

Strong linearity and the typology of templates

Jeff Good

1. Introduction

The term *template* is commonly employed in linguistic description and analysis when salient aspects of the linear arrangement of the subconstituents of some larger constituent appear to be specified independently from syntactic, semantic, or phonological concerns.¹ However, there has been essentially no work on the issue as to whether or not the term is used in a coherent way across the diverse grammatical phenomena to which it has been applied.² For example, are Semitic root-and-pattern morphology (McCarthy 1981) and Athapaskan position-class systems (Kari 1989) – both of which have been labeled “templatic” – on some level, the same basic kind of thing? If they are, then we will need to capture the nature of their relatedness in any system we develop for typologizing templates across different languages. If they are not, then we need to develop separate models for the two phenomena and treat the fact they have been given a common label as superfluous.

In Good (2003) I attempted to lay the foundations of a framework for the categorization of different kinds of linear relations, with the goal of being able to use that framework to come to a better understanding of templatic constructions. This paper will highlight those aspects of Good (2003) which I believe to be of most relevance to typological study. As such, the paper will be largely programmatic in nature, though Good (2003) contains not only programmatic elements but also a detailed examination of “templatic” data from three case studies involving diverse morphosyntactic phenomena: Bantu verb suffixes, Chechen verb phrases, and Saramaccan serial verb constructions.

The structure of this paper is as follows. In Section 2, I will introduce the basic framework for classifying linear relations assumed in Good (2003) and give an overview of relevant previous work on templates in different domains of grammar. In Section 3, I will discuss the Strong Linearity Domain Hypothesis, a working hypothesis developed in Good (2003) to help focus research into the properties of templates. An illustrative case

study of a morphosyntactic template, making use of that hypothesis, is given in Section 4. Finally, Section 5 offers a brief conclusion.

Table 1. A Pan-Athapaskan template (adapted from Hoijer 1971: 125)

Slot	Description
1	One or more adverbial prefixes.
2	The prefix for the iterative paradigm.
3	A pluralizing prefix.
4	An object pronoun prefix.
5	A deictic subject prefix.
6	Zero, one or two adverbial prefixes.
7	A prefix marking mode, tense, or aspect.
8	A subject pronoun prefix.
9	A classifier prefix.
10	A stem.

2. Strong linearity and templates

2.1. An informal discussion of the term *template*

As a first approximation, the salient feature common to grammatical elements which are labeled “templatic” is that they can only be described or analyzed by making use of extensive stipulations as to how their subconstituents are linearly ordered. This idea comes through quite clearly in, for example, Inkelas’s (1993) characterization of morphosyntactic templates (defined in [1c] below) as morphological systems where “morphemes or morpheme classes are organized into a total linear ordering that has no apparent connection to syntactic, semantic, or even phonological organization (Inkelas 1993: 560).”

A typical example of a description making use of the sort of structure described by Inkelas is given in Table 1, which represents a pan-Athapaskan verb template. It schematizes verbs in languages of the family as consisting of a stem (the final element in the verb) preceded by a series of nine prefixal slots, characterized semantically.

However, it is difficult to devise a definition of *template* that neatly encompasses phenomena commonly considered templatic, while excluding more mundane types of linear stipulation. For example, the lexically-specified ordering of segments in a morpheme has not, to my knowledge, ever been described as “templatic”, though it is not at all obvious whether such ordering is truly conceptually distinct from the sort of system de-

scribed for the Athapaskan verb in Table 1. Similarly, grammatical categories like *prefix*, *suffix*, *proclitic*, and *enclitic* contain, in their very definition, a minimal kind of linear stipulation: the distinction between “before” and “after”. However, this type of stipulation is also not typically described as templatic, though, again, it is not clear what principle may be behind this.

In fact, what seems to distinguish stipulations of linear order given the label templatic from other kinds of linear order stipulations is that they are, in some sense, unexpected (see Good 2003: 22–26). Stipulation of the order of segments in a morpheme is considered “normal” and, therefore, not templatic. Similarly, admitting the existence of a grammatical category like “affix” or “clitic” entails that elements belonging to such categories must have some specification for their linear realization with respect to a host – “before” or “after” are, intuitively, quite natural types of linear stipulation for such elements, and therefore, also not considered templatic.

However, we do not expect – that is, we do not consider it to be the typical or “unmarked” case – that the consonants and vowels of a word will have their linear realization specified independently from the consonants and vowels of the morphemes comprising the word. Thus, the root-and-pattern morphology associated with Semitic languages has been labeled templatic (McCarthy 1981). Similarly, the need to describe an entire morphological system through arbitrarily-ordered position classes, as in Table 1, is unexpected since we typically expect morphology to be “layered” – that is, what is considered normal is for affixes to attach to stems which, in turn, form stems that new affixes can attach to. The ordering relations among morphemes found in the complex but unstructured (i.e., “flat”) morphological systems described for Athapaskan languages do not conform to the predictions of this model and are, thus, also open to the label templatic.³

2.2. Previous theoretical work on templates

Little theoretical work appears to have been done on templatic phenomena in general. Rather, one finds work limited to particular classes of templates which can be descriptively categorized as phonological, morphophonological, morphosyntactic, or syntactic depending on what kind of constituent the template is analyzed as constraining. Informal definitions of these four classes of templates are given in (1).⁴ They all involve restrictions on linear realization, though phonological and morphophonological templates pri-

marily involve restrictions on overall linear shape, while morphosyntactic and syntactic templates primarily involve restrictions on linear order.

