A Feature Inheritance Approach towards Head-final Languages

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1 Introduction

On the assumption that linguistic parameterization is attributed to the morphosyntactic contents of functional categories (Borer 1984; Chomsky 1995), the directionality parameter stated over a lexical head plays no role in Minimalist syntax. Following Kayne (1994) in assuming that VO is the underlying order, Chomsky proposes that the contrast between VO and OV languages results from covert vs. overt object movement due to the absence vs. presence of an EPP property of *v*, the functional category above VP. Chomsky (2008) also proposes that only phase heads, C and *v*, can be specified for probing features and EPP, and T inherits its probing features and EPP from C via *feature inheritance* (FI henceforth). According to Chomsky, FI is a general property of all phase heads and should be at play in the domain of *v*-V. However, FI from C to T and *v* to V do not seem to be parallel; T is a functional category and V is a lexical category. Under Chomsky's own view that only functional categories can have parameterized features, lexical categories such as V are not eligible for

inheriting features from a phase head. Moreover, there are remaining questions how FI operates and accounts for parametric variations such as word order in a principled way.

This study proposes that the complement of v is not VP but AspP and that the functional head Asp is the beneficiary of FI from v, parallel to FI from C to T. In addition, FI is developed into a full-fledged mechanism, regulated by two principles and governed by three operational rules, which is at play both in the C-T and the v-Asp domains. Finally, the FI system developed in this paper is applied to account for the word order of head-final languages such as Japanese and Korean in contrast with that of head-initial languages such as English, with particular focus in the v-Asp domain, in which OV order is derived from VO in Japanese and Korean.
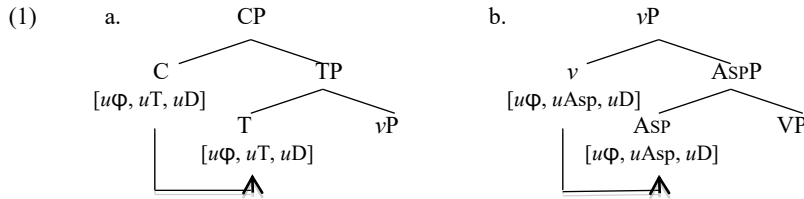
2   Feature inheritance

Chomsky (2000) considers C, T, and v to be core functional categories, but the probing features (or Agree or edge features in Chomsky's terms) and the EPP belong to phase heads only, C and v. T inherently lacks these features and its probing features and EPP property are inherited from C, the phase head, via FI. As a result, T serves as a probe at the phase level CP.

Chomsky (2001) suggests that FI is a general property of all phase heads and should be at play in the domain of v-V, analogous to that of C-T. However, FI from C to T and from v to V do not seem to be parallel; T is a functional category and V is a lexical (or substantive in Chomsky's terms) category. Chomsky is aware of this and notes that "T should be construed as a substantive rather than a functional category, falling together with N and V. … The C-T relationship is therefore analogous to the v^*-V relation." Thus, it seems that Chomsky offers a contradictory view on the status of T: on the one hand, T is one of core functional categories along with C and v, but it should be regarded as a non-functional, lexical category.

A central premise of research exploiting the lexical vs. functional distinction in current literature is that only functional categories can be probes and have parameterized features, which reins in syntactic variation, which was also endorsed by Chomsky in the Minimalist Program. If we abide strictly by this hypothesis, a lexical category V cannot inherit the probing features from v and become a probe, unless it is assumed to be a functional category. However, this problem disappears if we assume that the complement of v is not VP but AspP (Richardson 2003; Shim 2011; Travis 2000, 2010), and that the functional category Asp is the beneficiary of FI from v, parallel to FI from C to T, shown in (1): analogous to the C-T relation, v selects a functional category Asp and transmits its probing features to Asp via FI in (1b). All probing features such as φ-features,

aspect, and D-(accusative Case) features on Asp are inherited from its selecting phase head v.

