Modeling signifiers in constructional approaches to morphological analysis

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Abstract Constructional approaches to morphology and syntax are based on the idea that the Saussurean sign is not only a powerful device for modeling the relationship between the form and meaning of morphemes, but, if appropriately adapted, it can be usefully extended to any kind of morphological and syntactic structure. Such approaches have been shown to be able to effectively account for a wide range of morphosyntactic phenomena, but an underexplored area is how different kinds of signifiers become associated with both lexical and constructional meanings. This article considers this issue by exploring the range of variation found in the shapes of signifiers in morphological constructions. A particular focus will be signifiers that deviate from a canonical linear ideal and the role of templates in constraining the realization of signifiers. The kinds of meanings that specific kinds of signifiers can be associated with in signs will also be briefly considered. The primary goal of this article is to establish the study of possible signifier shapes as an important issue Construction Morphology more specifically. It will also be argued that constructional approaches are especially well suited for analyzing generalizations holding among the signifiers in a given language.

1 Linking the signifier to the signified

Constructional approaches to morphology and syntax are based on the idea that the Saussurean sign is not only a powerful device for modeling the relationship between the form and meaning of morphemes, but, if appropriately adapted, it can be usefully extended to any kind of morphological and syntactic structure (Hoffmann & Trousdale 2013: 1).[1] Consider, for instance, the representation of the English suffix *-hood* in (1), as found in a word like *motherhood*, based on

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Booij (2016). The symbol X here and below is used to represent an open slot in a morphological construction, in this case fillable by an appropriate noun stem.

(1) $\langle (\ (\ \text{X}\ )_{\omega_i}\ (\ (\ \text{hud}\ )_{\sigma}\ )_{\omega_k}\ )_j \leftrightarrow [\ \text{N}_i\ \text{SUFF}_k\ ]_{\text{N}_j} \leftrightarrow [\text{Quality of SEM}_i]_j \rangle$

The representation in (1) models *-hood* in terms of three parallel structures, one for its phonological form, one for its morphological subcategorization requirements, and one for its semantics. In the first part of the representation, the phonological form is analyzed as a kind of prosodic subcategorization frame (see, e.g., Zec & Inkelas (1990: 368–369)) consisting of two phonological words (represented with the ω symbol), one of which corresponds to the segmental material of the suffix (whose status as a single syllable is represented by the σ symbol) and the other to the "open" base form that the suffix must attach to in order to create a well-formed word. The morphological properties of the word are represented in the second part of the representation where, in particular, the requirement that the suffix attach to a noun is indicated. The final part of the representation represents how the *-hood* suffix creates a noun with the sense of "has the quality" of whatever noun it attaches to.

The conceptual similarity between the arbitrary form-meaning pairing of the classical Saussurean sign and the Construction Morphology representation in (1) is clear. The "tripling" in (1) is built on the same core idea that linguistic constituents should be described via the linkage of different kinds of linguistic objects, with a key innovation of constructional approaches being that the linkages can go beyond a simple pairing of "form" and "meaning"'.

Linguistic approaches making use of parallel architectures, such as what is found in (1), offer a powerful way in which to model many of the commonalities that can hold across large sets of linguistic constructions. For instance, the forms of all of the morphemes of a given language typically draw on a common set of segments and suprasegments. Separating out phonological representations from other aspects of linguistic structure allows such shared properties to be represented uniformly rather than forcing their details to be restated across every morpheme of a language. At the same time, this way of modeling cross-constructional similarity raises a new problem: If a morpheme, word, or phrase is to be represented via a set of parallel structures,

then what mechanisms ensure that these structures will be linked together in a sensible way? Put another way, what kind of theories do we need to understand the nature of the correspondence relations, represented as double arrows in (1), between form, grammar, and meaning.[2]

This article examines a specific part of this question by looking at variation in the kinds of forms that are allowed to pair with lexical and constructional meanings in linguistic signs. To the best of my knowledge, this topic, which we might informally term "signifier typology" has never been considered systematically, though as will be clear from this article's reliance on previous investigations into morphological form, parts of an implicit typology can already be found in the literature. The primary goal will be to establish this as a significant topic for further work in Construction Morphology (and constructional approaches more generally) and to lay out some of the key issues that would need to be considered in the development of a comprehensive theory of the role of signifiers in constructional approaches to morphosyntax.[3] An important conclusion will be that the notions of schema and subschema relations, which have already been developed within Construction Morphology (see Booij (2010: 51–55)), if suitably adapted, can also be used to model certain kinds of complex patterns of morphological realization that have yet to have seen close attention within the framework.

By way of background, a brief discussion of the theoretical context of this study is provided in section 2. In section 3, a number of illustrative form-meaning pairings will be presented to clarify the nature of the problem that is in focus here and to produce an initial typology of what will be termed "non-canonical" signifiers. This discussion will be introduced by examination of the properties of signifiers, as understood by Saussure. Section 4 will build on the work of Good (2016) to consider the special role of templates in shaping linguistic signs. Section 5 will explore the issue of how certain kinds of form-meaning pairings may be arbitrary but still

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[2] The problem of developing theories and formal models of the relationships between parallel structures is explored in syntactic frameworks such as Lexical Functional Grammar (see e.g., Bresnan (2001: 50–56) or the automodular approach developed by Sadock (2012: 30). So, the recognition of the problem is not new to this work. Rather, the intended contribution is to explore the problem in a domain not yet closely examined from this perspective: the linkage of phonological form to other grammatical properties.

[3] I use the term *signifier* to emphasize that the domain of interest are the forms associated with morphosyntactic constituents rather than full morphological constructions in and of themselves. Related terms, such as *exponent* or *formative*, could also be used, but these tend to be primarily used for specific kinds of morphology (e.g., inflection in the case of *exponent*) or emphasize specific ways that form does (or does not) pair with meaning (in the case of *formative*). The use of the term *signifier* also reflects a conscious attempt to relate work on constructional approaches to grammar to the Saussurean sign, the conceptual forbear of the construction.

show systematic patterns and what this means for models of morphology. Section 6 concludes the paper by looking at the value of constructional approaches to morphology for exploring the issues of interest here.

2   The theoretical context for this study

As will become clear, the observations to be made below build on a number of different strands of previous work, and in many cases, the data to be examined has been the subject of extensive previous theoretical investigations whose insights are drawn on here. For instance, section 3.1 will discuss tonal patterns of the sort that formed the basis of the development of autosegmental phonology (Goldsmith 1976) as well as CV-skeleton templates of the sort commonly associated with Semitic morphology that have also had a considerable impact on theoretical phonology (see, e.g., McCarthy (1979, 1981)).

However, the goal of this article is not to provide a general review of work on these, and related, topics or to fully explore and give justice to available abstract and theoretical analyses of them. Rather, it takes advantage of the ways in which previous work has revealed interesting patterns of variation in the shape of morphemes to help create an initial proposal for a typology of signifiers and to evaluate the suitability of Construction Morphology for modeling a wide range of signifier types. Tsujimura & Davis (2011: 823) make a similar point from a Construction Morphology perspective in observing how work on prosodic morphology (see e.g., McCarthy & Prince (1995)), again mostly down within theoretical phonology, can contribute to the development of models of "how the formal schema of a morphological construction can be prosodically delimited".

In developing the typology, work aimed at phonological, morphological, and, to a lesser extent, syntactic analysis will be considered. However, there will be a specific focus on the consequences of such work for understanding the kinds of shapes that signifiers can take on, thus providing a change in the orientation from which the data is considered. The aim is not to discount the contributions of earlier work but, rather, to see how this change in perspective, prompted by the development of constructional approaches to grammar, brings interesting new problems to light. Thus, for example, in section 3.2.4, data involving the insertion of so-called

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empty morphs (Aronoff 1994: 44–53) in order to satisfy phonological minimality constraints (see, e.g., Hall (1999: 7–8)) will be considered. The interest, though, will not be in the phonological conditions under which such morphs appear but, rather, in seeing how they fit within a typology of signifiers with non-canonical features.

Finally, it is worth noting that the methodological approach adopted here is deliberately intended to be surface oriented, as is typical of work done within typology as a subfield (Nichols 2007). Some of the apparently non-canonical patterns to be considered below could surely be rendered more canonical via abstract approaches to morphological analysis, and a possible example will be explicitly discussed for tonal data to be presented in section 3.2.5. The adoption of a more surface-oriented approach is not intended to suggest that an abstract one is not superior. Rather, it has been chosen because it assists with the development of an initial catalog of the diversity of signifier patterns by providing a more unified basis for comparing attested patterns of variation across constructions. The patterns that a surface-oriented of approach uncovers can then form the basis of testing and refining a range of theories that have bearing on the understanding of the possible shapes of signifiers in the languages of the world, much as, for instance, surface-oriented work on word order universals has produced useful generalizations for further theorizing on grammatical variation even in frameworks making use of highly abstract representations (see, e.g., Cinque (2005)).

3   The shapes of signifiers

3.1   The limits of linearity

Constructional approaches to morphology and syntax owe their conceptual foundations to Saussure's notion of the linguistic sign. Saussure's first principle regarding the nature of the linguistic sign, namely that the connection between the signifier and signified is arbitrary, is so deeply embedded in linguistic analysis that it scarcely seems possible to know what contemporary linguistics would look like without it. However, he also proposed a second principle, which has been largely overlooked by comparison and which anticipates many of the problems that will be considered here. It concerns the "linear nature of the signifier", and Saussure (1916/1959: 70) states that, while it "is obvious, apparently linguists have always neglected to state it, doubtless

because they found it too simple; nevertheless, it is fundamental, and its consequences are in-calculable. Its importance equals that of Principle I; the whole mechanism of language depends upon it...".

For Saussure, this principle derives from the auditory nature of the signifier in spoken language and the importance of time in structuring its articulation and perception. By the standards of contemporary approaches to phonological representation, it is clearly too simplistic in its "segmentalist" assumption that signifiers consist of a sequence of discrete sounds (see Aronoff (1992: 79)). At least since the development of autosegmental phonology (Goldsmith 1976), a more complex view of phonological representations has dominated, most notably with respect to the representation of tone, which is generally modeled as encoded on a separate "tier" from segmental patterns. This results in two separate "streams" of linear representation which must be brought together in order create signifiers within tone languages.

