

# Phase Cycles in Service of Projection-free Syntax

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## 1 Introduction: Towards Projection-free Bare Phrase Structure

The theory of *bare phrase structure* advanced by (Chomsky 1994 *et seq.*) holds that the compositional structure of human-language expressions is exhaustively characterized by recursive application of *Merge*.<sup>1</sup> Merge is a binary set-formation operation that takes two syntactic objects (SOs), say  $\alpha$  and  $\beta$ , and creates a set  $\{\alpha, \beta\}$ . Since no known condition of set theory requires that sets are associated with ‘labels’ or distinctive nonterminal symbols, only stipulations can guarantee assignment of any such extraneous entities to set-theoretic objects generated by Merge. Correspondingly, the representation of labels in bare phrase structure is a plain departure from the strong minimalist thesis (SMT), subsidiary enrichment of UG (Chomsky 2007:23; see also Collins 2002, Seely 2006). Then, we must ask if there is any strong empirical motivation that demands the theory of syntax to provide a distinct mechanism of labeling separate from the operation Merge.

The sixty years of research in the generative tradition have cemented linguists’ convention of drawing labeled tree-diagrams. The idea of labeled phrase structure owes its origin to the earlier transformational grammar advanced by Chomsky (1955/1975, 1957, 1965), in which it was assumed that base structures of sentences are generated by the system of *phrase structure rules* (PSRs), each of which takes a nonterminal symbol (such as NP, VP, and S) as its input and expands it into a string of terminal and/or nonterminal symbols. The PSR-based conception of phrase structure thus holds that all phrasal SOs are labeled by such nonterminal symbols as a necessary consequence of compositional structuring. The *X-bar theory* developed by Chomsky (1970 *et seq.*) further advances the idea that assignment of labels to phrasal nodes is achieved by *projection* of the features of  $X^0$  up to the categories of  $X'$  and  $X''$ . According to this conception of labeled phrase structure, nonterminal labels like  $X'$  and  $X''$  are ‘projections’ of  $X$ :  $N'$  is an intermediate projection of  $N$ ,  $V''$  is the maximal projection of  $V$ , and so on. The class of possible labels is thus radically reduced to the combination of locally projected features of lexical items and bar-level indices under this hypothesis, but the concept of labeled phrase structure was essentially carried over from PSRs by and large intact.

It should be acknowledged that the hypothesized feature-percolation via bar-level projections is proposed in the X-bar theory as a device to capture the *endocentricity* (*headedness*) of phrase structure, a basic fact of human language that the interpretive and/or distributional properties of a phrase  $\Sigma$  are largely determined by the features of a prominent lexical item within  $\Sigma$  (referred to as the *head* of  $\Sigma$ ). One may argue that labeling by projection is still necessary even in bare phrase structure to capture the facts about endocentricity. However, such an argument would go through only if it is further shown that labeling by projection is *the* necessary device of commendable theory-internal simplicity to encode endocentricity. This was arguably the case in the earlier PSR-based syntax, where labels were anyway generated as a necessary component of compositional structuring, but not any more in bare phrase structure, where labeling is bound to be a departure from the SMT, as we saw above. In this context, it should be noted that there are some proposals regarding the account of endocentricity that

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make little to no recourse to labeling by projection. For example, I contend that the series of work by Chomsky (2000, 2008) can and should be understood as paving the way for the projection-free account of endocentricity: Chomsky (2000) hypothesizes that determination of the head of a set-theoretic object  $\{\alpha, \beta\}$  correlates with selectional or probe-goal dependency between  $\alpha$  and  $\beta$ , an idea followed by a number of researchers. Under this proposal,  $\{\alpha, \beta\}$  is headed by (the head of)  $\alpha$  if  $\alpha$  selects or probes  $\beta$ . Collins (2002) is right in pointing out that this sort of selection/probe-based mechanism can be adapted to encode the centrality of ‘head’ LIs without making recourse to labels/projections, and his locus principle is a particular attempt to pursue this line of approach. Still after the selector/probe-based mechanism of head-detection became unavailable due to the elimination of selection from the theory of narrow syntax (Chomsky 2004:112-113; see also Pesetsky 1982), Chomsky (2008) puts forward another algorithm of head-detection (still misleadingly called the ‘labeling algorithm’) whereby  $\{\alpha, \beta\}$  is headed by (the head of)  $\alpha$  if (i)  $\alpha$  is an LI, or (ii)  $\beta$  is internally merged to form  $\{\alpha, \beta\}$ . Chomsky (p.c., lectures at MIT in fall 2010) further suggests to eliminate (ii) from this algorithm, reducing head-detection to minimal search of an LI for each phrase (i), a proposal to which we will return in §4.1 (see also Piattelli-Palmarini et al. 2009:52ff). See Narita (2011) for much more detailed exploration of projection-free minimal head-detection. See also Narita (2009a) for a different approach. These are all attempts to account for endocentricity without reference to any extraneous mechanism of projection, maximally respecting the SMT.<sup>2</sup>

Building on the prospect of the projection-free approaches to endocentricity, this article aims to make a step toward constructing a theory of bare phrase structure without labeling/projection. It will be argued in this article that, when coupled with the theory of phases adapted from Chomsky (2000 *et seq.*; see also Uriagereka 1999), projection-free syntax is indeed superior to projection-bound syntax both in terms of empirical coverage and theory-internal simplicity.

## 2 The H- $\alpha$ schema in Projection-free Syntax

In order to approach projection-free syntax, I will start our discussion by examining how the notion of labeling/projection is employed in the framework of bare phrase structure. It will be specifically pointed out that, despite his remark that labeling/projection is possibly a dispensable notion, Chomsky’s theory of syntax nonetheless fails to eradicate recourse to projection, most notably that of the so-called ‘edge-feature’ of lexical items.

### 2.1 Lexical Items and the Edge-feature

Any computational system of discrete infinity such as human language has to assume a recursively applicable generative mechanism, whose simplest formulation is represented by Merge. However, in order for syntax to even start applying Merge at all, there must exist some elements which can constitute input to Merge and are themselves not constructed by Merge. Such SOs constitute computational ‘atoms’ of the Merge-based recursive generation of SOs. Following Chomsky (2007, 2008), let us call these SOs *lexical items* (LIs). How the human mind can create LIs at all is an open empirical question (see §4.2), but at the very least, each LI must be associated with a property that permits it to be subjected to Merge. Chomsky calls this property the *edge-feature* (EF) of the LI. The hypothesis that LIs can be subjected to Merge is an ineliminable

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<sup>2</sup>Note also that there are some proposals on somewhat less local instantiations of feature-projection, such as WH-feature-percolation (Nishigauchi 1990b and others) and focus-projection (Selkirk 1995 among others). These mechanisms are again residues of earlier labeled phrase structure, and various proposals have been made to overcome the relevant descriptive demands without making recourse to projection: see Cable (2007, 2010) and the following discussion for the Q-based account of WH-dependency; see also Uriagereka (2008) and Irurtzun (2006, 2007) for some suggestive approaches to focus.

assumption for any theory of human language, and this hypothesis can be justifiably restated as that LIs are associated with the EF. Then, we can postulate as an axiom of our theory of syntax that there exist LIs with EFs. Adopting the standard terminology, we define the *lexicon* as a component of human language that stores LIs and hands them to syntactic computation.

Minimally, the EF is a feature that enables LIs to be subjected to Merge. What is a natural hypothesis that derives this effect? Regarding the characterization of EFs, Chomsky (2008) specifically provides the following remark.

“For an LI to be able to enter into a computation, merging with some SO, it must have some property permitting this operation. A property of an LI is called a *feature*, so an LI has a feature that permits it to be merged. Call this the *edge-feature* (EF) of the LI. ... When merged with a syntactic object SO, LI forms {LI, SO}; SO is its complement. The fact that Merge iterates without limit is a property at least of LIs—and *optimally, only of LIs*, as I will assume.” (Chomsky 2008:139, emphasis mine)

Here, Chomsky states that (1) is the effect that any conception of EFs should capture.

(1) The EF is the feature that permits its bearer to be merged with some SO.

One way to make sense of (1) is to assume that the EF is the feature that constitutes the locus, or trigger, of Merge-application, a formulation reminiscent of the earlier ‘EPP-feature’ of Chomsky (1995) that states, “I need a specifier.” Generalizing to the merger of ‘complement’ along the line suggested by Chomsky, we may say that the EF is the property of LIs that states, “I may have a sister.”

More importantly, Chomsky also proposes a rather strong hypothesis regarding the distribution of EFs, which is (2):

(2) The EF is a property only of LIs.

I agree with Chomsky in regarding (1) and (2) as a minimal set of assumptions. As stated above, the assumption that LIs are associated with EFs is ineliminable, since otherwise Merge cannot even start assembling LIs. However, once we grant the association of EFs with LIs, no further stipulation is necessary to ensure compositional structuring. Thus, without any such stipulation, it is LIs and only LIs that are associated with EFs with the property (1), as I will assume in this article. I will also provide some further discussion in §4 as to *why* UG is particularly designed to assign these properties (but not others) to the EF of LIs.

It should be noted that once we adopt (2), (3) arises as a logical consequence, inevitable unless some further UG-enriching stipulation is provided:

(3) No phrases (non-LIs) have EFs.

As an illustration, imagine a simple derivation where syntax operates Merge on two LIs, say X and Y. Both of these LIs are associated with EFs, so both of them can be merged with the other. The result is a set comprising them, {X, Y}. Importantly, the resultant SO is not an LI, thus by assumption (2), this phrasal SO is precluded from having an EF. This situation can be schematized as in (4), where the subscript *e* stands for the EF:

(4)  $X_e + Y_e \mapsto \{X_e, Y_e\}$   
Merge (\*{ $X_e, Y_e$ })<sub>e</sub>

The absence of EFs should be true for any phrase (non-LI) in general.

Now, let me point out that, by the combination of (1) and (2)/(3), we are forced to conclude (5):

- (5) Only LIs are permitted to be merged with some SO.

That is, any instance of Merge must take an LI as at least one of its inputs, utilizing its EF as a locus of the Merge operation combining it with the other SO. That is, all instances of Merge obey the form  $\{H, \alpha\}$ , where H is an LI and  $\alpha$  is an SO. I will refer to this constraint, which is in itself just a direct consequence of (2), as *the H- $\alpha$  schema*.

- (6) The H- $\alpha$  schema:  $\text{Merge}(H, \alpha) \rightarrow \{H, \alpha\}$ .  
Merge must take at least one LI as its input.

The H- $\alpha$  schema (6) requires that at least one of the Merge-mates be an LI for any instance of Merge. Note that the H- $\alpha$  schema makes a very strong prediction (7):

- (7)  $\ast\{XP, YP\}$ : No two phrases (non-LIs) can be merged.

At face value, this prediction seems to be contrary to the observation that instances of ‘XP-YP structures’ seem to be abundant in natural languages, and to be falsified by simple sentences like [[the man] [kissed the girl]]. Then, at first glance, the simplest hypotheses regarding EFs cannot be sustained.

Interestingly, Chomsky (2007) in effect avoids this ‘XP-YP’ problem by making recourse to labeling/projection. He notes,

“If an element Z (lexical or constructed) enters into further computations, then some information about it is relevant to this option: at the very least, a property that states that Z can be merged [i.e., an EF, HN], but presumably more, it is commonly assumed. The optimal assumption is that this information is provided by a designated minimal element of Z, a lexical item W (Z itself, if it is an LI), which is detectable by a simple algorithm; the *label* of Z, the head projected in X-bar theories.” (*ibid*, 9)

Chomsky claims here that there is a ‘simple algorithm’, called the labeling algorithm in Chomsky (2008), that can identify for an SO Z a designated minimal LI within Z that provides for Z, among other things, the property that states that Z can be merged with some SO, namely the EF with the properties (1) and (2). Simply put, the hypothesis put forward by Chomsky is that the EF is projected from designated LIs to phrasal SOs.

