

## **A Survey of Phonological Affix Order with Special Attention to Pulaar\***

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### **1. Introduction**

In standard OT, phonological constraints can outrank morphological constraints (McCarthy & Prince 1993a,b). This ‘P >> M’ ranking schema accounts for a range of phonological effects in morphology including phonologically conditioned suppletive allomorphy (Mester 1994, Dolbey 1997, Kager 1996), mobile affixes (Noyer 1994; McCarthy & Prince (1993a) suggest a P >> M analysis), phonologically induced morphological gaps (Prince & Smolensky 1993, but see Orgun & Sprouse 1999), infix placement (McCarthy & Prince 1993a,b, but see McCarthy 2003, Yu 2003), and phonological affix order (Hargus & Tuttle 1997). In this paper I report results of a cross-linguistic survey and a case study of one possible instance of phonological affix order.

In §2.1, I discuss affix order in Gombe Fula (Arnott 1970) and present a phonological analysis (§2.2). I then present new data from Fuuta Tooro Pulaar (§2.3) and a scope-based analysis (§2.4). In light of the findings in Fuuta Tooro, I revisit Gombe Fula (§2.5), showing that a scope-based analysis is possible for that dialect as well (and, in fact, is superior to the phonological analysis). In §3, I summarize a survey of other possible cases of phonological affix order. I conclude in §4.

### **2. Pulaar: Sonority-Based Affix Order?**

Pulaar (West Atlantic) is spoken in a wide area of West Africa and comprises a large number of dialects. The name ‘Fula’ is sometimes used for all Pulaar dialects plus other dialects known by names such as Fulfulde, Fulani, and Fulbe. However, ‘Fula’ usually does not include Pulaar, so there is no single cover term for all of the dialects. Since the focus of this paper is a Pulaar dialect, I use ‘Pulaar’ to refer to the entire language group.

Fuuta Tooro Pulaar, which I describe beginning in §2.3, is spoken in the Fuuta Tooro region along the border between Senegal and Mauritania. The consultant for this

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study is a 42 year-old speaker who moved to the US from a town near Matam, which is in Senegal in the eastern part of the Fuuta Tooro region. Before turning to Fuuta Tooro, I discuss in §§2.1-2.2 the order of affixes in Gombe Fula (Arnott 1970), a dialect of northern Nigeria. Arnott (1970: 333, 366) reports that the order of affixes is largely fixed in Gombe Fula. In particular, according to Arnott, immediately after the verb stem are consonantal suffixes ordered according to the formula ‘TDNR’: all of the /-t/ suffixes precede the /-d/ suffixes, which precede the /-n/ suffix, which precedes the /-r/ suffixes (1970: 366). This generalization, if true, is interesting (among other reasons) because ‘TDNR’ corresponds to increasing sonority on the sonority scale (see, e.g., Ladefoged 1982), meaning that the fixed order of affixes may be phonological (Paster 2001). This can be modeled via  $P \gg M$  and would constitute the first known example of the ordering of multiple affixes along a phonological scale, a phenomenon predicted by  $P \gg M$ . As I show, however, there is a better, non-phonological analysis of Gombe Fula affix order. This is an important negative result because it means that  $P \gg M$  overgenerates in predicting a phenomenon that apparently does not exist. I return to this point in §4.

## 2.1 Gombe Fula Affix Order

Arnott described eleven verb suffixes in Pulaar whose basic shape is a single consonant. These are shown below in (1) (Arnott 1970: 334, 340-364)<sup>1</sup>.

(1)	<u>Shape</u>	<u>Label</u>	<u>Example</u>
	-d	DENominate	fur- <b>d</b> -a ‘be grey’
	-t	REVerse	taar- <b>t</b> -a ‘untie’
	-t	REPetitive	soor- <b>t</b> -o ‘sell again’
	-t	REFlexive	ndaar- <b>t</b> -o ‘look at oneself’
	-t	RETaliative	jal- <b>t</b> -o ‘laugh at... in turn’
	-t	INTensive	yan- <b>t</b> -a ‘fall heavily’
	-d	ASSociative	nast- <b>id</b> -a ‘enter together’
	-d	COMprehensive	janng- <b>id</b> -a ‘read, learn all...’
	-n	CAUSative	woy- <b>n</b> -a ‘cause to cry’
	-r	MODal	6e mah- <b>ir</b> -i dī ‘they built them with’
	-r	LOCative	’o ’yiw- <b>r</b> -ii ‘he came from’

Arnott lists both -C and -VC forms of these suffixes (V is usually [i]). The -VC forms occurs somewhat inconsistently, so this may or may not be analyzable as epenthesis.

