

Parasitic Gaps Revisited*

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Lee, Kap-Hee. 2011. Parasitic Gaps Revisited. *Linguistic Research* 28(3), 493-515. The present paper proposes a new perspective on parasitic gap constructions in Korean depending on the assumption that parasitic gap constructions are no longer marginal in acceptability according to Phillips (2006). Considering all the traits of analyses, we can see that the previous approaches in the GB framework are severely controversial. Also, the analyses of feature checking through Agree do not accommodate the core properties of parasitic gaps in Korean. This paper would compare interpretation-centered analysis with syntax-centered analysis. Conclusively I argue that parasitic gap constructions in Korean can be analyzed without stipulations in interpretation-centered grammar. The argument may imply that non-determinism based on an interpretive system can have explanatory adequacy in the analysis of parasitic gaps in head-final languages. (Seoul Theological University)

Key words parasitic gap construction, neurolinguistics, Minimalist Program, interpretive system, D-effect, non-D-effect, non-determinism

1. Introduction

Parasitic gap constructions are exemplified by the following examples. Parasitic gaps are named so because they are parasitic to a real gap. They can not exist without a real gap. *t* is marked for a real gap, and *pg* for a parasitic gap.

- (1) a. Whom_i did your interest in *pg*_i surprise *t*_i? (Chomsky 1982)
b. What_i did the attempt to repair *pg*_i ultimately damage *t*_i? (Phillips 2006)
- (2) a. Which article_i did you file *t*_i without reading *pg*_i? (Engdahl 1983)
b. Who_i did you tell *t*_i that we were going to vote for *pg*_i? (Engdahl 1983)

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- c. This is the paper which_i John filed *t_i* without reading *pg_i* as soon as he received *pg_i* because he was not interested in *pg_i* although he knew he ought to read *pg_i* thoroughly. (Hudson 1984)

These examples show that a parasitic gap is acceptable inside a syntactic island when the sentence contains another gap that is not inside an island and when both gaps are linked to the same *wh*-phrase. It is well-known due to Engdahl (1983) that parasitic gaps in (1) are obligatory whereas those in (2) are optional since they can be replaced by a resumptive pronoun.¹ If the parasitic gaps in (1) are replaced by resumptive pronouns, it causes ungrammaticality in the sense of the original meaning.

This paper is divided into three parts. In section 2, the syntactic analyses since Engdahl (1983) in the framework of the Government and Binding (GB) theory will be reviewed. In section 3, findings in the neurolinguistic field will be introduced to focus on the relation between syntactic theory and neuroscience. In section 4, I will suggest an analysis of parasitic gaps which fits into the requirements of theoretical linguistics and empirical experiments. Section 5 is the conclusion of this paper.

2. Parasitic Gap Constructions in the GB Framework

Engdahl's (1983) seminal paper resumed the discussion on parasitic gap constructions although Ross (1967) had noted the phenomenon in English. She shows parasitic gaps very effectively and proposes that there is an accessibility hierarchy on the distribution of parasitic gaps as follows.

- (3) untensed domains > tensed domains (> = more accessible than)
- a. untensed domains : manner adverbs > temporal adverbs > purpose clauses
 - b. tensed domains : that/than clauses > when/because/if clauses > relative clauses/ indirect questions

¹ When a gap is replaced by a pronoun and it does not cause any difference in meaning, the pronoun is called a resumptive pronoun. Resumptive pronouns are often found in Hebrew.

In summary, the worst cases among optional parasitic gaps involve relative clauses and indirect questions whereas the best cases involve manner adverbs. She brings up key issues such as the location and character of the antecedent, the level where the parasitic gap is licensed, the anti-c-command relation between the real gap and the parasitic gap, the obligatory/optional distinction and the domain of the parasitic gap.

Kayne (1983) observes that parasitic gaps are not ruled out by Subjacency², nor by the Empty Category Principle (ECP)³. He proposes an extension of the ECP to account for his observation. His proposal that an empty category is licensed if it and its antecedent are contained in the same 'g-projection'⁴ can explain the cases in which the problematic gap is on a left branch, that is, a parasitic gap in subject domain and a parasitic gap in adjunct domain. He assures that the parasitic gap is in a chain with the antecedent of the true gap.

On the contrary, Chomsky (1986), adopting the proposal of Contreras (1984), posits a null operator that binds the parasitic gap. He assumes that the parasitic gap is the trace of the null operator and proposes a 'composed chain', a chain of the true gap and another chain of the parasitic gap. Through these gadgets Chomsky gives an account of the anti-c-command phenomenon between the true gap and the parasitic gap in terms of the binding theory. However, the 'composed chain' is criticized as a stipulation since there is no independent motivation or requirement.

Thus Culicover (2001) summarizes the properties of parasitic gaps as follows:

- (4) a. The antecedent of a parasitic gap must be in an $\bar{A}$ -position.
- b. A parasitic gap is licensed only at S-structure.
- c. The antecedent of a parasitic gap must be an NP.
- d. The true gap cannot c-command the parasitic gap.
- e. The parasitic gap is in a chain with the antecedent of the true gap.

² Subjacency is defined as follows: No element may be moved across more than one cyclic node.

³ ECP is defined as follows: A trace must be properly governed. It means that a trace should be c-commanded by an antecedent or by a lexical head.

⁴ The definition of 'g-projection' is as follows (Kayne 1983: (8)): Y is a g-projection of X iff

- a. Y is a projection of X (in the usual sense of X-bar theory) or of a g-projection of X, or
- b. X is a structural governor and Y immediately dominates W and Z, where Z is a maximal projection of a g-projection of X, and W and Z are in a canonical government configuration.

- f. Anti-c-command is a consequence of Condition C of the binding theory.

