

Cyclic Selection

Auxiliaries are merged, not inserted

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Abstract

Traditional approaches to verbal periphrasis (compound tenses) treat auxiliary verbs as lexical items that enter syntactic derivation like any other lexical item, i.e. via Selection/Merge. An alternative view that has received much attention in recent years is that auxiliary verbs are not base generated but rather *inserted* in a previously built structure (i.a. [Bach 1967](#); [Embick 2000](#); [Arregi 2000](#); [Cowper 2010](#); [Bjorkman 2011](#); [Arregi & Klecha 2015](#)). Arguments for the insertion approach to auxiliaries include their last-resort distribution and the fact that, in many languages, auxiliaries are not systematically associated with a given inflectional category (the "overflow" distribution, [Bjorkman 2011](#)). In this paper, I argue against the insertion approach. First, I demonstrate that the overflow and last-resort distribution follow from Cyclic Selection ([Pietraszko 2017](#)) – a Merge-counterpart of Cyclic Agree ([Béjar & Rezac 2009](#)). And second, I show that the insertion approach makes wrong predictions about compound tenses in Swahili, a language with overflow periphrasis.

1 Introduction

An increasing body of work on verbal periphrasis has proposed that auxiliary verbs used in compound tenses (typically *be* or *have*) are not base-generated via the basic structure building operation (Merge), but rather that they arise due to an insertion process, syntactic or postsyntactic (i.a. [Bach 1967](#); [Embick 2000](#); [Arregi 2000](#); [Cowper 2010](#); [Bjorkman 2011](#); [Arregi & Klecha 2015](#); [Fenger 2018](#); [Calabrese 2019](#)). An extensive argument against the base-generation view was given by Bjorkman (2011), who argues that syntactic Merge of auxiliaries would mean that they are in a selectional, and thus a systematic, cooccurrence relation with a given syntactic feature/projection. Despite this being true in some well studied languages, including English, there is robust evidence showing that there is no such systematicity crosslinguistically. Instead, default auxiliaries often show a distribution which can only be captured by referring to *combinations* of features/projections– a distribution that Bjorkman calls *the overflow pattern* of auxiliary use.

This paper argues that syntactic Merge of auxiliaries is not incompatible with the overflow pattern. The Cyclic Selection account proposed in [Pietraszko 2017](#), in which auxiliary verbs are merged as specifiers, derives this pattern in the same way as other existing accounts (i.e. via featural underspecification), despite the fact that auxiliaries are subject to selection and Merge. Cyclic Selection is a phenomenon in which the selected category (in this case, a verb) is merged as a specifier only in configurations where a selectional feature of a head cannot be checked by an element c-commanded by that head. Cyclic Selection is, then, analogous to Cyclic Agree ([Béjar & Rezac 2009](#)): in both, an operation (Merge and Agree, respectively) applies cyclically, making interaction with a specifier the last resort case. The Cyclic Selection approach to verbal periphrasis has several advantages: it eliminates the need for an auxiliary insertion mechanism and for defining stranded inflection (which requires auxiliary-support), while still deriving the

overflow pattern. Moreover, the phenomenon of Cyclic Selection is expected to exist given two fairly standard assumptions in current syntactic theory: bare phrase structure and cyclicity of syntactic operations.

Section 2 reviews existing approaches to verbal periphrasis, focusing on the predictions they make about the distribution of auxiliary verbs. In section 3, I present the Cyclic Selection account (Pietraszko 2017) and argue that it not only captures the overflow distribution but also is motivated by other aspects of syntactic theory. Section 4 develops the final, empirical argument for a Cyclic Selection account of default auxiliaries based on the interaction between periphrasis and T-to-C movement in Swahili.

2 Approaches to default periphrasis

The term *default periphrasis* refers to constructions in which a dummy verb (typically *be* or *have*) appears in addition to the lexical verb in certain inflectional contexts. These constructions are often called compound tenses:

- (1) a. She is working.
b. She has worked.

Another feature of default periphrasis is its sensitivity to inflectional complexity. Descriptively, a default auxiliary is required when there is "too much" inflectional morphology to be expressed on the lexical verb alone (2). Finally, default periphrasis is impossible unless necessary (3).

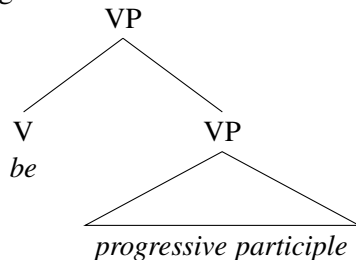
- (2) a. She i-s work-**ing**.
b. *She work-**ing**-s.
- (3) a. She work-s.
b. *She i-s work.

Due to this distribution of auxiliaries, default periphrasis is often characterized as a last-resort phenomenon.

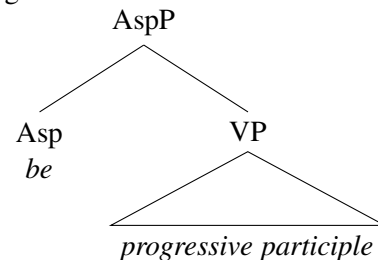
2.1 Against base-generation of auxiliary verbs

Traditional analyses of compound tenses assume that auxiliary verbs are, like any other category, part of syntactic structure (i.a. Ross 1967, 1969; Huddleston 1974; Emonds 1978; Pollock 1989; Déchaine 1993; Déchaine 1995; Roberts 1998; Schütze 2003; Harwood 2014b). Specifically, auxiliary verbs are of category V (or V_{Aux} , Aux) and select for another verb, requiring it to bear a particular inflection (e.g. *-ing/-en* in English). Other implementations of the base-generation approach treat auxiliaries as functional elements (i.a. Hoffman 1966; McCawley 1988; Tenny 1987; Cinque 1998, 1999, 2001). For instance, the English progressive auxiliary *be* has been analyzed as being of category Asp_{Prog} .

- (4) Base-generation as a V:

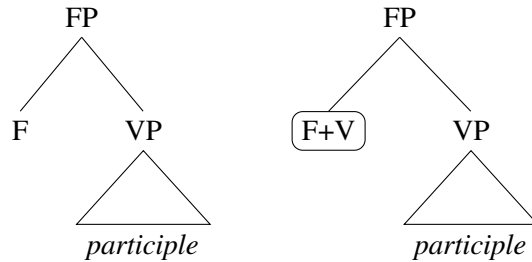


- (5) Base-generation as a functional head:



Even though the base-generation structures above are still frequently assumed, a growing body of literature proposes to abandon them (Embick, 2000; Arregi, 2000; Cowper, 2010; Bjorkman, 2011; Arregi & Klecha, 2015; Pietraszko, 2016, 2017; Fenger, 2018; Calabrese, 2019). Instead of merging auxiliaries in syntax, many of these works propose that they are *inserted* into an independently built syntactic structure – an idea going back to Bach (1967). Said insertion has been implemented in various ways in the literature (e.g. as syntactic or post-syntactic), but the unifying claim is that, in present-day terms, auxiliaries do not become part of the structure via Merge. Rather, Merge creates a structure without an auxiliary, but the structure may be *altered* so that it contains one. This is schematized below.

