see esp. Chomsky 2000; 2001; 2004; 2008). I also discuss the implications of my proposal for principles in the narrow syntax such as locality in movement, scrambling, and argument structure. I then wrap up the discussion with an overall summary.

This book has been written for syntacticians at the graduate level and above as well as for theorists concerned with the syntax–phonology and syntax–semantics interfaces. This book aims to provide theoretical and empirical support for a particular combination of research programs in cyclic syntax proposed in Chapter 1, but each chapter can also be read as an independent research paper. The advanced reader may skip the first three sections in Chapter 1 that provide a theoretical background for cyclic syntax, and move straight on to the overall outlook in section 1.4.

This book employs the Yale romanization system to transliterate Korean examples (Martin 1992). The Kunrei-shiki system is used for romanization of Japanese examples. For convenience, however, long vowels in Japanese are marked by doubling short vowels instead of using the circumflex. For ease of presentation, unimportant morphological details are omitted in the glosses. Throughout the book, I indicate a dependency between a noun and its associate quantifier with boldface, and between the subject and a secondary predicate with italics (for clarification, the predicational relationship can be indirect due to the mediation of a null subject: see Chapters 4 and 5). I use the term *n*P atheoretically to mark a nominal phrase that contains a noun and an associated quantifier. I employ the term *n*P to emphasize my lack of commitment as to whether the DP layer is projected in all nominal projections discussed in this work. *n*P may correspond to DP, NumP, or something smaller than DP. Nothing in this book hinges on the choice of term.

1

Edges in cyclic syntax

This chapter lays out the theoretical foundations concerning cyclic syntax which are crucial to understand my proposals developed in this book. I start the discussion by examining two competing programs concerning cyclic Spell-out (section 1.1). I then turn to the question of which syntactic unit must be considered as a proper cyclic domain (1.2). I also discuss how movement is regulated by locality conditions at the syntax proper (1.3). Finally, I present the general outlook of the book regarding syntactic edges and linearization (1.4).

1.1 Cyclic Spell-out

1.1.1 *Multiple Spell-out*

The first issue to be discussed in this book is cyclic Spell-out. The Minimalist Program adopts a strongly derivational model in which syntactic trees are built up out of lexical items via the operations Merge and Move. It is assumed that the computational system of the grammar meets with the interface levels, Phonological Form (PF) and Logical Form (LF); a derivation is given a phonological representation at PF and receives a semantic representation at LF. A central proposition advanced by the Minimalist Program is to reduce all substantive principles to interface conditions and all formal principles to economy considerations (Chomsky 1995). Thus, elimination of theory-internal levels such as D(eep)-structure and S(urface)-structure becomes a logical necessity. Naturally, much energy has been devoted to rethinking constraints and phenomena described as properties of D-structure and S-structure. 'Spell-out', later together with 'cyclicity', is one such innovation that the Minimalist Program employs to describe the connection between the lexicon and the interface levels in the grammar.

Spell-out separates the information relevant for phonetic interface from the information that pertains to the semantic interpretation, and ships each off to the appropriate interface. In the earlier version of the Minimalist Program (Chomsky 1993; 1995), a major function of Spell-out was viewed as making a useful distinction between overt vs. covert movement. If movement occurs before Spell-out, the

outcome of the movement will be visible at PF and thus it results in overt movement. If movement occurs after Spell-out, it affects the semantic interpretation at LF, but cannot alter the phonetic information that has already been shipped to PF; hence post-Spell-out movement is considered as covert movement. See (1) for a diagrammatic representation.

(1)   **Numeration**

                  │ ⟹ overt operations
                  ↓
PF ◄──────── **Spell-out**

                  │ ⟹ covert operations
                  ↓
              LF
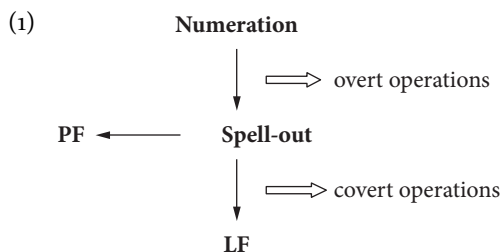
In the later development of the Minimalist Program, however, the focus of studies has shifted to the intrinsic property of Spell-out itself, whose function is not limited to the computational split of overt vs. covert operations (e.g. Chomsky 2000; 2001; 2004; 2005; 2007; 2008; 2013; Fox and Pesetsky 2005a; 2005b; Nissenbaum 2000; Uriagereka 1999). Uriagereka (1999), one of the pioneering works in this vein, argues that the earlier assumption that Spell-out applies only once is an undesirable residue of the T-model, and proposes that Spell-out applies as many times as possible up to economy. Uriagereka (1999) maintains that multiple Spell-out is not only possible but also necessary to obtain a legitimate syntactic object that can be linearized and interpretable at PF.

