

# The imperfect correlation between head movement and periphrasis

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## 1 Introduction

In this paper, we investigate the relation between head movement and the synthesis-periphrasis distinction in the verbal domain. We use the term *synthesis* to refer to verbal expressions in which the lexical verb bears all the verbal inflection in a clause. The following French example illustrates synthesis in the Imperfect:

- (1) Elle **lis-ait** le livre. *French Imperfect: synthesis*  
she **read-PST.3SG** the book  
'She was reading the book.'

In contrast, a *periphrastic* verbal expression additionally contains an auxiliary verb, and verbal inflection is distributed between the lexical verb and the auxiliary, as illustrated by the French Pluperfect in (2).

- (2) Elle **av-ait lu** le livre. *French Pluperfect: periphrasis*  
she **AUX-PST.3SG read.PTCP** the book  
'She'd read the book.'

We're specifically concerned with periphrasis involving *be* or *have* in compound tenses, and not other types of periphrasis such as *do*-support, serial verbs, and others.

Existing theories of periphrasis make certain crosslinguistic predictions about how the synthesis-periphrasis distinction interacts with head movement of the verb to a functional head such as T/Infl. A type of analysis we refer to as the "stranded-head approach" predicts a two-way correlation: Synthesis entails head movement of the lexical verb to T, and head movement of the lexical verb to T entails synthesis, as explained in section 2. A different type of account, which we call the "base-generation approach", predicts that there's no correlation in either direction (see section 3).

In this paper, we reassess the relationship between head movement and synthesis, and argue that a crosslinguistic correlation does exist, which rules out the base-generation analysis. However, the correlation is not as strong as predicted by the stranded-head approach: it holds in only one direction, as in (3).

- (3) *The Synthesis-Movement Generalization*  
head movement of lexical verb to T  $\rightarrow$  synthesis of lexical verb and T

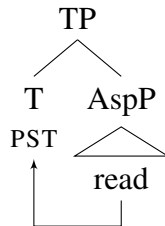
The generalization states that if the lexical verb moves to T, it must form a synthetic expression with T. In other words, if the lexical verb moves to T, periphrasis is impossible. Importantly, the inverse correlation doesn't hold, as synthesis is compatible with, but does not entail, head movement of the lexical verb to T.

We further argue in section 4 that the Synthesis-Movement Generalization can be explained by the hypothesis that both head movement and periphrasis are related to selection. More specifically, we propose that head movement is parasitic on a selectional relation (following Svenonius 1994, Matushansky 2006, and Preminger 2019) and that periphrasis is Merge of an auxiliary verb triggered by a selectional feature of T (Déchaine 1995, Cowper 2010, Pietraszko 2017). This analysis derives the complementarity of head movement of the lexical verb to T and the presence of an auxiliary from the fact that T’s selectional feature can be satisfied by the lexical verb or an auxiliary, but not both. If T’s selectional requirement is satisfied by an auxiliary, it’s not satisfied by the lexical verb, so the lexical verb can’t undergo head movement to T.

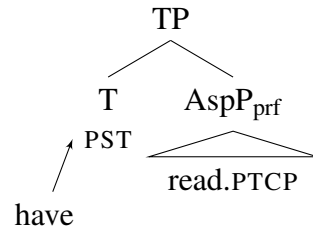
## 2 The stranded-head approach to periphrasis

The stranded-head analysis posits a direct link between head movement and synthesis (Laka 1990:18–25, Arregi 2000, Embick 2000, Schutze 2003, Kornfeld 2004:95–129, Saab 2008:200–221, Fenger 2019, 2020, Calabrese 2019, Cruschina and Calabrese 2021). The auxiliary verb is not the realization of any verbal or functional head initially merged in the clausal spine. Instead, the auxiliary is a dummy verb *inserted* in T only in cases when T is *stranded* due to the absence of head movement of the lexical verb to it. For instance, both Imperfect (1) and Pluperfect (2) in French are constructed with a past tense T. However, past tense inflection is realized on the lexical verb in the Imperfect, but on the auxiliary *avoir* ‘have’ in the Pluperfect. Under the stranded head approach, this contrast is due to the fact that the lexical verb in (1) moves to T (4), while the verb in (2) does not undergo such movement. This leaves T without a verbal host (T is a *stranded head*), repaired by insertion of a dummy verb, the auxiliary (5).<sup>1</sup>

(4) *Stranded head analysis: synthesis*



(5) *Stranded head analysis: periphrasis*



An assumption in this analysis is that certain heads, such as perfect Asp, introduce a type of opacity between the lexical verb and T, so that T is expressed periphrastically, rather than synthetically with the verb. The specific implementation is that these *opaque* heads block head movement of the lexical verb to T, which in turn triggers auxiliary insertion. In a synthetic tense, all heads between V and T are *transparent*, allowing head movement of the lexical verb to T.

As such, the stranded head analysis views periphrasis and head movement as two alternative ways of providing T with a verbal host. It thus predicts a double association of expression type (synthetic vs. periphrastic) and head movement, as stated in (6). Synthesis means that auxiliary insertion is not necessary and thus entails head movement of the lexical verb to T. Head movement of lexical verb to T precludes auxiliary insertion and thus entails synthesis.

<sup>1</sup>In the literature cited above, it is (sometimes implicitly) assumed that T has a verbal host when it is in a complex head that also contains a verb.

- (6) *Double association predicted by the stranded-head analysis*
- a. synthesis of lexical verb and T → head movement of lexical verb to T
  - b. head movement of lexical verb to T → synthesis of lexical verb and T

We argue next that the specific correlation in (6a) does not hold, which constitutes an argument against the stranded-head approach. The second correlation does appear to hold—it is what we refer to as the Synthesis-Movement Generalization and we discuss it in the next section.

Our argument is based on synthetic and analytic verbal expressions in Swahili. Like French, it has a synthetic-periphrastic distinction, illustrated here with the Simple Past and the Past Perfect:

- (7) A-li-soma. *Swahili Simple Past: synthesis*  
 3SG-PST-read  
 ‘(S)he read.’
- (8) A-li-kuwa a-me-soma *Swahili Past Perfect: periphrasis*  
 3SG-PST-AUX 3SG-PERF-read.  
 ‘(S)he had read.’

As in French, the lexical verb bears all inflection in the synthetic Simple Past, and periphrasis involves distributing inflection between the lexical verb and an auxiliary (which is always *(ku)wa* ‘be’). Given the logic of the stranded head approach, Swahili, just like French, must have the requirement that T have a verbal host. In (7), the requirement is met by head movement of the lexical verb to T, while in (8), the opaqueness of perfect Asp blocks head movement, so that T’s verbal host requirement is met by insertion of an auxiliary verb.

Contrary to the predictions of this approach, we argue that the lexical verb and T do form a complex head in the synthetic construction in French (1), but they do not in Swahili (7). Evidence that the lexical verb and T form a complex head in French comes from inversion contexts (in matrix questions), in which the hypothesized complex head moves to C resulting in inversion with the subject clitic, as in the following example:<sup>2</sup>


- (9) *French Imperfect: T carries the lexical verb along when it moves to C*
- $\swarrow$   
**Lis-ait**      -elle    \_\_\_    le livre?  
**read-PST.3SG** -she    the book  
 ‘Was she reading the book?’