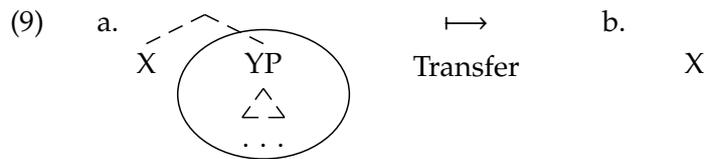
- (8) The EF for a phrasal/non-LI SO is projected from a designated LI (i.e., the label) of that SO.

Chomsky regards (8) as necessary if one would like to make room for XP-YP merger applying in narrow syntax, while sticking to the hypothesis that the EF is a property only of LIs. As soon as one adopts this hypothesis, however, one must posit some algorithm of projection/feature-percolation, hence departing from the SMT. In effect, Chomsky’s adoption of (8) can be regarded as a residue of earlier theories of labeled phrase structure, constituting a major obstacle on the road to achieving a truly projection-free syntax.

## 2.2 Phase Cyclicity and $\ast\{XP, YP\}$

Instead of admitting (8) into the theory of syntax, however, I will claim in the rest of the present article that the H- $\alpha$  schema (6) (or  $\ast\{XP, YP\}$  (7)) can be nevertheless sustained in projection-free syntax, if we adopt the idea that interpretation by CI and SM proceeds cyclically phase by phase (Chomsky 2001, 2004, 2008; see also Uriagereka 1999). Stated in the now familiar terminology introduced by Chomsky (2000 *et seq.*), a *phase* is an SO whose completion immediately triggers *Transfer*, an ‘interfacing’ operation which cyclically strips off the interior of the phase, sending it to the interfaces with CI and SM. For example, if a phase head X takes a phrase YP as its

sister, Transfer eliminates YP from the derivational workspace at the completion of the phase headed by X, and subjects it to interpretation by CI and SM.

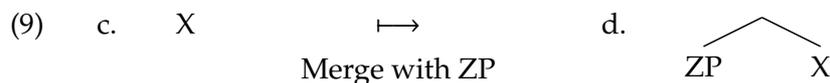


Chomsky specifically hypothesizes that Transfer has the effect of reducing the computational load in the derivational workspace by rendering the phase-interior domain inaccessible for further syntactic operations in later cycles, what he calls the *Phase-Impenetrability Condition* (PIC). I will assume with Chomsky (2008:143) that the PIC arises because the phase-interior subjected to Transfer will be literally ‘forgotten’, i.e., eliminated from the derivational workspace. In order to achieve this effect for computational efficiency, Transfer should be able to ship off to CI- and SM-interpretation not only YP and elements within it but also all the syntactic relations (sister-of, term-of, c-command, etc.) established with regard to them. I will specifically assume that the information subjected to Transfer includes the information that YP has undergone Merge with X and formed {X, YP}.<sup>3</sup> Thus, after Transfer applying to a phase {X, YP}, only the phase head X itself will be left for further computation.

A question arises as to how different this resultant ‘bare LI’ X is before and after the application of Transfer. This is an open question, but one thing for sure is that such an LI is still syntactically accessible as a matter of fact. In particular, it should be able to constitute further input to Merge even after Transfer. This state of affairs can be naturally captured by adopting Chomsky’s (2007, 2008) hypothesis that the EF of LIs is uniformly undeletable throughout the derivation in syntax (Chomsky 2007:11).

(10) The EF is undeletable throughout the derivation in syntax for all LIs.

Thus, after Transfer, nothing precludes X from utilizing its EF again to be merged to some SO, say ZP, in a way that still conforms to the H- $\alpha$  schema.

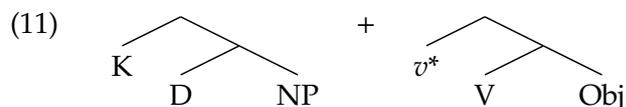


In the bare phrase structure framework where *complement* and *spec(ifier)* mean nothing more than *first-merged* and *later-merged* (Chomsky 1994 *et seq.*; see Chomsky 2007:11), this ‘second-merged’ ZP counts as a specifier of X, informally speaking. Given these considerations, I will assume that a phase head X, upon completion of X’s phasal computation, can still be merged with some other SO, due to the undeletability of EFs, and that this in effect provides room for apparent XP-YP merger.<sup>4</sup>

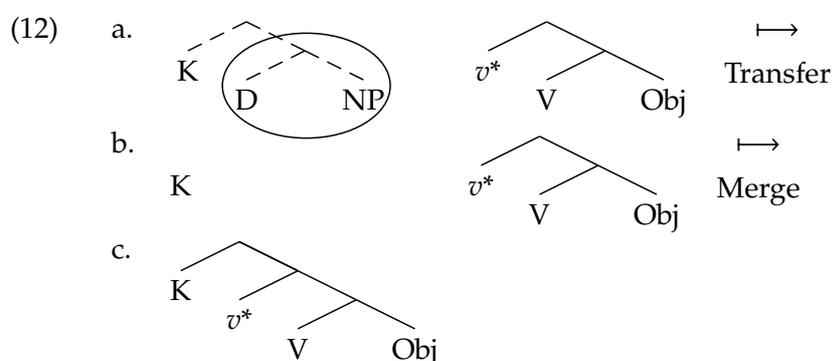
<sup>3</sup> See Narita (2011) for argument. As pointed out by Boeckx and Grohmann (2007) among others, CI and SM will need to ‘recombine’ separately Transferred bits of structures, in order to achieve the full-fledged compositional interpretation. To take the case in (9) as an example, CI and SM should be able to know that YP and X, though separately Transferred, will be recombined at SEM and PHON, respectively. Narita (2011) claims that this is achieved simply by subjecting to Transfer YP as well as the information that YP has previously combined with X by Merge, forming {X, YP}. As for the CI side, most of the theories of semantics proposed in the literature suggest that this is indeed all CI need to know for compositional interpretation, whether the prototypic interpretive rule is Function Application (Heim and Kratzer 1998) or Conjunction (Pietroski 2005, 2008); see also Hinzen (2006), Uriagereka (2008), Narita (2009b). As for the SM side, see Narita (2011) for exploration of the mechanism of linearization.

<sup>4</sup>The idea that Transferred phases count as atomic elements has been proposed in various places. For example, Uriagereka (1999) and Nunes and Uriagereka (2000) propose that Transfer/Spell-Out has the effect of eliminating all but the topmost label of an XP from the derivational workspace. This proposal been adopted by, e.g., Sheehan (in press) among others. However, it should be clear from the present discussion that I am here explicitly departing from their label-based conception of the ‘atomization’ effect of Transfer. Instead of making recourse to labeling/projection, I am claiming here that the relevant atomizing effect arises simply as a result of eliminating not only the phase-

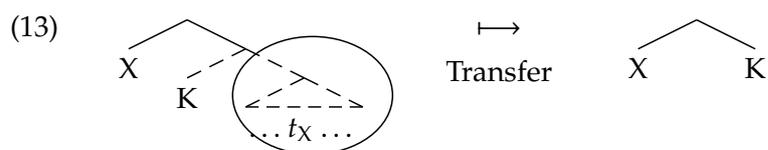
Consider, e.g., the merger of the external argument to the edge of  $v^*$ , a typical instance of apparent ‘XP-YP’ external merger. For reasons to be discussed, I will adopt the hypothesis that nominals are phases headed by the functional category K(ase) with an unvalued Case-feature (Bittner and Hale 1996a, Asbury 2008, Caha 2009 and references cited therein).



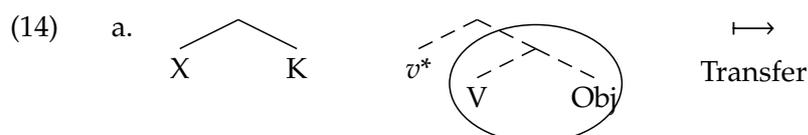
Such an instance of external Merge as such would be precluded by the H- $\alpha$  schema. However, if syntax can make use of Transfer and reduce at least one of the ‘XPs’ to a simplex LI, the external merger can be achieved without violating the H- $\alpha$  schema. For example, if we adopt the assumption that K can constitute its own phase, as I will, Transfer applying at the completion of the K-phase strips off all the structural information related to K’s complement {D, NP} to the interfaces, including the ‘merged-with’ relation that it holds with K. After the Transfer of {D, NP}, K in effect becomes a bare LI and can be merged to  $\{v^*, \{V, \text{Obj}\}\}$  while still conforming to the H- $\alpha$  schema. This derivation is sketched in (12).



It should be noted that Transfer of K’s complement does not always ensure the reduction of the K-phase to a simplex LI. For example, if some element X internal to the nominal undergoes successive cyclic WH-movement to the edge of K, resulting in a syntactic object  $\Sigma = \{X, \{K, [Y_P \dots t_X \dots]\}\}$  (with  $t_X$  a copy of X), Transfer of K’s complement YP only reduces  $\Sigma$  to  $\{X, K\}$ , which is still phrasal.

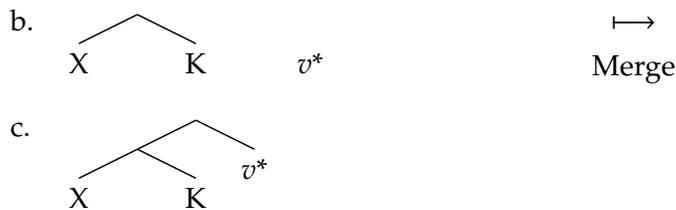


However, if we adopt the now standard assumption that  $v^*$  with a transitive verb is a phase head, and has an ability to Transfer its complement (Chomsky 2000, 2001, 2008), this Transfer can strip off all the structural information related to its complement  $\{V, \text{Obj}\}$  to the interfaces, including the one that it is merged with  $v^*$ . Thereby, it reduces the  $v^*$ -phase to a bare LI  $v^*$  that can utilize its EF for further application of Merge, say one with the phrase in (13).



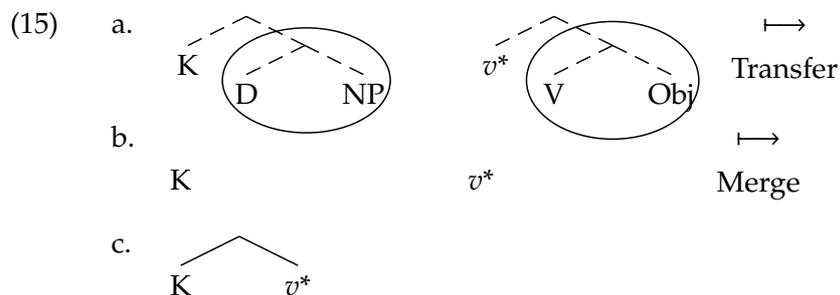

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interior XP but also the ‘constitute’ relation it has established with the phase head H by forming  $\{H, \text{XP}\}$ . See Narita (2011) for further argument.



In (14), Transfer of {V, Obj} by  $v^*$  (14a) in effect enables  $v^*$  to be merged with the subject KP.

Incidentally, I will refrain from the characterization of  $v^*$ -phase as the domain of fully realized argument structure: see Narita (2011) for argument. I will specifically assume that the external argument can be merged with  $v^*$  and receive the agent/causer  $\theta$ -role from  $v^*$  before or after Transfer has applied to the complement of  $v^*$ .<sup>5</sup> Thus, it should also be possible that both of the phases in (11) undergo reduction by cyclic Transfer prior to the application of external Merge.

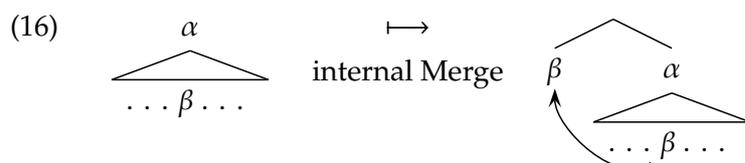


In a nutshell, apparent cases of XP-YP (external) merger are still susceptible to derivations complying with the H- $\alpha$  schema, as long as at least one of the two XPs is a phase without an edge and thus can be reduced by Transfer to a simplex LI. This points to a more general conclusion that cyclic Transfer is crucially in service of recursive structure-embedding by Merge.

