UNDERSPECIFYING SWAHILI PHONEMES

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1. Purpose & Scope

This study represents a thorough and rigorous application of Underspecification Theory phonology to the Swahili phoneme set. It provides explicit underspecified representations of all Swahili phonemes, together with the redundancy rules (viz., default rules and complement rules) necessary to fill in the features completely. One postcyclic phonetic rule is proposed to handle affricate features. Pertinent theoretic issues are investigated briefly as they arise.

The present analysis was developed as part of my dissertation research, a morphological account of deverbal nominals in Swahili, in order to provide a framework for formulating morphophonological rules to capture various kinds of allomorphy. The purpose here is to share these findings with other Africanists who may find the account useful as a model or starting point for developing their own descriptions of Swahili or related languages.

As this study comes at a time when Underspecification Theory is still under development, it is also of potential interest to phonologists, as a thorough and explicit illustration of the theory in application to a language for which the theory was not specifically tailored. Note that no discussion of the relative merit of competing hierarchical organizations is undertaken here, as Swahili data do not appear to discriminate between competing proposals meaningfully. Rather, the purpose of the proposal is essentially descriptive and focuses on the underspecification of the phonemes: viz. determining their minimal specifications and developing an explicit set of redundancy rules to fill in the feature values required.

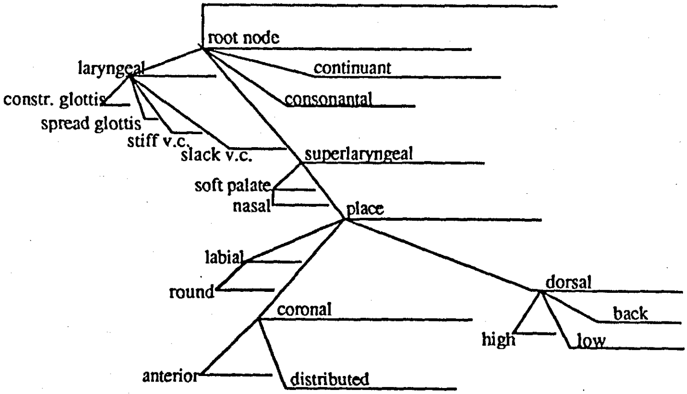
Indeed, the thoroughness of the analysis proposed is in one sense its most salient contribution. Many published underspecification studies have been a bit cavalier in their approach, especially as regards complement rules. Very often minimal features are given, perhaps for only part of a phoneme set, with a vague assurance that unstated complement rules will supply the missing features. Yet, it is not always trivially obvious how the complement rules should be formulated, nor even what the default values are presumed to be. Hence, a rigorously developed and expounded analysis, as given here, is intrinsically interesting by virtue of its completeness alone, beyond its descriptive value.

2. Theoretical Framework

Much recent research in phonology has focussed on efforts to achieve gains in economy and explanatory power by underspecifying phonological features and by organizing features hierarchically, including pioneering work by Archangeli & Pulleyblank (1986) which forms the theoretic basis for the present study.[1] The advantages of underspecifying hierarchically organized phonological features were developed by Diana Archangeli in her 1984 dissertation from notions expounded by G. N. Clements (1985).

2.1 Sagey: Elizabeth Sagey's 1986 dissertation was a diligent, painstaking exercise in exploring the hierarchical organization of phonological representations. Sagey works through her proposed hierarchy methodically, justifying and illustrating each proposed feature and its hierarchical relationships with its mother and any sisters.

(1) Sagey's Hierarchy



Sagey's hierarchy incorporates more intermediate structure than that of Archangeli & Pulleyblank (1986). Subsequent inquiry in the literature has had the effect of confirming many nodes proposed by Sagey, as well as refinements by other theorists (Archangeli & Pulleyblank 1989:193fn). Ultimately, the validity of Sagey's claims with regard to various details of intermediate structure will be decided empirically (or, at worst, by consensus). However, taken as a whole, Sagey's system presents some awkwardness to a linguist attempting to apply it. First of all, she would not appear to have provided any means of accounting for the feature [±ATR] (or a tense/lax distinction, if that terminology seems preferable). Most critical is the absence of the features [±sonorant] and [±lateral], without which liquids would appear to be beyond specification. Actually, Sagey does refer obliquely to these latter two features, as well as [±coronal] and [±strident], but offers no details or even hints of how she would propose to incorporate them in her hierarchy.

