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The Place of Level-Ordering in Morphology.*

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The morphological construct of level-ordering (Siegel 1979, Allen 1978, Kiparsky 1982, Mohanan 1982) has recently come under attack, both as a theoretical device and as a phenomenon. Many of the criticisms, including those of Sproat 1985 and Aronoff and Sridhar 1984, involve specific applications of this device to specific phenomena in English. The main aim of this paper is to counter the pessimistic outlook on level ordering with evidence from an altogether different source, a widespread phenomenon which the theory of Lexical Phonology has largely neglected. This is the phenomenon of position class morphology. I argue that level ordering is the only available mechanism within (some version of) this theory to even describe position classes, thus answering the objections of its critics.

1 Original motivation (from English)

The original inspiration behind level ordering was a generalization about English word formation. It had been noted in SPE that affixes in English subdivide into two main classes according to the phonological boundary with which they are associated. Siegel 1979 showed that this subdivision correlates with linear order: Class I affixes occur closer to the root than Class II affixes. The proposal that affixes belong to distinct, ordered strata was advanced to cover both the phonological and morphological facts, and constitutes one of the several hypotheses that together make up the theory of Lexical Morphology and Phonology (Allen 1978, Pesetsky 1979, Kiparsky 1982, Mohanan 1982)

Although Lexical Phonology, as formulated in Kiparsky 1982, conceptualizes strata as derivationally ordered subcomponents of the morphology, alternative models of level ordering exist as well. Selkirk 1982 accounts for Siegel's generalization by proposing two types of lexical constituents, the Root and the Word, with which affixes selectively combine (Class I suffixes combine with Roots; class II suffixes with Words (1b)). The phrase structure rules in (1a) ensure that Words dominate Roots but not vice versa, accounting for the ordering facts. A related proposal is developed in Inkelas 1990 (2); according to this view, each word is associated with parallel morphological and prosodic hierarchical structures whose various constituent types correspond directly to the levels of Lexical Morphology.

- | | | | | | | | | | | | | | | | |
|-----|----|--------|---|----------------|-----|----|-----|----|--------|----|---|---|------|---|---|
| (1) | a. | Word | → | Word Af | (2) | a. | n | b. | -ous: | [[|] | 1 | suff |] | 1 |
| | | Word | → | Root | | | | | -less: | [[|] | 2 | suff |] | 2 |
| | | Root | → | Root Af | | | ... | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | b. | -ous: | [| N ^r | ___ |] | 2 | | | | | | | | |
| | | -less: | [| N | ___ |] | 1 | | | | | | | | |
| | | | | | | | 1 | | | | | | | | |

Both accounts rely heavily on affix subcategorization frames to implement level ordering, as seen in the (b) examples, though Selkirk's framework makes limited use of phrase structure rules in addition.

2 Attacks

Attacks on the segregation of English morphology into at least two levels have taken two forms. First, critics have noted the existence of bracketing paradoxes; see Aronoff 1976, Strauss 1982, Aronoff and Sridhar 1984, Pesetsky 1985, and Sproat 1985 for extensive discussion. The second basis for dissent involves redundancy. Aronoff and Sridhar 1984 have argued that a morphological Stem/Word affix distinction is sufficient and that phonological levels are not required in English; conversely, Sproat 1985 argues that level ordering effects are strictly phonological, *not* morphological in nature. Finally, Fabb 1988 claims that level ordering is redundant from every perspective, and should be jettisoned from the analysis of English in favor of lexical selectional restrictions.

There are, of course, other languages for which claims of level-ordering stand relatively unimpeached (so far): these include Malayalam (Mohanam 1982); Sekani (Hargus 1988); Tamil (Christdas 1988); and Kashaya (Buckley 1992). However, in this paper I will attempt to support the claim of level ordering by introducing data of a new type: position class systems. I will argue that some device approximating level ordering — irreducible to local selectional or syntactic restrictions — has a rightful place in morphological theory. We turn first to Nimboran, a Papuan language of New Guinea.

3 A new use for levels: Nimboran position classes

Verbs in Nimboran conform to the descriptive template in (3). A few examples in (4) show verbs of average complexity. (The analysis in this section is taken from Inkelas 1992, based on the comprehensive grammar by Anceaux (1965).)