Each of these meets challenges not only by the specific properties of individual languages but by theoretical proposals that seek to derive the existence of parasitic gaps from general principles of Universal Grammar.

(4a) holds that the antecedent of a parasitic gap, whatever it is, must be in an $\bar{A}$ -position, but the factual evidence that Heavy NP Shift in English and scrambling in languages such as German and Persian can also license a parasitic gap gives the possibility that the antecedent could also be in A-position. Although there is another stream of claims that the position of the shifted heavy NP and the scrambled element can be an $\bar{A}$ -position, clitic movement that is prevalent in the Romance languages licenses a parasitic gap and the clitic movement has been treated as A-movement. All considered, it is very controversial to hold (4a) as a general property of parasitic gaps.

In the framework of the Government and Binding theory, (4b) is retained quite well, until Kim and Lyle (1996) argue that parasitic gaps are licensed at LF. One of their key observations is that parasitic gaps are not compatible with multiple *wh*-questions like '*Which parcel did you give *t* to whom without opening *pg*?'. Another observation is that a parasitic gap can be contained in VP ellipsis like 'Which article did you file *t* without meaning to [file *pg*?'. They claim (4b) to be implausible in that the ungrammaticality of the multiple *wh*-question with a parasitic gap cannot be explained and the interpretation of the VP ellipsis sentence must 'reconstruct' the parasitic gap at LF.

There are quite a few cases in which the antecedent of a parasitic gap is not an NP even in English. They can be a CP or a PP as follows:

- (5) a. [_{CP} That parasitic gaps don't really exist]_i, no one who believed *pg*_i
could prove *t*_i.
b. The table [on which]_i I placed the book *t*_i before carefully positioning
the glass *pg*_i

Furthermore Engdahl's (1983) Swedish data suggest that PPs and APs can be the antecedents of parasitic gaps. Although (4c) seems to have the most robust challenge,

it seems to me that this property may provoke a new insight on parasitic gaps, which will be argued in section 4 below.

The anti-c-command property of (4d) appears to be substantially correct and without serious challenge in the literature. Since a parasitic gap construction is such that another empty category cures the sentence with a problematic empty category, it is highly likely that the two gaps cannot c-command each other. (4d) is closely related with (4f) although (4f) is not established firmly as the basis for (4d). On the other hand, (4e) stands very controversial since a chain can be established under the assumption that the parasitic gap is a trace. However there is another stream of literature (Ross 1967, Cinque 1990, Postal 1993, among others) that the parasitic gap is an empty pronoun. Therefore most of the central properties remain open and too controversial to account for the phenomenon with general principles of UG. The properties in (4) will be examined in the case of Korean parasitic gaps in section 4.

3. Evidence from Neuroscience

Since Dr. Paul Broca found the damaged part in the brain after his patient's death in 1861 and named it Broca's Area, many doctors have studied the relationship between the brain and language in order to cure various kinds of aphasia. In just the last few decades, cognitive neuroscientists have become interested in language processing and language learning from the perspective of ordinary language users.

For the last three decades Generative Grammar has advanced from a GB framework to the Minimalist Program (MP henceforth) beginning with Chomsky (1995). However, it is true that the MP has changed not its basic ideas but the way they are executed in order to capture UG as minimally as possible.

Poeppel and Embick (2005) pose two questions with respect to the study of language and the brain: whether the study of the brain can reveal aspects of the structure of linguistic knowledge and whether language can be used to investigate the nature of computation in the brain. They argue that there is a mismatch in the 'conceptual granularity' between the elemental concepts of linguistics and those of neurobiology and cognitive neuroscience, and they posit the following problem:

(6) Granularity Mismatch Problem (GMP)

Linguistic and neuroscientific studies of language operate with objects of different granularity. In particular, linguistic computation involves a number of fine-grained distinctions and explicit computational operations. Neuroscientific approaches to language operate in terms of broader conceptual distinctions.

Moreover, they pose the second problem that the fundamental elements of linguistic theory cannot be reduced or matched up with the fundamental biological units identified by neuroscience as follows:

(7) Ontological Incommensurability Problem (OIP)

The units of linguistic computation and the units of neurological computation are incommensurable.

They claim that these two problems, GMP and OIP, hinder researchers in both fields from formulating theoretically motivated, biologically grounded, and computationally explicit linking hypotheses that bridge neuroscience and linguistics.

On the other hand, Marantz (2005), as a generative linguist who is running ME G⁵ brain monitoring experiments, poses a much more positive view that MP is already well-integrated into cognitive neuroscience, but there is a slight misunderstanding in the connection between the data relevant to linguistic theory and the example sentences used to represent these data in the literature. His suggestion is that MP should embrace the standard methodology in cognitive neuroscience by demystifying the nature of linguistic representations and computations so that generative linguists can provide representational and computational hypotheses to neuroscientists. Instead, cognitive neuroscientists, he adds, should make the hypotheses concrete by providing rich data from empirical experiments.

In this regard Phillips (2006) shows through off-line and on-line experiments that obligatory parasitic gaps in infinitival subject are equally acceptable as normal *wh*-dependencies despite the rarity of occurrence. However, there is a little difference in acceptability when the subject is a finite clause. Consider an example of the data

⁵ Magnetoencephalography (MEG) is a method with high temporal resolution as well as high spatial resolution, so it is considered to be the most recent and advanced one used in neurolinguistic studies.

and the results in Figure 1:

(8) INFINITIVAL

GOOD: The outspoken environmentalist worked to investigate what the local campaign to preserve the important habitats had harmed ____.

BAD: The outspoken environmentalist worked to investigate what the local campaign to preserve ____ had harmed the annual migration.

BOTH: The outspoken environmentalist worked to investigate what the local campaign to preserve ____ had harmed ____.