(6) Output of Merge → Auxiliary insertion



A common argument for insertion and against base-generation is the last-resort profile of auxiliary distribution, discussed above. Assuming that Merge is determined by selectional features, the base-generation structures in (4)-(5) indicate that the auxiliary c-selects for an XP containing a particular kind of participle (for simplicity, I assume that this XP is a VP). As c-selection is a lexical property of heads, we might expect a fair amount of variation in the distribution of auxiliaries crosslinguistically. For instance, we should find languages in which auxiliaries select for VPs only in simple tenses (giving rise to something like the English **is work* instead of *works* (3)), but not in progressive tenses, where the lexical verb would itself bear both tense and aspect inflection (**workings* instead of *is working*). In contrast to these predictions, the appearance of default auxiliaries correlates with increased inflectional complexity – a generalization crosslinguistically robust.

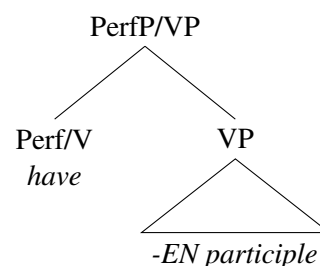
Bjorkman (2011) develops another distribution-based argument against base-generation, one that appears especially strong. In languages such as English, we observe systematic co-occurrence between auxiliaries and a particular type of inflection. For instance, progressive aspect always requires the auxiliary *be*:

- (7) a. She **is** working.
 b. She **was** working.
 c. She will **be** working.

This systematicity is compatible with the idea that the progressive auxiliary is base-generated, either as V or as Asp_{Prog} , as shown in (4)-(5) above. Similarly, perfect aspect always requires an auxiliary in English (8) – a fact also compatible with base generation of the perfect auxiliary (9).

- (8) a. She **has** worked.
 b. She **had** worked.
 c. She will **have** worked.

(9)



This systematic cooccurrence can be straightforwardly captured by selection: *-en/-ing* participles can only be selected by *have* and *be*, respectively; the auxiliaries themselves can be selected by any T.

Bjorkman's argument against base-generation is that, in many languages, there is no one to one correlation between a particular inflection and an auxiliary. Compare the English progressive and perfect tenses above with progressive and perfect tenses in Swahili:¹

- (10) Swahili progressive tenses
- a. ni-li-kuwa ni-**na**-soma
1SG-PST-AUX 1SG-IMPf-read
'I was reading'.
 - b. ni-ta-kuwa ni-**na**-soma
1SG-FUT-AUX 1SG-IMPf-read
'I will be reading'.
 - c. ni-Ø-**na**-soma (*ni-Ø-kuwa ni-**na**-soma)
1SG-PRES-IMPf-read
'I am reading'.
- (11) Swahili perfect tenses
- a. ni-li-kuwa ni-**me**-soma
1SG-PST-AUX 1SG-PRF-read
'I had read reading'.
 - b. ni-ta-kuwa ni-**me**-soma
1SG-FUT-AUX 1SG-PRF-read
'I will have read'.
 - c. ni-Ø-**me**-soma (*ni-Ø-kuwa ni-**me**-soma)
1SG-PRES-PRF-read
'I have read'.

As we see above, neither progressive nor perfect aspect systematically cooccurs with an auxiliary. They do in past and future tenses, but not in the present tense. This is rather puzzling under the selection-based account sketched above for English. If progressive participles are selected by an auxiliary, we predict that it should be so irrespective of tense since, at the point in the derivation when $\text{Asp}/V_{\text{Aux}}$ is merged with the lexical verb, T is not yet part of the structure. One might concoct a more intricate selection-based analysis to derive this countercyclic effect. Consider the following selection-based analysis of the progressive paradigm in Swahili (12). (Here, I treat the auxiliary as the functional head Asp, but (12) could be restated in terms of VP_{Aux} .)

- (12)
- | | | | |
|----|---------------------------------------|----|--|
| a. | Asp: [Sel: VP_{ing}] | c. | T_{Fut} : [Sel: VP or AspP] |
| b. | T_{Past} : [Sel: VP or AspP] | d. | T_{Pres} : [Sel: VP or VP_{ing}] |

According to this analysis, the auxiliary (Asp) selects for a progressive participle (VP_{ing}). Future and Past Ts select for either a bare VP (lexical verbs) or for AspP (auxiliary), giving rise to simple and progressive tenses respectively. The key part of (12) is that present tense T does *not* select for AspP, which is why an auxiliary is impossible in the present tense. In return, T_{Pres} can itself select for a progressive participle, giving rise to a synthetic (rather than a periphrastic) progressive tense (10-c).

¹ Unless otherwise noted, Swahili data come from the author's fieldwork.

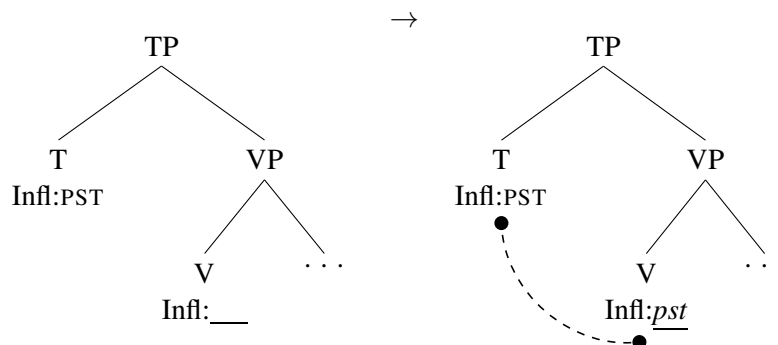
Such an analysis lacks any explanatory value and is immediately called into question by the fact that perfect aspect in Swahili shows exactly the same pattern: we observe periphrasis in the past and the future, but present perfect is obligatorily synthetic. The selection based analysis of the progressive in (12) makes no predictions about what perfect tenses should look like. Accounting for perfect tenses requires positing a new set of selectional features, for PerfP, that would incidentally mirror the set in (12), only replacing AspP with PerfP and VP_{Prog} with VP_{Perf}.² To make things worse, all languages that exhibit the overflow pattern of auxiliary use seem to behave the exact same way: they are synthetic in the present tense and periphrastic in other tenses (Bjorkman, 2011). The selection-based analysis entirely misses this generalization.

To derive the last-resort and overflow distribution of auxiliaries insertion approaches abandon the problematic selection-based analysis. Instead, they propose that a structure (built without auxiliaries) is evaluated for inflectional complexity, understood as the number of morphosyntactic features in the TAM domain. A dummy verb is inserted if and only if there is more such features than the lexical verb can itself host/express. The next subsection demonstrates how some existing insertion accounts derive the overflow pattern.

