Disjunctive Selection is Necessary for "Hierarchy of Projections" and it Accounts for Transitivity Failures

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1 Introduction

Much recent work, especially that which adopts a "cartographic" approach to syntactic structure (e.g., Rizzi 1997; Cinque 1999), posits a *Hierarchy of Projections* that is either universal or largely so but with some language-particular variations. This idea is most clearly spelled out in Adger (2010), where two types of Merge are posited, Sel(ect)-Merge and HoP-Merge (for "Hierarchy of Projection Merge"). In Sel-Merge, a category selects a feature, say "[C]," and this feature is checked off by Merging it with a category with that feature (e.g., a CP). HoP-Merge simply combines two categories with no selectional relation between them; the only condition is that it must respect the Hierarchy of Projections.

In this short remark, I show, following arguments in Bruening et al. (2018), that HoP-Merge can and should be eliminated. All Merge is Sel-Merge. That is, whenever two categories combine, one selects the other. The effects of the Hierarchy of Projections are best captured through *disjunctive* selection, where a category can select a set of elements. Disjunctive selection is independently necessary, and once we have it, HoP-Merge can be done away with. As I will show, even if we have HoP-Merge, we still need disjunctive selection. HoP-Merge is therefore entirely redundant.

I then go on to show that disjunctive selection, unlike HoP-Merge, can account for unexpected cases of transitivity failures in selection. In fact, if disjunctive selection is all there is, we *expect* occasional cases of transitivity failures. I show this using a case of affix ordering in Imbabura Quechua, from Cole & Hermon (2012).

2 Hierarchy of Projection Merge

As mentioned above, the idea of a Hierarchy of Projections is widely adopted. It is part of cartographic approaches (e.g., Rizzi 1997; Cinque 1999), but it is also assumed in some form by researchers working within many different approaches. It is spelled out most clearly in Adger (2010), and it is Adger's system that I will focus on here.

The Hierarchy of Projections view says that there is a fixed hierarchy of functional projections in each domain, for instance clauses and nominals. The hierarchies proposed by Adger (2010) for English clauses and nominals are the following. The numeral indicates the place on the hierarchy:

(1) (Adger 2010: 198, (39))

a. $\langle$V,1$\rangle$ $<$ $\langle$v,2$\rangle$ $<$ $\langle$Pass,3$\rangle$ $<$ $\langle$Prog,4$\rangle$ $<$ $\langle$Perf,5$\rangle$ $<$ $\langle$Mod,6$\rangle$ $<$ $\langle$Neg,7$\rangle$ $<$ $\langle$T,8$\rangle$ $<$ $\langle$Fin,9$\rangle$ $<$ $\langle$C,10$\rangle$

b. $\langle$N,1$\rangle$ $<$ $\langle$n,2$\rangle$ $<$ $\langle$Poss,3$\rangle$ $<$ $\langle$Num,4$\rangle$ $<$ $\langle$D,5$\rangle$ $<$ $\langle$Q,6$\rangle$

As can be seen, the hierarchy is simply stipulated for each domain.

Now, according to Adger (2010), there are two modes of combination, Sel(ect)-Merge and HoP-Merge (for "Hierarchy of Projection Merge"). In Sel-Merge, a category selects a feature, say "[C]," and this feature is checked off by Merging it with a category with that feature (e.g., a CP). For instance, a verb like *think* that selects CPs will have a [C] selectional feature that is checked off by merging a CP with it as its complement.

HoP-Merge, in contrast, simply combines two categories with no selectional relation between them. The only condition is that it must respect the Hierarchy of Projections. The idea is that it would not be desirable to have each category select a long disjunctive list; rather, Universal Grammar fixes a hierarchy, and Merge is free so long as it respects that hierarchy. For instance, T can freely combine with any of the categories below it (Neg, Mod, Perf, etc.). So we can have T combine directly with a verb, or with a verb plus Pass, verb plus Pass plus Prog, and so on (it is not clear what English elements "v,2" and "Fin,9" are supposed to be, so I ignore them here):

(2) a. The runner tripped. (V,1–T,7)

b. The runner was tripped. (V,1-Pass,3-T,7)

c. The runner was being tripped. (V,1-Pass,3-Prog,4-T,7)

The sequences 1–7, 1–3–7, and 1–3–4—7 all respect the hierarchy, so they are allowed. What is ruled out is merging elements in violation of the hierarchy:

(3) a. * The runner was having tripped. (V,1–Perf,5–Prog,4–T,7)

b. * The runner has should trip. (V,1–Mod,6–Perf,5–T,7)

1–5–4–7 and 1–6–5–7 violate the hierarchy and are ruled out.

Thus, HoP-Merge is supposed to allow all and only the licit orderings of functional elements within the English clause. Similar hierarchies for other languages would presumably have the right result for those languages, as well.

