

Suffix ordering in Bantu: a morphocentric approach¹

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1. INTRODUCTION

Within recent years there has been considerable interest in multiple affixation, particularly in explaining why strings of prefixes and suffixes occur in the orders in which they do. The explanations given have been of either a semantic or syntactic nature, as seen in two influential publications that appeared in the same year. Noting cross-linguistic tendencies to fix certain affix orders, Bybee (1985) attributes the most widely attested orders to the semantic function and scope of each affix (those having greater 'relevance' to the action of the verb root appear closer to it). On the other hand, Baker (1985), focusing on cases where affix ordering is not strictly fixed, argues for a 'Mirror Principle' (MP) by which contrastive affix orders (AB vs. BA) directly correlate with – and hence are explained by – the order of syntactic operations. Although seeking different motivations (and to some extent covering a different data base), Bybee and Baker have in common that they seek to find a morphology-external explanation for why affixes occur in the observed orders. While Bybee's semantic characterization of inflectional affixes is presented as a tendency, which "was found to be a valid prediction with very few exceptions" (p. 34), Baker's (1985) theory is generally interpreted as a necessary formal property of grammars: "Morphological derivations must directly reflect syntactic derivations (and vice versa)" (p. 375). Since derivational affixes marking causative, passive, reciprocal etc. are each affiliated with a syntactic operation, their specific ordering with respect to other affixes is said to reflect the order in which the corresponding syntactic operations have applied. Some researchers have expressed this morphology-syntax relationship as an inviolable universal: "... the Mirror Principle is an exceptionless generalization, with strong empirical content given the constraints on word formation" (Alsina 1999: 6).

Standing in opposition to both of the above characterizations is the possibility that affix ordering – or at least certain aspects thereof – is directly determined by the morphology proper. That is, languages can impose specific morphotactic constraints for which there is no synchronic extra-morphological explanation. If correct, one would expect cases where equivalent affixes arbitrarily appear as AB in one language, but as BA in another. The so-called morphotactic constraints might represent a relation between pairs of specific morphs, or they might define an overarching 'template' by which multiple affixes are automatically ordered, e.g. ABCD. The possibility of morphologically-determined templates has been questioned in the literature, most recently in a major work on Athabaskan affix ordering: '... template morphology is highly marked in languages of the world.... As pointed out by Myers 1987, if

template morphology is required, then three types of morphological systems exist – concatenative systems, non-concatenative systems, and templatic systems – with the last restricted to only a very few language families' (Rice 2000: 1). Accordingly, Myers, Rice and others have sought to reanalyze allegedly templatic prefix systems in Bantu and Athabaskan, respectively, so as to predict their properties from the syntax.

In this paper I reach a quite different conclusion. Based on the ordering of Bantu derivational verb suffixes, frequently cited in the literature, I show that that neither semantic scope (or 'compositionality') nor the syntactic MP can account for the full range of suffix ordering facts in any Bantu language. Instead, each suffix system represents a language-specific resolution of a basic tension between two competing pressures: the pressure for affix ordering to be compositional vs. the pressure for affix ordering to be fixed (invariant). For this purpose, I adapt the basic notions of Optimality Theory (OT) of Prince & Smolensky (1993) to the morphological realm: The different suffix ordering possibilities found either across different Bantu languages or within the same language are obtained by different rankings of the two families of constraints which I shall refer to as MIRROR and TEMPLATE. However, I will argue in the following paragraphs that, contrary to claims made by Baker (1985) and Alsina (1999), Bantu suffix ordering is driven by a Pan-Bantu default template, with the oft-reported mirroring effects resulting from 'exceptional' overrides, that is, from suffix-specific cases where MIRROR (B,A) outranks the default TEMPLATE (A,B).

The paper is organized as follows. In § 2, I show that the suffix ordering facts in Chichewa require the establishment of a fixed, default order which is obtained unless the general constraint TEMPLATE is overridden by a suffix-specific MIRROR constraint. In § 3 I consider syntactic evidence in favor of the 'morpho-centric' analysis of § 2. In § 4 I present further morphological arguments in favor of a Pan-Bantu suffix template, while § 5 presents phonological evidence, based specifically on the nature of cyclic effects within the suffixal phonology. The results are briefly summarized in § 6.

2. TEMPLATE vs. MIRROR IN CHICHEWA

This paper is concerned with the determinants of affix ordering in languages which exhibit multiple prefixes and suffixes. The examples will all come from Bantu languages, which are well-known for their agglutinative morphological structure. The Chichewa forms in (1), for instance, illustrate the multiple prefixation that occurs in most Bantu languages:

(1) Multiple prefixation in Chichewa

a. main root clause:	NEG-	SUBJ-	TNS-	ASP-	OBL-	stem	'we will not just hit him'
	sh-	ti-	dzá-	ngo-	mú-	ményá	-dzá- 'future', -ngo- 'just'
b. subordinate (non-root) clause:	ti-	sa-	dzá-	ngo-	mú-	ményá	
	SUBJ-	NEG-	TNS-	ASP-	OBL-	stem	

As seen in the first line of (1a), the general order of prefixes in a main (root) clause is: NEGATIVE, SUBJECT, TENSE, ASPECT, OBJECT. The order is so fixed that a system of 'slots' or 'position classes' has generally been proposed to account for Bantu prefixes (e.g. Meussen 1967, Stump 1997). That the resulting 'template' is at least in part arbitrary is seen by comparing the slightly different order in (1b). In subordinate (non-root) clauses, the subject prefix precedes the negative prefix. In both cases the orders are fixed.²

The basic lack of choice in the ordering of inflectional verb prefixes contrasts with what is sometimes found in the ordering of derivational verb suffixes. Bantuists and general linguists have long been impressed with the effects of compositionality (or scope) on the ordering of Bantu verb suffixes ('extensions') (Guthrie 1962, Spencer 1991). A representative 'minimal pair' involving both orders of the causative and reciprocal suffixes, again from Chichewa, is given in (2).³

(2) Ordering of causative and reciprocal suffixes in Chichewa (Hyman & Mchombo 1992)

a. Reciprocalized Causative	b. Causativized Reciprocal
[X _i cause [e.o., tie Y]]	[X cause [Y _i tie e.o.]]
V CAUS REC	V REC CAUS
[[[mang] its] an]	[[[mang] an] its]
'cause each other to tie'	'cause to tie each other'

In what is labeled a 'reciprocalized causative' in (2a), the causative suffix *-its-* precedes the reciprocal suffix *-an-*, while in the 'causativized reciprocal' in (2b), causative *-its-* follows reciprocal *-an-*. As seen, two different morphotactic structures are proposed which correspond not only to the two suffix orders *-its-* and *-an-*, but also to differences in meaning.⁴

This seems then to be a perfect job for the MP – and especially problematic for a templatic view of suffixes in Chichewa (or similar Bantu languages). However, there are two serious problems for the MP. First, there are other combinations of two suffixes that must in fact occur in a fixed order. Second,

(1) Multiple prefixation in Chichewa

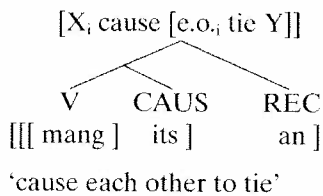
a. main root	NEG-	SUBJ-	TNS-	ASP-	OBJ-	stem	'we will not just hit him'
clause:	si-	ti-	dzá-	ngo-	mú-	ményá	-dzá- 'future', -ngo- 'just'
b. subordinate			dzá-	ngo-	mú-	ményá	
(non-root)	SUBJ-	NEG-	TNS-	ASP-	OBJ-	stem	
clause:							

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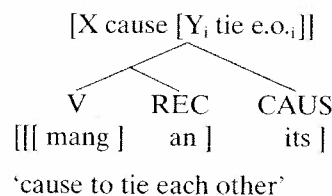
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a. Reciprocalized Causative



b. Causativized Reciprocal



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the indicated semantic compositionality is imperfect – specifically, asymmetric. I take up both of these issues now in turn.

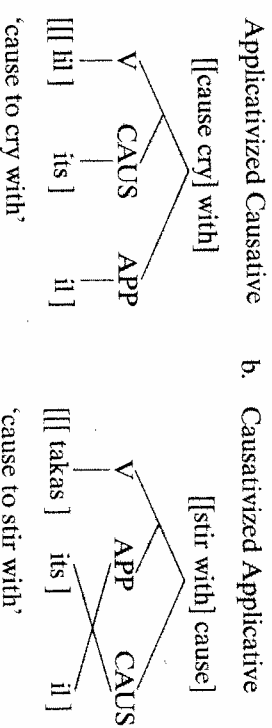
First, consider the problem of fixed suffix orders. In (3) I consider two utterances involving the causative suffix *-is-* and the applicative suffix *-il-*, needed here to license the instrument.⁵

(3) Chichewa CAUS-APP *-its-il-* represents both scopes, e.g. with instrument

- a. Applicativized causative: *-il-its-il-* [with [cause cry]]
alenjé a-ku-il-its-il-a mwaná ndodo
 hunters 3pl-prog-cry-caus-app-fv child sticks
 'the hunters are making the child cry with sticks'
- b. Causativized applicative: *-takas-its-il-* [cause [stir with]]
alenjé a-ku-tákás-its-il-a mkází mthiko
 hunters 3pl-prog-stir-caus-app-fv woman spoon
 'the hunters are making the woman stir with a spoon'

Close examination reveals that the fixed causative-applicative sequence *-its-il-* represents two different scopes. The sequencing *-its-il-* in (3a) is compositional, since the applicative instrument 'sticks' is used for causation, not for the crying, as shown in the bracketing in (4a). However, in (3b), the applicative instrument 'spoon' goes with the lower verb 'stir' and the *-its-il-* sequence is non-compositional, as the crossing lines in (4b) illustrate. That is, the only possible sequence is *-its-il-* in Chichewa, independent of semantic considerations.⁶

(4) Bracketings of (3a,b), where an instrument is licensed by the applicative



To summarize thus far, when the causative combines with another suffix, two different situations arise: with the reciprocal, Chichewa allows both *-its-an-* and *-an-its-*, but with the applicative, it allows only *-its-il-*. In order to account for this (and other) differences in suffix ordering properties in Chichewa (and other Bantu languages), I adopt the following approach for which additional evidence will be presented.

First, I propose the Pan-Bantu default suffix ordering template in (5).

(5) Pan-Bantu 'default' template: **C-A-R-P**

CAUS	APP	REC	PASS	
-ic-	> -id-	> -an-	> -u-	Proto-Bantu
-is-	> -il-	> -an-	> -w-	Shona
-ih-	> -il-	> -an-	> -iw-	Makua
-its-	> -il-	> -an-	> -idw-	Chichewa

As seen, both in Proto-Bantu (PB) and in most Bantu languages which have these suffixes, the default suffix ordering is Causative-Applicative-Reciprocal-Passive, or **CARP**.

Second, distinct from the template, Bantu languages sometimes show a tendency for specific suffixes to be ordered according to semantic compositionality, or scope.

Third, there are potential conflicts between the **CARP** template vs. compositionality. As elsewhere in language, conflicts and their resolution are nicely modeled by a system of ranked, violable constraints, as postulated in optimality theory (Prince & Smolensky 1993). While I adopt this notion of conflicts and the tableau notation of OT, I do not assume that the relevant constraints are necessarily universal. In what follows, I present evidence that the different suffix orders are determined by the ranking of two 'licensors': **TEMPLATE**, which licenses the **CARP** order, vs. suffix-specific overrides of **CARP** which license opposite suffix orders which mirror the semantic scope.⁷ Given a morphosyntactic input, the successive ordering(s) of two or more suffixes in the output will be determined by the relative ranking of **TEMPLATE**, on the one hand, vs. a family of **MIRROK** (=compositionality) constraints, which vary according to specific suffixes and the language in question.⁸ In fact, as we shall see, the pressure from compositionality is typically restricted and can be highly idiosyncratic. In other words, neither semantic compositionality – nor its syntactic analogue, the **MP** – is the default in Bantu, as has been previously assumed. Rather, (5) is.

Since the **CARP** template in (5) is general, in OT terms, it will be highly ranked in most instances. We have just seen this in the case of the causative and applicative. The two relevant constraints are defined in (6).

(6) Suffix ordering constraints for CAUS and APP

- a. **TEMPLATE**: A morphosyntactic input {CAUS, APP} is realized according to **CARP**, i.e. *-its-il-*
- b. **MIRROK (A, C)**: The morphosyntactic input [[...] APP] CAUS] is realized *-il-its-*

Whereas the **TEMPLATE** constraint in (6a) will be violated when either scope of **CAUS** and **APP** is realized as *-il-its-*, **MIRROK (A, C)** will be violated only when

(5) Pan-Bantu 'default' template: **C-A-R-P**

CAUS	APP	REC	PASS	
-ic-	> -id-	> -an-	> -u-	Proto-Bantu
-is-	> -il-	> -an-	> -w-	Shona
-ih-	> -il-	> -an-	> -iw-	Makua
-its-	> -il-	> -an-	> -idw-	Chichewa

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Whereas the *TEMPLATE* constraint in (6a) will be violated when either scope of CAUS and APP is realized as -il-its-, *MIRROR* (A, C) will be violated only when

the indicated input, where CAUS has scope over APP, is realized -its-il-. MIRROR (A, C) thus has no effect when the input is [[[...] CAUS] APP].

