A Fixed Hierarchy for Wolof Verbal Affixes

LESTON BUELL and MARIAME SY
University of California, Los Angeles

0.　　Introduction

This article examines the valence-changing verbal suffixes of Wolof, a West Atlantic language spoken primarily in Senegal and the Gambia. The challenge is to account for the various attested and ungrammatical suffix orders in forms where two or more suffixes are combined. It will be shown that a straight-forward head movement account is inadequate, if Baker's (1998) Mirror Principle is assumed. Instead, an analysis using phrasal movement will be argued for without appealing to any head movement. Wolof verbal extensions are taken to have a derivational pattern similar to that of verbal complexes, and to be amenable to a similar analysis as in Koopman and Szabolcsi (2000). The idea behind this article is taken from an analysis sketched out in a Koopman (2004), which itself is a response to Buell and Sy (2004).

1.　　Characteristics of the Analysis

A close correspondence between syntax and morphology is assumed. Words are taken to be built in the syntax, using only the usual syntactic mechanisms. Furthermore, with respect to head movement, the surface order of morphemes in a complex head is assumed to reflect the order of head adjunction operations, as required by the Mirror Principle. Establishing the underlying hierarchy of Wolof's valence-changing morphemes will lead us to observe Mirror Principle violations, forcing us to abandon a head movement approach. Instead, phrasal movement must be appealed to. This approach will generate all the attested morpheme orders.

　　Blocking unattested affix orders will depend on the concept of complexity filters (Koopman and Szabolcsi 2000). A complexity filter can be described as a lexically specified constraint on a head which requires its specifier at spell-out to not exceed a particular degree of complexity, defined here as the degree to which the feature to be checked is embedded. The concept of complexity filter will be taken up in greater detail at the point where it becomes relevant.

　　We argue that the range of Wolof valence-changing morpheme orders points to a single underlying hierarchy, namely: ImpCaus > Caus > Ben > Instr > V.

The analysis presented here thus contrasts with Buell and Sy (2004), which uses a variable hierarchy to account for the various orders.

2.   Simple Cases of Verbal Extensions

Here is a simple Wolof sentence, which we will use as a basis to illustrate the valence-changing suffixes:

(1) Faatu   togg   na   jën   wi.
    Faatu   cook   *na*   fish   the
    "Faatu cooked the fish."

The valence-changing suffixes we are concerned with are illustrated below:

(2) Benefactive (Ben, al_{Ben})
    Faatu   togg   ***al***   na   Gàllaay   jën   wi.
    Faatu   cook   BEN   *na*   Gàllaay   fish   the
    "Faatu cooked the fish for Gàllaay."

(3) Instrumental (Instr, e_{Instr})
    Faatu   togg   ***e***   na   jën   wi   (ag)   diwtiir.
    Faatu   cook   INSTR   *na*   fish   the   with   palm.oil
    "Faatu cooked the fish with palm oil."

(4) Causative (Caus, loo_{Caus})
    Faatu   togg   ***loo***   na   Gàllaay   jën   wi.
    Faatu   cook   CAUS   *na*   Gàllaay   fish   the
    "Faatu had/made Gàllaay cook the fish."
    (Causer = Faatu, Causee = Gàllaay)

(5) Impersonal causative (ImpCaus, $lu_{ImpCaus}$)
    Faatu   togg   ***lu***   na   jën   wi.
    Faatu   cook   IMP.CAUS   *na*   fish   the
    "Faatu had someone cook the fish."

We will assume that these affixes are merged somewhere above the lexical verb, as illustrated below with the benefactive suffix:

(6)
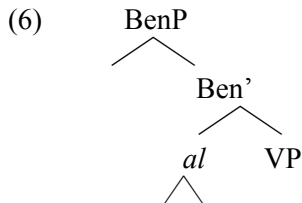
While it is these suffixes we are concerned with in this article, other suffixes

exist, including a locative, subject and object argument absorbers, and a different causative suffix used only with stative verbs. The remainder of the article focuses on deriving the orders of different combinations of the Ben, Instr, Caus, and ImpCaus illustrated above. In (7) is an exhaustive list of the grammatical combinations of these affixes.

