Approach the Probe

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Abstract

Tucking-in operations in phrasal movement follow from a particular locality constraint (APP) which brings a phrase as close as possible to the head which triggers movement. This constraint can replace the EPP. Empirical advantages of the APP are demonstrated in a range of constructions (inner object shift, root A-bar movement). The word order reversals which APP-constrained movement makes available are identified in French causatives, epistemic datives, and other applicative structures. English 'affix-hopping' is derived.

Contents

1 Introduction

In Richard's (1997) study of Bulgarian multiple wh-movement and other similar constructions, *tucking-in* operations are driven and constrained by two distinct grammatical principles. The first

is the general minimalist premise (EPP) that syntactic movement—of phrases, at least—occurs in order to provide a specifier for the triggering head (Chomsky, 1995).[1] The second is a novel principle that a phrase must move to a position as close as possible to the probe which attracts it. Richards does not provide a label for this latter constraint. In Richards (2001), he suggests that the effect follows from the Shortest Move principle, but he chooses not to isolate any particular precise implementation of Shortest Move. And since the term "Shortest Move" has been used to mean a number of things in the literature, it will be convenient to have a term to isolate the idea that phrases land close to the probe; let us refer to this as the *Approach the Probe Principle* (APP). Crucially, the APP must constrain movement operations rather than resulting representations, because the effect of tucking-in is always to leave the first specifier in a more distant position from the head than it was before. What is more, the APP does not itself trigger movement. It merely constrains the choice of landing site when a higher or lower specifier position within the same phrase are available options.

Richards does not observe that the APP, which is introduced specifically to account for complex cases, introduces a degree of redundancy to the theory of movement where simple cases are concerned. In embedded wh-questions in English, for example, wh-movement occurs because the C (=Force) probe attracts a single wh-phrase, and the landing site is the specifier of CP. But given the APP, this landing site is overdetermined by the principles controlling movement. The EPP, which requires that a specifier be created, is satisfied by this landing site. And the APP is also satisfied, because the specifier position in CP is as close to the C head as it is possible to be.

As Chomsky (1995, p. 5 *ff.*, and elsewhere) has emphasized, better explanations are frequently to be found by eliminating redundancies in our models. The goal of the present paper is to show that this particular overlap in coverage can be eliminated, and that the more parsimonious model which results offers more satisfactory accounts of a number of constructions which otherwise require special stipulation. These include some of the most well-studied puzzles in syntactic theory: English root inversion in questions, Germanic verb-second clauses, and internal object shift in English ECM constructions, and French *faire* causatives. They include, as well, a number of less-studied constructions in which the underlying word order is reversed; inversions in Albanian and Lubukusu (Bantu) belong to this second group, as does the French "epistemic dative". Finally, when the English tense system is examined, the same principles supply a better way to implement Chomsky's (1957) 'affix-hopping' operation than the minimalist literature otherwise provides.

What each of these constructions have in common, I will show, is that they are formed by moving a phrase to a position which is not the specifier of the triggering probe, but which nevertheless satisfies the APP by being as close as possible to the probe.

The key to eliminating the EPP/APP overlap is to distinguish between two functions of the EPP. As currently understood, the EPP plays two roles in the theory of movement: it forces movement to occur, and it identifies the landing site. But in Branigan (2010), henceforth PS, I argue that the EPP is both circular and empirically limited, and an alternative mechanism (*'provocation'*) is proposed

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[1] I use the term EPP here loosely, to refer to any principle in the EPP family, not just the classical EPP. In particular, I mean 'edge features' to fall under the label in this sense.

to drive movement. In the PS model, movement occurs when provocative probes trigger sideways movement of their goals, with the externalised goal then remerged in *somewhere*.[2] The triggering probe itself does not specify what the landing site will be. The probe only ensures that movement must take place. The choice of the landing site is made on other grounds. In PS, it was assumed that the Extension Condition guarantees that phrasal movement will be completed by creation of a new specifier, but in situations like Slavic multiple wh-movement, the Extension Condition is moot, since tucking in movement clearly contravenes this principle. The APP, on the other hand, does exactly what is needed.[3]

It should be noted, however, that although I will be adopting the PS model to illustrate how the APP applies, it is not the particulars of provocation which are important to the arguments presented here, but only the idea that the trigger for movement operations should be decoupled from the specification of a landing site. Any model of movement with this character would probably be compatible with the general lines of analysis which are developed in this paper.

Consider wh-movement in English embedded clauses, as in (1).

(1)   We wondered which sandwich Andrea would select.

We may assume that wh-movement is triggered in these structures by the unvalued operator feature of C in the embedded clause. In the PS model, the effect of the triggering operation is a pair of phrase markers, one of which is the original CP with the probe as its head. The other phrase marker is a copy of the original "goal" wh-phrase.

(2)
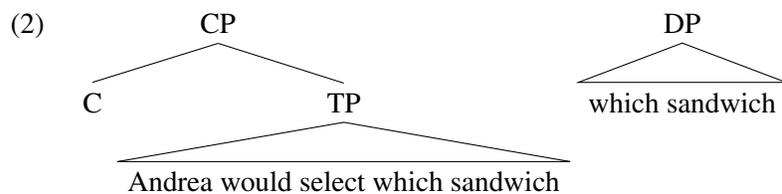
The three active components in this provocation operation—the probe, the internal wh-phrase, and the external wh-phrase—form a chain: (C, *which sandwich*, *which sandwich*). However, the chain becomes a legitimate interface object only after the external member has been merged into the original phrase marker and the probe is eliminated from the chain. It is the Merge operation which is controlled by the APP. In order to be merged as close as possible to C, the external wh-phrase must merge at the root CP, and become a specifier, as in (3).

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[2]The axiomatic basis for provocation is rather different than the text suggests, but the effects are the same, and the differences are unimportant for the concerns of the present paper.

[3]Watanabe (1995) proposes to derive the extension condition from the general principle that movement operations must disrupt existing structures as little as possible. The APP has a similar effect, inasmuch as a merge site close to the probe will never produce substantial changes in the the internal structure of the complement.

(3)

```
                    CP
           ╱                 ╲
        DP                    C′
     ╱      ╲             ╱        ╲
which sandwich  C                   TP
                             ╱            ╲
                      Andrea would select which sandwich
```
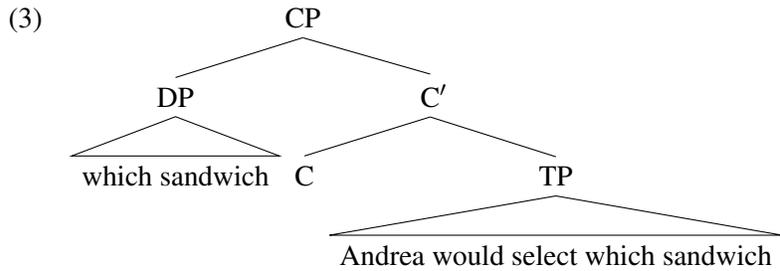
Any other merge position within the root CP will be more distant, and therefore is prohibited.

In a Slavic multiple wh-question like (4), the same reasoning will apply thoughout the movement of the first wh-phrase.

(4) *Koj kogo vižda?*
    who whom saw

    'Who saw whom?'

When C provokes the second wh-phrase, the pair of trees in (5) are produced, and a merge site must now be determined for the new external wh-phrase.

(5)

```
        CP                    D
     ╱      ╲                 │
   D          ╲              kogo
   │         ╱    ╲
  koj   C        TP
             ╱        ╲
          t vižda kogo
```
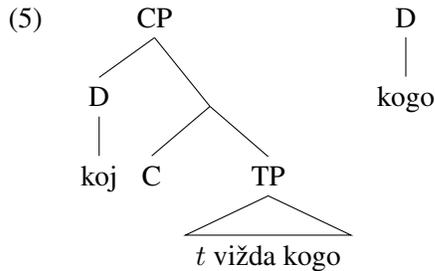
At this point, Merge of *kogo* at the root of CP would violate the APP while the tucking-in merge site does not. The latter is therefore obligatory.

2 Internal object shift

In any EPP-based movement model, movement must create a specifier for the triggering probe. The APP is more accomodating. If circumstances are such that a specifier for a triggering probe will not be tolerated, then we should expect the APP to be satisfied by a slightly more distant landing site.

Internal "object shift" in English provides an example of how the effects of the APP are sometimes expressed by merge to a lower position. Lasnik's (2001) analysis of some of Postal's (1974)

'raising to object' cases entails NP-movement to a specifier position in the matrix VP. (More accurately, Lasnik proposes the subject raises to an AgrP projection which translates pretty directly into VP in more recently refined models, but for the purposes of this discussion, the difference does not seem to matter much.) Consider (6):

(6)   We believe John sincerely to be intelligent.

As Postal observed, the orientation of the adverb *sincerely* in such examples is toward the verb in the matrix clause, despite its position to the right of the embedded subject *John*. This word order therefore seems to show that *John* has raised out of its own clause into the matrix verb phrase. For Lasnik, this necessitates an EPP feature in V (or AgrP) which appears *only* when v assigns accusative Case. Satisfaction of the EPP feature then gives rise to the matrix vP structure in (7).

(7)
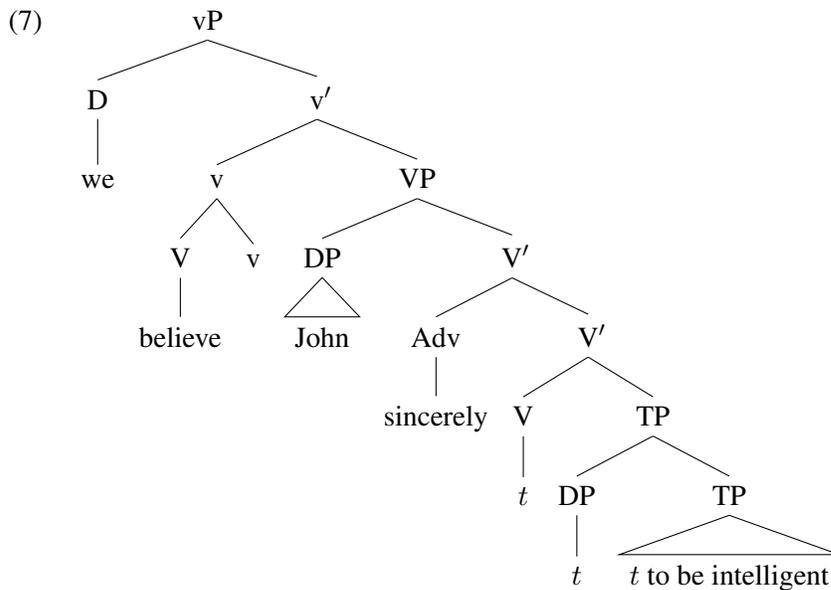
The problem with Lasnik's account—even accepting the EPP—is that it requires a new mechanism to ensure that movement occurs in the right circumstances. There is no obvious or natural connection between the presence of Case features on v and EPP features on V. Nor is it clear how to incorporate a statement to this effect into syntactic theory. Complement selection is normally sensitive to categorial features, not EPP features of a head.

