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2. Phonology

2.1. Inventory of consonants, vowels, and tones

2.1.1. Consonants

			lab	alv	pal	lat	vel	lab vel	lar	lab lar
obs	stop	vl	p	t	c		k	kw		
		vd	b	d	j		g	gw		
		glot	B	D	Dy					
	fric	vl	f	s		tl			h	hw
		vd	v	z		jl			gh	ghw
son	nas	m	n	ny			N			
	fl/tr		r							
	lat				l					
	s.v.			y				w		

Remarks:

Laryngeal fricatives - The laryngeal fricatives /h, hw, gh, ghw/ historically derive from velar fricatives */x, xw, G, Gw/ respectively. Some speakers still pronounce these with audible velar friction, though this is never very strong. There are borrowed words with original [h], e.g. hérán 'good fortune' (< Kanuri < Arabic), but these h's have fallen together with native h < *x. Phonologically /h, hw, gh, ghw/ and also /w/ all function as velars for at least one phonological rule, viz. realization of the linking morpheme /k/ as Ø in /___[velar] (-----, Schuh 1977:51).

Velar nasal - N has a very restricted distribution. Subphonemically, it is the allophone of /n/ found before velar consonants (/ngàacáan/ --> [ŋgàacáan] 'toad', /mângáan/ --> [mâŋgáan] 'friend') and optionally an allophone of /g/ for at least some speakers before a nasal (g@máan = @Nmáan 'thigh', g@nán = @Nnán 'receiving'). A second environment for the velar nasal is in qualifying words (3.5.4) such as t@NNá 'replete', g@r@NNà 'lined up'. As 3.5.4, fn. 1 states, however, this class of words never has a voiced obstruent as the last consonant. Since all the cases of [N] found here are geminate, and since geminate consonants in Bade are almost entirely restricted to this class of words, [NN] could reasonably be phonemicized as /gg/. The only environment where N is found and where no synchronic phonological explanation for its appearance is available is where it

is a realization of the linking morpheme /k/ 'of' (-----) before vowels and nasal consonants, e.g. zàyáa-N-íi 'your rope', Dàcə-N àmàtən 'hair of women', gwàmə-N máayāan 'ram of an emir'. This morpheme clearly reconstructs as *k (Schuh 1977), but in modern Bade no general rule realizes /k/ as [ŋ] between vowels (cf. ákān 'fire', bəkən 'roasting', etc.). This means that although [ŋ] is not, strictly speaking, phonemic in Bade, it does appear in a phonological environment where, at best, it requires an ad hoc rule for the phonetic realization of a single morpheme.

2.1.2. Vowels

Simple vowels	Diphthongs
i, ii ə u, uu	ai au
e o	
a, aa	

doubled vowels = long vowels

Remarks:

High vowels - The short high vowels (i, ə, u) in medial position do not contrast with each other, their quality depending on consonantal environment. Phrase final, /i/ and /u/ do contrast, but [ə] does not appear. See 2.4.1 for details.

Mid vowels - There is no length contrast for mid vowels. They are phonetically long in open syllables, but they will be written as undoubled everywhere.

Diphthongs - In unanalyzable lexical roots, only the diphthongs /ai/ and /au/ are found, e.g. áikwāan 'finger', áuDən 'grave'. Moreover, they are almost entirely restricted to initial position.¹ Word internal, only three examples of /au/ were found: kàuyú 'fry', gàunú 'weave zana mat', zàutú 'have diarrhea', the latter two having secondary verbal nouns (3.8.2.3.2) gáwánən and zàwátən respectively. In addition to underlying /ai, au/, various morphological processes yield the following diphthongal syllable peaks:

aai	<u>màaitú</u>	'become chief'	<u>máayāan</u>	'chief'
aa	<u>sáausáawà</u>	'pleasantly breezy'	(redup. of <u>saaw-</u>)	
eu	<u>réu</u>	'the place'	<u>ré</u>	'place' + <u>-w</u> 'the'
ii	<u>DíiuDíiwà</u>	'thin, slim'	(redup. of <u>Díiw-</u>)	

The diphthongs ?[oi] and ?[uui] (parallel to the existing diphthongs which glide in the opposite direction, [eu] and [iiu]) do not exist because Bade lacks any lexical items or morpheme combinations where these phonetic forms could arise. The potential diphthongs ?[ei] and

?[ou] monophthongize to simple mid vowels (see 2.4.3). The short high vowels are assimilated to a following semivowel and merge with it to form a long high vowel (see 2.4.1).

2.1.3. Tones

Tone is phonemic in Bade, i.e. pitch relationships between syllables in words are fixed and non-predictable, and words can potentially differ only in tone. Tonal alternations with purely phonetic conditioning (2.5) as well as morphologically conditioning (see esp. the verbal system, 3.8) comprise some of the more complex rules and rule interactions in the language. Yet from the point of view of contrast, tone bears an extremely light functional load. True lexical minimal pairs are almost non-existent (the only clear example I have found being káaká 'God', kàaká term of address for person of grandparents' generation). Forms in the verbal system differing only in tone exist, e.g. Perfective màskátú, Imperfective màskátù 'turn around, but here other factors in addition to tone, such as form of the subject pronoun, would always keep meanings distinct. Moreover, phonetically conditioned tone rules (2.1.5) obscure underlying tones to such an extent in connected discourse that one wonders how and why tonal distinctions have been maintained at all. Nonetheless, phonological tone is part of Bade, and based on comparative evidence, it seems to be a fairly stable part, since across languages and dialects in the Bade/Ngizim group, the same lexical items are pronounced with the same tones, ceteris paribus.