The meanings of the suffixes as described by Arnott are summarized below. First, the Denominative -*d* generally attaches to adjectives, converting them to verb stems. The Reversible -*t* suffix produces a meaning ‘opposite’ that of the stem. The Repetitive -*t* denotes repetition of an action. The Reflexive -*t* reduces the number of arguments of the verb by one, so that the subject performs the action on him/herself. The Retaliative -*t* indicates that an action is done to someone else in retaliation. The Intensive -*t* indicates

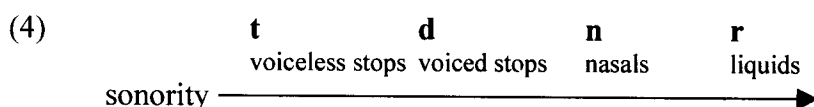
<sup>1</sup> In Arnott’s orthography, < ’ > represents glottal stop, < ’y > is a palatal implosive, <sh > is a palatal fricative, and <c > and <j > are voiceless and voiced palatal affricates. I have normalized Arnott’s transcriptions by using spaces where Arnott used hyphens between subject/object clitics and verbs.



as an extended radical...’ (1970: 370). Lexicalized forms often have idiomatic meanings not predictable from the meaning of their parts, and yet these forms have compositional meanings. I show in §2.5 that a scope-based analysis avoids having to posit lexicalized stems; first, I present below a phonological account based on Arnott’s generalization.

## 2.2 A P >> M Account of Gombe Fula Affix Order

Assuming that, despite the exceptions shown above, ‘TDNR’ is the correct generalization for the order of consonantal suffixes, we can analyze this phonologically using P >> M. As mentioned above, the ‘TDNR’ generalization lends itself to a phonological analysis because the order corresponds to increasing sonority, as schematized below.



To model sonority-based affix order, we need a phonological (P) constraint enforcing increasing sonority between consonants in separate morphemes (5).

- (5) \*FALLINGSONORITY C+C: When a consonant C<sub>1</sub> is followed by a consonant C<sub>2</sub> across a morpheme boundary, C<sub>2</sub> may not be less sonorous than C<sub>1</sub>.

The P constraint outranks a morphological (M) constraint (6) that requires affix order to correspond to semantic scope (Condoravdi & Kiparsky 1998).

- (6) SCOPE: Morphological constituency reflects scope.

This constraint refers to the proposal (see, e.g., Baker 1985, Bybee 1985, Rice 2000) that the order of affixes corresponds to their semantic scope (broadly defined; see Rice 2000) so that an affix occurs further from the root than another affix over which it has scope. We will make use of this concept in the analysis of Fuuta Tooro Pulaar in §2.4.

To ensure that the P constraint affects only the order of consonantal suffixes, we also need to assume some undominated constraints to prevent non-consonantal suffixes from being reordered and to prevent violations of \*FALLINGSONORITY C+C from being repaired by consonant feature changes rather than reordering (I will not formulate these here). Under this analysis, the ranking P >> M (\*FALLINGSONORITY C+C >> SCOPE) selects forms with the TDNR order, even when the order violates SCOPE, as shown in (7).

- (7) \*\*’o irt-**in-ir**-ii kam supu ’o kuddu ‘he made me stir the soup with a spoon’

/irt, -r, -n/	*FALLINGSONORITY C+C	SCOPE
irt-ir-in-	*!	
irt-in-ir		*

Based on scope, we expect the order -r-n because Causative has scope over Modal: the instrument is used by the causee, so Causative applies to a stem that already refers to an instrument. The -n-r order is selected because the sonority constraint outranks SCOPE.

Crucially, however, the form in (7) is *not* attested by Arnott (1970) (indicated by two asterisks above). I constructed this example based on the TDNR generalization for the sake of the argument. In fact, not a single example cited by Arnott contradicts our scope-based expectation for affix order. I argue in §2.5 that this is not accidental.

Our analysis allows for the ‘exceptional’ non-TDNR orderings if we assume, following Arnott, that these have lexicalized stems. In these forms, the suffix attaches straightforwardly to a stem ending in the consonant formerly belonging to another suffix.