(7)　　V-al_{Ben}-e_{Instr}, *V-e_{Instr}-loo_{Caus}*, V-loo_{Caus}-al_{Ben}, V-$lu_{ImpCaus}$-al_{Ben},
　　　　V-$lu_{ImpCaus}$-loo_{Caus}, V-e_{Instr}-loo_{Caus}-al_{Ben}, V-al_{Ben}-e_{Instr}-loo_{Caus},
　　　　V-$lu_{ImpCaus}$-al_{Ben}-e_{Instr}, V-$lu_{ImpCaus}$-loo_{Caus}-al_{Ben},
　　　　V-$lu_{ImpCaus}$-loo_{Caus}-al_{Ben} -e_{Instr}　V-$lu_{ImpCaus}$ -e_{Instr}[1]

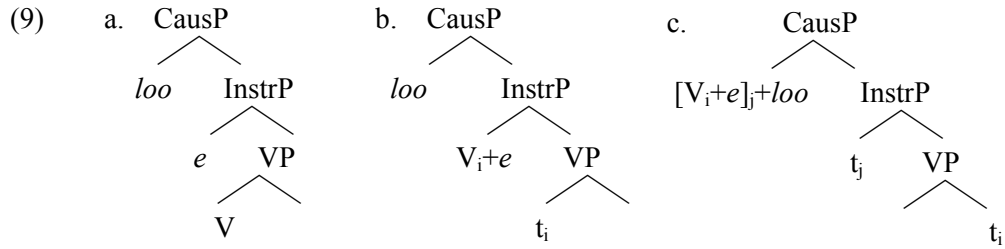## 3.　　Establishing the Underlying Hierarchy

For the moment, we will ignore the ImpCaus suffix, whose morphological position is constant, and consider just the Caus, Ben, and Instr suffixes. Taking into account two-affix combinations to establish the structural hierarchy for these affixes, assuming that they are attached to the verb by head movement leads to a contradiction as evidenced in the following cases.

　　First consider combinations of the Instr and Caus suffixes. The order for this combination is always V e_{Instr} loo_{Caus}:

(8)　a.　Gàllaay　　dóór　***e***　　***loo***　na　　Faatu　xeer　bi
　　　　　(ag)　　bant.
　　　　　Gàllaay　　hit　　INSTR　CAUS　*na*　　Faatu　stone　the
　　　　　with　stick
　　　　　"Gàllaay made Faatu hit the stone with a stick."
　　b.　*　　　　….dóór　***loo***　***e***　　na　　　...
　　　　　　　　　hit　　CAUS　INSTR　*na*

In a head movement account, this requires the Caus^0 head to be higher than the Instr^0 head in the structure. This is because, by the Mirror Principle, the Caus^0 suffix is farther from the verb root than the Instr^0 suffix and hence higher in the structure than Instr^0 and Caus^0 must hence attach to the verb root first. The derivation is shown here:

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[1] This combination and order of $lu_{ImpCaus}$ and -e_{Instr} occurs in wh-questions questioning the instrument, but not in statements. There seems to be a co-occurrence restriction between these two affixes in certain types of structures; as these restrictions have not been investigated further, we leave them for future research. For our purposes, it only matters which order they appear in whenever they co-occur.