Western Bade can be analyzed as having only two phonemic tones:

Hi ' Lo `

In addition, the following phonetic tones are found on syllables:

Fall ^ Rise ˇ Downstep (DS) -

There is also Downdrift whereby a Hi is lower in pitch after Lo than a Hi preceding that Lo.

Fall can often be analyzed as a sequence of Hi-Lo contracted onto one syllable through either historical or synchronic processes, e.g. áDîakf@n 'knee' < *ád-áa-k@f-@n 'head-of-knee-determiner' (cf. Ngizim kúfú 'knee'), kûmbáan 'pond' < *kúmbV + áan (cf. Gashua Bade kúmbàk). Other cases of phonetic Fall must be accounted for not by the contraction of two discreet tone bearing syllables into one, but rather as the result of tone processes and their interaction with consonant types (2.5). Thus, ná tlví 'I will pierce' derives from a verb form with underlying tones /tlví/ whose initial tone is raised but where the underlying Lo shows up in the Fall, its presence being facilitated by the voiced obstruent v (see 3.8.3.6.3). Finally, Fall is a phrase final realization of Hi for some speakers. Both Lukas (1967/68) and I noted this for some informants. Other speakers have a simple Hi, and finally (as is true in the dialect described here), many speakers realize final Hi after Hi as what I perceive as DS (cf. Schuh (1977:16, fn. 19)).

Rise is apparently always derived from interaction of tone with consonant types, never from contraction of Lo + Hi, since vowels bearing Hi are impervious to syncope (preventing a sequence CVCV... from becoming CVC...).² Thus, in the phrase ná gáunā-w 'I will weave it', the verb form must be analyzed as having underlying tones /gáunā-w/ with the initial syllable pulled down at its outset by a sofar poorly understood process (see 3.8.3.6.3, fn.----). Likewise, monosyllabic verbs beginning in a voiced obstruent are usually heard with rising tone (3.8.3.1.1), e.g. né dǒ 'I took (it) out'.

Downstep (DS) is problematic in Western Bade. Cases are common where interaction of Downdrift with processes which suppress or raise a Lo syllable between Hi's produce a downstep on the second Hi (s = syllable):

Suppression of Lo /śśś/ --> [śś]

/nə̀ ùktú/ --> [núktū] 'I took'

/dà Də̀bdì ìig̀lì/ --> [dà Də̀bdìig̀lì]
'that he sell to you'

Raising of Lo /śśś/ --> [śśś]

/ná m̀sì ìig̀lì/ --> [ná m̀sìig̀lì]
'I will buy for you'

(See 2.5 for a fuller account.)

In Ngizim and Gashua Bade, DS is marginally contrastive with Hi and Lo, i.e. there are a few words where a syllable following Hi is always pronounced as a DS, but there are also words where a syllable following Hi is always pronounced Hi and others where a syllable following Hi is always pronounced Lo. A case in point is the name for a child born following the birth of twin siblings, pronounced Kábāu in Gashua Bade, Kábō in Western Bade. Both dialects always pronounce this with the second syllable as DS. However, as I noted above, in the dialect under investigation here, there is no apparent contrast between Hi Hi# and Hi DS#, at least according to my hearing, and I hear no tonal difference between Kábō and any of hundreds of other words ending in the sequence which I have written Hi DS#, e.g. ákūn 'goat', báden 'Bade', etc.) Thus, in Western Bade there seems to be no reason to give DS underlying phonemic status. I have not been entirely consistent in tone marking in this book, sometimes marking Hi Hi (záwán 'rope') sometimes Hi DS (see above). Citations here are copied from my field notes, which I don't wish to alter in the absence of a native speakers or a recording of the actual utterances in my notes. I am confident, however, that no distinction exists between Hi Hi# and Hi DS#.

2.1.4. Remarks on orthography. In a series of meetings with officials of Bade Division (Borno State, Nigeria) in 1974, a standardized Bade orthography was arrived at. Results of these meetings are published in Schuh (1974). The symbols used in this book are those in 2.1.1-3 with a few exceptions:

1. Vowel length and tone - The standardized orthography was meant as a practical orthography for native speakers of Bade. Following the practice for orthographies of other languages in northern Nigeria, it was not considered necessary to mark tone or vowel length. The very low functional load of tone has already been mentioned (2.1.1.3). Vowel length is communicatively more significant, but lexical or grammatical confusions resulting from lack of length marking would be even less than is the case for Hausa, where an orthography which does not mark length is quite successful. However, in a technical reference grammar such as the present one, both tone and vowel length are significant and are marked using the symbols in 2.1.2-3. Vowel length is marked everywhere (except in a few examples drawn from Schuh (1975), where the Bade texts were originally written by Bade speakers themselves, who did not mark length). Tone is marked throughout Chapter 3, which deals with morphology, where tone is often significant. In Chapter 5, tone is omitted except where specifically mentioned and on subject pronouns of verbs (this allows the tone of the verb to be predicted in most cases, and there are potentially a few constructions where tone may be needed to indicate tense/aspect). Omission of tone in longer, non-formulaic utterances is justified in that it is almost impossible to state accurately what the tones will be for a given token of an utterance. This is the result of a number of factors: (1) phonetically conditioned tone rules (2.5), whose application depends on speech tempo and connectedness, interacting with morphologically conditioned tone rules, downdrift, vowel elision, and vowel coalescence (2.4.3); (2) generally rapid style of speech for most speakers; (3) fairly small pitch differential between Hi and Lo; and (4) low lexical functional load of tone, which allows blurring of tonal distinctions made in isolated citation of words.

2. Velar nasal - In the standardized orthography the symbol n' was adopted for [N] for typographical reasons. The symbol N is used here to avoid potential confusion for users of this book who are unfamiliar with the orthography.

There are a few other orthographic conventions to note:

3. Syllable final labialized velars - Preconsonantal labialized velars /kw, gw/ are fairly common. These have a noticeable affect on preceding vowels. If the preceding vowel is a short high vowel, it is always realized as u; if the preceding vowel is a or aa, there is perceptible lip-rounding anticipating the velar (no examples of other vowels have been found in syllables closed by labialized velars). In the case of short high vowels, the presence of u preceding the velar is sufficient to show that it is labialized without marking labialization on the velar itself. For a/aa, in the standardized orthography it was decided to write ... (a)auKC ..., this being the auditory (K = any velar, C = any consonant) impression conveyed by this combination. However, in the present grammar the practice followed will be to write ... (a)aKwC ... in order to avoid possible misinterpretations about syllable structure.

<u>Written</u>	<u>Underlying</u> (@ = any short, high vowel)	
ùktán	/@kwtán/	'taking'
dùksi	/d@kwsí/	'heavy'
àkws@n	= written	'tuft'
zákwtaān	= written	'Ruppell's griffon'

4. Elided and contracted vowels - Whenever two vowels come together across a morpheme boundary in connected speech, they combine in one of several ways (2.4.4) to form a single syllable peak. The following orthographic practices will be followed:

(1) If one of the vowels belongs to an affix, the form will be written as pronounced (vowels elided or contracted) and the affix separated by a hyphen. The decision as to which side of the vowel to put the hyphen on depends on the affix.

/nɛ̃ + @bdú/ written (and pronounced) nɛ̃-bdú 'I asked'

/ámà + áa + rī/ written (and pronounced) ám-áa-rī 'his wife'

/à + ìik + íi/ written (and pronounced) èe-k-íi 'look!' (m.sg.)

(2) The sequence a + ii contracts to [ee]. This will be written as such, sometimes with the "missing" /a/ in parentheses if this is important for some reason.

/áci gàfá íi-g̀lì/ --> [áci gàféeg̀lì]
written áci gàf(a) ée-g̀lì 'he caught for you'

Elsewhere, both vowels will be written even though only one is pronounced (see 2.4.4 for examples, where the written form = underlying rather than phonetic). There will be some inconsistencies where the first vowel is i/@/u/. This vowel will sometimes be written, sometimes not.

nɛ̃ màsɛ̃ àbáan or nɛ̃ màs àbáan 'I bought a bow'

2.2. Syllable and word structure

Following are the possible syllable types of Western Bade:

<u>Light</u>	<u>Heavy</u>	<u>Extra Heavy</u> ⁴
V	VV	VVV
CV	CVV	CVVV
	VC	VVC
	CVC	CVVC
i.e. (C)V	(C)V{ $\begin{smallmatrix} V \\ C \end{smallmatrix}$ }	(C)V{ $\begin{smallmatrix} V \\ C \end{smallmatrix}$ }

Syllabic nasals (written as nasal consonants with tone marks over them) are common in word initial position before obstruents, e.g. ṁDɛ̃n 'name', ṁsáan 'hippopotamus', ṁgàacáan 'toad'. Their status

as light or heavy is unclear since no phonological processes refer to the heavy/light distinction, and to my knowledge there is no Bade poetry with metric patterns which refer to syllable weight. When preceded by a vowel, these nasals are desyllabified, e.g. m̄cō 'this one (fem.)' but təm̄akú-mcō 'this sheep' (resyllabification producing a heavy syllable -kun-). Historically, these syllables sometimes are syllabification of the nasal portion of a prenasalized stop, e.g. ngúdīn 'poor man' (< Kanuri Ngúdi).

Extra heavy syllables are unusual in Chadic languages, but they are fairly common in Bade. Indeed, minimal and near minimal pairs exist contrasting heavy and extra heavy syllables, e.g. ràktú 'persevere' vs. ràaktú 'press down', mângáan 'friend' vs. màangáan 'Manga person', áikon 'seeing' vs. yáaikó (from /yaa-likó/) 'you (m.sg.) will see', ngàrèn 'old person' vs. àngàriin 'proverb'. A common environment of contrast for -aan and -an is in masculine/feminine pairs such as mângáan/mângán 'friend (m./f.)' (3.9.2.1.1).