(9) FINITE

GOOD: The outspoken environmentalist worked to investigate what the local campaign that preserved the important habitats had harmed ____.

BAD: The outspoken environmentalist worked to investigate what the local campaign that preserved ____ had harmed the annual migration.

BOTH: The outspoken environmentalist worked to investigate what the local campaign that preserved ____ had harmed ____.

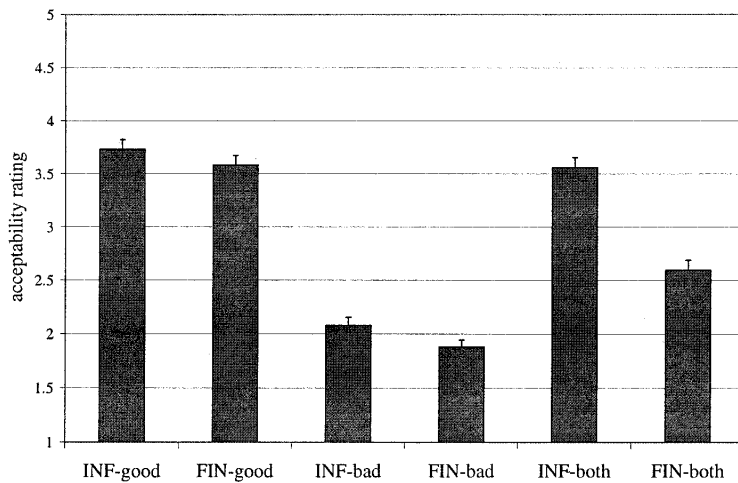


Figure 1. Mean Acceptability Ratings (Phillips 2006: 806)

The results of INF-good and INF-both indicate that adding a gap inside the subject island has little impact on acceptability when the subject contains an infinitival complement. In comparison with FIN-bad and FIN-both, we can see a partial rescuing effect even in the finite conditions. Although there is a considerable difference between INF-both and FIN-both, this sharply reduced rating can support the claim that parasitic gaps are restricted to a subclass of island types.

The off-line study shows that parasitic gap constructions are genuinely acceptable. His on-line study implies that normal speakers of English parse the grammar of parasitic gaps accurately and incrementally in the same way as other island phenomena. These results contribute to the conclusion that parasitic gaps are a real phenomenon and are not marginally acceptable for uninitiated English speakers. He also suggests the need for a representational account for island phenomena.

Since the late 20th century there has been a rapid advancement in techniques and methodologies for neuroscientific research. Electrophysiological and neuroimaging methods that are most used in neurolinguistic studies are Event-Related Potentials (ERP) and functional Magnetic Resonance Imaging (fMRI). The former has high temporal resolution whereas the latter has high spatial resolution. Many researchers use both methods in combination or MEG if affordable. The results from these methods are gaining considerable generalization in the study of language and the brain.

ERP components represent earlier and later stages of information processing and the most studied language-related components are N400, first reported by Kutas and Hillyard (1980), and P600,⁶ first reported by Osterhout and Holcomb (1992). The N400 is a negative-going wave with a peak around 400 milliseconds after the stimulus and known to reflect semantic expectancies whereas the P600 is a positive-going wave with a peak around 600 milliseconds after the stimulus and known to reflect syntactic complexity or anomaly.

⁶ In detail, the P600 is observed in response to a variety of different syntactic violations in phrase structure, subcategorization, agreement of number, tense, gender and case, and constraints on island phenomena as well as syntactic reanalysis or repair as in garden path sentences. And more details are revealed concerning the pattern of the P600. Gouvea et al. (2010) suggest that there is a distinction between the retrieval of elements in syntactic relations and the creation of the syntactic relations themselves. The latency of the P600 reflects the time needed for the retrieval processing and the amplitude or duration of the P600 is related to the number and type of syntactic relations.

Language comprehension in the human brain requires the rapid extraction and coordination of syntactic and semantic cues from linguistic input. Assuming that the P600 also reflects the combinatory processing in response to the conflicts between semantic and syntactic streams in the brain, Kim and Sikos (in press) suggest that altering the syntactic cues in the situations of syntax-semantics conflict affects ERP components. Consider the following:

- (10) CONTROL SENTENCE : The hearty meal was devoured
 a. The hearty meal was devouring
 b. The hearty meal would devour

They observe the P600 in the case of (10a), which needs single-edit-repair, *devouring* to *devoured*; however, they find LAN(left anterior negativity) instead of the P600 in the case of (10b), which needs multiple-edit-repair, a semantic role analysis of *the hearty meal* plus a syntactic analysis at least. This result supports growing evidence that combinatory semantic processing during sentence comprehension works substantially independently from, and can sometimes dominate, syntactic analysis. In other words, syntactic analyses vary, from fragile to robust, in their ability to resist challenges from semantic processing.

I would like to buy three points from this section. First, elemental concepts of linguistics should become more general and simple to be compatible with those of neuroscience so that we can advance to explicate the biological foundation of language. Second, parasitic gap constructions are as normal and real as island phenomenon, so we should analyze these gaps without considering any marginalities in acceptability. Third, language comprehension in the human brain requires combinatory operations between syntactic and semantic analyses. These points will contribute to posing a new approach to parasitic gaps.

4. A New Perspective on Parasitic Gaps

Before going for a new perspective, the properties of parasitic gaps in (4) are repeated in (11) to discuss the properties of Korean parasitic gaps:

- (11) a. The antecedent of a parasitic gap must be in an $\bar{A}$ -position.
 b. A parasitic gap is licensed only at S-structure.
 c. The antecedent of a parasitic gap must be an NP.
 d. The true gap cannot c-command the parasitic gap.
 e. The parasitic gap is in a chain with the antecedent of the true gap.
 f. Anti-c-command is a consequence of Condition C of the binding theory.

