

## Head Parameter and Externalization: A Preliminary Study

Yoshihito Dobashi

*Chukyo University*

**ABSTRACT.** This paper provides a preliminary attempt to reduce the effect of head parameter to the processes of externalization. I argue that the head-directionality variation can be captured in terms of the non-syntactic notions available in the externalization processes, i.e., adjacency and a third factor principle of Minimal Search. Minimal Search identifies lexical items in syntactic objects, and these items are linearized so that they are adjacent in some languages and non-adjacent in others, capturing the word order variation.\*

**Keywords:** head parameter, word order, minimal search, externalization, Final-Over-Final Condition

### 1. Parameters and Externalization

In the current minimalist program of syntactic theory, it is expected that syntax is universal. That is, parametric variation is (largely, or perhaps entirely) attributed to the processes of externalization (Berwick and Chomsky (2011), Tokizaki and Dobashi (2013), cf. Epstein et al. (2017)). If this view is correct, and if something like head parameter is real, then we need to recast head parameter (HP) in terms of externalization. The purpose of this paper is to derive the effects of HP in terms of the notions available in the externalization processes, which are adjacency and a third factor principle of Minimal Search. In section 2, I discuss the status of HP in the current study of syntax. In section 3, I suggest a novel reformulation of HP based on the processes of externalization. I conclude the discussion in section 4.

### 2. Head Parameter

HP is one of the important parameters in the principles-and-parameters theory in the 1980s, and it accounts for the cross-linguistic word order variation. One of its formulations is shown in (1):

- (1) a. head-initial: [<sub>X'</sub> X<sup>0</sup> Y<sup>max</sup> ]

---

\* Portions of this paper were presented at Sophia Linguistic Institute for International Communication (Online), September 18th, 2021, and at the 12th workshop on the Phonological Externalization of Morphosyntactic Structure (Online), February 13th, 2022. I would like to thank the audience there. This work is supported by JSPS KAKENHI (Grant Numbers 20H01269 and 20K00677).

- b. head-final: [<sub>X</sub> Y<sup>max</sup> X<sup>0</sup>] (Fukui 1993: 401)

A head precedes or follows its complement within a syntactic constituent. If it precedes its complement as in (1a), we have head-initial languages like English; if a head follows its complement as in (1b), we have head-final languages like Japanese.

In the subsequent minimalist program (Chomsky 1995), Bare Phrase Structure is adopted in place of X-bar theory, and the phrase structure is considered to be set-theoretical objects, and therefore linear order cannot be defined in syntax any more. Moreover, with the advent of Kayne's (1994) Linear Correspondence Axiom (LCA), many syntactic studies have started to assume that basic word order is universally SVO, and SOV is derived by moving the object O leftward over the verb V. So, practically, HP was eliminated from the grammar.

However, there are some compelling arguments that HP (or its effect) is real. For one thing, as Fukui (1993) argues, the values for HP correspond to the directionality of optional movement. Thus, Japanese is head-final and the leftward movement can be optional, allowing scrambling. English, on the other hand, is head-initial and the rightward movement can be optional, enabling heavy-NP shift. These facts indicate that something like HP is in fact real. Furthermore, Wexler (1998) observes, as stated in (2), that “[b]asic parameters are set correctly at the earliest observable stages,” including word order parameters and some others listed in (3):

- (2) Very Early Parameter-Setting (VEPS): Basic parameters are set correctly at the earliest observable stages, that is, at least from the time that the child enters the two-word stage around 18 months of age.
- (3) Basic parameters include:
- a. Word order, e.g. VO versus OV (e.g. Swedish vs. German)
  - b. V to I or not (e.g. French versus English)
  - c. V2 or not (e.g. German versus French or English)
  - d. Null subject or not (e.g. Italian versus English or French)

This indicates that HP is quite independent of the parameters concerning phrasal movement, such as NP-movement, which would be expected to account for the head-directionality variation without recourse to HP under LCA. Given these observations, it should be reasonable to assume that HP (or something that accounts for its effect) has its own place in the grammar, formulated independently of phrasal movement.