2.2 Insertion accounts

To capture the overflow nature of default periphrasis, many authors propose to treat it as a postsyntactic repair process (Embick 2000; Bjorkman 2011; Fenger 2018; Calabrese 2019). In order to be expressed synthetically with the verb, inflectional features must end up in a single complex head with a V. This can be done via head movement (Embick; Fenger; Calabrese) or via Infl-agreement (Bjorkman). In simple past, for instance, there is only one (marked) inflectional feature: [Infl:PST]. In this configuration, T can establish a relation with V and the result is a synthetic expression of V and T, like the English simple past (13). (Following Bjorkman, I encode this relation as Infl-agreement.³)

(13) Simple past (e.g. English *worked*): synthesis of V and [Infl:PST]

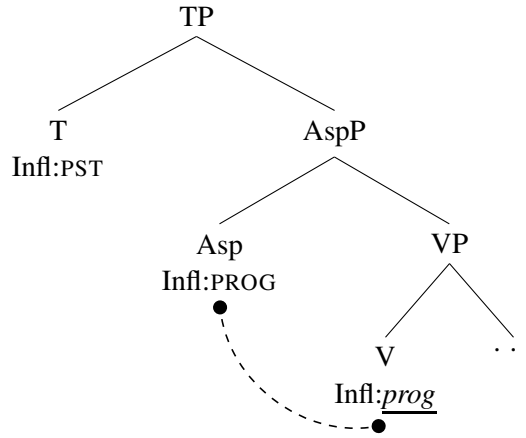


² Note that it is not possible to treat progressive and perfect aspect as the same head but with different features (by analogy to T_{Pres/Past/Fut}). It is well known that so called perfect aspect is a different category than viewpoint aspect (perfective, imperfective) – the two are not in complementary distribution, as in the English *has been working* (Iatridou et al. 2003; Pancheva 2003; Bošković 2014; Harwood 2013, 2014a; Ramchand & Svenonius 2014; Aelbrecht & Harwood 2015). A more accurate description of the perfect aspect is as a non-finite/embedded past tense (Hoffman, 1966; Bach, 1967; McCawley, 1971, 1988; Klein, 1994; Stowell, 2007; Arregi & Klecha, 2015).

³ In Bjorkman's system, head movement may also play a role in creating synthetic expression, in addition to Infl-agreement. This is, however, the case only in the fairly rare languages in which the lexical verb may express more than one inflectional feature (as in Latin, where e.g. past perfect is synthetic). These cases have no additional bearing on the present discussion and I omit them for reasons of exposition.

Periphrasis arises when an inflectional head is not in a relation with the verb. In Past Progressive in English, for example, T is such a stranded inflection:

- (14) Compound tense: Output of syntactic derivation



The reason why T in this configuration does not establish a relation with V is that, when T is merged, V's Infl-feature has already been valued by Asp and so V no longer has the relevant probe.^{4,5}

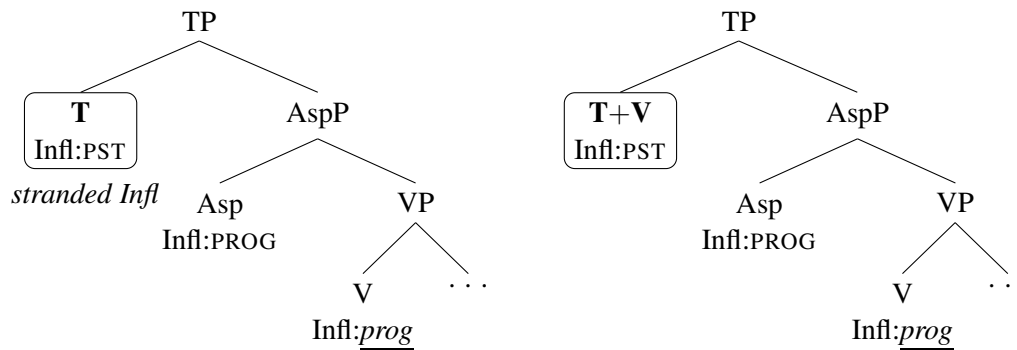
The structure in (14) is syntactically well-formed and the auxiliary verb appears at only at PF. In his analysis of Latin, Embick (2000) suggests that a finite auxiliary is simply the spellout of a T that's not in a complex head with V. Bjorkman (2011), Fenger (2018) and Calabrese (2019) implement it as insertion of a V node at PF:

- (15) Periphrasis as a PF repair of stranded inflection

Output of syntax:

→

PF insertion of V



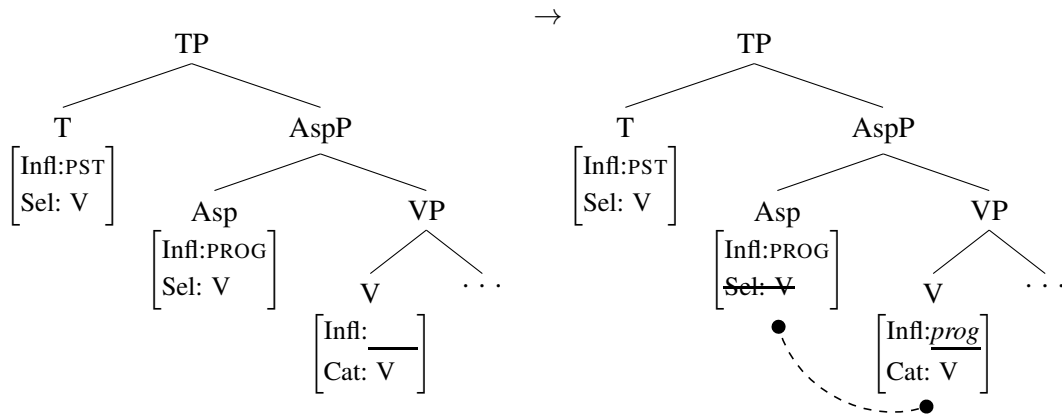
A similar insertion mechanism has been proposed in Cowper 2010 and Arregi & Klecha 2015, though for these authors the insertion takes place in syntax, rather than at PF. Cowper's proposal differs from the others in that it models auxiliary insertion as satisfaction of a selectional feature, making this process of V insertion a bit closer to syntactic structure building.

⁴ It is assumed here that Infl-agreement may involve upward probing (Adger 2003; Bjorkman 2011; Wurmbrand 2011).

⁵ Some details of analysis are omitted here. For instance, Bjorkman proposes that Asp also has an Infl-probe, valued by T. In either case, the [Infl:PST] feature does not end up on V. See section 4 for a discussion of why this specific detail is problematic for Swahili.

Cowper assumes that Infl-features on inflectional heads are bundled with a selectional V feature, [Sel:V] (Cowper's uV), and adopts the implementation of c-selection as feature checking (i.a. Svenonius 1994; Holmberg 2000a; Julien 2002; Adger 2003; Matushansky 2006; Adger 2010; Adger & Svenonius 2011). The [Sel:V] feature is checked by [Cat:V], borne by verbs. Importantly, V-checking can only take place under Infl-agreement. In the Past Progressive scenario, the derivation proceeds as follows:

(16) V-checking implementation (Cowper 2010, details adapted)



The unvalued Infl-feature of V is valued by the most local inflection, here Asp. Via this relation, Asp's selectional V feature is checked. Once T is merged, there is no unvalued Infl-probe in the structure, which in turn means that T's selectional V feature cannot be checked against the main verb and it remains unchecked. For Cowper, it is the unchecked selectional V-feature that counts as stranded inflection and triggers auxiliary insertion:

(17) Cowper (2010): auxiliary insertion

- a. **Stranded on Merge:** A head is stranded on Merge, or Merge-stranded, if it has a [Sel:V] feature that cannot immediately be checked.
- b. **BE-support:** The verb *be* is inserted immediately in a Merge-stranded inflectional head.

In (16), [Sel:V] on T is Stranded on Merge, triggering the immediate repair of BE-support (i.e. auxiliary insertion).