As for (11a) that the antecedent of a parasitic gap must be in an $\bar{A}$ -position, it is noted that the fact that scrambling in languages such as German and Persian can license a parasitic gap also holds true for Korean. Consider the following:

- (12) a. Mary-ka chayk-ul_i ilkci-anhko John-eykey t_i ponay-ess-ta.
 M.-NOM book-ACC read NOT J.-DAT send-PAST-DEC
 'Mary sent a book to John without reading.'
 b. chayk-ul_i Mary-ka pg_i ilkci-anhko John-eykey t_i
 book-ACC M.-NOM read NOT J.-DAT
 ponay-ess-ta.
 send-PAST-DEC
 'A book, Mary sent to John without reading.'
- (13) a. *[t_i hanpen e_j pon] salam_i-i nwukwu_j -lul
 once see person-NOM who-ACC
 chayyonghay-ss-ni ?
 employ-PAST-Q
 'Who_j did the person that saw pg_j once employ t_j ?'
 b. nwukwu_j -lul [t_i hanpen pg_i bon] salam_i -i t_j
 who-ACC once see person-NOM
 chayonghay-ss-ni ?
 employ-PAST-Q
 'Who_j did the person that saw pg_j once employ t_j ?'

Not only the scrambled *wh*-object in (13b) but also the scrambled non-*wh*-object in (12b) licenses a parasitic gap in Korean. As Lee (2006) argues, the scrambled position can be an $\bar{A}$ -position or an A-position, which implies that the antecedent of

parasitic gaps in Korean is not necessarily an $\bar{A}$ -position.

There seems to be no need to discuss the property in (11b) that a parasitic gap is licensed only at S-structure since the Minimalist Program does not assume D-structure or S-structure. Instead configurations and operations occur as interface conditions. The spirit of (11b) is that parasitic gap constructions are dealt with as overt movement. However, it does not seem to hold true in Korean since the scrambling of a quantifier can also license a parasitic gap as shown in (14) and it involves covert movement.

- (14) a. ne-nun motun sinmwun-ul_i ilkci anhko t_i chelhay-ss-ta.
 you-NOM every paper-ACC read not file-PAST-DEC
 '*You filed every paper_i without reading t_i .'
- b. motun sinmwun-ul_i ne-nun pg_i ilkci anhko t_i chelhay-ss-ta.
 every paper-ACC you-NOM read not file-PAST-DEC
 '*You filed every paper_i without reading t_i .'

As for (11c) that the antecedent of a parasitic gap must be an NP, we can find that although scrambling of adverbials is possible in Korean, it cannot license parasitic gaps. It is likely that not adjunct scrambling but argument scrambling does license parasitic gaps. If we revise (11c) as (15), it may accommodate the English examples in (5), repeated as (16):

- (15) The antecedent of a parasitic gap must be an argument.
- (16) a. [_{CP} That parasitic gaps don't really exist]_i, no one who believed pg_i
 could prove t_i .
- b. the table [on which]_i I placed the book t_i before carefully
 positioning the glass tpg_i

When we define an argument as a maximal projection which has a theta-role, the complement of a verb is also an argument. The examples in (16) show that the complement of the verb *prove* is CP and the complement of the verb *place* is PP.

As discussed in section 2, that the true gap cannot c-command the parasitic gap in (11d) appears to be solid as a property of parasitic gaps even in Korean, although the example in (2b) "Who_i did you tell t_i that we were going to vote for pg_i ?" does

not fit into this condition. Here t_i does c-command pg_i . On the other hand, discussing the property in (11e) that the parasitic gap is in a chain with the antecedent of the true gap does not appear to be interesting since the concept of chain is very controversial and the character of parasitic gaps is inconclusive. And we will not discuss the property in (11f) that anti-c-command is a consequence of Condition C of the binding theory since Condition C is considered to be irrelevant to languages such as Korean and Japanese. Thus we can say that in Korean as well as in English, analyses of parasitic gaps are excessively controversial and open to many questions.

To brief a few recent analyses of parasitic gap constructions in the MP framework, Chomsky (2008) has a position that phases CP and vP are also necessary for the analysis of parasitic gap constructions, and feature inheritance is needed from C to T for $\bar{A}$ -movement. Nissenbaum (2000) argues for a vP-level that it is crucial for the interpretation of parasitic gap constructions, using an interpretive rule called Predicate Modification⁷ at the interface level of LF. However, Legate (2003) argues that unaccusative and passive VPs are also necessary as a phase for parasitic gap constructions. Agbayani and Ochi (2007) analyse parasitic gap constructions in terms of feature split in lexical insertion/External Merge. In the same vein Assmann (2011) argues that the splitting mechanism is needed specifically for parasitic gap constructions, which are considered to be marginally acceptable.

In the beginning of the MP era, Chomsky (1995) states in the back cover that the Minimalist Program attempts to situate linguistic theory in the broader cognitive sciences. One of the most important innovations in MP is that a separate level of D-structure as an interface between the lexicon and the computational system is no longer assumed. To brief the progress in the MP framework, Chomsky's (1995) theory of movement is mainly based on the assumption that a derivation is determined by feature checking under the last resort condition with the basic operations of Merge and Move. Furthermore, Chomsky (2000, 2001) poses Agree by probe-goal feature checking instead of morphological feature checking for movement. The operation Agree is constrained by the Phase Impenetrability Condition(PIC), which implies that from beyond a certain distance syntactic objects become invisible

⁷ Nissenbaum (2000) posits predicate modifications as follows:

(41) Parasitic Gaps are licensed by predicate modification:

A PG is the gap left by null-operator raising internal to a phrase that modifies a vP targeted by movement. The target vP and the modifier together form a (conjoined) predicate of the moved XP.

to further syntactic operations.