Swahili also has an inversion construction. As shown in (10), in a specific type of relative clause, T (that is, the agreement and tense prefix complex) moves to C (Kinyalolo 1991, Ngonyani 1999, 2006, Demuth and Harford 1999, Henderson 2003, 2006:68–166), and is thus linearized to the left of the (agreeing) relative complementizer (here, *-cho*).<sup>3</sup> Unlike in French, however, the verb is not carried along and is instead stranded after C.

<sup>2</sup>The construction illustrated in (9) is known as ‘subject clitic inversion’. The analysis we assume here was first explicitly formulated in Pollock 1989:367 and Rizzi and Roberts 1989, building on previous work by Kayne 1969:42–51, Emonds 1978:165–168, den Besten 1983:75–78, Kayne 1983, and Rizzi 1986 (see Jaeggli 1980:155–186, Safir 1982:306–389, Sportiche 1999, and Pollock and Poletto 2017 for alternatives). Although the subject that the verb moves over must be a clitic, it can be doubled by an overt non-clitic subject in immediate preverbal position.


<sup>3</sup>If the subject of a relative clause such as (10) is overt, it necessarily follows the verb. See Ngonyani 2006 and Henderson 2006:106–108 for two possible accounts.

(10) *Swahili Simple Past: T moves to C alone*


  
 kitabu **a-li-** cho- \_\_\_ ki-soma  
 7book 3SG-PST 7REL- 7O-read  
 ‘the book that (s)he read’

Given this, we must conclude that in synthetic expressions, the verb does not undergo head movement to T in Swahili, as observed in the literature cited above. If it did, we would expect the verb to surface before the complementizer, contrary to fact (11).


(11) *Swahili Simple Past: Lexical verb does not move to C*


  
 \*kitabu **a-li-ki-soma** -cho \_\_\_  
 7book 3SG-PST-7O-read -7REL  
 ‘the book that (s)he read’

This is direct evidence against the correlation, expected under the stranded-head approach, that synthesis entails head movement. Both French and Swahili allow synthesis of the lexical verb and T, but only in French does it correlate with head movement of the lexical verb to T. This in turn has consequences for the analysis of the synthesis-periphrasis distinction: If synthetic tenses involve no opaque heads, then we cannot define opacity as the absence of head movement, since synthetic tenses in Swahili involve no head movement. In our analysis in section 4, we propose a different implementation of opacity.<sup>4</sup>

One may be tempted to analyze the contrast in (10–11) in postsyntactic terms, that is, the lexical verb does move to T in simple tenses and is thus carried along to C, but is postsyntactically displaced to the right of C. This could be viewed as a nonfinality requirement on the relative complementizer, or a finality requirement on the verb, along the lines of Arregi and Nevins 2012:237–340. Evidence against this analysis comes from so-called tenseless relatives, in which the verb does precede the relative complementizer:

(12) *Swahili tenseless relatives: Lexical verb moves to C*


  
 kitabu **a-ki-soma** -cho \_\_\_  
 7book 3SG-7O-read -7REL  
 ‘the book that (s)he reads’

Tenseless relatives involve head movement of the lexical verb to C, either because T is absent and thus C attracts the lexical verb directly, or because this type of T (which is null) attracts the verb, dragging it along to C (Kinyalolo 1991, Ngonyani 1999, 2006, Henderson 2003). However this movement occurs, (12) shows the surface order of morphemes in cases in which the verb moves to C: As expected given the Mirror Principle, the verb precedes C. Crucially, this is not the order in (10), hence it cannot involve movement of the lexical verb to C. Since (10) does involve T-movement to C that strands the verb, we conclude that the lexical verb does not move to T in this synthetic construction. These facts run against the prediction of the stranded-head approach that synthesis of the lexical verb with T entails movement of the lexical verb to T. In Swahili, the

<sup>4</sup>On a traditional view, English also lacks V-to-T movement and so it could, in principle, be used instead of Swahili to represent a language with no such movement in a synthetic tense. However, the facts in English are considerably more complicated than in Swahili due to the presence of *do*-support in the former.

lexical verb does not move to T in the Simple Past, and yet the construction is synthetic, as it doesn't involve an auxiliary verb.

Despite the absence of head movement of the lexical verb to T in Swahili, the two form a morphophonological unit (e.g. the complex has only one word-level stress, as discussed in Barrett-Keach 1986). Following Henderson 2003, we assume that this is due to postsyntactic Merger (Marantz 1988, Embick and Noyer 2001) of the lexical verb and T. The postsyntactic timing of this operation allows the observed stranding of the lexical verb under T-to-C movement (see (10) vs. (11)).

Given the existence of postsyntactic complex head formation in Swahili, synthesis in this language is compatible with a different and more permissive version of the stranded head approach, one in which synthesis can be the result of either syntactic head movement or postsyntactic Merger. In this alternative, the verbal requirement of T is a postsyntactic requirement for a verbal host (Bjorkman 2011:81–82, Calabrese 2019, Fenger 2020, Georgieva, Salzmann, and Weisser 2021), and as such, can be satisfied by syntactic head movement or by postsyntactic Merger. Synthesis in Swahili would be the consequence of postsyntactic Merger of the lexical verb and T. Recall that periphrasis is, under the stranded head approach, the result of opacity introduced by some functional head, such as perfect Asp. A potential shortcoming of the more permissive version of this account is that such heads would have to block two distinct operations: head movement in syntax and Merger in postsyntax. Thus, while this analysis can account for synthesis in Swahili, it creates a new problem, namely how to account for the fact that two distinct operations are systematically blocked by the same set of functional heads (the opaque heads that trigger periphrasis). An answer to this question is available in Fenger's (2020) analysis, in which opaque heads are identified as phase heads that trigger spellout (Fenger 2020:63). However, the identity of phase heads required by this account does not align with independent evidence for phasehood. For instance, both progressive and perfect Asp in English must be phasal under this account, since they're both opaque. However, Harwood (2014a) provides several arguments that only progressive Asp is a phase head in English. Similarly, it has been argued that vP/VoiceP is the only clause-internal phase in Swahili (Henderson 2003) and in Ndebele (Pietraszko 2021), a Bantu language with the same pattern of periphrasis as Swahili. For this reason, we do not adopt this account and develop an alternative in section 4.

### 3 The base-generation approach to periphrasis

Recall that the stranded-head approach makes two predictions, repeated from (6):

- (13) *Double association predicted by the stranded-head analysis*
- a. synthesis of lexical verb and T  $\rightarrow$  head movement of lexical verb to T
  - b. head movement of lexical verb to T  $\rightarrow$  synthesis of lexical verb and T

We have shown that this approach is untenable because prediction (13a) doesn't hold. In this section, we review another approach to periphrasis that does not link synthesis to head movement, and thus does not predict either (13a) or (13b). We refer to the alternative analysis as the *base-generation* approach and demonstrate that it too makes wrong predictions. Our argument is that (13b), which we refer to as the Synthesis-Movement Generalization here, does hold, that is, there is no periphrastic construction in which the lexical verb and T are related by head movement.