2.2 Non-Linear Phonology: In application, it is difficult to compare details of Sagey's approach with Archangeli & Pulleyblank's because the modus operandi and the notational conventions of the two systems are not the same. In Sagey, the mere inclusion of a node in a UR is significant; the notion of feature values seems to be confounded with the notion of a node's existence or absence. For instance, the very existence of a [labial] node implies [+round], even though the putative default value for roundness would be minus.

Now, Sagey's framework could be adequately adapted to account for Swahili since the elements lacking in Sagey's hierarchy (augmented by [±sonorant]), when compared with Archangeli & Pulleyblank's, are unnecessary for the discrimination of Swahili phonemes: specifically, [±strident], [±ATR] (or [±tense]), [±upper], [±raised], etc. Indeed, it might be argued that the smaller hierarchy represented a desirable economy. However, even passing over features like [±sonorant] and [±lateral], I consider many of the gaps in Sagey's hierarchy crucial to the description of many languages. Therefore, I have adopted Archangeli & Pulleyblank's system by virtue of its universal advantages.

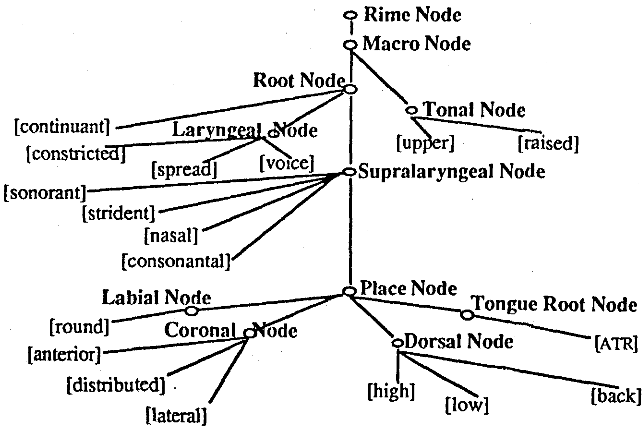
2.3 Archangeli & Pulleyblank: Underspecification Theory has been provided its most comprehensive exposition to date in the work-in-progress of Diana Archangeli & Douglas Pulleyblank, of which a preliminary draft was widely circulated in 1986. Archangeli & Pulleyblank trace the original inspiration for Underspecification Theory to a suggestion by Kiparsky (1982) that all redundancy should be eliminated from URs. Although underspecification and hierarchical organization have developed in tandem, Archangeli & Pulleyblank point out that there is in principle nothing to prevent them from being theoretically independent (1986:8-10).

Archangeli & Pulleyblank assume two kinds of redundancy rules: default rules and complement rules. Default rules, which are context-free and potentially universal, are assumed to correspond to what linguists have called the "unmarked" case. Default rules apply relatively late and assign a given feature value wherever no value for a particular feature has been supplied by the derivation. Complement rules, on the other hand, are context-sensitive and language-particular. They represent the "marked" case.

It is important to bear in mind that redundancy rules, whether default or complement, never change feature values; they merely furnish missing features. They are unordered in principle, but ordering of a kind is imposed by the phonological rules of the grammar of each language. The assumption is that redundancy rules apply at the beginning of the earliest stratum containing a rule referencing the specific feature value which the rule assigns. Obviously, all complement rules supplying a given marked feature value will need to apply before the default rule for the same feature is allowed to apply. Once a complement rule has been invoked, it is assumed to apply continuously whenever its structural description is met; this assumption helps the theory avoid problems of ternary power.

