

Getting morphemes in order: Merger, Affixation and Head-movement
Heidi Harley, University of Arizona
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Abstract

Head-movement is usually diagnosed by consideration of whether there is evidence for displacement of a single-word item; the multimorphemic character of a given form is also often taken to bear on the issue, particularly when the morpheme order mirrors the order of the extended projection in the syntax. However, it is clear that just as there can be head-movement without affixation, there can be affixation without head-movement. Even the issue of which morpheme orders can properly be taken as 'mirroring' the syntax is somewhat more complex in implementation than commonly assumed. In addition to the mirroring options available, additional mechanisms must be at work in deriving certain types of complex forms, and an analysis of the Cupeño verbal complex is argued to involve an intricate interplay of the possibilities. Finally, some of the formal problems posed by standard head-adjunction are reviewed, and a brief overview of some alternative theoretical approaches to head-movement is given.

Keywords

Cupeño, the Extension Condition, Merger Under Adjacency, M-merger, Cyclicity

Author Bio

Heidi Harley is Professor of Linguistics at the University of Arizona. She received her degree in 1995 from MIT under the supervision of Alec Marantz, and has held positions at the University of Lille III, the University of Pennsylvania, Harvard and Oxford in addition to the University of Arizona. Her research specialities include morphology, syntax and lexical semantics, and she has worked on these topics in several languages, including English, Japanese, Italian, Irish, Icelandic, and Hiaki. She has published papers in *Language*, *Linguistic Inquiry*, *Lingua*, *International Journal of American Linguistics* and *Studia Linguistica*, among others.

1 Introduction

Head-movement is in a way the poor sister in the theoretical typology of movement operations. Of the three types of movement operations, head-movement typically travels the shortest distance in the linear string, which makes diagnosing it particularly challenging; investigators must often rely heavily on the position of single-word constituents like negation to confirm that displacement has taken place. Further, its structural implementation has always been theoretically problematic. In earlier Government and Binding theory, the definition of government had to be carefully formulated in order to ensure that traces of head-movement could satisfy the ECP appropriately. Within Minimalism, head-movement violates the Extend Target and Chain Uniformity conditions, two intuitively natural restrictions easily derived from more fundamental premises, and which themselves impose empirically robust constraints on derivations—the very kind of constraint that Minimalist thinking predicts should apply in the syntax of natural language. Finally, head-movement is situated firmly at the interface between morphology and syntax, which means that much of the central data which head-movement is designed to account for must be considered from a morphological perspective as well as a syntactic perspective—and theories of the morphology-syntax interface are even more contentious and disparate than theories of syntax proper.

On the other hand, many of the empirical results produced by the theory of head-movement are among the most intuitively satisfying ideas in modern syntactic theory. It is gratifying, for example, to see students come to understand the fundamentals of the analysis of German V2 phenomena, and to watch the 'aha'

moment when they grasp the explanation of the clause-final position of the tensed verb in embedded contexts in contrast to its V2 position in matrix contexts (den Besten 1977).¹ Similarly, head-movement analyses have produced several of the most plausible and straightforward examples of parametric variation: the V-to-T parameter that differentiates French from English (Emonds 1976; Pollock 1989), the T-to-C parameter that differentiates German from French; the V-to-v parameter that distinguishes Hindi and Persian complex predicates (Folli, Harley, and Karimi 2005), the N-to-V parameter that differentiates true incorporation in Mohawk (Baker 1988) from pseudo-incorporation in Niuean (Massam 2001) or Hindi (Dayal 2003). Finally, syntactic head-movement can provide a satisfying explanation for the existence of the morphological ordering generalizations characterized by Baker 1985's Mirror Principle. In short, the theory of head-movement has generated an extremely fruitful and empirically significant line of inquiry, despite the difficulties associated with specifying exactly what head-movement *is*, structurally speaking.

In this paper, I will first briefly exemplify some of the generally accepted symptoms of head-movement—the empirical clues that tend to suggest to linguists that head-movement may have occurred (section 2). Having identified these symptoms, we can then ask, what are the particular theoretical tools available to the syntactician to model them? I will first consider the analytical and typological possibilities offered by perhaps the most standard view of the head-movement operation, head-adjunction. I then discuss cases from English and Cupeño that

¹ This being, of course, one case where head-movement traverses a significant linear distance in the string.

present clear challenges to this view, and identify two independently motivated operations on X^0 terminals that are available at the mapping to PF, Merger Under Adjacency and Affix-Specific Linearization. The interaction of these three operations expands the typology of morpheme orders available to the theory, and allows for an account of cases which would otherwise pose an insuperable challenge to the unadorned head-adjunction theory (section 3). Finally, I will review the theory-internal issues with the structural implementation of head movement in current Minimalist phrase-structure thinking, and very briefly describe the varied alternative toolbox for dealing with head-movement made available by various modern syntactic theorists (section 4). These theories reject the standard head-adjunction outlined in the first section of the paper for principled theory-internal reasons, and address the resulting theoretical gap in several different ways.

2 Diagnosing head-movement

2.1 Position

As with any kind of movement, the primary indication that movement has occurred is reorderings of the linear string. Finite French verbs appear to the left of the negative element *pas* (1), while participial versions of the same verb, bearing the same semantic relationship to negation and the clause's arguments, appear to the right of negation: (2):

(1) Jean ne parlait **pas** français
 Jean neg speak.p.imp neg French
 Jean wasn't speaking French.

(2) Jean n'a **pas** parlé français

Jean neg'has neg speak.ppl French
 Jean has not spoken French

Similarly, in the VSO language Irish, the finite and nonfinite verbs appear in different places in the sentence, though in this case, the diagnostic element with respect to which the verb is reordered is the subject DP, rather than a smaller monomorphemic element like negation:

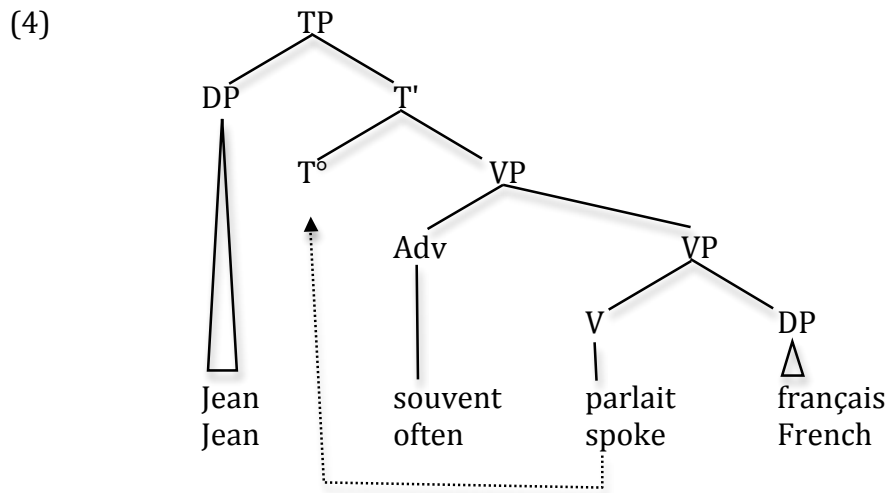
- (3) a. Phóg **Máire** an lucharachán (Carnie 2002)
 kissed Máire the leprechaun
 Máire kissed the leprechaun.
- b. Tá **Máire** ag pógail an lucharachán
 Is Mary prog kiss the leprechaun
 "Mary is kissing the leprechaun"

Since the subject DP can involve arbitrarily large structures, the distance between the two possible positions of the main verb is in principle unbounded.

In these cases, the main verb only surfaces in the lower position when the upper position is independently occupied by an overt element—an auxiliary in these examples. This effect is reminiscent of both the Wh-Island Constraint and the ban on Superraising. A wh-element cannot move into a position already occupied by another wh-element, and it cannot skip such positions, given the ill-formedness of sentences like **What did John wonder **why** Bill liked t*. Similarly, a DP cannot A-move into a position already occupied by another DP, and also cannot skip such positions, as shown by the ill-formedness of **Two men seemed **there** to be t in the room*. In the same way, the higher auxiliary intervenes between the main verb and higher head positions, so that even in contexts where verb-fronting would be possible were the

auxiliary not present, the presence of the auxiliary blocks it: **Parlé Jean a t français?* vs *A-t-il t parlé français?* and *Parlait-il français?*² (Travis 1984).

