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The tonal fluctuations found in main verb constructions in Qhalaxarzi (Kgalagadi) are described in outline. Rules accounting for these tonal alternations are presented informally after establishing the underlying tones of the morphemes making up the constructions. The analysis differs from some recent analyses of Bantu tone in that the tonal melodies of the language are treated as being derived by rule, rather than underlying.

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Die tonale fluktuasies wat in hoofwerkwoordkonstruksies in Qhalaxarzi (Kgalagadi) voorkom, word in breë trekke beskryf. Na die bepaling van die relevante morfeme se onderliggende toonhoogtes word die reëls wat die tonale wisseling beskryf informeel uiteengesit. Die analise verskil van sekere onlangse analises van Bantoe-ton in die sin dat dié taal se tonale melodieë eerder deur reëls gevorm word, en nie onderliggend bestaan nie.

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The purpose of this article is to describe in outline how the considerable tonal fluctuation found in main verb constructions in Qhalaxarzi is brought about.

Since Qhalaxarzi is not yet a written language, I took the liberty of designing an alphabet for it. This differs from normal Sotho orthographies in that it is conjunctive, and in the use of the following letters and their phonetic values:

t, th, d, and n are dental sounds,

r and *rz* represent respectively a voiceless and voiced trill,

tj, tjh, sj, and zj are alveopalatal sounds,

c, ch, and j are palatal stops,

q and *qh* are uvular stops,

x is an uvular fricative,

ε and *φ* represent cardinal vowels 3 and 6 respectively,

' indicates a high tone, low tones being unmarked.

The starting point of a description of tonal alternation is of course with the underlying tones of morphemes, in this case only those which make up main verb constructions, and I begin here.

Subject Prefixes (SP) are all high (H), except those of Classes 1, 4, and 9 in the positive indicative, for example

- (1) *mochó obózjayφ* 'the person (1) asks'
- (2) *ejwá ebóxólayφ* 'the dog (9) barks'
- (3) *meze ebónwáyφ* 'the villages (4) are seen'

and those of the first and second person singular and class 1 in the past consecutive, for example

- (4) *gabózja* 'I asked'
- (5) *wabózja* 'you (singular) asked'
- (6) *abózja* 'he (1) asked'

Examples of H SPs in these constructions are

- (7) *bachó bábózjaxφ* 'the people (2) ask'
- (8) *rzitjwá rzibóxólaxφ* 'the dogs (10) bark'
- (9) *moze óbónwaxφ* 'the village (3) is seen'
- (10) *hábózja* 'we asked'
- (11) *lábózja* 'you (plural) asked'
- (12) *bábózja* 'they (2) asked'

Object Prefixes (OP) are tonally like the past consecutive SPs: All are H except those of the first and second person singular and Class 1:

- (13) *ampala* 'he (1) counted me'
- (14) *axobala* 'he (1) counted you (singular)'

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- (15) *ambala* 'he (1) counted him (1)'
 (16) *ahébála* 'he (1) counted us'
 (17) *alébála* 'he (1) counted you (plural)'
 (18) *abábála* 'he (1) counted them (2)'

Other prefixal elements have underlying tones as follows: The indicative negative prefix is L *ha*; the participial negative prefix is L *sjaa*; the subjunctive negative prefix is L *sje*, and the infinitive negative prefix is H *sjaá*, for example

- (19) *hakébalé* 'I don't count'
 (20) *nó kēsjaabalé* 'if I don't count'
 (21) *bāsjebalé* 'they (2) shouldn't count'
 (22) *xosjaábala* 'not to count'

The aspect/mood infixes (AMI) indicating potential or progressive are both H, respectively *qá* and *sjá*, for example

- (23) *aqábóná* 'he (1) can see'
 (24) *osjábalayp* 'he (1) is still counting'

Tonally, radicals may be divided into classes according to whether (i) they contain only L tones; (ii) they contain one H tone; or (iii) they contain two H tones. These classes are illustrated below with bisyllabic (historically fused extended) radicals in the infinitive positive:

- (25) *xorpbala* 'to go to sleep'
 (26) *xohómola* 'to rest'
 (27) *xoxópola* 'to remember'

The H tone of a non-syllabic radical, and the second H tone of double-H monosyllabic radicals are manifested on the vowel (the tense suffix, or belonging to an extension) following the radical, for example

- (28) underlying *xo + j + a* becomes surface *xojá* 'to eat' where underlyingly the H belongs to the radical *j* 'eat', and
 (29) underlying *xo + bɸn + a* becomes surface *xobóná* 'to see'

where underlyingly the radical *bɸn* has two tones, the second of which is shifted.

