

**Size matters: auxiliary formation in the morpho-syntax and morpho-phonology**  
**Paula Fenger, University of Connecticut**

Recent work has shown that dummy AUX(iliaries) arise when two features compete for the same word (Kiparsky 2004, Bjorkman 2011, Pietraszko 2017). I show that this pattern is also found in agglutinating languages. However, this effect can be obscured by a rebracketing process (Embick and Noyer 2001) that combines two morphological words (V and AUX) into a single word. Careful attention to the domains of different phonological processes reveals the smaller words within words, showing that the same processes that create auxiliaries due to feature markedness constraints apply in agglutinating languages.

**Auxiliaries arise contextually.** An example of dummy AUX insertion is found in Turkish, which has two auxiliaries, *ol-* and *i-/y-* (Sağ 2013, Göksel 2001, Kornfilt 1997 a.o.). The presence of these AUX forms does not depend on a single feature, but on specific marked feature combinations. E.g. the morphemes for FUT(URE) and PROG(ESSIVE) can each be expressed on the main verb (1a-b), but even though both features can be used together, they cannot occur in a single word, (2a). Instead an AUX is needed to host one of the features, (2b). Stress is indicative of two words: generally stress falls on the last syllable of each word. In case of V+AUX, stress falls only on the last syllable of the main verb, patterning with phrasal compounds in Turkish, where stress falls on the left most member only (cf. Güneş 2009, Kabak and Vogel 2003).

- (1) a. Hasan çay-ın-ı iç-i'yor                      b. Hasan yarın ödev-in-i bitir-e'cek  
       H. tea-3.SG-ACC drink-PROG                H. tomorrow assignment-3SG-ACC finish-FUT  
       ‘H. is drinking his tea’                    ‘H. will finish his assignment tomorrow’
- (2) (yarın saat beş-te mektup) a. \*yaz-ıyor-aca'ğ-ım                      b. yaz-ı'yor ol-acağ-ım  
       tomorrow o'clock five-LOC letter                write-PROG-FUT-1.SG                write-PROG AUX-FUT-1.SG  
       ‘Tomorrow at five o'clock I will be (in the process of) writing a letter’                      (Kornfilt 1997)

For (2) it is not the case that FUT is inherently specified for occurring with AUX, since FUT can be expressed on the main verb and can co-occur with other inflectional morphemes; nor can PROG be specified for being the last suffix on a verb, since it can be followed by other suffixes and occur on AUX. Importantly, it is the combination of specific features that are not possible on one verb, which means AUX arises when two features compete for the same slot (Embick 2000, Kiparsky 2004, Bjorkman 2011, Pietraszko 2017).

**An apparent contradiction.** Apart from *ol-*, there is an AUX which phonologically alternates between *i-* and the glide *y-*, where *i-* occurs at the beginning of a word and *y-* otherwise. Both *ol-* and *i/y-* are the same underlyingly (Sağ 2013, Kornfilt 1997), where *i-/y-* occurs with EVID(ENTIALS), PAST and COND(ITIONALS) and *ol-* otherwise. Thus, the conditions for *i-* to arise are similar to *ol-*: only when two features cannot co-occur on a single verb, AUX is inserted and phrasal stress arises because there are two words, (3a). However, when *i-* is a glide, (3b), the stress pattern remains identical (indicating two words), but there is only one domain for vowel harmony: COND harmonizes with *i-* in (3a), but with *kal-* in (3b), indicating that AUX and the main verb form one word. Apart from this difference, (3a-b) are identical.

- (3) a. kal-'di i-se-niz                                      b. kal-'di-y-sa-niz  
       stay-PST AUX-COND-2.PL                      stay-PST-AUX-COND-2.PL  
       ‘If you have stayed’                            ‘If you have stayed’

Thus, (3b) seems contradictory: (I) AUX is indirectly needed because PST and COND cannot be expressed in the same word, also indicated by stress, but (II) there is only one vowel harmony domain in (3b), which means both PST and COND are in the same word. I now show how this apparent paradox can be resolved.

**Analysis part I: failed head movement forms two X<sup>0</sup>.** I assume dummy AUX can arise as an indirect result of the failure of head movement (cf. Embick 2000). I combine this with the idea that there are certain co-occurrence constraints that block head movement. More precisely, I propose that head movement is blocked due to constraints against the co-occurrence of specific feature combinations inside a single complex head (X<sup>0</sup>), illustrated in table 1i. This constraint leads to stranding of the inflectional feature higher in the clausal spine (table 1ii). To still express both features in the same clause, an AUX is inserted as a host for the stranded inflectional feature, since Turkish disallows inflectional morphemes without hosts (table 1iii-iv), cf. Lasknik’s (1976) Stray Affix Filter. After this, the morpho-phonology takes care of vocabulary insertion (table 2i). I assume that stress and vowel harmony (VH) apply to every

highest  $X^0$ , in this case both the main verb and the AUX (table 2ii-iv). The verb+AUX behaves as a phrasal compound, which receive stress on the leftmost element (2iii, following Güneş 2009, Kabak and Vogel 2003). This derives (2b), and more generally cases of AUX insertion for different features, including (3a).