This parallel suggests that a movement-based account of the variable position of the main verb in (1) and (2) is appropriate. The central idea is that the lexical verb is always base-generated within the VP, where argument-structural relations are satisfied. When it appears in positions manifestly outside the VP, it has moved there by head-movement—movement and adjunction to the closest co-commanding head position, illustrated below:



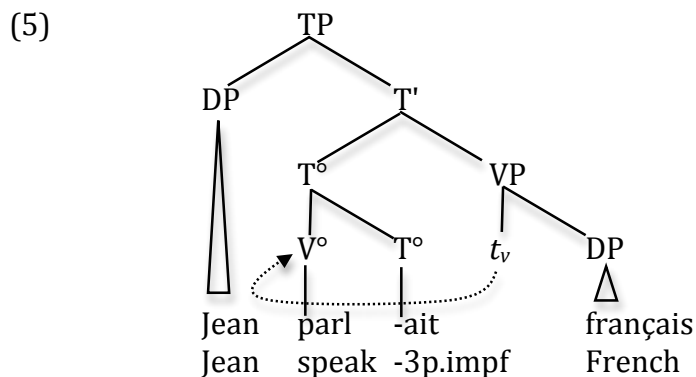
When the target position is independently filled, as in (1)b and (2)b, head-movement is blocked. Travis 1984 first modelled this effect with the Head Movement Constraint, later argued by Rizzi 1990 to be subcase of a generalized locality constraint on all movement operations, Relativized Minimality. This parallelism between head-movement and other cases of syntactic movement was

² Literally glossed: **Spoken John has French?; Has he spoken French? and Spoke he French?*

taken as strong evidence for the proposal that a movement operation was responsible for the variable position of the verb in pairs like (1)-(3)

2.2 Affixation

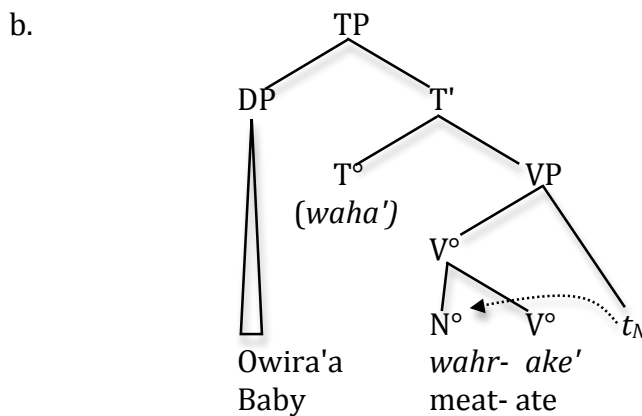
Syntactic head-movement is also often associated with multi-morphemic status, where a head-moved item appears attached to morphemes associated with the target head node. So, for example, the *-ait* suffix in (1)a indicates tense and subject agreement information, and appears on the verb when it has moved to T° . One natural hypothesis is to assume that the affix is the phonological content associated with the target node. If head-movement creates an adjunction structure, where the moved head adjoins to the c-commanding target head, then each morpheme in the verb is associated with a single syntactic terminal node.³ On this view, head-adjunction creates the correct morphosyntactic environment for the affix to attach to its host (cf. Baker 1988:68-74); in the head-adjunction configuration, both affix and host are dominated by a single word-level X° projection:



³ In some formulations of head-movement, in contrast, the moving element is substituted for the target (Rizzi & Roberts 1989, e.g.)

The notion that head-movement is not just a syntactic operation, but is also a morphological operation which builds word structures, has been very influential within generative grammar (though the two ideas are in principle independent of each other). Baker (1988), in a study of incorporation processes cross-linguistically, proposed to build verbs with incorporated objects and causative verbs by head-movement in the syntax—that is, he argued that head-movement could create these morphologically complex forms, and that the syntactic constraints on head-movement accounted for the attested and non-attested types of noun incorporation. So, for example, incorporation of an object noun *wahr-* 'meat' into the verb *-ake'* 'eat', in Mohawk, Baker proposed, was not a derivational N-V compounding operation, but rather a syntactic head-movement operation:

- (6) a. Owira'a waha'-wahr-ake' (Baker 1988)
 Baby Agr-meat-ate
 "The baby ate meat."



This proposal accounted for both the thematic relationship between the verb and the nominal object, as well as allowing a syntactic explanation for the failure of external-argument incorporation, in terms of the ECP.

Thinking of affixation as head-movement also allowed the theory to account for another important observation of Baker's: that morpheme order reflected semantic scope. Baker 1985 showed that a verb marked with both causative and reciprocal morphology could be interpreted as a causative of a reciprocal or a reciprocal of a causative, depending crucially on the order of affixation. He dubbed the generalized proposal that order of affixation reflects syntactic and semantic scope the "Mirror Principle". In that paper, Baker did not argue for a head-movement approach to all affixation, but the attraction is clear: If affixation is a syntactic operation, constrained by the Head Movement Principle, the Mirror Principle is derived as a prediction of the theory. This is so because the hierarchical structure created by several iterations of head adjunction up through the syntactic tree would necessarily directly match the hierarchical structure of the tree itself, given that no head in the extended projection could be skipped (the HMC), and that downward syntactic movement is impossible. The Mirror Principle is thus predicted if affixation is treated as a syntactic operation, while it must be treated as a stipulated correspondence relation in a theory where morphological operations like affixation are encapsulated in their own submodule in the lexicon, separate from syntactic structure-building. Patterns of verbal affixation like that of Korean *siph-ess-ta*, 'want-T_{past}-C_{decl}', for example, are the predicted outcome of a model which equates a) affixation with syntactically constrained head-movement and b) in which the hierarchy of projections is CP-TP-VP; given these two premises, the inverse order of tense marking and mood marking is predicted to be impossible.

In sum, two key properties which are often taken to be diagnostic of syntactic head movement, especially in combination, are a) variable position in the syntactic string, especially when associated with locality effects, and b) affixation.

2.3 Zero-affixation and string-vacuous head-movement

However, in many cases, perhaps most, the two diagnostic properties fail to correlate. One can detect displacement which is not accompanied by affixation, as in the case of sentence-initial auxiliaries and modals in English yes-no questions, which have no additional morphology despite their adjunction to C° . An example is illustrated in (7)a, b, below:

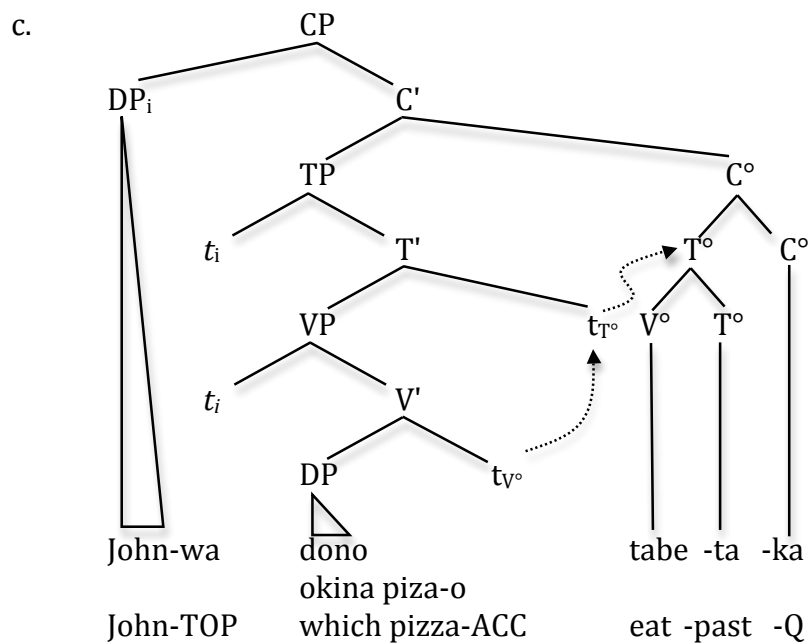
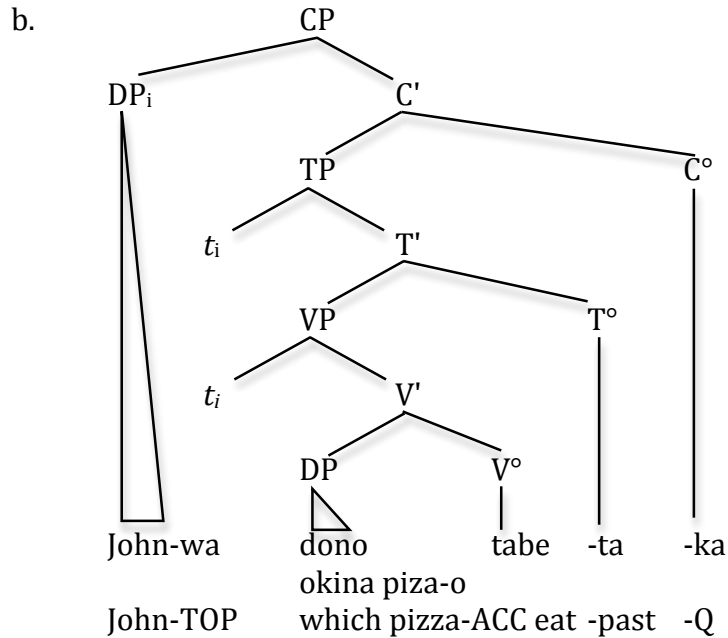
- (7) a. He can type.
b. Can he type?

Such cases, however, are easily accommodated in the framework if one assumes that zero exponence is a possible outcome for a terminal node. On that account, (7)b, involving head-movement and adjunction of T° to C° , *does* involve 'affixation', but by a purely morphological accident, the affix realizing the C° node is a null morpheme.

It is also easy to identify cases of affixation which are not obviously accompanied by displacement. The latter situation is amply represented in Altaic-type head-final languages, which typically exhibit a verb inflected in sequence with agglutinative morphemes respecting the clause-structure hierarchy, but where displacement, if it exists, cannot be detected due to the strictly head-final character of the language. If, in such languages all head positions are on the right, the

morphemes appear in the correct hierarchical order with or without the application of head-movement, as illustrated in the Japanese examples in (8)b, c:

- (8) a. John-wa dono okina piza-o tabe-ta-ka?
 John-TOP which big pizza-ACC eat-past-Q?
 "Which big pizza did John eat?"