- (17) Ava-it -elle lu le livre?  
 AUX-PST.3SG -she read.PTCP the book  
 ‘Had she read the book?’
- (18) Elle av-ait souvent lu le livre.  
 she AUX-PST.3SG often read.PTCP the book  
 ‘She had often read the book.’

Similarly, in Swahili an adverb can intervene between the auxiliary and the lexical verb in the past perfect:<sup>5</sup>

- (19) A-li-kuwa tayari a-me-soma  
 3SG-PST-AUX already 3SG-PERF-read  
 ‘(S)he had already read.’

On the other hand, there are languages in which auxiliaries do seem to form some sort of complex with the lexical verb. One such language is Turkish, as discussed in Kornfilt 1996 and Fenger 2019, 2020. This language has both synthetic (20) and periphrastic (21) verbal constructions. In both cases, there is a single word, as diagnosed by vowel harmony.

(20) *Synthetic definite past: one harmony domain*

- |  |                        |
|--|------------------------|
| a. <b>Kal</b> - <u>d</u> i- <u>n</u> ız. | <i>Back unrounded</i>  |
| stay-PST-2PL                             |                        |
| ‘You stayed.’                            |                        |
| b. <u>G</u> el- <u>d</u> i- <u>n</u> ız. | <i>Front unrounded</i> |
| come-PST-2PL                             |                        |
| ‘You came.’                              |                        |

(21) *Periphrastic past conditional: one harmony domain*

- |  |                        |
|--|------------------------|
| a. <b>kal</b> - <u>d</u> i-y- <b>sa</b> nız  | <i>Back unrounded</i>  |
| stay-PST-AUX-COND-2PL                        |                        |
| ‘if you had stayed’                          |                        |
| b. <u>gel</u> - <u>d</u> i-y- <u>se</u> -nız | <i>Front unrounded</i> |
| come-PST-AUX-COND-2PL                        |                        |
| ‘if you had come’                            |                        |

Vowel harmony is a diagnostic for wordhood in Turkish: Vowels in morphemes that follow the root within a word match the vowel of the root in backness and rounding. (In our examples above, we notate back vowels in bold, and front ones are underlined.) According to this diagnostic, both the synthetic definite past and the periphrastic past conditional form a single word, as all morphemes after the root, including those following the auxiliary in (21), harmonize with the root vowel. That is, unlike French and Swahili, the lexical verb and auxiliary can form a single word. Under the assumption that word formation must involve head movement, Turkish thus appears to counterexemplify the generalization that head movement entails synthesis.

<sup>5</sup>For independent reasons, T-to-C movement does not reveal the independence of the auxiliary and lexical verb in Swahili, as it does in French. See section 4.4 for relevant data and discussion.

However, the assumption that word formation necessarily involves head movement is not correct, as shown by Fenger (2019, 2020) for Turkish, based on Kornfilt 1996. Instead, they argue that the process that forms a single vowel harmony domain containing the lexical verb and the auxiliary is a postsyntactic operation (Lowering/cliticization). First, periphrastic expressions can consist of two vowel harmony domains (one containing the lexical verb and another the auxiliary). This is not possible with synthetic verbs:

- |      |  |  |
|------|--|--|
| (22) | *Kal-di-niz.<br>stay-PST-2PL<br>'You stayed.'                    | <i>Synthesis: Two harmony domains impossible</i> |
| (23) | kal-'di i-se-niz<br>stay-PST AUX-COND-2PL<br>'if you had stayed' | <i>Periphrasis: Two harmony domains possible</i> |

This suggests that the operation that puts the morphemes together in the synthetic construction is different from the one responsible for combining the lexical verb and the auxiliary into a single harmony domain in the periphrastic construction. This is confirmed by stress facts, as marked in the examples above. Word-level stress in Turkish is oxytone, as seen in the synthetic verbs in (20). Interestingly, stress in a periphrastic expression does not fall on the final vowel of the entire expression, but on the morpheme immediately preceding the auxiliary, independently of whether the two form a single harmony domain (21) or two (23). Kornfilt (1996) and Fenger (2019, 2020) argue that this is evidence that the lexical verb forms a domain at some level of representation that excludes the auxiliary in periphrastic expressions, which contrasts with the synthetic pattern, in which the entire verbal expression is a single domain of this type. That is, there is a word formation process that builds synthetic expressions, but which does not combine the lexical verb and the auxiliary in periphrastic ones, and we take this operation to be head movement, following Fenger (2019, 2020). The mismatch between the vowel harmony and stress domains in periphrastic constructions is due to an additional (optional) word-formation process (cliticization or Lowering). Stress domains are delimited by the extent of head movement, and vowel harmony domains are defined after both head movement and this later operation applies.

Similar observations and analyses have been made for Japanese and Slavic languages in which auxiliaries appear to form some sort of domain with lexical verbs (Borsley and Rivero 1994, Migdalski 2006, Fenger 2020:19–42). The important conclusion for present purposes is that all known instances of word formation between lexical verb and auxiliary are distinct from head movement. This is manifested by the fact that the lexical verb and auxiliary belong to separate domains for at least some phonological processes, contrasting with synthetic expressions. This is exactly what is expected from the Synthesis-Movement Generalization (13b): Movement of a lexical verb to a functional head entails synthesis and thus precludes periphrasis. Since the base-generation approach does not predict this generalization, we conclude that it does not provide a satisfactory analysis of all relevant facts of periphrasis. In the next section, we offer an analysis of periphrasis that derives the one-way correlation with head movement.

#### **4 A selection-based theory of the relation between head movement and synthesis**

In previous sections, we have argued that the correct generalization relating head movement with the synthesis vs. periphrasis distinction is the following:



(24) *The Synthesis-Movement Generalization*

head movement of lexical verb to T → synthesis of lexical verb and T

In other words, head movement of the lexical verb to T entails their synthesis, but the absence of this head movement is compatible with either synthesis or periphrasis. We've shown that the base-generation approach does not predict this generalization, and that the stranded-head approach incorrectly predicts it to be bidirectional.

In this section, we propose a selection-based analysis that predicts exactly (24). This analysis explains why head movement of the lexical verb to T entails their synthesis, that is, why the lexical verb doesn't move to T when T is associated with an auxiliary. Like the stranded-head approach, it is based on the general idea that certain functional heads (e.g. T) have a verbal requirement which triggers the presence of an auxiliary verb in some contexts. However, following Déchaine 1995, Cowper 2010, and Pietraszko 2017, we propose that the specific requirement is that the functional head *selects* for a V. According to this view, periphrasis arises whenever this V-selectional requirement of the functional head is satisfied by an auxiliary instead of the lexical verb.

Second, we assume the following connection between head movement and selection. Building on previous literature (Svenonius 1994, Julien 2002:52–98, Matushansky 2006, Preminger 2019), we propose that head movement is parasitic on a selectional relation: A head *X* undergoes head movement to *Y* only if *X* satisfies a selectional requirement of *Y*. In periphrasis, the V-selectional requirement of T is satisfied by an auxiliary verb, so if T triggers head movement, what moves is the auxiliary, not the lexical verb.