### 2.3 Internal Merge and the H- $\alpha$ Schema

In bare phrase structure, the movement transformation is reduced to *internal Merge (remerge)*, which creates a new occurrence of the moving element to the edge of the target phrase. Internal Merge leaves a copy of the former in its original position, thus it yields the *remerge/copy theory of movement* (Chomsky 1993, 1995). Internal Merge comes as free as external Merge, since only stipulations can preclude Merge from taking as its input either two independently constructed SOs (external Merge) or two SOs one of which is contained within the other (internal Merge) (Chomsky 2004, 2007, 2008). Our discussion so far was restricted to cases of external Merge, but the H- $\alpha$  schema should apply to cases of internal Merge as well.

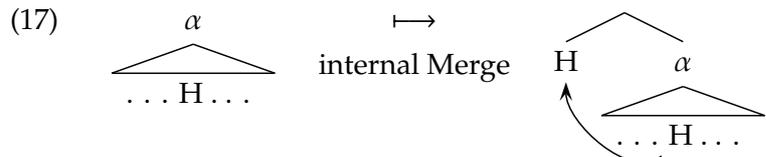
Consider a case of internal merger of  $\beta$  to the edge of  $\alpha$ , as schematized in (16).



Here,  $\alpha$  contains an original occurrence of  $\beta$ , and the application of internal Merge creates another occurrence of  $\beta$  to the edge of  $\alpha$ , leaving the copy of  $\beta$  in its original position. How can such an application of internal Merge comply with the H- $\alpha$  schema? Crucially, note that  $\alpha$  here is by definition a phrasal/non-LI syntactic object, given the very fact that it contains an occurrence of another syntactic object, namely  $\beta$ . Then, it follows from the H- $\alpha$  schema that

<sup>5</sup>See Marantz (1984) for the idea that external  $\theta$ -roles are assigned by VP.

the moving element, namely  $\beta$ , must always be an LI, since instances of XP-YP merger are precluded by the H- $\alpha$  schema as we saw above. Thus, any instance of internal Merge must actually take the following form, where  $\beta$  is restricted to an LI (H).



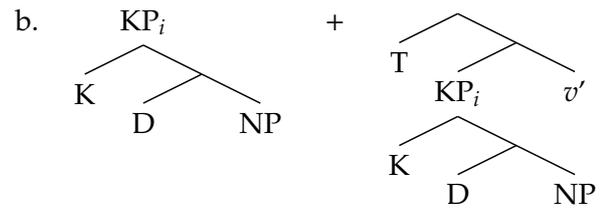
We are thus forced to conclude (18):

(18) Only LIs can undergo internal Merge.

Prima facie, any instance of 'XP'-movement would seem to falsify (18). However, recall that the previous section points to the conclusion that apparent cases of XP-YP merger are still compliant with the H- $\alpha$  schema, as long as either one of the two XPs can constitute its own phase without an edge, utilizing cyclic Transfer to render the phase head an LI with an EF. The same should hold for cases of internal Merge, too.

Thus, for example, consider a case of A-movement in (19a), where apparent 'XP-YP' internal merger in (19b) applies.

(19) a. [*The boy*]<sub>i</sub> t<sub>i</sub> hit Mary.

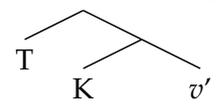


Although XP-YP merger is excluded by the H- $\alpha$  schema, note that the moving constituent is by assumption headed by a phase head K. Suppose that as early as the completion of the K-phase, the complement of K gets Transferred, rendering the subject KP a bare LI K. Then, what T attracts in the later derivational step is just a 'bare head' K. K can move to the 'EPP' position while still conforming to the H- $\alpha$  schema. The relevant derivation is sketched below.

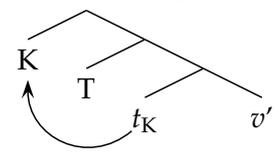
(20) a. Transfer of {D, NP} at the completion of the K-phase.



b. Recursive Merge builds T'.



c. Internal Merge



I propose that cases of A-movement are actually analyzed as involving internal Merge of a phase-head LI K.

Note that the interior  $\Sigma$  of the K-phase surfaces at the moved position. I contend that  $\Sigma$  gets interpreted as a sister of K by CI and SM (20a), prior to the application of internal Merge (20c) (see note 3 for relevant argument), which accounts for the fact that  $\Sigma$  gets pronounced in proximity to an occurrence of K. What remains to be explained is the fact that the highest occurrence is typically chosen to be pronounced in association with  $\Sigma$  (see Nunes (2004) for

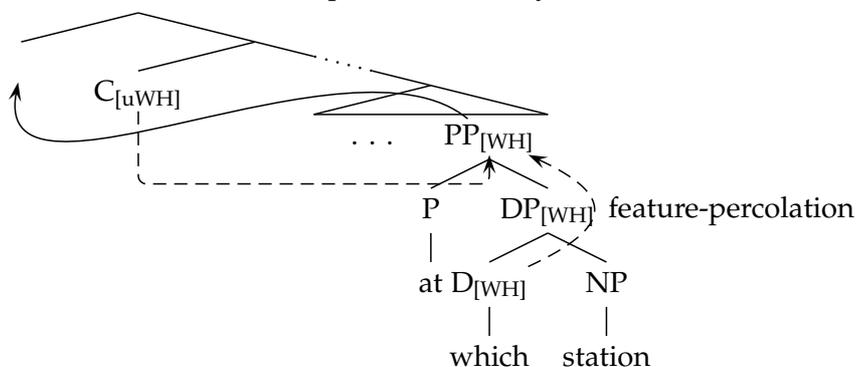
some related discussion). We might speculate that the choice of the highest occurrence is in part motivated by reduction of the burden of processing: all but one copy of a chain is to be erased at PHON, presumably due to minimization of computation and production (cf. Chomsky 2008:146), and processing would be further eased if the highest (which is typically the leftmost) is chosen to be pronounced, provided that the problem of finding the gap(s)/trace(s) of moved elements can rely on the directionality of left-to-right processing.

How about A'-movement? Let's consider the following example, where a PP containing a WH-element undergoes WH-movement into C-Spec.

(21) [At *which station*]<sub>i</sub> was John reading a newspaper *t<sub>i</sub>*?

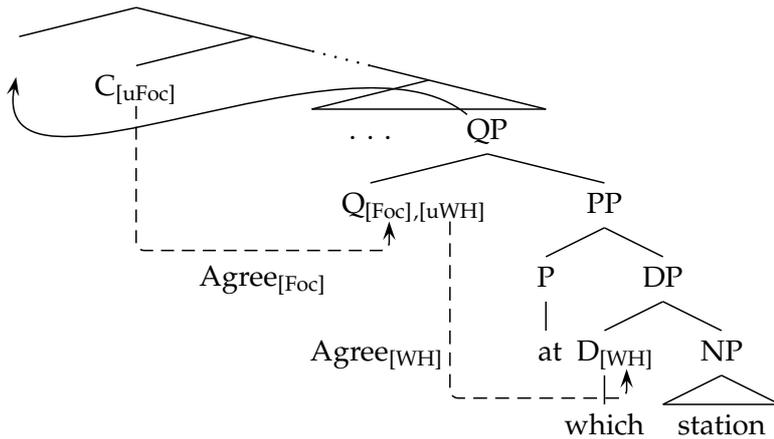
Such examples have been customarily analyzed in terms of feature-percolation, say of the WH-feature. According to this traditional analysis, entertained by, e.g., Nishigauchi (1990a, 1991, 1990b) among many others, the WH-feature of *which* gets percolated up to some higher phrasal node, here as high as the PP node, and as a result, the interrogative C attracts the [+WH] PP. The analysis is schematized as follows:

(22) Traditional WH-feature percolation analysis:



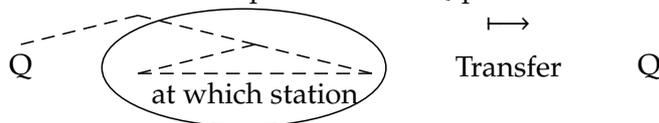
However, once we follow Chomsky (2004, 2008:140) in assuming that internal Merge applies (as) freely (as external Merge) unless barred by some other constraints, the WH-feature Agree-relation to the moving WH-phrase is no longer a necessary condition for WH-pied-piping, which in turn undermines the necessity of assuming WH-feature percolation. Note further that Cable (2007, 2010) argues, providing ample data from Tlingit, that the apparent WH-pied-piping phenomenon should be reanalyzed as a movement of a category headed by a separate functional category that he calls Q (see already Watanabe 1992a,b, Hagstrom 1998). According to his analysis, which I will adopt in the present study, the WH-element is first licensed as a goal of probing by Q (say of the WH-feature), and QP in turn constitutes a goal for C's probing (say that of the Foc(us)-feature). The relevant derivation is schematized as follows:

(23) Cable's (2007, 2010) Q-based analysis:

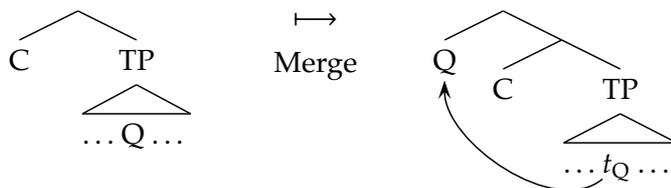


If we further assume that Q can also constitute a phase, then WH-movement is also susceptible to the account sketched above, complying with the H- $\alpha$  schema. Just like other phases, the complement of Q gets Transferred as soon as the Q-phase is constructed, rendering the phasal SO to a simplex LI Q. Later, C probes Q and attracts it to its specifier position. The relevant derivation is summarized as follows:

- (24) a. Transfer at the completion of the Q-phase:



- b. Recursive Merge builds the C-phase, applying internal Merge:



The Cablean Q-phase provides us with a natural way to analyze WH-movement in conformity with the H- $\alpha$  schema, as well as to eliminate the notion of WH-feature-percolation in the analysis of WH-movement. However, this article draws a stronger conclusion than Cable's: while Cable provides a significant step toward elimination of WH-pied-piping via his Q-analysis, he did refrain from drawing a stronger conclusion that his Q-analysis can offer a step toward the elimination of the notion of XP-movement altogether.<sup>6</sup> Then, taking advantage of Cablean Q, I claim that the H- $\alpha$  schema and phase cyclicity naturally eliminate the notion of XP-movement altogether, in line with, but taking a more radical step than, Cable (2010). See Narita (2011) for fuller exploration of WH-Q dependency along this approach.

What the discussion tells us is that as long as syntax can utilize cyclic Transfer to keep the moving element a bare LI (either a phase head or a non-phase head), syntax can still

<sup>6</sup>Thus, while arguing vocally against the notion of pied-piping, Cable notes,

"Note that, following the definition in (7) [which says: "Pied-piping occurs when an operation that targets the features of a lexical item L applies to a phrase properly containing  $L^{\text{MAX}}$ ," p.6; HN], I do not include under the rubric of "pied-piping" all instances of phrasal movement. That is, I accept as uncontroversial the existence of a mechanism of feature projection, which places the features of a head onto the projections of that head. What is at issue is any mechanism that places the features of a head onto nodes outside the projections of that head. This is a significant distinction, because feature projection is arguably indispensable, while the latter sort of devices are of little utility outside of deriving pied-piping structures." (Cable 2010:chapter 1, note 21, p.211)

Indeed, Cable's system still makes heavy use of labeling/projection to achieve XP-movement. See Narita (2011) for further exploration of the projection-free analysis of WH-Q dependency.

apply internal Merge in conformity with the H- $\alpha$  schema (6), without departing from the hypothesis that bare phrase structure is projection-free. Importantly, no syntactic operation of ‘pied-piping’ or ‘XP-movement’ needs to be involved in the analysis: what happens in apparent phrasal movement is actually internal Merge of a phase-head LI, with which previously interpreted/spelled-out interior materials are tightly associated. Under the assumption that only LIs can undergo internal Merge, we are rather forced to assume this line of approach to apparent phrasal movement in general.