Relevant data from the Mande language Kpelle, illustrating the classic kind of pattern that autosegmental approaches are designed to analyze, is given in Table 1. The forms are adapted from Hyman (2011: 207) and draw from Welmers (1962: 86). The crucial pattern in the data is the relatively limited number of tonal melodies found on words in Kpelle. The system can be analyzed with reference to only five abstract tonal patterns which surface in predictable ways. There are words with only high tones or low tones; words which show a falling contour, whether on a single vowel as in *kpôŋ* 'door' or across two vowels as in *kálì* 'hoe'; words containing only mid tones; and words containing a mid tone followed by a falling contour. As indicated in Table 1, the surfacing mid tone can be analyzed as connected to an underlying low-high sequence (see Hyman (2011: 207) for further discussion).

What is significant about the data in Table 1 is not only the patterns that are found but also the ones that are not. If tone was linked to vowels lexically, then we would expect a wider range of tone-vowel combinations to appear. For instance, if a falling tone is possible on the single vowel of a word like *kpôŋ* 'door', we might predict that there could be a word with two falling vowels in a row, though this is never found. Similarly, if mid-falling patterns are allowed, as in a word like *kōnâ* 'mortar', we might expect falling-mid patterns to be allowed, too, but these are not found either. By separating out tonal and segmental representations, data like what is seen

WORD	GLOSS	SURFACE	UNDERLYING
pá	'come'	H	H
láá	'lie down'	HH	
ɓóá	'knife'	HH	
pílí	'jump'	HH	
kpòò	'padlock'	LL	L
tɔ̀nɔ̀	'chisel'	LL	
tòlòŋ	'dove'	LL	
kpàkì	'loom'	LL	
yɛ̂	'for you'	F	HL
kpôŋ	'door'	F	
tóà	'pygmy antelope'	HL	
kálì	'hoe'	HL	
kpōŋ	'help'	M	LH
sēē	'sit down'	MM	
sūā	'animal'	MM	
kālī	'snake'	MM	
tɛ̄ɛ̂	'black duiker'	MF	LHL
yūɔ̂	'axe'	MF	
kōnâ	'mortar'	MF	
kpānâŋ	'village'	MF	

Table 1: Tone patterns in Kpelle (adapted from Hyman (2011))

in Table 1 can be readily accounted for: Surface tone patterns are limited in their realization since the language only has five basic underlying tone patterns to assign to lexical items.

The importance of data like that in Table 1 has long been recognized within theoretical phonology (see, e.g., Hyman & Lionnet (2017)), and more striking examples of tonal phenomena that challenge the linear approach to signifiers will be considered below in section 3.2. However, the implications for constructional approaches to morphology and syntax appear to have been underappreciated. Most work in such approaches implicitly assumes the "linear nature of the signifier" to be the normal state of affairs from a formal perspective, and the significance of apparent cases where simple linearity does not strictly hold is not specifically addressed. This can be seen, for instance, in the treatments of the forms associated with constructions in Sign-Based Construction Grammar, an especially carefully formalized variant of Construction Grammar (Sag 2012). Consider for instance the representation of the form of the clause *I forgot how good beer tastes* in (2) (Sag 2012: 75).

$$(2) \begin{bmatrix} \text{PHON} & /aj\#f\mathcal{x}gat\#haw\#g\upsilon d\#bir\#\text{'}tejst\text{-}s/ \\ \text{FORM} & \langle\, I, forgot, how, good, beer, tastes\,\rangle \end{bmatrix}$$

The example in (2) presents the form of a clausal construction in a highly reduced way, treating it essentially as a concatenation of words (though an indication of stress is also provided). This accords well with with the idea that signifiers must be linear in nature: The signifiers of signs above the level of the word can maintain their linear character if they are simply composed via the concatenation of signs which are themselves linear. (Within Sign-Based Construction Grammar, phrases are treated as signs on par with lexical items (Sag 2012: 67).)

It is clear that, in many cases, a simple concatenative model of construction formation is effective for analyzing the relationship between a higher-level construction and its constituent elements. It should probably be understood as the canonical means of construction formation (in the sense of the term as adopted within work on canonical typology (Brown & Chumakina 2012)) and will be referred to as such here.[4] However, it has been long been known that there are many kinds of deviations from this canonical pattern of construction formation. These are most well studied in morphological domains but are also found in syntactic ones. No systematic typology of non-concatenative structures has been developed, though specific examples are well known and have been of particular interest in work focused on their phonological analysis. To pick two (see also section 3.2), consider the data in (3) and Table 2. In (3) a representation of patterns of ablaut, drawing on Booij (2010: 241), is given, based on the specific examples of English verbs such as *sing*/*sang* and *ring*/*rang*. In Table 2 examples of verbs from Sierra Miwok are provided (see Freeland (1951: 94)) illustrating cases of CV-skeleton templates.

(3) $[\, X\ i\ Y\,]_V \sim [\, X\ a\ Y\,]$

The complications involved in the modeling of the composition of signifiers in verb forms exhibiting ablaut have long been the object of theoretical consideration (see, e.g., Hockett (1954: 223–224)), and it is clear that they present a challenge to approaches that rely on the

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[4] In a morphological context, Bye & Svenonius (2012: 429) refer to this as the "concatenative ideal".

PRIMARY	SECOND	THIRD	FOURTH	GLOSS
tuyá:ŋ	*tuyáŋ:*	*túy:aŋ*	*túyŋa*	'jump'
polá:ŋ	*poláŋ:*	*pól:aŋ*	*pólŋa*	'fall'
t̯opó:n	*t̯opón:*	*t̯óp:on*	*t̯ópno*	'wrap'
hut̯é:l	*hut̯él:*	*hút̯:el*	*hút̯le*	'roll'
telé:y	*teléy:*	*tél:ey*	*télye*	'hear'
CVCV:C	CVCVC:	CVC:VC	CVCCV	

Table 2: CV templates in Sierra Miwok

idea that signifiers should be "linear" objects. However, as indicated in (3), there are ways to model them that require relatively minimal adjustment to the canonical model—specifically, one simply needs to allow for operations that can alter the form of the basic segmental building blocks of linear signs. If ablaut were the only kind of deviation that were encountered, then forms exhibiting it could be simply treated as a minor class of exceptions without the need for deeper consideration, especially given that, at least in a language like English, the class of verbs associated with such exceptional behavior is relatively small in number.

Data like that in Table 2 is more problematic in this regard. It exemplifies the four stem shapes associated with verbs of a particular inflectional class in Sierra Miwok. The alternations among these stem forms are governed by the suffix (e.g., a tense suffix) which immediately follows the stem (Freeland 1951: 96). As indicated in the bottom of row of the table, these alternations can be schematized via patterns of consonants and vowels (including indication of length). The forms of the stems across each stem class make use of the same consonants and vowels, in the same relative order respectively, but the lengths of the consonants and vowels change and the positioning of the consonants and vowels with respect to each other can change (as can be seen by contrasting the Fourth stem with the other three stems). Unlike the English ablaut pattern, the alternations seen in Table 2 are systematic and cannot be modeled in terms of a simple pattern of segmental replacement but, rather, require a level of abstraction where the linear patterning consonants and vowels is separated from the specific consonant and vowel segments found within a word. A standard device used to model data like that seen in Sierra Miwok is the CV-skeleton template, most familiar from work on Semitic morphology (see, e.g.,

McCarthy (1979, 1981), Ussishkin (2000: 5)).[5] The modeling of these kinds of morphophonological patterns from a Construction Morphology perspective is considered in some detail in Davis & Tsujimura (this volume).

The examples seen so far begin to illustrate some of the ways in which signifiers can disobey Saussure's second principle, even if it is valid in some statistical sense. In the next section, I will catalog a range of additional examples of non-canonical signifiers as a first step towards a better understanding of the ways in which they can deviate from their default "linear nature".

3.2 Signifier deviations

3.2.1 A typology of non-canonical signifier structures

The goal of this section is to provide a range of ways that signifiers can deviate from the canonical linear ideal. The patterns to be considered have all been previously described. However, they have generally been seen as problems of "phonology" or "morphology" rather than in terms of their consequences for signifier typology. The nature of these patterns takes on new significance in light of the increased attention being paid to constructional approaches to grammar, and, in particular, Construction Morphology, due to their reliance on sign-based models for characterizing grammatical patterns, which is what makes them of interest here.

Section 3.2.2 begins the discussion by considering the well-known problem of so-called zero morphemes. Section 3.2.3 then looks at discontinuous morphemes. Each of these kinds of deviations from the canonical signifier have been given the most detailed discussion in work on morphology. The remaining deviations to be considered have seen more attention in work on phonology. Data from languages of Africa will play a prominent role in the discussion both because I am relatively familiar with them and because, as will be seen, tonal morphology is associated with a range of interesting deviations and African languages provide numerous examples of tonal morphology which can be explored in this respect (see also Hyman (2016) on this topic).

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[5] Smith (1985) gives an early application of a CV-skeleton analysis to Sierra Miwok, based on the descriptions of Broadbent (1964) and Freeland (1951) (see also Goldsmith (1990: 83–95)). See Good (2016: 9–12) for further discussion of this kind of templatic pattern.

3.2.2 Significative absence

Perhaps the most well-known non-canonical signifier is the lack of one entirely, commonly represented in terms of a Ø symbol or referred to along the lines of a "zero" or "null" morpheme. Of relevance here in particular are cases of apparent significative absence (see Stump (1997: 219)) where the lack of a signifier is taken to be a kind of signifier in its own right.[6] As discussed by Stump (1997: 225), significative absence is a typical feature of inflectional morphology due to the fact that paradigmatic oppositions among inflectional forms necessarily render the lack of overt inflectional marking in a given form meaningful by virtue of its opposition to overtly marked forms in the paradigm.

Less typical, but also attested, are cases where there is evidence for zero roots, or even zero words. In Nimboran, for instance, a language with complex templatic morphology (see section 4.3), there are a number of verbs whose root position contains no overt morpheme. In such cases, the verbal meaning can be determined on the basis of morphemes found in other positions (Inkelas 1993: 610–613).[7] Relevant examples are given in (4).