Merge produces a completely basic and merely associative set-theoretic object with no internal ordering (see Chomsky 1993; 1995). Only if collapsed and linearized into an ordered object can the syntactic unit be interpretable at PF. This means that a syntactic object must be linearized upon Spell-out before it is shipped off to the PF branch; otherwise the unordered syntactic unit will crash at PF. Uriagereka (1999) argues that a complex structure in syntax cannot be linearized all at once—there is no mapping procedure that maps a complex structure into an ordered flat structure all at once. Thus, it is necessary that Spell-out apply to different chunks of structure in different cycles; syntactic structures must be linearized in smaller units to which a mapping procedure may apply in a successive cyclic fashion.[1]

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[1] Uriagereka (1999) adapts Kayne's (1994) Linear Correspondence Axiom (LCA) to Chomsky's bare phrase structure. Uriagereka argues that command maps to a PF linearization convention in simple Command Units (CUs), where LCA may apply, as described in (i):

(i)   *Linear Correspondence Axiom (LCA)* (Uriagereka 1999: 252)
       a. Base step: If α commands β, then α precedes β.
       b. Induction step: If γ precedes β and γ dominates α, then α precedes β.

Multiple Spell-out is forced when a derivation involves more than one CU. To linearize a complex object with more than one CU under LCA, it is necessary to assume that each CU is linearized in different

Once it is assumed that multiple Spell-out and multiple linearization are ever possible, the notion of 'cyclicity' becomes central to a formal theory of the grammar (see Svenonius 2004 for a historical review of cycles in earlier works by Chomsky 1965; 1973; 1986; 1995). In fact, many recent studies in Minimalist syntax share the assumption that syntactic structure undergoes multiple Spell-out, and that Spell-out is strictly cyclic in the sense that the syntax utilizes all and only information available in the current cycle. In other words, once the information concerning (parts of) a derivation is sent off to the interfaces in a given cycle via Spell-out, that information cannot be accessed or altered in a later cycle.

1.1.2 *Two competing research programs*

Perspectives on cyclic syntax, however, may be quite divergent from each other depending on their basic assumption on the nature of cyclic Spell-out—in particular, how much information is encapsulated as a result of cyclic Spell-out. A model can be strict in varying degrees. Under the strictest model, it is assumed that units are completely removed from the syntax upon Spell-out and thus no longer accessible to later cycles. This means that a spelled-out unit can neither re-enter the syntax nor merge with the rest of the structure, and the final process of interphrasal association is accomplished in the performative components. On a less strict version, on the other hand, a model assumes that, though certain information concerning syntactic terms becomes inaccessible as a result of Spell-out, spelled-out terms may re-enter the syntax and be interpretable in later stages of syntax (see Uriagereka 1999 for comparison of different models).

In this section, I review two competing research models regarding this issue. One is the model developed by Chomsky in his series of work on phases (e.g. Chomsky 2000; 2001; 2004; 2007; 2008; 2013)—the most widely adopted and moderately strict model. Under the phase model, spelled-out units are not accessible to any further syntactic operations such as ellipsis and movement. The spelled-out units, however, may re-enter the syntactic derivation and merge with the rest of the structure in a later cycle, just like lexical items in the Numeration. The other model to be reviewed is the one developed by Fox and Pesetsky (2005a) known as Cyclic Linearization—a relatively recent and radically liberal model. This model assumes that syntactic terms are all accessible to syntactic operations even after Spell-out, and argues that cyclic effects observed in the grammar can be understood as a result of Cyclic Linearization.

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domains and glued together in a later cycle. Under LCA, the elements dominated by γ act as γ does in terms of precedence relationships, as stated in (i.b). This is a consequence of the fact that γ has been spelled out separately from the CU it is attached to in a different cascade. Uriagereka (1999) claims that the elements dominated by γ are frozen under γ's dominance after Spell-out, and the linearized object γ behaves like a lexical compound whose internal structure cannot be seen from a different CU. Uriagereka (1999) shows that this has the consequence of deriving various types of island effect in Minimalist syntax.

In this book, I will argue for the latter model with evidence from scrambling in Korean and Japanese. Before doing so, I briefly review the two models and their diverging predictions relevant to this book.