(1)　　a.　　　　CP　　　　　　　　　　b.　　　　vP

　　　　　C　　　　TP　　　　　　　　v　　　　AspP

　　　　[uφ, uT, uD]　　　　　　　[uφ, uAsp, uD]

　　　　　　　　T　　　vP　　　　　　　　　Asp　　　VP

　　　　　　[uφ, uT, uD]　　　　　　　　[uφ, uAsp, uD]

Going back to the discussion of FI from C to T, Chomsky does not discuss what happens when C's features are passed down to T: it is not clear whether all of C's features are are inherited by T or features are selectively transmitted to T. Also it is not well-defined either whether these features disappear from C after they are discharged to T or they remain active on C. To fill in these blanks, I propose that FI from C to T and v to Asp is regulated by two principles and governed by three operational rules.

(2)　Principles of FI
　　a.　*Feature selection*: Features may be selectively inherited.
　　b.　*Feature expiration*: Inherited features are only active on the heir (T, Asp) and lose their probing capability on the donor (C, v).

(3)　Operational rules of FI
　　a.　*Earliness*: Value features and satisfy EPP as early as possible.
　　b.　*Economy*: Minimize the number of feature checking operations.
　　c.　*Multiple agree under antisymmetry*: Only one goal is spelled out at the specifier of a probe in multiple agree relations.

Based on the principles and the operational rules of FI proposed above, I will show how the head-final structure of Japanese and Korean is built in comparison with the head-initial structure of English. It will be shown that languages differ from one another with respect to EPP-specifications on the features on C and v, and feature valuation on C and v via FI will be proposed to account for the word order contrast between Japanese/Korean and English.

3　Feature inheritance

3.1　Feature specifications on C and v

Japanese and Korean display head-final structure, in which all heads uniformly follow their complements, whereas English exhibits head-initial structure, all complements being preceded by their heads. This contrast is also observed in the C-T domain where the C head follows its complement in Japanese and Korean, while it precedes TP in English, as shown in (4).

(4) a. Kibo-ga   [CP [TP Dana-ga   hon-o   kat-ta]-**to**   it-ta
         -NOM   -NOM   book-ACC   buy-PST-COMP   say.PST

                                                                        Japanese

     b. Kibo-ka   [CP [TP Dana-ka   chayk-ul   sass-ta]-**ko**   malhayss-ta
         -NOM   -NOM   book-ACC   buy.PST-DECL-COMP   say.PST-DECL

                                                                        Korean

     c. Kibo said [CP **that** [TP Donna bought a book]]

This contrast can be explained if we assume that the subject base-generated at Spec, vP moves to Spec, TP in all three languages and the TP further moves up to the Spec, CP only in Japanese and Korean, while it remains in situ in English, as illustrated in (5). Assuming that both subject movement and TP raising are induced by the EPP specification on a feature on C, what this reveals is that EPP specifications on C in Japanese/Korean and in English differ: two of the feautures on C have the EPP property in Japanese/Korean, each being responsible for movement of the subject and TP, whereas only one feature on C is specified for EPP in English, triggering subject movement.
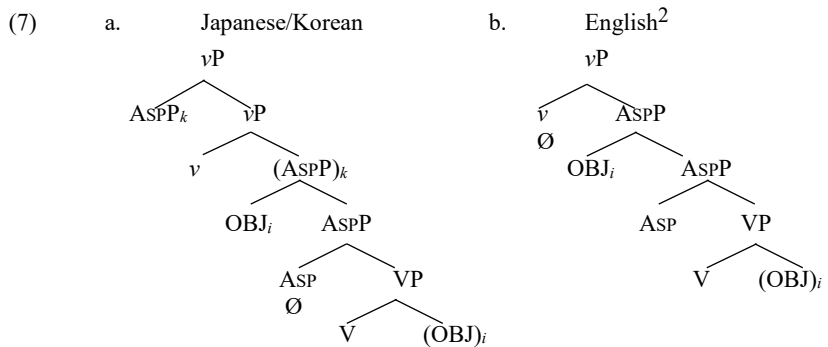
(5)   a.   Japanese/Korean   b.   English
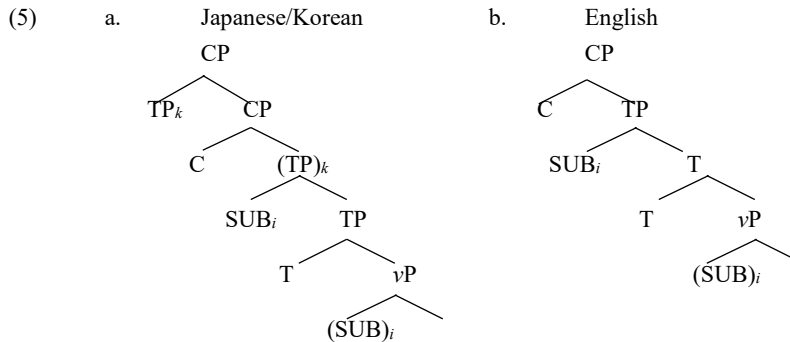
I assume that C in all these languages share the same features, $[u\varphi, uT, uD]$, as shown in (1a), and propose that $[uD]$ on C in all three languages are specified for EPP, triggering subject movement to TP. The evidence comes from the fact that the only phrases that can raise to Spec, TP in these languages are noun phrases that check nominative Case (i.e., uD) against T. In addition, $[uT]$ on C in Japanse and Korean are EPP-specified, triggering TP raising to Spec, CP. [1]