In this context, it should be noted that there are cases of pied-piping of apparent ‘specifiers’. The possessor of nominal phrases is a typical instance:

- (25) a. [The student’s  $\emptyset_D$  father]<sub>*i*</sub> seems [*t<sub>i</sub>* to be angry at Mary].  
 b. [Whose  $\emptyset_D$  mother]<sub>*i*</sub> did you see *t<sub>i</sub>*?

The H- $\alpha$  schema forces us to assume that the moving nominal phrase is actually a phase-head LI accompanying the previously transferred interior. The surface form suggests that the phase-interior that it is associated with actually contains the possessor. This fact is problematic for the traditional idea that nominals are headed by D(eterminer) and that D takes the possessor as its specifier (Brame 1981, 1982, Fukui and Speas 1986, Abney 1987): if D is the highest phase-head for a nominal, Transfer applying to the sister of D cannot affect the possessor at the edge of D.<sup>7</sup> This is one of the reasons why I am forced to assume, in pursuing the H- $\alpha$  schema, that there is a phase-head LI that occupies the highest position of all nominal arguments, which I assume is K(ase) (Bittner and Hale 1996a, Asbury 2008 and references cited therein; cf. Chomsky’s 2007 *n\**), and that its phase-interior domain contains the possessor as well as D. I further assume that this category constitutes the locus of Case-features as well as valued  $\varphi$ -features, a necessary assumption which ensures that its Case-feature can be checked via Agree applying in the next phase. See Narita (2011) for further exploration of nominal syntax based on the H- $\alpha$  schema.

The overall conclusion is that internal merger of phase-head LIs yields apparent XP-movement at PHON. Importantly, the option of undergoing ph(r)asal movement should be a privilege only of phase-head LIs, as long as we assume that cyclic Transfer is the only device to ‘anchor’ an XP (the interior of a phase) to its sister LI (the phase head). Narita (2011) claims that this hypothesis can be adopted to derive a rather straightforward typology of possible ‘XP-movement’. For instance, the long noticed observation that TP as opposed to CP strongly resists movement can be regarded as a straightforward consequence of this approach, under the standard assumption that C but not T is a phase head.

- (26) a. [<sub>CP</sub> that John criticized Mary]<sub>*i*</sub>, I believe *t<sub>i</sub>*.  
 b. \*[<sub>TP</sub> John criticized Mary]<sub>*i*</sub>, I believe that *t<sub>i</sub>*.  
 (27) a. It is [<sub>CP</sub> C PRO to go home (every evening)]<sub>*i*</sub> that John prefers *e<sub>i</sub>*.  
 b. \*It is [<sub>TP</sub> *t<sub>j</sub>* to go home (every evening)]<sub>*i*</sub> that John<sub>*j*</sub> seems *e<sub>i</sub>*.

Note that I am departing from the once dominant assumption that internal Merge should be triggered by a viral “EPP-property” of the attracting head. It has been widely assumed in the literature that internal Merge is a ‘costly’ operation and should be employed only when its application contributes to checking of a viral uninterpretable feature called the “EPP-feature” (the last resort conception of movement; Chomsky 1986b, 1995). However, Chomsky (2004, 2007, 2008) argues that this was a misguided conception of internal Merge. Rather, without any further stipulation, Merge should be able to take as input either two independent SOs (as in external Merge) or two SOs one of which is part of the other (as in internal Merge).

<sup>7</sup>Note that the analysis of WH-movement as in, e.g., (25b), would involve internal Merge of a covert phase head Q as we suggested above. Cable indeed argues that the Q-based analysis eliminates the need to assume the pied-piping operation for WH-movement: Q merges on top of the nominal phrase, Transfers its complement including the possessor, and undergoes A'-movement without any problem. However, such a Q-based analysis is unavailable in examples like (25a), where even A'-movement of nominal phrases ‘pied-pipes’ the possessor.

Correspondingly, unless stipulated otherwise, “[Internal]M[erge] (= Move, with the “copy theory”) is as free as E[xternal]M[erge]” (Chomsky 2008:140), due to the undeletability of EFs. Thus, no stipulations of extraneous and redundant “EPP-feature-checking” are necessary to drive internal Merge, and every LI can be freely subjected to internal Merge under the theory of generalized EFs.

### 3 The H- $\alpha$ Schema in Lieu of Fragmented Conditions on Extraction Domains

#### 3.1 Freezing effects

As we have seen above, the H- $\alpha$  schema predicts that only LIs can undergo internal Merge. Under the H- $\alpha$  schema, all the cases of apparent ‘XP’-movement must be analyzed as instances of internal merger of a phase-head LI that has subjected its phase-interior domain to Transfer. Then, assuming with Uriagereka (1999) and Chomsky (2000, 2004, 2008) that Transferred domains are inaccessible to further syntactic computation, a constraint often referred to as the Phase-Impenetrability Condition (PIC), it is predicted that all moved ph(r)ases exhibit the *freezing effect* (Culicover and Wexler 1980, Uriagereka 1999 and many others):

(28) A moved phase constitutes an island for extraction.

This is simply because all the moved ph(r)ases must have become ‘bare LIs’ by means of cyclic Transfer before undergoing internal Merge. Thus, the H- $\alpha$  schema derives the effect of (28) for free.

There are a number of facts that support (28). For example, it has been observed by a number of researchers that an in-situ subject is not an island, whereas a raised subject is (Lasnik and Park 2003, Stepanov 2007, Gallego 2010, Boeckx 2008a,b). (29) from Lasnik and Park (2003) illustrates this observation.

- (29) a. *Which candidate<sub>i</sub>* were there [posters of *t<sub>i</sub>*] all over the town?  
 b. \**Which candidate<sub>i</sub>* were [posters of *t<sub>i</sub>*]<sub>j</sub> *t<sub>j</sub>* all over the town?

If we follow Chomsky (1995, 2000), Hornstein (2009) and others in assuming that the merger of an expletive *there* into the subject position can allow the associate *posters of <which candidate>* not to be affected by internal Merge, subextraction from this in-situ subject is predicted to be possible, as shown in (29a), which is in sharp contrast with the case of subextraction from the EPP-raised subject, as in (29b).<sup>8</sup>

Note that (28) makes a reverse prediction that subject nominals do not exhibit freezing effects if the language lacks obligatory EPP raising. I argue that this is a desirable prediction that can be corroborated by, e.g., data from Japanese. It has been observed that Japanese does not exhibit subject condition effects in various constructions (see Kuno 1973, Lasnik and Saito 1992, Ross 1967, Saito and Fukui 1998, Ishii 1997, and references cited therein). The following examples are from clefts and (long distance) scrambling.<sup>9</sup>

<sup>8</sup>A question remains as to why the in-situ associate KP in expletive constructions can allow subextraction without inducing the PIC effect. I contend that the expletive is a D associated with an unvalued Case-feature [*u*Case] that is base-generated internal to KP. [*u*Case] of D, if subjected to Transfer without a value, will cause the derivation to crash due to its uninterpretability, which effectively prevents the KP from constituting its own phase, explaining the lack of the PIC effect. The idea that the expletive is base-generated internal to KP and moves on its own to the EPP position is adapted from Hornstein (2009:§6.3.2). See also Hoekstra and Mulder (1990), den Dikken (1995), Moro (1997), Groat (1997, 1999).

<sup>9</sup>See in particular Hoji (1990) for argument that Japanese cleft constructions with a case-marked nominal focus or PP focus involve A’-movement of an empty operator. See also Sakai (2000), Hiraiwa and Ishihara (2002) among others on alternative analyses of A’-movement in Japanese clefts.

- (30) *Japanese*: Lack of subject condition effects in Japanese
- a. The cleft construction  
 [*Op<sub>i</sub>* [John-ga [[Mary-ga *t<sub>i</sub>* katta koto]-ga mondai-da to] omotteiru  
 John-NOM Mary-NOM bought NML -NOM problem-CPL that think  
 no]-wa sono hon<sub>*i*</sub>-o da.  
 NML-TOP that book-ACC CPL  
 Lit. "It is that book<sub>*i*</sub> that John thinks that [that Mary bought *e<sub>i</sub>*] is a problem."
- b. scrambling  
 ?nani-o<sub>*i*</sub> [John-ga [[Mary-ga *t<sub>i</sub>* katta koto]-ga mondai-da to] omotteru]  
 what-ACC John-NOM Mary-NOM bought NML -NOM problem-is that think  
 no?  
 Q  
 "What<sub>*i*</sub>, John thinks that [the fact that Mary bought *t<sub>i</sub>*] is a problem?"

Interestingly, Fukui (1986/1995), Kuroda (1988) and Kato (2006) among others independently provide evidence for the view that Japanese subjects can (at least optionally) stay in-situ. Ishii (1997) among others proposes that these two observations are interrelated, and specifically that the lack of subject condition effects can be attributed to the lack of obligatory EPP in this language. The phase-based account of freezing effects ?? can straightforwardly incorporate Ishii's analysis.

Data from Romance post-verbal subject constructions provide additional evidence in favor of freezing effects (28). The following data are observed by Uriagereka (1988, 2009) for Spanish.

- (31) *Spanish*: transparent postverbal subject (Uriagereka 1988:116; see also Gallego 2007, 2010)
- a. \* [de qué conferenciantes]<sub>*i*</sub> te parece [que [las propuestas *t<sub>i</sub>*] me  
 of what speakers CL-to-you seem.3SG that the proposals CL-to-me  
 van a impresionar].  
 go-3PL to impress  
 "Of which speakers does it seem to you that [the proposals *t<sub>i</sub>*] will impress me."
- b. (?) [de qué conferenciantes]<sub>*i*</sub> te parece [que me van a  
 of what speakers CL-to-you seem.3SG that CL-to-me go-3PL to  
 impresionar [las propuestas *t<sub>i</sub>*]].  
 impress the proposals  
 "Of which speakers does it seem to you that will impress me [the proposals *t<sub>i</sub>*]."
- (32) *Spanish*: transparent postverbal subject (Uriagereka 2009)
- Qué partido<sub>*i*</sub>*; te hizo gritar [(el) que hayas perdido *t<sub>i</sub>*]  
 What game you made scream the that have.you lost  
 'What game has it made you scream that you lost?'

If we assume with Gallego (2010) (who builds on Uriagereka 1988, Belletti 2001 and others) that the postverbal subject in these examples stays in the base-generated Spec-*v*P position whereas the preverbal subject moves to Spec-TP, the relevant contrast in (32) can be subsumed under the same account in terms of the freezing effect.

Note that the H- $\alpha$  schema predicts that the freezing effect arises only derivationally, and it does not preclude the possibility of remnant movement, an instance of internal Merge of some ph(r)asal XP that contains a trace/copy of some smaller constituent  $\alpha$  which is moved out of XP prior to the movement of XP (den Besten and Webelhuth 1990, Müller 1996). Thus, remnant movement is readily ruled in by our analysis.

- (33) a. [How likely *t<sub>i</sub>* to win]<sub>*j*</sub> is John<sub>*i*</sub> *t<sub>j</sub>*?

- b. [Fired  $t_i$  by the company] $_j$ , John $_i$  indeed was  $t_j$ .

See Müller (1996), Takano (2000), Abels (2007, 2009), Narita (2011) among many others for further constraints on remnant movement. See in particular Narita (2011) for further details of the H- $\alpha$  schema-based account of freezing effects, where it is argued that the full-fledged analysis of freezing effects needs to be supplied with another constraint that he refers to as  $\ast\{t, t\}$ .

### 3.2 Subject Condition Effects and Beyond

It has been widely observed that a subject XP in Spec-T (whether it is nominal or clausal) resists subextraction from within, an observation that is traditionally attributed to Huang's (1982) CED in the GB era. Some relevant examples are given in (34).

- (34) a.  $\ast$ Which article $_i$  was [that John wrote  $t_i$ ] known to everyone?  
 b.  $\ast$ Which person $_i$  were [pictures of  $t_i$ ] on sale?