Let us first consider the phase-based model proposed by Chomsky (2000; 2001). Chomsky argues that syntactic derivation proceeds phase by phase. A phase is assumed to be a syntactic unit that is sent to the interfaces upon each Spell-out. In the earlier versions of his work, verbal phrases with full argument structure (transitive v*Ps) and CPs are considered the relevant unit, called 'strong phases'. It is assumed that Spell-out applies only to these strong phases (see Chomsky 2008 for nominal domains; see section 1.2 for detailed discussion on this issue).

Under the phase model, the operation 'Spell-out' applies cyclically. Each phase is spelled out and passed on to the phonological and semantic systems at the point at which the next higher strong phase is completed (Chomsky 2001: 13). Chomsky argues that the computational burden is significantly reduced if the earlier stages of the cycle can be forgotten or are inaccessible to further syntactic operations after Spell-out. The Phase Impenetrability Condition (PIC) is employed to implement this idea under the phase model (cf. also van Riemsdijk's (1978: 169) Head Constraint in an earlier framework, which forces movement paths to be punctuated).

(2) *Phase Impenetrability Condition* (Chomsky 2001: 13)
     [For a strong phase HP with a head H,] the domain of H is not accessible to operations outside HP; only H and its *edge* are accessible to such operations. [The edge includes the elements outside H, the specifiers (Specs) of H and elements adjoined to HP.]

One surprising consequence of the PIC is that the domain of Spell-out must be limited to the complement of a phase head, and that the edges and complements are spelled out separately. To be more concrete, consider configurations like (3) where ZP and HP are strong phases. Under the PIC, the complement of a phase HP is not accessible to operations at ZP once HP is spelled out. Crucially, however, the head H and its edge α are still accessible to syntactic operations in ZP even after the Spell-out of HP.

(3) [$_{ZP}$ Z   ...   [$_{HP}$ α [H YP]]]

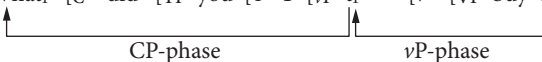Phase of HP

Spell-out domain of HP
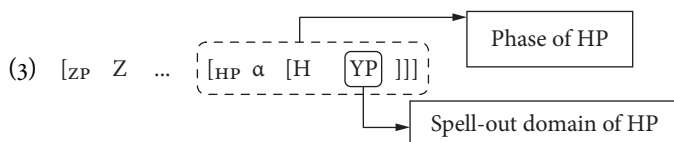
In effect, this proposal amounts to arguing that H and its Spec α in (3) belong to the next phase ZP for the purpose of Spell-out. As Nissenbaum (2000) argues, this would naturally follow from the proposal that Spell-out applies to the complement domain of a phase head, but not beyond. In other words, when Spell-out applies to a

given phase, only the complement of the head is spelled out and handed over to PF; the rest of the phase (the head and edge) must be spelled out in the next phase so that it is accessible to operations in the next phase.[2]

Another important consequence of the PIC is that 'escape hatches' must be postulated to explain long-distance movement in the grammar. Under the PIC, elements in the complement domain are inaccessible to any further operations in the higher domains. Once the terms in the complement domain are spelled out, they cannot undergo any type of movement and must be frozen *in situ*. To explain the fact that a phrase merged in a complement domain may undergo long-distance movement across phase boundaries (e.g. *wh*-movement), it is necessary to assume that movement occurs through the edge of every strong phase in a successive cyclic fashion.

For instance, *what* in (4) must move out of the complement domain VP before the *v*P phase is spelled out; otherwise, *what* would be trapped in VP and would not be able to undergo *wh*-movement to [Spec,CP]. To explain the fact that *what* in (4) lands at [Spec,CP], it is necessary to assume that *what* first moves to the edge of the phase, *v*P, and then to the edge of CP. The same story must be told for long-distance *wh*-movement such as (5): *what* moves through the edge of every strong phase in its way to the matrix [Spec,CP]. On this approach, successive cyclic movement is a necessary consequence of the PIC, and the edge must be designated as an escape hatch for movement out of strong phases.

(4) [$_{CP}$ What$_1$ [$_{C'}$ did [$_{TP}$ you [$_{T'}$ T [$_{vP}$ t$_1$ [$_v$ [$_{VP}$ buy t$_1$]]]]]]]?

     CP-phase   *v*P-phase

(5) [$_{CP}$ What$_1$ do you [$_{vP}$ t$_1$ *v* [$_{VP}$ think [$_{CP}$ t$_1$ that Mary   [$_{vP}$ t$_1$ [$_{VP}$ bought t$_1$]]]]]]]?

  CP-phase *v*P-phase CP-phase *v*P-phase

  (For ease of exposition, irrelevant details are omitted in (4)–(5).)