In the following paragraphs, we propose an implementation of the selection-based approach to synthesis and periphrasis. We present our analysis of synthetic and periphrastic tenses and their relation to head movement in Subsections 4.1 and 4.2 respectively, and show how the analysis derives the Synthesis-Movement Generalization in Subsection 4.3.

#### 4.1 Synthesis is selection, not head movement

We illustrate our analysis of synthetic tenses with the Simple Past in Swahili and the French Imperfect, repeated here:

(25) A-li-soma *Swahili Simple Past: synthesis*  
3SG-PST-read  
'(S)he read.'

(26) Elle lis-ait le livre. *French Imperfect: synthesis*  
she read-PST.3SG the book  
'She was reading the book.'

Recall that, even though both are synthetic, V and T in Swahili do not form a complex head in the syntax, but they do in French.

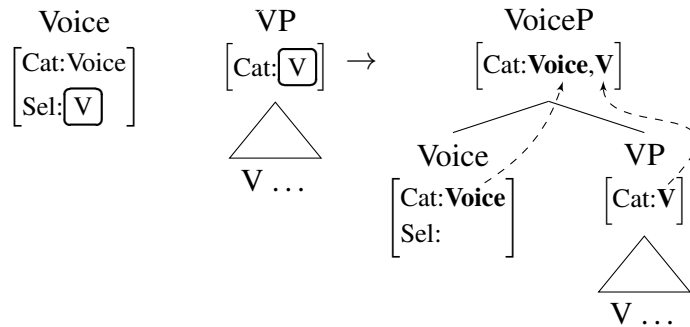
As is standardly assumed, Merge of a head with its complement is licensed by a selectional feature on the head. For the Swahili Simple Past in (25), T selects for Asp, Asp for Voice, and Voice for V.<sup>6</sup> As shown in (27), we formalize selectional feature checking as deletion of the value

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<sup>6</sup>For simplicity, we assume that AspP is projected in both synthetic and periphrastic tenses in French and Swahili, although the analysis we propose is compatible with the absence of AspP in synthetic tenses.

of a feature with attribute Sel. Furthermore, we build on previous literature proposing that functional projections in the extended projection of the verb are themselves verbal (Abney 1987:54–88, van Riemsdijk 1990, 1998, and Grimshaw 1991, 2000). Following Keine 2019, we implement this idea by projecting the category of the complement of the functional head as well as its own category, as illustrated below for VoiceP:

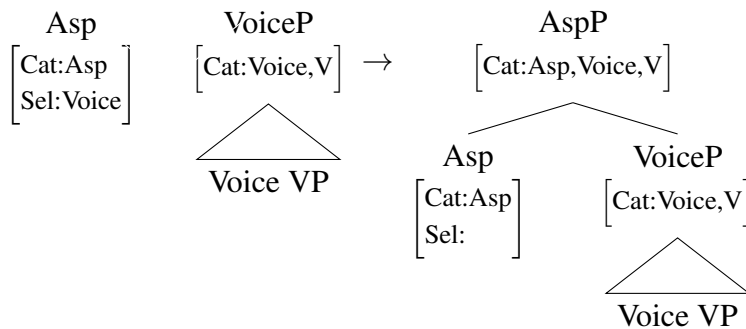
(27) *Merge of Voice and VP*



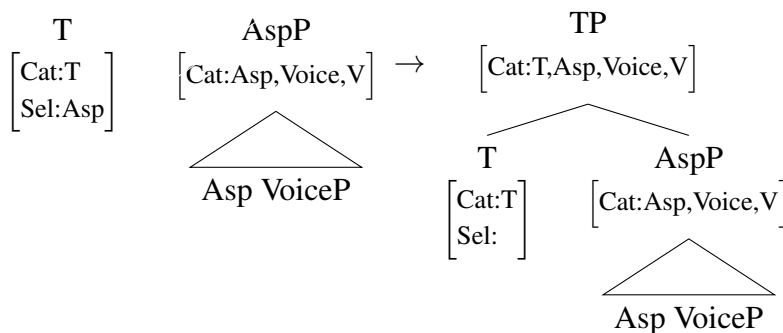
Recall that in the stranded-head approach, synthesis requires transparency between V and T so that T's V-requirement can be satisfied by the lexical verb via head movement. We agree that transparency is a necessary component of the analysis but we implement it in terms of category-feature projection: A *transparent* head like Voice projects the category of its complement (V), making it visible on its projection.

Higher functional heads are transparent too, and their Merge into the spine proceeds the same way, with the category of the selector and complement projecting all the way up the tree:

(28) *Merge of Asp and VoiceP*



(29) *Merge of T and AspP*



Because the functional heads are transparent, all the functional projections in the structure are verbal, that is, V is included in the value of their category feature. This completes the syntactic derivation of Swahili synthetic tenses, which, as shown in section 2, does not involve syntactic head movement of the lexical verb to T.<sup>7</sup> Complex head formation of these two elements is postsyntactic, as discussed in section 2.

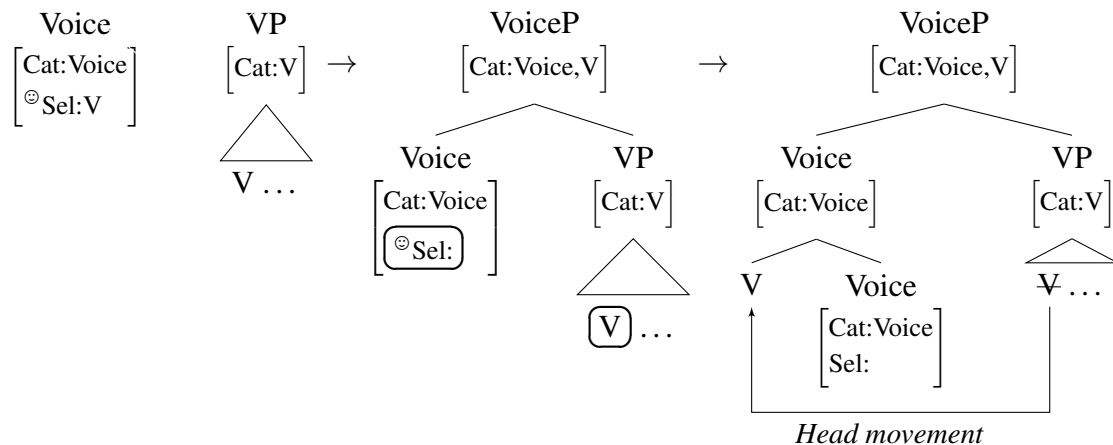
The derivation of the French Imperfect (26) involves the same selectional relations. Unlike the Swahili Simple Past, however, the French Imperfect involves head movement of the lexical verb to T. Recall our hypothesis that head movement is somehow parasitic on selection. We implement this as follows: A head that triggers head movement has a selectional feature whose attribute is  $\ominus$ Sel. For instance, an Asp head that triggers head movement has the selectional feature [ $\ominus$ Sel:Voice]. Specifically, after the value of the selectional feature is checked, the remaining [ $\ominus$ Sel:] is what triggers head movement:

(30) *Head movement*

- a. Structural description: a node  $X$  with the feature [ $\ominus$ Sel:], and  $Y$ , the head of  $X$ 's sister.
- b. Structural change: replace the head  $H$  of  $X$  with [ $Y H$ ], and [ $\ominus$ Sel:] in  $X$  with [Sel:].