- | | | | | | | | | | |
|-----|------|--------|--------------------|-------------------|-----------|-----|-----------|-------|----------|
| (3) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | root | PlSubj | DuSubj
PlObj | MObj
Particles | IncDuSubj | Loc | Iterative | Tense | SubjPers |
| | | | -----Durative----- | | | | | | |
-
- | | | | | |
|-----|----|-------------------------------------|---|---|
| (4) | a. | ηgedúo-maN-ná-r-ám | → | ηgedúomanarám |
| | | draw.sg-IncDuSubj-5Loc-Fut-Inc | | 'You (sg) and I will draw far away' |
| | b. | príb-tem[+A]-ηkát-t-u | → | príptemgétı |
| | | throw-Dur-Iter-Pres-1 | | 'I am throwing repeatedly here' |
| | c. | ηgedúo-rár-maN-ná-r-ám | → | ηgedúoremanarám |
| | | draw.sg-MObj-IncDuSubj-5Loc-Fut-Inc | | 'You and I (sg) will draw him far away' |

The position classes represented in (3) not only order morpheme classes, but also impose internal complementarity. We consider three examples. First, (5) and (6) show that the co-positional Dual Subject and Plural Object block each other. This is shown by the failure of Dual Subject marking to surface in (6), which is parallel to (5) except in possessing a Plural Object marker. In (6), Dual and Plural subject are both represented by the Plural Subject marker:

- (5) a. Sg subj: η gedúo-d-u → η gedúodu
draw.sg-Fut-1 'I will draw (here)'
- b. Du subj: η gedóu-k-d-u → η gedóukedú
draw-DuSubj-Fut-1 'We two will draw (here)'
- c. Pl subj: η gedói-<i>-d-u → η gedóidiu
draw.pl-<Pl>-Fut-1 'We (many) will draw (here)'
- (6) a. Sg subj: η gedóu-dár-d-u → η gedódáru
draw-PIObj-Fut-1 'I will draw them (here)'
- b. Du/Pl subj: η gedói-<i>-dár-d-u → η gedóidiedú
draw.pl-<Pl>-PIObj-Fut-1 'We two will draw them (here)'

Anceaux (p. 107) makes it clear that the blocking is not semantically motivated; forms with PIObj are ambiguous as to (nonsingular) number, *not* forcibly plural:

- (7) "As far as their meaning goes [=PIObj verbs with nonsingular subjects], they are no typical Plural Actor forms, as they may have the meaning of Dual Actor, in the case of the Third Person Neutral even exclusively so."

A second case of co-positional blocking occurs between Masculine Object and Durative. Thus, the usual contrast between presence and absence of a Masculine Object marker (8) is neutralized when a Durative marker is present (9).

- (8) a. No object: príb-be-t-u → príbetú
throw-6Loc-Pres-1 'I throw from here to above'
- b. Masc obj: príb-rár-be-t-u → príbrebedú
throw-MObj-6Loc-Pres-1 'I throw him from here to above'
- (9) Durative: $\text{príb-tem[+A]-be-t-u}$ → príptembetí
throw-Dur-6Loc-Pres-1 'I am throwing (him) from here to above'

Again, Anceaux assures us that the blocking is not semantic in nature (p. 109):

- (10) "Though this is seldom the case, an object may be mentioned in a sentence in which the predicate is a Durative form. This object, however, does not have any influence on the verb-form, in other words: Durative forms are indifferent to sex or number of the object."

Both cases of blocking we have just seen are simple: each morpheme belongs to a given position class, and only one morpheme may surface per position. The picture is complicated by the Durative. As seen above, it blocks the position 3 Mobj. As shown in (11), however, it also blocks the position 2 DuSubj.

- (11) a. Dual: η gedóu-k-t-u → η gedóuketú
draw-DuSubj-Pres-1 'We two draw (here)'
- b. Plural: η gedói-<i>-t-u → η gedóitiu
draw.pl-<Pl>-Pres-1 'We (many) draw (here)'
- c. + Durative: η gedói-<i>-tem[+A]-t-u → η gedóitiemtí
draw.pl-<Pl>-Dur-Pres-1 'We (2 or more) are drawing (here)'

Though not illustrated here, the Durative also blocks the position 2 PObj. Based on these facts, we may suppose that the Durative occupies positions 2 and 3 simultaneously, a sort of positional portmanteau. This possibility is confirmed by the more extreme case of ‘particles’, which can block anywhere from one to four positions. There are 70 or so of these (synchronically) semantically empty morphemes. About half of the approximately 300 roots discussed by Anceaux select for some particle under specified conditions. (12) illustrates two particles; notice in (b) that root and particle need not be adjacent to one another in the verb.