(9)   a.   CausP   b.   CausP   c.   CausP

      loo   InstrP   *loo*   InstrP $[V_i+e]_j$+*loo*   InstrP

          e   VP V_i+*e*   VP t_j VP

             V t_i t_i

Now let's turn to the Ben and Instr suffixes, where the surface order is always V *al*$_{Ben}$ *e*$_{Instr}$:

(10)   a.   Gàllaay   togg   ***al***   ***e***   na   Faatu yàpp   diwtiir.
           Gàllaay   cook   BEN   INSTR   *na*   Faatu meat   palm.oil
           "Gàllaay cooked Faatu some meat with palm oil."
     b.   *   ...   togg   ***e***   ***al***   na   ...
                    cook   INSTR   BEN   *na*

In a head movement account, and for the same Mirror Principle considerations just explained, this requires Instr^0 to be higher than Ben^0 in the structure: InstrP > BenP.   Finally consider Caus and Ben, with only the surface order *loo*$_{Caus}$ *al*$_{Ben}$:

(11)   a.   Gàllaay   bind   ***loo***   ***al (lool)***   na   gan   gi   xale   yi
           taalif.[2]
           Gàllaay   write   CAUS   BEN   *na*   visitor   the   child   the
           poem
           "Gàllaay made the children write the visitor a poem."
     b.   *   ...   bind   ***al***   ***loo***   na   ...
                   write   BEN   CAUS   *na*

In precisely the same way as before, in a head movement account, this requires Ben^0 to be higher than Caus^0 in the structure: BenP > CausP.

At this point, then, it would appear that we have established three facts: BenP > CausP, CausP > InstrP, and InstrP > BenP. However, by transitivity, these "facts" lead to a contradiction. Assuming BenP > CausP and CausP > InstrP, by transitivity we deduce BenP > InstrP, which contradicts our earlier conclusion InstrP > BenP. Therefore, we need to look for some other diagnostic to find the underlying hierarchy. In so doing, we might want to take into account the fact that in four-affix combinations only one order is possible:

(12)   V *lu*$_{ImpCaus}$ *loo*$_{Caus}$ *al*$_{Ben}$ *e*$_{Instr}$

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[2] Certain combinations of affixes which result in the concatenation of two vowels undergo syncope or coalescence depending on the types of vowels that come into contact.   In such cases, pronunciation is indicated in parentheses.

Given that we expect the increased number of affixes to lead to a greater degree of restrictiveness, it seems reasonable to take this order as indicative of the following hierarchy of merger for all Wolof verb forms:
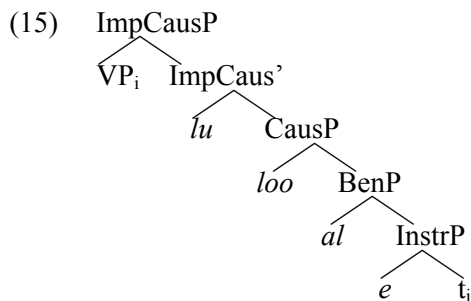
(13) $lu_{\text{ImpCaus}} > loo_{\text{Caus}} > al_{\text{Ben}} > e_{\text{Instr}} > \text{V}$

Further evidence in support of the idea that the hierarchy in (13) is correct can be found in the relative semantic scope of the Caus and Instr predicates.

(14) a. Jàngalekat   bi   bind-   lu-   loo-   al-   e   (luloole)   na
       xale   yi   gan   gi   taalif   bi   **kereyon**.
       teacher   the   write-   IMPCAUS-CAUS-   BEN-   INSTR   *na*
       child   the   guest   the   poem   the   pencil
       "The teacher made the children have someone write the poem
       for the guest **with a pencil**."
       [force [someone write the poem *with a pencil*]]
   b. *   ...   **yar**.
               whip
         "...**with a whip**."
       *[force *with a whip* [someone to write a poem]]

As indicated by the bracketed paraphrases, the instrumental predicate can modify the lower predicate WRITE A POEM in (14a), but cannot modify the higher, causative predicate as attempted in (14b). Thus, there seems to be a fixed hierarchy for ImpCaus and Instr: ImpCaus > Instr. What this example shows is that the instrument modifies the predicate which is embedded by the predicate of causation. This would be entirely unexpected if Instr^0 was actually merged higher than Caus^0. Assuming head movement would thus lead to admitting a Mirror Principle violation.