The hierarchy shown below in (2), based on Archangeli & Pulleyblank (1986) but incorporating some adjustments from Archangeli & Pulleyblank (1989), is proposed as universal. It should be plain, however, that some terminal features and perhaps even whole branches of the hierarchy might be irrelevant in the context of a given language's phonology. For instance, the Tonal Node would be pertinent only to tone languages. Only terminal nodes take binary (+ or -) values; intermediate nodes are merely hierarchical organizers.

(2) Hierarchy for Syllabic Segments



The rime node at the top marks the segment as syllabic. The diagram for a non-syllabic segment is identical to (2) except that the rime node at the very top is lacking.

3. The Phoneme Set

The apparent surface phonemes for Swahili are shown in the chart below. Although aspiration is distinctive for voiceless obstruents, it is the phonetic realization of prenasalization, so that it need not play a role in discussions of underlying feature values. Note that I follow Halle & Clements (1983) as well as Zawawi (1971) in treating the palatal affricates as underlying stops which become affricates by a late phonetic rule; I will elaborate on this in §7 below.

(3) Swahili Phonemes (standard orthography in parenthesis)[2]

		LABIAL	DENTAL	ALVEOLAR	PALATAL	VELAR	GLOTTAL
STOPS	*Vcl.*	p		t	č (ch)	k	
	Vcd.	b		d	ǰ (j)	g	
FRICATIVES	*Vcl.*	f	θ (th)	s	ʃ (sh)	χ (kh)	h
	Vcd.	v	ð (dh)	z		γ (gh)	

	LABIAL	DENTAL	ALVEOLAR	PALATAL	VELAR	GLOTTAL
NASALS	m		n	ñ (ny)	ŋ (ng')	
LIQUIDS		l r				
GLIDES			y		w	
VOWELS			i		u	
			e	o		
				a		

The chart above shows thirty-one phonemes. In fairness, even disregarding the aspiration issue mentioned above, this number is not unimpeachable. The problem is that Swahili contains a staggering number of words borrowed from Arabic. Four of the fricatives above appear only in such loans: [θ] (th), [ð] (dh), [χ] (kh), and [γ] (gh). However, the frequency with which these sounds occur in spoken and written Swahili is such that one cannot merely dismiss them as "code mixing" (a small minority of Swahili speakers are actually fluent in Arabic), especially when one considers that the verbs, at least, participate in the extensional system of derivational morphology, albeit with their own idiosyncratic set of rules; the point is that if such loans are so common in the language that rules of derivational morphology have been adapted to these verbs' structural peculiarities, then it is no longer possible to dismiss the sounds which occur in those words as "foreign".

Yet these sounds do not all enjoy the same status in the language. Of these four fricatives, the two voiced ones are probably the most integrated into the performance of all speakers. Some speakers substitute /s/ for [θ] (th), according to Johnson (1939:464), and /h/ replaces [χ] (kh) in words "in proportion as they become naturalized among Africans", though [χ] (kh) may be introduced into non-loans in place of /h/ through hypercorrection (ibid.:184). For the sake of completeness, the discussion which follows treats all four of these fricatives as independent phonemes of Swahili, since they reflect **potentially** phonemic distinctions for some speakers, although it is my personal opinion that [χ] (kh) is usually a phonetic alternate for /h/.

4. Minimal Specifications

Since Archangeli & Pulleyblank's feature metric is principally useful for the application of various phonological rules, I have taken the liberty of reducing the minimal phoneme representations to a chart displaying the feature values of the terminal nodes, as fully specified graphic representations are cluttered-looking and difficult to decipher. The intervening nodes can of course be interpolated from the terminal nodes in any case.

