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Kalenjin phonology and morphology: A further exemplification of underspecification and non-destructive phonology

Ken Lodge

School of Modern Languages and European Studies, University of East Anglia, Norwich NR4 7TJ, UK

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Abstract

Kalenjin, a Southern Nilotic language, has a harmony system normally associated with the vowel system and specifically with the feature [ATR]. This paper demonstrates that [ATR] is not an appropriate description of the phonetic correlates of the harmony system and that the system operates at least at syllable level, and in many cases at word level. In order to avoid having recourse to feature changing and deletion rules phonological representation is conceived of as layered and radically underspecified in the lexical entry forms. Furthermore such representations are non-segmental.

1. Introduction

The object of this paper is to investigate part of the phonological system of Kalenjin, a Southern Nilotic language spoken in the west of Kenya (and elsewhere; see Muthwii, 1994). The literature on the language is sparse (see refs.) and it must be stressed that, although there is a written form for the Bible, prayer books and stories in particular, there is no standard form. All the references refer to various dialects, which fall into the groupings given in (1).

- (1) (a) Rift Valley speakers: Kipsigis, Nandi, Keiyo, Tugen, Merkweta
- (b) Mount Elgon speakers: Sapiny, Kany, Terik, Pok, Pong'om
- (c) Päkot speakers
- (d) Datooga speakers in Tanzania.

I shall concentrate on the Tugen dialect, that of my informant, Margaret Muthwii of Kenyatta University, Nairobi. Of the dialects described in the literature, Nandi is the closest to Tugen.

I shall look at the system of what is usually referred to as vowel harmony in which certain phonetic features alternate in one and the same morpheme depending on the presence of those features in neighbouring morphemes. Since formulations of these alternations typically involve feature-changing rules, such as the one given by Hall et al. (1974: 251), reproduced here as (12), an alternative approach with underspecification is worth investigating.

2. The data: [ATR] and morphological concatenation

Kalenjin has a complex morphological system with a concomitant harmony system based on a feature called *open/close* in Tucker (1964) and Tucker and Bryan (1964, 1965) or [ATR] in Hall et al. (1974) and Creider and Creider (1989). The phonetic description of the features involved is problematic (see Tucker, 1964, and Hall et al., 1974, for different formulations of the differences). The phonetic correlates of [ATR] in Tugen have been investigated separately (Local and Lodge, 1994a), and the following features have been identified as being involved:

| | |
|--|---|
| (2) <i>close</i> /[+ATR] | <i>open</i> /[-ATR] |
| relatively higher and more peripheral tongue position for vowels | relatively lower and less peripheral tongue position for vowels |
| relatively shorter consonantal portions and longer vocalic portions | relatively longer consonantal portions and shorter vocalic portions |
| final voicelessness in coda approximants | final breathy voice in the rhyme |
| range of intervocalic consonantal articulations from stop to fricative | range of intervocalic consonantal articulations from fricative to approximant |
| stability in place of articulation for 'coronals' | variability in place of articulation for 'coronals' |

The range of intervocalic articulations heard in one and the same morpheme is usually incorporated into phonemic descriptions as allophones of the stops (cf. Creider and Creider, 1989: 13–14), but it seems to be that it is rather a matter of syllabic quality. It is quite clear that we are really dealing with syllable harmony rather than vowel harmony, as it is usually described, i.e. both vowels and consonants are affected. For the time being I shall continue to use the labels [±ATR] to apply to both consonants and vowels, to cover whatever the phonetic exponents are, but I shall make further suggestions below with regard to their phonological representation. One thing is clear: the features are apparent to the native speakers at least at syllable level, and a native speaker trained in the observation of oneself and of others can always pick out which type of syllable is being produced (with a few exceptions; see Muthwii's comments and discussions of Kalenjinness in several speakers' English, 1994).