Chomsky (2004) distinguishes external merge (EM) and internal merge (IM). The EM is for phrase structure building and the IM for movement. Consequently, movement becomes a special case of merge. According to Chomsky (2008), merge is induced by edge feature (EF) and the EF induces these two types of merge, EM and IM. The edge feature⁸ also has two types: unmarked EF and marked EF. The unmarked EF or Default EF optionally deletes, inducing the optional IM, whereas the marked EF blocks the optional deletability of the Default EF, inducing the obligatory IM.

Recently Yang (2009, 2011a, 2011b) argues that the non-determinism based on the theory of unmarked vs. marked IM is more explanatory than the determinism along with probe-goal feature checking by Chomsky (2000, 2001). Comparing Yang's (2009, 2011a, 2011b) and Chomsky's (2000, 2001, 2008) claim shows a few differences in their positions as follows:

(17) Differences between Chomsky's and Yang's arguments

	Chomsky	Yang
IM and EM exist	Yes	Yes
EF induces	optional & obligatory movement	optional & obligatory movement
Agree induces	obligatory mvt	None
Two kinds of EF	unmarked/default EF is optionally deletable and marked EF blocks the optional deletion	unmarked EF induces unmarked IM/EM(optional) and marked EF induces marked IM/EM(obligatory)
Move is induced by	feature checking in probe-goal relation or Agree	unmarked and marked EF
Feature inheritance	necessary for movement	not necessary

⁸ Edge feature (EF) is defined in Yang (2011b) as follows:

- (i) EF is an inherent feature of every lexical item.
- (ii) EF is an uninterpretable feature since it is not semantically interpreted; hence if it was not optionally deleted from the beginning, it has to be deleted by being satisfied through merger.
- (iii) A lexical item may have multiple EFs, which can be required by other motivated conditions like theta-structure or the multiplicity of modifiers.

Interpretive effect	D-effects in optional movement	D-effects in optional movement and non-D- effects in obligatory movement
Interpretation occurs	mostly at LF, some at interface	in interpretive system at interface

All in all, Chomskyan grammar has concentrated on narrow syntax, but Yang's theory is supposed to extend grammar to an interpretive system and abandon feature checking. Yang (2011b) shows that his view can embrace in the theory of merge not only optional movements like Clause-Internal Scrambling in Korean as in (18) but also obligatory movements like Subject-Raising in English as in (19).

- (18) a. [_{TP} Mary-ka ppalli chayk-ul_i [_{VP} John-eykey t_i
M.-NOM quickly book-ACC J.-DAT
ponay]-ess]-ta.
send-PAST-DEC
'Mary quickly sent a book to John.'
- b. [_{TP} Mary-ka chayk-ul_i ppalli [_{VP} John-eykey t_i
M.-NOM book-ACC quickly J.-DAT
ponay]-ess]-ta.
send-PAST-DEC
'Mary quickly sent a book to John.'
- c. [_{CP/TP} chayk-ul_i [_{TP} Mary-ka ppalli [_{VP} John-eykey t_i
book-ACC M.-NOM quickly J.-DAT
ponay]-ess]-ta.
send-PAST-DEC
'A book, Mary quickly sent to John.'

Yang claims that all the movements of the object *chayk-ul* 'a book-ACC' in (18) are optional and elicit a D-effect of 'aboutness'/highlighting or focus.⁹ These

⁹ Yang poses the list of interpretive effect of merge under the assumption that every merge induces a (new) interpretation (Chomsky 2008) as follows: D-effects indicate interpretive effects of IM in (b) and non-D effects indicate the interpretive effects of EM in (a).

(a) The interpretive effects of EM : (1) theta effects, (2) modifier/modifiee relations

movements are unmarked IMs induced by unmarked EF. Their interpretive effects share 'aboutness' in (18a, b, c) whereas (18c) carries the D-effect of focus. He assumes that the shared D-effect of 'aboutness' is due to the regular Clause-Internal Scrambling, or a phase-internal Agree-free unmarked IM.

- (19) a. [_{TP} A man_i seems [_{TP} t_i to [_{v*P} be t_i in the room]]].
 b. [_{TP} There_i seems [_{TP} t_i to [_{v*P} be a man in the room]]].

In (19) the marked IM is induced by a marked EF which is realized through blocking the 'optional deletability' of the default unmarked EF on T. The marked EF realized on T will induce the marked IM, i.e., the obligatory movement of *a man* or *there* in (19a, b). Their intermediate links will remain as unmarked IMs if the edge of the embedded TP is also an EPP position as has been claimed. Yang argues that the Agree feature checking does not properly induce the movement in (19b) since the phi-feature in the matrix T should agree with the phi-feature in the subject *a man* and raise *a man* instead of *there*.

On the other hand, Yang (2011b) claims that obligatory movements are rather unusual across languages in the sense that they have to be specified by some special condition like EPP even in the probe-goal feature checking theory. And he analyzes English *wh*-movement through the theory of merge induced by EF. Consider the following: *M* represents a marked EF, and *U* represents an unmarked EF.