- (12) a. *patíá-rár-bá-k-u* → *patíárebáku*
 hold_a_pig_feast-particle-Loc-Past-1 ‘We held a pig feast above’
 b. *iíé0-k2-rím-na[+A]5-k7-ug* → *iíékrimenekí*
 signal_them-DuSubj-particle-Loc-Past-1 ‘We two signalled them from here to far’

The distributional restrictions on particles are much more complex than is indicated by the rough assignment to position 3 in (3). (13) illustrates two of the simpler constraints Anceaux notes on the distribution of particles:

- (13) With *iabí-* ‘gather’ and particle *-de-*: Iterative, Loc markers disallowed
 With *skrí-* ‘shake’ and particle *-damaN[+A]*: DuSubj, IncDuSubj disallowed

Some constraints on particle occurrence can be traced to constraints on the root selecting that particle; others reside with individual particles themselves. We focus here on the latter type of constraint. Note that these constraints can always be stated in terms of which other morphemes must not occur in the same verb (14a). What is yet more significant is that the complementarity can be stated in terms of entire position classes (b):

(14)	<u>a. Morphemes prohibited</u>	<u>representative particles</u>	<u>b. Position class</u>
i.	IncDuSubj	<i>-maN[+A]-</i>	4
ii.	DuSubj and IncDuSubj	<i>-demaN[+A]-</i>	2,3,4
iii.	DuSubj	<i>-dán[+A]-</i>	2
iv.	all Loc and Iter	<i>-N-</i>	5,6
v.	DuSubj, all Loc ↓ Iter	<i>-náN[+A]-</i>	2,3,5,6
vi.	DuSubj and all Loc	<i>-ta[+A]-</i>	2,3,5

The various position classes with which a given particle may block are clearly not random. Rather, *each target of mass blocking by particles is a set of contiguous positions*. The one exception to this is position 4, whose sole occupant is the Inclusive Dual subject marker (4a,c). We know from (14) that certain particles block positions 3 and 5 without blocking the IncDu marker. This discontinuity poses a fatal problem for a model which conceptualizes positions in terms of a linear template. Such a model can obviously handle those affixes restricted to a single position or, conceivably, those which, like the position 2-3 Durative, occupy a string of contiguous positions. However, a linear template by its very nature cannot handle an affix which occupies two nonadjacent positions but permits the intervening position or positions to be filled by a different affix. This is exactly what would be required by the particles in (14v) and (14vi).

The solution I propose is to distinguish linear order (precedence) from position (dominance), identifying each affixal position class with a hierarchical level. The familiar linear positions are represented on the horizontal dimension; the new, hierarchical position I am proposing are represented on the vertical dimension:

(19) class	prefixes				Plural Class
	subject	adjective	noun	demonst.	
1 (sg)	a-	m-	m-	-cù	2
2 (pl)	wa-	wa-	wa-	wà-	
3 (sg)	u-	m-	m-	-cù	9
5 (sg)	lyi-	lyi-	Ø-, i-	-lyì	6
6 (pl)	gha-	ma-	ma-	-ghà	
7 (sg)	ki-	ki-	ki-	-kì	8
8 (pl)	shi-	shi-	shi-	-shì	
9 (sg, pl)	i-	i-, ŋ-	m-	-ì	10
10 (pl)	tsi-	tsi-	ŋ-	-tsì	
11 (sg)	ɬu-	ɬu-	u-	-ɬù	10
14	u-	u-	u-	-ù	
16	ha-	ha-	ha-	-hà	
17 (sg)	ku-	ku-	ku-	(-pf-)	6

At least four small puzzles emerge from this small corpus. We will look at them in turn, ultimately proposing a unified solution based on the premise of level ordering.

Puzzle 1: The question of zero prefixes

Though each noun root in Kivunjo must be underlyingly specified for noun class (which is generally unpredictable), nouns take class-marking prefixes nonetheless. We assume that this redundant class marking follows from the fact that nouns are bound roots and require prefixes to be well-formed. Support for this claim comes from the existence of a number of exceptional noun roots which, in the (unmarked) singular context, fail to take the prefix normally found on nouns of the relevant class. Nouns of this sort occur in classes 5 and 11. In (20), the (a) nouns take prefixes while the (b) nouns do not.

(20)	Singular	Plural	gloss	class
a.	tondo	ma-tondo	'stupid person'	5/6
	imba	ma-imba	'maize'	5/6
	uruka	ŋ-urukua [ŋgyuruka]	'country'	11/10
	uha	ŋ-uha [ŋgyuha]	'palm of hand'	11/10
b.	i-kangasi	ma-kangasi	'dry-roasting pan'	5/6
	i-ndo	ma-ndo	'thing'	5/6
	u-ku	ŋ-ku [ŋgu]	'firewood'	11/10
	u-waŋgo	ŋ-waŋgo [mbaŋgo]	'cow barrier'	11/10

We propose that the exceptional (a) nouns are lexically specified as free stems. Already marked for noun class, they have no need for a noun class prefix.