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[1] One may ask why it is $[uT]$, not $[u\varphi]$, which is specified for EPP on C, responsible for TP raising in Japanese and Korean. Although I assume that Japanese and Korean have φ-features, parallel to English, the presence of φ-features in these languages is subject to debate in the literature, due to the fact that Japanese and Korean do not show any morphological indication of φ-feautres on their nominals, such as person, number, and gender. While some researchers argue that φ-features may be lacking altogether in Japanese and Korean (Kuroda 1988; Saito

(6) a. C [$u\varphi$, uT^{EPP}, uD^{EPP}]   Japanese, Korean
    b. C [$u\varphi$, uT, uD^{EPP}]   English

Parallel to the C-T domain, head-final vs. head-initial structure of Japanese/Korean and English is also found in the *v*-Asp domain, in which the V head follows its complement in Japanese and Korean, while it precedes the object in English, as shown in (4). The OV vs. VO contrast in Japanese/Korean and English can be further illustrated in (7), in which the object first moves to Spec, AspP deriving OV order within AspP, and the entire AspP raises to Spec, *v*P in Japanese and Korean, triggered by the EPP specifications on *v*.

(7)   a.   Japanese/Korean   b.   English[2]

The *v*-Asp structure in (7) is entirely parallel to the C-T structure in (5). Based on this, I propose the following feature specifications on *v* in Japanese/Korean and English, in which [uD^{EPP}] and [uAsp^{EPP}] on *v* trigger object movement to Spec, AspP and AspP raising, respectively.

(8) a. *v* [$u\varphi$, uAsp^{EPP}, uD^{EPP}]   Japanese, Korean
    b. *v* [$u\varphi$, uAsp, uD^{EPP}]   English

I have identified probing features on C and *v* and how these features are specified for EPP in Japanese/Korean and English. Now I will move on to explore how these features are inherited following the FI principles in (2) and operational rules in (3) in the *v*-Asp domain, in which OV order is
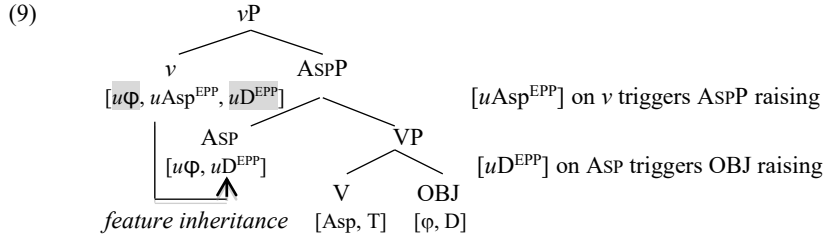

2007, 2011; Sells and Kim 2007), those who argue for the presence of φ-features regard subject (and object) honorification in Japanese and Korean as an indication of subject (and object)-verb agreement (Ahn 2002; Choe 2004; Harada 1976; Hasegawa 2005; Koopman 2005; Park 2008; Takata 2006). Skirting the debate about the absence or presence of φ-features in Japanese and Korean, I assume that [uT] on C is EPP-specified and is responsible for TP raising, rather than proposing that the EPP on [$u\varphi$] on C yields to parametric variation.