- (20) a. What_i do you think [_{CP} t_i that John bought t_i]?
 b. *Do you think [_{CP} what_i (that) John bought t_i]?
 c. [_{CP} *M* [_{IP} do you think [_{CP} *U* that [_{IP} John bought what]

For obligatory movements like English *wh*-movement as in (20a), the matrix C of the sentence should be given a marked EF as presented in (20c), which can block the "optional deletability" and induce the obligatory movement of the *wh*-phrase *what* to the edge of the matrix CP. As for the C head of the embedded CP in (20a, b),

(b) The interpretive effects of IM :

(i) Discourse effects : (1) topic, (2) focus, (3) aboutness, (4) highlighting, (5) givenness, (6) newness
 (ii) Semantic effects : (7) scope, (8) specificity, (9) null effect

it has no reason to be given a marked EF, so it is given an unmarked EF as a default EF, as shown in (20c). Since an unmarked EF does not necessarily induce IM, the unmarked EF given in the embedded C induces optional movement. If it opts for IM, the *wh*-phrase *what* moves to the edge of embedded CP and then to the edge of matrix CP. As the result, the sentence in (20a) is interpreted properly. On the contrary, if the unmarked EF does not opt for IM, the *wh*-phrase *what* cannot be in the position to be moved to the edge of matrix CP, so the sentence cannot be interpreted properly and happens to be ill-formed as in (20b).

Considering the three points I brought in the previous section and adopting Yang's theory, I would try to propose an alternative analysis of parasitic gaps. If the analysis is to be on the right track, it should have two advantages. One is that it should explain more of the properties of parasitic gaps, and the other is that it should be contained in more general principles of UG.

It has been argued in the literature that scrambling can license parasitic gaps as evidence that scrambling is $\bar{A}$ -movement. However, Karimi (2005) shows that scrambling in Persian¹⁰ cannot be considered typical $\bar{A}$ -movement. Conclusively she shows a possibility that $A/\bar{A}$ distinction is not a basic property of UG and this distinction should be determined by the position where XP receives an interpretation, and proposes that UG must allow interpretation based on representation in addition to derivation.

Now we would propose a new perspective on parasitic gaps based on Yang (2009, 2011b). Assuming that a lexical item may have marked/unmarked EF, we can account for parasitic gaps in Korean in the following:

- (21) a. Mary-ka chayk-ul_i ilkci-anhko John-eykey *t_i* ponay-ess-ta.
 M.-NOM book-ACC read NOT J.-DAT send-PAST-DEC
 'Mary sent a book to John without reading.'
 b. chayk-ul_i Mary-ka *pg_i* ilkci-anhko John-eykey *t_i*
 book-ACC M.-NOM read NOT J.-DAT
 ponay-ess-ta.¹¹

¹⁰ Persian has a mixed structure with respect to the head. That is, it is head-final in VP but head-initial in phrases other than VP. Thus Persian can be considered to be in the middle of Korean and English in terms of sentence structure although it belongs to SOV languages.

¹¹ An anonymous reviewer pointed out that a parasitic gap can be licensed in the following sentence even though there is neither movement nor trace:

send-PAST-DEC

'A book, Mary sent to John without reading.'

- c. chayk-ul_i Mary-ka kukes-ul_i ilkci-anhko John-eykey t_i
 book-ACC M.-NOM it-ACC read NOT J.-DAT
 ponay-ess-ta.
 send-PAST-DEC

'A book, Mary sent to John without reading it.'

The initial link in (21a), which is due to EM, is realized as a theta-effect of patient. Then the leftward IM of the object *chayk-ul* 'a book-ACC' in (21a) is induced by unmarked EF on the lexical item, so the movement, the unmarked IM, is optional and induces a D-effect of 'aboutness' or focus. The EF on the lexical item is realized by the D-effect and then deleted. In (21b) when the object *chayk-ul* 'a book-ACC' opts for unmarked IM once more since a lexical item may have multiple EFs, it happens to license a parasitic gap. (21c) shows that Korean parasitic gaps are optional and can be replaced by a resumptive pronoun. Since the matrix C or T does not have a marked EF in Korean unlike English, there is no reason that (21c) is not interpreted properly.

However, things are a little different in the following example.

- (22) a. [?]*[t_i hanpen e_j pon] salam_i-i nwukwu_j-lul
 once saw person-NOM who-ACC
 chayyonghay-ss-ni?
 employ-PAST-Q
 'Who_j did the person that saw e_j once employ t_j '
 b. ^{??}[t_i hanpen nwukwu_j -lul bon] salam_i-i t_j
 once who-ACC saw person-NOM
 chayyonghay-ss-ni?
 employ-PAST-Q

i) Mary-ka *pg* ilkci-anhko John-eykey chayk-ul ponay-ess-ta.

However, it seems to me that the gap in this sentence is not a parasitic gap since it is not parasitic to a real gap. I am aware that a solution to parasitic gaps in Korean is a very complicated subject matter and going to do further research to investigate whether a distinction of real/pseudo parasitic gaps is necessary in Korean.

- 'Who_j did the person that saw *e_j* once employ *t_j*'
 c. *nwukwu_j -lul* [*t_i hanpen p_{g_j} bon*] *salam_i-i t_j*
 who-ACC once saw person-NOM
chayyonghay-ss-ni?
 employ-PAST-Q
 'Who_j did the person that saw *p_{g_j}* once employ *t_j*'
 d. *nwukwu_j -lul* [*t_i hanpen ku_j-lul bon*] *salam_i-i t_j*
 who-ACC once he-ACC saw person-NOM
chayyonghay-ss-ni?
 employ-PAST-Q
 'Who_j did the person that saw him_j once employ *t_j*'

In (22a), the EM of the object *nwukwu-lul* 'who-ACC' is realized as a theta-effect of patient. If we allow interpretation based on representation, the subject [*t_i hanpen e_j pon*] *salam_i-i* 'the person who saw once' has two empty categories. Since empty categories do not have any EF, the subject with multiple empty categories cannot receive an interpretation. What (22b) shows is that the subject can be interpreted if an empty category is filled by the unmarked IM induced by unmarked EF on the lexical item.¹² Then as we see in (22c) when the object *nwukwu-lul* 'who-ACC' opts for unmarked IM once more since a lexical item may have multiple EFs, it happens to license a parasitic gap. The optionality of Korean parasitic gaps shown in (22d) is explained by the same way as shown in (21c).