As seen in the tableaux in (7), the general TEMPLATE constraint must outrank the (sometimes) opposing MIRROR (A, C) constraint:

- (7) TEMPLATE \succ MIRROR (C, A)

a. Applicativized Causative

[[[mang] C] A] I]	T	M(A, C)
^{CR} mang-its-il-	its-il	
mang-il-its-		

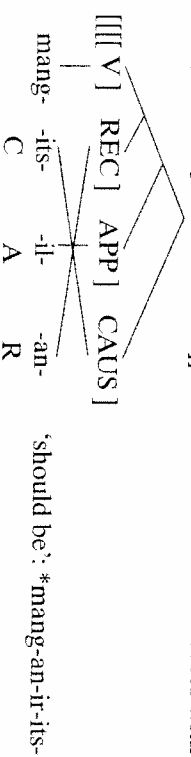
b. Causativized Applicative

[[[mang] A] C] I]	T	M(A, C)
^{CR} mang-its-il-	its-il	
mang-il-its-		il-its

In (7), rather than using asterisks to indicate violations, the suffix orderings licensed by each constraint are indicated in the relevant cells of the tableaux.⁹ In the case of an applicativized causative, in (7a), the correct order, -its-il-, satisfies the template, and, given the (C, A) input, the compositional override MIRROR (A, C) has no effect. In the case of a causativized applicative in (7b), however, -its-il- does violate MIRROR (A, C), but wins because TEMPLATE is ranked higher than the specific MIRROR constraint.

Recall the second problem for the MP to which I referred above: Although different suffix orders such as in (2) have typically been cited in support of the MP, there is the following difference in compositionality: The order in (2a), which is templatic, has both the compositional and non-compositional meanings, while the order in (2b) has only the compositional meaning. That is, mang-its-an- can mean either 'cause each other to tie' (= compositional) or 'cause to tie each other' (= non-compositional), while mang-an-its- can only mean 'cause to tie each other' (= non-compositional). I refer to a situation in which one order (e.g. RC) is necessarily compositional, while the other order (CR) is not necessarily so as *asymmetric compositionality*. The generalization is as follows: When two suffixes occur in both orders, the templatic order can have the compositional semantics of the non-templatic order, but not vice-versa. In fact, the example in (8) shows that the templatic order can even be used when this results in a suffix being compositionally out of place by more than one position or 'slot':

- (8) [X cause [Y, cut e.o., with]] 'cause to tie each other with'



In this case, the intended reading is that someone causes that others tie each other with some object (e.g. a rope). The ungrammatical order predicted by compositionality is *mang-an-il-its-, i.e. RAC, is ruled out because TEMPLATE is higher ranked than MIRROR (A, C), as in (7).

As in the case of CAUS and APP, the two corresponding constraints are proposed in (9) to account for the asymmetric compositionality of CAUS and REC:

- (9) Suffix ordering constraints for CAUS and REC

- a. TEMPLATE: A morphosyntactic input {CAUS, REC} is realized according to CARP, i.e. -its-an-
 b. MIRROR (R, C): The morphosyntactic input [[[...] REC] CAUS] is realized Verb-an-its-

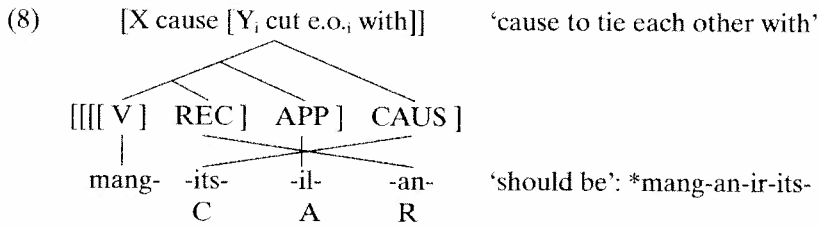
In this case, however, TEMPLATE is freely ranked with respect to the specific MIRROR constraint in (9b). This defines four tableaux, given two inputs and two rankings:

- (10) TEMPLATE = MIRROR (R, C)

a. Reciprocalized Causative

[[[mang] C] R] I]	T	M(R, C)
^{CR} mang-its-an-	its-an	
mang-an-its-		

[[[mang] C] R] I]	M(R, C)	T
^{CR} mang-its-an-		its-an
mang-an-its-		



In this case, the intended reading is that someone causes that others tie each other with some object (e.g. a rope). The ungrammatical order predicted by compositionality is *mang-an-il-its-, i.e. RAC, is ruled out because TEMPLATE is higher ranked than MIRROR (A,C), as in (7).

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[[[mang] C] R]	T	M(R, C)
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mang-an-its-		

[[[mang] C] R]	M(R, C)	T
mang-its-an-		its-an
mang-an-its-		

b. Causativized Reciprocal

[[[mang] R] C]	T	M(R, C)
^{CP} mang-its-an-	its-an	
mang-an-its-		an-its
[[[mang] R] C]	M(R, C)	T
mang-its-an-		its-an
^{CP} mang-an-its-	an-its	

The two outputs, -its-an- and -an-its-, and the observed asymmetric compositionality are produced in the following way. In the top tableaux of (10a,b), TEMPLATE is ranked higher than MIRROR. Both inputs thus produce the output mang-its-an-, which is therefore ambiguous as to scope. In the bottom tableaux of (10a,b), the specific compositionality constraint, MIRROR (R, C), is ranked higher than TEMPLATE. In the bottom left, the reciprocalized causative input still surfaces as mang-its-an-, because mang-an-its- violates TEMPLATE. In the one tableau at the bottom right, the causativized reciprocal input successfully surfaces as mang-an-its- because the input satisfies the higher ranked specific MIRROR constraint. As a result, the output mang-an-its- has only the one compositional meaning.

We have thus far seen one case in (7) where TEMPLATE outranks MIRROR, and we have just now seen a case in (10) where TEMPLATE and MIRROR are freely ranked. Although less frequent, it is also possible for a specific MIRROR constraint to outrank TEMPLATE. To show this, consider in (11) the relation between the applicative and passive, which has been extensively studied by Chichewa scholars (Alsina 1999, Hyman & Mchombo 1992, Baker 1988a,b):

- (11) Ordering of applicative (-il-) and passive (-idw-) in Chichewa
- | | | | |
|----|--------------------|----|---------------------|
| a. | APP-PASS | b. | PASS-APP |
| | -il-idw- | | -idw-il- |
| | <i>benefactive</i> | | <i>locative</i> |
| | <i>recipient</i> | | <i>circumstance</i> |
| | <i>instrument</i> | | <i>locative</i> |

As seen in (11a), the order -il-idw- is used when the applicative licenses a benefactive, recipient, instrument, or locative; 'the for (s.o.)', 'the with (sth.)', 'the

at (s.pl.)' etc. In (11b) we see that the opposite order, -idw-il- can alternatively be used for the locative, 'tie at (s.pl.)' and is the only option when the applicative licenses a circumstance, e.g. 'tie [sth.] for money', 'for no good reason' etc.). The two constraints and their rankings are shown in (12).

(12) Rankings of TEMPLATE and MIRROR (P, A)

- | | | | |
|----|--------------|------------------|---|
| a. | T » M (P, A) | -il-idw- | applicative = benefactive, recipient, instrument |
| b. | T = M (P, A) | -il-idw-/idw-il- | applicative = locative |
| c. | M (P, A) » T | -idw-il- | applicative = circumstance (e.g. 'tie for money') |

In (12a), TEMPLATE outranks MIRROR (P, A), when the applicative licenses a benefactive, recipient or instrument.¹⁰ In (12b), the two constraints are freely ranked, when the applicative licenses a locative. Finally, in (12c), MIRROR (P, A) must outrank TEMPLATE, when the applicative licenses a circumstance. I must point out that the order -idw-il- is highly unusual in Bantu – in fact, I know of no other Bantu language that allows the applicative to occur immediately after the PB *-u- (-w-) passive suffix.¹¹

In (12b) I have suggested free ranking of the constraints in order to get both orders. I have also relied on free ranking to capture what I've termed asymmetric compositionality. There's a third potential argument for free ranking, namely, suffix doubling (Hyman & Mchombo 1992), seen in (13).

(13) Chichewa APP (-il-) and REC (-an-)

- | | | |
|----|---|--|
| a. | mang- → mang-il- APP → mang-il-an- APP-REC | 'tie' 'tie for' 'tie for e.o.' |
| b. | mang- → mang-an- REC → *mang-an-il- REC-APP | 'tie' 'tie e.o.' 'tie each other for/at' |
| c. | mang- → mang-an- REC → mang-il-an- APP-REC | 'tie' 'tie e.o.' (idem) |

In (13a) the verb mang- 'tie' is first applicativized, and then reciprocalized. The resulting sequence, APP-REC -il-an-, is both compositional and templatic, so no problem. In (13b), the same verb is first reciprocalized and then applicativized. As seen, the -an-il- output is ungrammatical even under a compositional reading. Instead, (13c) shows that the templatic order -il-an- can be used with this meaning. As seen in (14), this can be attributed to the ranking TEMPLATE » MIRROR (R, A) in Chichewa:

at (s.pl.)' etc. In (11b) we see that the opposite order, *-idw-il-* can alternatively be used for the locative, 'tie at (s.pl.)' and is the only option when the applicative licenses a circumstance, e.g. 'tie [sth.] for money', 'for no good reason' etc.). The two constraints and their rankings are shown in (12).

(12) Rankings of *TEMPLATE* and *MIRROR* (P, A)

- a. $T \gg M$ (P, A) *-il-idw-* applicative = benefactive, recipient, instrument
- b. $T = M$ (P, A) *-il-idw-/-idw-il-* applicative = locative
- c. M (P, A) $\gg T$ *-idw-il-* applicative = circumstance (e.g. 'tie for money')

In (12a), *TEMPLATE* outranks *MIRROR* (P, A), when the applicative licenses a benefactive, recipient or instrument.¹⁰ In (12b), the two constraints are freely ranked, when the applicative licenses a locative. Finally, in (12c), *MIRROR* (P, A) must outrank *TEMPLATE*, when the applicative licenses a circumstance. I must point out that the order *-idw-il-* is highly unusual in Bantu – in fact, I know of no other Bantu language that allows the applicative to occur immediately after the PB **-u-* (*-w-*) passive suffix.¹¹

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- a. mang- → mang-il- APP → mang-il-an- APP-REC
'tie' 'tie for' 'tie for e.o.'
- b. mang- → mang-an- REC → *mang-an-il- REC-APP
'tie' 'tie e.o.' 'tie each other for/at'
- c. mang- → mang-an- REC → mang-il-an- APP-REC
'tie' 'tie e.o.' (idem)

In (13a) the verb *mang-* 'tie' is first applicativized, and then reciprocalized. The resulting sequence, APP-REC *-il-an-*, is both compositional and templatic, so no problem. In (13b), the same verb is first reciprocalized and then applicativized. As seen, the *-an-il-* output is ungrammatical even under a compositional reading. Instead, (13c) shows that the templatic order *-il-an-* can be used with this meaning. As seen in (14), this can be attributed to the ranking *TEMPLATE* \gg *MIRROR* (R, A) in Chichewa:

(14) TEMPLATE \gg MIRROR (R, A)

a. Reciprocalized Applicative

[[[mang] A] R]	T	M(R, A)
^ε mang-il-an	il-an	
mang-an-il		

b. Applicativized reciprocal

[[[mang] R] A]	T	M(R, A)
^ε mang-il-an	il-an	
mang-an-il		an-il

Similar to the non-mirror realization of -its-il- in (7b), the templatic order -il-an- can be used for an applicativized reciprocal in (13b), thereby constituting another case of asymmetric compositionality. As seen in (13d), Chichewa has an alternative to produce this same reading: it can double the -an- after applicative -il- to produce an -an-il-an- sequence. How to explain this doubling?

(13) d. mang- → mang-an-REC → mang-an-il-an-REC-APP-REC
'tie' 'the e.o.' 'the each other for/at'

As schematized in (15),

(15) M(A,R)
 \swarrow
 mang-an-il-an-
 \searrow
 T

my interpretation of this second option is that the sequence -an-il- is licensed by the MIRROR constraint, while the sequence, -il-an- is licensed by the TEMPLATE constraint. That is, by producing -an- on both sides of -il-, both constraints are actually satisfied.