Again, however, we can easily accommodate such cases in the framework if we are willing to posit string-vacuous head-movement for theory-internal reasons. Most broadly generative theories consider affixation to involve bundling under a single syntactic terminal node—that is, one 'leaf' of the syntactic tree should correspond to a single phonological word.⁴ Given this assumption, morphological affixation is indeed an indication that, by the time of Spell-Out, distinct syntactic terminal nodes have been grouped together under a single X^0 terminal node. If that is the case, the right analysis for (8)a is (8)c, not (8)b, just as this system of assumptions entails that the right analysis for (7)b involves a zero morpheme. Either displacement or affixation, then, might be motivation enough to posit the occurrence of head-movement in the syntactic tree.

3 Affixation, Displacement and the Mirror Principle⁵

⁴ Though, again, of course, mismatches in both directions are not difficult to come up with. There are certain cases of apparent movement that can be perspicuously treated as head-movement but do not (obviously) appear to result in affixation; one candidate case is particle shift (*John looked the number up* vs *John looked up the number*), treated by Johnson 1991, Koizumi 1993, Den Dikken 1995, a.o., as involving head-movement. Similarly, there are plenty of cases of morphological dependence that are not obvious candidates for a head-movement analysis, e.g. 'leaner' clitics like *'ll* in *I'll see you tomorrow*. See also discussion in Julien 2002.

⁵ Much of the discussion in this section also appears in Harley 2011.

Adopting the notion that head-movement is head-adjunction, thereby providing a unified theoretical treatment of both the characteristic properties of the process described in the previous section, we can derive a clear picture of what 'ideal' cases of head-movement should look like: they should show evidence both of displacement and a multimorphemic, affixed form whose affixal structure respects the Mirror Principle. However, in many very familiar cases, this ideal is not realized

3.1 Supplemental Mechanism I: Merger Under Adjacency

We have seen in the previous section that both displacement and affixation can each surface independently, without clear corroborating evidence for head-movement provided by the other diagnostic. We now turn to a well-known case in which the two diagnostics clearly *contradict* each other: English tense inflection on lexical verbs. The discussion and analysis below is based on that in (Bobaljik 1994; Halle and Marantz 1993).

In auxiliary-less English declarative clauses, the main verb shows affixation for tense and subject agreement (*-ed* in past tense, *-s* in present tense with a 3sg subject). By the affixation criterion, then, the verb must have head-moved to T° , forming a single complex terminal node which can be spelled out as a single phonological word.

However, when such English clauses are tested for displacement of the main verb to T° , the tests come up negative, as shown by Emonds 1976. The main verb must appear to the right of VP-adjoined adverbs such as *often* and *never*, even when inflected for tense—it behaves like French nonfinite main verbs. In contrast, English

auxiliary verbs and modals appear to the left of such adverbs, just as French finite main verbs and auxiliary verbs do.

- (9) a. Mary **often** walked to school
b. Mary may **often** walk to school

Another marker of the VP domain, negation, behaves perfectly normally in English clauses with auxiliaries: it intervenes between the finite auxiliary and the nonfinite main verb, just as in French. However, when an auxiliary-less clause like (9)a is negated, a startling transformation occurs: The main verb may no longer be inflected for Tense, and the dummy auxiliary *do* appears in the normal position for auxiliaries, indicating tense and agreement:

- (10) a. Mary did **not** walk/*walked to school.
b. Mary does **not** walk/*walks to school.

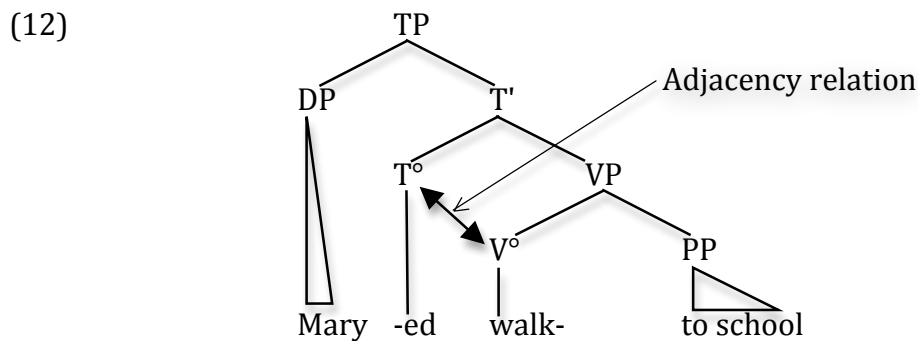
Similarly, when T° moves to C° to form a yes/no or wh-question in a clause which does not involve an auxiliary, the main verb may not be inflected for tense, and *do*-support applies:

- (11) a. Did Mary walk/*walked to school?
b. Does Mary walk/*walks to school?

The structural analysis of the facts in (10) and (11) seems very straightforward; the puzzle concerns the mechanism for attaching tense inflection to the verb in cases like (9)a. Bobaljik proposes that a post-syntactic affixation operation originally introduced by Marantz 1984 applies: (M-)Merger, which he refers to as *Merger Under Adjacency*.

On Bobaljik's account, terminal nodes can be adjoined to each other in the postsyntactic component as well, provided that after linearization they are structurally adjacent to each other. In a normal English declarative clause without

an auxiliary, T° and V° are adjacent in the relevant sense, and hence can undergo Merger Under Adjacency in the postsyntactic component. In such cases, then, affixation can occur in the absence of head-movement, as a kind of 'repair' when a stray affix is present. This is effectively a reinterpretation of an Affix Hopping analysis (Chomsky 1957) within a modern framework.⁶ Merger Under Adjacency is illustrated below:



Intervening heads, such as negation in (10), or specifiers, such as the subject in (11), disrupt the adjacency relation, preventing Merger Under Adjacency, and

⁶ Embick and Noyer 2001 argue that Merger under Adjacency is effectively a postsyntactic Lowering operation, which creates a complex terminal node under the V° head when T° is adjacent to V° . On that approach, the relationship between X° status and the phonological word is maintained. They distinguish two operations, Lowering and Local Dislocation; we will not be concerned with the precise nature of their distinction here.

requiring the application of a different repair operation, namely the insertion of dummy *do* to support stranded T° .⁷

Given the lessons of English inflected main verbs, we can draw two primary conclusions: First, displacement is a more important diagnostic of head-movement than affixation. Second, head-movement is not the only mechanism available to derive morphologically complex forms; rather, there is at least one other source for affixal behavior, albeit one constrained in very particular ways by structure and linear order: Merger Under Adjacency. The model must be supplemented in this way to account for the behavior of English inflected main verbs.

3.2 Supplemental Mechanism II: Affix-specific linearization

Turning back to the outcome of head-movement proper, we can ask what theoretical constraints there are on the adjunction operation itself. Given an Antisymmetry approach (Kayne 1994) to syntactic structure, the result of head-adjunction will always produce forms consistent with the Right-hand Head Rule of Williams 1981, where the moved and adjoined lower head (e.g. V°) precedes the upper target head (e.g. T°). In an antisymmetric theory, then, head-movement which produces structures headed by prefixes, rather than suffixes, should be impossible. A head-moved verb should appear suffixed with agglutinative morphemes each realizing the head of the phrases dominating VP, in their respective hierarchical order.

⁷ Adverbial adjuncts like *often*, due to their distinct structural status, do not intervene in the relevant sense, according to Bobaljik's proposal.

Plenty of languages, however, include prefixation as well as suffixation in the morphological makeup of complex inflected verbs. Consider, for example, the agreeing tense and aspect affixes of the Uto-Aztecan language Cupeño, as described in Hill 2005 and analyzed in Barragan 2003:

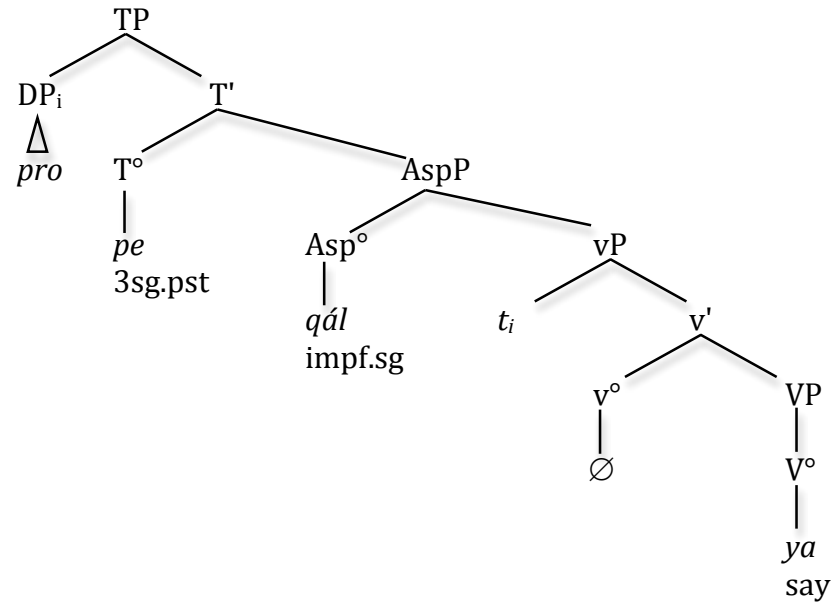
- (13) pe-ya-qál
 3sg.past-say-impf.sg
 T/Agr-V-Asp°
 “He was saying.” ((Hill 2005) ex. 2c)

In an Antisymmetry-centric approach, such patterns have to be treated in a fairly intricate fashion. However, an alternative is available in theories which adopt a parametric-linearization view of morphological headedness, as in Distributed Morphology (Halle and Marantz 1993).