Unfortunately, HoP-Merge is too permissive and has to be supplemented with Sel-Merge, as Bruening et al. (2018) point out. HoP-Merge incorrectly permits C to merge directly with V, for instance. This respects the hierarchy of projections, but there is no language that I know of where C can combine directly with the lexical verb, with no functional categories in between. In all languages something is necessary in between, either T or some sort of aspect or Mod. HoP-Merge is then not sufficient, and some sort of selectional feature has to be added to C.

Once we do that, however, we might as well get rid of HoP-Merge, and only have Sel-Merge. As stated above, the idea behind HoP-Merge seems to be that a disjunctive list of possible selectees would be undesirable, but we know that this is necessary for many cases of selection. For instance, many verbs can select multiple categories, but only one at a time. The verb *forget* selects for CPs or NPs, but not both simultaneously; it also does not allow other categories like APs or VPs:

(4) a. She forgot [$_{\text{NP}}$ her didgeridoo].

b. She forgot [$_{\text{CP}}$ that her didgeridoo needed tuning].

c. * She forgot [$_{NP}$ me] [$_{CP}$ that her didgeridoo needed tuning].
d. * She forgot [$_{AP}$ famous].
e. * She forgot [$_{VP}$ play the didgeridoo].

We need to say that *forget* selects for *either* NP or CP, which is exactly disjunctive selection; there is simply no way around this. We can notate this with a set:

(5) *forget* selects {N, C}.

Similar selectional patterns are prevalent, and in fact probably the norm: *think* selects CPs or PPs, *become* selects APs or NPs, and so on, ad infinitum.

The effect of HoP-Merge can then be captured very straightforwardly using the same kind of disjunctive selection, as follows (ignoring Adger's v and Fin, since it is not clear what English elements correspond to them):

(6) a. Pass selects V.
b. Prog selects {V, Pass}.
c. Perf selects {V, Pass, Prog}.
d. Mod selects {V, Pass, Prog, Perf}.
e. Neg selects {V, Pass, Prog, Perf, Mod}.
f. T selects {V, Pass, Prog, Perf, Mod, Neg}.
g. C selects T.

Prog, Perf, Mod, Neg, and T all select a disjunctive list, but C strictly selects T. Pass also strictly selects V. This correctly captures the effects of HoP-Merge, but does not run afoul of the problem of permitting C to directly combine with lower categories. The selectional statements in (6) also correctly rule out the violations in (3), since Perf is not on the list of things selected by Prog in (3a), and Mod is not on the list of things selected by Perf in (3b).

Disjunctive selection, then, captures the Hierarchy of Projections without a Hierarchy of Projections. It is also independently necessary, for verbs like *forget* and thousands of others. It is entirely unclear why using disjunctive selection would be less desirable than positing an entire second mode of Merge and stipulating an extrinsic hierarchy. Standard metrics of theory comparison clearly favor disjunctive selection over HoP-Merge: It captures everything that HoP-Merge does, but does not overgenerate the way HoP-Merge does; and it is independently necessary. Adding HoP-Merge to Sel-Merge is simply multiplying theoretical devices unnecessarily.

I conclude that HoP-Merge can and should be done away with. It does not actually capture the facts adequately, and an independently necessary device captures them better. We need disjunctive selection.

3 Transitivity Failures: Imbabura Quechua

Having concluded that disjunctive selection is necessary for functional categories in the clause, I now show how adopting disjunctive selection explains and indeed expects the existence of transitivity failures. I illustrate using a case from Imbabura Quechua (Cole & Hermon 2012). The facts

involve affix ordering, which I assume is directly correlated with the order of projections in the clause, given a syntactic approach to morphology.

In Imbabura Quechua, the first person suffix *-wa-* always precedes the progressive suffix *-ju-* when they occur together. In addition, the volitional/desiderative suffix *-naya-* always precedes first-person *-wa-*. *-naya-* and *-ju-* are freely ordered with respect to each other (but with different interpretations for each order). If ordering relations were transitive, the only order of all three that should be possible is then *-naya-wa-ju*, since *-wa-* can only precede *-ju-* and *-naya-* can only precede *-wa-*. However, it turns out that *-ju-naya-wa* is also possible, violating the restriction that *-wa-* always precedes *-ju-*:

(7) a. miku-naya-wa-ju-n
eat-Des-1-Prog-3
'I was wanting to eat.'