(21) a. Bound root: [[] kangasi]_{5/6} a. Free stem: [tondo]_{5/6}

Interestingly, this behavior is systematic in noun classes 3 and 9:

(22) a.	mdli	mdli	'town'	3/9
	moo	moo	'life'	3/9
b.	umbe	umbe	'cows'	9/10
	numba	numba	'house'	9/10

One might initially suppose these two noun classes simply lack prefixes altogether. However, the productive process of Augmentation shows this hypothesis to be wrong. Augmentative status is conveyed upon a noun by sending it into class 3, whereupon it takes the syllabic nasal prefix /m-/ (23a). Plural Augmentatives are formed by sending these derived class 3 nouns intact to class 9 (23b). There they acquire a second (homophonous) prefix.

(23) Citation form of base noun	a. Sg. Augmentative (class 3)	b. Pl. Augmentative (class 9)
cl. 1 'old lady' m-kyeku	m-kyeku	m-m-kyeku
cl. 3 'town' mdli	m-mdli	m-m-mdli
cl. 5 'stool' lodlinga	m-lodlinga	m-m-lodlinga
cl. 7 'granary' ki-kumbi	m-kumbi	m-m-kumbi
cl. 9 'soil' teri	m-teri	m-m-teri

Evidence for the noun classes of Augmentatives comes from the adjectival (24), verbal and demonstrative (25) concord they inspire:

(24) Class 3 Aug (sg)	Class 9 Aug (pl)	
a. m-sodlo m- $\dot{\text{t}}$ eshi Cl3-man Cl3-tall 'tall man (Aug)'	c. m-m-sodlo η gi- $\dot{\text{t}}$ eshi (< cl1 m-sodlo 'man') Cl9-Cl3-man Cl9-tall 'tall men (Aug)'	
b. m-timba m- $\dot{\text{t}}$ eshi Cl3-shack Cl3-tall 'tall shack (Aug)'	d. m-m-timba η gi- $\dot{\text{t}}$ eshi (< cl5 i-timba 'shack') Cl9-Cl3-shack Cl9-tall 'tall shacks (Aug)'	
(25) a. ki7-kumbi=ki7	'this granary'	base sg class 7
b. shig-kumbi=shig	'these granaries'	base pl class 8
c. m3-kumbi=cu3	'this granary (Aug)'	Aug sg class 3
d. m9-m3-kumbi=i9	'these granaries (Aug)'	Aug pl class 9

In sum, class 3 and 9 nominal prefixes exist. The free stem status that is exceptional in class 5 and 11 roots is simply regular in underlying roots of classes 3 and 9³.

Puzzle #2: Identity of the adjectival prefix:

Noun classes form two categories according to which prefix they assign to adjectives. As can be seen from the chart in (19), adjectives take either the Np or the Sm, depending on noun class. In classes 1, 3, and 6, head nouns and modifying adjectives both take the Np (noun class prefix):

(26) Cl 1: m-sudi m- $\dot{\text{t}}$ eshi n-a-i-imba	
Np-man Np-tall Foc-Sm-Tns-sing	'The tall man is singing'
Cl 3: mringa m-ca u-samb-i-o	
water Np-good Sm-eat-appl-pass	'The good water is being used for washing'
Cl 6: ma-imba ma-tutu gha-i-zrem-o	
Np-maize Np-small Sm-Tns-farm-pass	'The small maize is being cultivated'

By contrast, adjectives modifying class 5, 10 or 11 nouns take the Sm, not the (distinct) Np. The sentences in (27) have an NP-VP structure; the verb exhibits the same Sm as the adjective in the subject NP.

- (27) Cl 5: **i-kaṅgasi** **lyi-tutu** **lyi-angu** **kuta** **lodlinga**
 Np-dry-roasting pan Sm-small Sm-Tns-light compared to stool
 'The small dry-roasting pan is lighter (in weight) than the stool'
- Cl 11: **u-ku** **ʔu-tutu** **ʔu-Ø-ha**
 Np-firewood Sm-small Sm-Tns-burn
 'The small firewood was burning'
- Cl 10: **ŋ-caa** **tsi-tutu** **tsi-Ø-funjika**
 Np-fingernail Sm-small Sm-Tns-break
 'The small fingernails were breaking.'

In classes 2, 7, 8, 14, 16 and 17, Np and Sm are homophonous; thus the status of the adjective concord is indeterminate.