Let us assume, in accordance with the discussion in the previous section, that the complex affixed form in (9) has been formed by head-movement. Further, let us assume that UG provides a template for the extended projection of VP in which TP dominates AspP, which in turn dominates VP. (I will also assume in the diagrams which follow that “VP” is itself composed of two projections, vP and VP, in accordance with the theories proposed by Hale and Keyser 1993, Chomsky 1995a, b, among many others. See below for further discussion.)

Given these assumptions, we can posit the following kind of underlying structure for the complex form in (9):

(14)

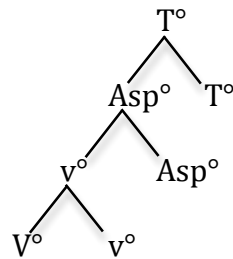


With simple left-adjoining head-movement, in an Antisymmetry approach, the predicted surface form is **ya-qál-pe*. However, with the addition of the straightforward assumption that affixes themselves specify whether they are positioned to the left or the right of their host, the correct form can be derived while still respecting the Mirror Principle. Call this assumption *Affix-specific Linearization*.⁸

⁸ A reviewer rightly points out that in many cases, treating linearization as driven literally by particular affixes will miss language-wide generalizations: It's often a *category*, rather than a particular affix, which seems to be subject to this kind of linearization constraint. In Cupeño, as we will see, for example, *all* Tense/Agr morphemes are prefixes, not just the one realized by *pe-*. Consequently, it would perhaps be better in many cases to state the linearization preference at the level of the category, rather than the affix itself; this would be a straightforward elaboration

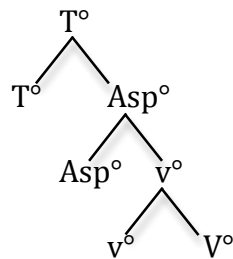
In this approach, the syntactic derivation only creates hierarchical structure, leaving linearization for the morphological component at Spell-Out. Head-movement adjoins V° to v° , v° to Asp° , and Asp° to T° , creating a four-layer complex T° structure. There are then several possible morpheme orders which represent a legitimate outcome of linearization, from a Mirror-Principle perspective, depending on the prefixal or suffixal status of each terminal node in the structure.⁹ The eight possible orders are illustrated below:

- (15) a. Everything suffixes to its sister (the Antisymmetric order):



Order: [[[V-v]-Asp]-T]

- b. Everything prefixal (a uniform right-adjunction order)

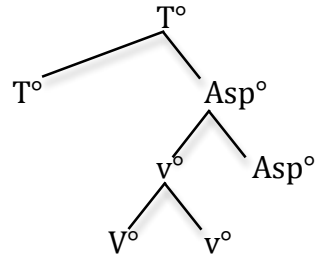


Order: [T-[Asp-[v-V]]]

- c. Everything except T° suffixal, T° prefixal

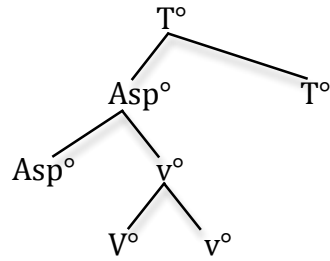
of the standard Headedness Parameter applied at the X° level rather than the XP level.

⁹ See Speas 1991 for this very point, although not elaborated in the direction taken here.



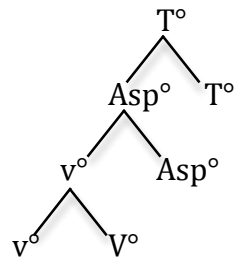
Order: [T-[[V-v]-Asp]

d. Everything except Asp° suffixal, Asp° prefixal



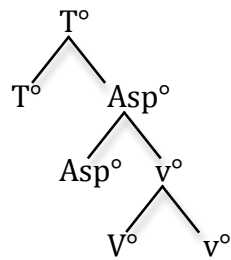
Order: [[Asp-[V-v]]-T]

e. Everything except v° suffixal, v° prefixal



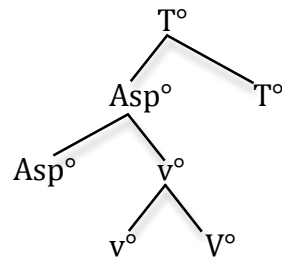
Order: [[[v-V]-Asp]-T]

f. Both T° and Asp° prefixal, v° suffixal



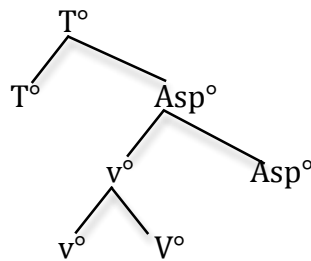
Order: [T-[Asp-[V-v]]]

g. Both Asp° and v° prefixal, T° suffixal



Order: $[[\text{Asp}-[v-V]]-T]$

h. Both T° and v° prefixal, Asp° suffixal



Order: $[T-[[v-V]-\text{Asp}]]$

In this case, assume that the Tense morpheme *pe-*, '3sg.pst' is listed as a prefix, while the Aspect morpheme *-qál*, 'impf.sg', is listed as a suffix. The Cupeño complex T° structure, then, must linearize in configuration (11)c or (11)h. Since the v° head in this example is not overtly realized, we for the moment cannot determine which of these two options is chosen (though perhaps linearization of non-overt morphemes is irrelevant to the grammar, in which case it remains simply underdetermined).

Supplemented with the possibility of affix-specific linearization, then, the number of Mirror-Principle-respecting morpheme orders is considerably larger than a simple left-adjunction approach to head-movement permits. The Mirror Principle is not made vacuous by this additional assumption, however; there are still many morpheme orders which are underivable with this mechanism. For example, any morpheme order in which a Tense morpheme intervenes between Asp and the

verb stem, or between *v* and *V*, is impossible; similarly any morpheme order in which Aspect intervenes between *v* and *V* is equally impossible.¹⁰

¹⁰ Julien 2002 also uses a combination of head-movement and morphophonological merger to analyze affixation patterns crosslinguistically, but adopts a more restrictive antisymmetric framework in which affix-specific linearization is not available. Since heads in the projection line (TP-AspP-VP) will frequently be adjacent (whenever no phrasal elements occupy intervening specifier positions), they are typically good candidates for such affixation-under-adjacency processes, producing T-Asp-V orders. She asserts they can also undergo head-movement, to produce inverse orders. In Julien's antisymmetric framework, however, linear orders of affixation which cannot be derived from the combination of projection-line merger and head-movement must be derived by phrasal movement. So, for example, the morpheme order in 15a (V-v-Asp-T) would be produced by head-movement; the order in 15b, involving prefixation (T-Asp-v-V), would be produced by prefixation-under-adjacency directly in the projection line, with no movement of any kind necessary. The order in 15c (T-V-v-Asp) would be produced by a combination of head-movement of *V* through *v* to Asp, followed by prefixation-under-adjacency of the *T* head to the left of Asp, without movement to *T*. Orders like that in 15d (Asp-V-v-T), however, would have to be produced by head-movement of *V* to *v*, followed by remnant phrasal movement of AspP to the left of *T*, followed by affixation-under-adjacency. Predicting that orderings produced by such phrasal movement are expected to be rarer than orderings produced by base-generated or head-moved structures, Julien 2002 performed an analysis of the distribution of *V*, Asp and *T* morpheme orders in 530

3.3 Exploiting the analytical space: Cupeño complex predicates

We have seen that morphologically complex words can be formed by head-movement, but that the head-movement operation must be supplemented with additional assumptions to account for two fairly basic patterns. The two additional items now added to our toolbox are affix-specific linearization and merger under adjacency. We have seen cases in which each of these two tools is exploited independently; it is natural to ask whether the typological patterns of the world's languages provide evidence that the effects of the two supplemental mechanisms can be detected in combination.

Barragan 2003 provides data from Cupeño which argue that indeed, both mechanisms must sometimes be exploited in the derivation of a single complex form. Cupeño contains many complex predicates, constructed from a lexical root corresponding to the V° node in the split-vP structure, and a light verb element, corresponding to the v° node. The particular v° used alternates depending on whether the complex predicate is causative or inchoative, a common pattern crosslinguistically (see e.g. Jacobsen 1993 on Japanese):

languages, confirming that the distribution of the various orderings tend to conform to the expectations of the theory. The affix-driven linearization approach described here, in contrast, would need to appeal to external factors to motivate different probabilities of occurrence of each of the orderings given in (15), since formally all are equally probable, being able to appear without using Merger-Under Adjacency.

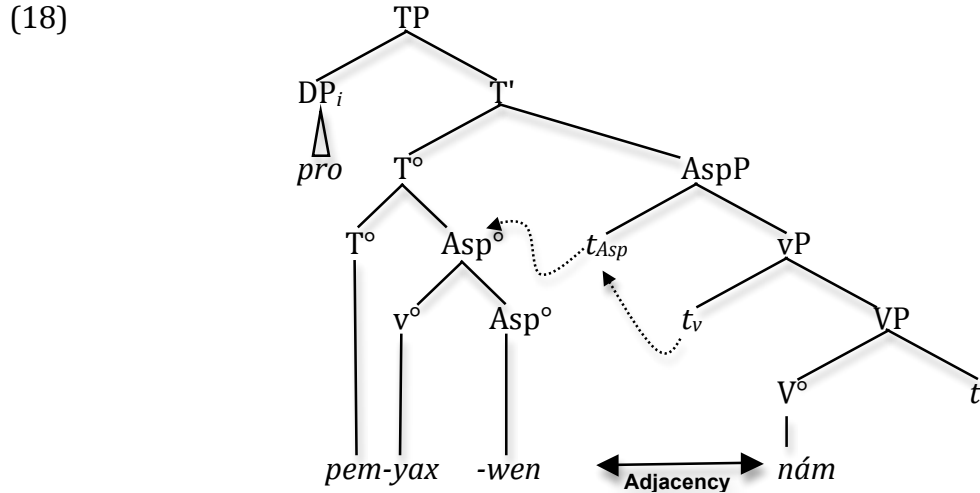
- | | | |
|----|--|---|
| c. | nám- pem -yax-wen
cross- Pst.3pl -vNonAg-Imp.Pl
“They used to cross” | <i>yax</i> -class verbs
Bipartite V+v: Nonagentive |
|----|--|---|

This configuration— V° - T° - v° - Asp° —is precisely ruled out by the Mirror Principle, on any interpretation. In no hierarchical structure generated by the syntax does T° occur between the VP projection and the vP projection.