What is more, given Pesetsky's (1992) "Agent/ECM correlation", the connection between the properties of v and the subject of an ECM complement is still stronger than Lasnik suggests. This correlation involves the fact that verbs with an agentive subject cannot normally participate in ECM. Thus, while (8a) is acceptable, (8b) is not.

(8) a. Mary discovered Bill to have read the book.

b. *John affirmed Mary to have entered the room.

In current terms, this pattern must concern the relationship between v—the head which is responsible for the subject θ-role and the ECM subject. Evidently, v may bear unvalued ϕ/Case features in an ECM context only when it has specific thematic properties. The properties of the root V are essentially irrelevant to understanding the correlation.

The core insight of the Postal/Lasnik observations can be implemented quite readily in a provocation model, given the APP. We need simply characterise the accusative Case features of ECM verbs as provocative, in the same sense as sketched out above. When v Agrees with the subject of an ECM infinitive, it then ensures the generation of an external copy of the subject, as in (9a), and of a chain headed by v: (9b).

(9) a.

```
           vP                              DP
         /    \                           /  \
        v      VP                        D    nP
      /  \    /  \                            /\
     V    v  Adv   VP                        John
     |       |    /  \
  believe  sincerely V   TP
              |       /  \
              V     DP    T'
              |    /\    /    \
              t  John  to be intelligent
```

b. (v, John, John)

The external member of the new chain must now be integrated into the original phrase marker, and as it is phrasal, it must merge as a specifier. Normally, the optimal merge site for this operation would be the vP root, but English does not allow vP to contain a specifier at the interfaces. (Of course, the experiencer argument of v will still be merged as a specifier to vP, but this is acceptable because it is always moved out later.) So another merge site must be chosen for the external copy, or the derivation will fail. The APP still requires that the merge site be as close as possible to v, and the next closest position is the VP complement. So *John* must become a specifier for VP, and Lasnik's structure (8) is the result.

Notice that the result comes for free, inasmuch as the APP, the unacceptability of vP specifiers, and the provocation operation are already motivated independantly. Since VP doesn't need an EPP feature in this scenario, there is no need for any mechanism to constrain these EPP features.

In contrast, Chomsky (2008) accomodates Lasnik's analysis by allowing phasal v to transfer an EPP feature to V. This operation represents a significant increase in descriptive power, justified

largely on theory-internal grounds, and stemming from the (attractive) hypothesis that grammatical operations can only occur at the phase level. If this hypothesis cannot be defended, then the motivation for Chomsky's feature-transfer operation disappears. As will be seen below, there are numerous contexts in which movement must take place at non-phasal points in the derivation. (The clearest of these are English root wh-movement and other A-bar movements in Germanic verb-second contexts. These are discussed in section 4.)
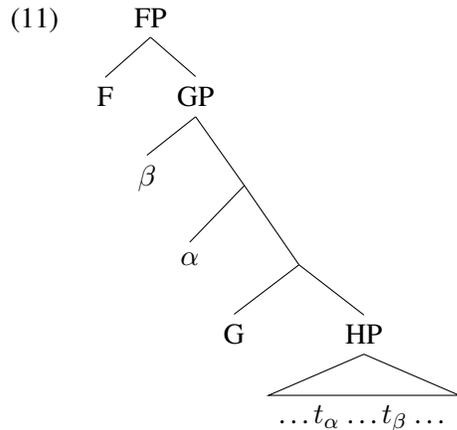
3   Argument Inversion and the APP

3.1   Deriving inversion

The proposal that movement can target a lower specifier position when necessary, and subject to the APP, makes a clear prediction in certain complex situations. While the tucking-in operation preserves the initial relative ordering of the displaced specifiers, movement of multiple specifiers to a position below a probe should have the opposite effect, and produce a mirror image relative ordering. Consider a structure (10), where F is a provocative probe with two particular marked properties. One is that F cannot tolerate a specifier. The second is that F may be valued multiple times, provoking each time. F is like English v in the first respect, and like Bulgarian "C" in the other.

(10)   FP
         / \
        F   GP
            / \
           G   HP
               / \
          …α…β…
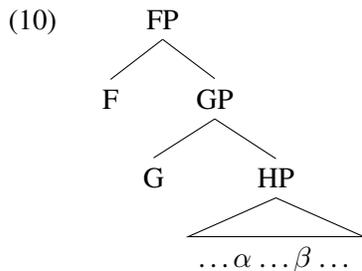
Let α and β both be phrasal categories which match the unvalued features of the F probe. In this situation, F will provoke α, the closer goal, and then β in turn. When the derivation must integrate α, it cannot be merged as a specifier for F, so by the APP, it must take the next best option and merge as a specifier for G. When β must be merged, the same logic applies, but as G already contains a specifier at that point, β must either be tucked-in or merged outside α, and the APP will be satisfied only if it takes the latter option. Thus, in this situation, (10) will give rise to (11), in which the base ordering of α and β has been derivationally inverted.

7

(11)

```
        FP
       /  \
      F    GP
          /
         β
          \
           α
            \
             G    HP
                 /    \
             ...t_α ...t_β ...
```

3.2 Epistemic datives

This prediction is validated by a range of different constructions in vP in a number of languages. One such is the French epistemic dative construction documented by Ruwet (1982). Some examples (from Ruwet, translations mine) appear in (12).

(12) a. *Je lui   croyais   une maîtresse dans chaque port.*
         I   him/DAT believed a   mistress in   every port
         'I believed him to have a mistress in every port.'

   b. *Je lui   trouve beaucoup de charme.*
      I   him/DAT find   lots   of charm.
      'I find him to have a lot of charm.'

   c. *Le médecin prévoit une issue   fatale à cette maladie.*
      the doctor predicts an outcome fatal to this illness
      'The doctor predicts that this illness will have a fatal outcome.'

This construction has a number of intriguing characteristics. Most immediately, the construction provides a meaning of possession, in some sense, which unites the indirect object and the direct object, but in a context in which the verb itself is separated from the possession relationship. This can happen, as in the (12) examples, because the verb itself lacks any possessive sense inherently, but it can also occur with verbs which normally impart a sense of a possessive relationship, but which become divorced from that relationship by the nuance of context, as in the (13) examples.

(13) a. *On lui   attribue   beaucoup de bonnes fortunes.*
   one him/DAT attributes lots   of good   luck
   'People suppose that he has a lot of luck.'

b. *Les Alliés prêtaient à Napoléon l'intention   de battre en retraite.*
   the Allies loaned   to Napoleon the intention of beat   in retreat
   'The Allies supposed that Napoleon had the intention to beat a retreat."

The same effect is actually marginally possible with some English double object verbs (Branigan, 1992), like (14).

(14) a. We grant Brad a certain naive charm.

b. I give him 10 years, no more.

In (14a), although the verb *grant* can be used as a verb of "giving", in this context it takes on a purely epistemic meaning ("I grant that P"), and the sense that *Tom* and his *charm* are in a possession relationship comes from the syntactic context more than from the verb. Similarly, in (14b), *give* here means something more like "predict" and what is predicted is the proposition that the person in question will have 10 years of something.
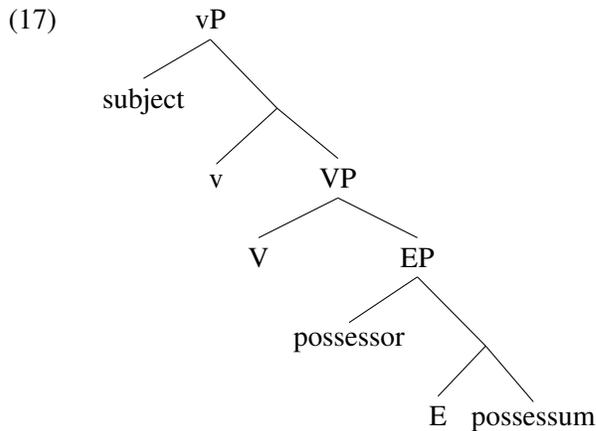
What is particularly significant about the French epistemic datives is that the possessor behaves as a "subject" with respect to binding conditions, as can be seen in (15).

(15) a. *Je leur   crois   du respect l'un   pour l'autre.*
   I   them/DAT believe of respect the one for   the other
   'I believe them to have respect for each other.'

b. **Ils   me   croient du respect l'un   pour l'autre.*
   they me/DAT believe of respect the one for   the other

c. *Je leur   prête de mauvaises intentions l'un   envers l'autre.*
   I   them/DAT lend of bad   intentions the one towards the other
   'I suppose them to have bad intentions towards each other.'

d. **Ils   me   prêtent de mauvaises intentions l'un   envers l'autre.*
   them me/DAT lend   of bad   intentions the one towards the other

Under standard assumptions, the fact that the dative "possessor" can bind the reciprocal *l'un l'autre* shows that the dative c-commands the accusative phrase. The fact that the possessor is the only acceptable antecedant shows that it is the only c-commanding antecedent within a certain clause-like domain. In that respect, these datives behave much like the subject of a small clause complement: (16).

(16) *_Pierre et Paul croient Marie amoureuse l'un de l'autre._
 Pierre and Paul believe Marie amourous the one of the other
 'Pierre and Paul believe Marie in love with each other.'

The binding properties of epistemic datives lead inexorably to the conclusion that the structure of the verb phrase in these examples must be something like (17), where E might be either an Applicative head, or some other less familiar category which can be selected by the verbs in question.