- (28) Cl 2: **wa-ndu** **wa-wico** **n-wa-i-ca** 'The bad people are coming'
 2-person 2-bad Foc-2-Tns-come
- Cl 7: **ki-te** **ki-tutu** **n-ki-ʔe-wa-funa** 'The big dog chased them'
 7-dog 7-ʔeshi Foc-7-Tns-OM-chase
- Cl 8: **shi-te** **shi-tutu** **n-shi-ʔe-wa-funa** 'The big dogs chased them'
 8-dog 8-ʔeshi Foc-8-Tns-OM-chase
- Cl 14: **u-ca** **u-ha** **n-u-ʔe-zreka** 'The new goodness got lost'
 14-goodness 14-new Foc-14-Tns-get lost
- Cl 16: **ha-ndu** **ha-tutu** **n-ha-Ø-ha** 'A small place just burned'
 16-thing 16-small Foc-16-Tns-burn
- Cl 17: **ku-zru** **ku-tutu** **n-ku-Ø-ʔuwo** 'The small ear was ailing'
 17-ear 17-small Foc-17-Tns-ail

Puzzle #3: asymmetries among adjective roots

Adjective roots also partition into two types. In addition to the adjectives we have dealt with thus far—termed 'versatile' adjectives—there is another class of adjective roots which systematically take the Sm even when modifying nouns whose noun class normally makes the Np available to adjectives. We term these 'rigid' adjective roots. Compare (29) ('rigid' adjective roots) and (30) ('versatile' adjective roots):

- (29) cl 1 a. **m-sodo** **a-ŋapi** b. **m-ana** **a-udeede** [$>$ oteete]
 Np-man Sm-big Np-child Sm-frivolous
- c. **mzri** **u-foi** d. **mra** **u-ŋapi**
 medicine Sm-much water gully Sm-big
- e. **ma-kaṅgasi** **gha-fapi** f. **ma-rina** **gha-foi**
 Np-roasting pan Sm-dirty Np-hole Sm-many
- (30) cl 1 a. **m-sodo** **m-ʔeshi** b. **m-ana** **m-kadamtsu**
 Np-man Np-tall Np-child Np-smart
- c. **mzri** **m-ca** d. **mra** **m-tutu**
 medicine Np-good water gully Np-small
- e. **ma-kaṅgasi** **ma-tutu** f. **ma-rina** **ma-ca**
 Np-roasting pan Np-small Np-name Np-good

(31) correlates noun class with adjective prefix for the two types of adjective root:

(31) Class		Prefix on versatile root	Prefix on rigid root
1	mu-	Np a-	Sm
2	wa-	Np (= Sm)	wa- Sm (= Np)
3	mu-	Np u-	Sm
5	lyi-	Sm lyi-	Sm
6	ma-	Np gha-	Sm
7	ki-	Np (= Sm)	ki- Sm (= Np)
8	shi-	Np (= Sm)	shi- Sm (= Np)
10	tsi-	Sm tsi-	Sm
11	ɬu-	Sm ɬu-	Sm
14	u-	Np (= Sm)	u- Sm (= Np)
16	ha-	Np (= Sm)	ha- Sm (= Np)
17	ku-	Np (= Sm)	ku- Sm (= Np)

Noun classes in which there is a distinction between restricted and unrestricted prefixes are shown in boldface. In each case, the restricted prefix appears on the versatile but not on the rigid adjective root.

Analysis of puzzles 2 and 3

We propose that the constituents of the noun are identified with one of three category types, arranged in a fixed hierarchy as shown in (32). Furthermore, we propose to identify each of the root types we have discussed with one of these three categories, as in (33):

(32) C	(33) [foi] _C	'rigid adjective root'
B	[tutu] _B	'versatile adjective root'
A	[usu] _A , [[] sodlo] _A	'free, bound noun root'

On this account, noun roots are category A, versatile adjective roots (e.g. *-tutu*) are category B, and rigid adjective roots (e.g. *-foi*) are category C.

This division of roots into hierarchically ordered categories now enables us to describe the prefix classes in related terms. (34a) shows those classes containing 'unrestricted' noun class prefixes. As these attach both to noun roots and to versatile adjective roots, we propose that the noun class prefixes may attach either to an 'A' or a 'B' category. By contrast, the subject markers in these noun classes go only on category 'C' forms. (34b) illustrates noun classes with 'restricted' noun class prefixes. These attach only to category 'A' forms, leaving the so-called subject marker to attach either to category 'B' or 'C' forms. Finally, (34c) depicts noun classes in which the same prefix attaches at all levels.