Barragan points out, however, that if we consider the v° morpheme on its own, ignoring the main verb for a moment, the pattern of affixation looks very familiar. Consider the v° morphemes *in* and *yax* as 'light' verbs—almost like auxiliaries. If we follow the normal rules of Cupeño grammar for inflecting those elements as verbs, we derive exactly the pattern in (17b) and (c) above: Tense prefixed to v° , Aspect suffixed to v° . The only puzzle is in the location of the V° morpheme.

In order to derive the Mirror Principle-violating morpheme order with bipartite verbs, Barragan proposes that in the complex predicates, it is v° , rather than V° , which head-moves to T° . In a sense, the pattern is exactly like that in a V2 language. There, a main verb will head-move to T except when there is an overt, intervening auxiliary verb, in which case the auxiliary moves to T, and the main verb remains *in situ* in the verb phrase. In the identical way, in Cupeño, V moves up to T (through v°) iff there is no overt v° morpheme, i.e. when the verb is a member of the \emptyset -class. When there *is* an overt v° morpheme, as in the bipartite *-in* and *-yax* classes class, v° moves to T, stranding the main V. The V is later subject to Merger Under Adjacency with the complex T-v-Asp form.

Let us consider Barragan's proposal for the derivation of the form (17)c above. In the syntax, the light verb *yax* head-moves first to Asp° (which suffixes to it) and then to T° (which prefixes to it). Then Merger Under Adjacency applies between T° and V° , prefixing the heavy verb root to the T° complex, deriving the surface morpheme order:¹¹



This solution is consistent with what we know about the effects of overt intervening heads on head-movement in other languages (namely that they block its application to lower elements), and derives the unusual morpheme order from two independent properties of Cupeño grammar: the existence of verb classes with an overt v° morpheme, and the prefixal status of T° . The only unusual aspect of the

¹¹ In fact, Cupeño tends to be head-final, like many Uto-Aztec languages, so the trees illustrating these structures should very likely in fact be mirror-images of what is presented here; note that in that case, the correct order between V and the T-v-Asp complex is derived simply by the usual headedness properties of the syntactic structure. In that case, Merger Under Adjacency could operate just as a 'leaner' cliticization operation would. See discussion in footnote 10.

analysis is the application of Merger Under Adjacency to the syntactically complex T° form containing the light verb and aspect as well as T—but since Merger Under Adjacency is a post-syntactic process, and head-movement proper is a syntactic one, there is no principled reason why the two cannot be combined in this way.¹²

3.4 Affixation: Head movement? or Merger Under Adjacency

We have seen above that although affixation is one common diagnostic for head movement, it seems clear that affixal behavior can also arise from other sources; in the above, I have endorsed the proposal that Merger Under Adjacency is one such source. This kind of adjacency-driven affixation/cliticization operation has been broadly appealed to in analyses of apparent non-constituent affixation as in English *John's* or *She'll*. Wojdak 2008 argues that a version of this operation is highly productive in the Salish language Nuuchah-Nulth. Similar proposals concerning affixation under adjacency between non-constituents, in the absence of head-movement, are made by Selkirk and Shen 1990 for Shanghai Chinese and by Meyers 1990 for Shona prepositionn. Julien 2002 similarly proposes that such an operation is responsible for a broad spectrum of affixation facts crosslinguistically, particularly in cases of prefixation.

¹² See Gorrie 2010 for discussion and analysis of the increased typological variation introduced by allowing for the possibility of combining these operations; remarkably, morpheme order even on these assumptions is still somewhat constrained by the theory.

So affixation is sometimes a diagnostic for head-movement, and sometimes not. Affixal order, too, is sometimes a diagnostic for the syntactic hierarchy of projections, because in general it respects the Mirror Principle. But as shown above, if this kind of Merger Under Adjacency operation is allowed to interact with head-movement operations, the Mirror Principle effect can be disrupted, as in Cupeño complex predicates. One can ask then, when affixation tells us anything at all—either about the syntactic hierarchy, or about head movement?

Let us consider the former question first: When can a piece of morpheme-order-related evidence justify an argument about functional projections, rather than about morpheme-ordering technology? The answer is found in the fact that when affixal order reflects the syntactic hierarchy of functional projections, it should also be the case that affixal order respects semantic scope, as noted by Keren Rice in her detailed consideration of morpheme order in the Athapaskan verb (Rice 2000). Indeed, this very effect is the original *raison d'être* for the Mirror Principle itself. Baker 1985:395 points out the different interpretations that attend the different morpheme orders in the following Bemba examples involving reciprocal and causative morphemes (examples originally from Givón 1976)

- (19) a. Naa-mon-**an-ya** Mwape na Mutumba
 1sgS-see-**recip-cause** Mwape and Mutumba
 "I made Mwape and Mutumba see each other."
- b. Mwape na Chilufya baa-mon-**eshy-ana** Mutumba
 Mwape and Chilufya 3pS-see-**cause-recip** Mutumba.
 "Mwape and Chilufya made each other see Mutumba."

Baker's point, of course, is that the binding and argument structure relations—presumably determined by syntactic configurations—are reflected in lock-step by

the morpheme order on the verb. If the verb is causativized first, then reciprocalized, the subject of causativization binds the logical subject of the embedded verb. If the verb is reciprocalized first, then causativized, the logical subject of the embedded verb binds the embedded object, and the subject of causativization does not enter into the binding relations defined by the reciprocalization. In short, the syntactic and semantic properties of these clauses mirror the morphological ordering on the verb. In these cases, then, it would be a mistake to derive the morpheme order via one mechanism and the syntactic and semantic hierarchy via another mechanism—the presence of Mirror Principle effects is enough to substantiate the claim that a given morpheme order reflects the syntactic and semantic hierarchy.

The second question is considerably more delicate. If a particular affixal form does not seem to exhibit displacement effects, are there other kinds of evidence one can bring to bear which could argue for a head-movement analysis? If head-movement is syntactic, and hence involves syntactic operations such as Copy and Reinsert, then one might expect that head-movement, like other kinds of syntactic movement, could in fact *affect* semantic interpretation—that is, the content of a given head might be interpreted in a higher scopal position than its First Merge position. Lechner 2006 marshalls an array of arguments in favor of this conclusion about head-movement, in opposition to many previous claims to the effect that head-movement is always semantically vacuous—i.e. claims that heads are always interpreted in their base-generated First Merge position. The key data he adduces

involve the relative scope of interpretation of a modal operator, negation, and a universal quantifier:

- (20) Not every pearl can be above average size.
Meaning: It is not possible for every pearl to be above average size.

The interpretation of (20) involves 'neg-splitting'. The negation contained within the subject DP takes widest scope. The modal is interpreted within the scope of negation but—crucially—outside the scope of the universal quantifier, also contained within the subject DP, giving the scope relations $\diamond > \neg > \forall$. The crucial problem posed by this data involves establishing the syntactic position in which the universal quantifier is interpreted. Lechner brings together a collection of arguments which point toward the conclusion that the universal quantifier cannot be interpreted below Spec-TP. How, then, can the modal, in T° , be interpreted outside the scope of the universal quantifier? Lechner proposes that the modal has head-moved above Spec-TP, to a c-commanding AgrSP head; the subject's surface position is in the specifier of this AgrSP phrase. The modal, having moved to AgrS $^\circ$, thus can take scope over the subject's universal quantifier at LF, after the latter is reconstructed and interpreted in Spec-TP. This proposal requires that head-movement, like other syntactic movements, is semantically active in at least some cases, i.e. it produces interpretive effects at LF.

A related proposal is advanced by Kishimoto 2010, where head-movement raising of negation to T is argued to expand the NPI-licensing domain of the clause to include the subject. Such head-movement of negation cases with NPI subjects form minimal pairs with cases where negation does not raise to T, and only objects, but not subjects, can contain an NPI. Kishimoto argues that since neg-movement to

T is the usual case in Japanese, there is typically no subject/object asymmetry for NPI licensing:

- (21) a. John-ga nani-mo kawa-nakat-ta.
 John-NOM anything buy-NEG-PAST
 'John did not buy anything.'
 b. Dare-mo hon-o kawa-nakat-ta.
 anyone book-ACC buy-NEG-PAST
 'No one bought the book.'
- Kishimoto 2010

However, in cases where *do*-support separates Negation and the verb stem, as Kishimoto shows is possible in a limited number of situations, we see a typical subject-object asymmetry with regard to NPI licensing:

- (22) a. John-ga dare-mo haire-naku si-ta.
 John-NOM anyone enter.can-NEG do-PAST
 'John made no one able to enter.'
 b. *Dare-mo Mary-o haire-naku si-ta.
 anyone Mary-ACC enter.can-NEG do-PAST
 'Anyone made Mary unable to enter.'
- Kishimoto 2010

Kishimoto takes these facts to show that head-movement does affect scopal relations such as NPI licensing, and consequently that head-movement is semantically active; it is then a 'true' syntactic movement, resulting in LF-interpretive differences.¹³

¹³ The literature concerning head-movement in head-final languages is substantial, and the discussion of Kishimoto's proposal here is not intended to imply the existence of a consensus view. Arguments against a head-movement analysis for such languages are presented in Yoon 1994, Koopman 2005 and Fukui and Sakai 2003, and contrasting arguments in favor of head movement in Otani and Whitman 1991, Han *et al.* 2007, and Koizumi 2000.