- (1) a. **Phonological template:** A restriction on the phonological patterns of a language stated in terms of allowed combinations of the phonological subconstituents of a given phonological constituent (e.g., allowable segment combinations in syllables, see Itô 1989).
- b. **Morphophonological template:** A restriction on the phonological shape of a morphological element, most often a stem or word, stated in terms of the phonological patterns the morphological element is allowed to be associated with (e.g., a minimality restriction on the size of a morpheme, see the discussion of [4c] in Section 3.3).
- c. **Morphosyntactic template:** A restriction on the ordering of morphemes in a word stated in terms of “slots” associated with syntactic or semantic categories (e.g., a position class system, see Table 1).
- d. **Syntactic template:** A restriction on the ordering of the subconstituents of a syntactic constituent stated in terms of a fixed linear structure not taken to be derived from general syntactic principles (e.g., the ordering domains of Kathol 2000).

I distinguish here between *morphophonological* and *morphosyntactic* templates to avoid ambiguity in the use of the term *morphological*, though both morphophonological and morphosyntactic templates will also often involve what we might call “pure” morphological restrictions – that is, some of their linear realization restrictions will be sensitive to specific morphemes or morpheme classes not definable purely in phonological or syntactic/semantic terms. An example of such morpheme-specific conditioning, in a morphosyntactic template, will be seen in Section 4.2, which gives a case study of the ordering restrictions of several Bantu verbal suffixes.

The most important theoretical work on templates with a cross-linguistic perspective, almost certainly, is that done on morphophonological templates under the rubric of the Prosodic Morphology Hypothesis (McCarthy and Prince 1995 and elsewhere) which “requires that templatic restrictions be defined in terms of prosodic units (McCarthy and Prince 1995: 320)”. McCarthy and Prince (1995: 319), in particular, single out the prosodic units of the mora, the syllable, the foot, and the phonological word as possible shapes of morphophonological templates.

We will see in Section 3 that the central hypothesis of Good (2003), the Strong Linearity Domain Hypothesis, is similar to the Prosodic Morphol-

ogy Hypothesis insofar as it also gives prosody a role in restricting the possible forms of templates.

With regard to the other types of templates listed in (1), the most familiar examples of phonological templates are probably syllable templates expressed by sequences like CV, CVC, VC, etc., which, in addition to their use as descriptive devices, have also been used in theoretical work. For example, Itô (1989) makes use of syllable templates to account for certain phenomena involving epenthetic segments (e.g., the epenthesis of vowels to break up consonant clusters in loanwords which are disallowed in a borrowing language but allowed in the donor language).

In addition to a rich descriptive tradition of work making use of morphosyntactic templates (see, e.g., Table 1), theoretically-oriented work on such templates includes Inkelas (1993), Kari (1989), and Simpson and Withgott (1986). Simpson and Withgott (1986) is noteworthy in this context for enumerating a list of properties which they claim distinguish morphosyntactic templates from “layered” morphology. Work like this has not made restrictive typological claims on the possible forms of templates along the lines of the Prosodic Morphology Hypothesis, but it is nevertheless useful in devising possible parameters for a qualitative typology of templatic phenomena.

Work on syntactic templates has been greatly overshadowed by work on hierarchical organization in syntax. Nevertheless, one can find cases of templatic analyses of certain syntactic phenomena. For example, a “precore slot” constructional template proposed by Van Valin and LaPolla (1997: 323) is specified as including a special clause-initial position which could contain, among other things, fronted *Wh*-words of the sort found in English content questions. Also of note, in this context, are traditional analyses of German syntax where sentential linearization is taken to be governed by ordering domains – effectively a type of syntactic position class – which operate independently of hierarchical structure (see Kathol 2000 for a contemporary formalization). However, while one can find such examples of templatic analyses of syntactic phenomena in particular languages, I am not aware of any work on their general typology, or even work of broad cross-linguistic scope.⁵

2.3. Strong linearity and weak linearity

As discussed in Section 2.1, an apparently crucial feature of phenomena labeled templatic is that they exhibit unexpected linear stipulations. This

makes working with the term in a rigorous way difficult since, without a separate theory of linguists' expectations for linear stipulations, it is not possible to know when a given phenomena should truly be labeled templatic. In order to deal with this issue, Good (2003) develops a new framework for classifying linearization phenomena, which is intended to serve as a foundation for the development of a general theory of templates, while avoiding the more problematic aspects of the term's use. The core of the framework rests on making an a priori distinction between *strong* and *weak* linearity, as in (2).

- (2) a. **Weak linearity:** Grammatically predictable linear relations holding among a set of linguistic constituents.
 b. **Strong linearity:** Grammatically unpredictable linear relations holding among a set of linguistic constituents.

These definitions are deliberately vague in many respects in order to be as theory independent as possible. For example, the term *constituent* should be understood broadly to mean a phonological, morphological, or syntactic constituent. Similarly, the notion of grammatical predictability is intended to be agnostic as to just what constitutes both "grammatical" and "predictable". In principle, *grammatical*, in this context, could include phonological and lexical phenomena, in addition to morphological or syntactic ones. By *predictable*, I simply mean cases where one can explain a given linear pattern as a direct consequence of some other independently-motivated generalization. More specific interpretations of *grammatically predictable* will, of course, be highly dependent on the theoretical approach one adopts.⁶

Importantly, while the classification of a given linearization pattern as strong or weak may be theory dependent, it seems unlikely that any grammatical theory could dispense with the distinction entirely. For example, it would be difficult (if not impossible) to analyze linear minimal sets like *pat*, *tap*, and *apt* in English without suggesting that some of the linear relations holding among the segments in those lexical items are unpredictable and, hence, strong. Similarly, every grammatical theory would predict, in one way or another, that at least the descriptive intuition encoded by Bybee's (1985) relevance principle would hold – that is, "that words that function together in the sentence tend to occur together in the sentence (Bybee 1985: 39)". Whatever linearization patterns one attributes to such a principle would be predictable on the basis of it and, hence, weak.