(34) a.	$\frac{1 \quad 3 \quad 6}{C \quad a- \quad u- \quad gha-}$	b.	$\frac{5 \quad 10 \quad 11}{C-B \quad lyi- \quad tsi- \quad ɬu-}$
	B-A m- m- ma		A i- ŋ- u-
c.	$\frac{2 \quad 7 \quad 8 \quad 14 \quad 16 \quad 17}{C-B-A \quad wa- \quad ki- \quad shi- \quad u- \quad ha- \quad ku-}$		

Prefixes which may attach to more than one category of form are underspecified for level of attachment. This is clearly motivated in the case of the indeterminate

prefixes in (34c), which attach to forms of any category. They contrast with the 'A' and 'C' prefixes in (34a) and (34b) which attach to only one specific level:

- (35) a. 'A' = [_ []_A] (Restricted Np)
 b. 'C' = [_ []_C] (Restricted Sm)
 c. 'ABC' = [_ []] (Unrestricted Np, Indeterminate prefix)

No distinct representation is needed for the 'two-level' prefixes in (34a,b). These are also completely unspecified; since they compete with more specific prefixes marked for attachment at a single level, the Elsewhere Condition ensure that the less specific prefix will be used only for the other two possible levels.

- (36) 'AB' = 'BC' = 'ABC' [_ []] (Unrestricted Np, Indeterminate prefix)

The following chart shows the featurally compatible prefix-stem combinations and further indicates which combinations are blocked (and by whom).

- (37)
- | | | | | | |
|---------------------------|-------------------------|-----------------------|----------------------------|--------------------------|-----------------------|
| [kangasi/te] _A | i [] _A | gha [] _C | lyi [] | ma [] | ki [] |
| | [ikangasi] _A | * (A≠C) | BLOCKED | [makangasi] _A | [kite] _A |
| | | | by [ikangasi] _A | | |
| [tutu] _B | * (A≠B) | * (B≠C) | [lyitutu] _B | [matutu] _B | [kitutu] _B |
| [foi] _C | * (A≠C) | [ghafoi] _C | [lyifoi] _C | BLOCKED | [kifoi] _C |
| | | | | by [ghafoi] | |

A possible alternative account of the versatile/rigid adjective root distinction would be to appeal to syntax, postulating e.g. that the former are nouns while the latter are verbs. This is borne out to some extent by the example in (38a). Certain rigid adjective roots, including *ɲani* 'big', serve without modification as verb roots (cf. the true verb root in (b)):

- (38) *Verbal adjectives (all nouns in class 1)*:
- a. Ohanyi n- a- ɬe- **ɲani** Ndesambudlo
 John FOC- Sm- Tns- **big** Ndesambudlo
 'John was bigger than Ndesambudlo'
- b. Ohanyi n- a- ɬe- **funa** Ndesambudlo
 John FOC- Sm- Tns- **chase** Ndesambudlo
 'John chased Ndesambudlo'

Versatile adjective roots may also serve as the base of a verb (39a), though they require a verbal extension suffix (cf. the verb in (b)).

- (39) a. Ohanyi n- a- ɬe- **angu -i -a** Ndesambudlo
 John FOC- Sm- Tns- **light -ext -FV** Ndesambudlo
 'John was lighter than Ndesambudlo'
- b. Ohanyi n- a- ɬe- **kod -i -a** Ndesambudlo
 John FOC- Sm- Tns- **cook -ext -FV** Ndesambudlo
 'John cooked for Ndesambudlo'

The fact that certain adjective roots can function directly as verb roots while others require a verbal extension does suggest a syntactic difference. However, this distinction cannot be collapsed with that between rigid and versatile adjective roots. Within both rigid and versatile adjective categories, we find roots which cannot

function as the base of verbs. This is most clear in the case of color terms. As shown in (40), *maande* 'red' belongs to the rigid category. Modifying a class 6 noun in (a), *maande* takes verbal (Sm) instead of nominal (Np) concord. By contrast, *iwu* 'black' belongs to the versatile category; modifying the same class 6 noun (in (b)), it takes the Np, *ma-*.

- (40) a. Ma- rinda **gha- maande** b. Ma- rinda **ma- iwu**
 Np- dress Sm- red Np- dress Np- black
 'red dress' 'black dress'

Further, neither of these adjective roots is capable of serving as the base of a verbal comparative of the kind illustrated in (38) or (39). The same is true of the other color terms in both rigid (41a) and versatile (b) adjective root lists, respectively. Clearly, it would be inaccurate to explain the behavior of rigid adjectives by categorizing them as verb roots.

- (41) a. *Ma- rinda n- gha- ~~le-~~ maande shiazru
 Np- dress FOC- Sm- Tns- red shoes
 'The dresses were redder than the shoes'
- b. *Ma- rinda n- gha- ~~le-~~ iwu -i -a shiazru
 Np- dresses FOC- Sm- Tns black -ext -FV shoes
 'The dresses were blacker than the shoes'

A different alternative might be to accept the idea of 'positions' but construe them in a strictly linear sense, i.e. as part of a flat linear template: D-C-B-A. Under this account, we could retain the insight that noun roots, versatile adjective roots and rigid adjective roots occupy distinct positions, by proposing that versatile roots occupy positions B-A while rigid roots occupy positions C-B-A. Noun roots would simply occupy position A. 'Restricted' Np's would occupy slot B while 'unrestricted' Np's would fill slot C. Sm's would belong to slot D.