(4) Fully Specified Phonemes (standard orthography)

✢/▭ = **minimal specification** **+/—** = **complement value** +/- = default value

	cnt	spr	**vce**	**snr**	strd	**nas**	cns	**rnd**	ant	**dist**	lat	**hi**	low	**bck**	ATR
i	+	-	+	+	-	-	-	-	(-)	(-)	-	+	-	-	+
e	+	-	+	+	-	-	-	-	(-)	(-)	-	▭	-	-	+
a	+	-	+	+	-	-	-	-	(-)	(-)	-	**—**	**+**	✢	+
u	+	-	+	+	-	-	-	✢	(-)	(-)	-	+	-	**+**	+
o	+	-	+	+	-	-	-	✢	(-)	(-)	-	▭	-	**+**	+
y	+	-	+	+	-	-	-	-	(-)	(-)	-	+	-	-	+
w	+	-	+	+	-	-	-	✢	(-)	(-)	-	+	-	**+**	+
p	▭	-	▭	**—**	-	-	**+**	✢	**+**	**+**	-	**—**	-	-	+
b	▭	-	+	**—**	-	-	**+**	✢	**+**	**+**	-	**—**	-	-	**—**
t	▭	-	▭	**—**	-	-	**+**	-	**+**	-	-	**—**	-	-	+
d	▭	-	+	▭	-	-	**+**	-	**+**	-	-	**—**	-	-	**—**
ch	▭	-	▭	**—**	**+**	-	**+**	-	-	✢	-	+	-	-	+
j	▭	-	+	**—**	**+**	-	**+**	-	-	✢	-	+	-	-	**—**
k	▭	-	▭	**—**	-	-	**+**	-	-	-	-	+	-	✢	+
g	▭	-	+	**—**	-	-	**+**	-	-	-	-	+	-	✢	**—**
m	**—**	-	+	+	-	✢	**+**	✢	**+**	**+**	-	**—**	-	-	**—**
n	**—**	-	+	+	-	✢	**+**	-	**+**	-	-	**—**	-	-	**—**
ny	**—**	-	+	+	-	✢	**+**	-	-	✢	-	+	-	-	**—**
ng'	**—**	-	+	+	-	✢	**+**	-	-	-	-	+	-	✢	**—**

	cnt	spr	**vce**	**snr**	strd	**nas**	cns	**rnd**	ant	**dist**	lat	**hi**	low	**bck**	ATR
l	○	-	+	+	-	-	**+**	-	**+**	-	**+**	**—**	-	-	**—**
r	+	-	+	+	-	-	**+**	-	**+**	-	-	○	-	-	**—**
f	+	-	○	**—**	**+**	-	**+**	✣	**+**	-	-	**—**	-	-	+
v	+	-	+	**—**	**+**	-	**+**	✣	**+**	-	-	○	-	-	**—**
s	+	-	○	**—**	**+**	-	**+**	-	**+**	-	-	**—**	-	-	+
z	+	-	+	○	**+**	-	**+**	-	**+**	-	-	**—**	-	-	**—**
sh	+	-	**—**	**—**	**+**	-	**+**	-	-	✣	-	+	-	-	+
h	+	**+**	**—**	**—**	-	-	**+**	-	-	-	-	○	**+**	✣	+
th	+	-	○	**—**	-	-	**+**	-	**+**	✣	-	○	-	-	+
dh	+	-	+	**—**	-	-	**+**	-	**+**	✣	-	○	-	-	**—**
kh	+	-	○	**—**	-	-	**+**	-	-	-	-	+	-	✣	+
gh	+	-	+	○	-	-	**+**	-	-	-	-	+	-	✣	**—**

In the table above, the proposed minimal specifications for each phoneme are given in shadow, while values provided by the operation of complement rules are **bold**. To take a transparent example, note that /m/ is minimally specified as [+nasal, +round]. This is a self-sufficient characterization of /m/ for Swahili since no other Swahili phoneme is both round and nasal: Swahili does not contain [ŋʷ], nor is nasality distinctive for vowels. So, filling in the remaining features by rule will be very simple for /m/. By contrast, /n/ is specified as [+nasal] only. However, minimal specifications for the other two nasals, /ñ/ and /ŋ/, contain another feature, [+distributed] and [+back] respectively, which is incompatible with /n/. Thus, the default and complement rules can be cast so that they will supply the values needed to describe /n/, since the extra features specified for /ñ/ and /ŋ/ can be trusted to differentiate them.