The motivation for analysing *xojá* underlyingly as I did in (28) is well known: In the course of its historical development, the proto-form **li* underwent the segmental process of vowel-desyllabification (and consonant-palatalization), but in this process the tone is left intact, and hence its synchronic association with a non-syllabic form. I believe that the second H in forms such as *xobóná* could have had a similar development, in that the protoform of *bɸn* could have been bisyllabic, say *bɸnɸ* perhaps. I admit, however, that my evidence for such a reconstruction is slight (and beyond the scope of this article), and that radicals such as *bɸn* could also be analysed as single-H radicals which spread their tone one syllable to the right. This phenomenon of spreading an H one syllable to the right, is, as I show further on, a common tonal process in Qhalaxarzi.

There are also toneless non-syllabic radicals in Qhalaxarzi such as *lw* 'fight', as in the infinitive for example

- (30) *xolwa* 'to fight'

Historically these arose from L-toned CV proto-forms, in this

case from **lu*. Unlike their H-toned counterparts, such as **li* mentioned above, it appears that for Qhalaxarzi at least, the L tone was deleted when the vowel was desyllabified. This is claimed because there is no evidence of such radicals tonally affecting an adjacent syllable, in the way, for example, that *j* 'eat' causes the L of the following tense suffix *a* to become H (see example 28). It is simpler, therefore, to consider it synchronically toneless.

The tones of extensions (except those fused to double-H monosyllabic radicals, such as *-ól-* in *xópól* (see example 27)) are analysed as underlyingly L. It is possible that these elements are actually toneless underlyingly — support for this comes from the fact that extension tones never trigger a tonal alternation. For the sake of uniformity — but also since my analysis is in no way complicated by the assumption — I take extensions as underlyingly L. Examples of synchronically extended radicals are:

- (31) *xo + bel + is + ɛzj + a → xoberzisezja* 'to boil (something or someone)'
 (32) *xo + bɸzj + ɛzj + an + a → xobózjezjana* 'to ask on behalf of each other'
 (33) *xo + bɸh + ol + ol + a → xobóhólola* 'to untie'

There are three tense suffixes. Low *a* occurs in the infinitive, the positive indicative and participial, and the past consecutive, for example (for infinitive examples, see 25, 26, and 27)

- (34) *obózja pózjɸ* 'he (1) asks a question'
 (35) *hɸ ɛbózja* 'if he (1) asks'
 (36) *abózja* 'he (1) asked'

High tense suffix *é* occurs only in the negative past, a form occurring in the data only as the complement of *hasé*, for example

- (37) *hasé kébózé* 'I didn't ask'

High *é* occurs in all other constructions (except that in the positive imperative with no OP, or first person singular OP, it is *á*), as exemplified below.

- (38) *hakébózé* . . . 'I don't ask . . .'
 ('. . .' means that an adjunct (object or adverb) would follow this construction)
 (39) *lésjébózé* 'you (plural) should not ask'
 (40) *bábózé* . . . 'ask them (2) . . .'
 (41) *bózjá* . . . 'ask . . .!'

The last morpheme found in main verb constructions are what I call post-suffixes. These are low *yp* and high *xɸ* which occur in the positive indicative with low SPs and high SPs respectively, if no adjunct follows the construction, for example

- (42) *obalayp* 'he (1) counts'
 (43) *kébálaxɸ* 'I count'

I now come to the rules themselves. These may be divided into two types: There are rules which are wholly morphological in that they require no contextual tonal information to trigger them, and there are rules which require both morphological and tonal specification. I shall look at the purely morphological rules first.