Here we may assume that a lexical item with *wh*-element has a marked EF, so the object *nwukwu-lul* 'who-ACC' has a marked EF and the marked EF induces a marked IM. Otherwise it cannot obtain a proper interpretation as in (22a). If we suppose that a lexical item with *wh*-element has a marked EF, it appears that syntactic *wh*-movement takes place. This assumption is indirectly compatible with Lin's (2005) argument that syntactic *wh*-movement is an essential condition for licensing of parasitic gaps in Chinese. However, It is widely assumed that Korean and Chinese have zero *wh*-movement typologically, so the argument for syntactic

¹² An anonymous reviewer threw doubt on the acceptability of the sentence (22b) and pointed out that the sentence needs a resumptive pronoun in the position of the trace of the moved *wh*-phrase if it is to be acceptable. If we note that (22b) is in the course of licensing parasitic gaps, the acceptability does not undermine the argumentation of the present paper. I comply with the reviewer's intuition in some degree and put two question marks in front of the sentence (22b).

wh-movement is more risky than otherwise argument. Furthermore, the optionality in Korean parasitic gaps cannot be explained under this assumption; thus we drop the assumption.

Now let us consider whether this analysis can be applied to parasitic gaps in Persian. According to Karimi (2005:53), Persian can also generate parasitic gaps by long-distance scrambling of *wh*-phrase and clause-internal scrambling of an object. Consider the following:

- (23) a. *kodum ketâb-ro_i Kimea fekr mi-kon-e Rahjue*
 which book-râ K think dur-do-3sg R
[bedune-inke pro e_i be-xun-e] t_i be ketâbxune pas-dâd.
 without that subj-read-3sg to library returned
 'Which book does Kimea think Rahjue returned to the library
 without reading.'
- b. *Kimea [bachche-hâ-ro_i] [qhablaz-inke [pro e_i be kelâs*
 K child-pl-râ before that to class
be-ferest-e]] be hamdige t_i mo'arrefi kard.
 subj-send-3sg to each other introduction did
 'Kimea introduced the children to each other before sending (them)
 to class.'

The sentences in (23) can be accounted for as follows. The leftward IM of the *wh*-phrase *kodum ketâb-ro* 'which book-ACC' in (23a) is induced by unmarked EF on the lexical item, so the movement, the unmarked IM, is optional and induces a D-effect of focus. As a result of the movement, (23a) happens to license a parasitic gap. Similarly (23b) can be explained that the leftward IM of the specific object *bachche-hâ-ro* 'child-pl-ACC' is induced by unmarked EF, so the movement is also optional and induces a D-effect of focus. Consider the following example:

- (24) a. **mardi_i ke [t_i yek bâr e_j dide] che kasi-ro_j*
 man that one time saw what person-ACC
estexdâm kard.
 employment did
 'Who_j did the person that saw e_j once employ t_j'

- b. *mardi_i ke [t_i yek bâr che kasi-ro_j dide] t_j*
 man that one time what person-ACC saw
estexdâm kard.
 employment did
 'Who_j did the person that saw e_j once employ t_j'
- c. *che kasi-ro_j mardi_i ke [t_i yek bâr pg_j dide] t_j*
 what person-ACC man that one time saw
estexdâm kard?
 employment did
 'Who_j did the person that saw e_j once employ t_j'
- d. *che kasi-ro_j mardi_i ke [t_i yek bâr uw-ro_j dide] t_j*
 what person-ACC man that one time he-ACC saw
estexdâm kard?
 employment did
 'Who_j did the person that saw e_j once employ t_j'

In (24a), the EM of the object *che kasi-ro* 'what person-ACC' is realized as a theta-effect of patient. If we allow interpretation based on representation, the subject *mardi_i ke [t_i yek bâr e_j dide]* 'the person who saw once' has two empty categories. Since empty categories do not have any EF, the subject with multiple empty categories cannot receive an interpretation. In (24b) the subject can be interpreted if an empty category is filled by the unmarked IM induced by unmarked EF on the lexical item. In (24c) when the object *che kasi-ro* 'what person-ACC' opts for unmarked IM once more since a lexical item may have multiple EFs, it happens to license a parasitic gap. The optionality of parasitic gaps in Persian can also be explained. If we assume that the matrix C or T does not have a marked EF in Persian, there is no reason that (24d) is not interpreted properly. Thus we can explain parasitic gap constructions in Persian by the same way as we do in Korean.

We have seen that non-determinism does not involve any problem with the intermediate link of the successive-cyclic movement in narrow syntax. Instead two assumptions are necessary to explain parasitic gap constructions in Korean and Persian. One is that the matrix C does not have a marked EF. The other is that a lexical item can have multiple EFs. The former may apply to *wh*-in-situ languages whereas the latter is one of the definitions of EF as in fn. 8. The second assumption

is an extension of the usage of multiple EFs in that it is required by motivated conditions like optionality of the positions of *wh*-phrases in explaining parasitic gap constructions in Korean and Persian.

As shown so far, Yang's theory seems to be more effective in explaining so-called optional movements in head-final languages by assuming marked/unmarked IM induced by marked/unmarked EF on the lexical item. The interpretive system at the interface judges the acceptability of sentences, so we can eliminate many problems and controversies in syntax-centered determinism. Furthermore non-deterministic theory is likely to entertain the issues found in neurolinguistic field and advance toward interdisciplinary research.