Uriagereka (1999) and Nunes and Uriagereka (2000) provide an account of the CED in terms of an adapted version of Kayne's (1994) Linear Correspondence Axiom (LCA). According to their proposal, Kayne's (1994) LCA should be modified in such a way that it does not make recourse to c-command relations among nonterminal/phrasal nodes.<sup>10</sup> In effect, the PF-requirement that all terminal nodes/LIs be totally ordered by their modified LCA derives that all instances of Merge must take the form H-XP, with H always preceding the terminals within XP. Any syntactic object of the form {XP, YP} should be ruled out by their modified LCA applying at PHON, given that no asymmetric c-command relation can be established between the terminals within XP and those in YP. Their LCA further requires that any noncomplement XP (prototypically specifiers and adjuncts) must be reduced to a terminal node by means of Spell-Out/Transfer, which renders the noncomplement inaccessible for further syntactic operations. Nunes and Uriagereka essentially claim that their modified version of the LCA always forces noncomplement XP to be reduced by means of cyclic Transfer at every instance of 'XP-YP' merger.<sup>11</sup> It is then predicted under their account of CED that *any* noncomplement should constitute an island. However, it is known that this prediction is too strong. For example, Stepanov (2007) reports a number of examples from various languages that exhibit subextraction from subjects. I here provide some relevant examples from Japanese that shows subextraction from the (sentential) external argument.

- (35) Japanese:  
 a. Cleft

<sup>10</sup> Nunes and Uriagereka's criticism of the original LCA (Kayne 1994) is well-taken: only stipulations can assure asymmetric c-command relations among nonterminals that the LCA requires. Incidentally, reference to labels has been the major form of stipulation to this effect, be it the category-segment distinction among nonterminals as in Kayne (1994), or the invisibility of nonminimal-nonmaximal projections as in Chomsky (1995). Then, Kayne's version of the LCA is bound to be a departure from the SMT (as correctly pointed out by Chomsky 2004:110 among others), to the extent that reference to labels is so. Kayne seems to agree with this criticism in part, thus he notes, "Full integration of the LCA with bare phrase structure will require reformulating the LCA without recourse to non-terminals." (Kayne 2009:note 8) I suspect that this problem has eventually convinced him to decide to dispense with the LCA in his account of antisymmetry in Kayne (2010). See Narita (to appear, 2011) for relevant discussion.

<sup>11</sup> Although the H- $\alpha$  schema-based account of the CED effect presented in this article has certain affinity with Nunes and Uriagereka's LCA-based account, Narita (to appear, 2011) argues that, despite Nunes and Uriagereka's claim to the contrary, phase theory can provide a descriptively adequate account of the CED effect only when syntactic theory is dissociated from the LCA. To the extent that Nunes and Uriagereka's modification is necessary to make the LCA label-free (see note 10), this fact corroborates Narita's conclusion that the LCA has no place either in projection-free syntax or projection-bound syntax (see also Narita 2010, Narita and Fujita 2010 and references cited therein). Kayne's (2010) departure from the LCA is correspondingly justified.

[Op<sub>j</sub> [John-ga t<sub>j</sub> okane-o karita koto]-ga Bill-o kizutuketa no]-wa  
 John-NOM money-ACC borrowed NML -NOM Bill-ACC hurt NML -TOP  
 Mary-kara<sub>j</sub> datta.

Mary-from CPL.PAST

“It was from Mary<sub>j</sub> [Op<sub>j</sub> that [that John borrowed money t<sub>j</sub>] hurt Bill].”

b. Scrambling

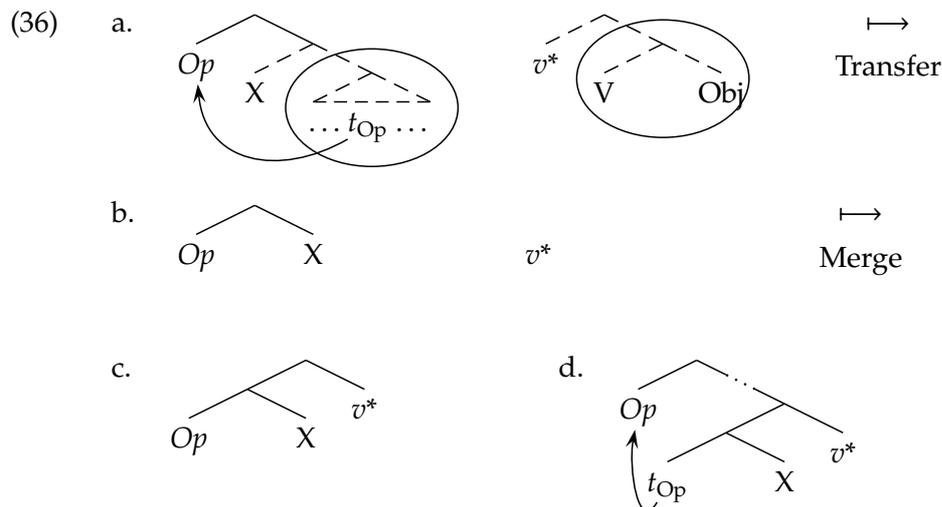
sono hon-o<sub>i</sub> John-ga [[Mary-ga t<sub>i</sub> katta koto]-ga Bill-o kizutuketa  
 that book-ACC John-NOM Mary-NOM bought NML -NOM Bill-ACC hurt  
 to] omotteru.

that think

“That book<sub>i</sub>, John thinks [that [that Mary bought t<sub>i</sub>] hurt Bill].”

Adopting the standard assumption that the external argument (sentential or not) is base-generated in Spec- $v^*$ , the sentential subject in these examples should constitute a bona fide example of a noncomplement that assumes an ‘escape-hatch’ for successive-cyclic subextraction. Such a ‘transparent’ noncomplement should have no place in Nunes and Uriagereka’s LCA-based account.

However, the H- $\alpha$  schema provides an account of CED effects that incorporates the basic tenet of Nunes and Uriagereka’s analysis but still accommodates the existence of transparent noncomplements. According to the H- $\alpha$  schema, external merger of two phrases, say XP and YP, is impossible unless at least one of the two phrases is reducible to an LI by means of cyclic Transfer. Thus, prior to the application of external Merge, either XP or YP must constitute a phase without an edge, so that it can be reduced to a simplex LI after Transfer. Unlike Nunes and Uriagereka’s analysis in terms of the LCA, the H- $\alpha$  schema does not specify which phrase to be reduced to an LI. Specifically, reduction of the  $v^*$ -phase to  $v^*$  as in (14b) will keep the edge of the subject accessible for further computation, allowing successive-cyclic subextraction. The derivation is sketched in (36) (here, I adopt the now widely accepted assumption, also discussed above, that nominative subjects can stay in-situ in Japanese; see Kuroda 1988, Fukui 1986/1995, 1988, Fukui and Speas 1986, Lasnik and Saito 1992 among many others):



I claim that this is essentially what happens in the examples of subextraction from an external argument in (35).

This analysis predicts that the reduction of  $v^*$ -phase to a simplex LI (36a) is a prerequisite for later subextraction from the subject external argument. That is, the  $v^*$ -phase is required not to have any edge in a derivation with subextraction from the external argument. Then, it is predicted that Transfer at (36a) should render the  $v^*$ -phase an island for extraction, due to the inability to assume an ‘escape-hatch’ for successive-cyclic movement. This prediction is

schematized in (37).

(37) \* ...  $Op$  ...  $X$  ...  $\{[Subj \dots t_{Op} \dots], [v^* \dots t_X \dots]\}$

Japanese provides crucial evidence in favor of this novel prediction. (38) gives a relevant minimal pair from Japanese cleft constructions ((38a) = (35a)).

(38) *Japanese*: Cleft and scrambling ((38a) = (35a))

- a. [ $Op_j$  [John-ga  $t_j$  okane-o karita koto]-ga Bill-o kizutuketa no]-wa  
 John-NOM money-ACC borrowed NML -NOM Bill-ACC hurt NML -TOP  
*Mary-kara<sub>j</sub>* datta.  
 Mary-from CPL.PAST  
 “It was *from Mary<sub>j</sub>* [ $Op_j$  that [that John borrowed money  $t_j$ ] hurt Bill].”
- b. \*? [ $Op_j$  Bill-o<sub>i</sub> [John-ga  $t_j$  okane-o karita koto]-ga  $t_i$  kizutuketa no]-wa  
 Bill-ACC John-NOM money-ACC borrowed NML -NOM hurt NML -TOP  
*Mary-kara<sub>j</sub>* datta.  
 Mary-from CPL.PAST  
 “It was *from Mary<sub>j</sub>* [ $Op_j$  that Bill<sub>i</sub>, [that John borrowed money  $t_j$ ] hurt  $t_i$ ].”

Recall first that Japanese does allow subextraction from external arguments, as shown in (38a). Specifically, we can construct a cleft sentence (38a) from the underlying sentence comparable to (39a) by A'-movement of  $Op$  out of the sentential external argument. In addition, it is widely known that Japanese allows optional scrambling of an object to a sentence initial position, thus, everything else being equal, alternation between (39a) and (39b) is freely available in this language.

(39) *Japanese*:

- a. [John-ga *Mary-kara* okane-o karita koto]-ga Bill-o kizutuketa.  
 John-NOM Mary-from money-ACC borrowed NML -NOM Bill-ACC hurt  
 “[That John borrowed money from *Mary*] hurt Bill.”
- b. Bill-o<sub>i</sub> [John-ga *Mary-kara* okane-o karita koto]-ga  $t_i$  kizutuketa.  
 Bill-ACC John-NOM Mary-from money-ACC borrowed NML -NOM hurt  
 “Bill<sub>i</sub>, [That John borrowed money from *Mary*] hurt  $t_i$ .”

I follow the standard assumption that object scrambling can target either an outer Spec- $v$  or some higher position (say Spec-T or Spec-C) (Kuroda 1988, Fukui 1986/1995, 1988, Fukui and Speas 1986, Saito 1992, 2003, Saito and Fukui 1998, Miyagawa 1997, 2003 among many others; but see also Ueyama 1998, Saito 2005, Fukui and Kasai 2004). Application of scrambling is purely optional in most cases (Saito 1989, Saito and Fukui 1998), and it usually does not interfere with any other syntactic operation. However, the curious fact remains that scrambling of the object crossing the sentential subject is disallowed in (38b), where a null operator moves out of the sentential subject. This state of affairs is indeed predicted by the H- $\alpha$  schema, as in (37): subextraction from the subject clause entails that Transfer has ‘atomized’ the  $v^*$ -phase, allowing no edge, prior to the external merger, thus even scrambling cannot apply to elements within the  $v^*$ -phase. No previous account of the CED effect made predictions on this sort of ‘complement island’, which lends further support for an H- $\alpha$  schema-based approach.

### 3.3 Adjunct Condition Effects and Beyond

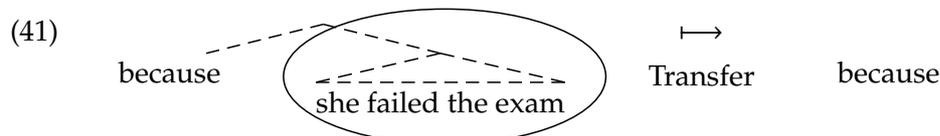
So far, I have put aside considerations regarding adjuncts, but the null hypothesis is that the H- $\alpha$  schema also holds for adjunction. That is, there should be no XP-YP merger, regardless of whether the merger is an instance of ‘substitution’ (argument-merger) or adjunction.<sup>12</sup>

<sup>12</sup>Chomsky (2004) proposes that these two types of Merge correspond to *set-Merge* and *pair-Merge*, respectively.

Consider, for example, adjunction/pair-Merge of an adverbial *because*-clause in (40):

(40) The man criticized Mary [because she failed the exam].