(17)

```
            vP
          /    \
     subject
            \    
             v    VP
                 /   \
                V     EP
                    /    \
              possessor
                        \
                     E   possessum
```

EP evidently constitutes a binding domain.

In the structure (17), we should not expect A-movement of the possessum to a position outside vP ever to be possible, because there are two higher nominals which should intervene. Even if the subject were removed, as in a passive version of (17), the presence of the possessor should be sufficient to block A-movement of the possessum. And this expectation initially seems to be confirmed in examples like (18).

(18) a. *_Une maîtresse dans chaque port lui était cru._
          a   mistress in every port himtextscdat was believed
          'He was believed to have a mistress in every port.'

     b. *_Beaucoup de charme lui est trouvé (par tout le monde)._
          lots   of charm himtextscdat is found by all the world
          He is found to have lots of charm (by everyone).

But Ruwet attributes to Paul Postal the observation that the passives of some epistemic datives are bad even when no movement occurs. So (18a) is not improved if an expletive is used in the subject position. Compare the status of (19a) with the grammatical result of using an expletive in a passive formed from a regular double object verb.

10

(19) a. *_Il lui   est cru   une maîtresse dans chaque port._
       it him/DAT is believed a   mistress in   every port

   b. _Il lui   a été prêté beaucoup de livres._
      it him/DAT has been loaned lots   of books
      'There have been loaned lots of books to him.'

Given the status of (19a), the ungrammaticality of the (18) examples need not be attributed to the A-movement of the possessum.

When passive structures are formed from other verbs (especially those which have as their core meaning some notion of transfer of possession), it turns out that the epistemic dative possessums _can_ undergo A-movement.

(20) a. _Une issue   fatale est prévue   à cette maladie (par le   médecin)._
       an   outcome fatal is predicted to this illness by   the doctor
       'This illness is predicted to have a fatal outcome.'

   b. _Beaucoup de bonnes fortunes lui   sont attribuées à tort._
      lots   of good   luck   him/DAT are attributed by mistake
      'He is thought to have a lot of luck wrongfully.'

   c. ?_Une maîtresse dans chaque port lui   est souvent imaginée._
      a   mistress in   every port him/DAT is often   imagined
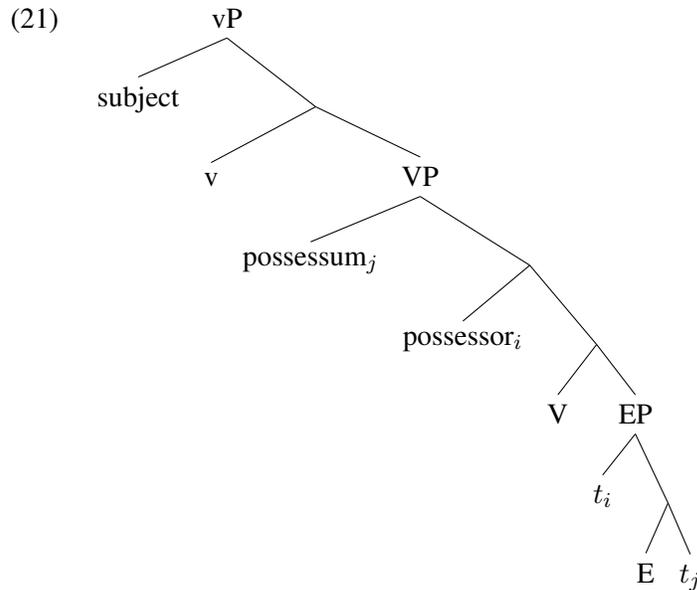   'He is often imagined to have a mistress in every port.'

We face a seemingly paradoxical situation. Given the binding facts, the possessor must be higher than the possessum. Given the A-movement facts, the possessum must be the most accessible goal for a T probe. The only way to resolve the paradox is by allowing the derivation to reverse the order of possessor and possessum midway. The possessum must be able to raise past the possessor before T enters the derivation.

Given the structure (17), the necessary inversion results if v has the properties of F in (10). v presumably does not tolerate a specifier in French, as it does not in English, given the absence of transitive expletive structures in either language. We may account for the Case-marking of both dative and accusative objects by supposing that v is able to Agree and assign structural Case twice, as argued by Bobaljik and Branigan (2006). Assuming that Case model, v must assign the marked (dative) Case first, and the unmarked (accusative) Case second. Person-Case Constraint effects then reflect feature conflicts located within a single active probe.[4] And just as in English (where v assigns structural Case only once), the ϕ/Case features of v are provocative.

Given these properties of v in French epistemic dative structures, the structure in (17) must be transformed into (21) in order to satisfy both the APP and the featural requirements of its compo-

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[4]See also Adger and Harbour for development of this approach to the Person-Case Constraint.

nent parts. The binding relations are evidently established within EP before the v probe assigns Case.

(21)

```
                    vP
                   /  \
              subject  \
                     /  \
                    v    VP
                        /  \
               possessum_j  \
                          /   \
                 possessor_i   \
                             /  \
                            V    EP
                                /  \
                             t_i    \
                                   /  \
                                  E   t_j
```

After (21) has been generated, however, the possessum is actually closer to T than the possessor, so in a passive vP, T can attract the possessor without worrying about any dative intervener.

3.3 French *faire* causatives

A similar situation arises with *faire* (and *laisser*) causatives in French, where the surface word order in transitive causatives has accusative objects preceding dative "subjects".

(22) *On   fera   discuter sa   thèse à   nos collègues.*
      one make-FUT discuss   his thesis to   our colleagues
      'We will have our colleagues discuss her thesis.'

The downstairs verb precedes both subject and object, of course, but the position of the verb is something of a red herring. Guasti (1993) shows that the lower verb raises up quite high into the matrix clause in this type of causative, and that it can even precede matrix subject-oriented quantifiers. Therefore I assume that the lower verb has raised up to the matrix v position.[5]
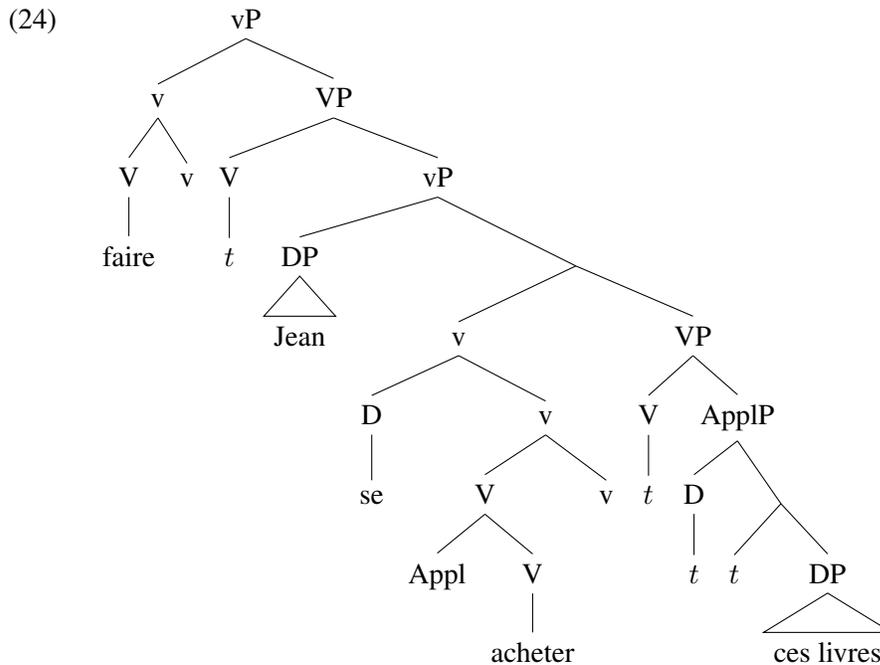
Despite the surface word order, the dative argument in transitive *faire* causatives retains subject-like properties. They bear the external θ-role normally assigned by v (of the downstairs verb) to

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[5]Biberauer and Branigan (in progress) argue that in this construction, as in several Germanic ones, the lower verb is displaced by the multiple head-movement process initially proposed by Collins (2002).

its specifier. And like accusative downstairs subjects in intransitive causatives, dative subjects can bind reflexive *se*.
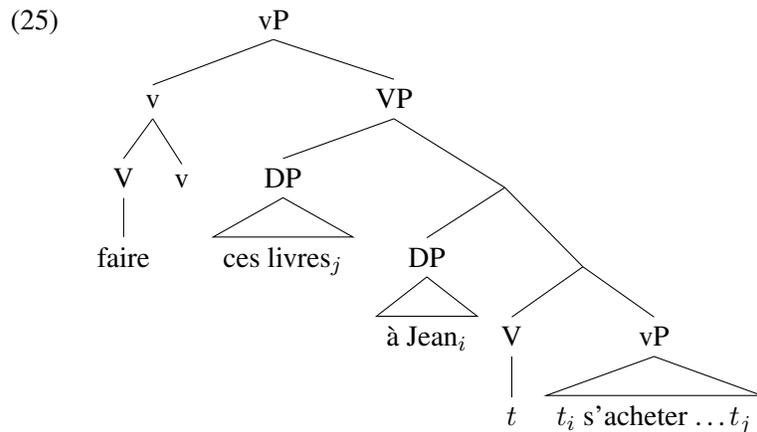
(23) a. *Il   a   fait   se   rendre Jean à   Paris.*   (Rouveret and Vergnaud, 1980)
          he   has   made   SELF render Jean to Paris
          'He made Jean go to Paris.'

   b. *Marie a   fait   s'acheter ces   livres à   Jean.*
       Marie has made SELF-buy these books to Jean
       Mare made Jean buy himself these books

As with the epistemic datives, we must conclude (uncontroversially), that at some point in the derivation, the dative subject c-commands the rest of its downstairs verb phrase within a particular domain. Thus, minimally, the structure of e.g. (23b) should be (24) at an early stage.