[2] Following Chomsky (1995) in assuming that V overtly raises to *v* in English, I assume that V first raises to Asp and the Asp+V complex then raises on to *v in* (6b), as a result of which the underlying VO order surfaces in English.

derived from its underlying VO order in head-final languages such as Japanese and Korean.

3.2 FI from *v* to Asp

The structure in (9) shows FI from *v* to Asp in Japanese and Korean, in which Asp inherits two of *v*'s features, $[u\varphi, uD^{EPP}]$.

(9)

```
                    vP
          ┌──────────┴──────────┐
          v                    AspP
  [uφ, uAspEPP, uDEPP]     ┌────┴────┐         [uAspEPP] on v triggers AspP raising
          │             ASP        VP
          │         [uφ, uDEPP]  ┌──┴──┐       [uDEPP] on ASP triggers OBJ raising
          └──────────────▲      V    OBJ
  feature inheritance        [Asp, T] [φ, D]
```

Following the principle of *feature selection* in (2a), Asp may inherit a subset of features of *v* in (9), including $[uD^{EPP}]$, which triggers object shift to Spec, AspP. Due to *feature expiration* in (2b), $[uD^{EPP}]$ on *v* no longer functions as a probing feature and remains inactive. On the other hand, $[uAsp^{EPP}]$ on *v*, which has not been transmitted to Asp, probes for a goal with the matching feature and triggers AspP raising to Spec, *v*P. But why does Asp inherit $[uD^{EPP}]$ from *v*, not $[uAsp^{EPP}]$ in Japanese and Korean?

In (9), *v* tries to transmit all of its features to Asp all at once, in accordance with the *earliness* rule of FI in (3a), allowing not only all of *v*'s features to be valued within AspP but also the EPP specifications on $[uAsp]$ and $[uD]$ to be satisfied as early as possible. If Asp inherits all of *v*'s features, it enters into multiple agree relations with V and the D head of the object. However, both $[uAsp]$ and $[uD]$ on Asp are specified for EPP, triggering the movement of the maximal projection of a goal with the matching features. Thus, both the VP and the DP-object are forced to move to Spec, AspP. Although such a derivation obeys *earliness*, it violates *multiple agree under antisymmetry* in (3c); both the VP and the object cannot be spelled out at Spec, AspP. As a result, the derivation crashes.

Following both *earliness* and *multiple agree under antisymmetry*, $[uAsp^{EPP}]$ and $[uD^{EPP}]$ on *v* cannot be inherited by Asp together, but Asp can only inherit either $[uAsp^{EPP}]$ or $[uD^{EPP}]$ from *v*. Why does Asp inherit $[uD^{EPP}]$, not $[uAsp^{EPP}]$ from *v* in Japanese and Korean? It is the rule of *economy* in (3b) that plays a role.

Suppose that Asp inherits $[uAsp^{EPP}]$ from *v*. Asp also inherits $[u\varphi]$. FI of $[u\varphi, uAsp^{EPP}]$ from *v* to Asp enables both features to be valed as early as possible and it does not violate *multiple agree under antisymmetry*, for only one of the two features inherited by Asp is EPP-specified; the goal with Asp feature will raise to Spec, AspP. To value $[u\varphi, uAsp^{EPP}]$ Asp enters into