Thus, we can account for Arnott’s (1970) data using P >> M. But since Arnott’s data are also consistent with scope, perhaps P >> M is not needed. Arnott provided no examples allowing us to distinguish the two analyses. I present data below from the Fuuta Tooro dialect including many examples that distinguish the two analyses in favor of the scope-based analysis. I argue in §2.5 that we can extend this analysis to Gombe Fula.

### 2.3 Fuuta Tooro Pulaar (Northeastern Senegal)

The consonantal suffixes of Fuuta Tooro are shown in (8)<sup>3</sup>.

(8)	<u>Shape</u>	<u>Label</u>	<u>Example</u>
	-d	DENominative	mi dom- <b>d</b> -ii ‘I became thirsty’
	-t	SEParative/Reversive	mi udd- <b>it</b> -ii baafal ŋgal ‘I opened the door’
	-t	REPetitive	o haal- <b>t</b> -ii ‘he spoke again’
	-d	COMprehensive/Associative	mi udd- <b>id</b> -ii baafe de ‘I closed all the doors’
	-n	CAUsative	mi jaŋg- <b>in</b> -ii ‘I taught’
	-r	MODal/Instrumental/Locative	mi dog- <b>r</b> -ii paɗe ‘I ran with shoes’

Note that there are fewer consonantal suffixes here than listed by Arnott (1970). This is because some suffixes of Gombe Fula are not used productively in Fuuta Tooro and because in some cases Arnott distinguished suffixes where the data in Fuuta Tooro suggest a single suffix (e.g., Modal/Instrumental/Locative). See Paster (2005) for details.

Several pairwise combinations of consonantal suffixes exhibit ordering alternations directly related to scope. For example, when Comprehensive has scope over Separative, the Comprehensive *-d* is ordered outside Separative *-t* (9a). The scope relation is shown by the fact that the comprehensive action takes place simultaneously, a meaning contributed by the Comprehensive (Paster 2005). In (9b), the order is reversed. This corresponds to Separative having scope over Comprehensive, evidenced by the ‘sequential’ meaning, which results from the fact that Separative has no simultaneous action meaning. The original action takes place simultaneously, but the undoing does not.

(9)	a.	o	sok- <b>t-id</b> -ii	baafe	de	fof
		3sg	lock-SEP-COM-past	doors	det.	all
			‘he unlocked all the doors (at once)’			

<sup>3</sup> Each suffix also has a -VC form as in Gombe Fula. For Fuuta Tooro, I use the official Senegalese Pulaar orthography, which omits predictable word-initial glottal stops, uses <ɲ> for the palatal nasal, and uses a ‘hooked y’ for the palatal implosive, which I replace with <ɠ>.

- b. o sok-**d-it-ii** baafe de fof  
 3sg lock-COM-SEP-past doors det. all  
 ‘he unlocked all the doors (in sequence)’

The Repetitive *-t* is ordered after the Comprehensive *-d* when Repetitive has scope over Comprehensive (10a). The fact that Repetitive has scope over Comprehensive is evidenced by the repetitive meaning in each case applying not only to the verb, but also to the participants referred to by the Comprehensive. When Comprehensive has scope over Repetitive (10b), the Repetitive *-t* is ordered first. The evidence for Comprehensive having scope over Repetitive is that in this example, the same participants are not necessarily involved in both the original and repeated actions. The Repetitive applies only to the verb, and then the Comprehensive applies to the output of Repetitive affixation, which is a repeated action. This is consistent with the order of the affixes.

- (10) a. min cok-**t-id-ii** baafal ŋgal  
 1pl lock-REP-COM-past door det.  
 ‘we all locked the door again together’ (someone else locked it before)  
 b. mi yaa-**d-it-ii** ‘e makko  
 1sg go-COM-REP-past with 3sg  
 ‘I went with her again’ (I went with her before)

As shown in (11), the Causative *-n* is ordered after the Separative *-t*. This is consistent with scope, since the Causative refers not to the original action, but to the ‘undoing’. Thus, Causative applies to a verb that already has the separative meaning, which is consistent with the ordering of the Causative *-n* outside the Separative *-t*.