I have uncovered a number of similar cases of suffix doubling in different Bantu languages which all share a common property: Suffix doubling can only yield an A-B-A pattern when B is a MIRROR override. That is, A-B is always atemplatic.¹² We once again see the primacy of TEMPLATE: Whereas a productive MIRROR override is sometimes responded to in this way by a TEMPLATE-driven

doubling, the reverse is never found. Thus, suffix doubling cannot yield sequences such as *-il-an-il-, where an input [[[verb] R] A] has first been spelled out templatically as -il-an-, followed by a MIRROR-driven doubling of -il-.

To account for such facts, I propose a solution utilizing constraint conjunction (Smolensky 1993). As seen in (16), TEMPLATE will be freely ranked with respect to the conjunction of MIRROR (R, A) and itself:

(16) TEMPLATE = TEMPLATE & MIRROR (R, A)

a. Reciprocalized Applicative

[[[mang] A] R]	T	M(R, A) & T
^ε mang-il-an-	il-an	
mang-an-il-an-	il-an	
mang-an-il-		

[[[mang] A] R]	M(R, A) & T	T
^ε mang-il-an-		il-an
mang-an-il-an-		il-an
mang-an-il-		

b. Applicativized reciprocal

[[[mang] R] A]	T	M(R, A) & T
^ε mang-il-an-	il-an	
mang-an-il-an-	il-an	an-il-an
mang-an-il-		

[[[mang] R] A]	M(R, A) & T	T
mang-il-an-		il-an
^ε mang-an-il-an-	an-il-an	il-an
mang-an-il-		

Again, there are two inputs and two constraint rankings. In the tableaux, I have assumed that co-licensors must be interpreted in an all-or-nothing manner: one

doubling, the reverse is never found. Thus, suffix doubling cannot yield sequences such as *-il-an-il-, where an input [[[verb] R] A] has first been spelled out templatically as -il-an-, followed by a MIRROR-driven doubling of -il-.

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(16) TEMPLATE = TEMPLATE & MIRROR (R, A)

a. Reciprocalized Applicative

[[[mang] A] R]	T	M(R, A) & T
mang-il-an-	il-an	
mang-an-il-an-	il-an	
mang-an-il-		

[[[mang] A] R]	M (R, A) & T	T
mang-il-an-		il-an
mang-an-il-an-		il-an
mang-an-il-		

b. Applicativized reciprocal

[[[mang] R] A]	T	M(R, A) & T
mang-il-an-	il-an	
mang-an-il-an-	il-an	an-il-an
mang-an-il-		

[[[mang] R] A]	M (R, A) & T	T
mang-il-an-		il-an
mang-an-il-an-	an-il-an	il-an
mang-an-il-		

Again, there are two inputs and two constraint rankings. In the tableaux, I have assumed that co-licensors must be interpreted in an all-or-nothing manner: one

can license an affix sequence (A-B) only if the other is also available to license another affix sequence (B-A).¹⁵ That is, M (R,A) & T is taken to license an -an-il-an- sequence, but not a subpart of it. Given the (A,R) input in (16a), M (R,A) & T has no effect, and so templatic -il-an- wins out over atemplatic -an-il-(an)-. With the different input in (16b), however, there is a conflict. TEMPLATE licenses -il-an-, and MIRROR (R, A) & TEMPLATE licenses -an-il-an-. As seen, TEMPLATE wins out in the upper tableau, while the conjunction wins out in the lower tableau, where MIRROR licenses -an-il- and TEMPLATE licenses -il-an-. In all cases, the winning candidate is the one for which all of the suffix orders are licensed by the highest ranked constraints. For further illustration involving three different suffixes, see the Appendix.

In order for the above analysis to go through, however, we need to rule out another potential candidate, mang-il-an-il-, included in the tableaux in (17).

(17) Tableau with mang-il-an-il- candidate

a. Reciprocalized Applicative

[[[mang] A] R]	M (R, A) & T	T
^{REC} mang-il-an-		il-an
mang-an-il-an-		il-an
mang-il-an-il-		il-an

b. Reciprocalized Applicative

[[[mang] R] A]	M (R, A) & T	T
mang-il-an-		il-an
^{REC} mang-an-il-an-	an-il-an	il-an
^{REC} mang-il-an-il-	il-an-il	il-an

In (17a), mang-il-an- remains the winning candidate, since the others have an -an-il- sequence which remains unlicensed. The problem in (17b), however, is that the conjunction licenses mang-an-il-an- as well as mang-il-an-il-. One way to account for this would be to stipulate that REC may have multiple exponence, while APP may not. However, this would miss the fact that an A-B-A sequence must represent a MIRROR override (A-B) followed by a TEMPLATE response (B-A) – and not the reverse. Cyclicity seems to be crucial here (cf. § 4): A cyclic spell-out is allowed to override TEMPLATE, but only if it is repaired by a templatic sequence. A templatic sequence would have no reason to be

'repaired', especially as M (R, A) is low-ranked in Chichewa (cf. (14)), and hence -il-an-il- is not an appropriate output for the input in (17b).

It is important to note that the results illustrated from Chichewa, although varying slightly, are quite typical within Bantu in general. For example, in almost every other Bantu language which realizes CAUS as a reflex of PB *-ic- (Bastin 1986), both semantic scopes of CAUS and APP are fixed in the same templatic order as Chichewa -its-il- (cf. Good 2001). In fact, I have found only two languages, Emakhuwa (Katupha 1991) and Ciyao (Ngunga 2000) which allow the opposite order as a productive override – with expected asymmetric compositionality. Ciyao has, in fact, innovated a new causative form -aas-, which is quite separate from unproductive, templatic -is- in the same language. On the other hand, in Bantu languages which realize CAUS as a reflex of PB *-i- (a tense high front vocalic suffix), e.g. Nyamwezi (Maganga & Schadeberg 1992), the required order is APP-CAUS -il-i- (cf. § 4). Since the linear ordering of the spell-outs of CAUS and APP is in part arbitrary, depending on which historical suffix (*-ic- or *-i-) is used to express the causative, it is clear that such ordering cannot be predicted on the basis of compositionality or the MP. This then constitutes further evidence for a templatic interpretation of suffix ordering in Bantu.

To conclude this section, a final morphological argument for TEMPLATE will again be illustrated from Chichewa (see § 3 and § 5 for syntactic and phonological arguments, respectively). It was pointed out in (11) and (12) that the applicative suffix licenses a variety of arguments and adjuncts in Chichewa. It should thus be logically possible to have more than one applicative suffix, each licensing a different argument/adjunct in the same clause, e.g. 'tie for s.o. with a rope', 'tie for s.o. in the garden', 'tie for s.o. for money', etc. Such multiple applicatives can be realized when the benefactive is a reciprocal, e.g. mang-il-an-il-an-a chingwe 'tie for each other with a rope', where we also observe the expected doubling of -an-. However, what one cannot derive in Chichewa is a case where the same suffix, here -il-, directly follows itself, as seen in (18).

(18) *-il-il- and *-its-its- in Chichewa

a.	mang-	'tie'
	mang-il-	'tie for (s.o./sth/reason)'; 'the with (sth.)'; 'tie at (some place)'
	*mang-il-il-	'tie for (s.o.) with (sth.)'; 'the with (sth.) at (place)'; 'tie for (s.o.) for (reason)'; etc.
b.	mang-	'tie'
	mang-its-	'cause to tie'
	mang-its-	'tie well'
	*mang-its-its-	'cause to cause to tie'
	*mang-its-its-	'cause to tie well'

'repaired', especially as M (R, A) is low-ranked in Chichewa (cf. (14)), and hence -il-an-il- is not an appropriate output for the input in (17b).

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(18) *-il-il- and *-its-its- in Chichewa

- | | | |
|----|----------------|---|
| a. | mang- | 'tie' |
| | mang-il- | 'tie for (s.o./sth/reason)',
'tie with (sth.)', 'tie at (some place)' |
| | *mang-il-il- | 'tie for (s.o.) with (sth.)',
'tie with (sth.) at (place)'
'tie for (s.o.) for (reason)' etc. |
| b. | mang- | 'tie' |
| | mang-its- | 'cause to tie' |
| | mang-íts- | 'tie well' |
| | *mang-its-its- | 'cause to cause to tie' |
| | *mang-its-íts- | 'cause to tie well' |

By the same token, Chichewa does not allow double causatives (*-its-its-) in (18b), nor can causative -its- and intensive -its-co-occur. In other words, Bantu languages such as Chichewa strictly enforce Menn & MacWhinney's (1984) Repeated Morph Constraint (RMC). This is straightforwardly accounted for if every occurring affix must be licensed by something, e.g. TEMPLATE, MIRROR, or a specific conjunction of the two. The CARP template does not license more than one C, A, R and P. In order to get sequences such as -il-il- and -its-its-, representing multiple spell-outs, it would be necessary to have an exceptional override – just as I have claimed for atemplatic suffix sequences not licensed by TEMPLATE.¹⁴

3. TEMPLATE MORPHOLOGY AND SYNTAX

To summarize thus far, I hope to have provided some reason to believe that suffix ordering is largely determined templatically in Bantu. All of the Bantu languages I have looked at obey most of the CARP template. I know of no Bantu language that requires an opposite order of the inherited PB suffixes, e.g. no language requires -il-its-, -an-il- etc. I also know of no Bantu language where suffix ordering obligatorily respects semantic compositionality (or syntactic mirroring). However, I do know of one language, Chimwiini, which, as seen in (19), obeys the template exactly:

- (19) Suffix ordering in Chimwiini is strictly templatic (Abasheikh 1978: 28)

'In Chimwiini, unlike some other Bantu languages, the order of the extensions is restricted. The following ordering of the extensions mentioned above is as follows:

– Verb Stem – Causative – Applied – Reciprocal – Passive

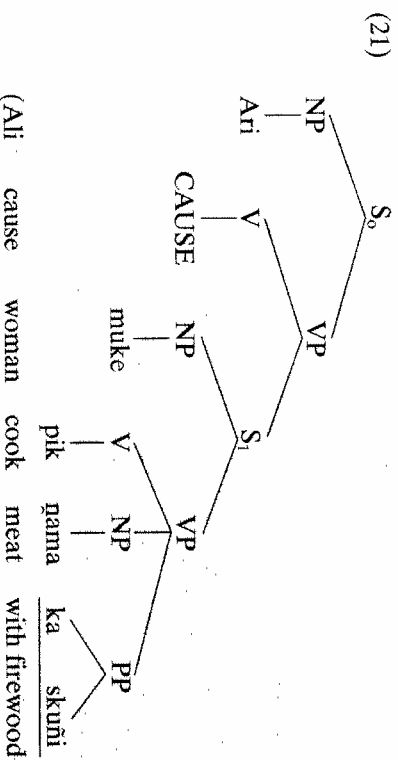
It is not possible to put these extensions in any other order.'

As an illustration, in (20) we see that Chimwiini, like Chichewa, uses the applicative to license instruments:

- (20) The applicative allomorph -iriz- is used after causative -ish-, e.g. to license an instrument
- a. luti, Ji mw-andik-ish-iriz-e mwana xati
stick Ji he-write-CAUS-APP child letter
'Ji used a stick to make the child write a letter'

- b. skuñi, Ari m-pik-ish-iriz-e: muke nama
firewood Ali he-cook-CAUS-APP woman meat
'firewood, Ali made the woman cook meat (with it)'
(Ali made the woman use firewood to cook meat)

In (20a), the surface order -ish-iriz- (CAUS-APP) reflects semantic scope, since the applicative instrument acts on the higher CAUSE. In (20b), we see the same templatic order, -ish-iriz-, but this time the surface order does not reflect the semantic scope, since the applicative instrument acts on the lower (main) verb and is therefore within the scope of the higher CAUSE. Abasheikh (1978) was well aware of this problem. Note his tree diagram of (20b) in (21), where he assumes a deep structure source using the preposition ka 'with'.