Since in French V moves all the way up to T, all functional heads have  $\ominus$ Sel. We illustrate the effect of  $\ominus$ Sel with the first part in the derivation involving Voice and VP:

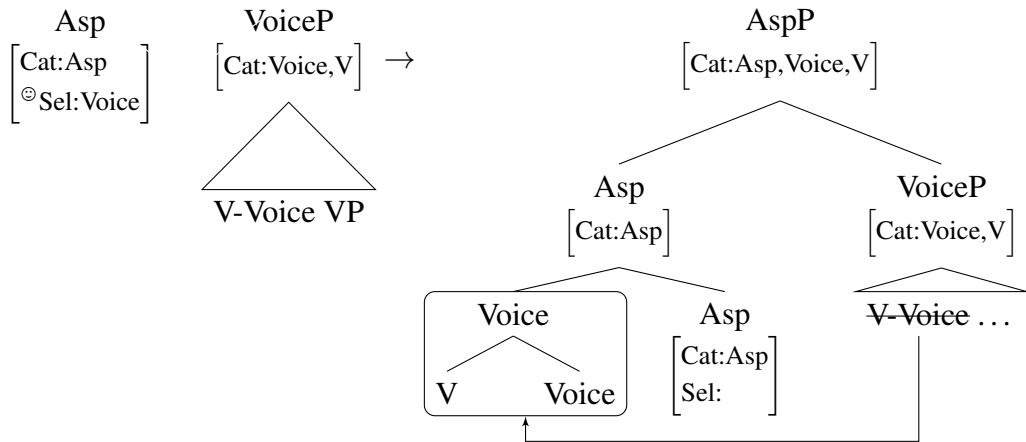
(31) *Merge of Voice and VP followed by head movement*



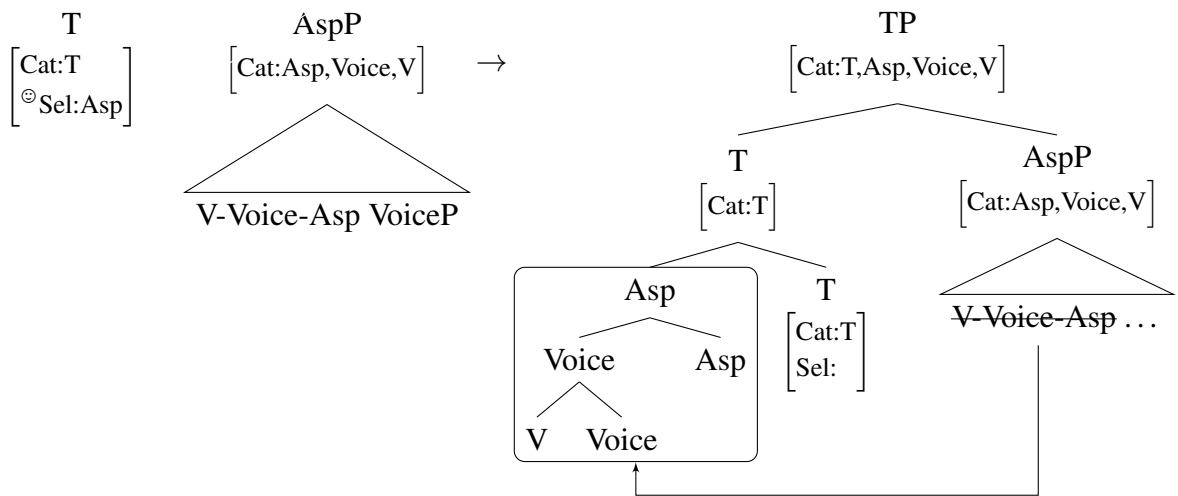
After Merge of Voice and VP, the selectional requirement of Voice is satisfied, leaving a valueless [ $\ominus$ Sel:] that triggers head movement of V to Voice. Further head movement all the way up to T is derived in the same way:

<sup>7</sup>The Swahili case might involve head movement of V to a lower position, but crucially, not all the way up to T. We abstract away from this here.

(32) *Voice-to-Asp movement in French*



(33) *Asp-to-T movement in French*



To summarize so far, the analysis derives that synthetic expressions can involve head movement, as in the French Imperfect, but need not, as in the Swahili Simple Past. This analysis, then, derives the lack of correlation between synthesis and head movement. We will add more detail to these derivations of synthetic tenses to reflect the full proposal, including the analysis of periphrastic tenses.

**4.2 Refining the analysis: Periphrastic tenses**

We illustrate our account of periphrasis with the Swahili Past Perfect in (8), repeated here:

- (34) A-li-kuwa a-me-soma *Swahili Past Perfect: periphrasis*  
 3SG-PST-AUX 3SG-PERF-read  
 ‘(S)he had read.’

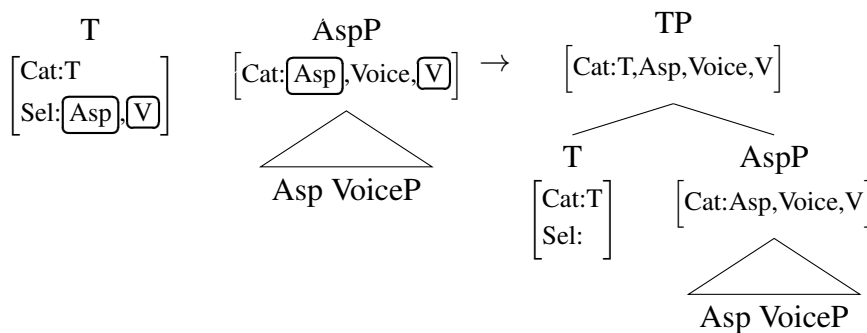
As we’ve shown in previous sections, periphrastic tenses never involve head movement of the lexical verb to T, that is, the lexical verb is never in a complex head with T in the syntax. Instead, T is associated with an auxiliary.