The vowel contrasts are as in (3).

| | | | | |
|-----|--------|---|----------|----------|
| (3) | [+ATR] | | [−ATR] | |
| | i | u | <i>i</i> | <i>u</i> |
| | e | o | <i>e</i> | <i>o</i> |
| | a | | <i>a</i> | |

Each can be distinctively long or short. In order to be able to indicate the syllabic nature of [ATR] I have chosen to symbolize the [−ATR] vowels and consonants in italics and the [+ATR] ones in ordinary roman (cf. Creider and Creider, 1989: 18). Before concentrating on the harmony system, we should note that the contrast [±ATR] is lexically contrastive and has a morphological function, besides being the basis of the alternations that are the focus of this paper, as in the examples in (4).

- (4) [ŋet] ‘to remain’
 [ŋet̩] ‘to tire’
 [samis] ‘awful’ (plural)
 [samis̩] ‘awful’ (singular)

Kalenjin is a tone language, but whether the tonal system interacts with the harmony system is not clear, so I have not included tonal markings in the transcriptions (cf. Hall et al.’s comments that the two are not connected, 1974: 246).

The consonantal contrasts are as in (5) in a phonemic analysis (cf. Creider and Creider, 1989: 13):

| | | | | |
|-----|---|---|---|---|
| (5) | p | t | c | k |
| | | s | | |
| | m | n | ɲ | ŋ |
| | | l | | |
| | | r | | |
| | w | | j | |

The allophonic variants are /p/: [p b β]; /t/: [t d]; /c/: [c ʃ ʧ]; /k/: [k g ɣ]. Certain consonant sequences and all geminates are illegal in Kalenjin. The transcriptions in this paper are ‘allophonic’ in nature, but the representation of the morphemes will be given in ‘phonemic’ form.

There are three different types of morpheme in Kalenjin, which vary in terms of their [ATR] values. These are called *dominant*, *recessive* and *opaque* by Hall et al. (1974: 246–248). Muthwii (1994) uses *adaptive* rather than *recessive*; I shall follow her in this respect. The behaviour of the three types is as in (6).

- (6) (i) dominant morphemes are specified [+ATR]; any neighbouring adaptive morpheme(s) will take on this value;

3. Former analyses

Tucker (1964) and Tucker and Bryan (1962, 1964, 1965) do not present a rule-based account of the dialects they are describing, but use process-like terminology in their treatment of the alternations (see Tucker and Bryan, 1964: 195–198). Creider and Creider (1989: 18–20) briefly deal with harmony in process terms and refer to Tucker (1964) and Hall et al. (1974). The latter use an SPE type of formulation for their rule for the Nandi-Kipsigis group of dialects and the Päkot dialect, as reproduced in (12) (1974: 251).

$$(12) \quad [-ATR] \rightarrow [+ATR]/C_0^2 [+ATR] C_0^2$$

However, although they specifically refer to opaque morphemes, they do not show how these avoid rule (12). Presumably such morphemes would have to be marked in the lexicon as exceptions.

Halle and Vergnaud (1981) rework Hall et al.'s material in an autosegmental framework. In it they make a number of substantive claims: [ATR] autosegments can be linked only to vowel slots in the core; [ATR] can also be part of the core specification, but autosegmental specification overrides core specification; autosegments are either linked to the core in the lexical representations or they are floating, i.e. not linked to the core slots. Linking is subject to the following conditions (= their (1f)):

- (13) (i) Each (vowel) slot is linked to at *most* one (harmony) autosegment.
 (ii) Floating autosegments are linked automatically to all accessible vowel slots.
 (iii) Unlinked autosegments are deleted at the end of the derivation.
 (Emphasis original.)

In order to make their analysis work they also find it necessary to invoke the No Crossing Constraint (for a critique of this constraint, see Coleman and Local, 1989).