5. Concluding Remarks

Yang's new perspective that the unmarked IM should be the norm whereas the marked IM should be exceptional is so attractive as to attempt to analyze parasitic gaps with it. Moreover this view seems to be compatible with three points I adopted from neuroscientific findings. They are: first, elemental concepts of linguistics should become more general and simple to fit into those of neuroscience according to the Granularity Mismatch Problem by Poeppel and Embick (2005); second, parasitic gap constructions are as normal and real as island phenomenon according to Phillips (2006); third, language comprehension in the human brain requires combinatory and highly interactive operations between syntactic and semantic cues (Kim and Sikos, in press).

In accordance with these thoughts I have noticed Yang's (2009, 2011b) non-deterministic interpretation-based theory of merge and applied it to the analysis of parasitic gaps in Korean and Persian. The non-deterministic theory of merge can explain the optional movements in Korean and Persian. Whether the character of parasitic gap is a trace or a pronominal does not matter in interpretation-based theory. And we can dispense with many problems in syntax-centered determinism.

Despite these advantages, a criticism can be raised that the theory seems too powerful and permissive. In addition to Subacency, which Yang(p.c.) assumes as it is, other basic conditions or constraints should be motivated in the theory so as to explain parasitic gap constructions in other languages like English. Much more

research should be done to refine constraints or conditions on the interpretation-based theory of merge.

References

- Agbayani, Brian and Ochi, Masao. 2007. Split lexical insertion in parasitic gap constructions. Ms. California State University, Fresno.
- Assmann, Anke. 2011. The island paradox with parasitic gaps. Ms. University of Leipzig.
- Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2000. Minimalist inquiries: The framework. In *Step by step: Essays in minimalist syntax in honor of Howard Lasnik*, eds. M. Roger, D. Michaels, and J. Uriagereka, 89-155. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2001. Derivation by phase. In *Ken Hale: A life in language*, ed. M. Kenstowicz, 1-52. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2004. Beyond explanatory adequacy. In *Structures and Beyond: The Cartography of Syntactic Structures*, Vol 3. ed. A. Belletti, Oxford: Oxford University Press.
- Chomsky, Noam. 2008. On phases. In *Foundational Issues in Linguistic Theory*, eds. R. Freidin, C. P. Otero and M. L. Zubizarreta, 133-166. Cambridge, MA: MIT Press.
- Cinque, Guglielmo. 1990. *Types of $\bar{A}$ -dependencies*. Cambridge, MA: MIT Press.
- Contreras, Heles. 1984. A note on parasitic gaps. *Linguistic Inquiry* 15: 698-701.
- Culicover, Peter W. 2001. Parasitic gaps: A history. In *Parasitic Gaps*, eds. P. Culicover and P. Postal, 3-68. Cambridge, MA: MIT Press.
- Engdahl, Elisabet. 1983. Parasitic gaps. *Linguistics and Philosophy* 6: 5-34.
- Gouvea, Ana, Phillips, Colin and Kazanina, Nina and Poeppel, David. 2010. The linguistic processes underlying the P600. *Language and Cognitive Processes* 25: 149-188.
- Hudson, Richard A. 1984. Multiple (alias 'parasitic') gaps. Ms. University of College London.
- Karimi, Simin. 2005. *A Minimalist Approach to Scrambling: Evidence from Persian*. Mouton De Gruyter.
- Kayne, Richard. 1983. Connectedness, *Linguistic Inquiry* 14: 223-250.
- Kim, Albert and Sikos, Les. in press. Conflict and surrender during sentence processing: An ERP study of syntax-semantics interaction. *Brain & Language*.
- Kim, Soowon and Lyle, James. 1996. Parasitic gaps, multiple questions, and VP ellipsis. *The Proceedings of the Fourteenth West Coast Conference on Formal Linguistics*, 287-301.

- Kutas, Marta and Hillyard Steven A. 1980. Reading senseless sentences: Brain potentials reflect semantic congruity. *Science* 207: 203-205.
- Lee, Hyeran. 2006. A study on scrambling in Korean: The minimalist approach. *Studies in Generative Grammar* 16: 425-460.
- Legate, Julie A. 2003. Some interface properties of the phase. *Linguistic Inquiry* 34: 506-516.
- Lin, Jonah. 2005. Does wh-in-situ license parasitic gaps? *Linguistic Inquiry* 36: 298-302.
- Marantz, Alec. 2005. Generative linguistics within cognitive neuroscience of language. *The Linguistic Review* 22: 429-445.
- Nissenbaum, Jonathan. 2000. *Investigations of Covert Phrase Movement*. Doctoral dissertation, MIT.
- Osterhout, Lee and Holcomb, Phillip J. 1992. Event-related brain potentials elicited by syntactic anomaly. *Journal of Memory and Language* 31: 785-806
- Phillips, Colin. 2006. The real-time status of island phenomena. *Language* 82: 795-823
- Poeppel, David and Embick, David. 2005. Defining the relation between linguistics and neuroscience. In *Twenty-first century psycholinguistics: Four cornerstones*. ed. A. Cutler Mahwah, NJ: Laurence Erlbaum Associates, Inc.
- Postal, Paul M. 1993. Parasitic gaps and the across-the-board phenomenon. *Linguistic Inquiry* 24: 735-754.
- Ross, John Robert. 1967. *Constraints on Variables in Syntax*. Doctoral dissertation, MIT.
- Yang, Dong-Whee. 2009. Edge feature, D-effects, and movement. *Studies in Generative Grammar* 19: 93-142.
- Yang, Dong-Whee. 2011a. On the notion of feature inheritance. *Studies in Generative Grammar* 21: 141-154.
- Yang, Dong-Whee. 2011b. The non-determinism and the notion of merge. In *Parameters in Language Design*, ed. S-M Hong, 419-471. The Korean Generative Grammar Circle.

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