If Lechner's and Kishimoto's conclusions prove to have broad empirical application, then in at least some cases, scopal effects associated with head-movement would be a crucial diagnostic for whether a given case of affixation should be treated as a case of true syntactic head-movement or as a postsyntactic Merger. Syntactic head-movement would then be like any other kind of movement, in which the structures altered by movement have more interpretive possibilities at LF than structures without movement.

However, we next turn to a set of alternative proposals for head-movement, some of which are developed as theoretical approaches to the view of the empirical landscape outlined by Chomsky 2001a,b among others: that head-movement in fact has no interpretive ramifications whatever. However, no advocate of such a position¹⁴ has yet offered an alternative account of Lechner's scope-splitting facts or other putative semantic consequences of head movement.

4 Other approaches to head-movement

Let us first quickly review why devising a coherent technology to implement head-movement is problematic for syntactic theory. This has to do with the particular properties of the phrase structure component of modern Minimalist theory, Bare Phrase Structure (Chomsky 1995a)

¹⁴ Including myself!

4.1 Theoretical Issues: Bare Phrase Structure, Extend Target and the Chain

Condition

It is a bit ironic that head-movement should pose a major technical problem for syntactic theory. At the beginning of the 1990s, it fit beautifully into the system of assumptions that were coalescing into the Minimalist Program. The Head Movement Constraint of Travis 1984 had been unified with other constraints on movement as an instance of Rizzi's 1990:11 Relativized Minimality, the first overarching vision of how economy considerations might restrict Move- α . As noted in section 1 above, the empirical picture for certain basic cases seemed equally rosy, so much so that they were and are staples of introductory syntax classes.

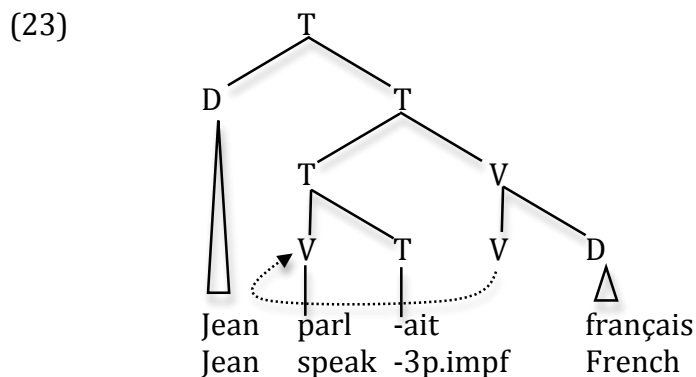
Nonetheless, getting the structural mechanism of head-movement to interact properly with the other fundamentals of the theory was a headache even within X-bar theory.¹⁵ Within Chomsky's Bare Phrase Structure formalism, it is essentially impossible. In Bare Phrase Structure, the crucial notion 'segment of X° ' becomes incoherent, since 'head' is equivalent to 'terminal node' and an X° is simply a terminal element with something adjoined to it, so that it projects; anything dominating a branching node is not an X° . Consequently, within Bare Phrase Structure, an adjunction-to- X° account of head-movement violates not only

¹⁵ For example, Rizzi 1991:117 n. 19 concluded that it must be substitution, rather than adjunction, as did Roberts 1991; Chomsky and Lasnik 1993: ex. 51, 58, concluded the opposite.

cyclicity¹⁶ (since adjunction is to a non-root node), but also Chain Uniformity, as outlined by Chomsky 1995b:321

“We have so far sidestepped a problem that arises in the case of ordinary head adjunction. Take α , K to be X° s in (120) [they’re sisters -HH], with α raising to target K , which projects, forming $L = \{ \langle H(K), H(K) \rangle, \{ \alpha, K \} \}$. Since K projects, α is maximal. Thus, α is both maximal and minimal. If that is true of t as well (e.g. in the case of clitic raising), then CH[ain] satisfies the uniformity condition. But suppose t is nonmaximal, as is common in the case of V-raising to I or to V. Then, under a natural interpretation, [chain uniformity] is violated; CH is not a legitimate object at LF, and the derivation crashes.”)

Both the cyclicity issue and the Chain Uniformity issue are illustrated in the tree below, repeated from (5) above, shorn of its pre-BPS XP vs X° annotations:



In order for V to raise and adjoin to T , T must have already entered the derivation and Merged with the already-built V projection (the V node corresponding to the VP node in (5)). The result of that Merge operation would require a label, and the T element, as the head of the structure, is copied to provide that label (producing the T

¹⁶ Also known as Extend Target (Chomsky 1995b: 190) and the Extension

Condition. Syntactic Merge, as formulated, within BPS can only operate on whole phrase-markers, not on substructures within extant phrase-markers.

node that corresponds to the T' node in (5) above).¹⁷ To implement traditional head-adjunction, at this point the lowest V in the structure (corresponding to V° in (5) above) undergoes Move—i.e. Copy and Re-Merge. However, in the traditional implementation of head-movement the copy of V must now Merge with the non-maximal T, rather than the root node T. Thus, head-adjunction is counter-cyclic.

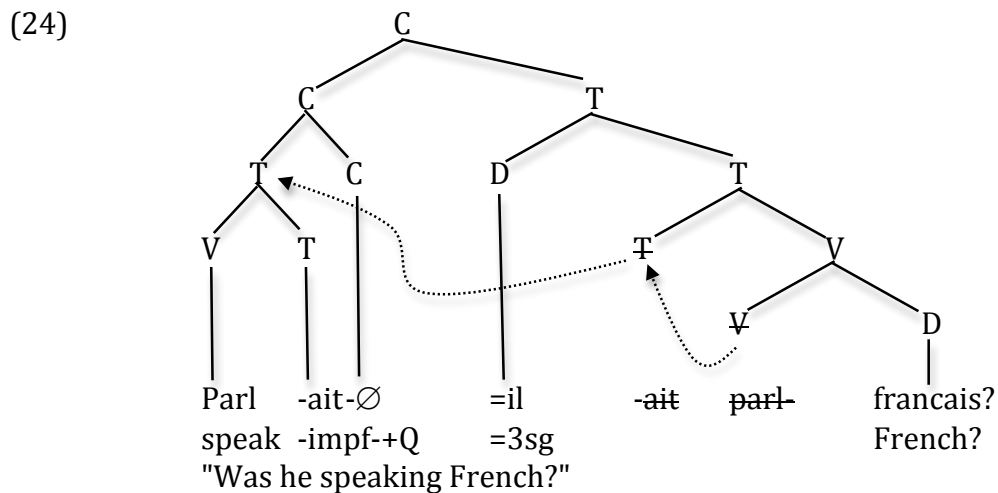
In order to grasp the violation of Chain Uniformity implicit in the tree above, it is important to understand that the categories 'maximal projection' and 'minimal projection' are intended to be *derived* properties in Bare Phrase Structure. Following a proposal of Speas 1990, Chomsky adopts the idea that 'minimal projection' is simply any node which does not dominate a copy of itself, and 'maximal projection' is any node which is not dominated by a copy of itself. Chain Uniformity, then, is the natural requirement that copies of a given constituent must match the minimal and/or maximal status of the copied element.

In (23), V in its base-position is a minimal projection (it does not dominate a copy of itself) and not a maximal projection (it is dominated by a copy of itself). In

¹⁷ In Bare Phrase Structure, the labelling operation, perhaps confusingly, is generally taken to be the same copy and re-merge operation as movement is. Merge itself creates a set, e.g. {V, D}. In order to label that set, one of its members is copied and re-merged: {V {V, D}}. This is the structure corresponding to something like [V D]_V in traditional bracketed notation; the confusing part is that the label itself is a Merged object in the set-theoretic notation. In the bracketed or tree notation, unlike in the set notation, the fact that the label itself is also the product of Merge is not obvious upon visual inspection.

its head-moved position, however, it *is* a maximal projection (since not dominated by a copy of itself). The chain formed by the movement of the V *parl-* consists of a head in one position and a maximal projection in another; hence head-adjunction violates Chain Uniformity.

The problem gets even worse as the process continues. At least both steps of head movement in (23) operate on and produce a syntactically ‘visible’ constituent, i.e. a minimal and/or maximal projection. Successive-cyclic head movement poses an even greater problem for the theory. Consider the tree in (24) below, where V to T is followed by T to C¹⁸:



Here, the second step of head-movement, where the complex T moves to adjoin to the C head, involves Copy and Re-merge of an intermediate-level projection. The complex T at the point of Copy is neither minimal nor maximal. By

¹⁸ This toy version of French finite verb inversion is not representative of current thinking on the derivation of French questions; see Poletto and Pollock 2004 for a full exposition.

hypothesis, syntactic operations are able to apply only to constituents they can 'see'; nonmaximal constituents do not meet this criterion, and hence should not be able to undergo syntactic movement as in (24).