The form in (12) cannot be formed by head movement. Rather, it must be formed by moving the verb root to a position preceding the ImpCaus^0 head, the highest head in our hierarchy:

(15)   ImpCausP
         /\
      VP$_i$ ImpCaus'
           /\
         lu   CausP
              /\
           loo   BenP
                 /\
               al   InstrP
                    /\
                  e   t$_i$

Most of the attested affix orders can, in fact, be derived in the very same fashion, as shown in the table (16), in which each of the morphemes used is numbered to make clearer the way the V (always the first head merged and hence

the highest number) has moved alone to precede any higher affixes. These orders are called "stranding orders" because the verb strands its affix rather than pied-piping it.

(16)   Pure stranding orders

		Surface Order		ImpCaus	Caus	Ben	Instr	V
				1	2	3	4	5
				lu	*loo*	*al*	*e*	V
a.	51234	V-*lu*_{ImpCaus}-*loo*_{Caus}-*al*_{Ben} -*e*_{Instr}		1	2	3	4	5
b.	4123	V-*lu*_{ImpCaus}-*loo*_{Caus}-*al*_{Ben}		1	2	3		4
c.	4123	V-*lu*_{ImpCaus}-*al*_{Ben}-*e*_{Instr}		1		2	3	4
d.	312	V-*lu*_{ImpCaus}-*loo*_{Caus}		1	2			3
e.	312	V-*lu*_{ImpCaus}-*al*_{Ben}		1		2		3
f.	312	V-*lu*_{ImpCaus}-*e*_{Instr}		1			2	3
g	312	V-*loo*_{Caus}-*al*_{Ben}			1	2		3
h.	312	V-*al*_{Ben}-*e*_{Instr}				1	2	3

4.   Successive Inversion and Complexity Filters

With a verbal head and valence-changing suffixes, we expect the verbal head to raise stepwise, with each successive suffix appearing at the end of the head which adjoins to it, as in the following case from Zulu:

(17) a.   Ba-   zo-   fihl₃-   el₂-   an₁-   a   imali.
           2.SBJ-   FUT-   hide-   APPL-   RECIP-   FV   9.money
           "They will hide money from each other."
           [from each other [hide money]]

      b.   Ba-   zo-   fihl₃-   an₂-   el₁-   a   amaphoyisa
           2.SBJ-   FUT-   hide-   RECIP- APPL-   FV   6.police
           "They will hide each other from the police."
           [from the police [hide each other]]

In Zulu, as in other Bantu languages, the reciprocal suffix -*an* normally appears to the immediate right of the head whose argument it encodes. In (17a), -*an* encodes the direct object of the simple verb *fihl* "hide" and thus appears to its immediate right, while in (17b), -*an* encodes an applicative object and thus appears to the immediate right of the applicative suffix -*el*. These facts are easily captured by assuming the -*an* is underlyingly lower than applicative -*el* in (17a), but higher than -*el* in (17b). The observed morpheme orders are obtained by successive inversion (which could technically be implemented either with head movement or phrasal movement). For example, in (17a) we have the underlying

hierarchy $Recip_1 > Appl_2 > V_3$. The verb first inverts with the applicative head, giving us $[V_3\ Appl_2]$. Then this internally inverted constituent inverts with the higher $Recip_1$, yielding $[[V_3\ Appl_2]\ Recip_1]$. It is this process we are terming successive inversion, which creates structures that obey the Mirror Principle.

Why should the Bantu verb root and suffixes undergo successive inversion while their Wolof counterparts do not? This contrast resembles a word order contrast found in verbal complexes in Germanic languages:

(18) a.   to want$_1$ to have$_2$ to sing$_3$ (English)
      b.   singen$_3$ müssen$_2$ wollen$_1$ (German)
      c.   WANT$_1$ > MUST$_2$ > SING$_3$ (underlying hierarchy)

The English and German phrases in (18) are assumed to be derived from the same underlying hierarchy in (18c), but the German inversion displays successive inversion while the English version does not exhibit any inversion at all.