Adverbial clauses like the one in (40) are obviously phrasal, so external merger of an adverbial clause to the main clausal spine would count as an instance of XP-YP merger, and the H- $\alpha$  schema would necessitate reduction of one of the XPs to an LI. If the adverbial clause is chosen, the adverbial *because*-clause is reduced to an LI. For expository convenience, I simply assume that *because* is the relevant phase head<sup>13</sup>



As long as the Transfer domain within the adjunct (here the complement of *because*) does not contain any uninterpretable feature, then it is a convergent domain, and it should thus be able to constitute a phase. In conformity with the H- $\alpha$  schema, application of cyclic Transfer (41) in effect enables the external merger in (46). As suggested by Uriagereka (1999) and Nunes and Uriagereka (2000), the required Transfer is presumably responsible for the strong opacity of these adjuncts (see Cattell 1976, Huang 1982, Chomsky 1986a, Uriagereka 1999).

- (42)
- a. \*This is the girl<sub>i</sub> that John failed the test [because he was thinking about *t<sub>i</sub>*].
  - b. \*I know what<sub>i</sub> the man criticized Mary [after she said *t<sub>i</sub>*].
  - c. \*It was this flaw<sub>i</sub> that the man criticized Mary [due to *t<sub>i</sub>*].

Uriagereka and Nunes claim that the CED effect in these examples can be readily attributed to the obligatoriness of Transfer-based reduction of these adjuncts to simplex nodes. I will essentially follow their reasoning and attribute the unacceptability of the examples in (42) to the PIC.

Contra the widely accepted view that adjuncts are always strong islands (see Cattell 1976, Huang 1982, Chomsky 1986a, Uriagereka 1999), however, it has been observed that not all adjuncts exhibit CED effects (see Chomsky 1982, Truswell 2007, 2011 among many others). For example, Truswell (2007, 2011) provides a thorough survey of apparent CED-violating subextraction from adjuncts. Some examples are reproduced in (43).

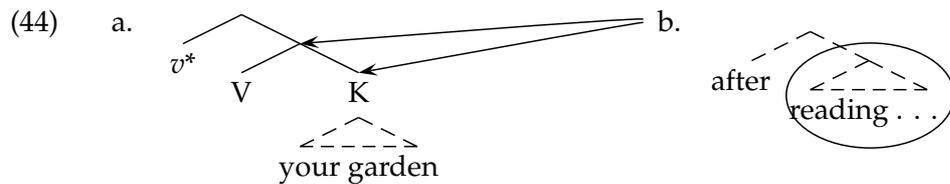
- (43)
- a. Which book<sub>i</sub> did John design his garden [after reading *t<sub>i</sub>*]?
  - b. What<sub>i</sub> did John arrive [whistling *t<sub>i</sub>*]?
  - c. Who<sub>i</sub> did John travel to England [to make a sculpture of *t<sub>i</sub>*]?

These examples transparently show that UG should not characterize adjuncts as exceptionless islands, contra Huang (1982), Uriagereka (1999), Nunes and Uriagereka (2000), Chomsky (2004), and Stepanov (2007). In terms of the H- $\alpha$  schema-based account, these examples show that certain adjuncts, including bare and PP gerundives (e.g., *(after) reading the textbook*) and purpose-clauses (e.g., *in order to save us from the guilt*), are allowed not to undergo reduction to a simplex node at the point of adjunction. How can we ensure this result, while still keeping the H- $\alpha$  schema-based account of CED effects for the type of adjuncts like those in (42)?

I would like to propose that, unlike the adverbial clauses like the one headed by *because*, which I assume adjoin to positions higher than *v/v\**, these transparent adjuncts are allowed to adjoin low in the clausal spine, below *v/v\**. I claim that this difference in adjunction sites allows us to make the cut between the former class of ‘high’ adjuncts (exhibiting CED effects) and the latter class of ‘low’ adjuncts in question (exempt from CED effects).

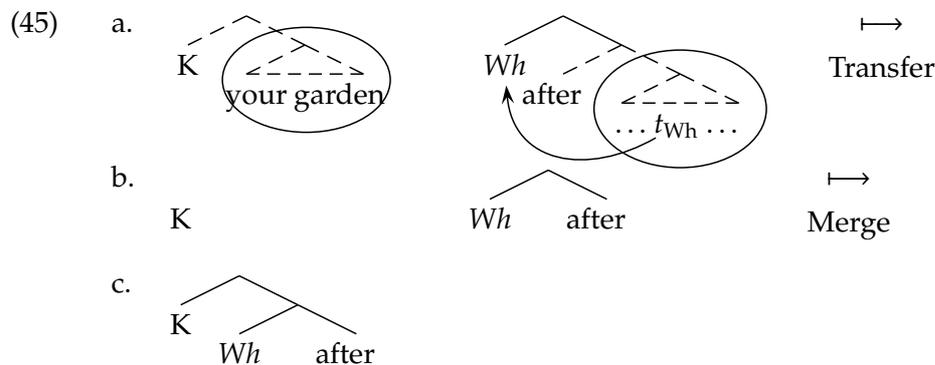
<sup>13</sup>But see Emonds (2009) for the hypothesis that most adjuncts are indeed headed by (often covert) P (adposition).

First, consider cases with transparent adjuncts, e.g., the adjunction of the PP-gerundive *after reading* ⟨*which book*⟩ in (43a).



By assumption, the adverbial is a type of ‘low’ adjunct that can be adjoined within the domain c-commanded by  $v^*$ . For the case in question, I argue that there are two potential adjunction sites, either to {V, K} or to K, with K being a phase-head residue of its own phase. I specifically assume that such adjuncts can adjoin *as low as in the sister of K*. Given that it is outside of the phase of K but still in the scope of  $v/v^*$ , there is no principled ground that excludes this position from being a potential adjunction site.

(44) is a case of ‘XP-YP’ merger, thus the H- $\alpha$  schema requires cyclic Transfer to reduce at least one of the XPs to a simplex LI. The Wh-phrase within the adjunct (44b) is by assumption a phase headed by covert Q (Cable 2007, 2010), thus reduced to Q after the Q-phase-level Transfer. In order for Q to undergo successive cyclic movement to the edge of interrogative C, Q should first evacuate to the edge of the ph(r)ase in (44b). As a result, a phase with Q at its edge can never be reduced by Transfer to an LI. The H- $\alpha$  schema therefore predicts that it should be the target of adjunction in (44a) that should be reduced to an LI. While the node {V, [K...]} is not a suitable candidate to be a phase, given the unvalued Case-feature on K, the reduction of the K-phase to K via cyclic Transfer is feasible, assuming the Theme KP constitutes its own phase without an edge. The derivation is schematically shown in (45).

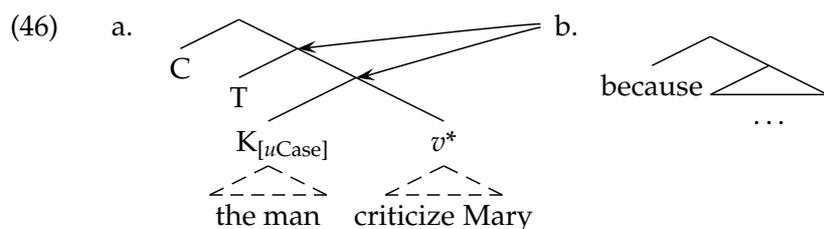


This reduction allows the edge of the adverbial to remain accessible for further operations, a desirable result.

On the other hand, I assume that high adverbials that show CED-effects, like finite clauses headed by *because* or *after*, are adjoined relatively high in the clausal spine, specifically positions that can take scope over  $v/v^*$ .<sup>14</sup> This adjunction would take the form of (46):<sup>15</sup>

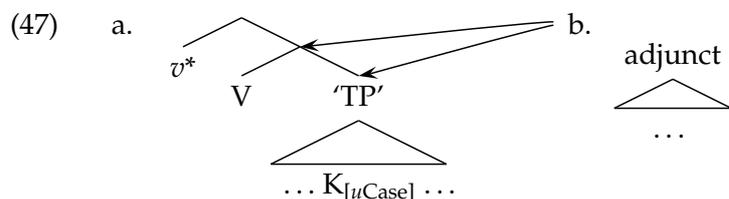
<sup>14</sup>The Condition C effect in examples like *He<sub>i</sub> got sick {because/since/after} John<sub>i</sub> ate that fish* shows that these adjuncts are necessarily located below the subject (which is at Spec-T) at SEM, thus it seems that adjunction of these adverbial clauses to a position that is not c-commanded by the raised subject is precluded for some independent reason. If we assume with Chomsky (2007, 2008) that every operation except external Merge takes place at the phase level, it naturally follows that external Merge of the adverbial to T’ or  $v^*$ P necessarily precedes the introduction of C and the EPP-driven subject raising.

<sup>15</sup>Adjunction to the subject K in this context is precluded, because it would result in a structure like {{K, adjunct},  $v^*$ }, locating the relevant high adjunct under the scope of  $v/v^*$ . This by definition violates the above-mentioned condition on the scope of high adjuncts.



Here, I claim that reduction of the adverbial clause (46b) to an LI is necessitated by the H- $\alpha$  schema. The reason is the presence of the uninterpretable Case-feature on the subject K. There is evidence that Nominative Case assignment by T is contingent on the presence of C (Iatridou 1993, Watanabe 1996). Richards (2007) and Chomsky (2007, 2008) specifically argue that the unvalued  $\varphi$ -features responsible for Nominative Case valuation are introduced by C and inherited onto T. The uninterpretable Case-feature of the subject K remains unchecked until the introduction of the phase head C, and so neither of the potential adjunction sites indicated by arrows in (46) can define a convergent phase. Therefore, it is impossible for these phrases to be reduced to simplex LIs by means of cyclic Transfer, and the H- $\alpha$  schema forces syntax to execute reduction of the adverbial (46b) to achieve external merger in (46). Consequently, the adverbial phase cannot assume any edge for successive-cyclic movement, precluding subextraction.

Moreover, I would like to point out that the H- $\alpha$  schema-based account makes a novel prediction that adjunction of transparent low adjuncts is unavailable for ECM-clauses. If we assume with Chomsky (1995, 2000, 2007, 2008) that the subject of the infinitival clause receives Accusative Case from  $v^*$  in the ECM construction (see already Chomsky 1981; see also Postal 1974, Lasnik and Saito 1991 for the raising-to-object analysis of ECM), the configuration to which the low adjunct adjoins will have the following form.



The unvalued Case-feature of K within the ECM infinitival effectively makes any of the potential adjunction sites in (47a) nonconvergent, thus the H- $\alpha$  schema again predicts that the low adjunct (47b) should constitute a phase without an edge (reducible to an LI by Transfer), prohibiting subextraction out of it. This prediction is indeed borne out by the unacceptability of (48a) (Bridget Samuels, p.c.):

- (48) a. *?\*Which trial<sub>i</sub> did the DA prove [the suspect to have been at the scene of the crime] [in order to conclude t<sub>i</sub>]?*  
 b. *Which trial<sub>i</sub> did the DA prove [that the suspect was at the scene of the crime] [in order to conclude t<sub>i</sub>]?*  
 c. *Which trial<sub>i</sub> did the DA decide [to call the suspect for psychiatric examination] [in order to conclude t<sub>i</sub>]?*

Crucially, note the contrast between (48a) and (48b)–(48c). On the one hand, the finite *that*-clause in (48b) is a CP that can constitute its own phase without an edge (*that* being the complementizer). Hence, its reduction to an LI can support a convergent derivation involving subextraction from the low adjunct. The same applies to the control infinitival CP [*PRO to call the suspect for psychiatric examination*] in (48c). On the other hand, an ECM-infinitival TP is different from finite and control CPs in that it cannot define its own phase due to the unvalued Case-feature on the raising object *the suspect*, thus its necessarily phrasal status precludes WH-

subextraction from applying through the edge of the low adjunct. The data in (48) hence constitute another piece of strong support in favor of the H- $\alpha$  schema based account of the adjunct condition effect.