Without working through the details, we note two serious problems for such an account. The first is that it predicts no recursion and the second is that it predicts that a slot 'B' prefix should never occur to the left of a slot 'C' prefix. Both predictions are falsified by the system of diminutive and augmentative formation. A small portion of this system suffices to prove that multiple prefixation occurs.

As we have already seen, augmentatives are formed by sending a noun root to class 3, as shown in (42b). However, what we have not yet seen is that just in case the noun root is itself monomoraic (42c), then it will take the nominal concord of its own base class prior to Augmentation. Such nouns will have two prefixes, the outer of which is the strictly 'B' level class 3 prefix, as in (42d).

- (42) a. i- seyesa 'lizard' (43) a. ki- kumbi 'granary'
 Np5- lizard Np7- granary
- b. m- seyesa 'lizard (Aug)'
 Np3- lizard
- c. i- dla 'leaf'
 Np5- leaf
- d. m- i- dla 'leaf (Aug)'
 Np3- Np5- leaf
- b. m- kumbi 'granary (Aug)'
 Np3- granary
- c. ki- te 'dog'
 Np7- dog
- d. m- ki- te 'dog (Aug)'
 Np3- Np7- dog

Although the noun in (42) happens to have its base in class 5, we find the same pattern obtaining in (43), where the nouns in question start off in class 7. In fact, it proves to be quite general: the class 3 prefix, strictly an 'B' slot prefix, is capable of occurring outside of any other nominal prefix in case the noun root is monomoraic. This attested recursion is fatal for a flat template approach, although it follows naturally from the hierarchical approach to levels we have advocated.

In summary, we stand by our conclusion that what distinguishes the versatile adjective roots is that they are level B constituents and thus able to take an (underspecified) Np.

Puzzle #4: allomorphy of Class 9 Np prefix

Adjectives in class 9 may take either of two prefixes, apparently in free variation. One is /ŋ-/; the other is /i-/, the Sm.

- (44) a. numba **ŋgi**-tutu **i-Ø**-ha b. numba **i**-tutu **i-Ø**-ha
- house Np-small Sm-Tns-burn house Sm-small Sm-Tns-burn
- 'the small house was burning' 'the small house was burning'

But neither of these prefixes has the same form as the nominal prefix that shows up on Augmentatives. As we saw earlier, the preprefix on plural Augmentative nouns surfaces as syllabic /m/, identical to the surface form of the singular class 3 Np. If we follow the simplest course and assume that the nonalternating surface form is the underlying form, then we arrive at the three-way prefix contrast given in (45) for class 9 — the only class with this complex a prefix paradigm.

- (45)
- C i- Sm
- B (ŋ-) Ap (versatile only)
- A m- Np

Although it would seem that the use of /ŋ-/ on adjectives is optional, the fact remains that /ŋ-/ surfaces neither on noun roots nor as a subject marker. When it is used, it is used exclusively on versatile adjective roots, suggesting an exclusive level B subcategorization.

The surface phonological form of /ŋ-/ has still more implications for our proposal of level ordering. As we have seen, in its function as the level B class 9 versatile adjective prefix, it has the invariant surface form [ŋgi]. Yet class 10 also has an /ŋ-/ prefix. We have noted that the class 10 /ŋ-/ is a category 'AB' prefix, showing up on noun roots and versatile adjective roots. The surface form of this prefix varies according to context. When it combines with vowel-initial noun roots, it surfaces as [ŋgi], taking the same surface form as the class 9 prefix:

- (46) *Class 10 plurals of vowel-initial class 11 nouns:*
- a. ŋ- uha → **ŋgyuha**
- Np- palm of hand 'palms of hand'
- b. ŋ- uango → **ŋgyuwaŋgo**
- Np- cow barrier 'cow barriers'

(47) *Class 9 velar nasal prefix on (versatile) adjective roots:*

- | | | | |
|----|---------|----------|--------------------|
| a. | pakudli | ŋ-tutu | → pakudli ŋgitutu |
| | bowl | Np-small | 'small bowl' |
| b. | ndzina | ŋ-moso | → ndzina ŋgimoso |
| | fist | Np-left | 'left-handed fist' |

However, when the class 10 /ŋ-/ prefix attaches to consonant-initial noun roots, it surfaces as a nasal homorganic to the initial consonant, as in (48):

(48) *Class 10 plurals of vowel-initial class 11 nouns:*

- | | | | |
|----|-----|-------------|----------------|
| a. | ŋ- | tifo | → ndifo |
| | Np- | footprint | 'footprints' |
| b. | ŋ- | wango | → mbango |
| | Np- | cow barrier | 'cow barriers' |

What causes these contrasting behaviors of /ŋ-/? We propose that when it combines with a level 'A' form — that is, with a noun root — /ŋ-/ simply assimilates in place to a following consonant. However, assimilation does not take place at level 'B'. Thus, when it combines with a (versatile) adjective root, /ŋ-/ instead triggers a rule of epenthesis, surfacing as [ŋgi]. Thus, the behavior of /ŋ-/ adduces some phonological support for the level ordering hypothesis that we motivated on the basis of morpheme ordering.