Specific distributional characteristics of vowels and consonants are covered in 2.3 and 2.4. The discussion which follows here recapitulates briefly the features covered in detail in Schuh (1978). Though that article describes the Gashua rather than the Western dialect, the facts are the same in all relevant respects.

The major word formation generalization can be stated as follows:

- (a) Pairs of consonants which can abut (form CC sequences) do so whenever permissible;
- (b) a short high vowel may never separate a pair of consonants which may abut.

From the syllable structure schemata above, it is clear that CC clusters after or before pause (#CC or CC#) and three consonant clusters (CCC) are never permissible. Otherwise most consonant pairs may occur in sequence. The second restriction may be rephrased as follows (where @ is a cover symbol for [i, ə, u]): there are no words with a sequence C₁@C₂V... where C₁ and C₂ form a permissible sequence. An environment preceding C₁ has purposely been omitted: if a vowel precedes C₁, the sequence will be VC₁C₂V; however, if C₁ is the first consonant of a word, Bade requires that the word have the structure @C₁C₂V. (If another C (C₃) precedes C₁, the facts are more complex, with sequences sometimes being @C₃C₁@C₂, sometimes C₃@C₁C₂, not always in predictable fashion--see Schuh² (1978)). Thus, the easiest environment to notice restrictions against specific consonant sequences is in word initial position, where words will have a form C₁@C₂V if the consonants are not permitted to abut but @C₁C₂V if they are.² The consonant restrictions will be illustrated by words of this type. The major restrictions on consonant sequences are as follows:

- (i) Consonants may not come together to form geminates, including cases where C₁ ≠ C₂ only with respect to voice.⁵

pəbətən 'ashes' not *əbbətən

- (ii) If C₁ is sonorant (nasal, liquid, semivowel) or glottalized, C₁ may not be an obstruent.

təlāan 'moon' not *ətlaan (tl = t + l)

bəlān 'nice' not *əblan

sìyú 'to fish' not *əsyu

dəBú 'to water (animals)'
(animals)'

Other types of sequences are possible, viz. obstruent + obstruent (ùktú 'take', ədbú 'set up', əbdú 'ask', ətltú 'put down', etc.); sonorant + obstruent (ərbú 'move', əlhú 'say'); word initial nasal + obstruent sequences have a syllabic nasal rather than əN (Ñhwú 'fill', məfú 'groan'); most sonorant + sonorant sequences are permissible (mənú 'guard', əlmú 'build', ərwén 'farming'), though nasal + liquid or semivowel is disallowed (məlāan 'oil', nìyú 'scorn'), probably because nasals are the most "obstruent-like" sonorants in articulation, and hence these sequences approximate the impermissible obstruent + sonorant. See Schuh (1978) for further discussion.

2.3. Consonant distribution and rules. The subdialect of Western Bade described here has virtually no productive consonant alternations. A number of sound changes have left Bade with interesting sound correspondences to other members of this language group (Schuh, to appear), but in only one or two cases (outside the Amshi subdialect) have these sound changes produced alternations.

2.3.1. Obstruent voicing agreement. Non-glottalized obstruents which abut must agree in voicing. In addition to being a condition on lexical structure, this restriction operates as a phonological rule, regressively voicing obstruents in reduplicants:

jábjáppà 'very small' cf. jáppà 'small'

jləbjləpá 'descending' redup. of jləp

cəgǰkən 'heel' < *jək-jək (cf. 2.3.2 for c < *j)

jəgǰaktú 'tremble' < *jak-jak-tu or *jag-jag-tu

There are many reduplicated verbs such as kəgdú 'break off many' (cf. kədú 'break off (intr.)'), fəvdú 'hit repeatedly' (cf. əvdú 'collide') where, because of the change mentioned in 2.3.1, it is not possible to know whether voicing assimilation in the CC sequences has taken place or devoicing of the first consonant. Comparative evidence is also ambiguous.

2.3.2. Obstruent voicing dissimilation. Throughout Bade proper the following sound change has taken place:

C

[+obstruent] --> [-voice] / ___ V (C) [C] [+obstruent]
 [+voice] [+voice]

Comparative evidence for this is abundant,⁷ e.g. kádùwáan 'duiker' (cf. Hausa gàdáa), sáavànyèñ 'guinea fowl' (cf. Hausa zàabóo). There is also internal evidence, especially in reduplicants, e.g. p@b@t@n 'ashes' (cf. proto-Chadic *b@tu), t@d@m@m@n 'blood' (cf. Bolanci dòm), fàav@rú '(many) go out' < v@rú 'go out', kwàgwDú 'admonish' < ?u@Dú (not attested in any related meaning), and examples mentioned in 2.3.1. In cases like the latter two, one could say that the alternation is productive insofar as this type of verb reduplication is productive (but see 3.9.4.2).

For reasons not yet determined, this sound change has left a large residue of forms not affected, so the restriction on segmental sequences implied by this sound change cannot be stated as a categorical rule. Thus, we find words such as dàbíin 'hoe', dàgùnén 'hip', gáagàrè 'big', jìij@màkón 'thorn', jl@gdàaràkón 'calabash fragment', etc.