To account for the facts of harmony they assume that all vowels are redundantly specified as [-ATR] and that dominant morphemes are specified with a floating [+ATR] autosegment in their lexical entry form. The opaque morphemes have a [-ATR] specification linked to the core. (Halle and Vergnaud follow Hall et al.'s pronouncement that there are only three opaque morphemes in Kalenjin, which is not in fact the case, as we shall see below.) By combining the well-formedness conditions with universal principles of association, Halle and Vergnaud avoid having any spreading rules. On the basis of this analysis they give the lexical representations in (14) (= their (1g); I have followed my conventions for the transcriptions that they give).

- (14) KI-A-KER [kiager] 'I shut it'
 [+ATR]
 KI-A-KER -e [kiagere] 'I was shutting it'

[-ATR] [+ATR]
|
KA-*ma*-A kezr -AK [*kamaagezrak*] ‘I didn’t see you (pl).’

In the first case, where all the morphemes are adaptive, Halle and Vergnaud state that the form is “subject to no modifications and surfaces in its underlying form [sic] as far as [ATR] harmony is concerned” (1981: 4), giving [-ATR], the redundant specification of all morphemes. In the second case all vowels are [+ATR] because (13ii) links the autosegment accordingly. In the third example, which is parallel to (11) above, the last three vowels are linked to [+ATR] by (13ii), but the No Crossing Constraint prevents it from being linked to the first morpheme, given the linking of {*ma*}, so {KA} surfaces as [-ATR] (= “is subject to no modifications”).

Since they operate with fully specified underlying forms, the association of the floating [+ATR] autosegment necessarily has the effect of changing the value of the redundant [-ATR] specification of the lexical entry form. It is also the case that the blocking effect of the autosegmental [-ATR] specification of the opaque morphemes is arbitrary, in that in other cases (though not in Halle and Vergnaud’s paper) spreading can delink such associations (cf. Broe, 1992: 153–154). That is to say, whether spreading can delink or not has to be indicated in a language-specific way, and possibly even a phenomenon-specific way.

A more recent paper on the Kipsigis dialect by Martin (1985) suggests that there is a fourth type of morpheme, one which is [+ATR] but has a restricted domain in that it affects no more than two preceding morphemes. The morphemes he discusses are demonstratives and possessives and he treats them as suffixes. However, no reasons are given as to why these morphemes should be so treated. (In fact, Martin’s paper is very unreliable and confusing, with morphemic analyses that are inconsistent and unjustified.) Tucker and Bryan treat demonstratives and possessives as separate words in Päkot (see 1962: 156–161), though in Nandi-Kipsigis only the demonstratives are separate, whereas possessives are given as suffixes (see 1964: 227–232).

However, if these morphemes are treated as separate words, the harmony system operates quite regularly. In (15)–(21) I give examples of some of these morphemes in various possible combinations. I have indicated the morpheme boundaries with a dash, but not separated the forms into words.

- | | | |
|--------------------------------------|-------------------------------|--------------------------------------|
| (15) [<i>kwes-az-paz</i>] | goat-that-our | ‘that goat of ours’ |
| (16) [<i>tuɣa-ɬu-gaj</i>] | cows-those-past | ‘those cows’ |
| (17) [<i>tuɣa-ɬaɣ-et</i>] | cows-our-?? | ‘those cows of ours’ |
| (18) [<i>tuɣa-ɬwaɣ-et</i>] | cows-their-?? | ‘those cows of theirs’ |
| (19) [<i>kwes-az-ga-paz</i>] | goat-that-yesterday-our | ‘that goat of ours of yesterday’ |
| (20) [<i>tuɣa-ɬaz-gaj-ga-ɬazk</i>] | cows-those-past-yesterday-our | ‘those cows of ours of yesterday’ |

- (21) [tuɣa-tʃaʒ-gaj-ga-tʃwazk] cows-those-past-yesterday-their ‘those cows of
theirs of
yesterday’

(?? = no particular meaning; my informant had difficulty in assigning any specific semantic content to this suffix.)