Following much previous work on periphrasis, we adopt the hypothesis that the auxiliary satisfies a verbal requirement of T—in particular, a selectional requirement (Déchaine 1995, Cowper 2010, Pietraszko 2017). Specifically, T selects both for the category of the complement and for V, as shown in (35). As discussed below, it is this V-selectional feature of T that triggers periphrasis when it cannot be checked by T’s complement.

$$(35) \begin{bmatrix} \text{Cat: T} \\ \text{Sel: Asp, V} \end{bmatrix}$$

In a synthetic tense, the V-selectional feature of T is satisfied by T’s complement (AspP) because functional heads are transparent, i.e. they project the category feature of their complement, as well as their own (see section 4.1). Since in our derivation the Swahili Simple Past given in (29) we did not take T’s verbal selectional requirement into account, the last step of the derivation should be revised as follows:

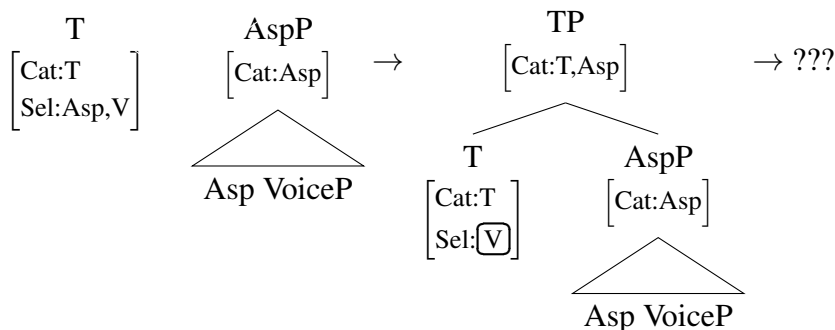
(36) *Merge of T and AspP in Swahili Simple Past*



In a sense, T’s V-selectional feature is satisfied by the the lexical verb since the category feature that checks it originates on the lexical verb. This apparent long-distance selection is made possible by the transparency of the intervening functional heads. This means that synthesis is the (indirect) satisfaction of T’s V-selectional feature by the lexical verb.

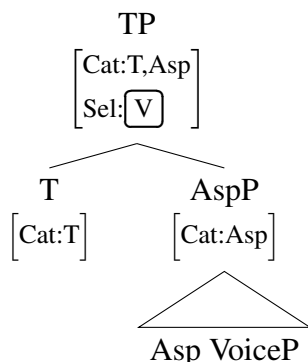
In contrast, periphrasis arises when T’s V-selectional feature is not satisfied by the lexical verb. Instead, it is satisfied by an auxiliary. We propose that this is because at least one of the functional heads involved in periphrastic constructions is *opaque*, i.e. it does not project the category feature of its complement. Perfect Aspect is one such head. Consider the derivation of Swahili Past Perfect below, which proceeds the same way as synthetic tenses (36), but only up to AspP. Since Perfect Asp is opaque, the category of Asp is just [Cat:Asp]—crucially, it does not include V. Consequently, T’s selectional V feature remains unchecked after T is merged:

(37) *Merge of T and AspP in the Swahili Past Perfect*



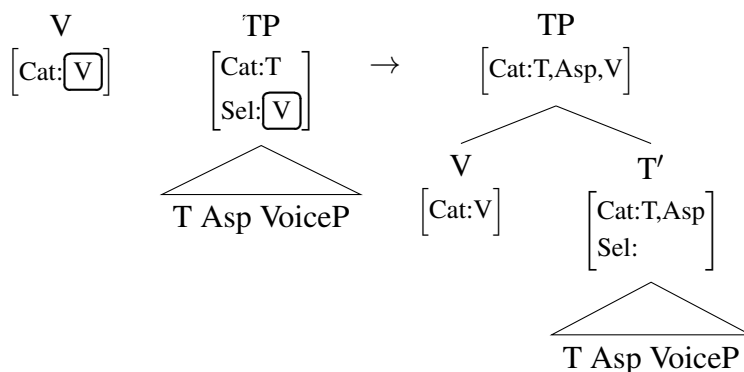
We propose that unsatisfied selectional features percolate to the phrasal level, here to TP:

(38) *Sel-feature percolation*



The [Sel:V] feature in TP triggers Merge of TP with an element of category V:

(39) *Auxiliary merged as the specifier of T*



The V in the specifier of T is realized as auxiliary *be* (*kuwa* in Swahili).<sup>8</sup> Note that, in the resulting structure, the auxiliary verb precedes T, even though the correct affix order is T-V (34). We assume that this reordering is the result of the same type of postsyntactic merger that applies to T and the lexical verb in synthetic tenses (see section 2).

In summary, synthesis arises when T's V-selectional feature is satisfied by the [Cat:V] feature projected from the lexical verb. Periphrasis is Merge of a new V to satisfy the V-selectional requirement of T when it cannot be satisfied this way. As shown above, this occurs when T's complement is opaque.<sup>9</sup>

<sup>8</sup>In this paper, we concentrate on periphrastic constructions in which the auxiliary is finite, that is, those in which the auxiliary satisfies a V-selectional feature in T. Functional heads other than (finite) T can also have a V-selectional feature that triggers periphrasis, as can be observed, for instance, in sentences with multiple auxiliaries, such as English *She had been reading*: The higher auxiliary *have* satisfies the V-selectional feature in T, and the lower auxiliary *be* satisfies the V-selectional feature in a lower head (presumably perfect Asp).

<sup>9</sup>Even though opaqueness is a necessary condition for periphrasis, it is not sufficient: If T doesn't have a V-selectional feature, an auxiliary will not be merged. This case in Swahili Present Perfect, which is synthetic despite having an opaque perfect Asp head because, we claim, present T in this language lacks the V-selectional feature. This distribution of periphrasis is termed the *overflow pattern* by Bjorkman (2011), who derives this pattern from featural underspecification of some functional heads. In some languages, like Swahili, present T is less featurally specified than past T. In our terms, this underspecification is implemented as the absence of a V-selectional feature.

### 4.3 Why periphrasis is mutually exclusive with movement of the lexical verb to T

In section 4.1, we posited a tight relationship between head movement and selection, and in section 4.2, we developed an analysis of periphrasis based on selection. In this section, we bring both proposals together to derive what we have argued is the correlation between head movement and the synthesis-periphrasis distinction, namely (40).

(40) *Synthesis-Movement Generalization*

head movement of lexical verb to T → synthesis of lexical verb and T

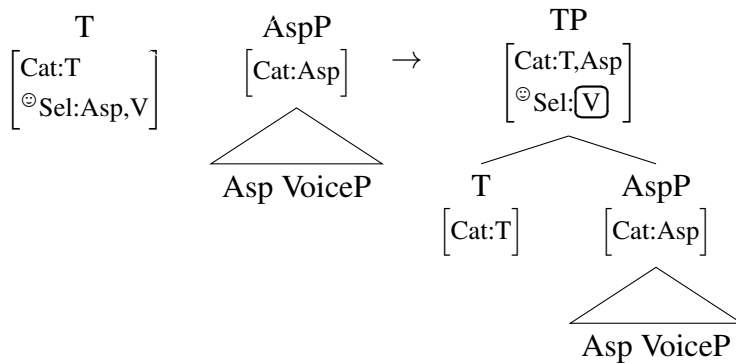
This means that in a periphrastic construction, the lexical verb never moves to T.

We illustrate our analysis with the Pluperfect in French (repeated below from (14)), a language which has both periphrasis and verb movement to T:

- (41) Elle av-ait lu le livre. *French Pluperfect: periphrasis*  
 she AUX-PST.3SG read.PTCP the book  
 ‘She’d read the book.’