In the westernmost Bade-speaking area (the villages of Adiya, Sugum, Madamuwa, and perhaps a few others), this sound change has produced alternations in certain prefixes. When the adjective forming prefix *ga- (3.9.3.1), the stative forming prefix *da-/d@- (3.9.3.2), or the person prefixes *g? 'you (sg.)' and *da/*d? '3rd person Subjunctive/2nd Subjunctive' (3.8.3) are prefixed to verb roots beginning in voiced obstruents, the consonants of these prefixes are devoiced:

- *ga- gà-mtá 'dead' from ntú 'die'
- *d@- t@-vadí 'lying down' from vádú 'lie down'
- t@-jlàwí 'seated' from jlàwú 'sit down'
- d@-táDà 'cast aside' from tàDú 'drop, release'
- d@-làgí 'halted' from làgú 'stop'
- *g? k@-rdiitàatá-yū-m 'you don't agree with me'
- g?-ncú tâam? 'what do you want?'
- g@-rBá-m 'don't move'
- *da/*d@
Árì Púkúmàamí tá z@nì má ... 'A.P. said...'
Aláajì dà-tké-cì 'Alaji killed him'

2.3.3. Restrictions on word final consonants. The only consonants which may appear word final are sonorants (nasals and liquids--also semivowels if the offglides of diphthongs are so analyzed). There can be no word final obstruents (except in ideophones (3.5.3) where

voiced, non-glottalized obstruents may not appear word final). This restriction accounts for final -i in words which must be reconstructed with final obstruents, e.g. vàDì 'five' (GB vàaD), as well as Definite Forms (3.1.1.2) ending in -i rather than an obstruent, e.g. ùuràkì 'leopard' (cf. GB ùulàk), pəbətí 'ashes' (GB pɔ̀bət).

2.3.4. Nasal agreement. The nasal m may precede alveolar obstruents or n, e.g. zəmtú 'draw out', kàamnú 'wait for', though not alveolar liquids (see 2.2, end). The nasal n may not precede liquids or semivowels (see 2.2, end), nor may it precede m. In the latter case, *n has dissimilated to l, e.g. əlmú 'build' (cf. Ngizim nəmú), hàalmú 'beat drum' (cf. GB kānām 'beating drum'). The palatal nasal, ny, occurs only prevocally; the distribution of the velar nasal is discussed in 2.1.1.

Elsewhere, nasals must agree in point of articulation with a following consonant, i.e. [māNgáan] 'friend' but no *[mamʒaan] or *[mangaan], [kàmpárən] 'wasp's nest' but no *[kanparən].

2.3.5. Metathesis. Consonant metathesis has taken place as a common though non-categorical sound change in Bade, especially where the sequence *C + velar has been rearranged as velar + C, e.g. əgvú 'fall' cf. Ngizim vəgú), əgdəmən 'chief' (cf. Ngizim dəgəm) (see Schuh (to appear) for details). In the Amshi subdialect, this has apparently left no traces as alternations, i.e. only comparative evidence indicates that metathesis ever took place. I do not know if productive alternations are to be found anywhere, but in texts from villages in the far western and northwestern area, I have found forms such as the following, suggesting that metathesis may be working (semi?) productively across morpheme boundaries:

na təvgəDon 'I will urinate' (lit: I-am beating-of urine)
 /na tə -k vəDon/
 I beating of urine
 imperf.

aDaakaan (= Amshi aDaakaan) 'knee' (lit: head-of knee)
 /aDa -k əkfaan/
 head of knee

tərbəgbu 'hobble, fetter'
 reduplication of tərbəgbu < /tə-r-ba-bgu/

2.3.6. Weakening of syllable final velars. In Schuh (1978:254, 257 ff.) I point out that in the Gashua dialect, the restriction against obstruent + sonorant or glottalized consonant sequences (2.2) has generally been relaxed where the obstruent is /g/ (or /gw/). This relaxation is also taking place in Western Bade, though not to the extent it has in Gashua Bade. Thus, Gashua Bade speakers freely allow əghrliD or əNnyì, with concomitant phonetic modification of /g/, as (perhaps preferred) variants of gərlid 'cave' and gənyì 'penis'. No speakers of Western Bade with whom I checked this would allow anything other than gəráan 'cave' and gənyáan 'penis'. Indeed, with plain /g/ relatively careful speech always required the ...gə +

sonorant/glottalized... form, though for at least some lexical items I sometimes heard the Gashua type pronunciation before nasals, e.g. g@náan ~ @Nnáan 'thigh', g@nán ~ @Nnán 'receiving'. Note also the reduplicant [láagh láaki] 'very small' < láaki.

However, for /gw/ the tendency to cluster /gw/ with a following sonorant or glottal, with reduction to [w], is more pronounced, e.g. ùuDán 'hurrying' (though gùDán is also heard), âurén 'hare' (though âgwrén is also heard). Some words now may be lexicalized with /w/ rather than /gw/, since I never found a variant with [gw] for Amshi speakers, e.g. âuDón 'Balanites aegyptiaca' (Ngizim ákDà, dákwDà 'gruel flavored with fruit of B.a.').