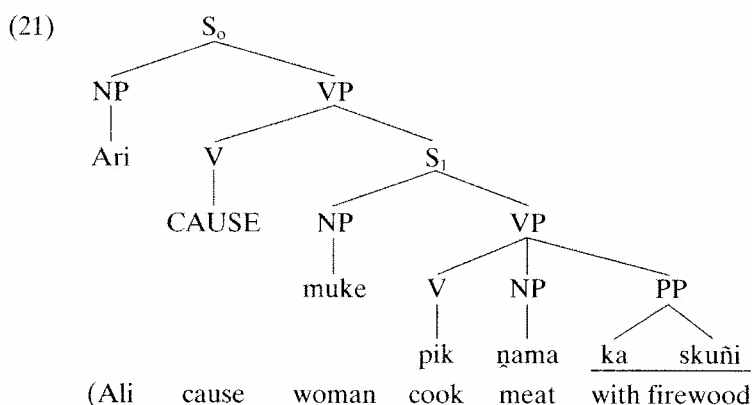


Abasheikh (1978: 216) – perhaps the father of the Mirror Principle in Bantu – writes: 'Both Preposition Incorporation and Predicate Raising must occur to derive the applied causative. If there is a connection between the ordering of these two rules and the order of the morphemes in the final surface forms (i.e. the causative suffix closest to the verb stem and the applied suffix after the causative), then presumably Predicate Raising would have to precede Preposition Incorporation.' In other words, syntactic rule ordering would have to be extrinsic, rather than following a cyclic principle. The inescapable conclusion is that suffix ordering does not reflect compositionality/semantic scope.¹⁵

The question now is: What about the relation between the *synzar* and suffix ordering? I.e. what about the Mirror Principle, which is a claim about morphology and syntax, not about morphology and semantics? Let us return to the corresponding CAUS-APP sequence, -its-il-, which we examined in Chichewa. In (22a), the -its-il- sequence is both templatic and compositional. Since the applicative instrument has wider scope, it can become the subject of the corresponding passive in (22b). In (22c), the causee 'children' is typically rejected as subject.¹⁶

- b. skuñi, Ari m-pik-ish-iriz-e: muke ñama
 firewood Ali he-cook-CAUS-APP woman meat
 'firewood, Ali made the woman cook meat (with it)'
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(22) Applicativized causative in Chichewa

- a. Mchombó a-ná-*lil-its-il-*a aná ndodo
CAUS-APP
'Mchombo made the children cry with a stick'
- b. ndodo i-ná-*lil-its-il-idw-á* ána
'a stick was used to make the children cry'
- c. ?*aná a-ná-*lil-its-il-idw-á* ndodo
'the children were made to cry with a stick'

This contrasts with (23a), where the *-its-il-* sequence is templatic, but non-compositional, since, the causation has scope over the applicative instrument. Thus, in (23b), the causee 'children' can become the subject of the corresponding passive, whereas the applicative instrument in (23c) cannot.

(23) Causativized applicative in Chichewa

- a. Mchombó a-ná-*lím-its-il-*a aná makásu
CAUS-APP
'Mchombo made the children cultivate with hoes'
- b. aná a-ná-*lím-its-il-idw-á* makásu
'the children were made to cultivate with hoes'
- c. ?*makású a-ná-*lím-its-il-idw-á* ána
'hoes were used to make the children cultivate'

The syntactic differences between (22b,c) and (23b,c) suggest that suffix ordering does not in this case reflect the order of syntactic operations. Hence, the Mirror Principle may not be universal in the 'no exceptions' sense, but rather in the (violable) OT sense.

4. THE TEMPLATE AS AUTONOMOUS MORPHOLOGY

Having established the CARP template, I would like now to raise two general questions about it: First, how much of the template is arbitrary/non-arbitrary? Second, why should there be a template at all?

The first question might be approached from either of two logical positions. First, the order of the elements in the template, CAUS-APP-REC-PASS, might have a functional basis of some sort (cf. Bybee 1985), or it might entirely be the result of historical processes, that is, accidental from a synchronic point of view.¹⁷ In Hyman & Mchombo (1992: 359) we took a somewhat intermediate view: 'the thematic hierarchy partially accounts for suffix orders that depart from what we would expect from the mirror principle ... suffixes that target roles higher on the thematic hierarchy should precede suffixes that target roles

lower on the hierarchy. Since the causative introduces an agent, the highest thematic role, it will tend to come first. Since the applicative introduces beneficiaries, goals and instruments – and since the reciprocal tends to realize a patient argument – applicative *-il-* should precede reciprocal *-an-*. Unfortunately, an applicative should follow a reciprocal when it introduces a locative or a circumstantial – lowest on the hierarchy – but only optionally does. It seems that the ordering properties have become fixed according to the prototypical functions of each of the affixes.¹⁸

Whatever merit there might be to this proposal, I should like now to argue the other side, that much of the templatic ordering of suffixes is arbitrary from a synchronic point of view. For this purpose I return to the expression of the causative in Bantu. As seen in (24a), Proto-Bantu had a short causative suffix consisting of the tense vowel *-i-*, realized as a glide before a vowel. It also had a long causative suffix in (24b), which consisted of the short causative *-i-* preceded by the formative **-ic-*, whose consonant frequently develops into an [s].

(24) Causative suffixes in Proto-Bantu (cf. Bastin 1986)

- a. **-i-* > *-i-* [-y-]
b. **-ic-i-* > *-is-i-* [-isy-, -is-, -iṣ-, -its-] etc.

In (25a) we see that some present-day languages maintain the proto situation. Many are, however, like Chichewa in (25b): having lost the short causative *-i-* (with some lexicalized relics), they have only *-is-*. Contrasting with this situation are other languages in (25c) which have only (or almost only) the short causative – (cf. Bastin 1986):

(25) Causative suffixes in present-day Bantu languages

- a. *-is-i-* and *-i-* e.g. Kinande, Luganda
b. *-is-* only e.g. Chichewa, Shona, Zulu
c. *-i-* only (or almost only) e.g. Nyamwezi, Nyakyusa

We have already seen that the applicative suffix must follow causative **-ic-* (*-its-* in Chichewa and *-ish-* in Chimwini). Contrasting with this are the Kinande data in (26a), which show that the applicative must precede the short causative **-i-* (Hyman 1993):

(26) Short causative *-i-* must follow applicative *-il-*, e.g. Kinande

- a. *-tsap-* 'get wet' (intr.)
-tsap-i- 'wet [something]' (= cause to get wet)
-tsap-il-i- 'wet [sth.] for/at'

lower on the hierarchy. Since the causative introduces an agent, the highest thematic role, it will tend to come first. Since the applicative introduces benefactives, goals and instruments – and since the reciprocal tends to realize a patient argument – applicative *-il-* should precede reciprocal *-an-*. Unfortunately, an applicative should follow a reciprocal when it introduces a locative or a circumstantial – lowest on the hierarchy – but only optionally does. It seems that the ordering properties have become fixed according to the prototypical functions of each of the affixes.¹⁸

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- a. *-tsap-* 'get wet' (intr.)
-tsap-i- 'wet [something]' (= cause to get wet)
-tsap-ir-i- 'wet [sth.] for/at'

- b. *-song- 'gather (tr.)' (pseudo-causative)
 -song-i- 'gather for/at'
 -song-er-i-

This is true even for the 'pseudo-causative' verb -song-i- 'gather' in (26b), for which no corresponding verb root -song- exists. The ordering of the applicative with respect to the different causative suffixes is summarized in (27).

- (27) Ordering of applicative with respect to the different causative suffixes
- is- → -is-il- CAUS-APP
 e.g. Chichewa -its-il-; Chimwini -ish-iriz-
 - i- → -il-i- APP-CAUS
 e.g. Kinande -ir-i-; Nyanwezi -il-i- → -ij-i-
 - is-i- → -is-il-i- CAUS-APP-CAUS
 e.g. Luganda -is-ir-i- → -is-iz-i-

Comparing (27a,b), we see that the applicative will go on different sides of the causative, depending on which causative suffix a language uses – and independently of which one is used productively (e.g. *-i- is non-productive in Kinande, but productive in Nyanwezi). In fact, as shown in (26c), in languages which keep the two-part causative sequence the applicative suffix is 'interfixed'. The CARP template should thus be elaborated as in (28).¹⁹

- (28) Elaborated template: CAUS-APP-REC-CAUS-Pass
 *-ic- -id- -an- -i- -u- Proto-Bantu

As seen, there is a phonological generalization: -V- suffixes come after -VC- suffixes.²⁰ There are historical reasons for this – specifically, the fact that the causative and passive were, most likely, part of a historical voice-marking system consisting of final vowel morphemes. On the other hand, both causative *-ic- and applicative *-id- are used as 'stabilizers', adding an extra weight to subminimal CV roots. Most verb roots in Bantu have the CVC shape in (29a). Whereas the -i- causative is quite general in Luganda (used interchangeably with -is-i-), the few CV roots such as If- 'eat' in (29b) must take the long causative -is-i-.

- (29) Conditioning of 'stabilizer' -is- (after CV roots), e.g. Luganda
- lim- 'cultivate' → lim-i- 'make cultivate'
 - If- 'eat' → If-is-i- 'make eat; feed' (*If-i-)

In other words, -is-, is oriented towards immediate-post-root position, while -i- is oriented to near-final position. Both, however, have the same function, that

of a causative, and both are capable of providing the same compositional possibilities with respect to other suffixes.²¹ I conclude that at least some of the properties of the TEMPLATE are quite arbitrary from a synchronic point of view – and hence an argument for autonomous morphology.

This leads me to my second general question: If TEMPLATES are potentially arbitrary, why should languages have them at all? What possible functional motivation could there be for fixed morpheme ordering, especially as concerns verb suffixes in Bantu, whose scope can vary with respect to other suffixes?

Before attempting a response, let us contrast templatic morphology with the opposite situation in (30).

- (30) An 'ideal' language:
- semantic compositionality : order of affixation correlates with semantic scope
 - syntactic mirror principle : order of affixation correlates with order of syntactic operations
 - morphological layering : order of affixation correlates with affix sequencing
 - phonological cyclicity : order of affixation correlates with cyclic phonology

If we were creating an ideal language with good engineering from scratch, we might impose an isomorphism throughout the different components of the grammar such that the order of affixation would correlate with the semantic scope, the syntactic operations, the morphological structure, and the cyclic application of phonological rules. We know, of course, that there are mismatches in real languages, but at least we can set each of the four correlations as an OT-style universal or 'ideal' that can be violated. In the ideal language, as the semantics varies, so would the syntax, the morphology, and the phonology. Since affixation processes would therefore occur in different orders according to these correlations, there would be no one fixed sequence of affixes. This is one half of the basic 'tension' I referred to between the pressure for affix ordering to be compositional vs. the pressure for affix ordering to be invariant.

But what is the corresponding universal that pushes languages towards fixed, templatic affix ordering? I would like to suggest that the ideal alignment in (30) is just too much to ask of actual speaker-hearers faced with having to pack and unpack morphologically complex forms in real time. It's not possible, and it's often not even desirable for the order of affixation to be taken so literally. In fact, much of the scope relations is either trivially predictable from the lexical semantics or the discourse context or non-consequential, even indeterminate.

of a causative, and both are capable of providing the same compositional possibilities with respect to other suffixes.²¹ I conclude that at least some of the properties of the *TEMPLATE* are quite arbitrary from a synchronic point of view – and hence an argument for autonomous morphology.

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If we were creating an ideal language with good engineering from scratch, we might impose an isomorphism throughout the different components of the grammar such that the order of affixation would correlate with the semantic scope, the syntactic operations, the morphological structure, and the cyclic application of phonological rules. We know, of course, that there are mismatches in real languages, but at least we can set each of the four correlations as an OT-style universal or 'ideal' that can be violated. In the ideal language, as the semantics varies, so would the syntax, the morphology, and the phonology. Since affixation processes would therefore occur in different orders according to these correlations, there would be no one fixed sequence of affixes. This is one half of the basic 'tension' I referred to between the pressure for affix ordering to be compositional vs. the pressure for affix ordering to be invariant.

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To see this, let's return one last time to the sequencing of causative and applicative suffixes, whose order is not compositionally free in the Bantu languages I've looked at, modulo special developments mentioned above in Emakhuwa (Katupha 1991) and Ciyao (Ngunga 2000).²² Consider the potential causative + applicative combinations in (31).

- (31) Potential causative + applicative combinations – all would be *-its-ili-* in Chichewa
- a. instrument applicative
make run with whip : [with whip [make X run]]
make stir with spoon : [make [X stir with spoon]]
 - b. circumstance applicative
make cook for feast : [make [X cook for feast]]
make suffer for fun : [make for fun [X suffer]]
 - c. locative applicative
make swim in lake : [make [X swim in lake]]
make land in the air : [make in the air [X land]]
 - d. benefactive applicative
make cook for baby : [make [X cook for baby]]
make learn for teacher : [make for teacher [X learn]]

In these inputs I've tried to provide pairs of forms which differ in scope. This task is easiest in (31a), where the the nature of the instrument applicative often disambiguates the scope. I have tried to do the same in (31b–d) with respect to circumstance, locative, and benefactive applicatives. What this kind of exercise demonstrates to me is that separating applicativized causatives from causativized applicatives is often marginal, difficult or not worth distinguishing. It may therefore be a great advantage to the speaker (perhaps also to the hearer) to just fix the order and not worry about it.

The surprise, sometimes, is that the fixed order is also imposed, non-compositionally, on complex, lexicalized verb forms such as in (32).

- (32) Lexicalized applicative + causative in Chichewa (Hyman & Mchombo 1992)
- a. uk- 'wake up'
 - b. uk-ili- 'rebel against'
 - c. *uk-ili-its- 'cause to rebel against'
 - d. uk-its-ili- 'cause to rebel against'

In Chichewa, the verb *uk-* 'wake up' in (32a) acquires the lexicalized meaning 'rebel against' when the applicative is added in (32b). The ungrammatical form in (32c) shows that one cannot causativize *uk-ili-* by adding *-its-* outside its base. Instead, as seen in (32d), *-its-* must be 'interfixed' into the position it occupies in the CARP template. The same kind of facts are seen with the relatively small set of motion verbs which use the applicative to express a locative goal. In (33a), the verb *-gw-* 'fall' occurs with a source or situative locative. The corresponding causative is seen in (33b).