Returning to Swahili, recall that, unlike in English, present progressive and present perfect are synthetic tenses, not periphrastic. All the insertion-based analyses discussed above can derive this overflow pattern via featural underspecification. This is made explicit in Bjorkman, and is at least an implicit possibility in the other accounts. Assuming that inflectional contrasts can be privative, a three-way tense system requires only 2 tense features: e.g. PST and FUT, with present tense being the absence of a feature. Similar privative contrasts can be made for Aspect: e.g. IMPF vs no feature (=perfective), and for Voice: PASS vs no feature (=active). In a language that encodes present tense as an absence of a tense feature, the present tense T does not trigger periphrasis since there is no Infl-feature to be stranded and repaired by auxiliary insertion. This is the case in Swahili, a language in which both present perfect and present progressive are simple tenses.

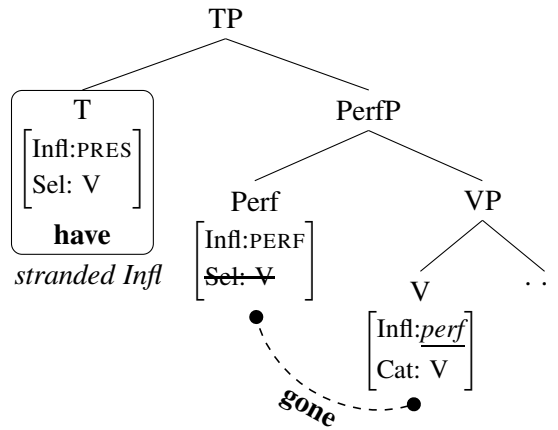
In languages with periphrastic present tenses (like English), all three tense interpretations

(present, past, future) are featurally marked, i.e. are specified with a tense feature. Thus, the tense feature inventory in English differs from that of Swahili as in (18).

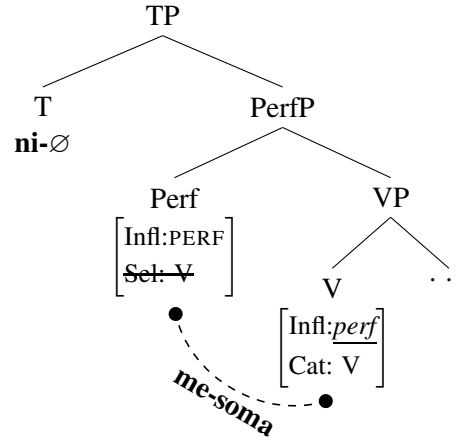
- (18) Tense feature inventories
- a. English: [Infl:PST/PRES/FUT]
 - b. Swahili: [Infl:PST/FUT] (no feature = present tense interpretation)

In Cowper's V-checking implementation, unmarked inflections, such as present T in Swahili, must lack the entire feature bundle containing the Infl-feature and the V-feature.⁶ Compare the derivations of present perfect in English and Swahili, based on the feature inventories in (18).

- (19) *Present perfect in English*
I have gone.



- (20) *Present perfect in Swahili*
ni-Ø-me-soma
1sg-PRS-PERF-read
'I have read'



At this point, it is worth noting the role that c-selection plays in structure building in Cowper's system. One might argue that, given that T has a [Sel:V] feature, its sister should be a VP. Why does T merge with AspP instead? In fact, Cowper assumes that it is s-selectional features that trigger Merge, while c-selectional features are checked immediately at merge. Thus, T and AspP are merged via s-selection, and c-selectional features behave like agreement features: they are checked (immediately) after they appear in the structure. A different account of how T and AspP are merged has to do with extended projections and will be discussed in the next section.

I argue in the next section that the same, underspecification-based account of the overflow pattern is possible without resorting to an insertion mechanism for auxiliaries. Combining Cowper's V-selection component with other common assumption in current syntactic theory gives rise to a system that generates auxiliary verbs in the syntax via regular structure building and derives the overflow pattern.

⁶ To be precise, Cowper assumes that functional heads without Infl-features may still have a [Sel:V] feature, which is checked without Infl-agreement. It's not clear how this would extend to overflow patterns, which Cowper does not discuss. For this reason, I simply assume that the entire feature bundle is absent in unmarked heads.

3 Cyclic Selection

Building on insights in Cowper 2010, Pietraszko 2016, 2017 proposes that default auxiliaries are merged in response to selectional V-features, borne by inflectional heads. Following previous work, Pietraszko assumes that c-selection underlies structure building, but not of extended projections, which are predefined, largely universal hierarchies (i.a. Abney 1987; Grimshaw 1991, 2000; Cinque 1998, 1999; Svenonius 1994; Starke 2001; Williams 2003; Svenonius 2012; Adger & Svenonius 2011; Adger 2013; Ramchand & Svenonius 2014). The idea that extended projections are built in a special way goes back to Abney (1987), who argues that c-selection should only be posited for those instances of structure building that exhibit lexical idiosyncrasies.⁷ For instance, the fact that the English verb *devour* requires a DP object but *eat* doesn't is a lexical c-selectional property of each verb. In contrast, the cooccurrence and relative order of Voice, Asp and T in the clausal spine is immensely regular, within a language and crosslinguistically. Idiosyncrasies of the *devour* vs. *eat* kind are not found. (For instance, there appear to be no languages in which imperfective Asp can select for passive, but not active Voice.) A specific implementation of this distinction was developed by Adger (2010), who proposes two structure-building operations (*HoP* stands for Hierarchy of Projections):

- (21) Two types of structure building (Adger, 2010)
 - a. *Sel-Merge*: c-selection-triggered Merge
 - b. *HoP-Merge*: Merge determined by a fixed order of functional projections

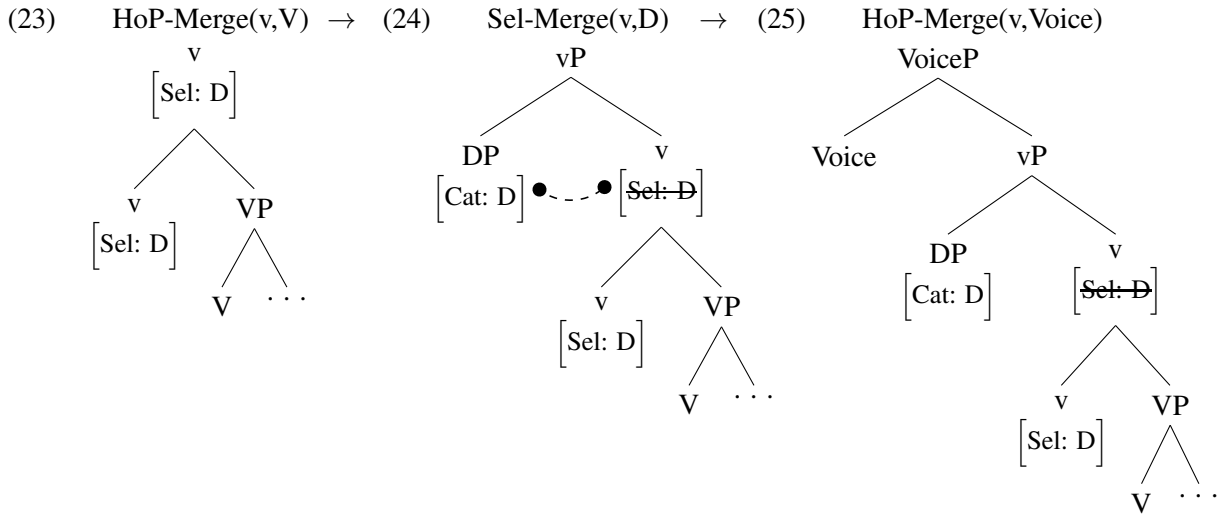
Functional heads that belong to the same extended projection are merged by HoP-Merge, not by Sel-Merge. This in turn means that, if a functional head additionally has a c-selectional feature, this feature must be satisfied by a specifier. As an illustration, consider little *v* which, by assumption, is part of the same extended projection as V and Voice, as shown below:

- (22) A fragment of the verbal extended projection: $\langle \dots \text{Voice}, v, V \rangle$

HoP-Merge maps this list of functional heads to a head-complement sequence. This happens irrespective of what c-selectional features those heads may have. In fact, since little *v* often introduces an argument, it may have a c-selectional D-feature.⁸ This feature will not trigger merge of a DP complement since *v*'s complement must be a VP by (22). Assuming Bare Phrase Structure (Chomsky 1994), the unchecked selectional feature projects to the root node, as in (23), from which position it triggers Sel-Merge of a DP (24) (see also Wood & Marantz 2017). Since the output of Sel-Merge is a *vP*, further building of the verbal extended projection may proceed normally (25).

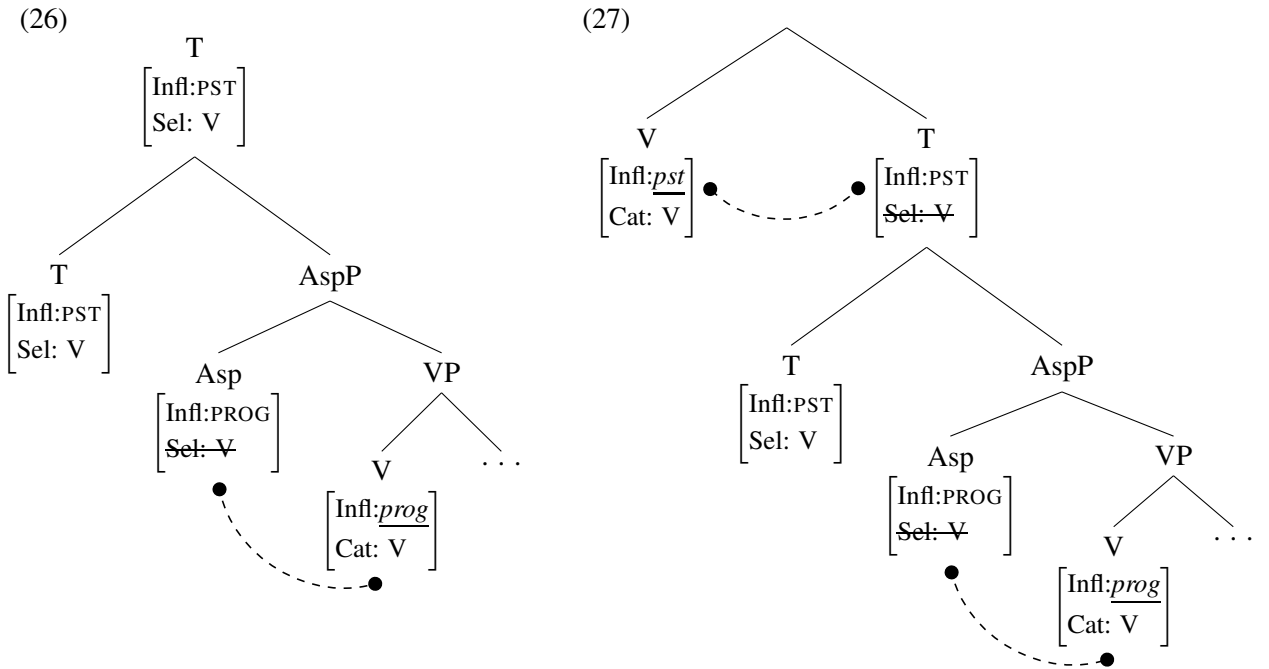
⁷ Abney uses the term *thematic relation* for lexically idiosyncratic selectional relations, and *f-selection* for the relationship between functional heads. Different set of relations is given in Pesetsky 1982, who argues that c-selection (Chomsky 1965's subcategorization) is unnecessary given certain assumptions about case licensing and independent concepts of s-selection and l-selection. Following Svenonius (1994), I treat all instances of syntactically idiosyncratic selection as c-selection.

⁸ Other notations include [uD/uN] (Julien 2002; Adger 2003), [D] (Holmberg, 2000b; Schäfer, 2008; Wood, 2015), [S:D] (Wood & Marantz, 2017) and sometimes EPP (Chomsky, 1995).



In short, then, c-selectional features of functional heads trigger Merge of a specifier, not a complement.

Under [Pietraszko \(2017\)](#)'s account of periphrasis, auxiliaries are merged due to a c-selectional feature of a functional head. Given the HoP/Sel-Merge distinction discussed above, this means that auxiliaries are merged as specifiers. Two assumptions adopted from Cowper are: i) inflectional heads bear the feature bundle [Infl:val, Sel:V], and ii) V-checking takes place under Infl-agreement. Thus, Asp in (26) checks its [Sel:V] against V, but T doesn't. As a result, T's selectional feature projects to the root node and triggers merge of a default/expletive element of the selected category (27). This account of periphrasis does not require defining "stranded inflection", nor positing a special rule of auxiliary insertion.




The process is called *Cyclic Selection*, by analogy with Cyclic Agree ([Béjar & Rezac 2009](#)), since the two share fundamental properties. In both, an operation (Merge or Agree) is triggered

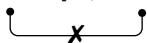
as soon as the probe is merged. If the probe finds an accessible goal in its c-command domain, it establishes a relation with it and becomes deactivated/valued. If, and *only if*, no goal is located in the c-command domain, does the probe project to the root node, from which position it can interact with the specifier. This underlying parallel between Cyclic Agree and Cyclic Selection is responsible for the fact that both show the same last-resort profile. For Cyclic Agree, consider the paradigm from Georgian, where an agreement probe on *v* searches for a DP with participant (1/2person) features (Béjar & Rezac 2009):

(28) A Cyclic Agree paradigm (data from Halle & Marantz 1993:117)

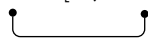
a. Object accessible \rightarrow agreement with object

g-xatav [[v φ_{PART} :—] [VP DP_{PART}]]]
2sg-draw 
 'I draw you'

b. Object accessible \rightarrow agreement with subject impossible

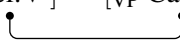
***v**-xatav [VP DP_{PART} [v φ_{PART} :—] [VP DP_{PART}]]]
1sg-draw 
 Intended: 'I draw you'

c. Object inaccessible \rightarrow agreement with subject required

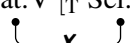
v-xatav [VP DP_{PART} [v φ_{PART} :—] [VP DP]]]
1sg.s-draw 
 'I draw him'

(29) A Cyclic Selection paradigm

a. Main V accessible \rightarrow checking by main V (synthesis):

She work-s. [[T Sel:V] [VP Cat:V]]]


b. Main V accessible \rightarrow checking by Aux V (periphrasis) impossible:

*She i-s work. [TP Cat:V [T Sel:V] [VP Cat:V]]]


c. Main V inaccessible \rightarrow checking by Aux (periphrasis) required:

She is working. [TP Cat:V [T Sel:V] [AspP ...]]]