2.4. Vowel distribution and rules

2.4.1. Quality of short high vowels. Short high vowels in Bade cluster around three acoustic centers: i, @ (= [ɨ]), u. Short i and u contrast in word final position: vàDì 'five' vs. fáDú 'four', n@ d@psú 'I hid' vs. ná d@psi 'that I hide'. The phonetic vowel @ never appears before pause.

Elsewhere, these three vowels are in complementary distribution depending on consonantal environment. In fact, there is an infinite range of vowels, governed by more or less "labiality", "palatality", "rounding", "backing", etc. of the consonantal environment, but at the systematic phonetic level, three different qualities prove to be satisfactory. The rules governing short high vowel quality can be stated as follows:

(a) $\begin{bmatrix} V \\ -\text{long} \\ +\text{high} \end{bmatrix} \rightarrow u / \begin{bmatrix} C \\ +\text{round} \end{bmatrix}$ (u if preceded or followed by w or a labialized velar)

wúDn		'knife'
kùrú	[kwùrú]	'refuse'
dùwún		'horse'
bùwáan		'trip'
túgzàráan	[túgwzàráan]	'sorcerer'
ùktú	[ùkwtú]	'take'

(b) $\begin{bmatrix} V \\ -\text{long} \\ +\text{high} \end{bmatrix} \rightarrow i / y$ (i if preceded or followed by y) y/

gìyín		'climbing'
nìyú		'swim'

(c) $\begin{bmatrix} V \\ -\text{long} \\ +\text{high} \end{bmatrix} \rightarrow$ elsewhere

@bdú		'ask'
B@rú		'crack'
k@Dó		'exceed'
s@n		'base'
@bjlà@m		'hyena'

Cases of conflict between (a) and (b) sometimes arise. In non-final syllables of words, the only conflict possible is for (a) to precede and (b) to follow (see note (2) in 2.4.2 for why this is so). In these cases, the vowel can only be called an "indeterminate vocalic transition" between the two consonants. Of eight words I collected where this conflict exists, I have recorded four with [i] and four with [u]:

wúyā	‘vulva’	hwìyú	‘cover drum’
kùyéēē@	‘early morning’	kwìyú	‘pack up’
kúyámmà	‘splash!’	gwìyáan	‘egg’
kúyyà	‘silent’	hwìyàmj@n@n	‘shoe’

In word final position a conflict between preceding y and following w can be created by adding the Previous Reference Marker (3.2.1). In these cases, the following w always prevails, the phonetic result being long [uu]:

gìyín ‘climbing’ /gìyí-w/ --> [gìyúu] ‘the climbing’

(There is no suffix morpheme like *y to test the parallel but opposite case.)

The statements of the distribution of [i, ə, u] within words also have the status of productive phonological rules. When words ending in -i or -u are medial in a phrase, in normal speech their quality will change according to consonantal environment.

átú	‘she’	[át@ b@nú]	‘she cooked’
		[átí yàayé]	‘as for her’
		[átú kwtú]	‘she took’
áci	‘he’	[ác@ b@nú]	‘he cooked’
		[áci yàayé]	‘as for him’
		[ácú kwtú]	‘he took’

(Presumably in phrases such as these if the preceding and following environments conflict, the same indetermination will exist as is found within words. I did not check this with informants.)

2.4.2. Distribution of vowels. The following vocalic distributional patterns in words hold for monophthongs (see 2.1.2 for remarks on distribution of diphthongs):

	<u>Word initial</u>	<u>Non-final open syllable</u>	<u>Closed syllable</u>	<u>Word final</u>
i	no	yes ¹ niyú ‘swim’	yes ^{1,2} gìyín ‘climbing’	yes vàDì ‘five’
ii	yes ² liwàn@n ‘day’	yes kiiDú ‘eat’	yes ³ hliintú ‘understand’ dàbíin ‘hoe’	(yes) ⁴ ági ‘you (m.s.)’
u	yes ¹	yes ¹	yes ¹	yes

	ùktú 'take' [ùkwtú]	kùrú 'refuse' [kwùrú]	túgzàráan 'sorcerer' [túgwzàráan]	f@dú 'four' dùwún 'horse'
uu	yes ⁵ ùuráan 'neck'	yes rùuyú 'farm'	no	no
@	yes ⁷ @bdú 'ask'	yes ¹ v@rú 'go out'	yes ¹ r@ptú 'join' áam@n 'water'	no
e	no	yes rètú 'divide'	yes ⁶ p@dêtl 'splash!' @rwén 'farming'	yes gàDé 'one'
o	no	yes kòtú 'call'	yes ⁶ kól-kól 'chopping' áísón 'sand'	yes kádùwó 'yesterday'
a	yes ám@n 'hand'	yes bàrú 'give'	yes tàksú 'tie' ákán 'fire'	yes Dàvá 'nice'
aa	yes áam@n 'water'	yes káamón 'farm'	yes kàaktlú 'measure' àbáan 'bow'	no

Notes:

¹Though i, @, and u can occur in various kinds of non-final syllables, their quality is determined by the statements in 2.4.1, of course.