- (33) Applicative locative goal + causative in Chichewa
- a. gw-a m-nyumba 'fall (while) in the house'
 - b. gw-ets-a m-nyumba 'cause to fall (while) in the house'
 - c. gw-el-a m-nyumba 'fall into the house'
 - d. *gw-el-ets-a m-nyumba
 - e. gw-ets-el-a m-nyumba 'cause to fall into the house'

In (33c), the applicativized verb stem *gw-el-* 'fall [towards]', which takes a goal locative, cannot be causativized as **gw-ets-el-* in (33d). Instead, the causative extension *-ets-* must be interfixed between the root and the applicative suffix *-el-*, as in (33e). Such non-compositional sequencing is particularly striking in the case of pseudo-causatives, where there isn't even a base from which to derive the extended verb form (cf. Kinande in (26b)).

5. PHONOLOGICAL EVIDENCE FOR TEMPLATES

In the previous sections we have seen that the VC causative **-ic-* comes before the applicative, while the V causative **-i-* comes after. What this means is that causative **-ic-* will be interfixed into a lexicalized CVC-*il-* applicative verb, as in (32d) and (33e), and applicative **-id-* will be interfixed into a lexicalized CVC-*i-* causative verb, as in (26b). The ordering of affixes disguises a deeper generalization: causativization precedes applicativization in Bantu. That is, when configuration, CAUS is spelled out before APP. When CAUS is spelled out via **-ic-*, will also precede applicative **-id-* in linear order. In the case of CAUS **-i-*, the spell-out occurs first, followed by the interfixing of APP **-id-* before it. In this section I will present phonological evidence that such a cyclic spell-out, rather than reflecting the morphosyntactic structure, is actually also templatic in nature. This last discussion will thus also illustrate the potential relevance of phonology in multiple affixation.

Consider the forms from Nyamwezi in (34).

In Chichewa, the verb *uk-* 'wake up' in (32a) acquires the lexicalized meaning 'rebel against' when the applicative is added in (32b). The ungrammatical form in (32c) shows that one cannot causativize *uk-il-* by adding *-its-* outside its base. Instead, as seen in (32d), *-its-* must be 'interfixed' into the position it occupies in the CARP template. The same kind of facts are seen with the relatively small set of motion verbs which use the applicative to express a locative goal. In (33a), the verb *-gu-* 'fall,' occurs with a source or situative locative. The corresponding causative is seen in (33b).

(33) Applicative locative goal + causative in Chichewa

- | | | |
|----|-------------------------------|--------------------------------------|
| a. | <i>gw-a m-nyumba</i> | 'fall (while) in the house' |
| b. | <i>gw-ets-a m-nyumba</i> | 'cause to fall (while) in the house' |
| c. | <i>gw-el-a m-nyumba</i> | 'fall into the house' |
| d. | * <i>gw-el-ets-a m-nyumba</i> | |
| e. | <i>gw-ets-el-a m-nyumba</i> | 'cause to fall into the house' |

In (33c), the applicativized verb stem *gw-el-* 'fall [towards]', which takes a goal locative, cannot be causativized as **gw-ets-el-* in (33d). Instead, the causative extension *-ets-* must be interfixed between the root and the applicative suffix *-el-*, as in (33e). Such non-compositional sequencing is particularly striking in the case of pseudo-causatives, where there isn't even a base from which to derive the extended verb form (cf. Kinande in (26b)).

5. PHONOLOGICAL EVIDENCE FOR TEMPLATES

In the previous sections we have seen that the VC causative **-ic-* comes before the applicative, while the V causative **-j-* comes after. What this means is that causative **-ic-* will be interfixed into a lexicalized CVC-*il-* applicative verb, as in (32d) and (33e), and applicative **-id-* will be interfixed into a lexicalized CVC-*j-* causative verb, as in (26b). The ordering of affixes disguises a deeper generalization: causativization precedes applicativization in Bantu. That is, when contiguous, CAUS is spelled out before APP. When CAUS is spelled out via **-ic-*, will also precede applicative **-id-* in linear order. In the case of CAUS **-j-*, the spell-out occurs first, followed by the interfixing of APP **-id-* before it. In this section I will present phonological evidence that such a cyclic spell-out, rather than reflecting the morphosyntactic structure, is actually also templatic in nature. This last discussion will thus also illustrate the potential relevance of phonology in multiple affixation.

Consider the forms from Nyamwezi in (34).

- (34) Nyanmwezi Causatives and Applicativized Causatives (Maganga & Schadeberg 1992)

	-root- <i>-i-</i>	-root- <i>-i-</i>	-root- <i>-i-</i>
a.	Bak- 'shine, burn (intr.)' og- 'bathe intr.'	Ɔac- <i>-i-</i> o <i>-i-</i>	'light' 'bathe (s.o.)' Ɔeeng- <i>-i-</i> nyqnh- 'smell'
b.	Ɔis- 'hide' Ɔon- 'see'	Ɔis- <i>-i-</i> Ɔon- <i>-i-</i>	'make hide' 'make see'
c.	gul- 'buy' kaanz- 'wash' buúnh- 'swim'	gul- <i>-i-</i> kaáñ- <i>-i-</i> buúñh- <i>-i-</i>	'sell' 'have washed' 'make swim'
			Ɔug- <i>-i-</i> kaáñg- <i>-i-</i> buúñgh- <i>-i-</i>

Note the palatalization of the root-final consonants when the causative suffix *-i-* is added in the second column of data. As seen in the third column of data, when the applicative suffix *-il-* is added, it must be interfixed before causative *-i-*. The forms above the box show that applicative *-il-* is palatalized to *-ij-* (where *j* is a palatal stop). The preceding root-final consonant is restored in (33a,b). However, the roots in the forms in the box curiously end in a velar. To understand why, we see in (34) that the derivation of applicativized causatives must be cyclic (cf. Hyman 1994, 2002a,b):

- (35) Derivation of applicativized causatives must be cyclic
- | | | | | | | |
|----|---------------------------------|------|---|-------------------------|---|-----------------|
| a. | replacive velar = etymological: | og- | → | o <i>-i-</i> | → | og- <i>-i-</i> |
| b. | replacive velar ≠ etymological: | gul- | → | g <i>u</i> - <i>-i-</i> | → | gug- <i>-i-</i> |

The verb root og- in (35a) is first causativized to o*-i-* and then applicativized to og-*-i-*, with its velar restored. Similarly, the verb root gul- in (35b) is first causativized to g*u*-, and then applicativized to g*u*-*-i-*. In this case the // becomes *j*, which then becomes [g]. It is the merger of /g/ and // to *j* in the box in (34) that is responsible: When the applicative is interfixed, all *j*'s are 'undone' (so to speak) to *g*'s (see Maganga & Schadeberg 1992; Hyman 2002ab).

This demonstration of cyclicity is important, because it predicts that we should get two different outputs in (36).

- (36) Two different outputs predicted according to cyclicity
- | | | | | | | |
|----|---------------------------|------|---|------------------|---|------------------|
| a. | applicativized causative: | CVI- | → | CV <i>j</i> - | → | CVg- <i>-i-</i> |
| b. | causativized applicative: | CVI- | → | CVI- <i>-il-</i> | → | CVI- <i>-ij-</i> |

In (36a) we first causativize the verb, palatalizing // to *j*, and then we interfix the applicative and depalatalize the *j* to *g*. In (36b) we first applicativize the verb and then causativize it, so the // of the root should still be intact.

Given what we have seen thus far, we would expect the potential difference in (36a,b) to show up in the case of instrumental applicatives: (36a) should be where the instrument goes with the causer, while (36b) should be where the instrument goes with the causee. The one form in (37) shows that this is not the case in Nyanmwezi.²³

- (37) Two scopes, one cyclic phonology
- | | | | | | | | |
|----|------|---------|---|------|---|-----------------|------------------------------|
| a. | sqł- | 'forge' | → | sqj- | → | sqg- <i>-i-</i> | [make with whip [X forge]] |
| b. | | | | | | sqg- <i>-i-</i> | [make [X forge with hammer]] |

The expected cyclic derivation is compatible with the compositional meaning in (37a), whereas the same required cyclic derivation is at odds with the compositional meaning in (37b).

A similar situation obtains in Chibemba. As documented in detail in Hyman (1994), causative *-i-* 'fricates' a labial obstruent to [ʃ] and a lingual obstruent to [sʃ]:

- (38) Phonological evidence for interfixing *-il-/-el-* in Bemba (Hyman 1994)
- | | | | | | | |
|----|-------|-----------------|---|------------------|-----------------|---------------------|
| a. | leep- | 'be long' | → | leef- <i>-i-</i> | 'lengthen' | (leef- <i>y-a</i>) |
| | lub- | 'be lost' | → | luf- <i>-i-</i> | 'lose' | (luf- <i>y-a</i>) |
| b. | fiit- | 'be dark' | → | fiis- <i>-i-</i> | 'darken' | (fiš- <i>y-a</i>) |
| | cind- | 'dance' | → | cins- <i>-i-</i> | 'make dance' | (cins- <i>y-a</i>) |
| | il- | 'cry' | → | lis- <i>-i-</i> | 'make cry' | (liš- <i>y-a</i>) |
| | buuk- | 'get up (intr)' | → | buus- <i>-i-</i> | 'get [s.o.] up' | (buuš- <i>y-a</i>) |
| | lúng- | 'hunt' | → | lúns- <i>-i-</i> | 'make hunt' | (lúnš- <i>y-a</i>) |

The forms given in parentheses on the right show how the indicated outputs are realized when the inflectional final vowel *-a* is added.

Now, if we add the applicative suffix *-il-* to the above causativized forms, the resulting forms are seen in (39).

- (39) Cyclic frication in Bemba
- | | | | | |
|----|------------------|---|---------------------|------------------------|
| a. | leef- <i>-i-</i> | → | leef-es- <i>-i-</i> | (leef-es- <i>y-a</i>) |
| | 'lengthen' | | 'lengthen for/at' | |
| | luf- <i>-i-</i> | → | luf-is- <i>-i-</i> | (luf-is- <i>y-a</i>) |
| | 'lose' | | 'lose for/at' | |
| b. | fiis- <i>-i-</i> | → | fiis-is- <i>-i-</i> | (fiš-is- <i>y-a</i>) |
| | 'darken' | | 'darken for/at' | |

In (36a) we first causativize the verb, palatalizing /l/ to j, and then we interfix the applicative and depalatalize the j to g. In (36b) we first applicativize the verb and then causativize it, so the /l/ of the root should still be intact.

Given what we have seen thus far, we would expect the potential difference in (36a,b) to show up in the case of instrumental applicatives: (36a) should be where the instrument goes with the causer, while (36b) should be where the instrument goes with the causee. The one form in (37) shows that this is not the case in Nyamwezi.²³

(37) Two scopes, one cyclic phonology

- a. sʉl- 'forge' → sʉj- → sʉg-ij-ǰ- [make with whip [X forge]]
 b. sʉl- 'forge' → sʉg-ij-ǰ- [make [X forge with hammer]]

The expected cyclic derivation is compatible with the compositional meaning in (37a), whereas the same required cyclic derivation is at odds with the compositional meaning in (37b).

A similar situation obtains in Chibemba. As documented in detail in Hyman (1994), causative -ǰ- 'fricates' a labial obstruent to [f] and a lingual obstruent to [s]:

(38) Phonological evidence for interfixing -il-/-el- in Bemba (Hyman 1994)

- a. leep- 'be long' → leef-ǰ- 'lengthen' (leef-y-a)
 lub- 'be lost' → luf-ǰ- 'lose' (luf-y-a)
 b. fiit- 'be dark' → fiis-ǰ- 'darken' (fiiš-y-a)
 cind- 'dance' → cins-ǰ- 'make dance' (cins-y-a)
 lil- 'cry' → lis-ǰ- 'make cry' (liš-y-a)
 buuk- 'get up (intr)' → buus-ǰ- 'get [s.o.] up' (buuš-y-a)
 lúng- 'hunt' → lúns- 'make hunt' (lúnš-y-a)

The forms given in parentheses on the right show how the indicated outputs are realized when the inflectional final vowel -a is added.

Now, if we add the applicative suffix -il- to the above causativized forms, the resulting forms are seen in (39).