As a representative model of cyclic syntax, Chomsky's phase approach has been adopted by many, but at the same time it has prompted important research questions. The validity of the PIC and accompanying claims concerning successive cyclic movement were especially at the centre of controversy. This has led to modifications of the phase model and novel theories concerning multiple Spell-out and long-distance movement (e.g. Bruening 2001; Chomsky 2008; 2013; den Dikken 2007a;

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[2] Under the phase model, spelled-out units cannot be a target of any operations at the syntax proper (except for External Merge). Note, however, that spelled-out units are not completely opaque for cross-phasal interactions. Even after Spell-out, information relevant to semantics and phonology is still accessible. For instance, information concerning the label of the complement, referential properties of nominal elements, and structure for prosodic assignment are still available even after Spell-out (see Uriagereka 1999 for discussion).

2007b; 2009; 2010; Epstein and Seely 2006; Felser 2004; Fox and Pesetsky 2005a; 2005b; Frank 2006; Gallego 2007; Grohmann 2003b; Nissenbaum 2000; Rackowski and Richards 2005; Svenonius 2004; Uriagereka 1999).[3]

Capitalizing on the consequences of linearization at the interfaces, Fox and Pesetsky (2003; 2005a; 2005b) propose an alternative approach to cyclic Spell-out, which derives successive cyclic movement without assuming escape hatches. Fox and Pesetsky argue with Chomsky (2000; 2001) that Spell-out results in linearization of syntactic structure, but depart from the phase model by arguing that all items are accessible to syntactic operations, such as movement, even after Spell-out. Under this approach, the PIC, or notion of an escape hatch, is simply unnecessary. Successive cyclic movement follows from a consequence of linearization that occurs at each Spell-out, called Cyclic Linearization (CL). CL refers to a mapping procedure between the syntax and PF, which linearizes syntactic structure and establishes relative orderings of syntactic terms contained in a Spell-out domain.

The implementation and consequences of cyclic Spell-out under the CL approach are significantly different from those under Chomsky's phase model. Most importantly, the domain of Spell-out is understood differently from the phase model. As mentioned above, under the phase model, the edge and the complement must be spelled out separately; otherwise, there is no way of explaining long-distance movement out of the complement domain. By contrast, under the CL model, the edge and the complement are spelled out together and get linearized in the same cycle.

For instance, in configurations like (6), not only the complement YP but also the head H and its Spec α get linearized when the HP is spelled out. Once spelled out, syntactic units in the same cycle are linearized and statements concerning relative ordering of the units are sent off to PF. For example, when HP in (6) is spelled out, relative orderings among the syntactic terms contained in HP are shipped to PF: namely, $\alpha < H$ (α precedes H), $\alpha < YP$ (α precedes YP), and $H < YP$ (H precedes YP). An ordering statement of the form $\alpha < \beta$ is understood by PF as meaning that the last element of α precedes the first element of β, with the exclusion of traces.[4]

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[3] For instance, previous researchers suggest that sometimes a less tight system must be enforced. Rackowski and Richards (2005) suggest that some movement does not move through phase edges due to agreement (e.g. long *wh*-movement in Tagalog proceeds through *v*P-edges, but not through embedded [Spec,CP] when the matrix verb agrees with C). Den Dikken (2007a; 2007b) claims that a phase may lose its phasehood due to phase-extending head movement. See also den Dikken (2010) for extensive critical reviews concerning evidence for successive cyclicity. As will be shown shortly, Fox and Pesetsky (2005a; 2005b) argue that in certain circumstances, movement must not proceed via phase edges. The evidence adduced against strict successive cyclicity naturally led researchers to modify Chomsky's phase model or develop new models of cyclic syntax (see Boeckx and Grohmann 2007 and references therein for an overview).

[4] For ease of exposition, I employ the term (and notation) of traces. Strictly speaking, however, traces do not exist in the derivation under the CL approach. Fox and Pesetsky (2003; 2005a; 2005b) assume that movement is the 'Remerge' of elements introduced in the previous derivation, and that ordering statements

(6) [$_{ZP}$ Z   ...   [$_{HP}$ α   [H   YP]]]

Spell-out domain of HP
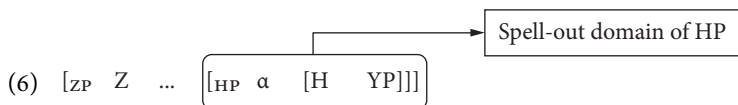
For convenience, I continue to call the Specs of a Spell-out domain the edges, as in Chomsky's phase system. It is important to note, however, that 'edges' under the CL model are just derivative notions (i.e. non-complement positions) and have no special grammatical status as a designated escape hatch. If edges are accessible to certain syntactic operations, complements are accessible to those operations as well.