two feature checking relationships, one with the object and one with the V. In addition, v enters into feature matching with the object to value its $[u\text{D}^{\text{EPP}}]$, which has not been transferred to Asp and remains active as a probing feature on v. All in all, v's features are valued via three rounds of feature matching shown in (10).
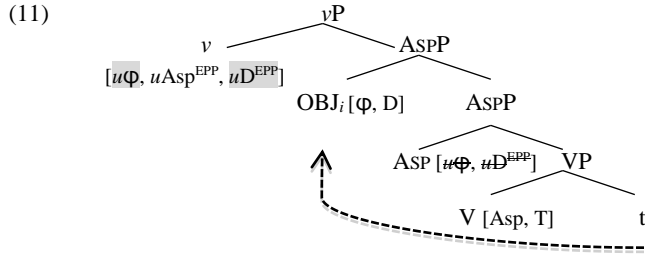
(10)
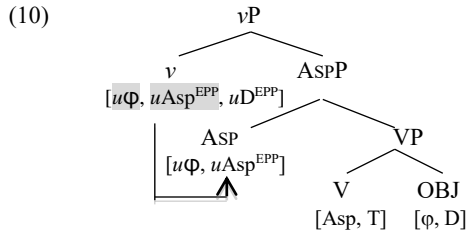
(i) feature matching between ASP and OBJ: $[u\varphi]$ is valued
(ii) feature matching between ASP and V: $[u\text{Asp}^{\text{EPP}}]$ is valued
(iii) feature matching between v and OBJ : $[u\text{D}^{\text{EPP}}]$ is valued

Instead Asp may inherit $[u\varphi,\ u\text{D}^{\text{EPP}}]$ from v, shown in (9). Under these circumstances, both φ and D-feautres on Asp can be valued via a single probe-goal relationship with the object. And $[u\text{Asp}^{\text{EPP}}]$ from v is valued against V; *(i)* feature matching between Asp and OBJ: $[u\varphi,\ u\text{D}^{\text{EPP}}]$ are valued and *(ii)* feature matching between v and V: $[u\text{Asp}^{\text{EPP}}]$ is valued in (9).
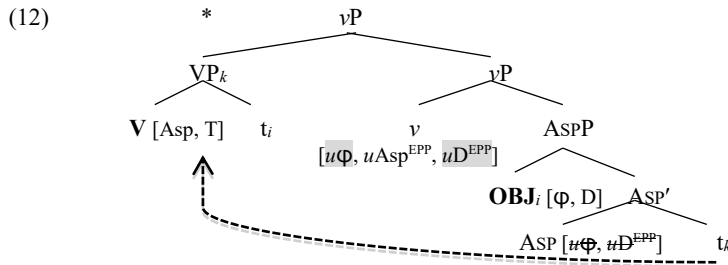
　　Although both (9) and (10) obey the rules of *earliness* and *multiple agree under antisymmetry*, the derivation in (9) involves a smaller number of feature matching operations than (10), two and three steps, respectively. As a consequence, the derivation of (9) wins over (10) according to the rule of *economy* in (3b), which states "Minimize the number of feature checking operations." Hence, it provides an answer to the question why Asp inherits $[u\text{D}^{\text{EPP}}]$ from v, not $[u\text{Asp}^{\text{EPP}}]$, in Japanese and Korean. Based on this, now I proceed to explain how OV order is derived.

3.3　Deriving OV order

After Asp inherits $[u\varphi,\ u\text{D}^{\text{EPP}}]$ from v, Asp enters into a probe-goal relationship with the D head of the object, which bears the matching features. While $[u\varphi]$ on Asp can be valued against the φ-feature on the object in-situ via Agree, $[u\text{D}^{\text{EPP}}]$ on Asp triggers the movement of the maximal projection of a goal with the corresponding feature. Consequently, the object (the maximal projection of D head) raises to Spec, AspP, delivering OV order within AspP, as shown in (11).

(11)

```
                              vP
        v                            AspP
[uφ, uAsp^EPP, uD^EPP]
                          OBJ_i [φ, D]        AspP
                                        ASP [uφ, uD^EPP]   VP
                                                    V [Asp, T]    t_i
```

In (11), [uAsp^{EPP}] on v still needs to be valued and the EPP property on [uAsp] on v triggers movement of the maximal projection with the matching feature, which is VP. However, if the VP moves to Spec, vP, OV order is not derived. Instead the surface order would be VO, shown in (12).