These difficulties, as well as the difficulty in getting V2 order to work out correctly given certain other assumptions (Chomsky 1995b:368), led Chomsky to conclude that head-movement is essentially phonological — not part of the syntactic component at all. This view is reiterated in Chomsky 2001a, n. 69. He provides no suggestions as to how this conclusion can be implemented in such a way as to retain the empirical generalizations and locality effects that made a syntactic treatment of head movement so attractive in the first place.

However, discussion in Chomsky 2001b:37 does lay out an empirical basis for considering head-movement to be a purely phonological operation. Prior to Lechner's proposal, most theoreticians had taken it as axiomatic that heads are always interpreted in their base position, regardless of how many iterations of head-movement have applied. Sentential negation in French and English exhibits the same scopal relationships with regard to the verb in sentences like those in (25), despite the presence of verb movement in one language but not the other; the same is true language-internally, as well, in that French sentences with auxiliaries, involving no head-movement of the main verb, behave the same scopally as those without.

- (25) a. John didn't know that Mary was speaking to him. $\neg > \textit{know}$
b. Jean ne savait pas que Marie lui parlait. $\neg > \textit{know}$
J. neg know not that M. to.him spoke.

Similarly, examples like those in (21) have been taken to indicate that mandatory modal movement across sentential negation is not interpreted, given that the modal scopes below negation; the assumption is that it is interpreted in its base position:¹⁹

(26) John cannot leave. $\neg > \diamond, * \diamond > \neg$

In short, examples where head-movement *fails* to affect interpretation are rather easy to come by, in contrast to cases where it does. Chomsky (2001b: 37) writes "...semantic effects of head movement in the core inflectional system are slight or nonexistent, as contrasted with XP movement, with effects that are substantial and systematic. That would follow insofar as head raising is not part of narrow syntax."

In summary, then, implementation of head-movement as syntactic head-adjunction poses significant technical problems. The seeming absence of semantic effects of head movement (*pace* Lechner and Kishimoto) is taken by Chomsky to suggest that head-movement is not a syntactic phenomenon at all, but rather a PF operation. Below, we (very) briefly discuss a number of alternative proposals for the technical implementation of head-movement. In some of these, head-movement still occurs in the narrow syntax; others attempt to implement Chomsky's notion of a PF

¹⁹ Without challenging Lechner's conclusions concerning the relative positions of the various interpreted elements in (20), it is worth noting that his proposal raises a host of interesting questions concerning the available interpretations of modals. That is, under what circumstances can they be interpreted in a moved position, and in what circumstances only in their base position? What rules out the availability of two scopal interpretations when V raises above negation, as in (25)?

operation; still others adopt entirely novel approaches to structure-building operations.

Alternative theoretical approaches to head-movement are designed to solve either or both the theory-internal structural problem and the potential issue raised by the apparent lack of interaction of head-movement and interpretation. I will next briefly describe a few such approaches in the literature, finishing with a discussion of my own approach, itself an adapted proposal from Hale and Keyser 2002. These alternative technical frameworks would each interact differently with the morpheme order and displacement issues raised earlier; I will point out some implications of that data where I think I can see what they might be, but extensive work would still be required in each case to address these questions properly.

4.2 Brody 2000: Mirror theory

Brody 2000 proposes a model which inverts the more usual syntacticocentric priorities in favor of a 'morphocentric' approach, eliminating head-movement from the theory by viewing syntactic structure as interpreting morphological structure, rather than the other way around. Morphologically complex words' internal structure is 'mirrored' in the syntactic projections: morphological 'specifiers' are interpreted and projected as syntactic complements. Brody adopts the notion that specifiers, morphological or syntactic, are universally to the left of the constituents they are specifiers of. Given that assumption, the linear order of morphemes within a word is a diagnostic for morphological specifierhood. A word like the Italian 3sg future form *finira* then must have a complex structure like that in (27):

- (27) Morphology
fin- ir- a
 finish-FUT-3sg
 [V[T[AgrS]]]

In Brody's system, the V is a morphological specifier of T, which is a morphological specifier of Agr. After this form is subject to the operation Mirror, a method for projecting a syntactic tree, a familiar syntactic projection results in which V is the complement of T and T is the complement of AgrS. The locus of Spell-Out of the complex morphological form in the projection line is determined by parametrically varying feature strength, as in (Chomsky 1995b):195; no head moves from any position to any other position during the course of the syntactic derivation.²⁰

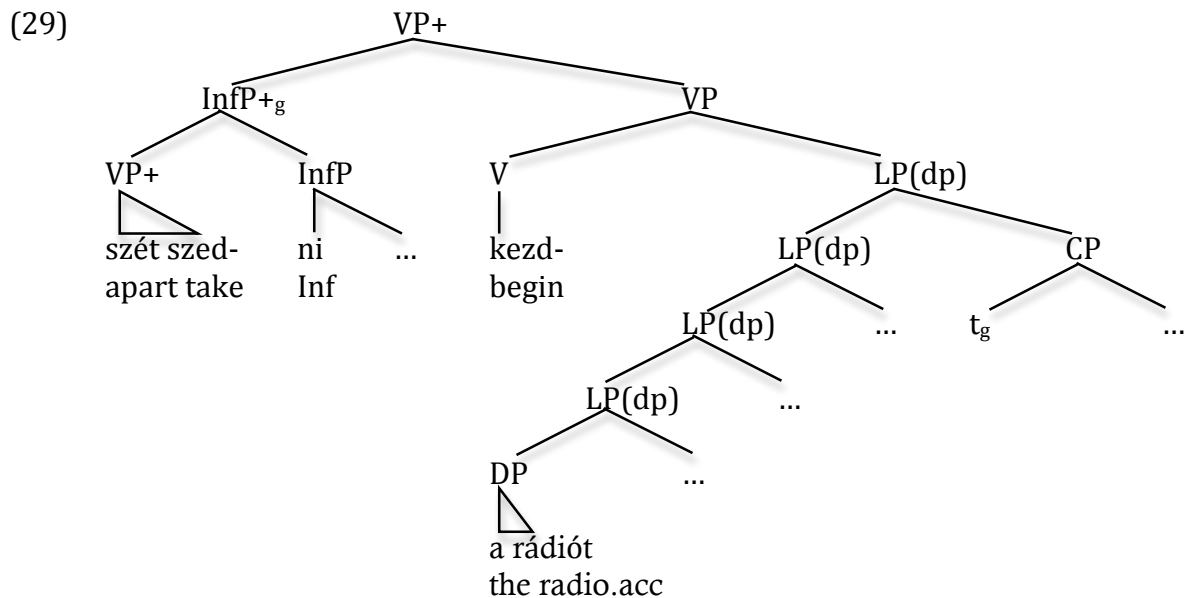
4.3 Phrasal movement approaches

Another family of approaches, deriving from Kayne's Antisymmetry model (Koopman and Szabolcsi 2000, Julien 2002, Mahajan 2003, a. o.), treat displacement of heads as a disguised species of regular XP movement. Head-movement, on these accounts, is actually remnant phrasal movement: All maximal projections in the specifier and complement position of, for example, VP, move leftwards and upwards in the tree, leaving behind a VP populated only with the V head itself, together with the traces of its erstwhile specifier and complement. The VP itself can then move leftwards and upwards in the tree, to a higher specifier position. Since the V is the

²⁰ A conceptually related framework is proposed in Di Sciullo 2005, in which the concept of asymmetry in grammar is argued to play a central role in the derivation of morpheme order.

sole remaining occupant of the VP, this produces the appearance of head movement without actually moving a head itself. After several iterations of these processes, the resulting derivations involve 'roll-up' trees on a massive scale. Below I replicate exhibit part of a derivation of a Hungarian complex predicate from Koopman and Szabolcsi 2000. The relevant sentence is given first, then a tree fragment illustrating the final step of the derivation of the embedded complex predicate is provided:

- (28) Nem akartam szét szedni kezdeni a rádiót
 not want.1sg apart take.inf begin.inf the radio.acc
 "I did not want to begin to take apart the radio."



In this derivation, the peculiar order of the embedded verb *szét szed-* 'take apart' with respect to the matrix aspectual verb *kezd* 'begin' is treated as the result of remnant movement of the InfP clause contained within the complement of *kezd*'s VP to *kezd*'s specifier. (Note that the morpheme order in the embedded InfP has already been established by movement of the embedded VP to spec-InfP.) Because all the arguments of the embedded verb have already moved out of the embedded InfP (to

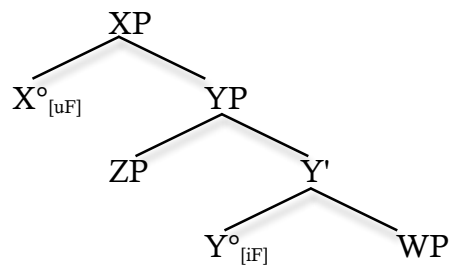
spec of LP, in a series of roll-up movements), the only visible effect of movement of the embedded InfP is to place the infinitive embedded verb to the left of the matrix verb in whose specifier it is sitting, leaving the embedded object to its right.

Morphological processes will then apply to derive appropriate phonological words from adjacent elements of the appropriate types, as in Merger Under Adjacency.