- (11) o ha**66-it-in-ii** kam 6oggol ŋgol  
 3sg tie-SEP-CAU-past 1sg rope det.  
 ‘he made me untie the rope’

If order is scope-based, we predict that the opposite order should correspond to the opposite scope relation, as was seen above where Separative-Comprehensive and Repetitive-Comprehensive were combined. In the case of Causative-Separative, however, it is impossible to find an order alternation corresponding to a meaning change because it is apparently impossible for Separative to have scope over Causative. This is explained by the fact that Separative generally applies to a verb whose semantics involve putting things together. Thus, in order for Separative to apply to a Causative, the entire Causative verb would have to have a ‘putting together’ meaning. There are apparently no verbs corresponding to ‘make be together’ that use the Causative *-n* such that a Separative would be expected to attach to the Causativized stem (see Paster 2005 for details).

When the Repetitive *-t* combines with the Causative *-n*, both orderings are acceptable, corresponding to scope. When Repetitive has scope over Causative, the Causative *-n* precedes the Repetitive *-t* (12a). The scope relation indicated by the fact that the same agent causes both the original and repeated actions. Thus, Repetitive applies to a Causativized verb, corresponding to the ordering of the Repetitive suffix outside the

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Causative. As predicted by scope, the opposite order of the Causative and Repetitive suffixes corresponds to the opposite scope relation from (12a). When Causative has scope over Repetitive (12b), the Repetitive *-t* precedes the Causative *-n*. The scope relation is evidenced by the fact that the original action is understood to have been done voluntarily rather than being caused by the same agent who causes the repeated action. Thus, Repetitive applies to the bare verb, and Causative applies to the Repetitive verb, meaning that causation applies to the repeated action and not necessarily to the original action.

- (12) a. o sood-**it-in-ii** een deftere nde  
3sg buy-REP-CAU-past 1pl book det.  
'she made us buy the book again'
- b. o sood-**in-it-ii** een deftere nde  
3sg buy-CAU-REP-past 1pl book det.  
'she made us buy the book again' (we bought it before voluntarily)

The relative order of the Separative *-t* and Modal *-r* corresponds to their scope. In (13), Modal has scope over Separative, as indicated by the fact that the instrument is used to undo the action and not necessarily to do the original action. Thus, the scope of the two suffixes in this example corresponds to the ordering of Modal *-r* outside Separative *-t*.

- (13) a sok-**t-ir-ii** baafal ŋgal coktirgal  
2sg lock-SEP-MOD-past door det. key  
'you (sg.) unlocked the door with a key'

It is apparently impossible to produce a single verb form where Separative has scope over Modal. When asked to produce such a form corresponding to, e.g., 'we unsewed the shirts with a needle,' ([we un-[sewed the shirts with a needle]]) where the needle was used to do the sewing but not the unsewing, the speaker is unable to express this with a single verb. Therefore, we cannot test the prediction of the scope principle that Separative should occur after Modal when Separative has scope over Modal.

When Modal has scope over Repetitive (14), *-r* is ordered after *-t*, as predicted. It is clear that Modal has scope over Repetitive here since it is specified that a different instrument is used in the original vs. repeated action. Thus, Repetitive applies to the verb first, and then Modal applies to the Repetitive stem.

- (14) mi irt-**it-ir-ii** supu o kuddu goddo  
1sg stir-REP-MOD-past soup det. spoon different  
'I stirred the soup again with a different spoon'

When Repetitive has scope over Modal, the Modal *-r* suffix is ordered after the Repetitive *-t* suffix, as shown in (15).

- (15) mi udd-**it-ir-ii** baafal ŋgal sawru  
1sg close-REP-MOD-past door det. stick  
'I closed the door with a stick again' (the same stick)

This is the first example we have seen where the affix order does not correspond to scope. Based on scope, we expect Repetitive *-t* to be ordered after Modal *-r* here. We know that Repetitive has scope over Modal because it is understood that the same instrument is used for both the original and repeated actions. This corresponds to the application of Modal to the verb root, and then application of Repetitive to the verb that already has an instrument so that the repeated action involves the use of the same instrument. Since this order has no apparent semantic explanation, I assume the *-t-r* order is part of a morphological template. We will account for this in the analysis in §2.4.

The order of the Causative *-n* with the Comprehensive *-d* is scope-based. When Comprehensive has scope over Causative, Causative *-n* precedes the Comprehensive *-d* (16a). When Causative has scope over Comprehensive, the Causative *-n* is ordered after the Comprehensive *-d* as predicted. However, the opposite ordering, *-n-d*, is also compatible with this reading (16b). This may be due to the difficulty of constructing English stimuli where Causative has unambiguous scope over Comprehensive. When the speaker is given with English sentences like this, he may interpret them so that Comprehensive has over Causative, explaining why *-n-d* is accepted. The meaning difference is subtle, and this should be investigated in conversation and/or narratives.