In the next section, I explore a possible account for head-directionality formulated in the processes of externalization.

### 3. Head Directionality in Externalization

One of the important notions in minimalist theorizing is efficient computation (Chomsky 2005). One of the specific ways of its formulation is Minimal Search (MS) that finds the prominent element within a syntactic object with minimal effort. For example, MS is applied to semantic interpretation of syntactic objects, and this algorithm is called Labeling Algorithm (Chomsky 2013). This indicates that a principle of efficient computation is also at work in the processes of semantic interpretation. Then, as suggested elsewhere (Dobashi 2019), it would be reasonably expected that MS is at work in the processes of externalization that phonologically interpret syntactic objects.

Let us consider MS in the externalization processes. Consider (4)

$$(4) \quad K = \{X, YP\}$$

In the syntactic structure  $K$  consisting of a lexical item  $X$  and a phrase  $YP$  that has internal structure, MS finds  $X$ . Let us call such an item *Prominent Element* (PE):

(5) *Prominent Element* (PE):

A lexical item detected with Minimal Search within a syntactic object.

Note that the detection of PE is different from Labeling Algorithm in that the latter searches for a “labelable” element (Chomsky 2013, 2015), while the former searches for any lexical item that is detectable with MS.

Given (5), let us assume that PEs are available in the processes of externalization. Then, let us consider what else is available in the processes of externalization. First of all, as the syntactic component is devoid of linear order, lexical items are linearly ordered in the processes of externalization. Second of all, linearization is a process that determines what is next to what. This means that the notion of adjacency is available, in addition to the relations such as precedence. Given these, I assume that PEs and adjacency are available in the processes of externalization.

Now let us consider how (the effect of) HP can be recast in terms of PEs and adjacency. As stated in (6) below, we have two logical possibilities. One is to make PEs adjacent to each other in the processes of externalization, and the other is *not* to make PEs adjacent to each other.

(6) PEs and Adjacency:

- a. Make PEs adjacent to each other.
- b. Do not make PEs adjacent to each other.

With these two options in mind, let us consider the syntactic structure L, shown in (7):

$$(7) \quad L = \{_{\delta} XP, \{_{\gamma} Y, \{_{\beta} ZP \{_{\alpha} W, QP\}\}\}\}$$

Here,  $\delta$  is a phase, Y is its phase head, and QP is a lower phase. For the processes of phase-by-phase derivation, I will adopt the assumptions summarized in (8) below. First of all, as in (8a), linearization applies phase-by-phase. HP is assumed to hold within a phrase XP, which is an X-bar theoretic notion, but now X-bar theory has been eliminated from the theory of grammar in the minimalist program, so I assume that the relevant domain for linearization is a phase. Thus, in (7), the process of linearization looks at the phase  $\delta$ , finds PEs with MS, and considers the adjacency relations between PEs, determining the linear ordering among XP, Y, ZP, W and QP (I will return to the detailed description of this process below). A second assumption, (8b), is that a specifier is to the left of its head. I will not go into details here, but this seems to be a general cross-linguistic tendency (Kayne 1994: 35). A third assumption, (8c), is that the two members of each syntactic constituent are always adjacent to each other when they are linearized. So, for  $\{ZP, \{_{\alpha} W, QP\}\}$ , W has to be adjacent to QP when linearized, and ZP has to be adjacent to the syntactic constituent  $\alpha$  consisting of W and QP. This amounts to saying that no line crossing is allowed when linearized. That is, a terminal element of the “tree” cannot be placed between the other two items in the way that a line of the tree diagram is crossed by another line.

(8) Assumptions (Cf. (7)):

a. Linearization applies phase-by-phase.