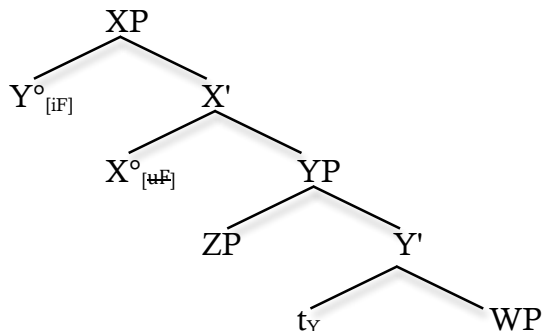
4.4 Head-movement approaches: Matushansky 2006 (also Platzack (this volume))

In a proposal directly aimed at addressing the difficult theoretical contradictions raised by head-movement, outlined in section 4.1 above, Matushansky 2006 proposes a version of head movement which obeys the Extension Condition, adjoining moved heads to the node at the root of the tree under construction, in a specifier position. This is then supplemented with a version of the Merger Under Adjacency operation, m-merger, whereby the moved head is adjoined to the now-adjacent head of the projection it has adjoined to. This sequence of operations is illustrated below:

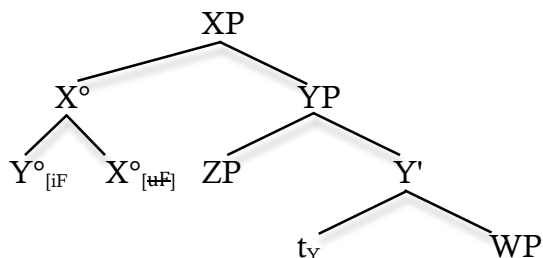
(30) a. Upper head X probes to value its features against lower head Y:



b. Lower head Y copies and re-merges to XP, creating a specifier position:



c. M-merger applies, lowering Y° to X° to satisfy morphological constraints



Subsequent operations might create further specifiers of XP, or move the complex X° bundle by the same sequence of operations described in (30).

The output of Matushansky's proposed process is seemingly identical to the traditional head-adjunction account, and captures many of its benefits. In particular, head-movement is unified with other forms of movement in that it reflects a feature-checking operation, and its local character is a consequence of the standard locality constraints on feature-checking. It also succeeds in eliminating the formal problem involving cyclicity/Extend Target, and (as in the discussion above) only makes use of independently motivated operations necessary elsewhere in the theory. In these regards, it is a very successful adaptation of traditional head movement within Minimalist Program assumptions.

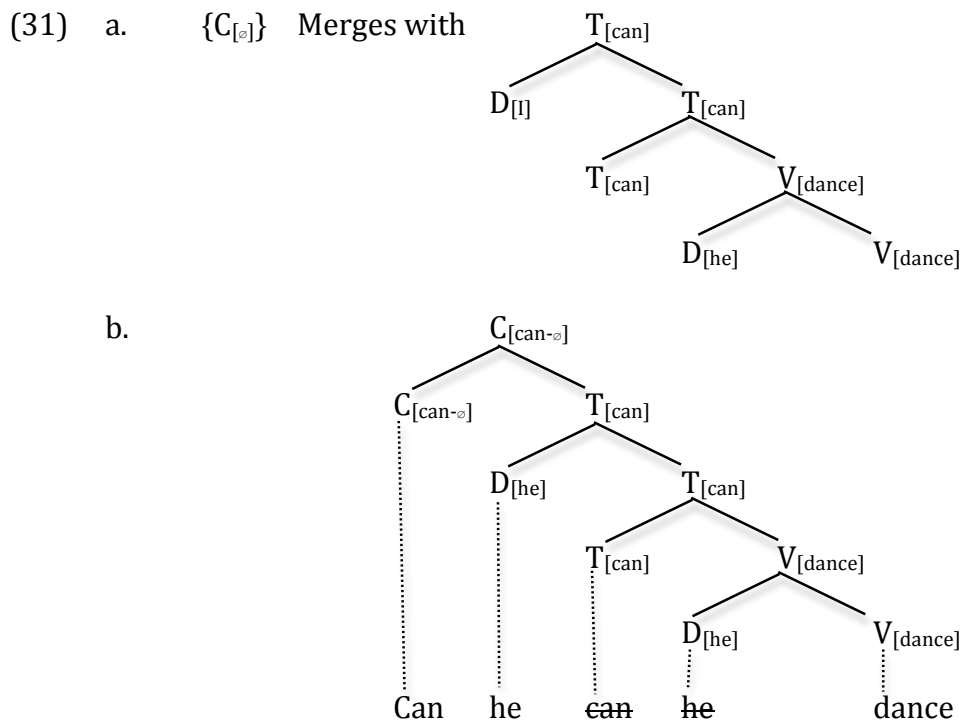
However, in one regard, it fails to be a fully satisfactory solution to the formal problems raised by head movement in Bare Phrase Structure. It fails to ameliorate the Chain Uniformity violation identified by Chomsky 1995, outlined in the quote at the end of section 3.4 above. The higher copy of the head Y° in (30)b, c above is, by definition, phrasal, since not dominated by a copy of itself. The lower copy, on the other hand, is necessarily a head. The chain $[Y^\circ, t_Y]$, then, is not uniform.

4.5 Conflation (Hale & Keyser 2002, Harley 2004)

The final approach to head movement I will outline here gives it a fundamentally different character from true syntactic movement; in a sense, it's a species of 'no-movement' approach. Nonetheless, the effect of head movement in this view is triggered by a syntactic operation, so it does not require a view of morphology as separate or independent of syntax, but rather continues to allow the standard 'interpretive' view of the morphological/PF component.

Hale & Keyser 2002 put forward a formal approach to what they term 'conflation' phenomena, which Harley 2004 shows accounts cleanly for the core cases of head movement. Conflation involves copying the phonological feature matrix of the sister's label at Merge of a new X° constituent. Since the sister's label in Bare Phrase Structure is a copy of its head, copying the phonological feature matrix of the sister constituent is equivalent to copying the phonological feature matrix of the head of the sister. The derivation of an English yes/no question using conflation to account for the apparent 'movement' of T° to C° , is illustrated below. The derivation is illustrated from the point at which the $[+Q]$ C° element is drawn from

the numeration and Merged with the existing structure in the workspace, a TP. At Merge, C° triggers conflation: the phonological feature matrix of the element it is merged with—the label of TP—is copied into the phonological feature matrix of the C°. The phonological feature matrix that is associated with the label of TP is ‘can’, so this is copied into the phonological matrix of C°. C°’s own phonological matrix happens to be a \emptyset -morpheme in English, so the effect is that the C° terminal node is pronounced as ‘can’. The phonological feature matrices of each node are indicated as subscripts to the node:



The final Spell-Out of each terminal node will as usual affect only the highest copy of any phonological feature matrix in the tree.

Understanding head-movement as conflation provides a clear explanation for its local character: Conflation is an operation that only applies to two sister nodes at

Merge, motivated by the syntactically affixal status of the Merged element. It will naturally be successive-cyclic in character, since the labels resulting from Merge, themselves copies of the Merged head, will contain the copied phonological feature matrix. And since there is no actual movement involved, no formal problems concerning the chain condition or cyclicity arise — indeed, the conflation operation is strictly cyclic in its application.

In many cases (as in the derivation of the French verb *parl-ait* in (5) above the copying head will itself also contain an overt phonological feature matrix, which creates an affixation relationship between the copied phonological feature matrix and the copying head. Within a Late-insertion model like Distributed Morphology, the copied material is not literally a phonological string, but rather the Position-Of-Exponence which is associated with every feature bundle in the numeration. In order to predict internal morphological hierarchical effects (for example, the existence of morphophonological processes which are sensitive to word-internal structure, as in level-ordered phonology), we need to assume that the grammar keeps a record of the hierarchy of positions-of-exponence within the head which triggered conflation. This record could be derivational in character—cyclic, phase-like spell-out of each position of exponence in turn, for example—or representational, endowing the structured set of positions of exponence resulting from conflation with the equivalent of bracketed structure. It is clear, however, that insertion operations and morphophonological readjustment operations are sensitive to this ordered hierarchy within the word, so the output of the conflation operation must be adjunction-like, rather than substitution-like, in character.

I think that conflation can provide a formal mechanism to accommodate (Chomsky 2000)'s assertion that head-movement is phonological in character, not syntactic, while retaining natural and syntactic explanations for many of its key properties. In deciding between a truly movement-based approach and the conflation account here, the empirical question of whether head-movement is associated with semantic effects will prove decisive. Conflation cannot, in principle, result in semantic effects, since it involves only phonological features/positions of exponence; a true movement account, on the other hand, can do so. Consequently, the proposals and data advanced by Lechner and Kishimoto that were described above will prove decisive in determining the correct model.

5 Conclusion

The primary goal of this paper, following along with the goals of the volume, has been to address the question of what the diagnostics for syntactic head movement are, and whether these individual diagnostics are in fact reliable cues. I hope to have shown that one tempting pair of diagnostics must be applied with extreme caution, namely, affixation and morpheme order. It is clear that while affixation *can* result from the application of syntactic head movement, it is not the case that affixation is invariably diagnostic of it, as there are clear cases of affixation which can be independently shown not to result from head-movement. Further, while syntactic head movement must produce morpheme orders that respect Baker (1985)'s Mirror Principle, it is plausible that the Mirror Principle itself is less constraining of

morpheme order than one might at first imagine, if we allow for the possibility of affix-specific linearization.

Nonetheless, it seems clear that when affixation, morpheme order and semantic scope are correlated, it is reasonable to conclude that syntactic head-movement has indeed created the complex form, as in Baker's original examples. Consequently, some form of head-movement, constrained by locality and cyclicity considerations, must be implemented in any adequate syntactic theory. The question of how best to accomplish this, however, remains a point of considerable contention.

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