²Short i in closed syllable can only be in the last syllable of a word. Elsewhere, "i" will always be metathesized with its governing consonant, y, the result being long ii. Thus, the word illustrating initial long ii derives from *yiwàné --cf. Ngizim yùwán.

³Phonetically there may be no differences between -in as in giyín and -iin as in dàbíin. The difference clearly emerges in morphophonemic patterns, however, e.g. addition of the Previous Reference Marker (3.2.1) yields [giyúu] for the former but [dàbíiu] for the latter.

⁴Final long ii occurs only in the second masculine singular pronoun in its various forms.

⁵All word initial long uu derive historically from wu (Schuh 1978). Thus, compare ùuráan with Ngizim wùrá.

⁶The mid vowels o and e are extremely rare in closed syllables other than word final. The only examples of e which I have found are pèrtú 'spread mat', déllá 'near', and ngwèllá 'peeking', the last two being ideophones. The vowel [o] is somewhat more common, but it usually seems to be analyzable as /Kwa/ or /aKw/ where Kw = a labialized velar, e.g. kòktú < /kwàkwtú/ 'become stuck', kòrtú < /kwàrtú/ = gòrtú < /gwàrtú/ 'outline, draw line'. But note words like fólfóllá 'hard and smooth' where no such explanation is possible.

A few generalizations can be drawn here:

Word initial: Historically speaking, only a, aa, and ii are found in this position. The high vowels that occur here (@, u, uu, and some ii) all derive from what I call "Prothesis" in Schuh (1978), viz. restructuring of words with initial *#C@CV... as #@CCv... .

Non-final open syllables: The entire vowel inventory of Bade appears here.

Closed syllables and final open syllables: The mid vowels e and o, which do not have a long/short distinction, may occur in both environments. Among short vowels, the only vowel which does not appear in both environments is @. If we think of @ as a neutralized version of /i/ or /u/ (2.4.1), then we can generalize to say "the mid vowels and all short vowels occur in closed syllables and word final". The long vowels /aa/, /ii/, and /uu/ are problematic. The situation can be recapitulated as follows:

	<u>Closed syllable</u>	<u>Word final</u>
aa	yes	no (marginal exceptions in ideophones)
ii	yes	no (except for a single morpheme)
uu	no	no (marginal exceptions in ideophones)

Again, from a historical point of view, the question is really why long vowels can occur in any of these environments, since at least proto-West Chadic would be reconstructed as allowing only short vowels here (Schuh, to appear; Newman 1979). Looked at this way, non-occurrence of uu is "normal". I have no explanation for the distribution of these vowels at this time.

2.4.3. Vowel elision, contraction and coalescence. In normal speech when two vowels come together, the phonetic outcome will be a single syllabic nucleus, brought about by elision of one of the vowels, contraction of the vowels, or coalescence of the two into a vowel different from either of the underlying vowels. It is possible to retain both vowels by inserting a glottal stop before the second, e.g. [átú 'áa nà] 'she will count' (normally pronounced [átáa nà]), but this is a marked, "emphatic" type of pronunciation rarely heard in even relatively careful speech. Thus, the practice in Lukas (1967/58) of providing initial glottal stops in all words with initial vowels or syllabic nasals is structurally and (almost always) phonetically incorrect.

The chart below lists all the possible vowel combinations. No words begin in e, o, or short i, hence the crossed out boxes. ~~In addition, I did not collect examples of the sequence -o uu- nor have I been able to find any in texts.~~ The presumed phonetic results are given in parentheses. Following the chart are examples of each possible combination with comments. The order of presentation of examples is left to right and top to bottom of the table:

Second in sequence -->

First in sequence		ə-	i-	u-	ii-	uu-	a-	aa-	e-	o-
	-ə	-ə-	X	-u-	-ii-	-uu-	-a-	-aa-	X	X
	-i	-ə-*	X	-u-	-ii-	-uu-	-a-	-aa-	X	X
	-u	-ə-*	X	-u-	-ii-	-uu-	-a-	-aa-	X	X
	-ii	-ii-	X	-ii-	-ii-	-iiu-	-iya-	-iyaa-	X	X
	-uu	see note on <u>uu</u> sequences below								
	-a	-a-	X	-a-	-e- (-ai-)	-au-	-a-	-aa-	X	X
	-aa	-aa-	X	-aa-	-aai- (-aa(y)ii-)	-aa-	-aa-	-aa-	X	X
	-e	-e-	X	-e-	-e-	-eu-	-e-	-e(y)aa-	X	X
	-o	-o-	X	-o-	-o(y)ii- -eo- or -ou-	-o-	-o-	-o(w)aa-	X	X

*By the rules in 2.4.1, "-ə-" here will be [i] if preceded by y and [u] if preceded by w or a labialized velar.