The full range of patterns of such verbal complexes in Germanic languages and Hungarian is treated in Koopman and Szabolsci (2000). In that analysis, successive inversion of verbal complexes is assumed to take place unless something like a complexity filter prevents it. Our proposal is to derive all the Wolof orders in the same way as verbal complexes. Now that the hierarchy has been established, our next task is to find all the cases of successive inversion in Wolof. Using our hierarchy, there is only one case of total successive inversion in Wolof, namely V-e_{Instr}-loo_{Caus}:

(19)   V-e_{Instr}-loo_{Caus}
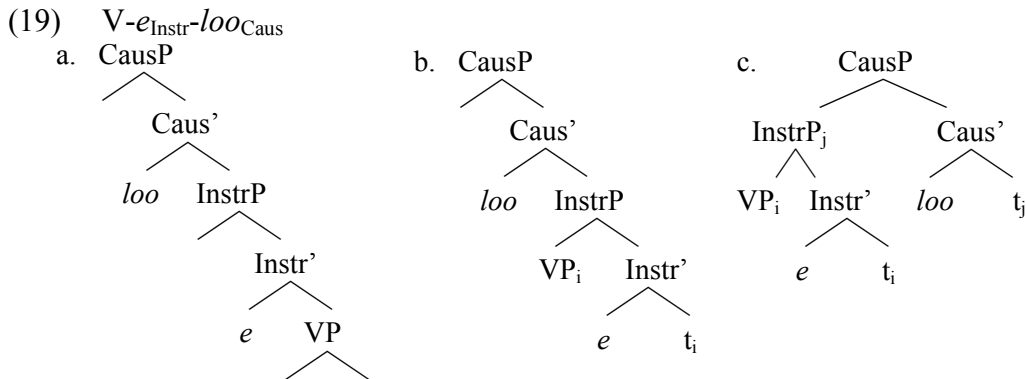
In this system, availability of successive inversion is expressed as the absence of complexity filters on any head to which a portion of the verbal complex raises. For our purposes here, a complexity filter constrains the degree to which the V^0 head can be embedded in this constituent. In (19c), the V^0 is not the head of the InstrP constituent that raises to the specifier of $Caus^0$. But rather, the V^0 is in the specifier of this InstrP. And yet the surface structure in which this V^0 is embedded in the specifier of a specifier is grammatical. This indicates that loo_{Cau} is not lexically specified for a complexity filter. Complexity filters are assumed to be constraints on specifiers, which is why the successive inversion in (19) has been

implemented with phrasal movement rather than head movement.

Now consider all of the forms containing lu_{ImpCaus} above in (16). In all of these forms, lu_{ImpCaus} immediately follows the verb stem. In other words, none of these forms use any degree of successive inversion. For example, for (16d), using successive inversion, we would get the morpheme order *V-loo_{Caus}-lu_{ImpCaus}, derived as follows:

(20)   *V-loo_{Caus}-lu_{ImpCaus}

a.
```
      ImpCausP
        |
      ImpCaus'
       /    \
      lu    CausP
              |
            Caus'
            /   \
          loo    VP
                  |
                  V
```

b.
```
      ImpCaus
        |
      ImpCaus'
       /    \
      lu    CausP
            /    \
         VPᵢ    Caus'
               /    \
             loo     tᵢ
```