In both paradigms, a relation with a specifier is possible and required if and only if no goal is accessible inside the probe's complement. This last-resort profile is a natural effect of cyclicity of syntactic operations, be it Agree or Merge.

There is one obvious difference between Cyclic Agree and Cyclic Selection. While c-selective features trigger structure building, agreement probes do not. This means that, after failing the search of its c-command domain, an agreement probe will be valued by its specifier only if such a specifier is independently merged. If it isn't, the probe will remain unvalued and likely give rise to default agreement morphology (Preminger 2011, 2014). In the case of

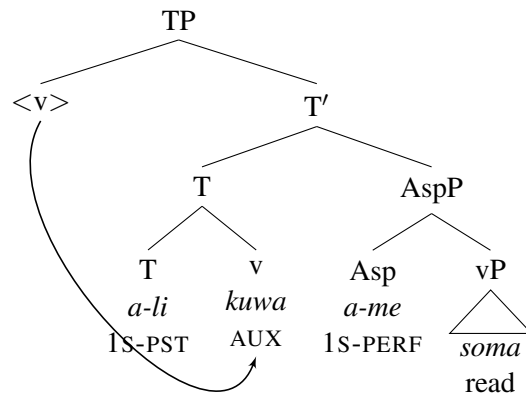
c-selection, the unsatisfied probe is a selectional feature, i.e. a feature that triggers structure building. This means that merge of an appropriate specifier is derivationally inevitable.

Like insertion approaches, Cyclic Selection derives the overflow pattern by featural underspecification. In languages with the overflow pattern, certain inflectional contrasts are encoded privatively. Assuming that inflectionally unmarked heads (like present tense T in Swahili) lack the [Infl:val, Sel:V] bundle, they do not trigger Merge of a verb. The derivation of Present Perfect in Swahili is then the same as in Copwer’s system (20).

Note, finally, that the merge of an auxiliary verb in the specifier position does not interfere with the shape of the extended projection. Since the auxiliary is a selectee, not the selector, it does not project, and the root node is of the same category as before auxiliary selection. This in turn means that the functional category (here TP) can participate in further building of the functional spine according to the Hierarchy of Projections.

A noteworthy aspect of the Cyclic Selection approach is that it involves merging a head in a specifier position. This type of configuration has been argued to arise due to (some types of) head movement (Kayne, 1991; Fukui & Takano, 1998; Toyoshima, 2001; Matushansky, 2006; Vicente, 2007; Harizanov, 2016). If head movement is internal merge of a head as a specifier, Cyclic Selection of an auxiliary is simply the external-merge counterpart of head movement of a verb. Like head movement in Matushansky 2006, Cyclic Selection of an auxiliary is typically followed by m-merger with the selecting head. M-merger of an auxiliary is schematized in (30) for the Swahili Past Perfect. (It is assumed here that TAM heads such as T and Asp each have a φ -probe (Carstens 2001; Pietraszko 2018b)).⁹

(30) *M-merger of an auxiliary (Swahili Past Perfect)*



A further parallel between auxiliary selection and Matushansky’s theory of head movement is that both are triggered by c-selectional features, rendering external and internal merge of a head in the same specifier position mutually exclusive. We thus predict complementarity between merging an auxiliary with a functional head F and moving the lexical verb to F. This prediction appears to be vastly correct (with apparent exceptions in cases where auxiliaries are clitics forming a prosodic unit with a lexical verb, as in Turkish (Kornfilt 1996) or Slavic languages (Borsley & Rivero 1994; Migdalski 2006)). In the remainder of the paper, I assume Matushansky’s theory of head movement for all types of head movement (long and local). I do so, however, largely for simplicity – the data and analysis discussed below are compatible with

⁹ Alternative analyses of multiple agreement in compound tenses include head-to-head φ -agreement (Baker & Willie, 2010) and head-to-head concord (Henderson, 2006).

there being more than one operation displacing heads (Rizzi & Roberts 1989; Embick & Noyer 2001; Hein 2018; Harizanov & Gribanova 2019, Arregi & Pietraszko to appear).

One of Matushansky's core arguments for treating head movement as movement to a specifier position comes from constructions in which m-merger apparently does not apply, leaving a head in the specifier position. In the next section, I argue that the same kind of evidence is available for verbs *externally* merged in the specifier position. The evidence comes Swahili relative clauses.

4 Swahili T-to-C movement: an argument for Cyclic Selection of auxiliaries

Under the Cyclic Selection account, default auxiliaries are verbal heads merged in the specifier position of inflectional phrases, such as TP. As such, they are externally merged counterparts of verbs that move to these positions under Matushansky's theory of head movement. In this section, I present an empirical argument for the Cyclic Selection analysis of auxiliaries. In Swahili, auxiliaries normally undergo m-merger with T. However, m-merger is bleeded in constructions involving syntactic T-to-C movement, which leaves the auxiliary behind.

Matushansky proposes that every step of head movement is immediately followed by m-merger. This is necessary to capture the pervasive absence of excorporation in head movement. Combining this with a Cyclic Selection account of auxiliaries in English, the auxiliary is m-merged with T before T undergoes movement to C (31), giving rise to subject-auxiliary inversion (32).¹⁰

- (31) a. $[C [_{TP} Aux [_{T'} T \dots]] \xrightarrow{\text{M-merger}} [C [_{TP} [_{T'} Aux+T \dots]]]$
 b. $[C [_{TP} [_{T'} Aux+T \dots]] \xrightarrow{\text{T to C}} [Aux+T+C [_{TP} [_{T'} \cancel{Aux+T} \dots]]]$

- (32) Is she <is> working?

If the operations in (31) were reversed and T-to-C movement applied before m-merger, we would expect the auxiliary to not invert with the subject. Only the inflectional affix would then be expected to move to C, in which case it would trigger do-support in C:

- (33) *Do-es $[_{TP} she [_{T'} be [_{T'} <-es>] working]]$?

The ungrammaticality of (33) leads to the conclusion that m-merger of the auxiliary in English applies before T-to-C movement. Given this, the original specifier position of the auxiliary is difficult to detect. Subject-auxiliary inversion equally follows from a theory in which the auxiliary is inserted directly in T, whether by an auxiliary-insertion process or by GB-style head movement from a lower position. One way to empirically distinguish the two analyses is by identifying cases in which m-merger does not apply or does not apply immediately after head movement. I demonstrate below that the latter is the case in Swahili compound tenses. T to C movement in Swahili gives rise to the counterpart of the ungrammatical English example in (33).

Swahili relative clauses may be formed with or without an overt complementizer (Barrett-Keach 1985). Whether overt or not, the relative C agrees with the relative head, here *book*. The overt complementizer has the form *amba*.

¹⁰This order of operations is equally necessary under the view that the auxiliary is base-generated below TP and undergoes Matushansky-style head movement to T.