(In (15) and (18) the /n/ of /na:/ is lost after certain consonants, including /s/.) In (15) we can see that the [+ATR] morpheme /naʒ/ does not dominate the two preceding morphemes. In both (15) and (19) /kwes/ is not affected by the [+ATR] morphemes following it. On the other hand, the adaptive morpheme /ka/ does harmonize with the following morpheme in (20) and (21), and so does adaptive /ET/ with the preceding morpheme in (17) and (18). If we analyze all these forms as made up of two words, the second starting where the harmony ceases to operate, we find the harmony works exactly like it does in examples (7)–(11). This means an analysis in each case as in (15′)–(21′), where the break between the two parts represents the word boundary:

- (15′) /KWES – NAʒ/ (adaptive – adaptive) /naʒ/ (dominant)
 (16′) /TUKA/ (adaptive) /tʃu-kaj/ (dominant – opaque)
 (17′) /TUKA/ (adaptive) /tʃaʒk-ET/ (dominant – adaptive)
 (18′) /TUKA/ (adaptive) /tʃwazk-ET/ (opaque – adaptive)
 (19′) /KWES/ (adaptive) /naʒ-KA-naʒ/ (dominant – adaptive – dominant)
 (20′) /TUKA/ (adaptive) /tʃaʒ-kaj-KA-tʃaʒk/ (dominant – opaque – adaptive – dominant)
 (21′) /TUKA/ (adaptive) /tʃaʒ-kaj-KA-tʃwazk/ (dominant – opaque – adaptive – opaque).

The solution is, therefore, to classify the temporal-demonstrative and possessive morphemes as roots, not as suffixes. The more complex forms in (19)–(21) are either compounds or more than one word.

The examples in (15)–(21) also show up a difference in the demonstrative forms not mentioned in the literature. There are two types of demonstrative, which I shall refer to as deictic and temporal. The deictic demonstratives refer to the immediate context of utterance, the temporal ones to some previous time. The former have a three-way distinction: proximal/medial/distal, the latter only a two-way distinction: proximal/non-proximal. The deictic ones are adaptive, the temporal ones dominant, so they are always [+ATR]. Thus (15) contains a deictic demonstrative /NAʒ/, whereas (19) contains a temporal one /naʒ/. Tucker and Bryan (1964: 221–226) discuss only the adaptive, deictic ones, which should be treated as suffixes on the criterion of harmony. It is the temporal ones and the possessives that are separate roots. Tucker and Bryan’s treatment of the latter (1964: 227–232) as suffixes is equally incorrect on the basis of the harmony system, since they do not harmonize in either Nandi or Kipsigis according to their data.

Spreading of [+ATR] to unspecified {KO-} and {-A} is automatic and initial {KA-} takes the default value [-ATR]. The presence of [-ATR] in the lexical representation of the second prefix stops the spread of [+ATR] to the initial unspecified prefix.

5. Prosodies and redundancy rules

The analysis proposed in section 4 and exemplified in (23) has not taken on board two important aspects of the Kalenjin harmony system that I emphasized in section 2: (i) the harmony system affects both consonants and vowels; (ii) whatever the phonological entity should be called, it is associated with quite a range of phonetic characteristics, as listed in (2). The first point could be accommodated in a non-segmental approach to phonology, such as I propose and exemplify at length in an analysis of Malay in Lodge (1993). The lowest level at which segmentation takes place is that of syllable structure in terms of Cs and Vs. The speech chain is parameterized into separate layers such as phonation and place of articulation. Each layer is instantiated by one of a set of features specific to the layer. These layers are similar to those proposed by Clements (1985) and developed by, for instance, Avery and Rice (1989), Paradis and Prunet (1989), Pulleyblank (1988a,b) and Yip (1989). In (24) I give the layers that I propose in Lodge (1992, 1993), to which it would be possible to add another, namely tongue root position. (I have replaced *nasality* with *velum*, in order to avoid confusion with the phonetic feature [nasal(ity)].)