(39) Cyclic frication in Bemba

- a. leef-ǰ- → leef-es-ǰ- (leef-eš-y-a)
 'lengthen' 'lengthen for/at'
 luf-ǰ- → luf-is-ǰ- (luf-iš-y-a)
 'lose' 'lose for/at'
 b. fiis-ǰ- → fiis-is-ǰ- (fiiš-iš-y-a)
 'darken' 'darken for/at'

cins-i-	→	cins-is-i-	(cins- <i>is</i> -y-a)
'make dance'	→	'make dance for/at'	
lis-i-	→	lis-is-i-	(lis- <i>is</i> -y-a)
'make cry'	→	'make cry for/at'	
buus-i-	→	buus-is-i-	(buus- <i>is</i> -y-a)
'get [s.o.] up'	→	'get [s.o.] up for/at'	
lúns-i-	→	lúns-is-i-	(lúns- <i>is</i> -y-a)
'make hunt'	→	'make hunt for/at'	

As seen, both the root-final consonant and the [l] of the applicative suffix -il- are fricated, suggesting the cyclic analysis in (40).

(40) Cyclic analysis with 'interfixing' of applicative -il- (Hyman 1994, Orgun 1996)

UR	Morphology1	Phonology1	Morphology2	Phonology2
a. lub-	→	lub-i-	→	luf-i-
'be lost'	→	'lose'	→	'lose for/at'
b. il-	→	il-i-	→	lis-il-i-
'cry'	→	'make cry'	→	'make cry for/at'

First the root-final consonant is fricated, then -il- is interfixed, then the [l] of -il- is itself fricated.

The cyclic derivation seems, thus, to mirror the morphosyntactic structure of these forms, which are applicativized causatives. If taken as evidence for compositionality, there should be two possible outcomes involving causative -i- and applicative -il- in Cibemba, e.g. with a root-final [k] in (41).

- (41) Two different outputs predicted according to cyclicity
- | | | | | | |
|------------------------------|------|---|-----------|---|-----------|
| a. applicativized causative: | CVk- | → | CVs-i- | → | CVs-is-i- |
| b. causativized applicative: | CVk- | → | CVk-il-i- | → | CVk-is-i- |

To test this, consider the motion verb *fyúk-* 'escape' in (42a), which directly takes a locative source (Nancy Kula, pers. comm.):

- (42) Applicative locative goal + causative in Cibemba
- | | | |
|----|-------------------------------|-------------------------------------|
| a. | <i>fyúk-a-mu-gandá</i> | 'escape from in the house' |
| b. | <i>fyúš-y-a-mu-gandá</i> | 'cause to escape from in the house' |
| c. | <i>fyúk-il-a-mu-gandá</i> | 'escape into the house' |
| d. | * <i>fyúk-is-y-a-mu-gandá</i> | |
| e. | <i>fyúš-is-y-a-mu-gandá</i> | 'cause to escape into the house' |

As seen in (42b), -i- produces the corresponding causative. In (42c), an applicative -il- is required to express a locative goal. When one attempts to causativize this form in (42d), the result, **fyúk-is-y-a*, is ungrammatical. Instead, a cyclic (non-compositional) realization is required, as in (42e). That is, a causativized applicative is expressed as an applicativized causative in Cibemba.

My interpretation of the facts in (37b) and (42e) is that both Nyanwezi and Cibemba have imposed phonological cyclicity as a templatic requirement on both combinations of [CAUS, APP], where CAUS is realized via the suffix -i-. The Nyanwezi depalatalization process also illustrates what I have referred to as 'cyclic non-identity' (Hyman 2002a), while double frication in (42d) shows that phonological cyclicity need not mirror the morphosyntactic bracketing. Both fixed outputs are consistent with the templatic interpretation that I have ascribed to Bantu suffixation in general.

Data from related languages with frication further underscore the potential for phonological conditions on the templatic realization of suffix combinations in Bantu. Schumann (1899) and Meinhof (1932) discuss alternations such as the following from Nyakyusa:

- (43) Replacive [k] in Nyakyusa
- | | | | |
|---------|-------------------------|---|------------|
| a. sat- | 'be in pain' | → | sat-il- |
| sas-i- | 'give pain' | → | sak-is-i- |
| gel- | 'measure' | → | gel-el- |
| ges-i- | 'try' | → | gek-es-i- |
| byj- | 'come back' | → | byj-il- |
| bys-i- | 'bring back' | → | byk-is-i- |
| sok- | 'go out' | → | sok-el- |
| sos-i- | 'take out' | → | sok-es-i- |
| ag- | 'run out [alle werden]' | → | ag-il- |
| as-i- | 'make run out' | → | ak-is-i- |
| b. tup- | 'become thick' | → | tup-il- |
| tuf-i- | 'thicken' | → | tuk-if-i- |
| olob- | 'become rich' | → | olob-el- |
| olof-i- | 'make rich' | → | olok-ef-i- |

In (43a), root-final lingual consonants are fricated to [s] in the causative. In (43b) root-final labial consonants are fricated to [f]. When these forms are then applicativized by adding -il- (as indicated by the arrows), in the causativized stems, a [k] replaces the [f] or [s], which in turn replaces the [l] of the applicative. These changes are schematized in (44).

- (44) a. -CVs-il-i- b. -CVf-il-i-
- | | |
|-----|-----|
| ↓ ↓ | ↓ ↓ |
| k s | k f |

What is of interest here are the facts in (45).

As seen in (42b), *-i-* produces the corresponding causative. In (42c), an applicative *-il-* is required to express a locative goal. When one attempts to causativize this form in (42d), the result, **fyúk-iš-y-a*, is ungrammatical. Instead, a cyclic (non-compositional) realization is required, as in (42e). That is, a causativized applicative is expressed as an applicativized causative in Chibemba.

My interpretation of the facts in (37b) and (42e) is that both Nyamwezi and Chibemba have imposed phonological cyclicity as a templatic requirement on both combinations of {CAUS, APP}, where CAUS is realized via the suffix *-i-*. The Nyamwezi depalatalization process also illustrates what I have referred to as ‘cyclic non-identity’ (Hyman 2002a), while double frication in (42d) shows that phonological cyclicity need not MIRROR the morphosyntactic bracketing. Both fixed outputs are consistent with the templatic interpretation that I have ascribed to Bantu suffixation in general.

Data from related languages with frication further underscore the potential for phonological conditions on the templatic realization of suffix combinations in Bantu. Schumann (1899) and Meinhof (1932) discuss alternations such as the following from Nyakyusa:

(43) Replacive [k] in Nyakyusa

a. sat-	‘be in pain’	→	sat-il-	
sas-i-	‘give pain’	→	sak-is-i-	‘give pain for/at’
gel-	‘measure’	→	gel-el-	
ges-i-	‘try’	→	gek-es-i-	‘try for/at’
buj-	‘come back’	→	buj-il-	
bys-i-	‘bring back’	→	buk-is-i-	‘bring back for/at’
sok-	‘go out’	→	sok-el-	
sos-i-	‘take out’	→	sok-es-i-	‘take out for/at’
ag-	‘run out [alle werden]’	→	ag-il-	
as-i-	‘make run out’	→	ak-is-i-	‘make run out for/at’
b. tup-	‘become thick’	→	tup-il-	
tuf-i-	‘thicken’	→	tuk-if-i-	‘thicken for/at’
olob-	‘become rich’	→	olob-el-	
olof-i-	‘make rich’	→	olok-ef-i-	‘make rich for/at’

In (43a), root-final lingual consonants are fricated to [s] in the causative. In (43b) root-final labial consonants are fricated to [f]. When these forms are then applicativized by adding *-il-* (as indicated by the arrows), in the causativized stems, a [k] replaces the [f] or [s], which in turn replaces the [l] of the applicative. These changes are schematized in (44).

(44) a. -CVs-il-i-	b. -CVf-il-i-
↓ ↓	↓ ↓
k s	k f

What is of interest here are the facts in (45).

(45) Extra morph -ik- with non-fricating root-final consonants

- a. *lim-* → *lim-il-*
 'cultivate'
lim-i- → *lim-ik-is-i-*
 'make cultivate for/at'
- b. *lum-* → *lum-il-*
 'bite'
lum-i- → *lum-ik-is-*
 'make bite for/at'

In these forms, /m/ does not fricate before -i-. We would therefore expect the applicatives of *lim-i-* and *lum-i-* to be **lim-is-i-* and **lum-is-i-*. Such forms are in fact impossible. Instead, as seen, an extra formative -ik- is found. Why should this be?

The answer, as Meinhof (1932) already suggested, is that [CAUS, APP] must be expressed by means of one of the sequences ... *kis* ... / ... *kif* ... (ignoring vowel height harmony), which I'll refer to as the KIS requirement. In the case of forms such as *lim-* and *lum-*, given the KIS requirement, one cannot simply interfix applicative -il-: /m/ cannot be replaced by [k] in the output; only [s] and [f] can be, as in (44). One way to look at this is to say that *lim-i-* and *lum-i-* cannot be applicativized, because they cannot meet the KIS requirement. Instead, the causative stem must be prepared as *lim-is-i-* and *lum-is-*, using the otherwise restricted longer form of the causative, -is-i-, which will then regularly undergo the changes in (45): *lim-is-i-* → *lim-is-il-i-* → *lim-ik-is-i-*. As a result, the templatic, phonological requirement KIS is satisfied.

The Nyakyusa KIS requirement appears to be an analogical extension of the use of a rhotic velar in the Nyanwezi case discussed earlier. A similar phonological templatic requirement involving double frication is found in Tonga, which arises when the perfective suffix -l- must co-occur with (and precede) causative -i-:

(46) Perfective of causatives in Tonga

- a.
- | | | | | | |
|----------------|--------------|---|-------------------|--------------|------------------------|
| <i>bulk-</i> | 'awaken' | → | <i>bús-iz-i-</i> | 'woke' | (<i>bús-iz-y-e</i>) |
| <i>bús-i-</i> | 'wake (tr.)' | → | <i>bús-iz-i-</i> | | |
| <i>jál-</i> | 'close' | → | <i>jáz-iz-i-</i> | 'made close' | (<i>jáz-iz-y-e</i>) |
| <i>jáz-i-</i> | 'make close' | → | <i>jáz-iz-i-</i> | | |
| <i>káng-</i> | 'fry' | → | <i>kánz-iz-i-</i> | 'made fry' | (<i>kánz-iz-y-e</i>) |
| <i>kánz-i-</i> | 'make fry' | → | <i>kánz-iz-i-</i> | | |
| <i>yeey-</i> | 'think' | → | <i>yeéz-éz-i-</i> | 'reminded' | (<i>yeéz-éz-y-e</i>) |
| <i>yeéz-i-</i> | 'remind' | → | <i>yeéz-éz-i-</i> | | |

- b.
- | | | | | | |
|---------------|----------------|---|------------------|--------------|-----------------------|
| <i>cis-</i> | 'hurt (intr.)' | → | <i>cis-iz-i-</i> | 'hurt (tr.)' | (<i>cis-iz-y-e</i>) |
| <i>cis-i-</i> | 'hurt (tr.)' | → | <i>cis-iz-i-</i> | | |
| <i>bez-</i> | 'carve' | → | <i>bez-éz-i-</i> | 'made carve' | (<i>bez-éz-y-e</i>) |
| <i>bez-i-</i> | 'make carve' | → | <i>bez-éz-i-</i> | | |
- c.
- | | | | | | |
|----------------|----------------|---|---------------------|----------------|---------------------------|
| <i>ump-</i> | 'burn (intr.)' | → | <i>ump-iziz-i-</i> | 'burned (tr.)' | (<i>ump-iziz-y-e</i>) |
| <i>ump-i-</i> | 'burn (tr.)' | → | <i>ump-iziz-i-</i> | | |
| <i>ím-b-</i> | 'sing' | → | <i>ím-b-iziz-i-</i> | 'made sing' | (<i>ím-b-iziz-y-e</i>) |
| <i>ím-b-i-</i> | 'make sing' | → | <i>ím-b-iziz-i-</i> | | |
| <i>lúm-</i> | 'bite' | → | <i>lúm-iziz-i-</i> | 'made bite' | (<i>lúm-b-iziz-y-e</i>) |
| <i>lúm-i-</i> | 'make bite' | → | <i>lúm-iziz-i-</i> | | |
| <i>lét-</i> | 'bring' | → | <i>lét-éz-éz-i-</i> | 'made bring' | (<i>lét-éz-éz-y-e</i>) |
| <i>lét-i-</i> | 'make bring' | → | <i>lét-éz-éz-i-</i> | | |
- d.
- | | | | | | |
|---------------|-----------------|---|--------------------|-------------------|-------------------------|
| <i>bót-</i> | 'be good' | → | <i>bót-ézez-i-</i> | 'made good' | (<i>bót-ézez-y-e</i>) |
| <i>bót-i-</i> | 'make good' | → | <i>bót-ézez-i-</i> | | |
| <i>bós-i-</i> | 'proclaim good' | → | <i>bós-éz-i-</i> | 'proclaimed good' | (<i>bós-éz-y-e</i>) |

The forms in (46a) show that most linguals fricate to [s, z] before causative -i- in Tonga. When the causative forms are then perfectivized, -il- is interfixed between the root and -i-. The result is cyclic frication, as in Chibemba. The output forms of the perfectivized causatives are shown to the right in parentheses as they occur with the perfective final vowel -e.