c.
```
            *ImpCausP
            /        \
        CausPⱼ      ImpCaus'
        /    \       /     \
      VPᵢ   Caus'   lu      tⱼ
            /   \
          loo    tᵢ
```
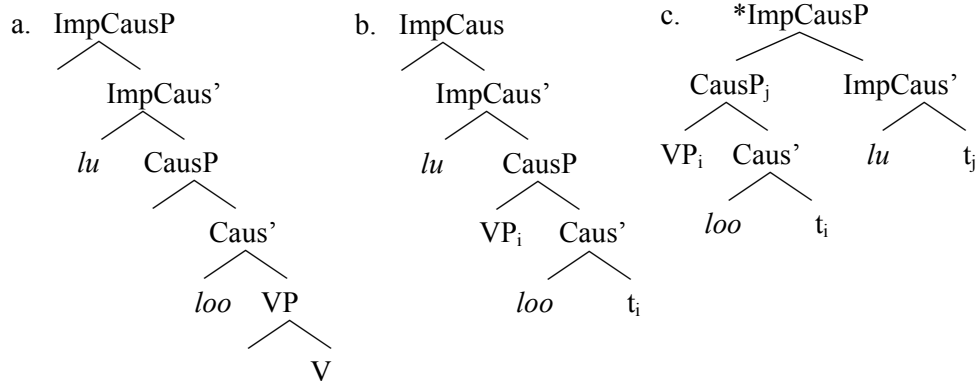
Such an ungrammatical derivation is ruled out by assuming that lu_{ImpCaus} has a complexity filter, meaning that while it requires a verb in its specifier at some point in the derivation, as in (21a), at spell-out the verb cannot be embedded more deeply in its specifier, as in (21b):

(21)   a. VP not embedded

```
      ImpCausP
      /      \
    VP      ImpCaus'
    /\       /    \
   /__\     lu    ....
```

b. VP too embedded for lu_{ImpCaus} complexity filter

```
         *ImpCausP
         /       \
       XP       ImpCaus'
      /   \      /    \
    VP    X'    lu    ....
    /\
   /__\
```
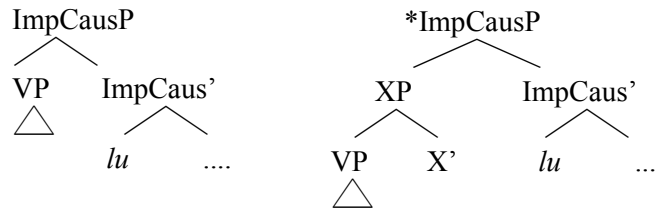
Similarly, in the form combining al_{Ben} and e_{Instr}, the former must immediately follow the verb.

(22)   V-al_{Ben}-e_{Instr}

			ImpCaus	Caus	Ben	Instr	V
		Surface Order	1	2	3	4	5
			lu	*loo*	*al*	*e*	V
a.	312	V-al_{Ben}-e_{Instr}			1	2	3
b.	*321	*V-e_{Instr}-al_{Ben}					

Because the successive inversion order is not available, we conclude that al_{Ben} also has a complexity filter of the same form as the one for $lu_{ImpCaus}$.

To summarize, then, we have isolated the following complexity filters for the four affixes under consideration:

(23)   a. lu_{ImpCau} has a complexity filter.
          b. al_{Ben} has a complexity filter.
          c. loo_{Caus} does not have a complexity filter.
          d. Instr is the lowest head in our hierarchy; no complexity filter could be detected. (The verb will never be embedded enough to trigger an effect.)
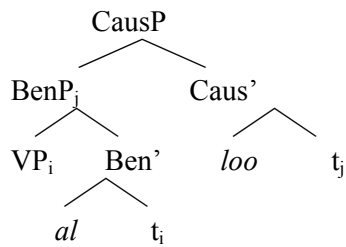
8.   Problems

All the grammatical orders can be obtained with the fixed hierarchy. However, issues do arise in ruling out a few of the ungrammatical orders. One such issue concerns the way in which al_{Ben} and loo_{Caus} combine.