- (24) tongue root
 lips
 resonance
 velum
 phonation
 manner
 place

The extent of prosodic features is measured in terms of C and V syllable places and may be of any length, e.g. word-length, syllabic, onset, nuclear, coda, or part thereof (as in the case of friction in the onset [st-], for instance, where it is restricted to the initial consonant place). It would be a simple matter to represent advanced and retracted tongue root positions as mutually exclusive features on the tongue root layer, which in Kalenjin are at least syllable-length and, as we have seen, are very often word-length.

However, in Lodge (1992, 1993) I have tried to maintain a single interpretation of each feature such that if a feature [ALVEOLAR] is present in a representation, it will always mean 'having an alveolar articulation'. Since there is a wide range of phonetic correlates of [ATR] in Kalenjin, it would be difficult to maintain such an interpretation in this instance (cf. the arguments in Local and Lodge, 1994b). This range of correlates is the second important aspect of the harmony system of Kalenjin that I referred to above. In a parameterized representation of speech these phonetic cor-

relates will appear on different layers. (This would be the case even with a Clementsian geometry.) In fact, in the approach I am advocating there should be no difficulty with such a parameterized set of phonologically relevant features, distributed variously throughout the syllable: what is missing, in contradistinction to an analysis using [ATR], is an overall label for the co-occurrence of these features. What is needed is the addition of a feature for breathy voice on the phonation layer, which I will symbolize H, with no tongue root layer at all. (Note that if a tongue root layer *is* needed for other languages, then tongue root position can also be specified for Kalenjin, but it will in this case be redundant not distinctive.) In (25) I give a set of features necessary for the representations of Kalenjin.

- (25) lips: ROUND NEUT(RAL) SPR(EAD)
 resonance: FRONT RETR(ACTED) CENT(RAL) ADV(ANCED) BACK
 velum: NAS(AL) ORAL
 phonation: V O H
 manner: STOP FRIC(ATIVE) LAT(ERAL) TRILL
 APPR(OXIMANT) HIGH MID LOW
 place: LAB(IAL) DENT(AL) ALV(EOLAR) P(ALATO-)ALV(EOLAR) PAL(ATAL)
 DOR(SAL)

We are now in a position to consider the lexical entry forms for a contrasting pair of [ATR] words. Let us start with [ɲet]/[ɲet̚], given in (4). The fully specified forms of [ɲet] and [ɲet̚] are as in (26).

- (26)
- | | ɲ | e | t | ɲ | e | t̚ |
|-----------|------------------|-----|------|-----------------|-----|------|
| | C | V | C | C | V | C |
| lips | SPR ----- | | | SPR----- | | |
| resonance | BACK FRONT ----- | | | BACK RETR ----- | | |
| velum | NAS ORAL----- | | | NAS ORAL----- | | |
| phonation | V -----O | | | V-----O | | |
| manner | STOP | MID | STOP | STOP | MID | STOP |
| place | DOR | | ALV | DOR | | DENT |

The fully specified forms of [kol] ‘good planters’ and [kol̚] ‘plant’ (imperative) are as in (27) (cf. the narrow transcriptions in Local and Lodge, 1994a).

- (27)
- | | k | o | l | k | o | l̚ |
|-----------|------------|-----|-----|------------|-----|------|
| | C | V | C | C | V | C |
| lips | ROUND----- | | | ROUND----- | | |
| resonance | BACK----- | | | ADV----- | | |
| velum | ORAL----- | | | ORAL----- | | |
| phonation | O | V | O | O | V | H |
| manner | STOP | MID | LAT | STOP | MID | LAT |
| place | DOR | | ALV | DOR | | DENT |

We now have to consider what specifications are needed in the lexical entries. If, for the purposes of this paper, we ignore those contexts where vowel coalescence takes place (see Creider and Creider, 1989: 20), then the vowel contrasts can be handled with the specifications in (28).

| | | | | | |
|-----------|-------|-------|-------|-------|-------|
| (28) | i | e | a | o | u |
| | V | V | V | V | V |
| resonance | FRONT | FRONT | FRONT | BACK | BACK |
| manner | HIGH | | LOW | | HIGH |
| | i | e | a | o | u |
| lips | | | | ROUND | ROUND |
| manner | HIGH | | LOW | | HIGH |

Note that the resonance features are syllable length, except in those cases where a consonant is specified differently on that layer, as in [ɲet]/[ɲet] in (26). The upper set are those in dominant morphemes, the lower ones in adaptive ones. Except in /o/ and /u/ lip position is predictable: BACK gives ROUND, which can be symbolized as in (29); (30) predicts ADV from either ROUND or LOW.