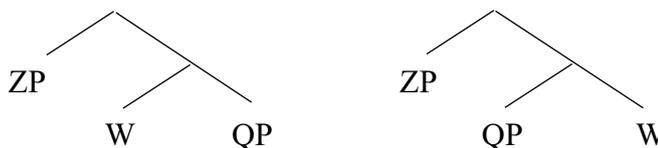
b. Specifier is to the left of its “head”.

$$XP > Y$$

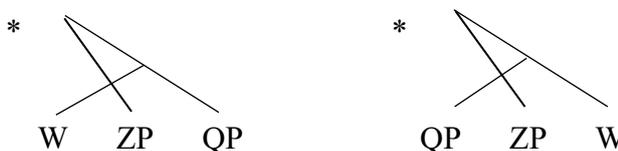
$$ZP > W$$

c. Two members of each syntactic constituent are always adjacent to each other when linearized.

i. For  $\{ZP, \{W, QP\}\}$ , either  $ZP > W > QP$  or  $ZP > QP > W$  is possible:



ii. No line crossing:



Given these assumptions, let us go back to the two logical possibilities stated in (6). Let us consider the first logical possibility (6a), which requires that prominent elements be adjacent to each other. In the structure (7), reproduced in (9) below, W is detectable with MS in  $\alpha$ , and Y is detectable with MS in  $\gamma$ . So, W and Y are PEs in L:

$$(9) \quad L = \{_{\delta} \text{XP}, \{_{\gamma} \text{Y}, \{_{\beta} \text{ZP} \{_{\alpha} \text{W}, \text{QP}\}\}\}\}$$

Then, this structure is linearized so that W and Y are adjacent to each other. Given the assumptions in (8), the only possible order is the one in (10) below, where the two prominent elements W and Y are adjacent:

$$(10) \quad \text{XP} > \text{ZP} > \text{QP} > \text{W} > \text{Y}$$

This word order turns out to be equivalent to the head-final order.

Let us turn to the other possibility (6b), which requires that PEs *not* be adjacent to each other. Let us consider the structure (9) again, repeated below in (11):

$$(11) \quad L = \{_{\delta} \text{XP}, \{_{\gamma} \text{Y}, \{_{\beta} \text{ZP} \{_{\alpha} \text{W}, \text{QP}\}\}\}\}$$

PEs are W and Y as before, and these two items should not be adjacent to each other this time. Given the assumptions in (8), the following three orders can be obtained for the syntactic object L:

- (12) a.  $\text{XP} > \text{Y} > \text{ZP} > \text{W} > \text{QP}$   
 b.  $\text{XP} > \text{Y} > \text{ZP} > \text{QP} > \text{W}$   
 c.  $\text{XP} > \text{ZP} > \text{W} > \text{QP} > \text{Y}$

(12a) is a typical head-initial order: W precedes its complement QP, and Y precedes its complement  $\beta$ .

It should be noted here that specifiers and complements are not always filled or pronounced. Then, two heads will be adjacent even if (6b)/(12a) is chosen. Since (6) is a parameter formulated as part of the externalization process, it would be expected to have a violable character that is common to the phonological constraints in Optimality Theory. To be more specific, let us consider a simple transitive construction with an auxiliary verb, such as the one in (13a). Here, the specifier of VP is phonetically null (a trace), and as a result of applying (12a) to linearize the structure, Aux *can* is adjacent to V *speak*:

- (13) a. [ John [ can [ <sub>VP</sub>  $t_{\text{John}}$  speak [ <sub>NP</sub> Japanese ] ] ] ]  
 b. John > **can** > **speak** > Japanese.

I assume that once the parameter value (6b) is set and the linearization pattern (12a) is selected, the process of linearization operates uniformly and blindly without considering specific phonetic manifestations of syntactic objects, and automatically puts a PE to the left of its sister in strictly head-initial languages like English, sometimes violating the non-adjacency requirement (6b). Note that even though it is violable, (6b) is more likely to avoid head-head adjacency than (6a), and therefore serves to capture parametric variation in word order.