(4) a. *Ø-rár-ŋkát-t-u* ⟶ *rekátu*
   laugh-PRT-ITER-PRS-1s/p
   "I laugh repeatedly (here)." (Inkelas 1993: 610)

   b. *Ø-rár-be-d-u* ⟶ *rebedú*
   bring-PRT-to.above-FUT-1s/p
   "I will bring from here to above." (Inkelas 1993: 610)

   c. *rekéi-k-re-bá-r-am* ⟶ *rekéikrebáram*
   turn-DU.SBJ-PRT-above-FUT-3M.s/p
   "They two will turn above." (Inkelas 1993: 574)

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[6] Transformationalist frameworks also frequently make use of elements resembling zero morphemes, so-called null operators (see, e.g., Browning (1987)). These devices are used to analyze certain kinds of phrasal syntactic relations. While they can occupy positions in a syntactic tree that can also be occupied by signs, they do not seem to be signs in the Saussurean sense. See also Baker (1990) on the distinction between two kinds of zero, one more morphological in orientation and the other more syntactic in orientation, as well as Lemaréchal (1997) for consideration of the role of "zeros" in linguistic analysis more broadly. Rhodes (1992: 413–414) provides an early discussion of zero morphemes from a constructional perspective, and Trommer (2012b) contains a recent overview of zero morphology from a theoretical perspective. The term *significative absence* is used here to make clear that a specific kind of zero morphology is in focus here where a sign that is otherwise canonical lacks an overt signifier of any kind.

[7] Inkelas (1993) is based on the description of Anceaux (1965).

d. *príb-tam^e-be-t-u*   ⟶ *príptembetɨ́*
   throw-DUR-to.above-PRS-1s/p

   "I am throwing him/Ø from here to above."   (Inkelas 1993: 585)

The first position in the Nimboran verbal complex is reserved for the verb root, which is then followed by a series of affixes, some of which have relatively straightforward function (e.g., subject agreement) and others of which do not. In particular, there is a class of morphemes labeled *particles* by Inkelas (1993: 574–578) that combine with verb roots to encode verbal meanings in an apparently non-compositional way. (In this respect, they are reminiscent of verb-particle combinations, such as *give in* in English.) In (4c), an example is given for a verb root *rekéi-* appearing with the particle *-re-* to encode the meaning 'turn'. It is not obligatory for a verb root to appear with a particle, as seen in (4d), where the root *príb-*, on its own, encodes 'throw'.

What is of special interest in the present context are the examples in (4a) and (4b). In these verbs, there is no root morpheme. The meaning of the verb, however, can be determined by the appearance of a specific particle along with other fixed morphemes. In (4a), a zero root, along with the particle *-rár-* and the Iterative marker encodes the meaning 'laugh'. In (4b), the same particle appearing with a zero root and a member of a specific set of locative markers (including *-be-*, as found in the example) encodes the meaning 'bring'. Inkelas (1993: 611–613) provides specific arguments for an analysis of verb forms like this in (4a) and (4b) as involving the appearance of actual zero roots that are associated with meaning.

Significative absence does not even seem to be limited to bound morphology. Fortune (1942) documents a case of an apparent zero verb in Arapesh appearing in a syntactic construction where it codes the meanings of 'strike', 'kill', or 'fight'. Relevant examples are given in (5).

(5) a. *na*   *ku̥*
    3s.M.SBJ 3s.F.OBJ

    "he strikes or kills her" (Fortune 1942: 66)

  b. *kwa*   *n*
    3s.F.SBJ 3s.M.OBJ

    "she strikes or kills him" (Fortune 1942: 66)

c. *kwa   mitak an*
3s.F.SBJ clasp 3s.M.OBJ

"she clasps him" (Fortune 1942: 64)

d. *kwa   mitak oku̞o*
3s.F.SBJ clasp 3s.F.OBJ

"she clasps her" (Fortune 1942: 64)

In Arapesh, the juxtaposition of arguments without an overt verb yields a clause interpreted as encoding an action where the first argument is the subject of a verb meaning 'strike', 'kill', or 'fight' and the second argument is the object, as in (5a) and (5b). In (5c) and (5d), there is an overt verb resulting in an SVO structure that provides the model for the zero verb analysis of (5a) and (5b).

Of the various deviations from canonical signifiers discussed here, significative absence poses the least problem with respect to the idea that signifiers should adhere to a canonical linear ideal. This is because zero morphemes can be straightforwardly interpreted as being "vacuously" linear. They are nevertheless noteworthy as a deviation from the classical Saussurean sign insofar as they provide evidence that it is possible for a sign to lack a signifier entirely and, as seen in the examples from Nimboran and Arapesh, they are not limited to being found in a specific, narrow morphological domain (e.g., inflectional morphology).[8] Zero morphemes can thus be considered a kind of "defective" sign, lacking one of the two defining features of signs, the signifier.[9] In section 3.2.4 an example of the reverse kind of defectiveness, where there is a signifier that does not appear to have any signification, will be considered.

3.2.3 Discontinuities in signifier structure

Deviations from canonical signifier structure that present more obvious problems for treating signifiers as generally being linear arise from various kinds of signifier discontinuities. There

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[8] The opposite pattern where a sign has a signifier that does not clearly signify anything is found as well in the form of various dummy elements which appear for formal reasons but do not encode any specific semantics. An example of this can be found in Ndebele where a dummy morpheme with shape *yi-* appears in cases where a disyllabic templatic restriction must be satisfied in certain verbal forms but cannot be met automatically for verb roots whose signifiers do not have enough phonological material (see Hyman (2009: 186), Good (2016: 71–73), and section 3.2.4).

[9] The use of the term "defective" here is extended from its application to domains such as paradigmatic gaps and certain kinds of prosodic irregularities (Baerman 2010, Zimmermann 2017).

does not seem to be a standard typology of this phenomenon, though Harris (2017: 1–26) contains a useful overview of many of these in her examination of the notion of multiple exponence (see also Caballero & Harris (2012), as well as Caballero & Inkelas (this volume) for consideration of multiple exponence within Construction Morphology). Work on the complications involved with patterns of exponence more generally (see, e.g., Trommer (2012a)) is also clearly relevant in this context.

An example of a signifier discontinuity can be found in the Mohawk data in (6). In Mohawk, the Dualic prefix *t-* is reported as obligatorily appearing with certain verb stems, such as the verb encoding 'stand up' but not the one for 'sit down', as seen in (6a) and (6b). Its position in the verbal template can allow it to appear quite distant from the stem it is associated with, as seen in the example in (7).

(6) a. *téstaʔn*
       te-s-t-aʔn
       DUALIC-2s.A-stand-INCH
       "Stand up!"

    b. *sátyʌ*
       s-at-yʌ
       2s.A-REFL-set
       "Sit down!"   (Mithun 2000: 237)

(7) *tau̯sahsaterʌnó:tʌ*
    t-au̯-sa-hs-ate-rʌn-ot-ʌ-'
    DUALIC-OPT-RPT-2s.A-REFL-song-stand-CAUS-PFV
    "You should sing again."   (Mithun 2000: 237)

The morphological discontinuity between the Dualic and certain stems in Mohawk is paralleled by syntactic dependencies in other languages, such as German. In (8a), a German future coding construction is provided as an example of an auxiliary construction. The main verb, *anrufen* 'to call up', is in an infinitival form, and it is a member of a class of morphosyntactically complex verbs, with initial elements usually described as "separable" in the literature on German (see Müller (2002: 253–340) for an extensive overview). In the case of this verb, the relevant separable element has the form *an*, and it is simply glossed as a "prefix". In a different construction, involving a verb marked in the present tense, seen in (8b), the main verb appears in

second position (the usual position for finite verbs in non-subordinate clauses), but the element *an* appears at the end of the clause in a position "separated" from the verb.

(8) a. *Peter wird   Paul anrufen.*
        Peter be.FUT.3s Paul PFX.call
        "Peter will call Paul up."

     b. *Peter ruft   Paul an.*
        Peter call.PRS.3s Paul PFX
        "Peter calls Paul up."

Different possible analyses could be proposed for patterns like those seen in Mohawk and German. On the one hand, we could treat the relevant discontinuous elements in examples like (6a) and (8b) as constituting signifiers of distinct signs that cannot be assigned clear-cut semantics on their own. This would allow them to be treated as canonical signifiers with "unusual" meaning. Alternatively, they could be treated as discontinuous signifiers, consisting of two distinct formal pieces, each with its own linearization constraints but associated with a relatively readily identifiable kind of meaning. Depending on the details of the language in question, there may be reason to pick one of these alternative analyses over another—or even some other kind of analysis. However, it seems impossible for any analysis to be able to treat these patterns as solely involving canonical signs.

Booij (2010: 121–142) discusses related phenomena to what is seen in (8) in Dutch from a Construction Morphology perspective, arguing that an advantage of constructional approaches is their ability to model the hybrid morphological/syntactic features of phenomena like this effectively since they do not assume a strict divide between the lexicon and syntax. What is of special interest in the present context is understanding under what conditions such bipartite signifiers are allowed. Booij (2010: 131), for instance, models Dutch verbs which show patterns of separability as combinations of two word elements, one of which must be a verb and the other assignable to a more open set of word classes (namely, prepositions, adverbs, adjectives, and nouns). A question that might be considered more broadly is whether a pattern like this, where the morphosyntactic category of one element is fixed while the other is more open, may be a common one for discontinuous signifiers.

In the present context, cases of discontinuities where the data strongly favors an analysis in terms of discontinuous signifiers, as opposed to two distinct signifiers which must occur together, are of the most interest. One well-known category of such cases involves circumfixation, where an affix has both prefixal and suffixal components, and another involves infixation, where the signifier associated with an affix breaks up the otherwise linear structure of another signifier (see Štekauer et al. (2012: 197–212) and Yu (2007)).

An especially noteworthy set of cases of discontinuities of this kind involve phenomena that can be broadly classified under the term *endoclisis* (see Harris (2000, 2002)) where a clitic (or clitic-like) element appears within the signifier associated with an independent word. Idiatov (2005) presents a detailed examination of a phenomenon like this in his consideration of the complex relationship between intensifiers and numerals in the Mande language Tura. Relevant data is provided in (9). (The overall facts are more complicated than what is presented here, and the interested reader should consult Idiatov (2005) for the full range of details.)