(24)

```
                          vP
                      ／      ＼
                    v          VP
                  ／ ＼      ／      ＼
                V    v   V          vP
                |        |        ／      ＼
              faire     t    DP           vP
                            △         ／      ＼
                          Jean      v          VP
                                  ／ ＼      ／   ＼
                                D    v   V      ApplP
                                |  ／ ＼  |     ／   ＼
                               se V   v  t   D        ...
                                 ／＼        |      ／  ＼
                              Appl  V       t     t  t    DP
                                    |                      △
                                 acheter                ces livres
```

The inverted word order in the transitive causatives now emerges from essentially the same premises as in the epistemic dative constructions. Matrix v cannot tolerate a specifier, assigns both dative and accusative Cases (in that order), and provokes its goal both times. Thus the dative subject is displaced from its original position as the specifier of the lower vP to become the specifier of the higher V. And the accusative object, which is provoked second, satisfies the APP by merging as a still higher specifier in matrix VP. The resulting structure is (25).[6]

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[6]The structure shown does not incorporate the movement of the lower verb, which I have set aside.

(25)

```
                          vP
                 ┌─────────┴─────────┐
                 v                   VP
              ┌──┴──┐        ┌────────┴────────┐
              V     v       DP                 │
              │           ╱────╲        ┌───────┴───────┐
            faire      ces livres_j    DP               │
                                     ╱───╲       ┌───────┴───────┐
                                  à Jean_i        V              vP
                                                  │          ╱────────╲
                                                  t      t_i s'acheter … t_j
```

The *faire* causative data presented by Rouveret and Vergnaud actually provide an argument to show that movement of a goal is to a position lower than the probe. The relevant data begins in (26)–(27).

(26) a. *Jean fera   aller Marie à   Paris.*
          Jean make-FUT go   Marie to Paris
          'Jean will make Marie go to Paris.'

      b. *Jean y   fera   aller Marie.*
          Jean there make-FUT go   Marie
          'Jean will make her go there.'

      c. *Jean fera   se   rendre Marie à   Paris.*
          Jean make-FUT SELF render Marie to Paris
          'Jean will make Marie go to Paris.'

      d. **Jean y   fera   se   rendre Marie.*
          Jean there make-FUT SELF render Marie
          'Jean will make her go there.'

(27) a. *Marie a   fait   acheter ces   livres à   Jean à   Paris.*
          Marie has made   buy   these books to Jean to Paris
          'Marie made Jean buy these books in Paris.'

      b. *Marie les   a   fait   acheter à   Jean à   Paris.*
          Marie them has made   buy   to Jean to Paris
          'Marie made Jean buy them in Paris.'

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c. *Marie a fait y acheter ces livres à Jean.*
   Marie has made there buy these books to Jean
   'Marie made Jean buy these books there.'

d. **Marie les a fait y acheter à Jean.*
   Marie them has made there buy to Jean
   'Marie made Jean buy them there.'

(28) a. **Sa mère est arrivée à les faire s'acheter à la jeune fille.* (Kayne,
       her mother is arrived to them make SELF buy to the young girl
       'Her mother managed to get her to buy them for herself.'
       1975, p. 429)

   b. **La manque de scrupule les a fait s'adjuger aux députés.*
      the lack of scruples them has made SELF award to the deputies
      'Lack of scruples made the deputies appropriate them for themselves.'

What these contrasts show is that movement of clitic pronouns in this construction is subject to a intervention condition which is sensitive to clitic status of nominals. While clitics from the downstairs verb phrase may raise into the matrix verb phrase (and beyond), they may not do so if there is another downstairs clitic which remains there. So in (26b) and (27b), *y* and *les*, respectively, are permitted to appear as clitics in the root clause. But in (26d) the presence of *se* in the lower verb phrase blocks movement of *y* upwards, and *y* blocks movement of *les* in (27d).

A clitic attached to the downstairs verb does not block upwards movement of the subject, however.

(29) a. *Cela les a fait se poser des questions.*
       that them has made SELF pose of questions
       'That made them ask themselves some questions.'

   b. *Elle leur fera se laver les mains.* (Kayne, 1975, p. 298)
      she them/DAT make-FUT SELF wash the hands
      'She will make them wash their hands.'

This is as we would expect, if the downstairs clitic is attached below the specifier of vP, as in the (24) tree. An intervening clitic can intervene, after all, only if it is closer to the attracting probe. At the same time, an initial position higher than the lower v explains why clitics originating as downstairs subjects cannot be left downstairs.

(30) **Jean fera lui acheter ce livre.*
     Jean make-FUT him/DAT buy this book
   'Jean will make him buy this book.'

15

But now consider exactly what is involved in the intervention effect in (27d). In order for the y clitic (attached to v) to prevent an upstairs probe from attracting *les*, y must be situated higher than *les* at the point in the derivation where this attraction might take place. Suppose, contrary to what I have been arguing, that objects in a *faire* causative were displaced to the left by forces internal to the downstairs complement. In other words, let us consider the hypothesis that there is some head F in (27c) which attracts *ces livres* past the subject and merges it as a specifier in FP, as in (31). (The movement of the lower verb to a higher position will still be a later operation.)

(31)   [Marie a fait [$_{FP}$ ces livres F [$_{vP}$ à Jean [$_v$ y acheter] . . .]]

This type of operation might account for the relative word order of subject and object without the APP and the idea that a displaced goal might be merged below its probe. But if F could displace an accusative goal in (31), then it should be equally able to displace an accusative goal in (27d), to produce an intermediate structure like (32).

(32)   [Marie a fait [$_{FP}$ les F [$_{vP}$ à Jean [$_v$ y acheter] . . .]]

But now the accusative clitic is located higher than the y adjoined to the downstairs v, and no intervention effect should be found. Since this is the wrong result, the conclusion must be drawn that there is no movement of the accusative object internal to the complement of *faire* before the upstairs v triggers movement. In other words, both (27c) and (27d) must leave the accusative object in its base position until the upstairs v assigns accusative Case. The structure for each will be (33).

(33)
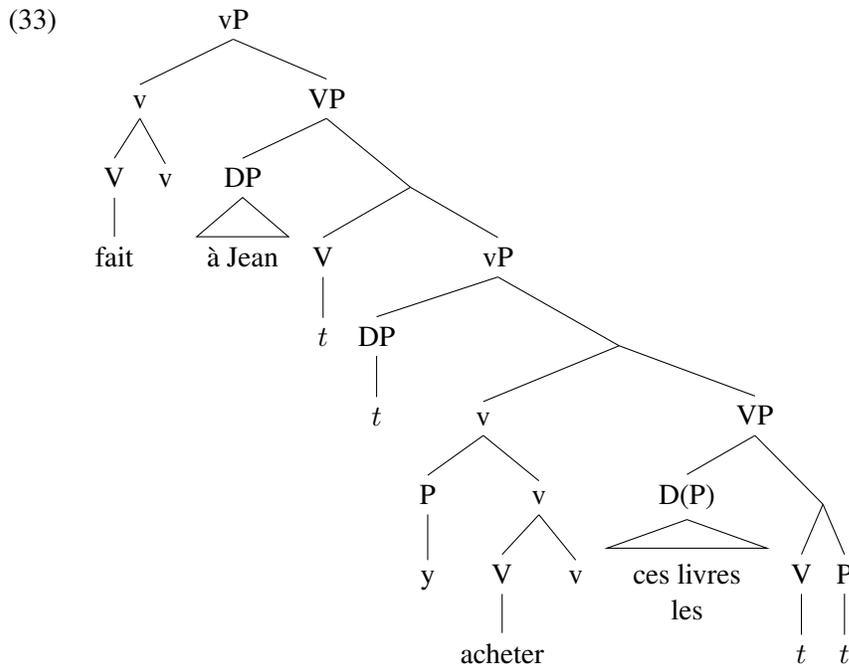
When the upper v provokes *ces livres* in this structure, it merges as an outer specifier in the matrix VP. Because *les* is a clitic, however, provocation of *les* by upper v is blocked in (33) because the *y* clitic is closer, so the derivation of (27d) fails, as it should. Note that the derivation of such structures also fails if the matrix v does not provoke the lower object at all, even if it is attached as a clitic to the lower verb, as (34) shows.
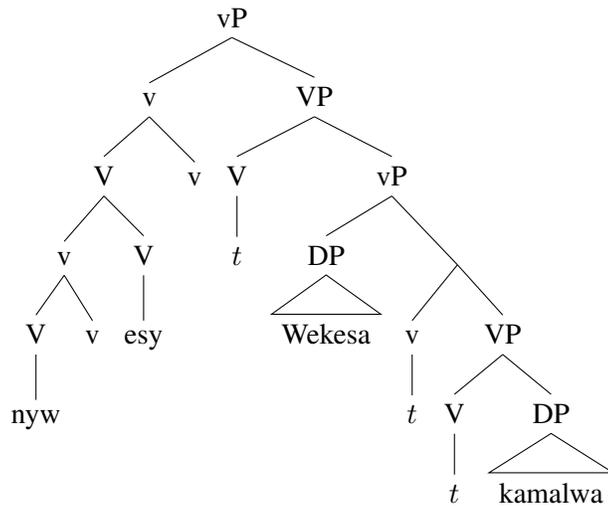
(34) * *Sa mère   est arrivée à faire se   les   acheter à la jeune fille.*   (Kayne,
        her mother is   arrived to make SELF them buy   to the young girl
        1975)

In these two French constructions, the reversal of underlying word order results because the v probe always provokes both its dative goal and its accusative goal. If only the dative were provoked, no inverted order would be generated. But there appear as well to be languages in which the French pattern is exploited as one of two options. As described by Baker et al. (2012), Lubukusu causatives are much like French (verb incorporation aside), but are slightly less restrictive. Alongside the theme-agent order in (35a), the agent-theme order in (35b) is possible (except where blocked by the *Phase Edge Prominence Constraint*).

(35) a. *Wafula a-nyw-esy-a*   *Wekesa ka-ma-lwa.*
          Wafula Agr-Tns-drink-Caus-fv Wekesa Agr-Agr-beer

      b. *Wafula a-nyw-esy-a*   *ka-ma-lwa   Wekesa.*
          Wafula Agr-Tns-drink-Caus-fv Agr-Agr-beer Wekesa

Baker et al. (2012) show that each order in (35) can feed A-movement operations, so that a passive causative can be formed with either the causee or the downstairs object as the final subject of the sentence. This means that the derivation must include some mechanism for optionally reversing the underlying order within the causative complement. Baker *et al* simply stipulate an optional A-movement internal to VP which violates Closest Move/Superiority in order to account for the reversed word order in (35b), but the APP offers a better approach. We need only Suppose the structure of both of these clauses includes the substructure (36) after the causative suffix is introduced.