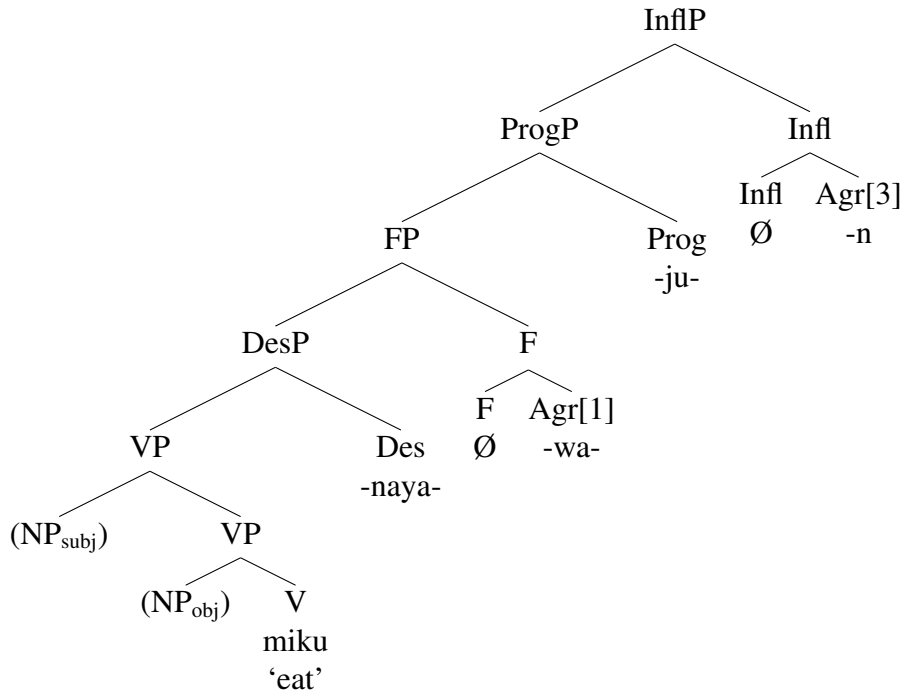
b. miku-ju-naya-wa-n
eat-Prog-Des-1-3
'I wanted to be eating.'

It is as though only adjacent pairs are evaluated for ordering. The order *-ju-naya* is allowed, as is the order *-naya-wa*. The order **-ju-wa* is not allowed, but these two are not adjacent in (7b).

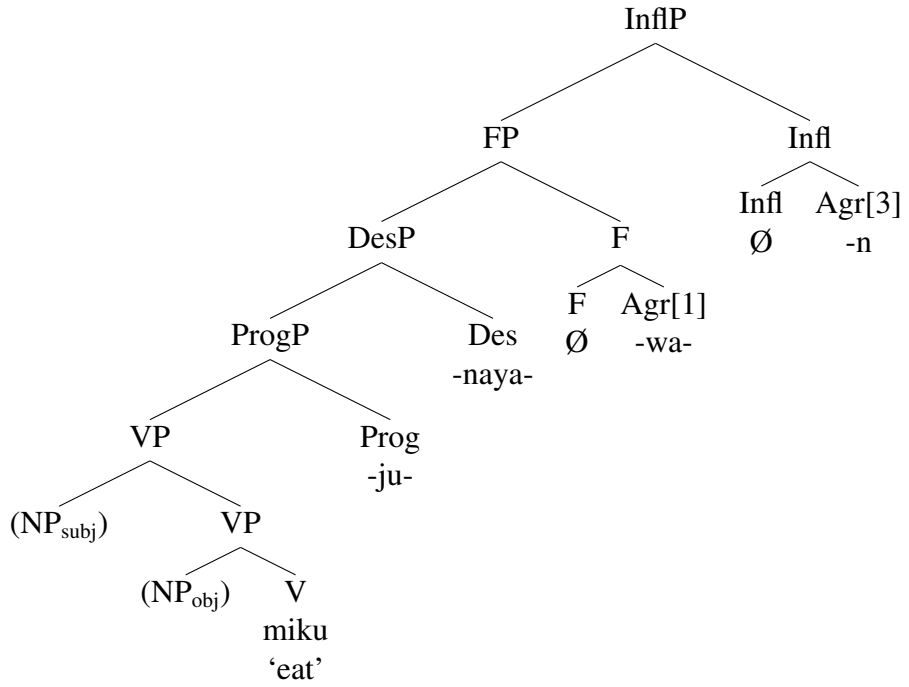
Cole & Hermon (2012: 296, (30)) present a template of verbal morphology in Imbabura Quechua that includes many more morphemes than the three focused on here. I will include these morphemes in the proposed statements of disjunctive selection, but will not otherwise discuss them. I focus only on the three morphemes illustrated in (7a–7b).