- (16) a. 6e njal-**n-id-ii** mo  
 3pl laugh-CAU-COM-past 3sg  
 ‘we all made him laugh together’
- b. mi woy-**d-in-ii** 6e ~ mi woy-**n-id-ii** 6e  
 1sg cry-COM-CAU-past 3pl  
 ‘I made them cry together’

When the Comprehensive combines with the Modal so that Comprehensive has scope over Modal, Comprehensive *-d* is ordered after Modal *-r* (17a). The scope relation is indicated by the fact that a different instrument is used to perform the action on each object. When Modal has scope over Comprehensive (17b), Modal *-r* is ordered after Comprehensive *-d*. The fact that Modal has scope over Comprehensive here is clear since the same instrument is used to perform the action on each object. This is consistent with the application of Modal to a stem already having the comprehensive meaning so that the instrument applies to all of the objects referred to by the Comprehensive.

- (17) a. mi sok-**r-id-ii** baafe 6e coktirgal godɲgal  
 1sg lock-MOD-COM-past doors det. key different  
 ‘I locked each of the doors with a different key’
- b. mi sok-**d-ir-ii** baafe 6e coktirgal  
 1sg lock-COM-MOD-past doors det. key  
 ‘I locked all of the doors with a key’ (the same key)

The final pairwise combination of suffixes shows variation. When Causative has scope over Modal, we expect *-n* to come after *-r*. We do find this order corresponding to this scope reading, but the opposite order can also be used (18a); either order is allowed with no meaning difference. We find the same variation when Modal has scope over



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Causative (18b). Here, we expect Modal *-r* to be ordered after Causative *-n*, but the opposite order can also be used. Our analysis will need to account for this.

- (18) a. o irt-**ir-in**-ii kam supu o kuddu ~  
 3sg stir-MOD-CAU-past 1sg soup det. spoon  
 o irt-**in-ir**-ii kam supu o kuddu  
 3sg stir-CAU-MOD-past 1sg soup det. spoon  
 ‘he made me stir the soup with a spoon’ (I used a spoon)
- b. o irt-**in-ir**-ii kam supu o lafi ~  
 3sg stir-CAU-MOD-past 1sg soup det. knife  
 o irt-**ir-in**-ii kam supu o lafi  
 3sg stir-MOD-CAU-past 1sg soup det. knife  
 ‘he made me stir the soup with a knife’ (he used a knife)

This exhausts the pairwise combinations of the consonantal suffixes. Based on these examples, we have three generalizations about the order of consonantal suffixes in Fuuta Tooro (19). In §2.4 I propose an analysis to account for these generalizations.

- (19) a. Repetitive *-t* precedes Modal *-r* regardless of their relative scope.  
 b. Causative *-n* and Modal *-r* are freely ordered with each other regardless of scope.  
 c. Otherwise, order is determined by scope.

#### 2.4 Scope-Template Account of Fuuta Tooro Affix Order

Rice (2000) claims that scope determines the order of affixes whenever there is a scope relation between them. Otherwise, order is arbitrary. Templates are ‘emergent’; in OT terms, SCOPE always outranks TEMPLATE. However, a language with scope-based order can have elements of fixed order that override scope, as seen above. This follows from TEMPLATE >> SCOPE; a ranking I use in the analysis of Fuuta Tooro affix order below.

In this analysis, I break TEMPLATE into three separate constraints, shown below.

- (20) T<sub>REP</sub> PRECEDES R: Repetitive *-t* precedes Modal *-r*.  
 N PRECEDES R: Causative *-n* precedes Modal *-r*.  
 R PRECEDES N: Modal *-r* precedes Causative *-n*.

The observed affix order effects will be analyzed by ranking these templatic constraints above SCOPE so that scope determines the order of affixes as long as the template is not violated; when scope and the template conflict, the template ‘wins’.

The ranking T<sub>REP</sub> PRECEDES R >> SCOPE successfully selects forms where the template and scope agree, as shown in the tableau in (21).

- (21) mi irt-**it-ir**-ii supu o kuddu goddfo ‘I stirred the soup again with a different spoon’

/irt, -t, -r/	T <sub>REP</sub> PRECEDES R	SCOPE
irt-it-ir-		
irt-ir-it-	*!	*

Since the repeated action is not done with the same instrument as the original action, Modal has scope over Repetitive, and therefore we expect Modal *-r* to be ordered after Repetitive *-t*. This is the order that is selected since SCOPE agrees with the template.