(36)

```
                        vP
                      /    \
                     v      VP
                   /  \    /   \
                  V    v  V     vP
                /  \   |  |    /   \
               v    V  t  t   DP    ...
              /\    |         /\    v    VP
             V  v  esy    Wekesa   |   /   \
             |                     t  V     DP
            nyw                       |    /  \
                                      t   kamalwa
```

The usual incorporation operations will raise the lower verb up to the causative suffix (Baker, 1988); our concern is with the objects. If the matrix v now simply provokes *Wekesa* in (36), then the APP will ensure that the causee will end up as the specifier in the upstairs VP. If the matrix v has the option of provoking *kamalwa* as well, then the object will remerge as a higher specifier in the upstairs VP, and the order in (35b) will result. In both cases, the uppermost specifier in VP should be accessible for subsequent A-movement, if attracted by a still higher probe.

3.4 "Leapfrogging"

The inversion mechanism which the APP makes available, and which allows Lubukusu passives to displace the lower object in a causative construction, resembles what McGinnis (1998) calls "leapfrogging". And some of McGinnis's own cases appear to show that it occurs in a monoclausal structures as well. (To this point, the focus has been on more complex structures, simply because there are more analytic possibilities in simple double object verb phrases, so it is more difficult to pin down what the base structure must be.) In Albanian, for example, standard quantifier-pronoun binding tests show that indirect objects assymetrically c-command direct objects. McGinnis illustrates this with the (37) data, from Massey (1992).

(37) a. *Agimi   ia   dha   secilit djalë   pagën   e   tij.*
          Agim-NOM CL give each   boy-DAT pay-ACC his
          'Agim gave to each boy his pay.'

    b. **Agimi   ia   ktheu secilin liber   autorit   të tij.*
          Agim-NOM CL return each   book-ACC author-DAT its
          'Agim returned to its author each book.'

18

In passive sentences, however, where the direct object is the target of agreement, the reverse is true.

(38) a. *Secili libër   iu kthye   autorit   të tij.*
         each book-NOM CL kthye-NACT author-DAT its
         'Each book was returned to its author.'

    b. *Secilit djalë   iu dha   paga   i tij.*
         each boy-DAT CL give-NACT pay-NOM his
         'Each boy was given his pay.'

The reversal of binding possibilities is to be expected if Albanian double object passives, like Lubukusu and French causatives, require v to provoke both the dative and the accusative nominals in turn, and if such provocation is followed by a merge operation which creates a VP (not vP) specifier. In that case, once again, the hierachical ranking of accusative and dative arguments will be reversed from the base positions. Notice that active sentences in Albanian must not undergo the same process, despite the presence of both dative and accusative Case. What this implies is simply that the accusative Case assignment does not imply provocation in Albanian, but agreement of v with the lower nominal in a passive, when Case is not assignment, does require provocation (presumably to render the lower object accessible to T). This then must be an option which the Case parameters established by universal grammar make available.

A similar account can be given to another of McGinnis' cases: British English dialects in which the lower of two objects is accessible for A-movement in passives. Thus, in (39b), *a book*, which presumably originates as the complement in an applicative phrase, ends up as the subject, while the higher object *Colin* remains inside the verb phrase. Again, the reversal of word order can be taken to reflect a double provocation of the two objects by T, followed by merger of each as specifiers for VP.

(39) a. Colin was given a book for his birthday.

    b. A book was given Colin for his birthday.

McGinnis obtains these results in Albanian, British English, and in other similar cases, by imposing her own condition on the how multiple specifier ordering is resolved. She proposes that a tucking-in ordering, which preserves the underlying order, is enforced when the attracting probe values the same type of feature in Agree. This is the case for Slavic multiple wh-movement. But if the probe values two distinct types of features, then the second specifier to be moved must become a higher specifier. Thus, for example, in McGinnis's analysis of Japanese scrambling, a single head may value both ϕ/Case features and a scrambling feature, and the scrambling feature will be satisfied by a phrase which raises to a higher specifier position.

Clearly this type of account will only be explanatory to the extent that a typology of features is available to ground it. Unless an independant metric of similarity is in place which allows us

to judge when two features are to count as similar enough to produce a tucking-in order, the only way to identify what makes features "similar" is by looking to see whether they trigger a tucking-in result, or an inversion result. But this amounts to a circular logic, and must be abandoned. In contrast, the claim that the APP controls when tucking-in is preferred to inversion may be difficult to test, but it appears not to be circular, and is therefore preferable.
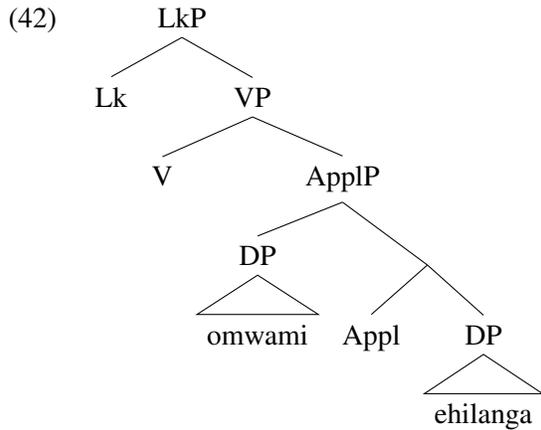
Baker and Collins (2006) discuss yet another set of cases which resemble the double object structures McGinnis discusses, but in which the presence of an extra "linker" morpheme introduces an extra complication. An example is the Kinande sentence (40), where the linker *y'* appears between the direct and the indirect object, and where the linker agrees in ϕ features with the preceding nominal.

(40) *Mo-n-a-h-ere*   *omukali*   *y'*-   *eritunda.*
      AFF-1SS-T-give-EXT woman/1 LK/1 fruit/5
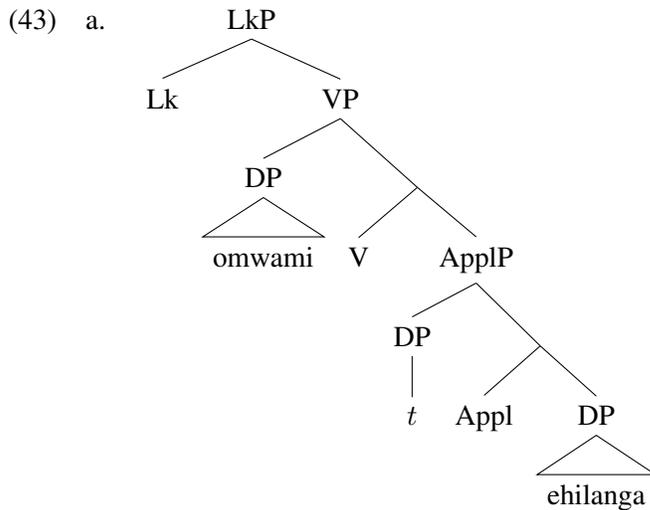   'I gave a fruit to a woman.'

As they show, the linker morpheme cannot simply be equated with an head position of ApplP, because the nominal which precedes it can originate as a higher or a lower element of the verb phrase. (Moreover, the applicative head is incorporated into the verb and transparently reflected in the verbal morphology.)

(41) a. *Kambale* *a-seng-er-a*   *omwami* *y'*-   *ehilanga.*
          Kambale 1S/T-pack-APPL-FV chief/1   Lk/1   peanuts/19
          'Kambale packed peanuts for the chief.

      b. *Kambale* *a-seng-er-a*   *ehilanga*   *hy'*-   *omwami.*
          Kambale 1S/T-pack-APPL-FV peanuts/19 Lk/19 chief/1
          'Kambale packed peanuts for the chief.'

Baker and Collins simply accept that Lk may attract either a closer nominal or a more remote one, despite the evident challenge this poses for our understanding of locality constraints. Happily, we can find a more principled way to describe the situation. The option of reversing the underlying word order can again be taken as an effect of the APP, if we simply assume that there is a provocative head for which the displaced goals are merged only as specifiers for its complement. For example like (41), this requires a derivation for the verb phrase which includes a structure similar to (42).

(42)

```
              LkP
             /   \
           Lk     VP
                 /   \
                V     ApplP
                     /    \
                   DP      \
                  /  \      \
              omwami  Appl   DP
                            /  \
                         ehilanga
```

We now need only characterise the Lk head as bearing provocative ϕ features which may be valued either once or multiply. Lk itself can accomodate a specifier, but (as will be seen shortly) if it takes on a specifier immediately, the derivation will fail at a higher stage. So when Lk provokes a goal, the result must be integrated by a merge operation which targets VP. If Lk provokes only once, then the result will be the structure (43a), and Lk will agree with *omwami*. If Lk provokes twice, then (43b) is generated, and Lk agrees with the second goal *ehilanga*.[7] In this respect, Kinande Lk behaves much like v in British English passives.