The rule of Subject Prefix Lowering (SPL) lowers an SP

preceding the potential infix *qá*, for example

- (44) *keqábalá* (or *nqábalá*) 'I can count' (compare with 43)

Another rule, Subjunctive Lowering, causes the H tense suffix plus an immediately preceding H extension tone to become L in the positive subjunctive if there is not an OP in the construction, for example

- (45) *hébózjẹ* 'let us ask'
(46) *héxópólẹ* 'let us remember'

Compare these to (47) and (48) in which an OP is present:

- (47) *hébábózjẹ* 'let us ask them (2)'
(48) *hébáxópólẹ* 'let us remember them (2)'

A third purely morphological rule is Adjunct-less Lowering (AdlessL). This rule lowers the H tense suffix in negative indicatives and in imperatives, positive or negative, if no adjunct follows these constructions, for example

- (49) *hahébózjẹ* 'we do not ask'
(50) *bózja* 'ask!'
(51) *sjebózjẹ* 'do not ask!'

Compare these to (52), (53), and (54) respectively, in which an adjunct does follow:

- (52) *hahébózjẹ pójjọ* 'we do not ask a question'
(53) *bózja pójjọ* 'ask a question!'
(54) *sjebózjẹ pójjọ* 'do not ask a question!'

Although this rule is triggered by purely morphological information, it is prevented from applying if the preceding tone is an L radical tone, for example

- (55) *hahébalẹ* 'we do not count'

The rest of the rules require both morphological and tonological specification. The first of these, Adjunct-ful Raising (AdfulR), is in a sense the other half of AdlessL. Just as AdlessL lowers a high tense suffix if no adjunct follows, so AdfulR raises a low tense suffix if an adjunct does follow. This occurs only in the positive indicative, and only if the SP is high, for example

- (56) *bábózja* . . . 'they (2) ask . . .'
(57) *kékhúrzúmólá* . . . 'I uncover . . .'

Compare these to (58) and (59) respectively, in which the SP is low, and no AdfulR takes place:

- (58) *ebózja* . . . 'he (9) asks . . .'
(59) *okhúrzúmola* . . . 'he (1) uncovers . . .'

Observe that in (57) not only was the tense suffix raised, but also the extension *-ol-*. This is caused by a rule I call Left Suffix Raising (LSR), which raises all extensions to the left of a high tense suffix. In this case the H tone of the tense suffix is derived, of course, by AdfulR, but underlyingly H tense suffixes have the same effect, for example, in the imperative (plus following adjunct), the subjunctive (with OP), and the negative past:

- (60) *morqbázjẹ* . . . 'put him (1) to sleep . . .!'
(61) *kérzikhúrzúmólẹ* . . . 'I should uncover them (10) . . .'
(62) *hasẹ bábózjánẹ* 'they (2) did not ask each other'

LSR is different from all of the rules given so far in that it applies generally when the tense suffix is high, irrespective of the construction type.

An equally pervasive rule is Right Prefix Raising (RPR). This rule has two parts: (i) a H SP (except in the past consecutive) or a H OP, will cause an immediately following L radical tone to become H (examples 63 and 64), and (ii) any H SP, and the AMIS, potential *qá* and progressive *sja* will cause an immediately following L OP to become H (67 and 68):

- (63) *kébalaxọ* 'I count'
(64) *bárqbázjẹ* 'put them (2) to sleep!'

Compare these to (65) and (66) respectively, in which the SP and OP are L:

- (65) *obaluyọ* 'he (1) counts'
(66) *morqbázjẹ* 'put him (1) to sleep!'

Examples for part (ii) of the rule are:

- (67) *kémbalaxọ* 'I count him (1)'
(68) *uqúrmbala* 'he (1) can count him (1)'

Observe in (67) that the derivedly H OP *m* does not in turn cause the following L radical *bal* to become H.