In sharp contrast with Chomsky's phase model, the CL approach argues that terms are accessible to syntactic operations after Spell-out and free to move out of the already spelled-out domains. In the configuration of (6) seen above, not only the edge α but also the complement YP are eligible to movement triggered by a higher head Z after Spell-out of HP. This does not mean, however, that movement may occur out of spelled-out domains randomly. In fact, the CL model argues for the opposite: movement is restricted not only by the syntax proper, but also by the interactions between the syntax and PF.

Under the CL model, movement is constrained by locality conditions in the syntax, just as in Chomsky's phase model. More importantly, the CL model further argues that even a derivation created by licit movement is filtered out at PF if the derivation cannot be properly linearized—a proposition that has not been investigated in any depth in Chomsky's model. In particular, Fox and Pesetsky (2005a) argue that if the result of (licit) movement yields a derivation that cannot be ordered at PF, the derivation is canceled out as being unpronounceable. A derivation cannot be linearized at PF if ordering information stored in previous cycles is not consistent with ordering information obtained in a later cycle.

To be more concrete, suppose that PF receives an ordering statement such that α precedes β in an earlier cycle ($α < β$) but reads the opposite information that β precedes α in a later cycle ($β < α$). PF then cannot decide the relative orderings between α and β because two conflicting statements have been registered at PF. If the precedence relationship between α and β cannot be determined, the derivation cannot be pronounced and thus will be canceled out at PF. This means that the linear ordering of terms may be shifted via movement before Spell-out (as long as the movement satisfies locality conditions in syntax), but is fixed once and for all after Spell-out at each cycle. If an ordering statement that α precedes β is sent off to PF, α must precede β at the end of later cycles as well; otherwise, an ordering conflict arises and the derivation will be canceled out. This is an important consequence of CL that will be argued for in this book and is summarized in (7).

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are established for the most recently merged elements, if they are remerged. See Fox and Pesetsky (2005a; 2005b) for details.

(7)   *Consequence of Cyclic Linearization*
      The linear ordering of syntactic units is affected by Merge and Move within a
      Spell-out domain, but is fixed once and for all at the end of each Spell-out.

Fox and Pesetsky (2005a; 2005b) argue that cyclic effects in the grammar can be
captured by this consequence of CL, (7). More specifically, long-distance movement
occurs through the edge of the Spell-out domain in each cycle due to the monoton-
icity of CL; the precedence relationship registered in an earlier cycle must be
preserved in later cycles. To illustrate this, consider the derivations in (8)–(10). The
derivations in (8) show that movement out of the edge to the next Spell-out domain is
possible without ordering contradiction. The contrast between (9) and (10) shows
that (single) movement out of a non-edge is impossible if it does not go through the
edge. Note that this is exactly the result that the PIC is designed to capture.

Movement out of edge zone

(8)   a. [$_{\alpha P}$ X   [α Y]]: **X<α<Y**

      b. [$_{\beta P}$ X$_1$ Z   [$_{\alpha P}$ t$_1$ [α Y]]]: X<Z<αP => **X<Z<α**

Consider (8) first. Suppose that αP and βP are Spell-out domains. In (8a),
X precedes the head α and the complement Y in the αP domain. Once αP is
spelled out, the linear ordering X < α < Y is established at PF. Crucially, this ordering
cannot be erased or changed, so as to avoid ordering contradictions in PF in a later
cycle. As described in (8b), suppose that a new element Z is merged in the higher
domain βP, and that the element X merged in αP is remerged in βP (i.e. movement of
X in βP). After the Spell-out of βP, the new orderings (X < Z < αP) are added to
PF. Since the first (overt) element in αP is α, PF obtains new linearization informa-
tion, X < Z < α. Given that the ordering in βP is *consistent* with the one in αP, the
derivation in (8b) poses no problem for PF.[5] Thus, movement of X from the edge in
(8b) is correctly ruled in under CL.

Compare the derivations in (8) with (9), which show that certain types of move-
ment out of non-edge zones are ruled out under CL. In (9), X precedes Y in the lower
Spell-out domain αP. Suppose that Z is merged in the higher domain βP, and that
Y undergoes movement over Z without going through the edge, as described in (9b).

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[5]   It is worth stressing that ordering statements are evaluated with respect to precedence relationship,
but not with respect to immediate precedence relationship. In other words, X and Y in (a) and (b) must
preserve their relative ordering, but the immediate precedence relationship with respect to X and Y can be
changed by External Merge of a higher element Z, as in (b). I thank Justin Fitzpatrick (p.c.) for clarifying
this point.