This ranking also selects forms where TEMPLATE forces a violation of SCOPE (22).

- (22) mi udd-**it-ir**-ii baafal ngal ‘I closed the door with a stick again’ (same stick)

/udd, -t, -r/	T <sub>REP</sub> PRECEDES R	SCOPE
udd-it-ir-		*
udd-ir-it-	*!	

The scope order is *-r-t* since Repetitive outscopes Modal (the same instrument is used in the original and repeated actions), but the *-t-r* order is selected by T<sub>REP</sub> PRECEDES R.

The order of *-n* and *-r* is handled by variable ranking. In ranking #1, N PRECEDES R >> R PRECEDES N, SCOPE. This selects forms where *-n* precedes *-r* (23).

- (23) o irt-**in-ir**-ii kam supu o labi ‘he made me stir the soup with a knife’ (he used a knife)

/irt, -n, -r/	N PRECEDES R	R PRECEDES N	SCOPE
irt-in-ir-		*	
irt-ir-in-	*!		*

Here, the order predicted by scope is *-n-r*, since Modal has scope over Causative (the causer, not the causee, uses the instrument). Since this agrees with the high-ranked N PRECEDES R constraint, the winning candidate also satisfies SCOPE.

Our ranking also selects forms where SCOPE is violated (24).

- (24) o irt-**in-ir**-ii kam supu o kuddu ‘he made me stir the soup with a spoon’ (I used a spoon)

/irt, -r, -n/	N PRECEDES R	R PRECEDES N	SCOPE
irt-in-ir-		*	*
irt-ir-in-	*!		

The scope order is *-r-n* since Causative has scope over Modal (the causee uses the instrument), but since N PRECEDES R outranks SCOPE, the non-scope *-n-r* order wins.

In ranking #2, R PRECEDES N outranks N PRECEDES R and SCOPE. This selects forms with the Modal *-r* preceding the Causative *-n* regardless of scope. As seen in the tableau in (25), this ranking selects forms where the template and scope agree.

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- (25) o irt-**ir-in**-ii kam supu 'o kuddu 'he made me stir the soup with a spoon' (I used a spoon)

/irt, -r, -n/	R PRECEDES N	N PRECEDES R	SCOPE
irt-in-ir-	*!		*
<sup>☞</sup> irt-ir-in-		*	

Here, the scope order is *-r-n* since Causative has scope over Modal (the causee uses the instrument). This agrees with R PRECEDES N, so the winner obeys SCOPE as well.

This ranking also selects forms where scope and the template disagree, so that the winning candidate obeys the template at the expense of a scope violation (26).

- (26) o irt-**ir-in**-ii kam supu 'o lafi 'he made me stir the soup with a knife' (he used a knife)

/irt, -n, -r/	R PRECEDES N	N PRECEDES R	SCOPE
irt-in-ir-	*!		
<sup>☞</sup> irt-ir-in-		*	*

Here, the scope-based order is *-n-r* since the causer uses the instrument. However, because R PRECEDES N outranks SCOPE, the winning candidate has the *-r-n* order.

The two constraint rankings are summarized below:

- (27) Ranking #1: T<sub>REP</sub> PRECEDES R, N PRECEDES R >> R PRECEDES N, SCOPE  
 Ranking #2: T<sub>REP</sub> PRECEDES R, R PRECEDES N >> N PRECEDES R, SCOPE

By using template constraints and SCOPE, all M constraints, we have captured the order of consonantal suffixes in Fuuta Tooro without P >> M. We will now revisit Gombe Fula, and I will show that a scope-based analysis is possible for that dialect as well.

## 2.5 A Scope-Based Reanalysis of Gombe Fula

As mentioned in §2.2, every example provided by Arnott (1970) is consistent with scope. Though most of Arnott's examples obey the 'TDNR', they are also consistent with scope. For instance, *-t-r* in (28) is a 'TDNR' order. However, the order is also consistent with scope, since the adverb 'slowly,' introduced by Modal, applies to the Reversive action, not the original action. The Modal applies to a verb to which Reversive has already applied, corresponding to the ordering of the Modal *-r* outside the Reversive *-t*.