I adopt a syntactic approach to verbal morphology, where the morphemes on the verb are syntactic heads. Their order with respect to the verb stem directly reflects their hierarchy in the clause (Baker 1985). Within such an approach, there will be a DesP headed by Des(iderative) and a ProgP headed by Prog(ressive). As for the first-person suffix *-wa-*, I assume that it is an Agr[1] head that adjoins to a head in the clause, which I will call F. F itself is null, but the position of Agr[1] will then be whatever position F would be expected to appear in. I assume that the third person agreement marker is an Agr[3] head adjoined to a higher head, call it Infl. The structures I propose for (7a) and (7b) are then the following:

(8) a.



b.



The verb may move through all the heads in the clause, or the heads can all simply attach morphologically; this is unimportant. F and Infl will agree with the first person and third person arguments, respectively, which will be spelled out on the adjoined Agr morphemes. How exactly this works is also unimportant.

We can now give the selectional statements that license these trees. First, Prog selects a disjunctive list of categories. Refl is a reflexive, And is an andative, Caus is a causative, and Ing is an ingressive (see Cole & Hermon 2012: 296, (30)):

(9) Prog selects {V, Refl, And, Caus, Ing, Des, F}.

Des also selects a disjunctive list of categories:

(10) Des selects {V, Refl, And, Caus, Ing, Prog}.

As does F:

(11) F selects {V, Refl, And, Caus, Ing, Des}.

Infl can select any of the above categories, but none of them select Infl, so Infl is always the highest. Once the selectional statements are spelled out for all the other affixes (Refl, And, Caus, Ing), a generally fixed ordering will emerge. However, not all relations are fully specified, and it is this that gives rise to the transitivity failure.

First, note that F does not select Prog, so *-wa-* cannot appear immediately outside of *-ju*. Prog does select F, so *-ju-* can follow *-wa-*. This rules out the illicit sequence **-ju-wa-* (*Prog-AGR[1]) but permits the allowed one, *-wa-ju-*.

Second, Des does not select F, but F selects Des, so Des may not appear immediately outside of *-wa-* but *-wa-* may appear immediately outside of Des (*-naya-*). This rules out **-wa-naya-* but permits *-naya-wa*.

Third, Des selects Prog and Prog selects Des, so both *-naya-ju-* and *-ju-naya-* are allowed.

Now, despite the fact that *-wa-* can only precede *-ju-* and *-naya-* can only precede *-wa-*, both of the trees in (8a–8b) are well-formed. In (8a), Infl selects everything, Prog selects F, F selects Des, and Des selects V. In (8b), Infl selects everything, F selects Des, Des selects Prog, and Prog selects V. Both trees are well-formed. F does not select Prog, but this does not matter in (8b) because selection is strictly local and F does select Des; the fact that Des then selects Prog is not visible to F. All of the selectional requirements of the individual heads are satisfied.

Note that this would not be possible in a HoP-Merge theory. Each head would be assigned a number. Since *-wa-* (adjoined to F) can only precede *-ju-* (Prog), F must have a lower number than Prog. Since *-naya-* (Des) can only precede *-wa-* (adjoined to F), Des must have a lower number than F. But if F has a lower number than Prog, then the tree in (8b) violates HoP-Merge.

This brings up another, conceptual problem with HoP-Merge. Evaluating it requires scansion of the entire tree. It is not possible to evaluate it by looking only at each head and its complement. Disjunctive selection, by contrast, only looks at head-complement pairs. It is extremely local, which is what most people have concluded is true of selection. The Imbabura Quechua case shows us yet again that this is true: non-local relations cannot be evaluated. Only local ones can. HoP-Merge is then incompatible with how we know selection works, and must be rejected. Disjunctive selection, in contrast, leads us to expect transitivity failures like the one we see in Imbabura Quechua, precisely because only local relations can be evaluated.

4 Conclusion

I have shown here that HoP-Merge must be eliminated from the model of grammar. It does not succeed in capturing the empirical facts, while disjunctive selection, which is independently necessary, does all of the work of HoP-Merge without its drawbacks. There is no need to stipulate an extrinsic Hierarchy of Projections and no need to posit a second mode of Merge besides Sel-Merge. Disjunctive selection, furthermore, leads us to expect transitivity failures in selection, and they do indeed occur.

This leads to a question: Why do we see a similar hierarchy of functional projections across languages? If all there is is selection, why do functional heads tend to select certain other functional heads and not others? Note first of all that the theory of HoP-Merge did not answer this question, either; it simply stipulated a hierarchy. Having rejected this hierarchy, we can and should start to investigate the question of why certain selectional patterns tend to recur and others do not. Why does C only select certain high functional categories and not V directly? Why do Mod and T tend to select most other categories, but not vice versa, and thus Mod and T occur high? These are questions that we should be investigating, and in many cases there are potential answers: for instance, there are probably semantic reasons why Aspect tends to occur lower than T. The thing to note here is that simply stipulating a Hierarchy of Projections has the effect of stopping inquiry into these questions. Getting rid of it will hopefully stimulate the search for actual answers.

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