Where one draws the line between strong and weak linearity in a given constituent is necessarily a matter of analysis, but it is hard to imagine any grammatical framework not invoking both kinds of linearity on some level. Distinguishing between strong and weak linearity can play a crucial role in refining our understanding of templates since, as we have seen, what is “special” about templatic phenomena is the nature of their strong linearity. In Section 4, we will see how making this distinction will help us come to a better understanding of one specific template found in the Bantu verb stem.

3. Generalizing and constraining templates

3.1. Introducing the Strong Linearity Domain Hypothesis

Good (2003) was focused primarily on morphosyntactic templates. However, an important general theme of the work – and the one of primary consideration here – was developing a model for a general typology of templates. Good (2003) proposes that an exploration of this typology can be usefully framed by the Strong Linearity Domain Hypothesis, given in (3). The term *domain* in the Strong Linearity Domain Hypothesis refers to any linguistic constituent (broadly construed) over which strong linear restrictions apply.

- (3) **Strong Linearity Domain Hypothesis:** The boundaries of any strong linearity domain must be coextensive with a prosodic constituent, and its non-predictable linear relations must be consistent with the characteristic phonology of that prosodic constituent.

Before moving forward, it is worthwhile to discuss what sort of hypothesis the Strong Linearity Domain Hypothesis is intended to be. While it certainly could be interpreted as a statement of some formal linguistic universal, in my view, it is better understood as a working hypothesis. That is, what is important about it is not so much if it is correct but, rather, the ways in which it can help focus analyses of templatic constructions so as to allow us to get a better understanding of their typological properties.

As formulated, the Strong Linearity Domain Hypothesis makes no specific reference to templates. Rather, it is a hypothesis regarding the broader phenomenon of strong linearity. However, informally speaking, we can say that what is interesting about templatic phenomena is that they have “too much” strong linearity. Thus, if we gain a deeper understanding of the na-

ture of strong linearity, we will likely have made a substantial step towards coming to a general understanding of templates, as well. Thus, a hypothesis like the Strong Linearity Domain Hypothesis should be of interest here.

The Strong Linearity Domain Hypothesis suggests that strong linearity domains should be linked to two aspects of a language's phonology: prosodic constituents and characteristic phonologies. I discuss each of these things in turn in the following sections. In Section 3.4 I will briefly discuss the motivation for the Strong Linearity Domain Hypothesis.

3.2. Prosodic constituency

Broadly speaking, prosodic phonology is the study of phonological constituency. The most well-known theoretical approaches to prosodic phonology, like those of, for example, Nespor and Vogel (1986) and Selkirk (1984) are based on two distinct theoretical claims. The first is that prosodic categories are universal, limited to items like *syllable*, *foot*, *phonological word*, *intonational phrase*, etc. (see, for example, Nespor and Vogel 1986). The second is that phonological constituency obeys the Strict Layering Hypothesis (Selkirk 1984: 26–27), which can be informally understood as a statement that phonological constituency must be representable as a well-formed tree.

Neither claim is unproblematic. Inkelas (1993) and Downing (1999), for instance, argue for models where metrically-defined prosodic constituents – like the syllable and foot – below the level of the phonological word are augmented by a parallel class of morphologically-oriented prosodic constituents (e.g., the *prosodic stem*). Similarly, Inkelas and Zec (1995: 548–549) discuss how analyses of the phrasal phonology of different languages do not unequivocally support the Strict Layering Hypothesis.

In Good (2003) and, here, in Section 4.4, I take an empirically-oriented approach towards identifying prosodic constituents. A unit is treated as a prosodic constituent if at least one, and ideally a number of, phonological generalizations target that unit as the domain over which they apply. Such an approach is not inherently incompatible with approaches positing a restricted, universal set of prosodic categories. However, as applied to a particular language, it might make claims which are incompatible with them.

3.3. Characteristic phonology

While prosodic constituency has been discussed in the literature for some time, the second core notion of the Strong Linearity Domain Hypothesis, the *characteristic phonology* of a prosodic constituent, was new to Good (2003). Informally speaking, it should be relatively easy to understand what is meant by the term: a given prosodic constituent should have a recognizable set of phonological characteristics and its *characteristic phonology* simply encompasses that set of characteristics.

As an example, consider the phonological word in Turkish (Altaic, Turkic). The generalizations in (4) apply to this prosodic constituent in the language (see Lewis 1967: 15–24 and Inkelas and Orgun 1995: 773).

- (4) a. The Turkish word is a vowel harmony domain.
- b. The Turkish word receives final accent.
- c. The Turkish word is minimally bimoraic.

We can, thus, say that the characteristic phonology of the Turkish phonological word is at least the sum of the three characteristics seen in (4).

There are two important points to be made about the generalizations in (4). First, they are not exceptionless. To pick one example, there are numerous cases of words not receiving final stress (Lewis 1967: 21–24). Such violability is, in fact, central to the notion of characteristic phonology, which should be understood as representing a prototype rather than a strict set of requirements.

The second important point to be made about the generalizations in (4) relates to generalization (4c). There is a good case to be made that the constraint that words in Turkish are minimally bimoraic is not active at the level of the prosodic word, but, rather, at the level of the prosodic root (Inkelas and Orgun 1995: 773–781). However, if a root must be minimally bimoraic, then a word must necessarily also be minimally bimoraic. Bimoraicity, then, becomes part of the characteristic phonology of the word even though it is not a “word-level” restriction. This illustrates the general point that it should not be assumed that the properties of a given characteristic phonology must derive directly from a constraint/rule that manifests itself directly within the domain of the relevant prosodic constituent.