Turning to (46b), roots which already end in /s/ or /z/ also interfix -il-, which in turn becomes -iz- (harmonized -éz-). In (46c), however, where the roots end in immutable consonants, e.g. labials and some /t/'s, the perfect suffix appears doubled as -iziz-/-ézez-. The verb -bót- 'be good' is seen in (46d) to have two different causatives: -bót-i- 'make good' vs. -bós-i- 'proclaim good', whose different perfects confirm that the interfixed perfective will appear doubled only if the preceding consonant is other than [s] or [z]. The reason is that Tonga perfectivized causatives must have ... *siz* ... or ... *ziz* ... in their suffixal sequence, which I shall term the SIZ requirement. Like the KIS requirement of Nyakyusa applicativized causatives, the SIZ requirement of Tonga perfectivized causatives shows the importance of phonological conditions on the realization of certain suffix combinations – hence, further evidence of the generality of templatically determined suffix ordering in Bantu.²⁴

In this section we have examined the interaction of causativize -i- with applicative -il- (and, to some extent, with perfective -il-). To repeat, the generalization which covers all cases of interaction of both Proto-Bantu causatives, *-ic- and *-i- is stated quite simply, as in (47):

b.				
cis-	'hurt (intr.)'			
cis- <i>-j-</i>	'hurt (tr.)'	→	cis-iz- <i>-j-</i>	'hurt (tr.)' (cis-iz-y-e)
bez-	'carve'			
bez- <i>-j-</i>	'make carve'	→	bez-ez- <i>-j-</i>	'made carve' (bez-ez-y-e)
c.				
ump-	'burn (intr.)'			
ump- <i>-j-</i>	'burn (tr.)'	→	ump-iziz- <i>-j-</i>	'burned (tr.)' (ump-iziz-y-e)
ímb-	'sing'			
ímb- <i>-j-</i>	'make sing'	→	ímb-iziz- <i>-j-</i>	'made sing' (imb-iziz-y-e)
lúm-	'bite'			
lúm- <i>-j-</i>	'make bite'	→	lúm-iziz- <i>-j-</i>	'made bite' (lumb-iziz-y-e)
lét-	'bring'			
lét- <i>-j-</i>	'make bring'	→	lét-ezez- <i>-j-</i>	'made bring' (let-ezez-y-e)
d.				
bót-	'be good'			
bót- <i>-j-</i>	'make good'	→	bót-ezez- <i>-j-</i>	'made good' (bót-ezez-y-e)
bós- <i>-j-</i>	'proclaim good'	→	bós-ez- <i>-j-</i>	'proclaimed good' (bós-ez-y-e)

The forms in (46a) show that most linguals fricate to [s, z] before causative *-j-* in Tonga. When the causative forms are then perfectivized, *-il-* is interfixed between the root and *-j-*. The result is cyclic frication, as in Chibemba. The output forms of the perfectivized causatives are shown to the right in parentheses as they occur with the perfective final vowel *-e*.

Turning to (46b), roots which already end in /s/ or /z/ also interfix *-il-*, which in turn becomes *-iz-* (harmonized *-ez-*). In (46c), however, where the roots end in immutable consonants, e.g. labials and some /t/'s, the perfect suffix appears doubled as *-iziz-/-ezez-*. The verb *-bót-* 'be good' is seen in (46d) to have two different causatives: *-bót-*-j-** 'make good' vs. *-bós-*-j-** 'proclaim good', whose different perfects confirm that the interfixed perfective will appear doubled only if the preceding consonant is other than [s] or [z]. The reason is that Tonga perfectivized causatives must have ... *siz* ... or ... *ziz* ... in their suffixal sequence, which I shall term the *SIZ* requirement. Like the *KIS* requirement of Nyakyusa applicativized causatives, the *SIZ* requirement of Tonga perfectivized causatives shows the importance of phonological conditions on the realization of certain suffix combinations – hence, further evidence of the generality of templatically determined suffix ordering in Bantu.²⁴

In this section we have examined the interaction of causativize *-j-* with applicative *-il-* (and, to some extent, with perfective *-il-*). To repeat, the generalization which covers all cases of interaction of both Proto-Bantu causatives, **-ic-* and **-j-* is stated quite simply, as in (47):

(47) Morphological Generalization: Causativize first!

Thus, if the causative suffix is a reflex of PB *-ic- (e.g. Chichewa -its-), then the templatic order -its-il- will result directly. On the other hand, if the causative suffix is a reflex of PB *-i-, the templatic ordering -il-i- will result from cyclicity + interfixing, i.e. CVC → CVC-i → CVC-il-i-, which Hyman (1994) documents in great detail for Chibemba. Note for the purposes of this study that the generalization in (47) appears to be an autonomous, morphological one.^{25,26}

6. SUMMARY AND CONCLUSIONS

In the previous sections I have presented a number of arguments in favor of the view that suffix ordering in Bantu is templatic in the default case. In almost all Bantu languages, causative and applicative suffixes must appear in a single fixed order. Where suffixes occur in two different orders, e.g. CAUS and REC, one sequence is licensed by the general CARP template, while the other is attributable to a specific MIRROR constraint referring to that sequence. The striking conclusion to drawn from this study is that there is no evidence that Bantu suffix ordering is driven by semantic compositionality or by a general Mirror Principle. Instead, these pressures are low-ranked in Bantu and, when present, have a limited effect on the overall system, as we have seen.²⁷ That Bantu suffix ordering is largely templatic is also supported by phonological conditions which enter into the realization of suffix combinations.²⁸ As I have also implied, the elaborated synchronic CARCP template in (28) is in part arbitrary, the product of history. This conclusion thus challenges the fundamental approach of those who have cited Bantu derivational suffixes in support of a non-arbitrary relation between morphology and syntax, or between morphology and semantics. Whether or not such relations occur elsewhere, Bantu suffixation provides strong evidence for the autonomy of morphology.

APPENDIX: THREE SUFFIXES (CAR) IN CHICHEWA

It should be clear from the proceeding that a full understanding of suffix ordering can be achieved only by undertaking an exhaustive examination of all co-occurring sequences of two, three, and four productive suffixes in a Bantu language, systematically varying their semantic scope and corresponding syntactic properties. Since such an undertaking would be enormous even for a single language, the current paper has had the more modest goal of sorting out some of the major issues that a partial comparative study reveals.²⁹ In this brief appendix I show how the approach I adopt accounts for the realization of

different scopes of CAUS, APP, and REC spelled out on a single verb in Chichewa. These are summarized in the table in (48).

(48)

	CAR	ACR	CRA	ARC	RCA	RAC
a. mang-an-il-an-its					×	×
b. mang-il-an-its			×	×	×	×
c. mang-its-il-an	×	×	×	×	×	×
d. mang-its-an-il-an			×		×	×
e. mang-an-its-il-an					×	×

The six possible inputs are shown at the top of the table, where CAR stands for [[[verb] C] A] R], etc. Given the three inputs C, A and R, there should, in principle, be six orders of -its-, -il- and -an-. However, *-il-its-an- is ungrammatical because of the APP-CAUS sequence *-il-its-. (47d,e) require doubling of -an-, since both *mang-its-an-il- and *mang-an-its-il- are ungrammatical. The following summarizes the table in (48):

1. [[[mang] C] A] R] has only one output, mang-its-ir-an-, since its scope is templatic (there is no contradictory licensor).
2. [[[mang] A] C] R] also has only one output, mang-its-ir-an-. The scope of A-C does not agree with the template, but there is no activated AC filter which would license *-ir-its-.
3. [[[mang] C] R] A] has two possible outputs: mang-its-ir-an-, following the template, or -its-an-ir-an-, when the template is not followed. The other three outputs have the order -an-its- which does not correspond to the C ... A input.
4. [[[mang] A] R] C] also has two outputs: mang-its-ir-an-, which follows the template, and mang-il-an-its-, which allows -its- to go last by MIRROR (R,C). The other three outputs have -an-ir-an-, which does not correspond to the A-R input.
5. Both [[[mang] R] C] A] and [[[mang] R] A] C] can be realized with any of the five indicated outputs. The tableaux for [[[mang] R] A] C] 'cause that s.o. tie each for/at' in (49) show why this is so:

different scopes of CAUS, APP, and REC spelled out on a single verb in Chichewa. These are summarized in the table in (48).

(48)

	CAR	ACR	CRA	ARC	RCA	RAC
a. mang-an-il-an-its					×	×
b. mang-il-an-its				×	×	×
c. mang-its-il-an	×	×	×	×	×	×
d. mang-its-an-il-an			×		×	×
e. mang-an-its-il-an					×	×

The six possible inputs are shown at the top of the table, where CAR stands for [[[verb] C] A] R], etc. Given the three inputs C, A and R, there should, in principle, be six orders of -its-, -il- and -an-. However, *-il-its-an- is ungrammatical because of the APP-CAUS sequence *-il-its-. (47d,e) require doubling of -an-, since both *mang-its-an-il- and *mang-an-its-il- are ungrammatical. The following summarizes the table in (48):

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3. [[[mang] C] R] A] has two possible outputs: mang-its-ir-an-, following the template, or -its-an-ir-an-, when the template is not followed. The other three outputs have the order -an-its- which does not correspond to the C ... A input.
4. [[[mang] A] R] C] also has two outputs: mang-its-ir-an-, which follows the template, and mang-il-an-its-, which allows -its- to go last by MIRROR (R,C). The other three outputs have -an-ir-an-, which does not correspond to the A-R input.
5. Both [[[mang] R] C] A] and [[[mang] R] A] C] can be realized with any of the five indicated outputs. The tableaux for [[[mang] R] A] C] 'cause that s.o. tie each for/at' in (49) show why this is so:

(49) a. $T \gg M(R, A) \& T \gg M(A, C); T \gg M(A, C) \gg M(R, A) \& T$

/mang-R-A-C/	T	M(R, A) & T < M(R, C)
mang-an-ir-an-its	ir-an	an-ir-an an-its
mang-ir-an-its	ir-an	an-its
mang-its-ir-an	∇ its-ir-an	
mang-its-an-ir-an	its-an, ir-an	an-ir-an
mang-an-its-ir-an	its-ir-an	an... ir-an an-its

b. $M(R, A) \& T \gg T \gg M(A, C)$

/mang-R-A-C/	M(R, A) & T	T	M(R, C)
mang-an-ir-an-its	an-ir-an	ir-an	an-its
mang-ir-an-its		ir-an	an-its
mang-its-ir-an		∇ its-ir-an	
mang-its-an-ir-an	∇ an-ir-an	∇ its-an, ir-an	
mang-an-its-ir-an	an... ir-an	its-ir-an	an-its

c. $M(R, A) \& T \gg M(A, C)$

/mang-R-A-C/	M(R, A) & T	M(R, C)	T
mang-an-ir-an-its	∇ an-ir-an	∇ an-its	ir-an
mang-ir-an-its		an-its	ir-an
mang-its-ir-an			its-ir-an
mang-its-an-ir-an	an-ir-an		its-an, ir-an
mang-an-its-ir-an	∇ an... ir-an	∇ an-its	its-ir-an

d. $M(A, C) \gg M(R, A) \& T \gg T$

/mang-R-A-C/	M(R, C)	M(R, A) & T	T
mang-an-ir-an-its	∇ an-its	∇ an-ir-an	ir-an
mang-ir-an-its	an-its		ir-an
mang-its-ir-an			its-ir-an
mang-its-an-ir-an		an-ir-an	its-an, ir-an
mang-an-its-ir-an	∇ an-its	∇ an... ir-an	its-ir-an

e. $M(A, C) \gg T \gg M(R, A) \& T$

/mang-R-A-C/	M(R, C)	T	M(R, A) & T
mang-an-ir-an-its	an-its	ir-an	an-ir-an
mang-ir-an-its	∇ an-its	∇ ir-an	
mang-its-ir-an		∇ its-ir-an	
mang-its-an-ir-an		its-an, ir-an	an-ir-an
mang-an-its-ir-an	∇ an-its	∇ its-ir-an	an... ir-an

In these tableaux, a check mark (∇) is placed by sequences whose licensors are invoked in establishing successful outputs. Once all of the sequences of at least one output candidate have been licensed, one cannot move further down to a lower ranked licensor to evaluate other candidates. Thus, in (49a), only undominated TEMPERATE is invoked. In (49b), there are two successful outputs, because second-ranked TEMPERATE is required in both cases, and so forth. The last tableau in (49c) shows a three-way tie. Whether this unorthodox adaptation of OT is the best way to get these results or not, the important observation is that an input such as $[[[[[mang] C] A] R]]$ has only one output, while an input such as $[[[[[mang] R] A] C]]$ has five. The inescapable conclusion is that multiple factors are at play in determining affix ordering in Bantu – and presumably elsewhere.

d. $M(A, C) \gg M(R, A) \& T \gg T$

	/mang-R-A-C/	M (R, C)	M (R, A) & T	T
✓	mang-an-ir-an-its	✓ an-its	✓ an-ir-an	ir-an
	mang-ir-an-its	an-its		ir-an
	mang-its-ir-an			its-ir-an
	mang-its-an-ir-an		an-ir-an	its-an, ir-an
✓	mang-an-its-ir-an	✓ an-its	✓ an ... ir-an	its-ir-an

e. $M(A, C) \gg T \gg M(R, A) \& T$

	/mang-R-A-C/	M (R, C)	T	M (R, A) & T
	mang-an-ir-an-its	an-its	ir-an	an-ir-an
✓	mang-ir-an-its	✓ an-its	✓ ir-an	
✓	mang-its-ir-an		✓ its-ir-an	
	mang-its-an-ir-an		its-an, ir-an	an-ir-an
✓	mang-an-its-ir-an	✓ an-its	✓ its-ir-an	an ... ir-an

In these tableaux, a check mark (✓) is placed by sequences whose licensors are invoked in establishing successful outputs. Once all of the sequences of at least one output candidate have been licensed, one cannot move further down to a lower ranked licensor to evaluate other candidates. Thus, in (49a), only undominated TEMPLATE is invoked. In (49b), there are two successful outputs, because second-ranked TEMPLATE is required in both cases, and so forth. The last tableau in (49e) shows a three-way tie. Whether this unorthodox adaptation of OT is the best way to get these results or not, the important observation is that an input such as [mang C] A] R] has only one output, while an input such as [mang R] A] C] has five. The inescapable conclusion is that multiple factors are at play in determining affix ordering in Bantu – and presumably elsewhere.