Table 1: Morpho-syntax			Table 2: Morpho-phonology		
i	Constraint	*[PROG, FUT] <sub>X0</sub>	i	Vocabulary	[vaz-ıyor] [ol-AcAk-Im]
ii	Head mov't	[[V PROG] [FUT]]	ii	Stress	[vazı'yor] [olAcAk'Im]
iii	Infl Constraint	*[INFL] <sub>X0</sub>	iii	Phrasal stress	[vazı'yor] [olAcAKIm]
iv	Aux insertion	[[V PROG] [AUX FUT]]	iv	Vowel Harmony	[vazı'yor] [olacağ'im]

**Analysis part II: lowering after VI forms new  $X^0$ .** To account for the alternation between (3a-b), I propose an analysis inspired by Kornfilt (1996). The data can be accounted for if we assume that rebracketing (Noyer and Embick 2001) takes place (I) after vocabulary insertion and stress assignment and (II) before VH. Just as above, I assume a constraint \*[PST, COND]<sub>X0</sub> which blocks head movement and strands COND; a dummy AUX is inserted to host COND. Vocabulary insertion and stress proceeds similarly too: two  $X^0$ 's indicates two stress domains (table 3ii), phrasal stress deletes the right most stress (table 3iii). What is optional for *i/y-* (and impossible in (2)) is rebracketing (table 3iv) which merges the two  $X^0$ 's that make up the phrasal compound, creating a larger  $X^0$  node: compare Table 3iv-A where lowering does not take place and *y* becomes *i-* and B where lowering takes place. Now, when VH applies (v), it finds two  $X^0$  in table 3A, leading to two VH domains, but one  $X^0$  in table 3B, leading to one VH domain.

Table 3		A. kal-'di	i-se-niz	B. kal-'di-y-sa-niz
i	Vocabulary	[kal-TI] <sub>X0</sub>	[y-sA-nIz] <sub>X0</sub>	[kal-TI] <sub>X0</sub> [ysA-nIz] <sub>X0</sub>
ii	Stress	[kal'TI] <sub>X0</sub>	[ysA'nIz] <sub>X0</sub>	[kal'TI] <sub>X0</sub> [ysA'nIz] <sub>X0</sub>
iii	Phrasal Stress	[kal'Ti] <sub>X0</sub>	[ysAnIz] <sub>X0</sub>	[kal'Ti] <sub>X0</sub> [ysAnIz] <sub>X0</sub>
iv	Rebracketing	[kal'TI] <sub>X0</sub>	[isAnIz] <sub>X0</sub>	[kal'TIysAnIz] <sub>X0</sub>
v	Vowel harmony	[kal'di] <sub>X0</sub>	[ise'niz] <sub>X0</sub>	[kal'diysa'niz] <sub>X0</sub>

This means that even in an agglutinating language such as Turkish dummy AUX are found, even though this can be obscured by a rebracketing operation, leading to a new  $X^0$ . This operation crucially applies after syntax, when the specific feature values are not present anymore.

**Language variation.** The formation of two  $X^0$  due to markedness constraints, AUX insertion and rebracketing should be independent of each other. Bantu languages can be analyzed as having markedness constraints, but sometimes insert dummy AUX (Kinande, Bjorkman 2011 and Ndebele, Pietraszko 2017), and sometimes only have rebracketing: It has been shown there is a phonological split between V and the INFL domain (Barret-Keach 1986, Myers 1987), even though both INFL and V behave as a single word.

Another language with constraints and rebracketing, but no AUX insertion is Japanese. Like Turkish, accent shifts with the addition of suffixes and always falls in the same place, (4). However, with specific feature combinations, in this case PROG and PAST (5), accent does not shift. I assume (5) is parallel to (3b), with one difference. Both patterns arise due to conflicting features competing for one  $X^0$ , in case of (5) PST and PROG and one  $X^0$  is created due to rebracketing. However, no AUX is inserted in Japanese because there is no constraint against stranded affixes.

(4) a. ha'tarak-u	b. hatarak-a'se-ru	c. hatarak-ase-ra're-ru	(5) hir'ak-e-tei-ta
work-INFL	work-CAUS-PRES	work-CAUS-PASS-PRES	open-INTR-PROG-PAST
'to work'	'Make X work'	'X is made to work'	'was opening X'

**Conclusion.** Paying attention to phonological processes reveals that dummy AUX insertion is also found in agglutinating languages, but can be obscured by a rebracketing operation that takes place after vocabulary insertion. Thus words can consist of sub-words, shown with different phonological phenomena; Moreover, the data presented here support the need for ordering of operations in the morpho-phonology.

**Sel. Refs:** Bjorkman, 2011, BE-ing Default: the Morphosyntax of Auxiliaries. Embick, 2000, Features, Syntax, and Categories in the Latin Perfect. Göksel, 2001, The auxiliary verb *ol* at the morphology-syntax interface. Kornfilt, 1996, On copular clitic forms in Turkish. Pietraszko, 2017, Inflectional Dependencies: A study of complex verbal expressions in Ndebele. Sağ, 2013, Copula in Turkish.