The Strong Linearity Domain Hypothesis states, somewhat vaguely, that “non-predictable linear relations must be consistent with the characteristic phonology of that prosodic constituent”. How should the word *consistent* be interpreted? Good (2003: 47–48) explicitly skirts the problem of

developing general criteria for this sort of consistency and restricts claims regarding consistency to language-specific templatic phenomena. While such *ad hoc* methodology would clearly be problematic in the context of a long-term research programme on the typology of strong linearity making use of the Strong Linearity Domain Hypothesis, at preliminary stages of study it seems to be a necessity, since it is only by an examination of specific cases that we can devise an initial catalog of different types of consistency which will inform the development of a broad typology. Section 4 will contain discussion on how one instance of strong linearity was argued to be consistent with the characteristic phonology of the relevant prosodic constituent.

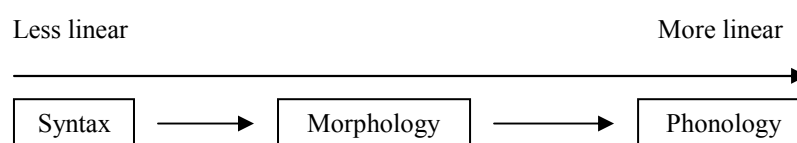


Figure 1. Clinal nature of linearity restrictions, from a descriptive perspective

3.4. The motivation behind the Strong Linearity Domain Hypothesis

The logic behind proposing a hypothesis connecting strong linearity to prosodic phonology is not necessarily obvious. Therefore, I will briefly describe the motivations underlying the formulation of the Strong Linearity Domain Hypothesis here. They derive in large part from the rough, descriptive model of grammar given in Figure 1. The model schematized in Figure 1 is intended to express the idea that phonological constituents can generally be more detailed in their linear specifications than morphological constituents, which, in turn, can be more detailed in their linear specifications than syntactic constituents. For example, prototypically we think of phonological constituents as possibly containing quite elaborate specifications of the order of their subconstituents (e.g., of the segments in a syllable), while syntactic constituents generally make use of much simpler linear specifications involving only basic notions like “before” or “after” (as in, e.g., “the object appears *before* the verb”). Morphology, of course, lies in between these two extremes.

Assuming a model like the one schematized in Figure 1, the leading idea behind the Strong Linearity Domain Hypothesis is this: If strong line-

arity restrictions represent unpredictable linear relations in some constituent, we should look to the more “linear” aspects of grammar in trying to understand the source of such restrictions. The hypothesis, therefore, connects strong linearity to phonology, a relatively linear aspect of grammar, in an attempt to address two important questions: (i) where strong linearity should be found (prosodic constituents) and (ii) what it should look like when it is found (the characteristic phonology of that constituent).

In the next section I give a case study of the application of the Strong Linearity Domain Hypothesis to the analysis of a particular template in order to illustrate its potential value as a tool for the general study of templates.

4. A case study of “templatic” strong linearity

4.1. Introduction

Given that typological investigation into the general structure of templates is only in its early stages, a useful methodological approach is the use of illustrative case studies. Of course, the set of cases one initially examines might ultimately turn out to be misleading in one way or another. However, as long as one takes this into account, such studies can clearly serve as worthwhile tools in making an initial exploration of a given typological space.

In this section, I will present a case study of a templatic phenomenon involving verbal suffix ordering in Bantu, showing how it can be analyzed as consistent with the Strong Linearity Domain Hypothesis, while, at the same time, illustrating how the application of the hypothesis to a particular templatic pattern can give us insights into its structure that might otherwise go unnoticed. This case study is drawn from Good (2003: 107–274). Related discussion is found in Hyman (2003) and Good (2005). These works are able to examine the data underlying important descriptive generalizations about the Bantu template to an extent that is far greater than what is possible here.

4.2. Overview of the Bantu data

Bantu languages are well known for making use of verbal suffixes which alter the basic valence and semantics of verb roots. Two such suffixes, the

Causative, reconstructed as **-ic-* (with forms like *-its-*, *-is-*, or *-ish-* as typical reflexes), and the Applicative, reconstructed as **-id-*, with forms like *-ir-* and *-il-* as typical reflexes), are exemplified from Chichewa in (5) and (6), respectively. Throughout, I use capitalized terms like “Causative” to refer to particular Bantu suffixes and lower-case terms like “causative” to refer to the functions of those suffixes.⁷

- (5) Chichewa (Niger-Congo, Bantoid; Baker 1988: 10)

Mtsikana a-na-gw-ets-a mtsuko.
 1.girl 3S-PST-FALL-CAUS-FV 3.waterpot
 ‘The girl made the waterpot fall.’

- (6) Chichewa (Niger-Congo, Bantoid; Alsina and Mchombo 1993: 18)

Chitsîru chi-na-gúl-ír-á atsíkána mphátso.
 7.fool 7-PST-buy-APPL-FV 2.girl 9.gift
 ‘The fool bought a gift for the girls.’

In (5) the Causative *-ets-* appears after *-gw-* ‘fall’, giving causative semantics to the verb, as well as shifting its valence from intransitive to transitive. In (6) the Applicative *-ir-* allows the verb *-gúl-* ‘buy’ to take two unmarked objects instead of one, with the benefactive object *atsíkána* ‘girl’ acting as the “added” argument.

In many Bantu languages, a single verb root can be both causativized and applicativized. One way in which this is marked can be seen in the Chichewa example in (7) where a Causative and Applicative (in that order) both appear on the same verb stem.