(24)   V-loo_{Caus}-al_{Ben}

		ImpCaus	Caus	Ben	Instr	V
	Surface Order	1	2	3	4	5
		lu	*loo*	*al*	*e*	V
a.	312 V-loo_{Caus}-al_{Ben}		1	2		3
b.	*321 *V-al_{Ben}-loo_{Caus}					

The ungrammatical order in (26b) is problematic for the simple reason that we have already established that loo_{Caus} does not have a complexity filter. So, we must say that al_{Ben} forces specifier extraction of VP, but why it should do so is not understood, given the ungrammatical structure in (25) and the grammatical orders in (26a).
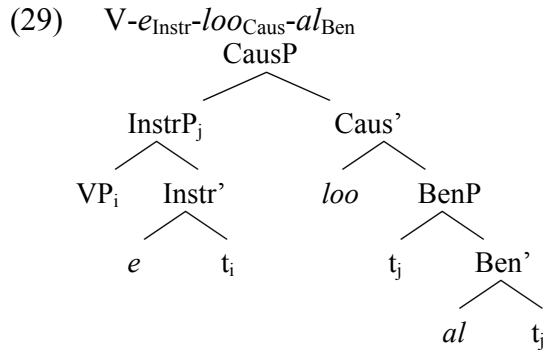
(25)   *V-al_{Ben}-loo_{Caus}

CausP
    BenP$_j$ Caus'
  VP$_i$ Ben'   *loo* t$_j$
      al   t$_i$

(26)   Caus+Ben+Instr

			ImpCaus	Caus	Ben	Instr	V
	Surface Order		1	2	3	4	5
			lu	*loo*	*al*	*e*	V
a.	4231	V-al_{Ben}-e_{Instr}-loo_{Caus}					
b.	4312	V-e_{Instr}-loo_{Caus}-al_{Ben}	1	2	3	4	
c.	*4321	*V-e_{Instr}-al_{Ben}-loo_{Caus}					
d.	*4123	*V-loo_{Caus}-al_{Ben}-e_{Instr}					

First we must note that the choice between two grammatical orders in (26a) and (26b) cannot be the result of a mere morphological reordering independent of syntax, because the preferred argument orders used with the two forms are different:
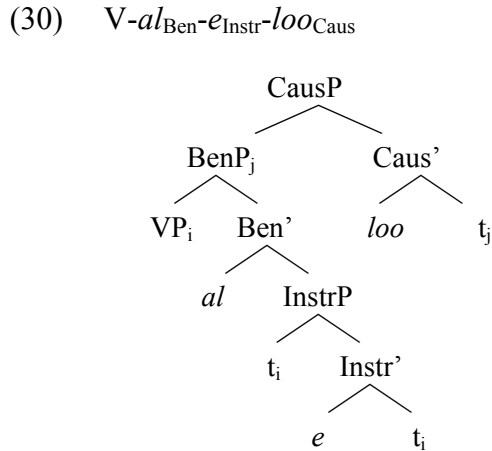
(27) Gàllaay dóór ***al   e   loo***   na   Faatu xale yi bant xeer.
 Gàllaay hit   BEN INSTR CAUS *na*   Faatu child the stick stone
    a.   "Gàllaay made the children hit a stick with a stone for Faatu."
         ...V al_{Ben} e_{Instr} loo_{Caus} Beneficiary Causee...
    b.   ?? "Gàllaay made Faatu hit a stick with a stone for the children."
         ?? ...V al_{Ben} e_{Instr} loo_{Caus} Causee Beneficiary...

(28) Gàllaay dóór ***e   loo al***   na Faatu xale   yi   bant xeer.
 Gàllaay hit   INSTR CAUS BEN *na* Faatu child the   stick stone
    a.   ?? "Gàllaay made the children hit a stick with a stone for Faatu."
         ?? ...V e_{Instr} loo_{Caus} al_{Ben} Beneficiary Causee...
    b.   "Gàllaay made Faatu hit a stick with a stone for the children."
         ...V e_{Instr} loo_{Caus} al_{Ben} Causee Beneficiary...