Let us next consider (12b). I take this ordering to be manifested by the verb-second constructions, exemplified by a German sentence in (14), where the higher phrase is head-initial, and the lower phrase is head-final:

- (14) Er hat [      das Buch gekauft ]  
       he has [      the book bought ]  
       XP Y (ZP) QP        W

Lastly, let us consider (12c). This ordering seems to violate the Final-Over-Final Condition (FOFC, Sheehan et al. 2017), shown in (15), which is known to account for robust cross-linguistic generalizations about word order:

- (15) a. The Final-over-Final Condition (FOFC)

A head-final phrase  $\alpha P$  cannot immediately dominate a head-initial phrase  $\beta P$ , if  $\alpha$  and  $\beta$  are members of the same extended projection.

- b.  $*[_{\alpha P} [_{\beta P} \beta \gamma] \alpha]$ , where  $\beta$  and  $\gamma$  are sisters and  $\alpha$  and  $\beta$  are members of the same extended projection.

(Sheehan et al. 2017: 1)

Roughly speaking, a head-final phrase may not immediately dominate a head-initial phrase if both of the heads are members of the same extended projection. For example, as in (16), Aux is in a head-final position, and therefore the Aux Phrase may not dominate a head-initial Verb Phrase:

- (16)  $*[_{AuxP} [_{VP} V XP] Aux]$

As long as W and Y in (11) belong to the same extended projection, the head-final phrase headed by Y immediately dominates the head-initial phrase headed by W in (12c), violating FOFC. So, whatever accounts for FOFC excludes the word order (12c) for independent reasons.

#### 4. Conclusion

In this short paper, I gave a rough sketch of how to derive the effects of HP making use of the non-syntactic notions of adjacency and a third factor principle of efficient computation MS, which are available in the processes of externalization. There are, of course, many questions remaining unanswered, including the questions of how each language or each construction chooses one of the values in (6), and of how (12a) is selected over (12b), or vice versa, when (6b) is chosen. I will leave them for future work.

#### References

- Berwick, Robert and Noam Chomsky. 2011. The Biolinguistic Program: The Current State of its Development. Anna Maria Di Sciullo and Cedric Boeckx (eds.) *The Biolinguistic Enterprise*, 19-41, Oxford, Oxford University Press.
- Chomsky, Noam. 1995. *The Minimalist Program*, Cambridge, Massachusetts, MIT Press.
- Chomsky, Noam. 2004. Beyond Explanatory Adequacy. Adriana Belletti (ed.) *Structures and Beyond: The Cartography of Syntactic Structures Vol. 3*, 104-131, Oxford, Oxford University Press.
- Chomsky, Noam. 2005. Three Factors in the Language Design. *Linguistic Inquiry* 36, 1-22.
- Chomsky, Noam. 2013. Problems of Projection. *Lingua* 130, 33-49.
- Chomsky, Noam. 2017. Notes on Parameters. *Linguistic Analysis* 41, 475-479.
- Chomsky, Noam and Howard Lasnik. 1977. Filters and Control. *Linguistic Inquiry* 8, 425-504.
- Dobashi, Yoshihito. 2019. *Externalization: Phonological Interpretations of Syntactic Objects*. London, Routledge.
- Epstein, Samuel David, Miki Obata and T. Daniel Seely. 2017. Is Linguistic Variation Entirely Linguistic? *Linguistic Analysis* 41, 481-516.
- Fukui, Naoki. 1993. Parameters and Optionality. *Linguistic Inquiry* 24, 399-420.
- Holmberg, Anders. 2000. Deriving OV Order in Finnish. Peter Svenonius (ed.) *The Derivation of VO and OV*, 123-152, Amsterdam, John Benjamins.
- Kayne, Richard. 1994. *The Antisymmetry of Syntax*, Cambridge, Massachusetts, MIT Press.
- Sheehan, Michelle, Theresa Biberauer, Ian Roberts, and Anders Holmberg. 2017. *The Final-Over-Final Condition: A Syntactic Universal*, Cambridge, Massachusetts, MIT Press.
- Tokizaki, Hisao and Yoshihito Dobashi. 2013. Introduction to Universal Syntax and Parametric Phonology. *Linguistic Analysis* 38, 147-151.
- Wexler, Ken. 1998. Very Early Parameter Setting and the Unique Checking Constraint: A New Explanation of the Optional Infinitive Stage. *Lingua* 106, 23-79.