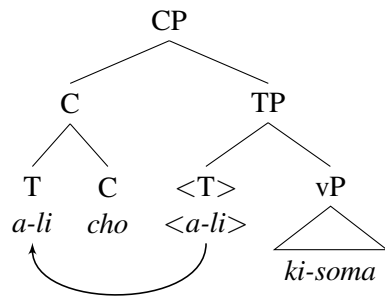
- (34) kitabu [_{CP} amba-cho a-li-ki-soma]
 7book COMP-C7 1S-PST-7o-read
 ‘the book that he read’

When the relative C is null, some head undergoes movement to C (Kinyalolo 1991; Ngonyani 1999; Demuth & Harford 1999; Henderson 2003; Ngonyani 2006), bringing T to the left of the relative agreement suffix. Interestingly, only the material in T inverts with C, leaving the verb to the right of the complementizer:

- (35) a. kitabu [_{CP} a-li-cho- ki-soma]
 7book 1S-PST-C7- 7o-soma
 ‘the book that he read’
 b. *kitabu [_{CP} a-li-ki-soma-cho]
 7book 1S-PST-7O-soma-C7

The standard analysis of this pattern is based on an independently motivated claim that, in most Swahili clauses, V does not move to T (Buell 2002; Henderson 2003; Ngonyani 2006; Pietraszko 2018a). In the absence of V to T movement, T to C movement inverts T and C only, causing the verb to be linearized to the right of C (36).

- (36) Derivation of (35-a)



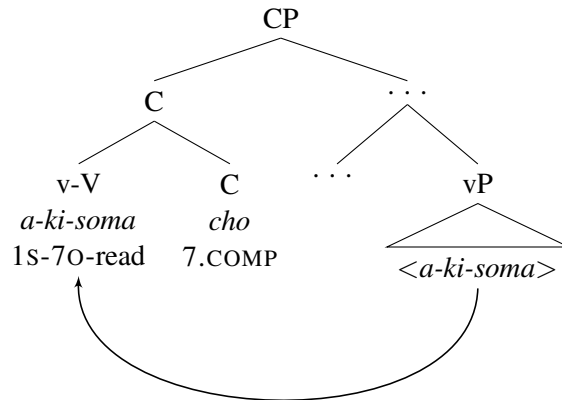
Three major arguments can be given for the analysis in (36). The first come from affix order: if V moved to T, we would expect it to appear on the same side of C as T, contrary to fact. Importantly, the T-C-V affix order is problematic not only under the assumption that head movement can only result in left-adjunction (the LCA, Kayne 1994). It arises even if we assume that morphemes can have idiosyncratic prefix/suffix status. V to T to C movement would create a complex head in which T and V form a constituent to the exclusion C. As such, V and T cannot be linearized on different sides of C (Mirror Principle, Baker 1985, 1988). Assuming that syntactic operations apply cyclically, Mirror Principle violations can only arise due to an interaction of two (or more) operations displacing heads (Harley 2010; Myler 2013, 2017; Harizanov & Gribanova 2019; Zyman & Kalivoda 2020, Arregi & Pietraszko to appear). V to T to C head movement cannot derive this affix order.

The second argument, often presented in the literature, is that there exist constructions in which the verb moves to C in Swahili: so called *tenseless relatives*. Crucially, in those constructions the verb is linearized to the left of C:

- (37) kitabu [_{CP} a-ki-soma-cho <a-ki-soma>] *reduced (tenseless) relative*
 7book 1S-7O-read-C7
 ‘the book that he reads’

Swahili tenseless relatives have been analyzed as reduced relative clauses, with a deficient or a missing T (Henderson 2003; Ngonyani 2006). In the absence of T, it is the verb that becomes the target of head movement triggered by the relative C:¹¹

(38) Structure of (37) after m-merger



The main point of this comparison is that, when a verb does move to C, it is linearized to its left. This, in turn, supports the non-movement analysis of tensed relatives, in which the verb follows C.

And third, the absence of V to T to C movement in the past tense is corroborated by prosody. In Swahili, every prosodic word receives penultimate stress (Barrett-Keach 1986). A verb that moves to C, as in (38), forms a prosodic word with C (39-a): there is a single penultimate stress assigned to the material hosted in C. In contrast, a tensed relative (35-a) bears both a primary and a secondary stress, each assigned on the penultimate syllable of the complex heads that emerge if V does not move to T (39-b).

- (39) a. $[_{C+V} \text{ a.ki.so.ma.cho }] \rightarrow \text{akiso'macho}$ (not: a.kiso'macho)
 b. $[_{C+T} \text{ a.li.cho }] [_{v} \text{ ki.so.ma }] \rightarrow \text{a.lichoki'soma}$

Henderson analyzes this contrast as stress assigned in each phase (vP and CP). An alternative view assigns stress within a complex head (Pietraszko 2018a). In either case, the crucial fact is that the past tense contains both a primary and a secondary stress, while the tenseless relative does not. This corroborates the analysis of tenseless relatives as involving V to C movement and of past tense relatives as involving two separate complex heads, in v and in C, each mapped into their own prosodic unit. The two prosodic units are then mapped into a single Phonological Word, resulting in the emergence of primary and secondary stress. This view assumes that PWords need not correspond to syntactic constituents (Julien 2002).

Turning to auxiliaries, recall that the insertion approach posits that the auxiliary is inserted in T. The prediction is, then, that auxiliaries should invert with the relative C under T to C movement. This is not what we find in Swahili:

¹¹ Note that, despite lacking tense, the fronted lexical verb is inflected for subject agreement. It's important to keep in mind at this point that, in Bantu languages, the presence of a subject agreement morpheme is not indicative of the presence of T. Subject agreement may be reflected on a broad range of functional heads in the clausal spine, including Perf, Asp and Voice/v (i.a. Kinyalolo 1991; Carstens 2001; Henderson 2006; Pietraszko 2017, 2018b).

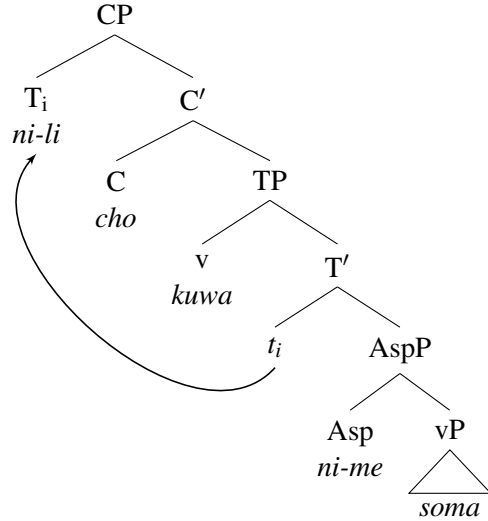
- (40) *kitabu [CP ni-li-kuwa-**cho** ni-na-soma]
 7book 1SG-PST-AUX-C7 1SG-PROG-read
 ‘the book that I was reading’

Instead, auxiliaries behave like verbs that do *not* move to T – they follow the T-C complex:

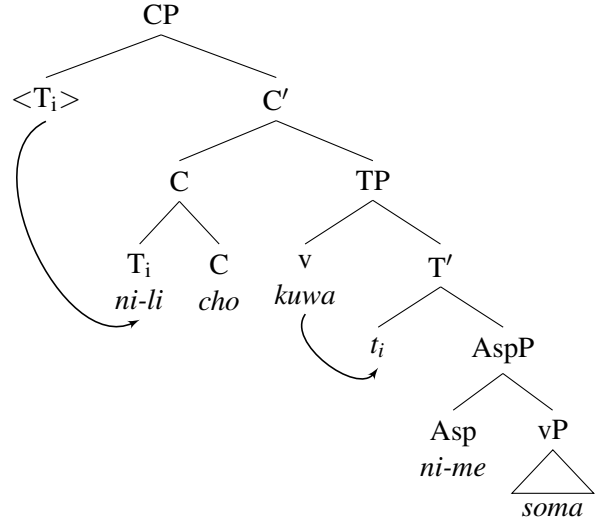
- (41) a. kitabu [CP ni-li-**cho**-kuwa ni-na-soma]
 7book 1SG-PST-C7-AUX 1SG-PROG-read
 ‘the book that I was reading’

In contrast, the Cyclic Selection analysis captures these facts in a straightforward way. They are a case of m-merger not applying immediately after a head is merged in a specifier position. By hypothesis, Swahili differs from English in that the structure is not sent to PF until the CP phase is complete.¹² First, the auxiliary *kuwa* is merged as Spec,TP. Subsequently, T to C movement applies, displacing T, but not the auxiliary, to C (42). At PF, m-merger creates a T-C complex head, while the auxiliary forms a complex head on its own¹³.

- (42) T to C movement (Syntax)



- (43) M-merger (PF)



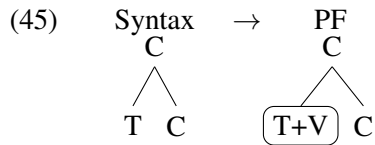
As predicted, the auxiliary and the T-C complex form separate prosodic domains, as evidenced by the presence of a penultimate stress in each:

- (44) [ni.li.cho] [ku.wa] → ni.li'cho'kuwa

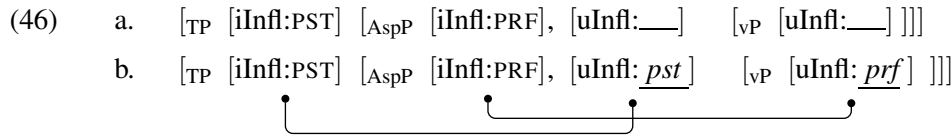
¹² The necessity of immediate spellout of every phrase targeted by head movement is undoubtedly a controversial aspect of Matushansky's theory. Under the standard assumption that only vPs and CPs are sent to spellout, we would expect the Swahili pattern to be more common. Matushansky suggests that m-merger need not entail complete spellout, including Vocabulary Insertion, to the effect that every phrase may be sent to spellout just for m-merger and only vP and CP involve complete spellout. In these terms, the Swahili facts would mean that TP in this language is not sent to PF even just for m-merger. Another solution is that Matushansky-style movement of heads is the correct theory of only some instances of head movement, certainly including long head movement. Local head displacement may be the result of a different operation (e.g. GB head adjunction, Conflation (Harley 2004), Amalgamation (Harizanov & Gribanova 2019), Generalized Head Movement (Arregi & Pietraszko to appear)). Under these assumptions, auxiliary selection would be the external merge counterpart of long head movement. Resolving this issue is beyond the scope of this paper and it has no immediate significance for its main claims.

¹³ I leave open the question of whether the auxiliary undergoes m-merger with the unpronounced copy of T or not. This determination may depend on the assumed theory of local head movement and it happens to be immaterial here.

The affix order in Swahili relative clauses resists analysis under insertion approaches to verbal periphrasis. If the default auxiliary is inserted in T in syntax, movement of T to C without the auxiliary would require excorporation. Allowing excorporation freely fails to capture the pervasive roll-up nature of head movement that led to the Mirror Generalization. For this reason, I assume, following previous literature (Harley 2010; Myler 2013, 2017; Harizanov & Gribanova 2019; Zyman & Kalivoda 2020, Arregi & Pietraszko to appear), that attested violations of the Mirror Principle are due to other operations, with head movement proper being fully cyclic roll-up movement, which, by itself, can only create Mirror-Principle obeying structures. The Swahili facts are equally problematic for approaches that treat auxiliary insertion as a post-syntactic process (Embick, 2000; Bjorkman, 2011; Fenger, 2018; Calabrese, 2019). If the auxiliary is inserted in T at PF, we incorrectly predict that, in cases of T-to-C movement, the auxiliary should appear in C:



Finally, I'd like to address a possible reanalysis of these facts adopting a particular detail of Bjorkman (2011)'s insertion approach, namely that Asp has both a valued and an unvalued Infl-feature:¹⁴



For Bjorkman, only the uninterpretable uInfl features count as stranded inflections, triggering auxiliary insertion when not appearing in a complex head with a V. Thus, the offending Infl-feature in (46) is [uInfl:pst] in Asp, not [iInfl:PST] in T. Auxiliary insertion would then insert a dummy verb in Asp. Assuming that there is no Asp to T movement in Swahili, this analysis has the potential to derive the fact that the auxiliary does not move to C under T to C movement.

There is good reason to think, however, that the auxiliary is not inserted in Asp. As discussed above, Asp has its own exponent: the prefix *me-*, preceded by a subject agreement affix. The exponent of Asp forms a unit with the lexical verb, to the exclusion of the auxiliary. For instance, it can be separated from the auxiliary by an adverb:

- (47) Ni-li-kuwa tayari ni-**me**-ki-soma.
 1sg-PST-AUX already 1sg-PERF-7o-read
 'I had already read it.'

On the other hand, there is evidence that *me* is not the exponent of [uInfl:prf] in V. The prefix can be separated from V by morphology exponents higher than V, e.g. by object agreement, in (47). The head hosting an object agreement probe is itself fairly high in the argument structure domain – higher than heads introducing applied objects and causees, as these argument control object agreement. Thus, the head exponed by *me-* must be located outside of the argument structure domain. Indeed, the standard analysis of clauses like (47) in Swahili is that in (48) (i.a. Carstens & Kinyalolo 1989; Carstens 2001; Ngonyani 2006).

¹⁴In Bjorkman's systems, is true for all functional heads except the highest one (here T). See also Adger 2003; Wurmbrand 2011.

(48) . . . [AspP ni-me [VoiceP/AgrOP ki- [vP soma]]]

Together, these facts point to the conclusion the auxiliary is not inserted in Asp: the exponent of Asp_{Perf} is *me-*, and it does not form a complex head with the auxiliary. (The same conclusions about Swahili compound tenses was reached by Carstens & Kinyalolo (1989), who also propose that the default auxiliary is inserted in T). On the other hand, these facts are fully compatible with the Cyclic Selection derivation: since the auxiliary is in Spec,TP, (47) is derived by assuming (48) and merging the adverb with AspP.

5 Conclusion

I argued that the overflow pattern of periphrasis does not constitute evidence that auxiliaries are subject to an insertion process different from regular syntactic structure building. I contend, following previous literature, that this type of distribution necessitates a last-resort analysis of default periphrasis. Such an analysis, however, does not require a new structure building operation ("insertion"). Assuming Bare Phrase Structure and cyclicity, Merge is *predicted* to give rise to last-resort structure building in the right featural context. I then demonstrated that last-resort structure building, called Cyclic Selection, finds empirical support in Swahili, where T to C movement strands the auxiliary verb in TP. This type of interaction between T to C movement and periphrasis strongly suggests that auxiliary verbs are not inserted in T directly.

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