(9) a. *wo   pììlɛ̂*
         3p.SBJ.TAM two
         "They are two."   (Idiatov 2005: 36)

     b. *àâ   mɔɔ   bháálá lefʋ kɛ̂ɛ.á*
         3s.SBJ.NEG.TAM can.TAM work   even do.with
         "He cannot even work."   (Idiatov (2005: 60); citing Bearth (1971: 191))

     c. *wáâ   pìì   lefʋ lɛ̂*
         3p.SBJ.NEG.TAM t[wo] even [t]wo
         "They are not even two/they are not two at all [but just one]."   (Idiatov 2005: 32)

The example in (9a) provides an instance of the numeral meaning 'two' in its typical form. In (9b), an example is provided of a specific intensifier in Tura that is translatable as 'even'. In (9c), the pattern of interest here emerges: Numerals can be "split" by intensifiers when modified by them. (The glossing of this example informally represents this splitting by similarly dividing the spelling of the English word *two*.) This splitting pattern is not restricted to just this one

number or intensifier, but is more general in nature (and it can also be accompanied by partial reduplication). In examining this pattern, Idiatov (2005: 76) describes the analytical problem as follows: "The need for an adequate synchronic morphological analysis of the constructions at issue made it necessary to address some theoretical questions, such as endoclisis, word integrity, and constancy of the morphological status of linguistic entities." He ultimately treats intensifiers like *lefʊ* 'even' as alternating between having word and infix status and develops the notion of a *pseudoword* (Idiatov 2005: 74) to characterize the two elements corresponding to 'two' in an example like (9c) as a way to "describe a situation when a certain linguistic element can be analyzed as a word on the level of form but not on the level of meaning" (Idiatov 2005: 77).

Regardless as to whether or not one accepts this specific analysis, it is clear that data like that seen in (9) presents interesting questions for any model of signifiers since it provides an example of a case where signifiers that look canonical in some constructions can take on non-canonical behavior in quite specific contexts. The syntactic particularity of this pattern is, broadly speaking, clearly supportive of constructional approaches to morphology and syntax, while at the same time raising interesting questions about the modeling of signifiers in such frameworks, in particular with respect to the conditions under which a signifier may lose its linear "integrity".

3.2.4   *Signifiers of defective signs*

Patterns most often looked at from the point of view of phonology also present interesting cases of deviations from canonical linear signifiers. A well-known case, morphology involving CV-skeletons was discussed in section 3.1. In this section and following ones, other cases of deviations connected to phonological patterns will be considered.

The first case where phonological restrictions are connected to the appearance of non-canonical signifiers which will be considered is segmental in nature. Specifically, the data in Table 3 from Ndebele, a Bantu language, taken from Hyman et al. (2009: 283), provides cases of what might be called "defective" signifiers in phonological terms (though the label "subminimal" is more commonly used in this context).[10] The second half of the table gives a number of

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[10] The abbreviations "H" and "L" in Table 3 indicate the tone class of the verbs they follow (Hyman et al. 2009: 308).

Imperative forms for these phonologically defective roots, with shape -C-. Non-defective roots are found in the first half of the table.

IMPERATIVE	GLOSS	TRANSLATION
lim-a	'cultivate-FV'	'cultivate!'
bamb-a	'catch-FV'	'catch!'
thum-a (H)	'send-FV'	'send!'
nambith-a (H)	'taste-FV'	'taste!'
yi-dl-a (H) (*dl-a*)	'YI-eat-FV'	'eat!'
yi-lw-a (H/L) (*lw-a*)	'YI-fight-FV'	'fight!'
yi-m-a (H) (*m-a*)	'YI-stand-FV'	'stand!'
yi-z-a (H/L) (*z-a*)	'YI-come-FV'	'come!'

Table 3: Ndebele stem minimality and insertion repair

The Imperative in Ndebele regularly consists of the verb root followed by an inflectional Final Vowel (of form *-a* in Table 3). In -CVC- (or longer) roots, this strategy automatically results in a surfacing word of at least two syllables, as seen in the data in the first half of the table. This is not the case for the -C- roots in the second half of the table. Based purely on the lexical shape of their signifiers, a monosyllabic form like *Ca* would be expected for their imperatives. Such forms, however, would violate a restriction that words should be disyllabic in the language. One of the available repair strategies for forming imperatives of such verbs is seen in Table 3, where a formative of shape *yi-*, which does not contribute to verbal semantics, is prefixed to the stem (see Sibanda (2004: 113–114) for discussion of other repair strategies).

The Ndebele situation presents us with the possibility that certain signifiers are permitted in the lexical specification of a sign despite the fact that their shape will inevitably violate restrictions of a language's grammar. In this case, the deviation from the canonical linear signifier is not in terms of the ordering of its elements, as was the case in the examples discussed in section 3.2.3, but, rather in terms of patterns of length (see Good (2016: 73–75) for more on this distinction). In Ndebele, there are strategies available to "repair" words containing defective signifiers when necessary. Instances where defective signifiers result in ineffability—that is certain expected forms are simply inexpressible due to the lack of an available repair strategy—are also attested, with Turkish presenting such a case (Inkelas & Orgun 1995: 769–773) (see also Good (2016: 69–71)).

There are two broad issues raised by defective signifiers from a Construction Morphology perspective. First, they suggest that grammars may contain constraints that, in effect, define an "ideal" signifier in a given morphosyntactic context (e.g., that a verb root should have at least -CVC- structure in Ndebele). That is, a full morphological model would need to describe not only how signifiers combine but also what kinds of signifiers are expected in the first place. Many constraints on signifiers can be understood as more or less purely phonological in nature, for instance aspects of their syllable structure. However, the Ndebele case is different from this: There is a phonological constraint on a *morphological* unit, which brings the pattern into the domain of morphology.

Second, in languages like Ndebele where there are repair strategies available for cases of defective signifiers, the possibility that they will involve the appearance of unpredictable dummy elements, such as the *yi-* seen in Table 3, provides us with examples of formatives that have the appearance of signifier but lack any association with meaning. These are, in effect, the "inverse" of zero morphs (see section 3.2.2). Whatever analysis one might devise for patterns like the one exemplified for Ndebele in Table 3, they show that any full constructional model of morphology will have to assume that it is possible that the morphological forms of a construction will not necessarily only consist of the forms of its constituent morphemes. Grammatical constraints may force the appearance of other morpheme-like elements as well.

3.2.5 *A relative signifier*

Tonal patterns present a number of complications for the modeling of signifiers. Much of this is due to the well-known problem of aligning two independent sets of linearly structured patterns, namely tonal and segmental ones, a topic that was discussed in section 3.1. However, there are other complications raised by tonal morphology. These can relate both to the ways that distinctions are coded via changes in tone as well as the ways that tones coding a specific lexical item can appear in an utterance. The latter kind of complication will be discussed in section 3.2.6.

As an example of the first kind of complication, the data in Table 4 presents patterns of singular/plural marking via tone changes in words belonging to a specific noun class (Class 9/10

using Bantuist terminology) in the Bantoid language Mundabli (Voll 2017). The abbreviation *S* in the table refers to a super-high tone in a four tone level system where low (L), mid (M), and high (H) tones are also present. Mundabli is one of a number of languages of its area that show tonal patterns like this (see, e.g., Hombert (1980: 91–92)). While some nouns in this class (given in the first section of the table) do not show any alternation between their singular and plural forms, most of them do. Generally, in such cases the singular form has a lower tone and the plural a higher tone. This lower/higher pattern is also observed in various elements showing agreement for noun class (e.g., the pronominal forms associated with these nouns have the shape *yì* in the singular and *yī* in the plural).

SG TONE	PL TONE	SG EXAMPLE	PL EXAMPLE	GLOSS
M	M	*kū*	*kū*	'rat mole'
H	H	*dzáŋ*	*dzáŋ*	'sugar cane'
L	ML	*kù*	*kù*	'rope'
LH	S	*tsǒ*	*tső*	'baboon'
L.L	M.ML	*tàmà*	*tāmà*	'lion'
L.LH	S.S	*làmbǔ*	*lǎmbű*	'orange'

Table 4: Mundabli tonal singular/plural alternations (Voll 2017)

An important feature of the singular/plural encoding seen in Table 4 from the present perspective is that it it cannot be described in terms of a fixed pattern, such as all singular nouns have low tone and all plurals have high tone. Rather, it involves relative higher/lower pattern. This cannot be straightforwardly modeled in typical approaches to signifier representation which treat signifiers as associated with "constant" phonology. It is possible to assign this encoding pattern concrete subpatterns (e.g., that a noun with a low tone in the singular typically will have a mid-low pattern in the plural), and presumably that level of concreteness would be encoded at some level of a constructional analysis of these patterns. At the same time, the lower/higher "metageneralization" is not only interesting from a descriptive perspective, it also has its own signifying quality insofar as, with few exceptions, nouns showing tonal alternations are only found within within Class 9/10. So, it can be seen as encoding a kind of grammatical meaning in its own right.

The existence of abstract patterns that apply over classes of signifiers raises interesting questions regarding the range of devices needed to model signifier behavior in Construction

Morphology. This will be explored in more detail in section 4 when the role of templates in Construction Morphology is considered. In cases like this, the issue is not so much that any one signifier departs from the canonical linear ideal. Rather, it is that signifiers are not behaving simply as "inert" sound representations associated with a particular meaning, as suggested by the classical Saussurean sign. Instead, they seem to participate as elements within a kind of language-specific "signifier grammar" (see also section 4).

Before moving on, it is worth reiterating a methodological aspect of this paper introduced in section 2: A surface-oriented approach to cataloging different kinds of non-canonical signifiers has been deliberately adopted here. The pattern of relative tonal alternation seen in Table 4 has, therefore, been taken at "face value". However, in this case, as well various other cases to be considered below, it would clearly be possible to devise abstract analyses which would render these signifier patterns more canonical at an underlying level. For instance, one could posit a floating low-tone prefix in the singular forms of the alternating nouns and a high-tone prefix in the plurals, with various rules governing their precise realization, and this is presumably the historical source of these tonal alternations (see, e.g., Hyman (1981: 11) for a historical analysis of similar alternations in Noni, spoken nearby to Mundabli). It may be the case that the best approach to the analysis of some of the signifiers considered here is to view them as canonical at some abstract level representation. A fuller survey would make this clearer to the extent that it might establish the existence of constraints on attested patterns for certain classes of non-canonical signifiers, such as relative signifiers of the sort seen in Table 4, which could be analyzed as falling out automatically from a theoretically motivated set of abstract representations.