(12)

```
         *                        vP
        VP_k                              vP
    V [Asp, T]     t_i        v                    AspP
                        [uφ, uAsp^EPP, uD^EPP]
                                          OBJ_i [φ, D]     Asp'
                                                  ASP [uφ, uD^EPP]    t_k
```

On the other hand, if AspP is pied-piped by VP and the entire AspP raises to Spec, vP, we do get the correct order, OV, as in (13).

(13)

```
                              vP
        AspP_k                       v'
    OBJ_i [φ, D]    Asp'        v              t_k
                          [uφ, uAsp^EPP, uD^EPP]
                ASP              VP
           [uφ, uD^EPP]
                          V [Asp, T]    t_i
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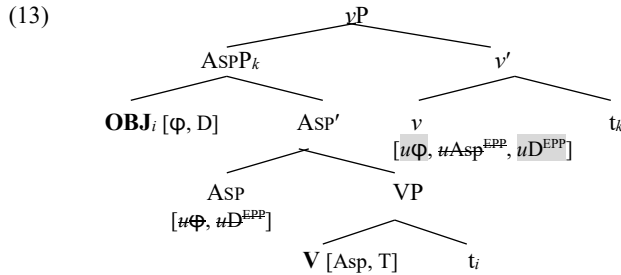
How do we rule out (12) on principled grounds and leave (13) as the only legitimate derivation in Japanese and Korean? Here, I appeal to a perspective from Distributed Morphology towards functional and lexical categories (Halle & Marantz 1993; Harley & Noyer 1999). DM offers a syntactic approach to word formation, in which a word is syntactically derived via merging a category-neutral root with a category-defining functional head (Marantz 1997). On this view, a lexical category (or an *l*-morpheme) such as V, N, and A, is a root, whose lexical status is unspecified and requires selection by a functional category (or *f*-

morpheme), such as *v*, *n*, and *a*, in order for its lexical status to be determined and spelled out via Vocabulary Insertion at PF. Taking this view, the fact that VP cannot undergo syntactic movement in (12) can be explained by the claim that projections of lexical roots are incapable of undergoing syntactic movement, arguably because the root would be severed from the functional category that determines its category and with the aid of which it can be subjected to VI at PF (den Dikken, p.c.). Assuming that the determination of a lexical category is not done derivationally in the syntax but representationally in the PF component, VI for any lexical roots requires the local presence of a functional category in the PF representation, which can determine the lexical roots' categorial status. As a consequence, movement of VP severing it from its selecting head Asp cannot occur, but the entire AspP pied-piped by VP must raise to Spec, *v*P to satisfy the EPP property on [*u*Asp] of *v*, as in (13), resulting in OV order in Japanese and Korean.

4 Concluding remarks

Taking the view that morphosyntactic features on functional categories lead to cross-linguistic variation and C and *v* are core functional categories, word order variation is attributed to feature contents of these functional categories. Adopting the notion of FI, which was primarily proposed for the domain of C-T by Chomsky, in which T inherits its probing features from C, I proposed FI for the *v*-Asp domain, in which Asp inherits its probing features from *v*. To promote FI as a full-fledged mechanism to derive syntactic derivations, I proposed two principles of FI, *feature selection* and *feature expiration*. In addition, I claimed that FI is governed by the rules of *earliness*, *economy* and *multiple agree under antisymmetry*.

To account for head-final structure in Japanese and Korean in comparison with head-initial structure in English, I proposed feature specifications on C and *v* in these languages, and showed syntactic movements are a consequence of EPP specifications on features on C and *v* and feature checking via FI from C to T and *v* to Asp.

This study argued for a syntactic feature-checking mobilizing and refining FI in such a way as to ensure efficient structure building and descriptive as well as explnatory adequacy in keeping with the very spirit of the Minimaist Program.

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