RPR is restricted from applying to a penultimate L tone which is followed by a final H. Observe the lack of its application in the following two examples:

- (69) *hakébalẹ* 'I do not count'
(70) *hámohá* 'we gave him (1)'

The last rule is called Inter-High Raising (IHR). This rule causes an L morpheme, which may be the subjunctive negative prefix *sje*, an L OP or an L radical, to become H when it is between two high tones, for example

- (71) *hésjébózjẹ* 'let us not ask'
(72) *xosjááxóbózja* 'not to ask you (singular)'
(73) *kéxórqbázjẹ* 'let me put you (singular) to sleep'

Compare (71) and (72) with (74) and (75) respectively, in which the tone following the susceptible morpheme is L. In (73) the derivation is as follows: *ké + xo + rqb + azj + ẹ* becomes *kéxórqbázjẹ* by RPR, becomes *kéxórqbázjẹ* by LSR, and finally *kéxórqbázjẹ* by IHR.

- (74) *hésjébalẹ* 'let us not count'
(75) *xosjááxobala* 'not to count you (singular)'

IHR in certain cases takes on the function of RPR where this rule is prevented from applying to a penultimate L followed by final H. For example, if (69) had an adjunct following it, it would become

- (76) *hakébalẹ* . . . 'I don't count . . .'

where the H tone of *bal* is analysed as being a result of the application of IHR. Another example would be

(77) *héhóké* 'let us mention you (singular)'

where IHR raised underlyingly L OP *xó* 'you (singular)' in penultimate position with a final H following. This function of IHR, of standing in for RPR, so to speak, is, however, restricted to only certain constructions. For example, in the past consecutive, (70) does not by means of this rule become

(78) **hámohá* 'we gave him (1)'

In some constructions the combined effect of these rules is the characterization of that construction by a particular tone melody. Observe, for example, that in the negative indicative without following adjunct, the melody is LHL, irrespective of the underlying tone class of the radical (the only exception being with L monosyllabic radicals in which case the tone sequence is LHLH as in *hakébalé* 'I do not count'). This melody is created by Left Suffix Raising, Right Prefix Raising, Inter-High Raising and Adjunct-less Lowering, as is illustrated below with the forms *hakéxóróbázjé* (L radical *róbazj*) 'I do not put you to sleep', *hakéxohómózjé* (single H radical *hómózj*) 'I do not put you to rest', and *hakéxóxópólé* (double H radical *xópól*) 'I do not remember you':

(79)	<i>ha + ké + xó + róbazj + é</i>	<i>ha + ké + xó + hómózj + é</i>	<i>ha + ké + xó + xópól + é</i>
LSR:		ázj	ózj
RPR:	xó	xó	xó
IHR:	rób		
AdlessL:	hakéxóróbázjé	hakéxohómózjé	hakéxóxópólé

Other tonal melodies found in the language are LH in the negative indicative with following adjunct, HL in the subjunctive without OP, H in the subjunctive with OP, among others. All of these melodies are created by the combined application of at least some of the rules discussed above. As such, they must be regarded as surface tone melodies, derived by accident, so to speak, from different underlying tonal structures.

This is different from the treatment given to tone melodies in some recent analyses of Bantu tone, where the melodies are claimed to be underlying and to be mapped directly onto

morphosyntactic constructions. This is the way Odden (1984) and Laughren (1984) treat Shona verb stems and Zulu nouns respectively, for example.

It would be quite possible in Qhalaxarzi to treat melodic constructions in this way, but in my view, to do so would mean the unnecessary proliferation of theoretical apparatus for handling tone, since the very rules which were shown to create tone melodies are independently required to account for tone alternations in non-melodic constructions in any case. As an example of a non-melodic construction (one which is not characterized by a particular tone sequence) consider the positive imperative without following adjunct, which can have the 'melodies' LH, LHL, or HL:

- (80) *balá* 'count!'
 (81) *róbála* 'go to sleep!'
 (82) *bózja* 'ask!'
 (83) *khurúimola* 'uncover!'

It is possible that the way tone melodies are created synchronically in Qhalaxarzi represents historically the way in which underlying tone melodies come into existence in those languages which have them. Such an historical change would

be caused by the lexicalization of surface melodies, together probably with analogical levelling if there were exceptions, and analogical extension to constructions originally not exhibiting surface tone melodies.

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