5 Level ordering revisited: an answer to the critics

Fabb 1988 has argued against level-ordering in English on the grounds that 'level-ordering does no extra work in ruling out suffix pairs beyond that done by independently needed selectional restrictions.' By 'selectional restriction' Fabb means selection for properties other than part of speech. Of course, in a representational model of level ordering like the hierarchical one adopted in this paper, level-ordering is accomplished by selectional restrictions. But we do not mean to trivialize Fabb's claim by redefining his terminology. Let us consider the specific selectional restrictions Fabb discusses:

- (49) a. Suffix attaches only to unsuffixed stem (explains *person + ify* and *clar + ify* vs. **person + al + ify*.)
 b. Suffix may follow only an unsuffixed stem or one of a small set of specific suffixes (explains *revolut + ion + ary* but **patron + age + ary*)
 c. Suffix attaches freely

Although Fabb considers these selectional restrictions as a replacement for the theory of level ordering, another perspective is that (a) and (c) are exactly the kind of restrictions we expect to see in a theory of level ordering of the type advocated in this paper. Consider in particular category (a). Any reference to 'unsuffixed stem' is quite unexpected in a theory of morphology which restricts access to internal structure. Recognizing such a stem presupposes access by an affix to information about suffixation — even when potentially embedded inside layers of prefixation. This requires more than just a peek inside the rightmost bracket to make sure that the word doesn't end in a suffix. In fact, Fabb acknowledges his claim requires that "all internal brackets are visible to all derivational suffixes" (p. 533).

Fabb's approach makes it possible to describe a suffix which attaches to all forms containing exactly one suffix, or exactly two — or forms containing exactly one affix, whether suffix or prefix. These predictions are clearly undesirable. But what is Fabb really getting at here? His conclusion seems to be that once we exclude affix order and local morphological restrictions (e.g. of the kind just discussed by Hyman and Mchombo (this volume)), we are left with the observation that certain suffixes must immediately follow a stem. But this is exactly the kind of statement we expect to find in a *position class system*. And that, of course, is what I have claimed level ordering is well-suited to handle. We may interpret Fabb's proposal not as a rejection of level ordering theory but rather as the inspiration to divide up the suffixes in a different way. What was originally intended as an argument against level ordering in fact may turn out to be an argument in its favor — as long as level ordering operates in the new form suggested for it here.

- (50) a. Retained: claim of ordered levels
b. Rejected: notion that each affix belongs to a single distinct level
c. Rejected: notion that each level has unique phonological correlate(s)

We have made extensive use of the notion of underspecification for level and that a given affix may change the level of the constituent to which it attaches. Neither idea is new; suggestions along both lines can be found in Selkirk 1982. However, the representational model, with its heavy reliance on affixal selection frames, is ideally suited to capture both possibilities.

In conclusion, exactly those phenomena problematic for a straightforward position class analysis can be handled with the levels of lexical phonology, if we jettison certain parts of level-ordering theory — to which objections had been raised in the past anyway (such as the correspondence between phonology and morphological ordering). Furthermore, we can relate position class systems to so-called 'layered' systems by manipulating the single parameter of level-internal recursion, thus bringing position class morphology into the mainstream of the theory of Lexical Phonology and Morphology.

Notes

*Thanks to Larry Hyman for many thought-provoking discussions of the issues dealt with in this paper.

¹This work is part of a larger project on Kivunjo adjectival concord which I am undertaking with Lioba Moshi. There is some orthographic disagreement in the published literature on Kivunjo (see McHugh 1990 for an overview). In this paper we use 'gh' for [ɣ], 'zr' for [z], 'sh' for [ʃ], 'c' for [ç], and 'dl' for [ɽ]. However, we retain IPA symbols for the velar nasal [ŋ] and velarized lateral [ɭ].

²The slight differences between this paradigm and that in McHugh 1990 will not concern us here (see Inkelas and Moshi (in prep) for a full discussion)

³Kinship terms in class 1 also systematically fail to take prefixes (Inkelas and Moshi (in prep)).

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