3.2.6 A "sheared" signifier

Another pattern of interest here that is attested in signifiers containing tonal specifications is what one might term "tonal displacement". This is a special case of signifier discontinuity (see section 3.2.3) where the segmental features of a word's signifier and its tonal features do not appear together. A particularly striking case of this comes from the Nigerian language Izon, following an analysis presented in Harry & Hyman (2014: 677–678) on the basis of data drawn

from Efere (2001: 158–159), who describes the Bumo variety of the language. In noun phrases, the initial noun of the phrase determines which of four tone patterns appears on all subsequent words, and their lexical tones fail to be realized. Relevant data is provided in Table 5. In isolation, only two tonal classes of nouns can be observed, nouns with all high tones or nouns with a medial fall. However, in phrases, four tone classes emerge.

MELODY	NOUN	EXAMPLE PHRASE	NOUN GLOSS
(L)H+H	*bélé*	*bélé náná kímí*	'pot(s)'
(L)HL+L	*sérì*	*sérì nànà kìmì*	'scarf'
(L)H+L	*wárí*	*wárí nànà kìmì*	'house'
(L)H+HL	*ìkíé*	*ìkíé nànà kìmì*	'friend'

Table 5: Izon tonal classes (Harry & Hyman 2014: 677–678)

The first column in Table 5 schematizes the four tone melodies associated with nouns where a "+" indicates the division between the initial word and other words. The parenthesized L is used to indicate that nouns may appear with an initial low tone vowel. The second column gives example nouns associated with these patterns with their tones in isolation. The third provides a frame meaning 'man who owns/has' that consists of *náná kímí*. This frame can be used to show the different effects that nouns in each of these classes have on words which follow them. The first example in Table 5 gives a noun of the H+H class which has high tones throughout and assigns high tones to the following words in the noun phrase. Nouns in the HL+L class have a high-low pattern with all following words having low tones, as indicated. Nouns in the H+L class show high tones on the noun with low tones on the following words. Finally, words in the H+HL class show high tones on the noun with a high tone on the first syllable of the following words and then all low tones.

Harry & Hyman (2014: 677) analyze these patterns by suggesting that nouns in Izon are either accentless or associated with a pitch accent consisting of an HL contour that can be specified as being located in various positions in the word, reminiscent of what has been described for Japanese (see, e.g., Gussenhoven (2004: 186–187)). They further treat accentless nouns as associated with a default H. The lexical specifications of the example words in Table 5 under this analysis are schematized in (10).

(10) CLASS   H+H   HL+L   H+L   H+HL
      SEGMENTS *bɛlɛ* *sɛrɪ*   *wari* *ikiɛ*
      TONES   HL   HL   HL

The representations in (10) separate the segmental and tonal aspects of the signifiers of these nouns across each of the four classes exemplified in Table 5. The pitch accents are associated with three possible positions: non-final syllable, final syllable, and post-final. In all accented words, the overall contour of noun phrases is characterized by a fall at some point in the phrase (along with the possibility of an optional rise if the noun begins with a vowel as is the case for *ikíέ* 'friend'). Accentless words are associated with no such contour. For words with non-final accent, the fall will appear within the word, as seen for *sέrì* 'scarf'. For words with final accent, the contour is realized across the boundary of the first word and the second word, as seen in the phrase beginning with *wárí* 'house' in Table 5. Finally, for words with post-final accent, the contour is realized on the word immediately following the noun, as seen for *ikíέ* 'friend' in Table 5.

From a descriptive standpoint, it is convenient to characterize data like this in terms of one word "assigning" tones to a following word. However, if we assume the representations in (10), it would be more accurate to treat this as a case of a "split" signifier, where the segmental and tonal features of the signifier do not need to completely align, even to the point where the contour associated with accent is completely displaced onto the segmental material associated with the following word, as is the case for *ìkíέ* 'friend'. This raises interesting questions concerning wordhood in Izon: What is the morphological status of a "hybrid" element like *náná* in Table 5 when it has a falling tone contour after a word with post-final accent? Its segments are associated with one word but the tones are associated with another. Is it still a "word" in such cases?

From the perspective of understanding non-canonical signifier shapes, we do not have to address that question directly, but it is certainly of interest to note this as an instance of a kind of signifier "displacement" where part of one signifier can only be realized if material from another signifier is present. While it is well-known that phonological processes can blur word boundaries, for instance in cases of elision, coalescence, or tone spreading, those processes do

not typically involve a significant part of the lexical material of a word only ever being realized in the presence of another word. This provides us then with another interesting case where the linear nature of the signifier is violated: the segmental and tonal components of the signifier of a "word" may not be realized together.

The fact that non-canonical signifiers such as those seen in Table 4 and Table 5 are found in the domain of tone is part of a wider pattern of tonal morphology exhibiting features not found in segmental phonology (see Hyman (2013)). Other kinds of phonological features have been seen to show similar patterns to tone in their ability to be detached from specific segments in signifier (e.g., nasality) (see Akinlabi (2011) for overview discussion). However, the kind of signifier splitting seen in Table 5 appears to be unique to tonal phenomena, at least so far.

3.2.7 *Phonologically-blocked signifiers*

Another way in which signifiers can deviate from the canonical linear ideal are cases where the phonologies of the signifiers of two signs interact in a way which prevents one of the signifiers from appearing. Consider, for instance, the data in Table 6 which shows singular/plural pairings across nouns for a specific noun class in the Bantoid language Naki, where the singular forms can be associated with Bantu noun class 3 and plurals with Bantu noun class 6 (see Good & Lovegren (2017)). Naki is a language with relatively robust singular/plural marking on nouns. However, nouns of the class seen in Table 6 sometimes fail to code a singular/plural distinction on the noun itself. The data in Table 6 shows three possibilities for coding the singular/plural distinction in these nouns: (i) the presence of an ŋ in the plural form not present in the singular, most typically in the coda position of monosyllabic words ending in a vowel in the singular, (ii) no formal distinction between the singular and plural, and (iii) for a small set of nouns, the loss of a labial articulation in the first consonant of the singular (see Kießling (2010) for discussion of this pattern from an areal perspective).

There is some degree of irregularity in the singular/plural encoding of these nouns, but, broadly speaking, a generalization holds that, if the singular form of the noun matches certain phonological restrictions, for instance has the shape of a monosyllabic open syllable or begins with a labialized consonant, it will code a singular/plural distinction, whereas otherwise, it

CLASS 3	CLASS 6	GLOSS
fō	*fōŋ*	'axe'
gí	*gə́ŋ*	'egg'
gú	*gúŋ*	'spear'
jū	*jūŋ*	'nose'
lī	*lə̄ŋ*	'tongue'
wə́ní	*wə́ŋní*	'tail'
díd	*də́ŋ*	'whisker'
də̄ŋ	*də̄ŋ*	'pumpkin'
bɔ́d	*bɔ́d*	'fire/gun'
sɔ́ŋ	*sɔ́ŋ*	'flute'
yə́d	*yə́d*	'eye'
fìmfì	*fìmfì*	'quill'
bwề	*bề*	'foot'
kpə̀	*kà*	'palm (of hand)'
mgbáŋ	*ŋgáŋ*	'root'

Table 6: Class 3/6 nouns in Naki

will not. Patterns of "phonological blocking" like this do not seem especially rare. Akinlabi (2011: 1950), for instance, discusses this phenomena in the context of a broader study of featural affixation, also citing an instance where something comparable is found in Dutch.

Data like this is generally seen as the domain of phonology, not the "lexicon", and it is clear that phonological analysis has a significant role to play in understanding patterns like those seen in Table 6. Nevertheless, if one adopts a constructional approach to morphology which takes an (augmented) Saussurean sign as the primary building block of grammar, then phonological constraints on the actual realization of a signifier at all (here coding plurality) are of clear interest. In particular, they raise questions regarding the kinds of phonological environments that can be associated with lack of realization of a signifier and what kinds of signifiers (both from a formal and a semantic perspective) may be most likely not to be realized (see also section 5).

3.2.8 Towards a signifier typology

The survey of ways in which signifiers deviate from the canonical linear ideal presented in this section is not intended to be exhaustive. Instead, the goal has been to present a range of deviations to make it clear that there is a wide variety of potential complexities involved in the

grammatical modeling of signifiers. Zero morphemes, for instance, suggest that the presence of an overt signifier is not an essential part of a sign (see section 3.2.2), and tone provides us with cases of "meta-signifiers" (see section 3.2.5)—that is, abstract patterns holding among classes of more concrete signifiers—as well as cases where the pieces of a single signifier can be spread out over more than one word (see section 3.2.6). Moreover, the deviations can be oriented primarily towards morphological patterns, as is the case for certain kinds of discontinuous morphemes (see section 3.2.3) or be driven by phonological concerns (see section 3.2.7).

Overall, it seems clear that signifier typology is in area in need of broader investigation. This point will be further underscored by the discussion below in section 4, which considers a special class of signifier-like entities, so-called morphological templates (see Good (2016)). The behavior of templates strongly suggests that understanding signifiers does not only require a better understanding of the range of typological variation attested for them but that we also need to recognize that the morphological systems of some languages may rely on something that we might call a "signifier grammar".

4 Templates as "constructive signifiers"

4.1 The building blocks of signifiers

A final class of non-canonical signifiers (or, at least, signifier-like) elements that will be considered here are so-called templates. The term is understood here to refer to grammatical patterns where the form of some linguistic constituent appears to be well conceptualized as consisting of a fixed linear structure, whether in terms of the arrangement of its subconstituents or its overall length (see Good (2016: 1–22) for further discussion). Templates are not typically treated as signifiers, but they clearly have a similar function in that they define a linearization structure which is part of the means through which specific meanings are encoded.[11] This is especially the case for those instances where the template is the sole exponent of a given morphosyntactic category, as is found for certain Semitic CV-skeleton templates, though it is also true for instances

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[11] The work of Gurevich (2006: 54–57) within Construction Morphology employs templates to characterize ordering relations among morphemes, though the role of templates within the framework is not a central issue to the discussion.

of templates that are linked to segmental affixes, of the sort found for Sierra Miwok, discussed in section 3.1 (see Davis & Tsujimura (2014) for further discussion of this distinction).

In section 4.2 an example of a template involving phonological constraints on verb stems in the Bantu language Tiene will be discussed, and in section 4.3 data from Nimboran (a language previously discussed in section 3.2.2) will be considered as an example of templatic restrictions involving morpheme order. As part of the analysis, some initial proposals for incorporating templatic generalizations into Construction Morphology will be provided as a way of highlighting how the framework can be extended to these relatively complex morphological phenomena. In particular, they will be treated as a kind of "constructive signifier", i.e., an abstract specification of the possible shapes of a class of concrete signifiers, each associated with its own meaning.