Importantly, (48a) and (48b) are identical as far as their semantic interpretations are concerned, and so the contrast in this minimal pair constitutes a strong piece of evidence that the nature of the contrast is *syntactic* rather than semantic or extra-grammatical. Thus, it speaks against one of the most detailed studies of the (un)availability of subextraction from adjuncts, namely Truswell (2007, 2011), which puts forward a semantico-centric account of the relevant facts. Specifically, Truswell proposes the following semantic condition and argues that subextraction from adjuncts is allowed as long as it satisfies this condition.

(49) *The Single Event Condition* (Truswell 2007, 2011):

An instance of WH-movement is acceptable only if the minimal constituent containing the head and the foot of the chain describes a single event.

He elaborates the theory of event composition to ensure the result that the minimal constituent containing the WH-chain constitutes a description of a single ‘macro-event’. However, the Single Event Condition has nothing to say about the contrast between (48a) and (48b), given that (48a) describes as ‘single’ a ‘macro-event’ as (48b) does. Truswell’s argument against the relevance of syntax is correspondingly undermined. At least, then, phase cyclicity and the Single Event Condition may be principles that support each other in accounting for the facts about subextraction from adjuncts. One may also argue that a more interesting interpretation of these two components of explanation is to speculate a connection between them: rather than seeing the semantic condition as an unexplained axiom that *a posteriori* allows subextraction from adjuncts, we may rather see the phase-based successive cyclicity, independently motivated by the principle of minimal computation, as the source of semantic coherency (‘single-eventhood’) of the relevant syntactic domains. See Narita (2011) for further discussion. See also Narita and Samuels (2009) and Samuels (this volume) for data that suggest the relevance of phase cyclicity to prosodic phrasing.

### 3.4 Further Generalization on Phrase Intervention

We saw in the previous sections how H- $\alpha$  schema-based phase cyclicity can provide a uniform account of the freezing principle, the subject condition, and the adjunct condition. In addition, it also provides a novel account of the ‘complement-island’ effect discussed in (37), as well as the cases of certain permissible subextraction from adjuncts studied by Truswell (2007, 2011) among others. Let me further point out that the prediction made by the H- $\alpha$  schema for these data can be generalized to the following derivational constraint that we may call the *Phrasal Sister Condition* (PSC):

(50) Phrasal Sister Condition (PSC):

No syntactic operation (internal Merge or Agree) can relate X and Y in the structure

... X ... {[ $\alpha$  ... Y ... ], [ $\beta$  ... ]} ... (linear order irrelevant)

where  $\beta$  is phrasal (not an LI or a phase which has been reduced to an LI by Transfer).

(50) can be straightforwardly deduced from the H- $\alpha$  schema, simply because it predicts that Merge cannot combine two phrases XP and YP unless Transfer reduces at least one of them to a simplex LI. This single generalization can cover all the conditions on extraction domains discussed so far: First, the freezing effect corresponds to cases where  $\alpha$  is a moved ph(r)ase and  $\beta$  is the target of internal Merge. Next, in a derivation where subextraction from the in-situ external argument applies, the operator moves to the edge of the K-phase for successive cyclic

movement, thus making the K-phase irreducibly phrasal. If  $\beta$  stands for this phrasal K-phase, then it is predicted that extraction from  $\alpha$  is unapplicable, which derives the ‘complement-island’ effect discussed in §3.2. Further, the case of impermissible subextraction from adjuncts can be fit into the generalization in (50), where  $\beta$  stands for the main clausal spine containing an un-Case-marked K(P), and  $\alpha$  the relevant opaque adjunct.

I would like to argue that the following data from raising constructions lend further support to the prediction by the PSC (50).

- (51) a. *Many books<sub>i</sub>* seem [to John] (still) [to be  $t_i$  in the room].  
 b. \**Who(m)<sub>i</sub>* do *many books<sub>j</sub>* seem [to  $t_i$ ] (still) [to be  $t_j$  in the room]?  
 c. [*To whom*]<sub>*i*</sub> do *many books<sub>j</sub>* seem  $t_i$  (still) [to be  $t_j$  in the room]?

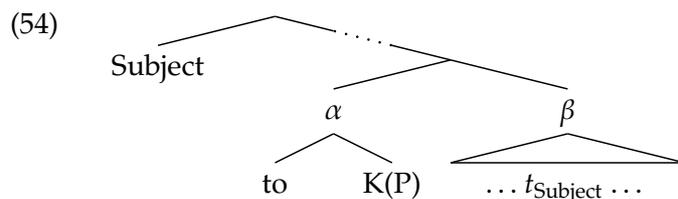
The raising predicate *seem* can optionally take an experiencer argument PP, as exemplified by *to John* in (51a). What is interesting is the fact pointed out by Groat (1999) that this *to*-PP is opaque to syntactic operations: e.g., subextraction of its complement yields ungrammaticality as shown in (51b). Notice that PP is generally not an island for extraction in English, as shown in (52), and hence previous theories that characterize English PPs as transparent (van Riemsdijk 1978, Abels 2001) would have little to say about the contrast in (51). By contrast, in order for my account to make sense of the transparency of these PPs, it is sufficient to hypothesize that they are like low adjuncts discussed in §3.3, in that they can be base-generated at the bottom of the *v*-phase.

- (52) a. *Which city<sub>i</sub>* are you heading [to  $t_i$ ]?  
 b. *Who(m)<sub>i</sub>* did you give a present [to  $t_i$ ]?  
 c. *John<sub>i</sub>* was spoken [to  $t_i$ ] (by Mary).

I contend that (51) can be rather straightforwardly accounted for by the PSC (50). To begin, the experiencer PP is presumably located above the raising infinitival TP and below the raised subject KP, as shown by the binding facts in (53).

- (53) a. *John<sub>i</sub>* seems [to {*himself<sub>i</sub>*/*him<sub>\*i</sub>*}] [TP to be  $t$  smart]  
 b. *They<sub>i</sub>* seems [to {*each other<sub>i</sub>*/*them<sub>\*i</sub>*}] [TP to be  $t$  smart]

Thus, the raising construction behind examples like those in (51) should involve something like the structure in (54).



This is another instance of apparent ‘XP-YP’ structure, for which the H- $\alpha$  schema makes a now familiar prediction: either  $\alpha$  or  $\beta$  should constitute an edgeless phase reducible to a simplex LI by means of Transfer. Raising of the subject out of  $\beta$  indicates that  $\beta$  does not constitute a phase and hence is irreducibly phrasal, so it should be  $\alpha$ , the experiencer PP, that constitutes such an edgeless phase. The P-phase can move by itself, as shown in (51c), but extraction from such a PP should be disallowed due to the PIC, yielding the unacceptability of (51b). This way, (54) constitutes another case supporting the PSC (50), where an irreducibly phrasal SO  $\beta$  bars movement out of its sister  $\alpha$ .<sup>16</sup>

<sup>16</sup>Note that a similar observation can be made for cases where a raising verb takes a finite clause complement. The data are from Groat (1999:30-31) and Hornstein (2009:144).

## 4 Further Consequences

We saw that the postulation of the H- $\alpha$  schema derives a number of predictions that receive strong empirical support. Before concluding the present article, I would like to discuss some further consequences of the H- $\alpha$  schema in this section.

### 4.1 Projection, Endocentricity and Full Interpretation

Chomsky (2007:23) suggests that label(ing)/projection is possibly a dispensable notion, and reference to labels is a departure from the SMT. Chomsky's theory of syntax nonetheless fails to eradicate recourse to labeling/projection. Most notably, Chomsky hypothesizes that at least the EF of an LI, whose properties are summarized in (55), can percolate up to phrasal SOs by the medium of labeling/projection, as we observed in §2.1.

- (55) a. The EF is the feature that permits its bearer to be merged with some SO.  
b. The EF is a property only of LIs.

However, I argued that the theory of phase cycles adopted from Chomsky (2004, 2007, 2008) paves the way for keeping to the minimal hypothesis that syntax assumes no mechanism of EF-projection. It was further shown that syntax without EF-projection straightforwardly derives what I have called the H- $\alpha$  schema, which is shown to be associated with richer empirical coverage. Thus, phase cyclicity undermines one of the core motivations behind labeling/projection, namely the percolation of EFs. Notice further that phase theory in tandem with the H- $\alpha$  schema eliminates the notion of XP-movement and pied-piping altogether. Thereby, it undermines another major function of labeling/projection, namely delineation of maximal projections (or pied-piping domains) susceptible to syntactic operations such as internal Merge. The feasibility of eliminating labeling/projection is correspondingly enhanced.

As noted at the beginning of this article, the approach to projection-free syntax is in part motivated by the fact that various accounts are proposed to capture the effect of endocentricity of phrase structure without recourse to labeling/projection. Among others, Chomsky (p.c., lectures at MIT in fall 2010) proposes that the mechanism of head-detection can be radically reduced to minimal search of an LI for each phrase. The hypothesis can be stated as in (56):

- (56) Minimal head detection (Chomsky p.c., lectures at MIT in fall 2010):  
For any syntactic object  $\Sigma$ , the head of  $\Sigma$  is the most prominent LI within  $\Sigma$ .

The effect of (56) is essentially that for any syntactic object  $\{H, \alpha\}$ , where H is an LI and  $\alpha$  an SO, H is the head of  $\{H, \alpha\}$  (cf. the first clause of Chomsky's 2008 labeling algorithm; see also Piattelli-Palmarini et al. 2009:52ff). As noted, no notion of projection is implied in this minimal theory of endocentricity, keeping to the SMT. Minimal search of LIs involved here may be an effect of the third factor of language design (Chomsky 2005) like principles of computational efficiency, as suggested by Chomsky.

Phrases headed by *v*, *C*, *n*, *P* and so on are all interpreted differently at CI, which strongly suggests that the effect of endocentricity figures in semantic interpretation. Correspondingly, if (56) is the correct mechanism of head-detection, it should be operative at least at CI (and less clearly at SM). Indeed, Chomsky goes on to suggest that only SOs whose heads can be identified by (56) can receive legitimate interpretation at CI. Under this hypothesis, any XPs

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(i) \* *Who(m)*<sub>i</sub> does it seem [to *t*<sub>i</sub>] [that it is raining]

(ii) [*To whom*]<sub>i</sub> does it seem *t*<sub>i</sub> [that it is raining]

These data are also susceptible to the same account based on the PSC (50), if we adopt Rosenbaum's (1970) hypothesis that the expletive *it* in such a configuration is base-generated at the edge of the embedded *that*-clause and moves to the subject position.

whose heads cannot be detected by (56) would violate the principle of *Full Interpretation* (FI) (cf. Chomsky 1995:194):

- (57) Full Interpretation (FI):  
Every constituent of SEM and PHON contributes to interpretation.

It should be noted in this context that Chomsky still assumes that Merge can apply to two XPs (by the medium of labeling/projecting EFs onto XPs). Any SO of the form {XP, YP} would be headless according to (56), and thus it would fail to receive interpretation.<sup>17</sup> In this line of approach, then, the strength of FI must be correspondingly undermined.<sup>18</sup>

The strength of FI, as well as that of minimal head detection (56), is an open empirical question we have to largely leave for further research (see Narita 2011). However, let me note that, if the H- $\alpha$  schema put forward in this article is on the right track, it follows that syntax *cannot* generate any interface-illegitimate objects of the form {XP, YP} for which (56) fails to determine heads. In regard to head detection, then, syntactic computation governed by the H- $\alpha$  schema is 'failure-proof' so to speak, and SOs generated thereby always satisfy FI. Correspondingly, the H- $\alpha$  schema's contribution to the SMT is corroborated, to the extent that FI constitutes a desirable component of optimal language design.

The desideratum of guaranteed FI-satisfaction can be regarded as a straightforward consequence of the H- $\alpha$  schema. This line of reasoning is in part motivated by the above-mentioned hypothesis that the H- $\alpha$  schema itself can be independently deduced from the properties of EFs. That said, however, it must also be admitted that the question of *why* the EF should have the properties in (55) is left open in this approach for the time being. This problem is especially burdensome, for the EF as formulated in (55) exhibits quite peculiar properties, distinct from all other features of LIs, as pointed out by Fukui (2011) and Boeckx (2010).