- (7) Chichewa (Niger-Congo, Bantoid; Sam Mchombo, p.c.)

Ti-na-mang-its-ír-a atsíkana alenje mbuzi.
 1P-PST-tie-CAUS-APPL-FV 2.girl 2.hunter 10.goat
 ‘We made the hunters tie the goats for the girls.’

In addition to the Causative, in many Bantu languages, there is another suffix, here labeled the Transitive, which can also play a role in causative-marking. The Transitive is reconstructed as **-j-* (where *j* represents the highest front vowel in a seven-vowel system), and its typical reflexes are either a *-y-* glide or a mutation of the consonant it would have followed historically (or a combination of the two). Therefore, it does not always have a segmental reflex (see Good 2005: 9–12). An example of the Transitive, alternating with the Causative, from Runyoro-Rutooro, is given in (8).

- (8) Runyoro-Rutooro (Niger-Congo, Bantoid; Bastin 1986: 116)
- | | | |
|-----------------|------------------|-------------|
| <i>-og-a</i> | ‘bathe-FV’ | ‘bathe’ |
| <i>-og-y-a</i> | ‘bathe-TRANS-FV’ | ‘wash’ |
| <i>-og-ís-a</i> | ‘bathe-CAUS-FV’ | ‘make wash’ |

As seen in (8), in Runyoro-Rutooro the Transitive is associated with direct causation and the Causative with indirect causation. The distinct uses of these suffixes seen in languages like Runyoro-Rutooro is what motivates the choice of the terms Transitive and Causative here. However, most Bantu languages do not show such a clean semantic split in the use of the suffixes, and their distribution can be quite complicated (see Good 2005: 9–12). From a cross-Bantu perspective, it is best to consider the function of both as marking general causativization.

There are three common patterns for the morphological exponence of causativization involving these suffixes, two straightforward ones where either the Causative or the Transitive appears on a given verb (with the choice potentially governed by semantic, lexical, or phonological factors) and an additional more complex pattern where both the Causative and Transitive appear (in that order) on the verb stem. This latter pattern can be found in Meru, for example, and is illustrated in (9) (glossing adapted and extended from original source). This example additionally shows that the Applicative generally appears between the Causative and Transitive when all three appear on the same verb stem.

- (9) Meru [mer] (Niger-Congo, Bantoid; Hodges 1977: 118)
- | | | |
|--|--------------|----------------|
| <i>Ni-a-or-íth-iir-j-e</i> | <i>muntu</i> | <i>arj̄twa</i> |
| FOC-3S- <i>spank</i> -CAUS-APPL-TRANS-FV | 1.person | 2.student |
| ‘He caused the students to be spanked for the person.’ | | |

Hyman (2003) and Good (2005) present extensive evidence that a template plays an important role in determining possible orders in which the Causative, Applicative, and Transitive suffixes can appear on a single verb stem. For present purposes, this template can be schematized as in (10).

- (10) CAUSATIVE (*-ic-) > APPLICATIVE (*-id-) > TRANSITIVE (*-j-)

The schema in (10) represents a claim that, if multiple suffixes are present, the Causative must precede the Applicative which, in turn, must precede the Transitive. I will abbreviate this templatic pattern as CAT. In

some languages, not all of these suffixes are productively employed – for example, the Transitive is no longer productive in Chichewa. In such cases, the suffixes found in a given language will still generally follow the subset of the CAT pattern applicable to them. In the Chichewa case, for example, the order CA, a subset of the CAT pattern, is allowed (see, e.g., [7]) but AC order is not.

The primary pieces of evidence for the template in (10) are the attested ordering possibilities for these morphemes across Bantu languages. Good (2005: 33–37), for example, presents the results of a survey of thirty-two Bantu languages, spread over most of the Bantu-speaking area, with respect to relative-order possibilities for the Causative, Applicative, and Transitive. Of those, only four (the Korekore dialect of Shona, Makua, Bukusu, and Xhosa) were found to productively allow a non-CAT order, with each allowing AC order. However, even for those languages, the uses of AC order are quite restricted as compared to the uses of CA order. For example, in Korekore AC order is used productively only in infinitival relative constructions (Dembetembe 1987: 78). (See Good 2005: 33–37 for further discussion.) Further evidence for the template given in (10) is discussed in Hyman (2003) and Good (2005).

4.3. Strong linearity in the Bantu verb stem

In the previous section, I used the abbreviation CAT to describe the Bantu suffixing ordering template. However, in the present context, it is important to understand just how the CAT “template” translates into strong linearity restrictions. In (11) I give one possible such characterization.

- (11) a. The Causative cannot directly follow the Applicative.
 b. The Transitive cannot be followed by any -VC- suffix.

An important aspect of (11) is that the restrictions are characterized in terms of specific Bantu morphemes and not, for example, in terms of a general class of causative or applicative morphemes. I take the linear order restrictions of these Bantu suffixes to be morpheme-specific and only indirectly related to their semantic content. I will come back to this issue in Section 4.5.

Another important aspect of the restrictions in (11) is that they are given as “atomic” ordering statements rather than as a monolithic statement covering all ordering possibilities. This will facilitate the comparison of dif-

ferent aspects of the template with different aspects of the characteristic phonology of the verb stem in Section 4.4.

Clearly, there could be other ways to characterize the strong linearity restrictions encoded by the CAT template than those given in (11). As we will see in Section 4.4, these particular restrictions can be understood to be consistent with the Strong Linearity Domain Hypothesis, which is the principle reason why they have been chosen here. In fact, one of the benefits of applying the hypothesis to specific cases of templates is that it forces their properties to be described with a higher degree of precision than might otherwise be done. Of course, these more precise descriptions may turn out to be inaccurate. But even such a negative discovery will still represent an advance over our previous understanding of the template in question.