The derivation is very similar to the Past Perfect in Swahili. Specially, we assume that perfect Asp is opaque and T has a V-selectional requirement.<sup>10</sup> Thus, when T is merged, its selectional V feature is not checked by its AspP complement, as AspP does not have a categorial V feature. As a result, T’s selectional feature percolates to its projection:

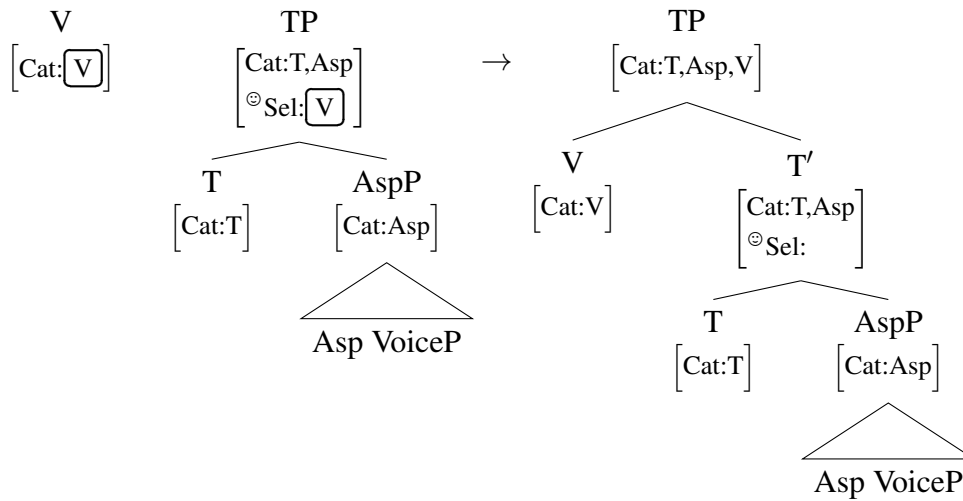
(42) *Merge of T and AspP in the French Past Perfect*



Note that this selectional feature is of the type that triggers head movement (<sup>⊙</sup>Sel:…), to which we return below. As in Swahili, the percolated selectional V feature in TP triggers its Merge with auxiliary V:

<sup>10</sup>Present tense T in French has a V-selectional feature, just like any other T—perfect aspect triggers periphrasis both in the past and in the present. This is unlike Swahili, in which present tense T doesn’t have a V-selectional feature and consequently the Present Perfect is synthetic (see footnote 9).

(43) *Auxiliary merged as the specifier of T*



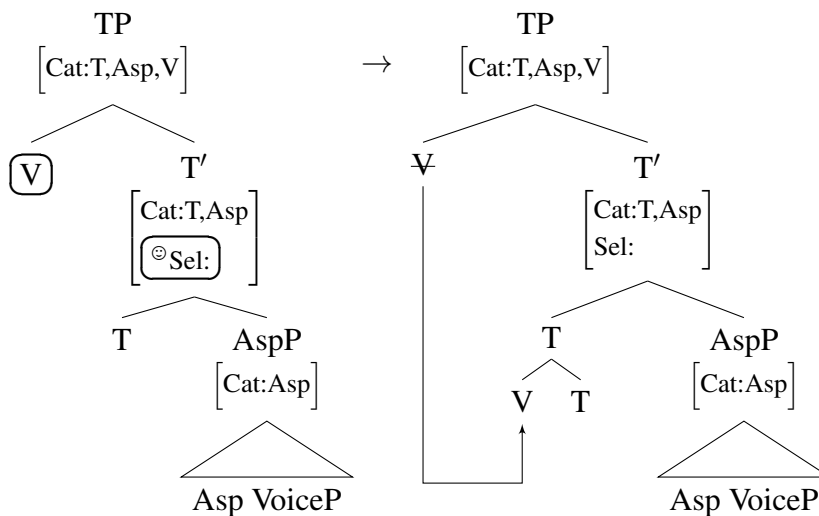
At this point, head movement applies. Recall that head movement is triggered by a [ $\ominus$ Sel:] feature whose values have all been checked (deleted):

(44) *Head movement*

- Structural description: a node  $X$  with the feature [ $\ominus$ Sel:], and  $Y$ , the head of  $X$ 's sister.
- Structural change: replace the head  $H$  of  $X$  with [ $Y H$ ], and [ $\ominus$ Sel:] in  $X$  with [Sel:].

Importantly, in this case, what undergoes head movement is the auxiliary in the specifier of T. The relevant [ $\ominus$ Sel:] feature is in TP, which according to (44) triggers movement of (the head of) its sister to its own head (T):

(45) *Head movement of auxiliary V to T*



Although this looks like lowering, the locality condition imposed by our version of head movement is the same in all cases, namely sisterhood. In the standard case of head movement, the trigger is in the head, resulting in head movement out of the complement. In this case, the trigger is in the projection of the head, resulting in head movement out of the specifier. In both cases, however, the structural relation is the same: The moved head is the head of the selectee.



Importantly, a selection-based analysis of periphrasis derives the Synthesis-Movement Generalization. Since head movement is parasitic on selection and it's the auxiliary that satisfies T's verbal selectional feature in periphrastic constructions, only the auxiliary can undergo head movement to T. In other words, head movement of the lexical verb to T is impossible in periphrasis because there's no selectional relation between those two heads. This selectional relation does hold in synthetic tenses, which is what precludes merging an auxiliary verb, and allows—but doesn't require—head movement of the lexical verb to T. In contrast, in the stranded head approach T's verbal requirement is that T and V form a complex head, which wrongly predicts that synthesis necessarily entails head movement of the lexical verb to T.

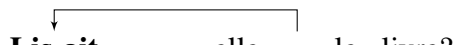
The problem with the base generation approach is that it doesn't make any predictions about the interaction between periphrasis and head movement. As the auxiliary verb is generated as part of the clausal spine, it has a complement that contains the lexical verb, so the auxiliary could in principle trigger head movement of the lexical verb. In our selection-based approach, the auxiliary has no such complement (because it's not part of the clausal spine; see (43)). Because of that, the auxiliary cannot attract the lexical verb, or any other head, by head movement.

#### 4.4 A final argument for the selection-based approach to periphrasis

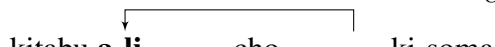
An important aspect of our analysis is the specific claim that auxiliaries are merged due to a syntactic requirement of T, namely its V-selectional feature. This entails that the auxiliary and T don't form a complex head (unless head movement applies, as in French). This contrasts with the stranded head approach (section 2), in which the auxiliary is inserted directly into a complex head with T. This specific difference between the two approaches yields different predictions, testable in Swahili. We argue below that only the selection-based approach makes the correct predictions.

We showed in section 2 that synthesis allows but does not require head movement of the lexical verb to T. The relevant contrast is that while the lexical verb forms a complex head with T in French synthetic constructions, it does not in Swahili. As shown by examples (9–10), repeated below, this is reflected in inversion constructions in which T moves to C. In French, T-to-C movement carries along the lexical verb, inverting it with the subject clitic (46). In Swahili, T-to-C movement strands the lexical verb and only T inverts with the relative complementizer (47).

(46) *French: T carries the lexical verb along when it moves to C*


  
**Lis-ait**        -elle    \_\_\_ le livre?
   
**read-PST.3SG** -she        the book
   
 'Was she reading the book?'