4.2   A morphophonological template: Tiene verb stems

In order to make the discussion of templates more concrete, data illustrating some of the features of a template structuring the morphophonological realization of verbs in the Bantu language Tiene is provided in Table 7. Tiene verb structure is analyzed in detail in Hyman & Inkelas (1997) and Hyman (2010), and Good (2016: 154–166) considers it in the context of a broader comparison of templatic structures. (Some aspects of the data seen in Table 7, such as vowel alternations, will not be considered here but are analyzed in these other works.) All work on Tiene is based on the description of Ellington (1977). For ease of exposition, an inflectional final vowel is parsed off from the stem in Table 7 where this is straightforward. This vowel is not relevant to the pattern of interest.

INFINITIVE	CAUSATIVE	GLOSS
-lɛ	*-lées-ɛ*	'eat'
-lab-a	*-lasab-a*	'walk'
-lók-a	*-lósek-ɛ*	'vomit'
-mat-a	*-maas-a*	'go away'
-pal-a	*-paas-a*	'arrive'
-píín-a	*-píís-ɛ*	'be black'

Table 7: Causative verb forms in Tiene (Hyman 2010: 147–148).

The paired forms in Table 7 give non-causative and causativized verb stems in Tiene. Causativized verbs appear with a Causative affix that can be associated with an underlying form

along the lines of *-es-*. This can be seen most clearly in the first verb pair in the table *-lɛ* vs. *-léesɛ* 'eat'. However, there is an unusual set of restrictions on the shape of verb stems in this language which, among other things, disallows coronals as the third consonant of a stem. In causativized stems based on forms which end in labials, this restriction is satisfied by having the *s* of the Causative appear as the second consonant, seemingly behaving as a kind of infix. This results in verb pairs like *-laba/-lasaba* 'walk'. In causativized stems based on forms which end in coronals, the restriction is fulfilled by having the *s* of the Causative effectively replace the coronal that would otherwise be expected to appear, thus resulting in pairs like *-pala/-paasa* 'arrive'. These patterns can be roughly characterized via a template along the lines of CVTVK where T is used for any coronal consonant and K for a non-coronal. (The final vowel seen in the forms in Table 7 is left out of the template since its appearance can be attributed to independent aspects of the morphological structure of the verb.)

Assuming we accept that templatic analyses like the one just presented for Tiene—or the one presented above for Sierra Miwok in Table 2—are valid, what is their role in Construction Morphology? A template is not a signifier in its own right, but, rather, represents a kind of constraint on possible signifier shapes in specific constructional contexts (for Tiene, verb stems). Templates have been placed into the class of *significantia artificialiter* by Simpson & Withgott (1986: 173), following the use of the term by Jakobson & Waugh (1979: 30) (which they, in turn, attribute to Thomas Aquinas) to characterize phonemes, a class of grammatical elements which lack associations with meaning in their own right, but allow for the construction of signifiers.[12] One way to conceptualize templates would be to treat them as a kind of signifier "construction", providing a schema for how a certain class of signifiers can be formed without being signifiers in and of themselves. This would seem to suggest that a Construction Morphology approach that incorporated templatic patterns would require that the notions of schema and subschema (see Booij (2010: 51–55)), as applied to morphological constructions, may also be valuable as devices for characterizing relationships among classes of signifiers associated with a common template within a larger network of lexical relations (Booij 2010: 25–26).

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[12] Simpson & Withgott (1986) is focused on morphosyntactic templates of the sort associated with slot-filler morphology rather than morphophonological templates of the sort exemplified in Table 7, but their characterization would seem to apply equally well to both kinds of templates.

Fully developing a model for templatic relations in Construction Morphology is outside the scope of this paper, but an informal schematization of the form that they might take on is illustrated in (11). A similar approach is taken by Tsujimura & Davis (2011: 811). In (11a), a simple constructional representation of the stem *-lab-* 'walk' from Table 7 is provided. In (11b), a constructional representation is provided of causativized verbs in Tiene. These representations collapse the phonological and morphosyntactic properties of the constructions into a single representation that is paired with a representation of their semantic properties. In (11c), I introduce a new convention to express the templatic restrictions imposed on Tiene verb stems. A CVTVK schema is enclosed by double parentheses indicating that this is not a signifier in and of itself but, rather, a pattern used to construct a signifier.[13] This is categorized as a π-stem, which here is used to refer to a category of prosodic stem in Tiene. This templatic restriction then is taken as part of the description of the signifier of a construction that is associated with the morphosyntactic category of a suffixed verb stem. The semantic properties of the verb stem in (11c) are not indicated since these are dependent on the specific verbal suffix that appears in the construction. (The Causative suffix is used here for illustration, but Tiene also shows applicativizing and stativizing suffixes whose appearance follows the CVTVK template, as described in Hyman (2010).) Tsujimura & Davis (this volume) provide analyses of comparable morphological patterns in Japanese in more detail than what is given here for Tiene, thus providing a useful comparison.

(11) a. [*-lab-*]$_{\text{VSTEM}}$ ↔ ['walk']

b. [[X]$_{\text{VSTEM}_i}$ [*-es-*]$_{\text{VSUFF}_j}$]$_{\text{VSTEM}_k}$ ↔ [Causative of SEM_i]

c. ⟦ CVTVK ⟧$_{\pi\text{-STEM}}$
   ⇓
   (X)$_{\pi\text{-STEM}_k}$ ↔ [VSTEM_i VSUFF_j]$_{\text{VSTEM}_k}$

The particular templatic restriction depicted in (11c) for Tiene can be placed into the broad class of phonotactic restrictions, even if these are of an unusual kind. More usual kinds of

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[13] Rhodes (1992: 418), in an early proposal for a constructional approach to morphology, suggests that a special feature can be associated with morphological constructions to specify the way the phonological material associated with the construction should be combined. The CVTVK schema could be viewed as a language-specific instantiation of such a feature.

phonotactic restrictions, e.g., on syllable structure, could also presumably be modeled as elements of signifier construction, though the extent to which they would be associated with a specific grammatical category would differ from language to language. Inkelas (2014: 44–59) provides an overview and examples of "morphological conditioning of phonology within a language", which can result in restrictions on signifier shapes specific to a given morphosyntactic class of elements, which is of clear relevance here. She cites Smith (2011: 2439), for example, who considers cases of phonological *privilege* where one word class can support a greater range of phonological contrasts than another word class and who finds in particular that noun privilege is more common than other types.

4.3 A morphosyntactic example: The Nimboran verb

Templatic restrictions can be characterized not only in phonological terms, as in the example discussed above in section 4.2, but also in morphosyntactic terms in languages exhibiting so-called slot-filler or position class morphology (see Good (2016: 12)). These kinds of templates involve restrictions on linear realization that are characterized in terms of morphosyntactically defined categories, such as "subject marker" or "tense marker" rather than phonological ones. An example can be found in the Nimboran verb, following the analysis of Inkelas (1993). (See section 3.2.2 for additional discussion of Nimboran.) In Figure 1, the schematization of Nimboran verb structure given by Inkelas (1993: 597) is adapted for presentation here.[14] This represents only an overview of her analysis of the complex facts of the Nimboran system. (Good (2016: 117–130) discusses the templatic features of the Nimboran verb as well.) The relevant template is enclosed in large square brackets in Figure 1. As indicated, not all of the apparent surface morphological positions in Nimboran are treated as part of the template. Two of the positions, zero and one, are outside of the template and classified as the verb stem, while the other positions are arranged templatically and, together, are given the label "modifier".[15]

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[14] The abbreviations for the position class labels in Figure 1 are interpreted as follows (see Inkelas (1993: 561)): PL.SBJ, Plural Subject marker; DU.SBJ, Dual Subject marker; PL.OBJ, Plural Object marker; M.OBJ, Masculine Object marker; INC.DU.SBJ, Inclusive Dual Subject marker; LOC, Directional–Locational markers; ITER, Iterative marker; TNS, Tense markers; SBJ.PERS, Subject Person (and gender) markers.

[15] There is some controversy in the theoretical literature as to whether or not linguistic treatments relying on complex position class systems of the sort developed by Inkelas (1993) should be considered valid as analytical devices (see, e.g., Downing & Stiebels (2012: 416–416)). As discussed in Good (2016: 31–34), there are methodological reasons to consider how such analyses compare to other analyses of ordering restrictions at present.

root	PL.SBJ	DU.SBJ PL.OBJ	M.OBJ	INC.DU.SBJ	LOC	ITER	TNS	SBJ.PERS
0	1	2	3	4	5	6	7	8

Figure 1: Schematization of Nimboran verbal system following Inkelas (1993).

The examples in (12) illustrate morphemes occupying each of the eight position classes that Inkelas (1993) analyzes for the Nimboran verbal system. Both an abstract morphological parsing and a transcription of the surface form of the verb are presented. In addition to the complications raised by its templatic ordering constraints, there are also significant morphophonemic alternations that, in some cases, obscure the identity of morphemes across examples. The morphological analysis in the examples is drawn from Inkelas (1993), where specific reference to the original source, Anceaux (1965), can be found. Some changes in glossing and transcription conventions have been made for ease of exposition in the present context, involving, in particular, the addition of labels corresponding to the numbered position classes in Figure 1. Acute marks in (12) indicate the position of an accent whose primary surface realization involves pitch (Anceaux 1965: 36–37).