As a way to address this issue, let me also note that, alternatively, we can instead entertain a reverse causal analysis of the EF and FI. Specifically, we may hypothesize that the H- $\alpha$  schema and the related properties of EFs are deduced from the cooperation of FI and the interface requirement that the head of each phrase be detected by minimal search (56) at CI. That is, we may also postulate that it is rather FI in its full force that compels syntax to obey the H- $\alpha$  schema, and further strongly configures the properties of EFs associated with LIs. Thus, the interplay of the three factors is open to bidirectional interpretation as in (58):

- (58) Constant satisfaction of FI  $\Rightarrow$  the H- $\alpha$  schema  $\Rightarrow$  properties of EFs

I will leave the choice between these two theories of the H- $\alpha$  schema open for future research. However, note that both of these approaches share the same conclusion that UG should not assume any mechanism of projection: first, the theory of EFs requires that the EF must not project, since otherwise we cannot rule out XP-YP merger. If phrases are labeled by projected features of head LIs, the absence of EF-projection would be at best mysterious. Moreover, the minimal search-based account of head detection makes sense only when labeling by projection is *not* the mechanism used to account for endocentricity. Both approaches thus point to the fundamental hypothesis that bare phrase structure is projection-free, which is what we have been arguing for throughout the present article.

Let me finally note that minimal head detection (56), when tied with the H- $\alpha$  schema, makes for some cases predictions quite different from traditional theories of endocentricity. One of the most notable differences will arise for cases of 'specifier'-merger: to take a representative example, consider cases where internal Merge moves Y to the 'specifier' of X, creating an SO

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<sup>17</sup>Chomsky actually regards this as a desirable result, noting typical XP-YP structures like those involving intermediate copies of successive cyclic WH-movement and EPP-raised subjects as instances of SOs that appear to receive no interpretation at CI.

<sup>18</sup>Chomsky proposes that traces of movement are invisible for head-detection, thus an XP-YP structure can be salvaged for head-detection if one of the XPs moves.

of the form  $\{Y, \{X, [ \dots t_Y \dots ]\}\}$ . For such a configuration, (56) will unambiguously identify  $Y$  as the head of the structure. Thus, it is the WH-moved  $Q$ , not  $C$ , that will be the head of  $\{Q, \{C, [ \dots t_Q \dots ]\}\}$ , and it is the EPP-raised subject  $K$ , not  $T$ , that will be the head of  $\{K, \{T, [ \dots t_K \dots ]\}\}$ , and so on. No strong evidence internal to narrow syntax speaks either for or against such predictions; see Starke (2004), Donati (2006) and Chomsky (2008) for much relevant discussion. Selection and subcategorization used to make major recourse to (then narrowly syntactic) headedness in earlier theories of UG, but in the modern framework where selection (categorial or semantic) plays no role in narrow syntax (Chomsky 2004:112-113; see also Pesetsky 1982), CI just retroactively assigns to SOs selectional interpretations with various degrees of deviance. Probably, then, the notion of ‘head’ may be reduced in this approach to just a hierarchically prominent LI that primarily configures CI-interpretation of the SO in question. For internal Merge in particular, it may make sense to see moved LIs as ‘heads’, constituting loci of interpretation that determine, e.g., the scope of relevant operator-variable linkages, among other things. Note also that ‘adjunct’ LIs attached to the main clausal spine would be predicted by (56) to constitute the heads of the relevant adjunction structures. To the extent that this consequence is regarded as problematic, we may have to find some independent means to delineate the mode of adjuncts’ contribution to CI-interpretation, possibly by making recourse to either Chomsky’s (2004 *et seq.*) pair-Merge theory or Lebeaux (1988, 2009) and others’ late-Merge theory of adjunction. Furthermore, the external argument  $K$  at the edge of  $v^*$ , as in  $\{K, \{v^*, VP\}\}$  for example, would be identified as the head of the SO, which may be problematic as well for the purpose of  $\theta$ -role assignment. But recall the claim from §2.2 that cyclic Transfer at the  $v^*$ -phase-level effectively reduces  $\{K, \{v^*, VP\}\}$  to  $\{K, v^*\}$ , for which  $v^*$  may also be identified as the head, circumventing the problem of  $\theta$ -role assignment by  $v^*$  to  $K$  (cf. Epstein 2009 for related discussion). All in all, the combination of minimal head detection (56) and the H- $\alpha$  schema eradicates the ‘specifier-of’ relation altogether from the theory of syntax, a conclusion for which a number of arguments are put forward on independent grounds (see Starke (2004), Jayaseelan (2008), Chomsky (2010), Lohndal (in progress)). I cannot do justice to all these important ramifications in this short article, but readers are referred to Narita (2011) for further exploration.

## 4.2 Speculation on the Problem of Learnability

Throughout the present study, I have used the term ‘lexical item’ (LI) to refer to the ‘atomic’ elements of computation that are stored in the mental lexicon and bear some property that allows them to be subjected to Merge, a feature that is called an edge-feature (EF). Each LI may further contain, in addition to the EF, some formal features that differentiate one LI from the other in their functions and distributions in syntactic derivation, as well as some other intrinsic features that can contribute to interpretation either at CI or SM (semantic and phonetic features). That LIs have EFs follows rather straightforwardly in this line of reasoning, but that said, we really don’t know what the internal composition of LIs can be. How ‘complex’ are LIs? Does UG specify any constraint on the possible compositions of LIs? How can the composition of each LI be learned/acquired by the child through experience?

Opinions vary as to what the smallest unit of linguistic computation is, or where the computation ‘bottoms out’. Linguists have proposed all sorts of different conceptions of the lexicon, but there is no sign that the controversy will ever find a point of agreement. However, despite linguists’ continuous failure to pin down a reasonable and agreeable set of universal linguistic primitives, human infants still acquire the lexicon of one or another I-language with remarkable speed and uniformity, a familiar poverty-of-the-stimulus fact. How could this ever be possible? If there is indeed some set of primitives that are readily accessible to infants, why are trained adult linguists bound to fail to find the slightest trace of them?

The H- $\alpha$  schema might hint at a clue to this learnability problem. Consider, for example,

recent experimental results discussed in Yang and Gambell's work (see Yang 2002, 2004, Gambell and Yang 2003 among others), according to which the general mechanism of statistical data analysis (presumably a constituent of the third factor of FL design) provides a reasonable first-cut segmentation of words in primary linguistic data, when it works in tandem with the principle (presumably determined by UG) that each phonological word bears a single primary accent. Given the relative ease of detecting phonological words in primary data (say, the three phonological words in /ðə'boɪz'kɪstəd'gɜːl/, *the-bóys kíssed a-gírl*), it seems reasonable to suppose that children acquire these readily detectable units as the first provisional candidates for LIs. From there, the H- $\alpha$  schema provides a preliminary analysis of sentential structures comprised of these words, synthesizing them in accordance with the H- $\alpha$  schema (e.g., {*the-bóys*, {*kíssed*, *a-gírl*}} or the like). In addition to such a 'bottom-to-top' application of the H- $\alpha$  schema-based structural analysis, the H- $\alpha$  schema might also give a clue to a 'top-down' decomposition of words to smaller units. For example, the phonological word *the-bóys* may be eventually analyzed as {the, bóys}, further to {the, {boy, s}}, and even to {the, {-s, {n,  $\sqrt{\text{boy}}$ }}} under the guidance of the H- $\alpha$  schema. Each of such H- $\alpha$  schema-based reanalyses of phonological word structures may lead to a corresponding revision of the list of provisionally analyzed LIs. For example, a learner of English may start with the provisional list of unanalyzed phonological words as his first lexicon, say {*the-bóys*, *kíssed*, *a-gírl*, ...}, but continuous revisions will be made to this list as the acquisition proceeds.

Various cues from experience (distributional or semantic) may be taken as evidence for such decomposition. Among other things, the H- $\alpha$  schema predicts that any instance of a movable element should involve a topmost phase-head LI, sometimes covert: for example, provided with the H- $\alpha$  schema, the distribution of nominals, some of which involves A- or A'-movement, might be sufficient to indicate that there is some category that appears at the topmost edge of the relevant nominal structure, namely K. Whereas learners of languages like Japanese will identify it with overt case-particles (like *o* 'ACC' and *ga* 'NOM'), learners of languages like English may assign a morpheme with zero phonetic content to this category. Arguably, such functional categories are relatively easy to detect via overt evidence, such as morphological manifestation and movement. So to speak, they satisfy what Fukui and Sakai (2003:327; see also Thráinsson 1996) calls the *visibility guideline for functional categories*, which holds that a functional category has to be visible (i.e., detectable) in the primary linguistic data, thus simplifying the problem of learnability.

In this respect, the H- $\alpha$  schema is both a very 'soft' and a very 'hard' constraint on the possible form of linguistic structure. It is quite 'soft' in the sense that it allows both leftward and rightward branching of the H- $\alpha$  structure, as in, e.g., {the, {{n,  $\sqrt{\text{lecture}}$ }, yesterday}} in English, or {{that-GEN, {yesterday-GEN, {n,  $\sqrt{\text{lecture}}$ }}}, ACC} (*so-no kinoo-no koogi-o*) in Japanese. More importantly, the analysis parses the relevant H- $\alpha$  branching structure without involving any extra notions like 'head-of', 'adjunct-of', or 'specifier-of'. As we have seen throughout the present article, these notions are just unnecessary and stipulative residue of the earlier phrase structure grammar that are simply unavailable in projection-free bare phrase structure. On the other hand, the H- $\alpha$  schema is so 'hard' a constraint that it disallows any vacant structural slots like unfilled 'specifiers' and 'complements', which cannot be excluded in X-bar-theoretic phrase structures. Moreover, it strongly restricts the possible instances of 'displacement' in natural languages, and it instructs the child that any apparent instances of 'XP'-movement should involve cyclic application of Transfer, specifically triggered by (probably covert) phase-heads that encapsulate Transferred domains for phonological purposes.

This way, the H- $\alpha$  schema provides a strong restriction on the space of possible syntactic structures, and hence a strong bias for the initial linguistic analysis entertained by the child. The problem of explanatory adequacy is correspondingly simplified, approaching the desideratum of principled explanation of FL.

## 5 Concluding remarks

This article was an attempt to eliminate projection from the theory of bare phrase structure, regarding it as a departure from the SMT. It proposed that cyclic Transfer, applying in a ‘forgetting-about’ fashion as proposed in (Chomsky 2004), can reduce a phase to a phase-head LI, and that such a reduced phase head LI can be subjected to another application of Merge, without percolation of EFs. It was argued that phase cyclicity is crucially in service of recursive compositional structuring in projection-free syntax. This article specifically entertained the following reasoning: if the premise in (59) holds, then the consequences in (60) are straightforwardly derived.

- (59) UG does not assume any mechanism of labeling/projection.
- (60)
- a. The H- $\alpha$  schema (6) holds for all instances of Merge.
  - b. Only phases can undergo ‘XP’-movement (viz. movement of a phase head that has subjected its complement to Transfer).
  - c. All moved ph(r)ases constitute islands (the freezing effect).
  - d. CED effects arise for moved subjects but not for in-situ subjects.
  - e. CED effects arise for ‘high’ adjuncts but not for ‘low’ adjuncts.
  - f. The PSC (50) is derived, unifying the account of CED effects and more.
  - g. Syntax generates SOs that constantly satisfy FI with regard to minimal head detection.
  - h. The H- $\alpha$  schema provides a strong analytic means for the acquisition of LIs.

To the extent that the payoffs summarized in (60) meet descriptive and explanatory adequacy, the explanatory force of (59) is correspondingly corroborated. The overall conclusion, in a nutshell, is that the hypothesis of projection-free syntax not only keeps more closely to the SMT but also achieves even richer empirical coverage than theories of projection-bound syntax. It is obvious that many of the ramifications of the proposal are left for future research, but I hope to have shown that the results entertained in this article provides some ground to pursue the minimal/minimalist hypothesis of projection-free bare phrase structure.

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