Certain default features are given in parentheses above; these represent features which may arguably be irrelevant to a given set of phonemes (cf. Archangeli & Pulleyblank 1986:85, 146-147, 157). Normally, minimal specifications include only non-default values; this is the case with the specifications above.

The minimal URs are accomplished using only eight underlying features (viz. [-continuant], [-voice], [-sonorant], [+nasal], [+distributed], [+round], [-high], and [+back]), of which the last three suffice to distinguish the vowels. The system is also efficient in terms of the total number of minimal features invoked. For the thirty-one phonemes in the table, the present proposal specifies two phonemes by default (no features specified), ten phonemes with one feature each, fifteen phonemes with two features each, and four phonemes with three features each; this means that this proposal requires the specification of only fifty-two terminal nodes in order to distinguish the thirty-one phonemes.

There is a subtle apparent inconsistency in the preceding paragraph which requires elucidation. I state at the top of the paragraph that I use only eight underlying features to distinguish the phonemes. Yet, near the end I claim that I manage to differentiate fully ten phonemes using only one feature each, and two with no features at all. How can this be possible?

The answer lies in the presence or absence of the rime node. Under the present underspecification analysis the glides merge underlyingly with their corresponding vowels in terms of terminal features: viz. /y/ is simply /i/ attached to a C on the CV tier (i.e., /i/ lacking its rime node), as /w/ is /u/ attached to a C (i.e., lacking its rime node). This strategy is explicitly licensed by Archangeli & Pulleyblank (1986:142).

This manoeuvre accounts for the fact that two phonemes can be captured with no terminal nodes at all (viz. /i/ and /y/) and adds one extra phoneme to the set captured with one underlying feature (viz. [+round], for /w/ as well as /u/). The means of having a tenth single-feature phoneme is provided by the effect of a language-specific constraint on the operation of complement rules. The constraint in question captures the generalization that in Swahili only vowels and nasals can be consonantal. In particular, Swahili has no syllabic liquids at any level.

(5) **c-constraint:** [+consonantal] can be connected to a rime only if the rime is connected to [+nasal]

By virtue of this constraint, /e/ and /r/ may both share the same minimal UR with regard to terminal features: viz. [-high]. While the two sounds are ultimately distinguished on the basis of a number of features (e.g., [±consonantal], [±ATR]), the crucial distinction from which the others fall out is the fact that /e/ is always headed by a rime node while /r/ never is. The complement rules in (8) below exploit this fact, captured in the c-constraint in (5), in order to derive the correct SR for the two phonemes even though their minimal specifications are identical.[3]

5. Default Rules

It is possible to engineer an approach which would follow simple arithmetic in positing as defaults whatever value for each feature was held by a majority of the phonemes in a language; in such a case, the resulting set of features would be likely to fail to define any real phoneme in the language. However, it is more in the spirit of Underspecification Theory to assign default values which will describe a phoneme. Indeed, Archangeli & Pulleyblank (1986) claimed universal status for their underlying default values,[4] which describe the vowel /i/.

Intuitively, /i/ seems to be an excellent choice for the default phoneme in Swahili. The best evidence comes from the way the language treats various borrowings as they become nativized. Loans which fail to conform to Swahili's allowable CV patterns can be remediated through the anaptyxis of /i/.

(6) (Eng.) bicycle ⇒ (Sw.) baisikeli

(Ar.) ismu ⇒ (Sw.) isimu 'name'

This insertion can be accomplished simply by adding empty V slots to the immigrant CV tier wherever Swahili's syllable-structure constraints require it. Such inserted vowels' features would then be filled in by the default rules.[5]

Following Archangeli & Pulleyblank's (1986:353-354) lead, the defaults would be:

(7) **Default Rules**

a. [ ] → [-nasal]
b. [ ] → [-lateral]
c. [ ] → [-consonantal]
d. [ ] → [-back]
e. [ ] → [-distributed]
f. [ ] → [-round]
g. [ ] → [-anterior]
h. [ ] → [+continuant]
i. [ ] → [+voice]
j. [ ] → [-spread]
k. [ ] → [+sonorant]
l. [ ] → [+high]
m. [ ] → [-low]
n. [ ] → [-strident]
o. [ ] → [+ATR]
p. [ ] → [-constricted glottis]

Normally one expects minimal specifications for phonemes to include only non-default values; this is the case with the specifications above. The feature [±constricted glottis] is included here as representative of features which are irrelevant to the Swahili phonological system and which are supplied phonetically across the board: viz. [±upper] and [±raised].