Turning to the ungrammatical orders, the pure successive inversion form in (26c) is ruled out because al_{Ben} has a complexity filter while the form would require the complex phrase [V+e_{Instr}] in its specifier. The pure stranding form in (26d) is ruled out, because partial successive inversion is possible, employed in the (26a,b) forms. As for (26b), V-e_{Instr}-loo_{Caus}-al_{Ben}, assuming our fixed hierarchy, the bracketing must be [V-e_{Instr}]-loo_{Caus}-$al_{Ben.}$. This form respects the complexity filter on $al_{Ben.}$ (Recall that complexity filters are filters on surface representations, not on derivations.) [V-e_{Instr}] is extracted from the specifier of al_{Ben} and moved to the specifier of loo_{Caus}:
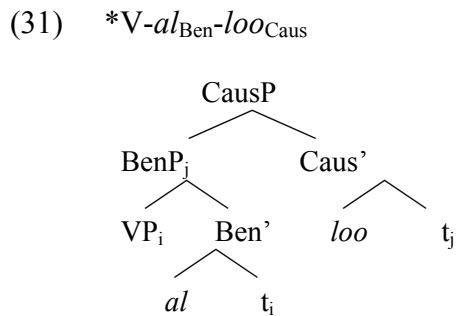
(29)   V-e_{Instr}-*loo*$_{Caus}$-*al*$_{Ben}$

```
                    CausP
              _____|_____
           InstrP_j           Caus'
           __|__            ____|____
        VP_i   Instr'      loo      BenP
              __|__              ____|____
             e    t_i          t_j      Ben'
                                      ___|___
                                     al     t_j
```

It is the grammatical order V-*al*$_{Ben}$-e_{Instr}-*loo*$_{Caus}$ in (26a) that is problematic. Given our hierarchy, the bracketing must be [V-*al*$_{Ben}$-e_{Inst}]$_r$-*loo*$_{Caus}$, with this structure:

(30)   V-*al*$_{Ben}$-e_{Instr}-*loo*$_{Caus}$

```
                    CausP
              _____|_____
           BenP_j             Caus'
           __|__            ____|____
        VP_i   Ben'        loo      t_j
              __|___
             al   InstrP
                  __|___
                 t_i   Instr'
                      __|__
                     e    t_i
```

The problem is that (30) is structurally identical to the simpler, but ungrammatical order *V-*al*$_{Ben}$-*loo*$_{Caus}$, seen above in (25) and repeated here for convenience:

(31)   *V-*al*$_{Ben}$-*loo*$_{Caus}$

```
                CausP
           _____|_____
        BenP_j           Caus'
        __|__          ____|____
     VP_i   Ben'      loo      t_j
           __|__
          al   t_i
```

It is not clear how V-*al*$_{Ben}$-e_{Instr}-*loo*$_{Caus}$ can be allowed without also allowing the ungrammatical *V-*al*$_{Ben}$-*loo*$_{Caus}$.

9.   Conclusion

We have seen that using head movement to derive valence-changing affix orders in Wolof leads both to contradictions and to incorrect scopal predictions if the Mirror Principle is assumed. An alternative account employing phrasal movement and a fixed structural hierarchy was shown
capable of deriving all the attested orders.

Problems encountered using the phrasal approach involved ruling out a few ungrammatical orders. However, this is not a particular disadvantage of our account over one which employs either head movement or a variable hierarchy, as any type of account will face the same problem.

Conversely, the phrasal account seems to have certain advantages. First, it allows us to maintain a close correspondence between morphological order and syntacic structure. Second, it allows us to treat cross-linguistic variation in valence-changing morpheme orders in the same way as verbal complexes, in which a similar range of orders is observed. And finally, a phrasal fixed hierarchical account presents the learner with fewer options, restricting the number of possible underlying hierarchies (a real problem if Mirror Principle violations are admitted), and, assuming the possibility of forming words in syntax, perhaps restricting the domain in which the learner must choose between derivations employing head movement and those employing phrasal movement.

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