4.4. The Bantu verb stem and the Strong Linearity Domain Hypothesis

In order to determine whether or not the strong linearity restrictions given in (11) match the predictions of the Strong Linearity Domain Hypothesis we must establish two things: (i) that the Bantu verb stem is a prosodic constituent and (ii) that these strong linearity restrictions are consistent with the characteristic phonology of that constituent.

Establishing the first point is not particularly difficult. As Hyman (1993: 25) writes in a survey of the Bantu verb stem, “apparently all Bantuists agree that the verb stem is distinguished by phonological characteristics. . .”. He then gives a number of these characteristics, some of which are adapted in (12).

- (12) a. Vowel height harmony is observed in some Bantu languages within (but not outside of) the verb stem.
- b. Vowel coalescence often applies differently within the verb stem than it does elsewhere.
- c. All vowels between the initial vowel of the verb stem and the obligatory Final Vowel are underlyingly toneless.

The discussion above focused on the combination of a verb root followed by valence-changing suffixes. However, the relevant prosodic unit, which will be referred to here as the *prosodic verb stem*, is generally taken to also include an inflectional Final Vowel found at the end of the verb, and this will be the prosodic constituent I will employ in the analysis to follow.

(This vowel can be seen in the examples in Section 4.2 containing full verb forms.)

So, the idea that the Bantu verb stem is coextensive with a prosodic constituent seems uncontroversial. However, establishing that the strong linearity restrictions, as given in (11), are consistent with the characteristic phonology of the verb stem is more difficult, not least because, unlike prosodic constituency, the notion of consistency with a characteristic phonology is new to this line of research. The first step is to give a description of the relevant properties of the prosodic verb stem's characteristic phonology. A schematization of these properties is given in Table 2. (In Table 2, Y represents a glide.)

Table 2. Schematization of the shape of Bantu verb stems

Stem Type	Shape				
Minimal	-CVC-	-V			
	ROOT	FV			
Extended	-CVC-	-VC-	-V		
	ROOT	CAUS/APP	FV		
Further extended	-CVC-	-VC-	-Y-	-V	
	ROOT	CAUS/APP	TRANS	FV	

The schematization in Table 2 is intended to describe Proto-Bantu. Therefore, it will not cleanly apply to all Bantu languages. It indicates that the typical shape of a verb root in Bantu is -CVC- (though exceptions to this pattern seem to have existed even in Proto-Bantu) (Meeussen 1967: 85–89). With the addition of the inflectional vowel, this gives the verb stem the prototypical shape CVCV.

As seen, extensions with shape -VC-, like the Causative and Applicative, extend this basic shape and maintain the overall CV pattern. The Transitive, when added, can alter this basic shape somewhat when it surfaces as a vowel, for example as in Kimeru (see [9]), or even when it surfaces, more typically, as a glide (as in the Runyoro-Rutooro data in [8]), by creating a complex Cy towards the end of the verb stem. But even then, the overall CV pattern is maintained throughout the interior of the stem, and the alteration of the pattern at the edge of the stem is itself not particularly drastic.

Based on the descriptive generalizations schematized in Table 2, in (13), I give a characterization of the characteristic phonology of the Bantu verb stem, limited to characteristics that are relevant to the present discussion.

- (13) a. **Morphophonologically bounded:** Prototypically, it has disyllabic shape CVCV. Deviations typically involve suffixation.
- b. **Shape follows CV pattern:** Even though the root itself may have a shape like CVC, the nature of Bantu morphophonology means the surfacing stem will have a shape like CVCV.

Each of the two strong linearity restrictions given in (11) can be understood as being roughly comparable to one of the properties of the characteristic phonology of the verb just given in (13). The statement in (14a) connects restriction (11a) to phonological characteristic (13a), and the statement in (14b) connects restriction (11b) to phonological characteristic (13b).

- (14) a. **CAT restricts the expansion, and, thus, the size, of the stem:** By imposing a restriction that the Causative cannot follow the Applicative, the morphological possibilities for stem expansion become more limited, consistent with phonological characteristic (13a) that the stem is morphophonologically bounded.
- b. **CAT maintains CV pattern:** The -VC- shape of the Causative and Applicative suffixes maintains the CV pattern of the verb “naturally”. The surfacing of the Transitive suffix towards the end of the stem ensures the pattern will be maintained throughout the interior of the stem, consistent with phonological characteristic (13b).

As seen in (14), there are clear parallels between the characteristic phonology of the prosodic verb stem and its strong linearity restrictions – the prosodic verb stem is relatively “small” and restriction (11a) limits stem expansion. The prosodic verb stem follows a CV pattern and restriction (11b) “conspires” to maintain that pattern. In my own view, these strong linearity restrictions can, therefore, be understood to be consistent with the characteristic phonology of the prosodic verb stem, and they are, therefore, in accord with the Strong Linearity Domain Hypothesis.

4.5. Why CA and not AC?

An important question left open by the analysis just presented is why the order of the Causative and Applicative is fixed as CA instead of AC. The Strong Linearity Domain Hypothesis gave us some insight into the nature

of the form of Bantu verb suffix template but, by its very nature, it has little to say about syntactic and semantic aspects of templatic restrictions. In Good (2003: 262–272) and Good (2005: 46–48), a historical explanation for this aspect of the template was offered based on the observation that crosslinguistic evidence indicates that, all things being equal, a causative is likely to grammaticalize (in temporal terms) before an applicative.