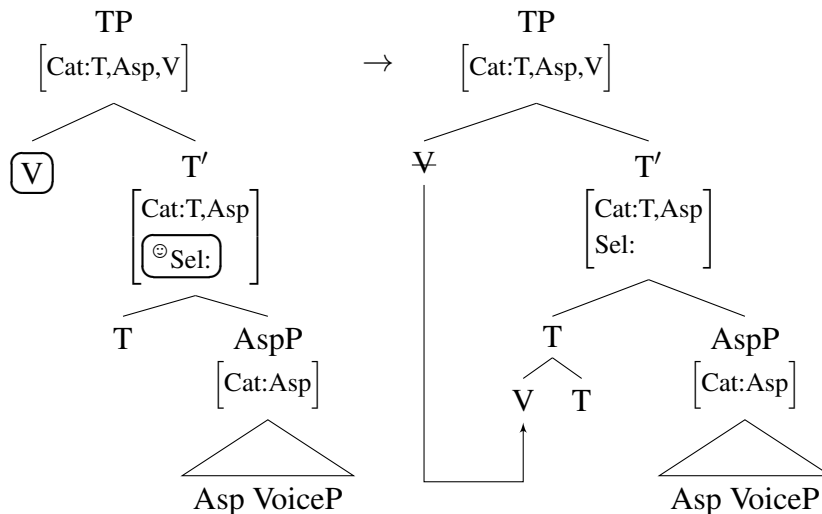
(47) *Swahili: T moves to C alone stranding the lexical verb*


  
 kitabu **a-li-**        cho-    \_\_\_ ki-soma
   
 7book **3SG-PST-** 7REL-        7O-read
   
 'the book that (s)he read'

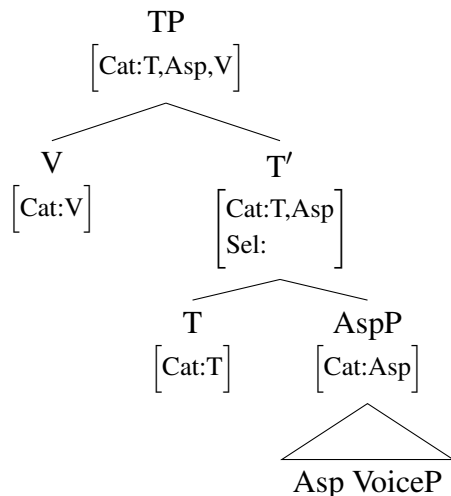
Our analysis of this difference between the two languages predicts that they should have a similar contrast in periphrastic constructions: French T triggers head movement of either the lexical verb (in synthetic tenses) or an auxiliary (in periphrastic tenses), but Swahili T does not have a head-movement-triggering feature, so it's not expected to form a complex head with either the lexical

verb or the auxiliary. This is reflected in the final representations of periphrastic tenses in the two languages, repeated here:

(48) *Auxiliary-to-T head movement in French*



(49) *No auxiliary-to-T head movement in Swahili*



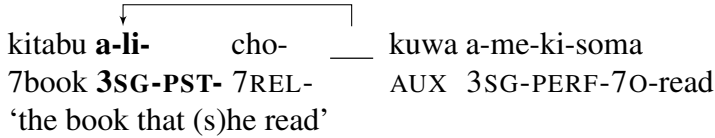
The specific prediction is that T-to-C movement carries the auxiliary along in French but not in Swahili. The following examples show that this prediction is correct. In French, the material in the inverted position before the subject clitic *elle* includes both T (i.e. tense and agreement) and the auxiliary (example repeated from (17)):

(50) *French Pluperfect: T carries the auxiliary along when it moves to C*

Av-ait -elle \_\_\_ lu le livre?  
 AUX-PST.3SG -she read.PTCP the book  
 'Had she read the book?'

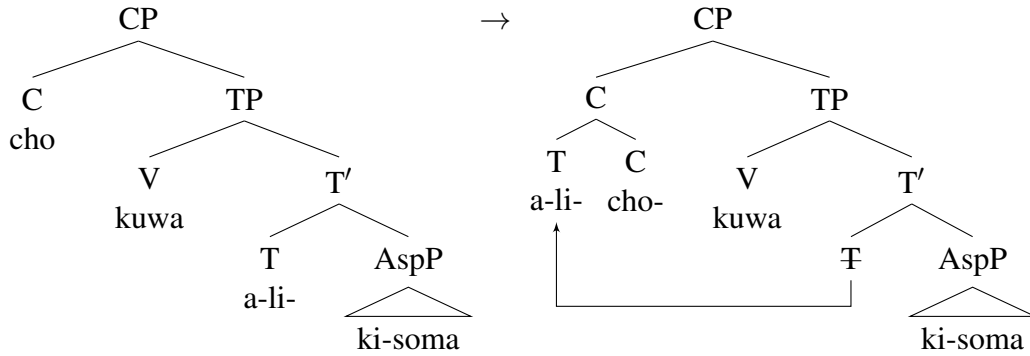
On the other hand, in Swahili, what inverts with the complementizer *cho* is only T (i.e. tense and agreement prefixes) and does not include the auxiliary verb:

(51) *Swahili Past Perfect: T moves to C alone stranding the auxiliary*



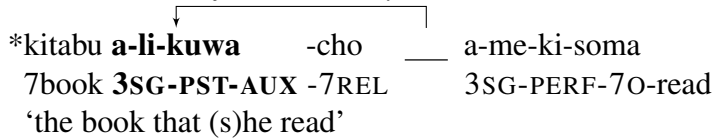
This is the prediction of the analysis because, unlike French, the auxiliary verb in the specifier of TP does not undergo head movement to T, as shown in (49). Consequently, T does not carry the auxiliary along to C in (51):

(52) *The syntax of inversion in the Swahili Past Perfect*



In contrast, the stranded head approach incorrectly predicts that the auxiliary is carried along to C, as it forms a complex head with T in this analysis:

(53) *Swahili Past Perfect: Auxiliary doesn't move to C*



This incorrect prediction is the direct consequence of the claim that the auxiliary is directly inserted into a complex head containing T. Deriving the facts thus requires the auxiliary to be merged in a position outside that complex head, as predicted by the selection-based approach.

## 5 Conclusion

In this paper, we argued that a selection-based theory of periphrasis combined with a selection-based theory of head movement correctly predicts how the two phenomena interact. We presented evidence that the interaction is a one-way correlation, as stated in the Synthesis-Movement Generalization: Head movement of the lexical verb to T entails synthesis, and thus precludes periphrasis. This means that there is complementarity between presence of an auxiliary and head movement of the lexical verb to T. This complementarity follows from the view that T's verbal selectional requirement is satisfied by different elements in synthesis and in periphrasis: by the lexical verb in the former and by the auxiliary in the latter. Assuming that head movement is parasitic on selection, we derive that in synthesis, only the lexical verb can move to T, and in periphrasis, only the auxiliary can do so. Thus, head movement of the lexical verb to T is possible (though not obligatory) only under synthesis and conversely, it is impossible under periphrasis. Other analyses predict a correlation that is either too strong (i.e. bidirectional) or non-existent.

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