(43) a.

```
              LkP
             /   \
           Lk     VP
                 /   \
                DP    \
               /  \    \
           omwami  V    ApplP
                        /   \
                      DP     \
                      |       \
                      t   Appl  DP
                               /  \
                            ehilanga
```
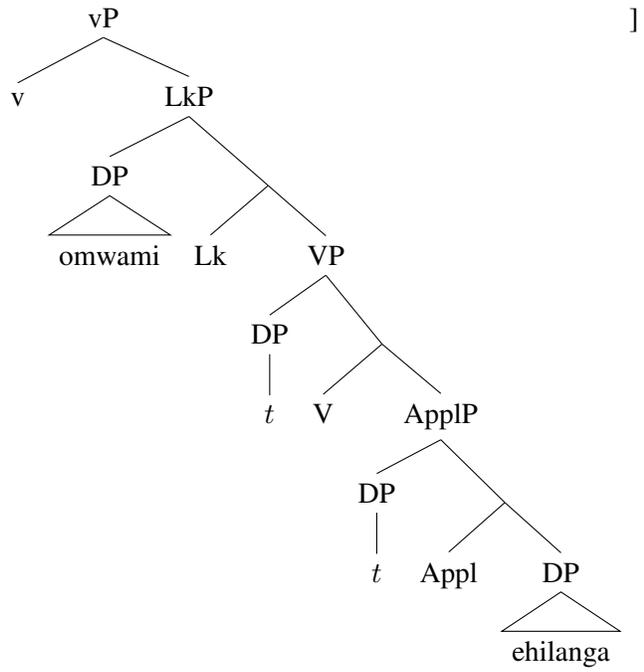
_____

[7]Bruening and Rackowski (2001) document a similar agreement pattern in Wampanoag object agreement, where the second agreement target overwrites the effects of the first valuation.
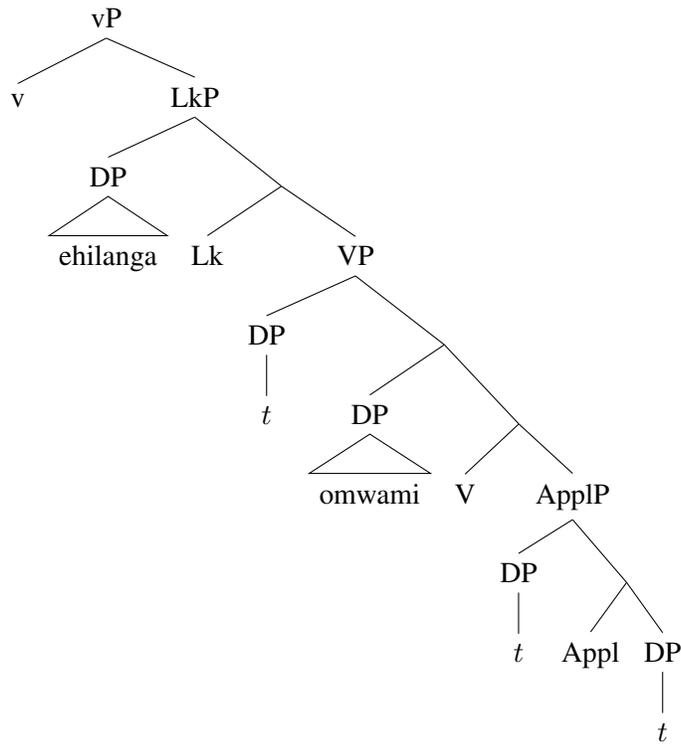
b.

```
                    LkP
                 /        \
               Lk          VP
                         /     \
                       DP        \
                      /  \         \
                 ehilanga  DP        \
                          /  \        \
                     omwami   V      ApplP
                                    /     \
                                  DP        \
                                  |          \
                                  t     Appl   DP
                                              |
                                              t
```
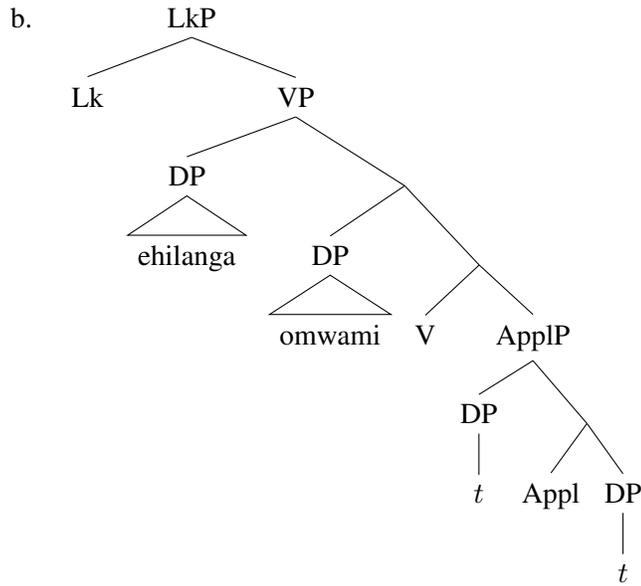
The LkP category must be a complement to v, as Baker and Collins propose. And v itself has a provocative ϕ/Case feature to value, which it must match to the closest available nominal. As usual, v cannot accomodate a specifier, so whatever type of object v provokes will have to be merged as the specifier for its complement, which is LkP. Thus (43a) will give rise to (44a), and (43b), to (44b).

(44) a.

```
                    vP
              ┌──────┴──────┐
              v            LkP
                     ┌──────┴──────┐
                    DP             │
                  ┌─┴─┐      ┌──────┴──────┐
               omwami   Lk           VP
                              ┌───────┴───────┐
                             DP               │
                              │         ┌──────┴──────┐
                              t         V           ApplP
                                              ┌──────┴──────┐
                                             DP             │
                                              │       ┌──────┴──────┐
                                              t      Appl          DP
                                                                 ┌──┴──┐
                                                               ehilanga
```

]

b.

```
                    vP
              ┌──────┴──────┐
              v            LkP
                     ┌──────┴──────┐
                    DP             │
                  ┌─┴─┐      ┌──────┴──────┐
              ehilanga  Lk           VP
                              ┌───────┴───────┐
                             DP               │
                              │         ┌──────┴──────┐
                              t        DP             │
                                     ┌─┴─┐      ┌──────┴──────┐
                                  omwami   V   V          ApplP
                                                    ┌──────┴──────┐
                                                   DP             │
                                                    │       ┌──────┴──┐
                                                    t      Appl     DP
                                                                     │
                                                                     t
```
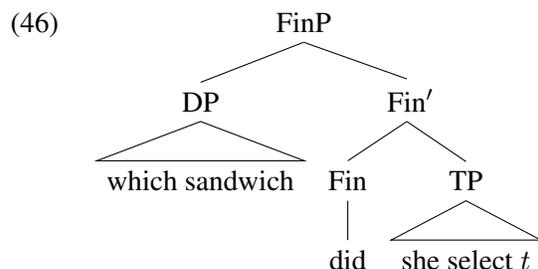
23

4 Root inversions

To this point, the cases in which the most significant APP effects have been identified have involved the internal structure of the verb phrase, where the critical factor has been the inability of v to accomodate specifiers. We should expect similar consequences, however, in any other context in which a provocative probe cannot host a specifier. And this expectation is confirmed in the case of English root wh-questions, where wh-movement finds a landing site lower than Spec-C.

Previous work has established that the position of a displaced wh-phrase is different in root and embedded clauses (Rizzi, 1999). In root questions, the wh-phrase can be preceded by a (parenthetical) topic, as in (45a). In embedded questions, this is impossible. [8]

(45) a. Yesterday, which sandwich did she select?

  b. *They are going to ask me yesterday, which sandwich she selected.

A more salient difference between embedded and root questions is, of course, the upwards movement of the auxiliary verbs in the latter. In PS, it is shown that T raises to Fin in English when something other than the subject becomes a specifier for FinP. (The technical details of the T-to-Fin movement are not critical here. It is enough that that auxiliary-inversion should be a reliable diagnostic for movement of a non-subject to the specifier position in FP.) Thus, at least a part of the structure of (45a) will be (46).

(46)

```
                    FinP
             _____/    _____
           DP                  Fin′
        __/  \__            __/   \__
  which sandwich        Fin         TP
                         |        /    \
                        did    she select t
```

But this structure raises the question of what motivates movement in root questions. It cannot be the case that Fin can freely attract a wh-phrase, because Fin cannot do so outside of root contexts. (The proposal advanced in PS was that a provocative feature could be added to Fin to bring wh-phrases closer to their ultimate target in root clauses, which was taken to be the specifier of a Focus
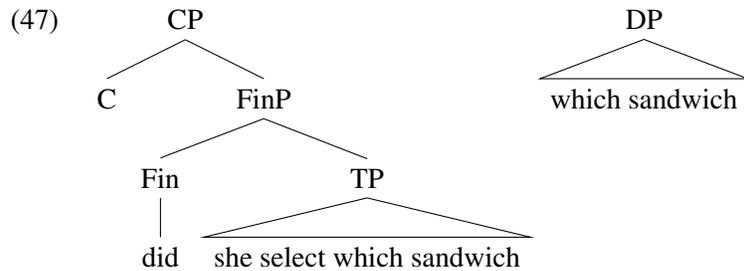
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[8] In embedded questions in English, the wh-phrase cannot precede a topic either, as in (i).

(i) *They are going to ask me which sandwich yesterday she selected.

It is shown in PS that the unacceptability of (44) follows from the inability of Fin to raise to Force when a Top head intervenes. This datum therefore instantiates a different type of grammatical problem.

Phrase, but that constitutes rather a lot of *ad hoc* machinery to accomplish what looks like a simple result.[9])

The optimal answer would be that it is the same probe which triggers movement in both embedded and root wh-questions, but that independant factors force the merge site for the wh-phrases to differ. Suppose therefore that even root questions include a C probe which triggers movement. The immediate result of provocation by C in (45a) will then be (47).
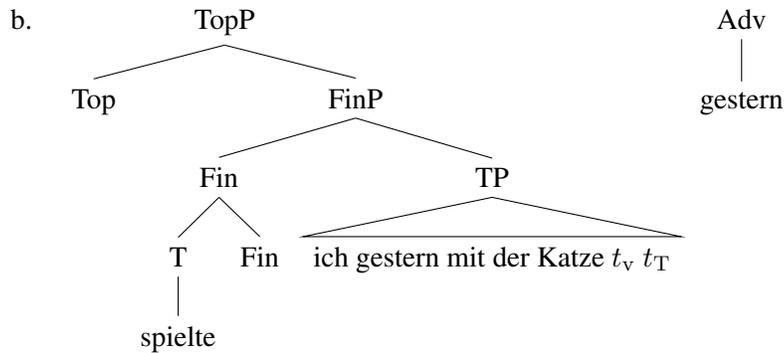
(47)

```
          CP                              DP
         /  \                            /  \
        C    FinP              which sandwich
            /    \
          Fin     TP
           |     /   \
          did  she select which sandwich
```

If we assume that the phasal head of a root clause is not visible at the Interfaces (Fitzpatrick, 2006), because only the complement of the final phase is interpreted, then the root CP cannot be a viable merge site for the external wh-phrase. The next closest merge site, and the one then required by the APP, will be the specifier of the FinP complement. The resulting structure for FinP will be (46). In an embedded clause, however, CP is always interpreted, so nothing prevents an external wh-phrase from merging at the root, creating a specifier for CP.