Since the Bantu Causative and Applicative have a similar shape, we can hypothesize that they developed from similar sources (perhaps from post-verbal auxiliaries [Givón 1971]), in which case the fact that the template has order CA instead of AC could be a byproduct of the Causative grammaticalizing before the Applicative, with each following a similar grammaticalization path. Of course, the Transitive has a causative function as well – and appears after the Applicative in the template. But the shape of the Transitive is quite distinct from the shape of the Causative and Applicative, suggesting it developed along a different grammaticalization pathway, making the relative chronology of its grammaticalization less relevant here. (Hyman 2003: 262 suggests the source of the Transitive may have been as a voice marker of some kind.) There is, of course, a good degree of speculation in all of this. Nevertheless, it points to a possible explanation for properties of the Bantu template not covered by the above analysis: differential timing and pathways of grammaticalization.

4.6. Prospects

While I have only been able to present the basic outlines of how the Strong Linearity Domain Hypothesis can be used in the analysis of a template here, this case study illustrates how the application of hypothesis can play a role in refining our understanding of templates generally. For example, in this particular instance, attempting to understand the CAT template by characterizing its strong linearity restrictions – and seeing if those restrictions were consistent with the Strong Linearity Domain Hypothesis – led to an interesting conclusion: For the Bantu verb suffixes, it was important to distinguish between restrictions particular to language-specific morphemes and grammaticalization patterns affecting broad functional classes of morphemes. Each played a role in accounting for the template, with the former having a central role in explaining the template's form and the latter having a role in explaining the functional distribution of template's morphemes.

Whether or not this suggests a general principle for the analysis of comparable types of templatic phenomena is an open question. However,

given that the Strong Linearity Domain Hypothesis was developed primarily as a working hypothesis, the fact that its application caused this issue to be raised at all is of most interest here. In particular, this case study suggests a possible methodological principle in the analysis of templates: Formal aspects of their linear ordering may require a different kind of account than functional aspects. While such a principle may not be particularly surprising, I do not believe it has been explicitly formulated elsewhere – and, it, perhaps, marks a small advance in our understanding of templatic phenomena.

5. Conclusion

In this paper, I have outlined some of the general issues surrounding the development of a general typology of templatic constructions. Unlike, say, word order patterns, the basic categories we should start with in developing such a typology are not immediately obvious, and it was suggested that, we should begin by focusing not on “templates”, *per se*, but rather on strong linearity – an important feature of templates.

The case study of Bantu verbal suffixes given here presented at least two methodological principles which could be applied to future study of templatic phenomena. The first is that it may be important not to analyze templates monolithically, but, rather, to break them down into lower-level statements of stipulated linear ordering restrictions. The second is that the modes of explanation we may need to come to an understanding of the formal structure of templates may be quite distinct from the modes of explanation required to understand the functional categories expressed by the elements within them.

I would like to conclude by highlighting what I believe to be a particularly intriguing idea coming out of this study, introduced in Section 2, but which was not focused on – that the unifying characteristic of templates is not simply that they involve stipulations of linear order but, rather, that they involve *unexpected* stipulations of linear order. If there is truth to this characterization, it forces us to address the general question: What sorts of stipulated linear patterns do we expect in different types of constituents? To the best of my knowledge, this question has not been addressed systematically (though there are, of course, relevant proposals for particular aspects of grammar, like syntax or morphology). Dealing with the issues this question raises in a general way would seem likely to yield interesting results in the study of many types of syntactic, morphological, phonological,

and lexical patterns. This suggests that coming to better understanding of what makes a template a “template” may also help us to come to a better understanding of phenomena which would never be called “templatic”.

Notes

1. I would like to thank Larry Hyman, Andrew Garrett, and Johanna Nichols for serving as advisers on the dissertation on which this work is based. Sharon Inkelas, John McWhorter, Masha Polinsky, Rich Rhodes, Bill Weigel, and Alan Yu also deserve thanks for their input on that work. More recently, Tom Güldemann, the editors, two reviewers, and audiences at the University of Pittsburgh, the MPI for Evolutionary Anthropology, and the 2006 LSA Annual Meeting also gave valuable comments on this work. Due to limitations of space, I was not able to address many worthwhile remarks made on earlier versions of this paper.
2. In this paper, I am only concerned with linear realization templates – that is, templates used to account for the linear realization of the subconstituents of a given constituent. While this is the most prominent use of the term within linguistics, other uses can be found. For example, the constructional templates of Van Valin and LaPolla (1997), discussed in Section 2.2, are used to account not only for linearization phenomena but also other grammatical properties of a constituent. The usage of template in such a context seems to reflect the general, non-linguistic use of the word *template*, to mean something like “pattern”.
3. I should point out, in this context, that, while the examples of templates given in this section involve linear order, there is another possible linear dimension which can be relevant for templatic restrictions, phonological length. That is, the “unexpected” linear parameter could be one wherein a given unit is stipulated as having to have some particular phonological size. Minimality restrictions, wherein, for example, words in a language must always be minimally of a certain length – e.g., two moras or syllables – fall into this class of templates. Such a minimality restriction, found in Turkish, will be discussed in Section 3.3.
4. So-called clitic clusters (Simpson and Withgott 1986) clearly can also be considered templatic, though they do not fit cleanly into the enumeration of template types given in (1) since they can straddle the boundary between morpho-syntactic and syntactic templates. The difficulty in categorizing them as “morphological” or “syntactic” is independent from the fact that they are templatic. Therefore, in principle, they should also be considered to be testing grounds for the Strong Linearity Domain Hypothesis, discussed in Section 3.