(12) a. $\eta gedói_0\text{-}^i{}_1\text{-}d_7\text{-}u_8 \longrightarrow \eta gedóidiu$
   draw.PL-PL.SBJ-FUT-1s/p
   "we (more than two) will draw here"　　　　　　　　　　(Inkelas 1993: 568)

   b. $\eta gedóu_0\text{-}k_2\text{-}be_5\text{-}k_7\text{-}u_8 \longrightarrow \eta gedóukebekú$
   draw.DU-DU.SBJ-to.above-PST-1s/p
   "we two drew from here to above"　　　　　　　　　　(Inkelas 1993: 563)

   c. $\eta gedúo_0\text{-}rár_3\text{-}\eta a_5\text{-}k_7\text{-}u_8 \longrightarrow \eta gedúore\eta áku$
   draw.SG-M.OBJ-below-PST-1s/p
   "I drew him below"　　　　　　　　　　　　　　　　　(Inkelas 1993: 570)

   d. $\eta guá_0\text{-}maN_4\text{-}k_7\text{-}ám_8 \longrightarrow \eta guáma\eta kám$
   bite.DU-INCL.DU.SBJ-PRS-INCL
   "you (sg.) and I bit (here)"　　　　　　　　　　　　(Inkelas 1993: 567)

   e. $\eta gedúo_0\text{-}báN_5\text{-}\eta kát_6\text{-}k_7\text{-}am_8 \longrightarrow \eta gedúobeká\eta kam$
   draw.SG-from.below-ITER-PST-3s.M

"he drew repeatedly from below to here"   (Inkelas 1993: 572)

As suggested by the examples in (12), within the template, only Position 7 and Position 8, corresponding to tense-marking and subject-marking, are obligatory. However, Position 7 can only be treated as obligatory if one assumes significative absence is present in the system. This seems reasonable, in this case, due to the fact that significative absence appears to be a central part of the language's paradigmatic system of tense marking (Inkelas 1993: 573), as well as the fact that the language has also been described as exhibiting the unusual phenomenon of having zero roots (see section 3.2.2). The remaining positions are not obligatorily present. As with the Tiene template discussed in section 4.2, we can understand the Nimboran template as a kind of constructional signifier: It constrains the space of possible verbal signifiers, but is not an actual surfacing signifier in its own right.

In constructional terms, however, the nature of the constraints imposed by the Nimboran template on the verb is somewhat distinct from the Tiene case. This is because they do not operate on the phonological dimension of the construction but, rather, the morphosyntactic one. This is schematized in (13), where the template is described in terms of the position class numbers given in Figure 1. Double brackets are used to encode the template, rather than the double parentheses seen in (11), to indicate that this constructional signifier constrains a morphosyntactic constituent rather than a prosodic one. The phonological dimension of the construction is schematized as consisting of two prosodic units of the same type, following Inkelas (1993: 563–566), where the first prosodic unit corresponds to the stem and the second to the modifier. The semantic aspect of the construction is not indicated here since that depends on the identity of the specific elements appearing in the stem and modifier positions.

(13) $⟦\,2\,3\,4\,5\,6\,7\,8\,⟧_{\text{VMODIFIER}}$
                                              $↕$
   $(\;X\;)_{\pi_j}\,(\;X\;)_{\pi_j} ↔ [\;\text{VSTEM}_i \quad [\;X\;]_{\text{VMODIFIER}_j}\;]_{\text{VERB}_k}$

Obviously, the analyses provided in (11) and (13) cannot be taken as full-fledged treatments of templates in Construction Morphology. Nevertheless, they should make clear that the framework can be readily extended to handle such patterns. Moreover, to the extent that templates

can be understood as a kind of construction, this makes Construction Morphology a natural framework in which to analyze them and can be seen as an additional reason for its general adoption for morphological analysis.

4.4 Constraining signifiers

In the schematic representations in (11) and (13), the representation of the sign has been extended to allow for the expression of abstract constraints that limit the space of possible signifiers in the construction. In the case of (11), these constraints were modeled as being operative directly over the phonological representation, i.e., the part of the sign associated most directly with the signifier. In (13), the constraints were modeled as operative over the morphosyntactic representation, which, by virtue of encoding information about the linearization of morphemes, also affects the possible shapes of signifiers at the constructional level, though more indirectly.

While templatic patterns like these are striking instances of grammatical restrictions on signifier shapes, they should, perhaps, best be seen as occupying extreme ends of a cline of possible constraints. In the phonological domain, general phonotactic constraints on segmental arrangement and syllable structure also impose constraints on signifiers, as briefly mentioned in section 4.2. In the morphosyntactic domain, there is also, for instance, a clear bias towards affixes that are either prefixes or suffixes, as opposed to infixes, circumfixes, or the rarer class of elements labeled "mobile" affixes, which appear as prefixes or suffixes depending on their phonological environment (see, e.g., Paster (2009: 34–36), Jenks & Rose (2015)). A gap in our current understanding of the structure of signs is the full range of restrictions that can be imposed on the shapes of signifiers, which kinds are more common, and which less common.

Overall, the existence of templates points to a complication in the modeling of signs not anticipated in work extending the classic Saussurean model to domains such as morphology and syntax: They suggest that signifiers cannot simply be modeled as "inert" sequences of elements that are strung together to form larger constructions. Rather, they can be embedded in larger systems of signifier relations that may form a kind of signifier grammar in their own right. Modeling such relations would go beyond merely patching up problems for linearization associated with non-canonical signifiers such as umlaut (see (3)) or those discussed in section 3.2 and,

instead, seem to require the development of sets of schema and subschema relations describing possible signifier shapes in a given language (see also Good (2016: 90–91)).

This conclusion would appear to complement that of Booij & Audring (2017: 291) who propose that an extension to the basic constructional schemas of Construction Morphology, second-order schemas (i.e., schemas of schemas) can be used to account for patterns of morphological truncation in nickname formation. In both cases, non-canonical signifiers would seem to require an extension of the framework's basic tools to model the "intricate network of lexical relationships" that characterize morphological systems (Booij & Audring 2017: 291).

5 Arbitrary but not unsystematic? Sign–signifier pairings

To this point, the discussion has focused on the shapes of signifiers themselves without detailed consideration of the kinds of meanings that different kinds of signifiers are paired with. While the "arbitrary nature of the sign" (Saussure 1916/1959: 65) is Saussure's first principle, it is clear that there are limits to this arbitrariness when the basic device of the sign is used to model morphological and syntactic generalizations. This is recognized by Saussure (1916/1959: 131) in his distinction between absolute and relative arbitrariness, where the latter notion is used to characterize constructions involving the combination of signs in grammatically prescribed ways to create new words, as is the case for compounds. (Saussure (1916/1959: 131) specifically cites, for instance, compound numbers, such as *nineteen* as instances of relatively arbitrariness.)

For non-constructional approaches to morphology and syntax, where the use of signs as a formal device is largely limited to the domain of lexical items which are then concatenated by various grammatical operations (e.g., inserted into a tree structure), the distinction between absolute and relative arbitrariness can, at least partly, be treated as resulting from a distinction between "lexicon" and "grammar". For constructional approaches, which do not view these as discrete domains, the distinction needs to be modeled some other way. While a general framework for exploring the relationship between absolute and relative arbitrariness of signs has not been developed to the best of my knowledge, there is existing relevant work focusing on specific areas of form-meaning relationship. Haiman (1983), for instance, explores the connection between linguistic "distance" (i.e., how far apart two morphemes are from each other) and their

conceptual relationship. Similarly, Mayerthaler (1987: 48–50) develops a number of principles of "morphological markedness theory" which seeks to account for asymmetric patterns in morphological encoding (e.g., the fact that some morphosyntactic categories, such as plural, seem to be more likely to be associated with overt coding than others, such as singular). More generally, Downing & Stiebels (2012) offer a thorough overview of iconicity in language of relevance here.

In the present context, it is perhaps easiest to illustrate the importance of understanding the allowable range of form-meaning pairings in constructional approaches by considering a constructed example of a non-canonical sign pattern that seems unlikely to ever be attested, even though its signifier components are of a type that are otherwise attested. Consider, for example, the extreme version of CV-skeleton morphology schematized in (14). The basic signifier pattern is comparable to the sort exemplified above in Table 2: CV skeletons are treated as distinctive signifiers in their own right which combine with segmental signifiers in the realization of words. However, in this case, the CV skeletons are associated with meanings normally considered to be clausal in nature, and the segmental material that combines with them is divided across meanings normally associated with nouns and verbs. The nominal meanings are represented via consonants and the verbal meanings via vowels. These "lexical items" are represented in (14a). When the consonantal and vocalic signifiers are combined with the CV skeleton signifiers, pronounceable "sentences" can be produced corresponding to standard sentential meanings, as presented in (14b).

(14) a. *tgr*   'tiger'
       rkn   'raccoon'
       ao   'sleep'
       uioe   'see'
       CVCVC   intransitive sentence template
       CVCVC CVCVC   transitive sentence template

   b. *Tagor.*   'The tiger sleeps.'
      Tugir roken.   'The tiger sees the raccoon.'

If we admit the need for CV skeleton morphemes, which seem like an appropriate device to model morphological alternations in languages like Sierra Miwok, there does not appear to be any specific mechanism within Construction Morphology, or constructional approaches

more broadly, which would suggest that the particular signifier pattern schematized in (14) should not be attested. One could easily construct other such examples. Based on what is attested in Izon, for instance, as described in section 3.2.6, one could imagine a language where tonal melodies connected to nominal meanings associate with segmental melodies connected to verbal meanings, and vice versa. Such a system also would seem highly unlikely to be attested.

Following Dryer (2006: 207–208), I do not assume that linguistic formalisms should be simultaneously explanatory and descriptive, as typically considered important in the Chomskyan tradition. Therefore, I am not concerned here about whether the formal devices of Construction Morphology exclude the description of a language like the one seen in (14). However, it seems clear that any complete theory of Construction Morphology should be able to account not only for the range of attested signifier shapes but also for why certain kinds of signifier shapes are found associated with some meanings but not others.

Returning to actually attested patterns, the domain of tone, which was seen above to be a significant source of different kinds of non-canonical signifiers (see, e.g., section 3.2.5 and section 3.2.6) also provides a relevant example in this context. The data in Table 8 provides forms from the Bantu language Umbundu, which has been described by Schadeberg (1986) as exhibiting patterns of tonal case. The forms in the table are for words meaning 'hippopotamus'. Those in the "augment" column are the common noun forms for the word, and those in the "no augment" column are proper noun forms (e.g., used to refer to a character called Hippopotamus in a story).

CASE LABEL	AUGMENT	FORM	NO AUGMENT	FORM	LABEL
PREDICATIVE	*óngevé*	A	*Ngévé*	A	Predicative
OBJECT	*óngevé*	A	*Ngèvé*	B	Object
COMMON	*òngevé*	B	*Ngèvé*	B	Common

Table 8: Umbundu tonal cases (Schadeberg 1986: 431)

As can be seen in Table 8, nouns in Umbundu can appear in two case forms, labeled A and B. There are two classes of nouns with respect to the patterning of the case categories. Those appearing with a so-called "augment" prefix and those not appearing with an augment.[16] Each

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[16] The details of the form and function of augment morphemes can be somewhat complicated. See Katamba (2003: 107–108) for overview discussion and de Blois (1970) for a detailed survey. For present purposes, we can

class of nouns shows two case forms. However, the forms with the augment show the same tones in the Predicative and Object cases and a distinct form in the Common case. (These case terms will be discussed further below.) The forms without the augment, by contrast, exhibit syncretism in the Predicative and Object case and a distinct form in the Common case. Thus, there is evidence for three cases even though individual nouns only ever show two distinctions.