The general Germanic verb-second word order pattern also revolves around the use of the specifier position in FinP to host non-subjects. Unlike English, the other Germanic languages appear not to permit overt specifiers for left-peripheral heads like Top and Foc. Nevertheless, Top and Foc continue to provoke goals with the appropriate features within TP. That being the case, a German example like (48a) will have the post-provocation structure in (48b), which can be resolved in a way which satisfies the APP only if the adverbial topic *gestern* merges as a specifier in FinP.

---

[9]The solution provided in PS was technically sound, I think, but it unfortunately also requires a degree of derivational "look ahead".

(48) a. *Gestern   spielte ich mit   der Katze.*
          yesterday played I   with the   cat

    b.

```
              TopP                                    Adv
             /    \                                    |
          Top      FinP                             gestern
                  /    \
               Fin      TP
              /   \     /  \
            T    Fin  ich gestern mit der Katze t_v t_T
            |
         spielte
```

In this case, the triggering Top probe is not a phase head.

    Because Top and Foc must co-opt Spec-Fin to host the phrases they displace, it follows that verb-second Germanic languages cannot have both a topic and a focus in one clause. German (49a) thus contrasts with Italian (49b).

(49) a. *In der Regel nur   nach Barcelona wird er   reisen.*
          usually   only to   Barcelona will he   travel
          'Usually he will only travel to Barcelona.'

    b. *A Gianni, QUESTO, domani   gli   dovrete   dire*   (Rizzi, 1997)
          to Gianni THIS   tomorrow him/DAT should-2 say
          'Tomorrow, you should say THIS to Gianni'

    The use of FinP as a merge site for something provoked by Force can be compared with situations in which FinP is a merge site for something provoked by the Fin head itself. The former situation arises only when some other factors preclude the "better" solution, in which a ForceP merge site were selected. The latter situation will have a different profile, in which the FinP merge site is the preferred solution, and where no special triggering context is necessary.

    In some dialects of English, Fin sometimes appears to be the actual head which triggers wh-movement. Here, in strongly interrogative contexts, Force appears to be optionally absent in embedded questions, just as Force may be absent—more commonly—in strongly declarative contexts. (The latter option gives rise to embedded declarative verb-second clauses in many Germanic languages, as discussed in PS.) Thus, the embedded inversion in (50) can be attributed to Fin rather than Force provoking the wh-phrase.

(50) Ask your mother when should we stop by.

As Fin provokes *when*, the APP identifies the optimal merge site as FinP. And as always, the use of the specifier position in FinP for something other than the subject then drives auxiliary inversion.[10]

A similar, but more extreme, departure from the Germanic norm is found in Afrikaans (Biberauer, 2003, 2012), where again inversion cooccurs with wh-movement in embedded clauses, as in (51).[11] Unlike the relevant dialectal Englishes, Afrikaans allows such inversion in the complement of verbs which do not select for interrogatives, as in (51b).

(51) a. *Ek wonder wat   het hy vandag weer   aangevang.*
          I   wonder what has he today   again done

      b. *Ek onthou   duidelik hoeveel   mense sou   die partytjie bygewoon heet.*
          I   remember clearly   how.many people should the party   attended   have

Apparently Force can be omitted more widely in Afrikaans embedded clauses, and therefore wh-movement may be triggered by Fin more freely. But the basic mechanism remains the same, and can be distinguished from the pan-Germanic pattern of Force triggering all wh-movement, with the merge sites reflecting the specific conditions imposed by root or embedded phasal contexts.
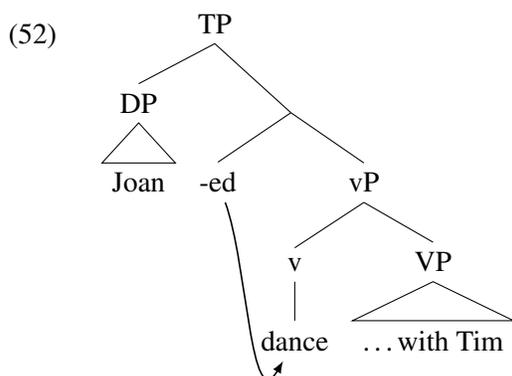
5 Affix hopping

Perhaps the most persuasive of Chomsky's original (1957) arguments for a transformational component in natural language syntax was the analysis developed there of English verbal inflection, and particularly of tense inflection. The key to that analysis was the operation of 'affix hopping', which displaced tense inflections from their base position, and attached them to the leftmost verb.

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[10] At the same time, the absence of a Force head in the embedded clause makes acceptable topicalisation past the embedded wh-phrase, simply because the presence of a Top head no longer blocks the Fin-to-Force movement which would otherwise be necessary. McCloskey's (2007) generalisation concerning the correlation of embedded inversion and topicalisation in wh-contexts then follows.

[11] Biberauer finds a diachronic correlation between the acceptability of double negation structures and embedded questions with inversion, which she attributes to the syntactic effects of a Polarity Phrase which systematically selects CP in Afrikaans. An alternative account of the double negation facts might emerge if we suppose that Afrikaans allows a Pol head in the middle zone of the "left periphery", between Force and Fin. This position would be constrained in the same way that Foc and Top are constrained in PS; it would never be possible in a context in which Fin must raise to Force. As such, the presence of double negation might be taken as an Afrikaans diagnostic for embedded clauses where the Force head is absent.

(52)

```
                TP
         ┌───────┴────────┐
        DP              ┌──┴───┐
        /\             -ed     vP
      Joan                  ┌───┴────┐
                            v        VP
                            │       /  \
                          dance  …with Tim
```

(The affix *-ed* lowers onto *dance*.)

As Lasnik (1995) notes, this analysis is actually the most satisfactory and elegant account in the literature, but it has proven difficult to reconcile with minimalist premises. (Lasnik's own attempt to do so relegates affix-hopping to the PF branch of the derivation. He solves the affix-hopping problem by placing it outside of the core syntactic derivation, and necessarily makes greater demands of the PF module in the process. It's a reasonable conjecture, if the derivation truly cannot accomodate affix-hopping, but I think we can do better.)

In a nutshell, the affix-hopping problem is that it requires lowering of the affix onto the verb, and there has been no satisfactory mechanism to enable lowering movements to take place. But the APP actually provides exactly this mechanism, once a few details are filled in.

Uncontroversially, tense features are interpreted in the T position in any sentence where a modal verb is the head, such as (53).
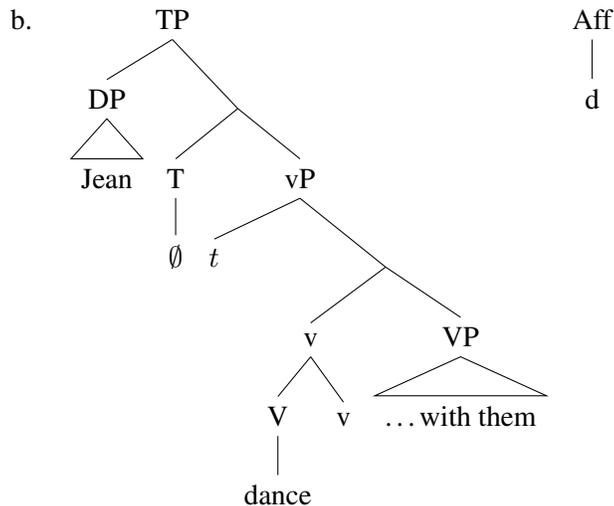
(53)   Jean could run a marathon.

One interpretation of (53) takes *could* as the past tense of *can*, plausibly with a partially suppletive root *coul-* ([cU]) to which the regular past tense affix *-ed* ([d]) is added (Halle and Marantz, 1993).

In the spirit of *Syntactic Structures*, let us suppose that *coul-* and *-ed* originate as separate syntactic objects. Going one step further, we can take *coul-*, the modal root, as the head of TP. Lacking any tense inflection to begin with, *coul-* must bear an unvalued tense feature, which will serve as a probe.

The actual tense suffix *-ed*, then, does not originate within TP. It is instead a bound morpheme drawn from the numeration which can provide a value for unvalued T. Other than that, *-ed* is semantically empty. Valuation takes place 'sideways', before *-ed* finds a place in the TP structure. Tense features within *-ed* are not themselves meaningful, so the operation which values T must also eliminate the tense feature from *-ed*. But *-ed* does contain phonetic content, and it must merge with TP as close as possible to the T probe. And as *-ed* is an affix, and as *coul-* can accomodate an affix—and in fact must do so—*-ed* will Merge by adjoining to T, producing the inflected form *could*. And a similar story can be told for all the other inflected modal forms in past and present tenses.

In sentences lacking auxiliary verbs, the initial content of T is a formative which lacks phonetic content, but which still bears an unvalued tense feature. And like a modal verb, silent T can value its tense feature by finding an external match (*-ed* or *s/∅*, for past or present tense values, respectively). Thus, the derivation of (54a) will include a stage where the structure is (54b).

(54) a. Jean danced with them.

b.

```
                TP                          Aff
              /    \                         |
           DP        \                       d
          /  \        \
        /____ \        \
       Jean    T        vP
               |       /  \
               ∅  t  /      \
                    /         \
                   v           VP
                  / \        /    \
                 V   v     /_____\
                 |        ... with them
               dance
```
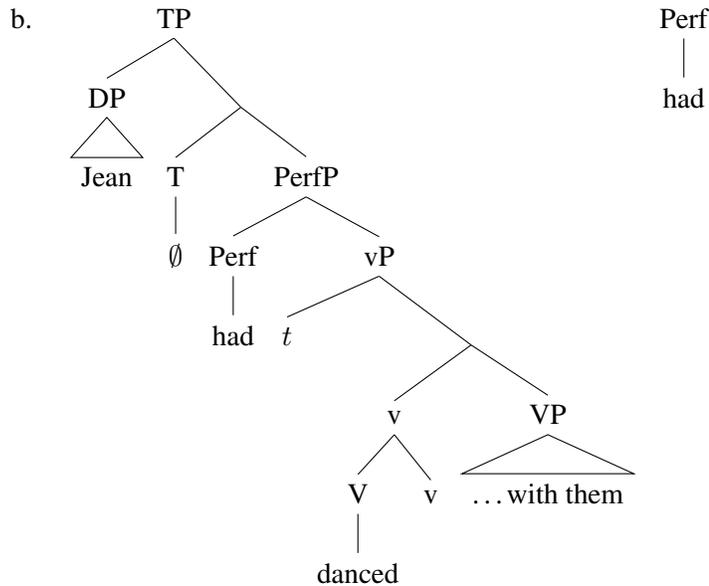
Once again, the *-ed* affix must now merge with TP, and it must do so in a manner which satisfies the APP. But in this case, it cannot simply adjoin to the T probe, because the output would not satisfy the requirements of the PF interface, where *-ed* would appear as a free affix. The next best Merge solution—which will still be satisfactory for the APP—is to adjoin to v, which is the next head down. And as adjunction of *-ed* to the verb in v produces a legitimate morphological structure, this solution must be taken.