5. Superficially, syntactic constructions, in the sense of Construction Grammar (see, e.g. Kay and Fillmore 1999) often appear to be possible instances of templates, and some, like the “precore slot” template Van Valin and LaPolla (1997: 323) are clearly analyzed as such. However, as discussed in Good (2003: 390–395), determining whether or not a given construction is “templatic” first requires having a detailed analysis of the source of linearization patterns in the construction. There may be some relationship between constructions and templates, but they do not cleanly correlate.
6. A striking recent example of how theoretical attitudes can crucially affect whether or not some set of linear relations are predictable – and, therefore, weak or strong – can be found in Rice (2000), which argues that, contrary to traditional descriptions, the ordering of prefixes in the Athapaskan verb “template” (see Table 1) is predictable on syntactic grounds, and it, therefore, is not truly exhibiting strong linearity but, rather, weak linearity.
7. Glossing abbreviations are as follows: APPL Applicative, CAUS Causative, FOC focus, FV Final Vowel, P plural, PST past, S singular, TRANS Transitive. Numbers refer to person and Bantu noun classes.

References

- Alsina, Alex, and Sam A. Mchombo
1993 Object asymmetries and the Chichewa applicative construction. In *Theoretical Aspects of Bantu Grammar*, Sam A. Mchombo (ed.), 17–45. Stanford: Center for the Study of Language and Information.
- Baker, Mark
1988 *Incorporation: A Theory of Grammatical Function Changing*. Chicago: University of Chicago.
- Bastin, Yvonne
1986 Les suffixes causatifs dans les langues bantoues. *Africana Linguistica* 10: 55–145.
- Bybee, Joan
1985 *Morphology: A Study of the Relation between Meaning and Form*. Amsterdam: Benjamins.
- Dembetembe, N.C.
1987 *A Linguistic Study of the Verb in Korekore*. Harare: University of Zimbabwe.
- Downing, Laura J.
1999 Prosodic stem ≠ prosodic word in Bantu. In *Studies on the Phonological Word*, T. Alan Hall, and Ursula Kleinhenz (eds.), 73–98. Amsterdam: Benjamins.

- Givón, Talmy
 1971 On the verbal origin of Bantu verb suffixes. *Studies in African Linguistics* 2: 145–164.
- Good, Jeff
 2003 Strong linearity: Three case studies towards a theory of morphosyntactic templatic constructions. Ph. D. diss., Department of Linguistics, University of California, Berkeley.
 2005 Reconstructing morpheme order in Bantu: The case of causativization and applicativization. *Diachronica* 22: 3–57.
- Hodges, Kathryn Speed
 1977 Causatives, transitivity and objecthood in Kimeru. In *Papers from the Eighth Conference on African Linguistics*, Martin Mould, and Thomas J. Hinnebusch (eds.), 113–125. Studies in African Linguistics, Supplement 7.
- Hoijer, Harry
 1971 Athapaskan morphology. In *Studies in American Indian Languages*, Jesse Sawyer (ed.), 113–147. Berkeley: University of California.
- Hyman, Larry M.
 1993 Conceptual issues in the comparative study of the Bantu verb stem. In *Topics in African Linguistics*, Salikoko S. Mufwene, and Lioba Moshi (eds.), 3–34. Amsterdam: Benjamins.
 2003 Suffix ordering in Bantu: A morphocentric approach. In *Yearbook of Morphology 2002*, Geert Booij, and Jaap van Marle (eds.), 245–281. Dordrecht: Kluwer.
- Inkelas, Sharon
 1993 Nimboran position class morphology. *Natural Language and Linguistic Theory* 11: 559–624.
- Inkelas, Sharon, and Orhan Orgun
 1995 Level ordering and economy in the lexical phonology of Turkish. *Language* 71: 763–793.
- Inkelas, Sharon, and Draga Zec
 1995 Syntax-phonology interface. In *The Handbook of Phonological Theory*, Goldsmith, John A. (eds.), 535–549. Oxford: Blackwell.
- Itô, Junko
 1989 A prosodic theory of epenthesis. *Natural Language and Linguistic Theory* 7: 217–260.
- Kari, James
 1989 Affix positions and zones in the Athapaskan verb. *International Journal of American Linguistics* 55: 424–455.
- Kathol, Andreas
 2000 *Linear Syntax*. Oxford: Oxford University.

- Kay, Paul, and Charles J. Fillmore
1999 Grammatical constructions and linguistic generalizations: The what's X doing Y? construction. *Language* 75: 1–33.
- Lewis, Geoffrey L.
1967 *Turkish Grammar*. Oxford: Oxford University.
- McCarthy, John
1981 A prosodic theory of nonconcatenative morphology. *Linguistic Inquiry* 12: 373–418.
- McCarthy, John, and Alan Prince
1995 Prosodic morphology. In *The Handbook of Phonological Theory*, Goldsmith, John A. (eds.), 318–366. Oxford: Blackwell.
- Meeussen, A.E.
1967 *Bantu Grammatical Reconstructions*. Tervuren: Tervuren.
- Nespor, Marina, and Irene Vogel
1986 *Prosodic Phonology*. Dordrecht: Foris.
- Rice, Keren
2000 *Morpheme Order and Semantic Scope: Word Formation in the Athapaskan Verb*. Cambridge: Cambridge University.
- Selkirk, Elisabeth
1984 *Phonology and Syntax: The Relation between Sound and Structure*. Cambridge, Mass.: MIT.
- Simpson, Jane, and Meg Withgott
1986 Pronominal clitic clusters and templates. In *Syntax and Semantics 19: The Syntax of Pronominal Clitics*, Hagit Borer (ed.), 149–174. New York: Academic Press.
- Van Valin, Robert D. Jr., and Randy J. LaPolla
1997 *Syntax: Structure, Meaning, and Function*. Cambridge: Cambridge University.