(29) BACK → ROUND

(30) ROUND }
 LOW } → ADV

where the arrow is implicational, i.e. ‘if A is specified lexically, then B’, and the brace indicates a disjunction. I call such statements *predictive rules* (cf. Lodge, 1992, 1993). The default features for lips, resonance and manner are SPR, RETR and MID, respectively, as in (31)–(33).

(31) lips → SPR

(32) resonance → RETR

(33) manner → MID

which are to be read as ‘if F is unspecified, then A’.

Coda stops and fricatives are always voiceless, whereas the sonorants have breathy voice in ‘[-ATR]’ syllables and are voiceless in ‘[+ATR]’ ones. If all coda consonants are unspecified for phonation, then we need a predictive rule deriving o from FRONT or BACK (the lexical specifications of ‘[-ATR]’ syllables) (34), and a default rule for the other cases (35). The subset principle ensures that they apply in the appropriate circumstances.

(34) FRONT }
 BACK } → O

(35) phonation → H

Place of articulation of the coronals is handled by a predictive rule giving ALV from FRONT or BACK (36), and the default rule (37). This assumes that coronals are unspecified for place lexically (cf. Paradis and Prunet, 1989, 1991).

- (36) FRONT }
 BACK } → ALV
 (37) place → DENT

Under this analysis the rhymes of the four words in question look something like those given in (38). (This paper is not the place to work out all the details of lexical specification in Kalenjin, so I am simply concentrating on the rhymes to exemplify the lexical entries and the applicability of the predictive and default rules.)

- (38)
- | | | | | | | | |
|-----------|------|-------|-------|--|---|---|------|
| | ŋ | e | t | | ŋ | e | t |
| | C | V | C | | C | V | C |
| lips | | | | | | | |
| resonance | | FRONT | ----- | | | | |
| velum | | | | | | | |
| phonation | | | | | | | |
| manner | | | STOP | | | | STOP |
| place | | | | | | | |
| | | | | | | | |
| | k | o | l | | k | o | l |
| | C | V | C | | C | V | C |
| lips | | | | | | | |
| resonance | BACK | ----- | | | | | |
| velum | | | | | | | |
| phonation | | | | | | | |
| manner | | | LAT | | | | LAT |
| place | | | | | | | |

Rules (29)–(37) give the representations in (39).

- (39)
- | | | | | | | | |
|-----------|-----|-------|-------|--|-----|-------|-------|
| | ŋ | e | t | | ŋ | e | t |
| | C | V | C | | C | V | C |
| lips | SPR | ----- | | | SPR | ----- | |
| resonance | | FRONT | ----- | | | RETR | ----- |
| velum | | | | | | | |
| phonation | | | o | | | | o |
| manner | | MID | STOP | | MID | STOP | |
| place | | | ALV | | | | DENT |

| | | | | | | | |
|-----------|------------|-----|-----|--|------------|-----|------|
| | k | o | l | | k | o | l |
| | C | V | C | | C | V | C |
| lips | ROUND----- | | | | ROUND----- | | |
| resonance | BACK----- | | | | ADV----- | | |
| velum | | | | | | | |
| phonation | | | O | | | | H |
| manner | | MID | LAT | | MID | LAT | |
| place | | | ALV | | | | DENT |

(Note that the approach here is polysystemic, i.e. what happens in the coda, for instance, does not have to apply elsewhere; cf. Local, 1992; Lodge, 1992, 1993.)