6. Complement Rules

Assuming the default rules in (7) above, the complement rules below will suffice to generate fully specified phonemes from the minimally specified ones articulated in (4), with the proviso that one further post-cyclic rule is required for the affricates. Recall further that these complement rules assume the operation of the language-specific c-constraint enunciated in (5), which states the legitimate generalization about Swahili that nasals are the only potentially syllabic consonants. The interaction of this c-constraint with **Complement Rule** (8f)—hereafter CR (8f)—below in the derivations of /e/ vs. /r/ and /o/ vs. /v/ is especially critical.

(8) **Complement Rules**

a. [ ] → [-sonorant,+consonantal] / [-voice]
b. [ ] → [+consonantal] / [-sonorant]
c. [ ] → [-continuant] / [+nasal]
d. [ ] → [+consonantal] / [-continuant]
e. [ ] → [+consonantal] / [+distributed]
f. [ ] → [+consonantal] / [-high]
g. [ ] → [+back] / [-consonantal,+round]
h. [ ] → [-sonorant] / [-nasal,+consonantal,+back]
i. [ ] → [-sonorant] / [-nasal,+distributed]
j. [ ] → [-sonorant] / [-nasal,+consonantal,+round]
k. [ ] → [+spread,-voice] / [+consonantal,-high,+back]
l. [ ] → [+anterior,+distributed] / [-continuant,+round]
m. [ ] → [+anterior] / [(+consonantal),-distributed,-back]
n. [ ] → [-high] / [+anterior]
o. [ ] → [+anterior] / [+distributed,-high]
p. [ ] → [-voice] / [+continuant,-anterior,+distributed]
q. [ ] → [+lateral] / [-continuant,+voice,+sonorant,-nasal]
r. [ ] → [-high] / [-consonantal,-round,+back]
s. [ ] → [+low] / [+continuant,-round,-high,+back]
t. [ ] → [+strident] / [-sonorant,-round,-anterior,-back]
u. [ ] → [+strident] / [+continuant,-sonorant,+anterior,-distributed]
v. [ ] → [-ATR] / [+voice,+consonantal]

The set of rules above is self-feeding. I will comment briefly on the rules, although they are largely self-explanatory.

The first six complement rules essentially serve to fill in the feature [+consonantal], observing that voiceless sounds, obstruents, stops (including nasals), and distributed sounds are always consonants. CR (8f) interacts with the c-constraint in (5) above to ensure that /r/ and /v/ are [+consonantal]. Crucially, the rule is prevented from applying to /e/ and /o/ (and eventually /a/) by the fact that these vowels are always headed by a rime node. Since Swahili vowels are never [+nasal], the language-specific c-constraint blocks the application of the rule to vowels.

CR (8g) observes that the round vowels are both back. The next three rules supply the feature [-sonorant] to various obstruents while **CR (8k)** sets two non-default values for /h/.

The subsequent four rules, as well as **CR (8r)** address the marked feature values [+anterior] and [-high], while **CR (8p)** stipulates that /ʃ/ is voiceless and CR (8q) supplies the critical feature [+lateral] to /l/. CR (8s) completes the basic work by filling in the feature [+low] in the two places it is needed.

It is not clear that the last three rules do any useful work in Swahili phonology. I am not aware of any Swahili rule which references [±strident] or [±ATR]. However, since this dissertation adopts Archangeli & Pulleyblank's hierarchy, for its cross-linguistic advantages, the rules needed to generate values for features included in their system are provided here.