NOTES

- ¹ Earlier (longer and shorter) versions of this paper have been circulated or presented on a number of occasions making it possible for me to test these ideas against a number of Bantu languages. I have received very helpful feedback from a number of colleagues, including Herman Batibo, Jeff Good, Francis Katamba, Nancy Joyce Mathangwane, Sam Mchombo, Ngesimo Mutaka, Armindo Ngunza, Josephat Rugemalira, Thilo Schadeberg and Galen Siband. I should especially like to thank Mark Baker, Sharon Inkelas, Lynn Nichols and Andrew Spencer for their detailed comments on an earlier draft of the paper which have helped to clarify some of the issues involved in analyzing the Bantu materials, as well as alternatives. While some of the above are definitely not in full agreement with my approach, it is hoped that the synthesis which I offer concerning Bantu suffix ordering will be helpful to any scholar who wishes to challenge or explore these results in fuller detail.
- ² The distinction root/non-root clause is used for convenience, since the situation is considerably more complex. See Guldemann (1999) for a recent statement on negative verb marking in Bantu.
- ³ The verb forms cited in this paper are generally incomplete: Besides requiring prefixes in all but the singular imperative, verb stems (root + suffixes) must end in an inflectional 'final vowel' (FV) morpheme, usually -a. Cf. the imperative form: mang-a 'he!'
- ⁴ As in most approaches to morphology, I will rely on a distinction between features and the morphs (exponents) that realize them, e.g. CAUS, REC vs. -its-, -an- in Chichewa. I intend the bracketings/trees to indicate at least semantic, if not also syntactic scope.
- ⁵ My thanks to Sam Mchombo for providing and discussing these and other such Chichewa sentences with me.
- ⁶ For discussion of the syntax of utterances such as those in (3), see § 3.
- ⁷ Sharon Inkelas (pers. comm.) has suggested the following definitions, illustrated by CAUS and REC:
- License-T: If [C] and [R] occur in the input (either scope), then there must be an -its- an- sequence in the output
- License-M: If [R] C occurs in the input, then there must be an -an-its- sequence in the output
- ⁸ The constraint Mirror which refers to semantic scope, should not be confused with the Mirror Principle. While readers may choose to interpret my bracketings as syntactic, the important point is that the linearized suffixes frequently fail to mirror either syntax or semantics (cf. § 3). My view of licensing by the CARP template is similar to the notion of positive filters developed for Romance clitics by Perlmutter (1971). Although I have not seen an empirical need to do so, both Mark Baker and Andrew Spencer (pers. comm.) have suggested the possibility of exploding TEMPLATE into six atomic constraints on individual pairs of morphemes (CA, CR, CP, AR, AP, RP), the latter noting also that this might be effected by means of alignment constraints. I do not rule this possibility out.
- ⁹ For an early proposal to introduce the notion of licensing into OT, see Ito, Mester and Padgett (1995).
- ¹⁰ The templatic nature of this fact is not seen as unambiguously in Chichewa, which is an asymmetric object language (Bresnan and Moshi 1993), as in symmetric languages where AP is the required applicative-passive order independent of whether it is the applicative object (e.g. benefactive) or the object of the main verb that is subjectivized. Thus, 'child was cooked

food' and 'food was cooked child' both require an AP -i-w- sequence in Haya, Luganda, Kihande, etc.

¹¹ The productive passive in Chichewa involves -w- (*-u-) preceded by -il- (= APP?), where I → d before a glide. The unusual nature of a PA order is also recognized by Horton (1949: 91), who explains that the sequence -w-il- is found in Lwena K.14 because the passive occurs frozen only on certain roots in that language. Northwest Bantu languages which use a different morpheme for passive, e.g. Mokpe A.22 -av- (Henson 1999), Mongo C.61 -am- (Hulstaert 1965), do attest the order PA. Also, Siband (1999) has shown that Ndebele's two passive morphs, -iw- and -w- are ordered on different sides of the applicative: The templatic order is -iw-il-w-. I take all of this as evidence that the widespread CARP template, which clearly needs to be further elaborated, is morphotactically driven by specific affixes.

¹² Some exceptions to this apparently occur when the first suffix is lexicalized (Siband 1999, Mathangwane 2000, Good 2001). While I have not been able to predict when suffix doubling will occur, my impression is that its productive use is more likely when the Mirror override concerns two suffixes which are contiguous in the CARP template, e.g. Chichewa -an-il-an-, Ikalanga -w-an-w- and Cibemba -i-an-i- (-i- being another causative suffix – see § 4). Although -an- is typically involved in suffix doubling, perhaps Chichewa does not have doubling of *-an-is-an-, because CAUS -its- and REC -an- are not contiguous in the CARP template. All of this requires more research.

¹³ As seen in the next paragraph, M (R,A) must in fact be subordinated to T.

¹⁴ Both the RMC and its repairs can be quite complex in Bantu. In some cases a construction is blocked; in others, a single affix appears to do double duty. I cite the RMC simply to illustrate that its widespread effects are consistent with a templatic interpretation of Bantu verb extensions.

¹⁵ Alsina (1999) suggests that such cases of invariant suffix ordering might be accounted for via interfixing (cf. § 4, § 5 below). In this analysis, Chichewa would have two derivations: applicativized causative (Verb → Verb-its- → Verb-its-il-) vs. causativized applicative (Verb → Verb-il- → Verb-its-il-). This second derivation is however unlikely for Chimwini. This is because the applicative extension, normally -ir-, has the allomorph -iRiz- after the sibilants /s, z/ and palatal /j/, including causative -ish- [-is-] (Kisseberth and Abasheikh 1974, Abasheikh 1978). I would argue that the morph -ir- is present to prevent the sequence -ish-iz- in applicativized causatives, which would otherwise be produced by the rules of the language (Kisseberth & Abasheikh 1975). However, if we were to first applicativize a verb to CV-C-ir-, and then subject it to causativization, not only would -ish- have to be interfixed, but, inexplicably, we would also have to add another morph -iz- after the applicative. This seems an undesirable solution, so I reject interfing. Rather, the CARP template is simply undominated in Chimwini, as Abasheikh clearly states.

¹⁶ My thanks to Sam Mchombo (pers. comm.) for his insights into the Chichewa data cited in this section.

¹⁷ For historical speculations concerning some of the facts discussed here, see Good (2001) and Blevins (2002), chapter 11.

¹⁸ Mark Baker (pers. comm.) points out a syntactic generalization: the earlier suffixes C and A increase valence, while the later suffixes R and P do not, also that some of the template (e.g. CA) may be more widespread than just Bantu. Lynn Nichols (pers. comm.) points out that in Zuni the order is R-A-root-C-P. Both suffixal C-P and prefixal mirror-image R-A would support such a notion, although whether the rest of CARP is observed is obscured by the fact that both prefixing and suffixing is involved.

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- ¹⁹ Good (2001), who restricts himself to applicative and causative, refers to *-i-* as 'transitive' (T), and proposes the sub-TEMPLATE CAT.
- ²⁰ There may even be another phonological generalization: the C of VC suffixes rises in sonority (*c, *d, *n), which I normally would not have proposed except that this generalization holds as well in Arnott's (1970) formula for the Gomba dialect of Fula: T > D > N > R.
- ²¹ In some Bantu languages which have both causatives, *-i-* may be lexicalized with certain verb roots only, or may mark direct causation, while *-is-i-* may be less restricted and may mark indirect causation. In Luganda, however, the two are generally interchangeable, which therefore raises complications for proposals to see *-is-* and *-i-* as semantically or syntactically distinct (Pytkäinen 2002).
- ²² Kinande presents a special case where *-is-* and *-ir-* do not seem to cooccur in productively created verb stems (Nguessimo Mutaka, pers. comm.). There are, however, a number of specific verbs which allow them to occur. While there is a preponderance of *-is-ir-i-* sequences, e.g. *lim-is-ir-i-* 'make cultivate for/at', there also are unpredictably occurring cases of *-ir-is-i-*, e.g. *hek-er-es-i-* 'make carry for/at'. The co-occurrence and specific order of *-is-* and *-ir-* thus appear to be lexicalized. Without exception, however, Kinande respects the order *-ir-i-*, when the short causative appears alone with the applicative.
- ²³ The output form in (36) and its two scopes were verified from mutually intelligible Sukuma, which shows the same facts as Nyanwezi (Herman Batibo, pers. comm.).
- ²⁴ In Tonga, the alternative to a SIZ requirement would be to interfix perfective *-il-* twice, each time undergoing frication. Otherwise we should obtain an *-iliz-* sequence – which is, however, attested in the applicativized causative in other Bantu languages, e.g. Chimwiini (Abasheikh 1978) and Kirundi (Meeussen 1959).
- ²⁵ The principle 'Causativize first!' also accounts for another widespread fact in Bantu. Even in languages such as Ganda, where the short causative *-i-* is productive and generally interchangeable with *-is-i-*, the latter must be used with CV- roots: *li-is-i-* 'make eat, feed', *gu-is-i-* 'make fall'. Independent of scope, the only possible realization of CV- verbs with a causative and an applicative suffix is *li-is-iz-i-*, *gu-is-iz-i-*, where *r* → *z* before *-i-*. These forms are obtained by requiring causativization to precede applicativization. If it were possible to applicativize these verbs first (i.e. *li-ir-* and *gu-ir-*), we would obtain forms like **li-iz-i-*, **gu-iz-i-*, where the (outer) causative could be spelled out as *-i-*. Since no Bantu language I know allows this to happen, the generalization in (47) holds here too.
- ²⁶ There is also evidence in Bantu that causativization generally precedes passivization. As Judith Aissen (pers. comm.) has reminded me, in many languages passive morphology is often prohibited under causativization, e.g. French *faire manger la banane par l'enfant* 'make eat the banana by the child' (not **faire être mangée la banane par l'enfant*). In Bantu, passives such as 'I was caused to eat the banana' are common, but not **the banana was caused to be eaten (by me)*. See, however, Katupha (1991), who shows that Emakhuwa, while otherwise respecting the templatic CARP orders, attests causative *-ih-* as the second element of APP-CAUS, REC-CAUS and PASS-CAUS as the only (language-specific) mirror overrides in the extension system.
- ²⁷ This conclusion is related to, though weighted differently from that reached in Hyman (1993) and Hyman and Mchombo (1992), where the Mirror Principle was a default occasionally overridden by specific morphotactic constraints. This seems similar to the conclusion reached by Muyken (1988: 279) concerning Quechua: "... the order of affixes is in part governed by rules particular to a so far little understood word formation component ... at the

same time, the interpretation of affix order generally follows much better understood principles of compositionality and wellformedness of tree representations."

²⁸ The most striking case I know is Tiene (Ellington 1977, Hyman and Inkelas 1997). Verb bases are maximally CVCVC-, in which case the second consonant must be coronal and the third consonant must be non-coronal. Thus, when APP *-el-* is added to *yók-* 'hear', the result is *yólek-*.

²⁹ A full study would also have to look at any other productive suffix that might interact with CARP, e.g. stative *-ik-* and various so-called intensive suffixes which may be homophonous with the *-is-* causative or an otherwise restricted doubled applicative *-ilil-*, etc.

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