As far as the harmony system is concerned, the analysis is basically what was presented in (22) above, but without the [ATR] label. Dominant and adaptive morphemes are specified as in (28) and exemplified in (38). Since the adaptive morphemes have no resonance specifications, the neighbouring dominant ones supply theirs by an automatic spreading mechanism. Opaque morphemes have a specified resonance feature, as in (40), which stops any spreading from an adjacent dominant one.

(40)

| | | | | | |
|-----------|------|------|-----|-------|-------|
| | i | e | a | o | u |
| | V | V | V | V | V |
| lips | | | | ROUND | ROUND |
| resonance | RETR | RETR | ADV | ADV | ADV |
| manner | HIGH | | LOW | | HIGH |

(Since, as far as I can tell from my informant's observations, there are only four opaque morphemes, *ma*, *kaz*, *kaj*, *kej*, only the first two of these would appear in lexical representations.)

The differences in timing referred to in (2) will have to be accounted for by a separate algorithm. This will specify all durations for each feature of each word, depending on the context. For example, our present data show that syllable length is relatively constant, but that the distribution of duration varies according to the nature of the syllable in question: '[+ATR]' syllables are CV:C; '[-ATR]' syllables are C:VC:.

6. Conclusion

The debate about the appropriateness of underspecification continues and this paper is only a very small contribution to that debate. Mohanan (1991) has already presented a critique and claims that underspecification of any kind (either contrastive or radical) is unsuccessful in its declared aims and an unnecessary way of expressing the insights which the analyses of its proponents bring to light, in particular the preservation of distributional regularities in patterns of alternation and the asymmetric status of feature values in distribution and alternation (cf. Mohanan's introduc-

tory remarks, 1991: 285). This is not the place to respond to his criticisms, though some are indeed well-founded, for example, that use of underspecification and some version of constraints-and-repair in the same analysis is unnecessary duplication (1991: 295). In other words, why have both structure-building and structure-changing rules in the same theory?

In this paper I have tried to show that in Kalenjin the label [ATR] is inappropriate on many counts, several of which are discussed in more detail elsewhere (Local and Lodge, 1994a,b). Even if it were an acceptable phonological label, however, an approach based on the principles of radical underspecification allows an elegant analysis of the three different types of morpheme encountered in the language.

One aspect of underspecification not addressed by Mohanan is worth a mention as a final comment in this paper. An interesting question to try to answer is the following: is underspecification merely a way of enabling us to relate forms by means of declarative redundancy rules, or is it a way of capturing important facts about language acquisition and speech perception? The former view of underspecification and redundancy rules as a device for relating linguistic forms makes no claims about psychological reality. On the other hand, underspecification as part of a theory of mental representations in the lexicon needs to be investigated thoroughly by psycholinguists. Lahiri and Marslen-Wilson (1992) make an interesting contribution in this area with respect to lexical representations in English and Bengali of the oral/nasal contrast in rhymes, and geminate versus non-geminate consonants in Bengali. But another aspect to be investigated is the status of the redundancy rules to relate the lexical and surface forms. Are they, too, psychologically real? This seems to me to be a fruitful area for future research.