7. Palatal Affricates

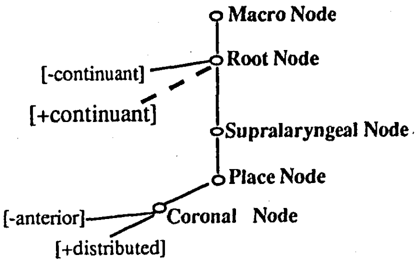
One last bit of phonetic cleanup remains to be accomplished. Recall from §3 that the palatal affricates /č/ (ch), /ǰ/, and /ñ/ (ny) were treated as stops underlyingly. As a final task, we must insert a [+continuant] specification linked to these segments; it is assumed that the feature [±continuant] resides on its own tier.

(9) **Affricate Formation**

II. [+continuant]
III. trigger/target condition
- [-continuant, -anterior, +distributed]
- unrestricted application

This rule has adds its argument [+continuant] to distributed continuants which are not anterior, The tier structure for the postcyclic rule of **Affricate Formation** (9) would look like this:

(10) Diagram of **Affricate Formation**



With the unlinked feature [+continuant] now linked to the previously obstruent segment, the required affricated phonetic output will be generated.

This rule is autosegmentally comfortable, but it is unsatisfying from the perspective of underspecification. This kind of automatic filling in of phonetic features is exactly the kind of work one would like to have accomplished by redundancy rules (specifically, a complement rule in this case). However, it is a tenet of Underspecification Theory (regardless of the specific theorist, insofar as I can determine) that redundancy rules apply only in cases where there is no value yet established for the feature in question on a given segment. Thus, there is no theoretically orthodox means of writing a complement rule to insert an extra feature with the opposite value of a feature already present. One might attempt to finesse the issue by underspecifying /č/ and /ǰ/ as simultaneously [+continuant] and [-continuant], but this approach would also be heretical to the theory, since URs may include only non-default values: it is evident that [+continuant] and [-continuant] cannot both be non-defaults—one of them must be the default value. Thus, we are forced to handle this bit of cleanup in the postcycle until such time as the evolution of Underspecification Theory provides a more elegant means of generating affricates.

8. Conclusion

The present proposal represents a thorough, efficient, and explanatorily satisfying underspecification approach to Swahili phonology. Included in the discussion were a cursory comparison of Sagey's system with Archangeli & Pulleyblank's, the issue of exactly what to include in the Swahili phoneme set, problems related to complement-rule formulation, and apparent obstacles in Underspecification Theory.

In the course of the exposition, this system has shown itself to be superior to a non-underspecified approach: viz. in the relative economy of its underlying feature inventory, in its efficiency in capturing URs with fewer total features, and in its explanatory advantages in capturing valid generalizations about Swahili phonology.

NOTES

[1]This research also owes much to preliminary work by Dorothy Evans, who has been generous with her insights and criticism.

[2]Also following standard Swahili orthography, the symbol /y/ will be used to represent the alveolar glide, in contrast to strict IPA convention, where it stands for a high, front, round vowel.

[3]This is a striking use of the power of Underspecification Theory in order to achieve economy and explanatory advantages. Yet, if one had some theoretical objection to minimally specifying two phonemes with the same single terminal feature, then the impasse could be resolved by adding [-consonantal] to the minimal underlying feature inventory in order to differentiate /e/ and /r/, and ultimately /o/ and /v/; still, little is achieved, since for the glides the absence of the rime node is the only distinction available in the theory.

[4]Subsequent developments in their research would indicate that they are abandoning the assumption of universality of default values (Archangeli 1990).

[5]While I am confident of the basic validity of my premise here, I would be remiss to fail to mention certain complicating factors in the nativization process. Most salient is the fact that the default /i/ can be labialized by a preceding [+labial] segment: viz. (Ar.) ʔadab ⇒ adabu 'good manners', (Ar.) aḍaʕ ⇒ dhaifu 'weak'. A sort of loan-word vowel-harmony also may be seen to play a role: (Ar.) ṣanduuq ⇒ sanduku 'box'.

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