'Affix-hopping' is then simply the best solution available for merging an external affix into a structure where the probe itself cannot accomodate it.

Of course, in contexts where *do*-support is motivated, the tense affix can still adjoin to the optimal merge site, which remains the T probe.

As for the more complex derivations involving the auxiliary verbs *have* and *be*, I will adopt Lasnik's proposal that English *have* and *be* enter the derivation with values for T already supplied. As with *-ed*, the tense features in auxiliary verbs must be deleted once they are matched with a T probe. And again, the valuation of tense features on T require an external match, so *have* and *be* will necessarily undergo head-movement (as described in section 1 above, and in more detail in PS). The derivation of (55a) will then include the stage in (55b).

(55) a. Jean had danced with them.

b.

```
                TP                                      Perf
               /  \                                      |
             DP    \                                    had
            /\      \
          Jean   T    PerfP
                 |    /    \
                 ∅  Perf    vP
                     |     /  \
                    had  t     \
                              /    \
                             v      VP
                            /\      /  \
                           V  v   …with them
                           |
                         danced
```

Nothing in this structure prevents the external *had* from merging by adjunction to T, so the final structure is one in which the auxiliary verb has effectively raised to T.[12]

In fact, the *Syntactic Structures* analysis for more complex auxiliary structures can be readily implemented along the same lines. If we take perfective *-ed* and progressive *-ing* as independant affixes which can be used to provide a value for the perfective and progressive auxiliaries, respectively, then the appearance of these affixes on lower heads would simply reflect the general requirement that auxiliaries first need to accomodate a still higher inflectional affix, so that the aspectual affixes which actual supply their interpretations are always forced to merge at the next head down.[13]

This approach pays dividends in considering the tense systems of other similar languages, as well. Consider the three-way syntactic distinction between English, French, and Swedish. In French, movement of the inflected verb to T is the rule Pollock (1989). With Lasnik, we can attribute this pattern to a lexical property of French verbs which supplies a tense feature to the verbs before they are drawn into the syntactic derivation. As the verbs bear tense features, there is nothing analogous to the English independant tense affixes, and French verbs will raise for the same reason as English auxiliaries do. In Swedish, in contrast, neither finite auxiliaries nor finite
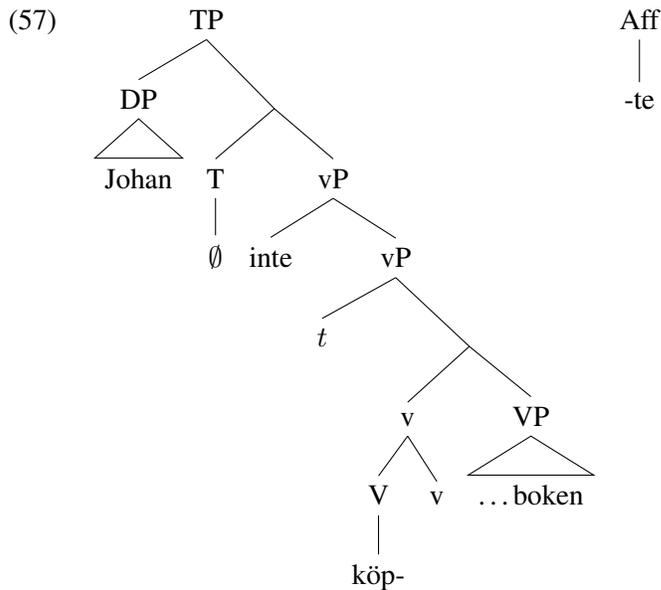
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[12]The dialectal difference which allows *have* as a principal verb to raise to T will have to follow from a difference in the status of the tense inflection in non-auxiliary *have*. Dialects which leave principal *have* within vP will treat the past tense suffix as an external *-ed* for this verb, just as for regular verbs.

[13]As a technical detail, in order to ensure that aspectual auxiliaries cannot accomodate their own valuing affixes in sentences where a modal verb carries the tense, it would be necessary to require that modal verbs also introduce another zero infinitival or subjunctive affix into the chain of valuing external head.

principal verbs raise (except for in verb-second contexts) (Holmberg, 1986). Past and present tense inflection is, however, expressed on finite verbs.

(56) a. … *om Johan inte köpte   boken*
                if   Johan not bought book.the
          'if Johan didn't buy the book.'

      b. … *att pojkarna troligen   redan   har   varit här*
                that boys.the   probably already have been here
          'that the boys have probably already been here'

Swedish, then, exploits affix-hopping to a greater extent than English does. In Swedish, T is always empty and its unvalued tense features are always valued by an external tense affix: *-te* for the past tense; *-r*, for the present. The TP structure for (56a), for example, will require the stage in (57).

(57)

```
          TP                          Aff
        /    \                         |
      DP       \                      -te
     /\          \
  Johan   T       vP
          |      /   \
          ∅   inte    vP
                      /  \
                     t    \
                           \
                        /      \
                       v        VP
                      / \      /\
                     V   v   …boken
                     |
                   köp-
```
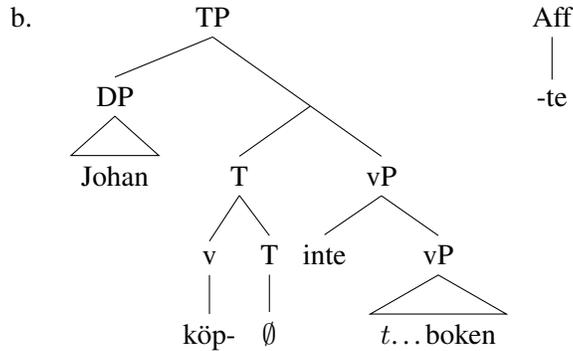
And the external affix must always merge to the only merge site available and which satisfies the APP, and that means the next head down from T—*v* in this case.

In root clauses and other verb-second contexts, the finite verb does raise to T (for reasons which seem disconnected from the valuation of tense features) before going on into the clausal left periphery. When this occurs, there is no reason to suppose that 'affix hopping' is necessary. In (58a), for example, if the verb raises to T before the tense features of T are valued, then then (58b) will follow.[14]

---

[14]The result is the same if the affix merges to T before the verb raises.

31

(58) a. *Johan köpte   inte boken.*
Johan bought not book.the
'Johan didn't buy the book.'

b.

```
                    TP                          Aff
           ┌─────────┴────────┐                  │
          DP                   ┌────────┐        -te
          /\                   T         vP
        Johan               ┌──┴──┐   ┌──┴──┐
                            v     T  inte    vP
                            │     │         /    \
                           köp-   ∅      t…boken
```

And in this case, the external *-te* affix will presumably merge directly to T, producing a legitimate verbal output and optimally satisfying the APP in the process.

6   Conclusions

So now a fairly wide range of constructions have been identified which require movement which does not conform to the EPP, but which satisfy the APP. On that basis, the redundancy between these two putative universal concepts must be resolved by keeping the APP and abandoning the EPP. We might now turn to the next question: where does the APP come from?

One answer could be that UG contains the APP in whole, as a reflection of how evolution and physical constraints have combined to ensure this part of human biology. That would be the boring answer.

Another possibility might be worth exploring, however, and that is that the APP arises from "third factor" considerations, in the sense of Chomsky (2005). Implemented in a provocation-based model, for example, the APP provides an answer to the question of where to merge an external member of a chain, the APP seems to have clear functional value, because it isolates a single phrase marker as the proper result in conditions which otherwise would have a large number of equivalent outputs. As such, it should be advantageous both for the parsing mechanisms, which would need to consider a far larger set of possibilities without it, and for the generative procedure, which one would hope can find an optimal solution for building structure from the numeration. Exploring this hunch in more detail might yield a better understanding of the balance between language-specific and 3rd factor principles of language design. In any case, however, the discovery of a new way to tackle some old, hoary empirical problems confirms the value of the heuristic strategy that we should seek to remove redundancy from our models.

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Approach velocity. Workpiece deformation. Cleanliness of the work area. This guide is a general guide on probes and probing. It covers probing practice; types of contact probing systems, their advantages and disadvantages and how they work. It also covers the advantages and disadvantages of various stylus configurations; choosing the appropriate probing sphere size; and the use of non-contact sensors on CMMs. It is an update of a guide first published in 2001. Probing based approaches have been effectively used for network monitoring in the past. Probes such as ICMP pings provide an effective tool for detecting compromised nodes which try to delay or drop traffic. But an intelligent attacker may evade detection by giving preferential treatment to probe traffic. This is usually possible because probe packets have a different format from regular application packets and are easily distinguishable. As the probe approaches the plate, the capacitance increases. The nature of this change was observed to be a function of power series (quadratic). Figure 3 shows the capacitance as the probe approaches a dry cuvette. However, the coefficients in this power series change in the presence of fluid in the path of the probe. Because the fluid has a much greater dielectric constant than air, when the fluid becomes a higher percentage of the dielectric between the probe and the plate, the capacitance increases more rapidly. This study's approach involves administration of PET imaging probes and detection of the resulting 511-MeV gamma rays, due to positron decay, with a PET scanner. Over the past three decades, more than 2,000 PET probes have been developed [1] to provide assays of a wide array of biological and pharmacological processes. With Parker Solar Probe's latest closest approach to the Sun in direct view of Earth, some 40 observatories around the globe and several spacecraft, including STEREO, BepiColombo, and Solar Orbiter, made simultaneous observations of activity stretching from the Sun to Earth. Distances and planet and spacecraft locations are not to scale. Credit: NASA/Johns Hopkins APL/Nate Rudolph. "Parker Solar Probe has shown us that there is