The precise tone patterns found on nouns associated with each case differ depending on the noun. Some example patterns are presented in (9), where a number of nouns are given along with an indication of their noun class. A general pattern is that the A forms begin with a high tone and the B forms with a low tone.[17]

A	B	GLOSS
éyó	*èyo*	'5.tooth'
óvayò	*òvayo*	'6.tooth'
óndukò	*ònduko*	'9.name'
ócipetà	*òcipeta*	'7.bark'
ónjó	*ònjó*	'3.house'
ókulyá	*òkulyá*	'15.eat'
úlúme	*ùlúme*	'1.man'
ócitúngo	*òcitúngo*	'7.sauce'
óciwávì	*òciwávì*	'7.spider'
ókutòlà	*òkutólà*	'15.tear'

Table 9: Umbundu tonal classes (Schadeberg 1986: 431)

Case marking via tone appears to be relatively uncommon in languages of the world. The survey of Dryer (2013) revealed only five languages, out of a sample of over a thousand, showing tonal case, all of them in Africa. Within Bantu, tonal case is described for at least several Western Bantu languages (Kavari et al. 2012: 316). What is of interest here are the number of distinctions found in such systems and the categories that these cases encode. While segmentally encoded case systems are described as having as many as twenty cases (see Iggesen (2013)), attested tonal case systems appear to make use of only a relatively small number of distinctions, where "the total number of cases distinguished is limited to maximally three",

treat nouns with and without the augment in a way comparable to the declension classes associated with segmental case systems.

[17] In the transcription system used for Umbundu for the data presented here, a vowel without a tone mark has the same tone as that found in the preceding syllable. Further details on the interpretation of the tone transcription can be found in Schadeberg (1986: 427–428).

with the only known exception in the study of König (2008: 224) being the Nilotic language Turkana. In addition, languages with tonal case are all of the "marked nominative" type, where the forms associated with "subjects" have a more restricted distribution than forms associated with "objects" (König 2008: 224). For instance, citation forms may be the same as object forms rather than the "nominative" subject forms.

A variant of this case marking pattern can be seen in the Umbundu examples given in (15), (16), (17), and (18). The citation forms of two nouns are given in (15). One of the nouns is coded with the augment and the other is not, but, in both cases, they begin with a high tone, indicating that they are in Schadeberg's (1986) Predicative case. This is the same form found for nominal predicates, seen in (16).

(15) a. *ónjíla*
          'AUG.bird.A'

      b. *Kándímba*
          'Hare.A'   (Schadeberg 1986: 432)

(16) a. *ómokó*
          AUG.9.knife.A
          "It is a knife."

      b. *òngólo   óciɲamà*
          AUG.9.zebra.B AUG.7.animal.A
          "A zebra is an animal."

      c. *Sómá*
          1.chief.A
          "It's the chief."   (Schadeberg 1986: 432)

By contrast, subject nouns in Umbundu are associated with an initial low tone, as seen in the data in (17). That is, subject noun forms are distinct from citation forms. (The subject noun in (17b) has two noun class prefixes, and the outer one codes locative semantics.) Umbundu shows a complication to a standard marked nominative pattern in that only objects with an augment prefix show the same tonal pattern as citation forms. This is seen in (18) where, in (18a), the

object can be seen with an initial high tone, which is characteristic of citation contexts. In (18b), by contrast, the noun without the augment shows an initial low tone, otherwise associated with subject forms as seen in (17). It is this split in the tone patterns of objects that leads Schadeberg (1986) to propose the three-way case distinction for Umbundu presented in Table 8 (though see König (2008: 210–211) for further discussion).

(17) a. *òlusapo*   *lwápwá*
       AUG.11.story.B 11.TAM.finish.FV
       "The story is finished."

     b. *vòmbénje*   *múĩi*   *óvávo*
       18.9.calabash.B 18.TAM.be AUG.6.water.A
       "In the calabash is water."   (Schadeberg 1986: 434)

(18) a. *ndàlandá*   *ómbísi*
       1s.TAM.buy.FV AUG.9.fish.A
       "I bought a fish."

     b. *ndàsangá*   *Sòma*
       1s.TAM.meet.FV 1.chief.B
       "I met the Chief."   (Schadeberg 1986: 434)

What is interesting about tonal case patterns in the present context is that there appear to be implicational relationships between this specific means of expressing case and logically independent grammatical properties, such as whether the case system will be relatively small or show a marked nominative pattern. At least for Umbundu, key reasons for the attested patterns appear to be historical in nature. Its tonal case system most likely arose from a system originally based around definiteness marking that developed into a case system (see Schadeberg (1986: 444–445), König (2008: 211–218), and Blanchon (1998)). Such a grammaticalization scenario would not be expected to yield a large case system since definiteness, and related notions such as referentiality, are not associated with the same degree of semantic oppositions as, for instance, spatial relations, which are found to be grammatically encoded via segmental case. The connection between tonal case and the marked nominative pattern can also be understood

as an expected development for a case system grammaticalizing from a definiteness marking system. Subjects tend to be definite and topical while objects tend to be indefinite and in focus. The fact that citation forms would pattern with objects in such a system is not especially surprising given that the function of naming a noun would place it into focus as well.

I am not aware of any systematic study of systematic correspondence between certain kinds of form (e.g., here tonal morphology) and certain kinds of function (e.g., here, marked nominative case systems with limited case oppositions). However, other examples can presumably be found. Perhaps the most well-known general example is the apparent link between reduction of form and the development of "grammatical" meanings (see, e.g., Hopper & Traugott (2003: 100–101)). These kinds of form-meaning patterns raise an interesting issue for Construction Morphology: To what extent should they be treated as historical accidents falling outside the scope of synchronic models and to what extent should apparently systematic relations between form and function be treated as significant properties of synchronic grammars? In addition, how should they be formally modeled?

Patterns like these pose a general problem for formal models of grammar, not just Construction Morphology. However, Construction Morphology is especially well suited to deal with them due to its ability to effectively blend the description of idiosyncratic patterns with more general ones. In this case, the general issue is how to describe constraints on form-meaning pairings in broad terms, and the more idiosyncratic issue is the apparent link between tonal case marking and particular kinds of case systems.

6   Conclusion

The bulk of this paper has focused on issues in the modeling of signifiers within Construction Morphology that do not yet seem to have received much attention within the framework. None of the concerns raised here are intended to be arguments against constructional approaches. Rather, by returning to a view of grammar centered around the device of the sign, constructional approaches revealed the existence of a number of analytical problems that have been obscured in other kinds of approaches. In particular, sign-based approaches bring to the forefront the

extent to which high-level grammatical patterns depend on the shapes that signifiers can take on and the ways in which those signifier shapes interact with each other.

Despite this paper's emphasis on non-canonical signifiers, the arguments here are also not intended to be taken to mean that the shapes of signifiers are simply unconstrained. In fact, certain logically constructible patterns do not appear to occur such as the "syntactic" CV-skeleton pattern presented in (14). Rather, the claim is that observed deviations from linear signifiers are sufficiently varied that a systematic exploration of signifier typology appears to be called for. In other words, this does not appear to be a case where there is a broadly coherent system of signifier formation that is subject to the occasional "leak", to borrow the well-known metaphor of Sapir (1921: 39). Instead, there appear to be important generalizations yet to be discovered, such as the ways in which tonal signifiers may systematically differ in their behavior from segmental ones or the categories of morphological elements that can form discontinuous signifiers.

Fortunately, the basic tools are in place to model the patterns described here within Construction Morphology. Schema relations, for instance, provide the foundation for modeling templatic patterns. Moreover, nothing within the architecture of Construction Morphology requires that signifiers must have a linear shape, even if much work within it has focused on morphological patterns where this largely holds true. Gurevich (2006), for example, demonstrates that the framework is flexible enough to accommodate highly complex inflectional morphological patterns. This does not relieve us of the problem of developing a proper kind of "signifier theory", but it does suggest that constructional approaches provide an appropriate means for modeling any such theory.

In this respect, it is worth concluding by specifically contrasting sign-based approaches with what one might call "string-based" approaches. It is often the case that the object typically used to represent a linguistic form, the string, becomes improperly conflated with the form itself (see, e.g., McCawley (1998: 2–3) for relevant discussion). This conflation of "linguistic form" with "string" seems to be a particularly prominent feature of generative approaches to syntax, going back to Chomsky (1957: 26–30). The idea, for instance, that a representation such as /kæt/ is sufficient to represent the form of a word like *cat*, leads to an assumption that the models of morphology and syntax centered around a simple operation of concatenation are more or less

sufficient for morphosyntactic analysis. However, even for a relatively simple word like *cat*, there is quite a bit more to its form than a mere sequence of sounds: It has syllabic structure, metrical structure, two boundaries, etc. Moreover, as made clear above, there are many more complexities that can be associated with signifiers (see also Rhodes (1992: 420)).

Ultimately, an emphasis on string-based representations leads to an oversimplified view of signifiers and an overreliance on concatenation as the primary device for morphosyntactic combination. This, in turn, simultaneously obscures the complexities of the form-meaning pairings found in grammars and leads to a proliferation of formal devices (e.g., movement operations) to address data that fails to adhere to canonical linear patterns. In contrast, by focusing attention on the detailed properties of signs themselves, constructional approaches provide the tools to describe non-linear patterns in ways that allow for both their generalities and specificities to be clearly represented, which can help us come to a more precise understanding of the full range grammatical patterns of the world's languages.

Glossing abbreviations

1–18 (not followed by s/p)	noun class (Bantu)
1, 2, 3 (followed by s/p)	first, second, third person (singular/plural)
CAUS	causative
A	agent (Mohawk)
	"A" nominal case (Umbundu)
AUG	augment
B	"B" nominal case
DU	dual
DUALIC	dualic
DUR	durative
F	feminine
FV	final vowel (Bantu)
INCH	inchoative
INCL	inclusive
ITER	iterative
M	masculine
NEG	negative
OBJ	object
OPT	optative
PFV	perfective
PFX	prefix
PL	plural
PRS	present
PRT	particle
PST	past
REFL	reflexive
RPT	repetitive
SBJ	subject
SG	singular
TAM	tense-aspect-mood marker

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