References

- Archangeli, D., 1984. Underspecification in Yawelmani phonology and morphology. Unpublished Ph.D. dissertation, M.I.T.
- Archangeli, D., 1988. Aspects of underspecification theory. *Phonology* 5, 183–207.
- Avery, P. and K. Rice, 1989. Segment structure and coronal underspecification. *Phonology* 6, 179–200.
- Broe, M., 1992. An introduction to feature geometry. In: G. Docherty, R. Ladd (eds.), *Papers in laboratory phonology II*, 149–165. Cambridge: Cambridge University Press.
- Clements, G.N., 1985. The geometry of phonological features. *Phonology Yearbook* 2, 225–252.
- Coleman, J., to appear. Declarative lexical phonology. To appear in F. Katamba and J. Durand.
- Coleman, J. and J.K. Local, 1989. The ‘No Crossing Constraint’ in autosegmental phonology. *York Papers in Linguistics* 14, 169–219.
- Creider, C.A. and J.T. Creider, 1989. *A grammar of Nandi*. Hamburg: Helmut Buske.
- Halle, B.L., R.M.R. Hall, M.D. Pam, A. Myers, S.A. Antell and G.K. Cheron, 1974. African vowel harmony from the vantage point of Kalenjin. *Afrika und Übersee* 57, 241–267.
- Hall, M. and J.-R. Vergnaud, 1981. Harmony processes. In: W. Klein, W. Levelt (eds.), *Crossing the boundaries in linguistics*, 1–22. Dordrecht: Reidel.
- Katamba, F. and J. Durand (eds.), to appear. *Frontiers of phonology: Primitives, architectures and derivation*. London: Longman.
- Lahiri, A. and W. Marslen-Wilson, 1992. Lexical processing and phonological representation. In: G. Docherty, D.R. Ladd (eds.), *Papers in laboratory phonology II*, 229–254. Cambridge: Cambridge University Press.

- Local, J.K., 1992. Modelling assimilation in non-segmental rule-free synthesis. In: G. Docherty, R. Ladd (eds.), *Papers in laboratory phonology II*, 190–223. Cambridge: Cambridge University Press.
- Local, J.K., and K.R. Lodge, 1994a. [ATR]: Advanced Tongue Root or Another Travesty of Representation? An investigation of Kalenjin. Paper presented at the LAGB Spring Meeting, University of Salford, April 1994. To appear in *York Research Papers in Linguistics YLLS/RP/1994-4*.
- Local, J.K., and K.R. Lodge, 1994b. Phonological representation and phonetic interpretation: Exemplification from Kalenjin. Paper presented at the Second Phonology Workshop, University of Manchester, May 1994. To appear in *York Papers in Linguistics*.
- Lodge, K.R., 1992. Assimilation, deletion paths and underspecification. *Journal of Linguistics* 28, 13–52.
- Lodge, K.R., 1993. Underspecification, polysystemicity and non-segmental representations in phonology: An analysis of Malay. *Linguistics* 31, 475–519.
- Martin, B., 1985. Vowel harmony in Kipsigis. *Studies in African Linguistics, Supplement* 9, 215–219.
- Mohanan, K.P., 1991. The bases of radical underspecification. *NLLT* 9, 285–325.
- Muthwii, M.J., 1994. Kalenjin in Kenya: The socio-phonological interaction of an ethnic language with English and Kiswahili. *Language Forum* 2, 1–48.
- Paradis, C. and J.-F. Prunet, 1989. On coronal transparency. *Phonology* 6, 317–348.
- Paradis, C. and J.-F. Prunet (eds.) 1991. *The special status of coronals*. (Vol. 2 of *Phonetics and phonology*.) San Diego, CA: Academic Press.
- Pulleyblank, D., 1988a. Vocalic underspecification in Yoruba. *Linguistic Inquiry* 19, 233–270.
- Pulleyblank, D., 1988b. Underspecification, the feature hierarchy and Tiv vowels. *Phonology* 5, 299–326.
- Tucker, A.N., 1964. Kalenjin phonetics. In: D. Abercrombie, D.B. Fry, P.A.D. MacCarthy, N.C. Scott, J.K.M. Trim (eds.), *In honour of Daniel Jones*, 445–470. London: Longmans.
- Tucker, A.N. and M.A. Bryan, 1964. Noun classification in Kalenjin: Nandi-Kipsigis. *African Language Studies* 5, 192–247.
- Tucker, A.N. and M.A. Bryan, 1965. Noun classification in Kalenjin: Nandi-Kipsigis. *African Language Studies* 6, 117–187.
- Yip, M., 1989. Feature geometry and cooccurrence restrictions. *Phonology* 6, 349–374.