- (28) 'o ma66-**it-ir**-ii yolnde hakiilo  
 3sg close-REV-MOD-pastdoor slowly  
 'he opened the door slowly' (p. 367)

(29) is also consistent with both scope and the 'TDNR' generalization. Here, the order corresponds directly to the order of logical operations performed on the root. First, the Denominative *-d'* attaches to the adjective, converting it into a verb meaning 'be healthy'. Then, the Repetitive *-t* applies to this stem, yielding a new stem meaning 'be healthy again' (= 'be cured'). Next, the Causative *-n* applies, resulting in a stem meaning 'make be cured' (= 'cure'). Finally, the Modal *-r* attaches to this stem, introducing an instrument,

giving the meaning ‘cure with (some new medicine)’. The order of attachment of the affixes is reflected in the order of the suffixes: *-t-n-r* (Repetitive-Causative-Modal).

- (29) 'o yam-**d-it-in-ir-ii** mo lekki gokki kesi  
 3sg<sub>i</sub> healthy-DEN-[REP]-CAU-MOD-past 3sg<sub>j</sub> medicine other new  
 ‘he<sub>i</sub> cured him<sub>j</sub> with some new medicine’ (p. 368)

Thus, the ordering generalization that Arnott (1970) accounts for using the ‘TDNR’ generalization can also be accounted for by scope. The two examples shown above are the clearest examples, but no example contradicts the scope generalization.

Not only does scope account for Arnott’s (1970) examples obeying the ‘TDNR’ generalization, but it also accounts for the ‘exceptions’, which Arnott explained as having lexicalized stems. Several of Arnott’s exceptions can be explained straightforwardly based on scope. In (30), Repetitive has scope over Comitative.

- (30) mi wol-**d-it-at-aa** 'e ma**bbe**  
 1sg speak-COM-REP-future-negative with 3pl  
 ‘I won’t speak with them again’ (p. 368)

Ignoring the Negative, the form *mi-wol-d-it-ii 'e mabbe* ‘I spoke with them again’ would mean that the subject had spoken with ‘them’ before and did so again. This can be schematized as [[speak with] again]. Thus, the order of the affixes corresponds to scope.

Similarly, in (31), the Comitative *-d* has scope over Causative *-n*, since the word ‘fed’ is used in the English translation.

- (31) 'o nyaam-**n-id-ii** di  
 3sg eat-CAU-COM-past 3pl  
 ‘he fed them all’ (p. 368)

Once again, an apparent exception is explained straightforwardly based on scope.

Finally, in (32), Retaliative has scope over the Causative since the term ‘frighten’ in the English gloss means ‘cause to fear’. The interpretation is [[cause to fear] in turn], which corresponds to the *-n-t* order, which disobeys the ‘TDNR’ generalization.

- (32) mi hul-**n-it-oo** mo  
 1sg fear-CAU-RET-future3sg  
 ‘I’ll frighten him in turn’ (p. 368)

Since some of Arnott’s exceptional forms are explained by scope, and none of his examples contradict scope, we can say that Arnott provided no evidence for a non-scope principle in the order of consonantal suffixes. The scope-based analysis allows an explanation of the ‘exceptional’ forms, which Arnott ignored. It also avoids the problem that the meaning of Arnott’s lexicalized stems is derived straightforwardly from their component parts rather than being idiomatic as ‘frozen’ forms often are.

Thus, we have seen that neither Fuuta Tooro Pulaar nor Gombe Fula exhibits phonological affix order. In each dialect, the order of consonantal suffixes is scope-based, with some exceptions in Fuuta Tooro that are not phonologically conditioned.

### **3. Other Results of the Survey**

Only 4 other possible cases were identified in a survey of hundreds of languages representing all major language families. The existence of templatic affix order is common (see Bloomfield 1962, Zwicky 1985, Simpson and Withgott 1986, Speas 1990, Stump 1992, 1993, Inkelas 1993, Hyman and Inkelas 1999, and Good 2003), so the lack of cases of phonologically conditioned affix order is striking and may in itself be considered a negative result for the P >> M prediction. I summarize the other cases below.

Jacobsen claims that suffixes in Washo (Hokan, California/Nevada) are reordered ‘to insure an even distribution of stressed and unstressed syllables, and to draw most sequences of unstressed syllables to the end of the word’ (1973: 9). Affixes occur in a non-scope order in some examples. Under P >> M, we can analyze this by ranking footing constraints over SCOPE. However, this may also be analyzed via subcategorization without P >> M: stressed suffixes subcategorize for a foot to their left.

Descriptively, the verb in Awtuw (Ram, Papua New Guinea) has 13 affix slots (Feldman 1986: 53). The plural *-m* occurs in suffix position +3 or +6. *-m* cannot appear in +3 if *-re* Future or *-rere* Desiderative appears in +5, unless the *-iy* Imperfective or *-kay* Perfect is in +2. *-m* also cannot appear in +3 if *-(k)ek* Conditional is in +4 and nothing follows it (Feldman 1986: 71). Where *-m* cannot occur in +3, it can appear in +6. Wherever *-m* can occur in +3, it can also occur, doubly marked, in both +3 and +6. This complicated +3 ~ +6 alternation for plural marking may be phonologically motivated because the alternation seems to optimize syllable structure in many contexts. In each example where *-m* is disallowed in +3, the ungrammatical form would have had a more complex consonant sequence than the grammatical form. This suggests that the apparent morphological conditions on the position of *-m* are really phonological. Note, however, that two consonant sequences are allowed, even where a form with only one consonant in the same position is available. Therefore, the alternation is phonologically optimizing only for consonant-final roots. Because there is not a phonological explanation for the pattern across all root types, this may be best analyzed as morphological conditioning.

Hargus & Tuttle use P >> M to account for the placement of the *s-* Negative prefix in Witsuwit'en (Athabaskan, British Columbia). In some examples, *s-* occurs inside the Tense/Aspect prefix (Hargus & Tuttle 1997: 207). With ‘inner’ subjects, the *s-* prefix occurs outside the Tense/Aspect prefix, which Hargus & Tuttle claim occurs in order to avoid a complex coda (1997: 207). Hargus & Tuttle’s analysis is that the normal order of the prefixes is Neg-T/A, but the order changes so that *s-* can be a coda, except where this would create a complex coda. Hargus & Tuttle (1997: 207) formulate this via P >> M using the constraints in (33).

- (33) \*COMPLEX  
ALIGN-CODA-SNEG: SNEG should be a coda.  
TENSE-STEM: Align the R edge of the Tense prefix to the L edge of the verb stem.  
NEG-STEM: Align the R edge of the Neg prefix to the L edge of the verb stem.

The ranking \*COMPLEX >> ALIGN-CODA-SNEG >> TENSE-STEM >> NEG-STEM selects the observed orderings. Note, however, that the data are consistent with a phonological metathesis analysis that does not involve P >> M. Since the prefixes in question each consist of a single segment, it may be the segments and not the morphemes themselves whose order is phonological. Perhaps the regular order is T/A-Neg-, and after the prefixes are in place, phonological metathesis occurs to repair complex codas. The metathesis does not have to result from the regular constraints of the language; it could be specific to the *s*-prefix (as is the ALIGN-CODA-SNEG constraint proposed by Hargus & Tuttle).

According to Wiering & Wiering (1994), a series of consonantal suffixes in Doyayo is ordered by scope, except that the *-m* pluralizing suffix is first in any combination. It also occurs before the final consonant of a consonant-final verb root. We can model the pattern by ranking a constraint banning [m] as the second in a consonant cluster over a constraint aligning *-m* to the right edge of a stem. However, we do not need P >> M: the placement of [m] could result from simple phonological metathesis. The generalization that [m] comes first in consonant clusters is surface-true, not specific to *-m* (Wiering & Wiering 1994: 70). Therefore, this can be handled via phonological metathesis. We need not assume that the placement of the affix itself is phonological.

The survey revealed only 5 putative cases of phonological affix order. Fula/Pulaar was argued at length to involve affix order driven by scope, not by phonology. Each of the other cases described here was claimed to be consistent with an analysis not involving P >> M. Thus, we have no examples of phonological affix order requiring P >> M.

#### 4. Conclusion

In this paper, I have presented results of a cross-linguistic survey of phonological affix order. The results show that there are few types and cases of the phenomenon, and we find no cases of the ordering of multiple affixes along a phonological scale, as is predicted by the P >> M ranking schema. A possible case in Gombe Fula was shown not to exemplify phonological ordering. Arnott's (1970) claim of fixed order that led to a sonority-based account turned out to be descriptively inferior to an account based on semantic scope. Thus, we have no cases of phonological affix order that necessitate P >> M, suggesting that the model should be revised or abandoned. This result converges Yu's (2003) research showing that P >> M overgenerates for infixation; the present survey shows that P >> M is not suited to account for phonological affix order either.

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