- ə ə- /jə məsə ʔfcāan/ --> [jə məsəfcāan] 'we bought a mat'
- ə uu- /áci məsə ʔgdāan/ --> [áci məsəʔgdāan] 'he bought a gourd'
- ə ii- /áci dəpsə ʔigii/ --> [áci dəpsəʔigii] 'he hid it for you'
- ə uu- /áci Dəgə ʔurəkən/ --> [áci Dəgəʔurəkən] 'he followed a leopard'
- ə a- /áci məsə ʔkūn/ --> [áci məsəkūn] 'he bought a goat'
- ə aa- /áci ʔktə ʔāmən/ --> [áciʔktāmən] 'he took water'
-
- i ə- /də məsi ʔfcāan/ --> [də məsəfcāan] 'that he buy a mat'
- i u- /də məsi ʔgdāan/ --> [də məsəʔgdāan] 'that he buy a gourd'
- i ii- /də dəpsi ʔigii/ --> [də dəpsəʔigii] 'that he hide (it) for you'
- i uu- /də Dəgə ʔurəkən/ --> [də Dəgəʔurəkən] 'that he follow a leopard'
- i a- /də məsi ʔkūn/ --> [də məsəkūn] 'that he buy a goat'
- i aa- /də ʔkti ʔāmən/ --> [dəktwāmən] 'that he take water'
-
- u ə- /wə ʔbdú/ --> [wəbdú] 'that we (incl.) ask'
- u u- /átú ʔsfú/ --> [átúsfú] 'she swept'
- u u- /átú ʔktú/ --> [átúktú] 'she took'
- u ii- /átú ʔikó/ --> [átúikó] 'she saw'
- u uu- /átú ʔunú/ --> [átúunú] 'she spent the night'
- u a- /átú ʔ táksà/ --> [átátáksà] 'she will tie'
- u aa- /átú ʔá nā-w/ --> [átáá nāw] 'she will count (them)'
-
- ii ə- /áci məsə ʔigii ʔfcāan/ -> [áci məsəʔigiiʔfcāan]
'he bought you a mat'
- ii u- /áci məsə ʔigii ʔgdāan/ -> [áci məsəʔigiiʔgdāan]
'he bought you a gourd'
- ii ii- /áci kəDá gli ʔi jərən/ -> [áci kəDá glijərən] 'his testimony is better than yours' (lit: he exceeds you as-to truth)
- ii uu- The exact phonetic properties of this combination are difficult to determine. Even on repeated listening to

recordings I am not sure whether there are two syllable pulses or one.

/áci gáfá íigìi ùuràkʰn/ -> [áci gáfégìiuràkʰn]
'he caught you a leopard'

-ii a- /nə̀ bàrə̀ íigìi ákùn/ -> [nə̀ bàríigìiyákùn] 'I gave you a goat'
-ii aa- /nə̀ bàrə̀ íigìi áamʰn/ -> [nə̀ bàríigìiyáamʰn] 'I gave you water'

-uu as first vowel: Long /-uu/ does not occur lexically at the end of words. Word final long [uu] does result from addition of the Previous Reference Marker (3.2.1) -w to words ending in short high vowels, e.g. msì 'husband' but [msúu] 'the husband'. In some cases, at least, ...V-w does not behave as a vocalic unit, e.g. -a-w does not become -o as the diphthong *-au has (see fn. 1). Therefore, I have not taken the long [uu] in this construction to be a legitimate example of phonologically long /uu/.

-a @- /áci gáfá @ktlán/ --> [áci gáfáktlān] 'he caught a cow'

-a u- /átú dá ùgzì/ --> [átú dágzì] 'that she return'

-a ii- The most frequent and productive realization of /-a ii-/ is [e]. This was found in all environments which were checked with one exception, viz. verbs other than likó 'see' which begin in the vowel ii-. Thus, /atu da iiDi/ --> [at@ daiDi] 'that she twist' but apparently not *[deDi]. A historical explanation for this is that such verbs originally began in the sequence *yV..., except for 'see', which must be reconstructed with initial *ii- (see fn.10). However, this explanation has problems, since the noun liwán in the fourth example below also originally began in *yV... (cf. Ngizim yùwán).

/áci gáfá íigìi/ --> [áci gáfégìi] 'he caught (it) for you'

/dɛ̀lá dàrà jàgá ìi gáajà/ --> [dɛ̀lá dàrà jàgégáajà]

'the jackal always comes to our place'

/ná bèrə̀-k bè-tkú-wà ìi sòbà/ -> [ná bèrə̀g bètkúwég sòbà]

'I will give our thing to (our) friend's wife'

/jə̀ @skàaká liwán pəm/ --> [jə̀skàakéwán pəm]

'we didn't sleep' (... do sleep)

/à lik-íi/ --> [èekíi] 'look!' (m.sg. imperative)

-a uu- /áci gáfá ùuràkʰn/ --> [áci gáfáuràkʰn] 'he caught a leopard'

-a a- /áci gáfá ágwren/ --> [áci gáfágwren] 'he caught a hare'

-a aa- /áci ùktàatá áamʰn pəm/ --> [áciùktàatáamʰn pəm]
'he didn't take water'

-aa @- /j-áa @skù/ --> [jáaskù] 'we (excl.) are on top'

-aa u- /n-áa ùktà/ --> [náakwtà] 'I will take'

-aa ii- This sequence is normally realized as a unisyllabic diphthong [aai]. An exception involves the preposition ii 'to, toward, for', where -aa + ii is frequently heard as two syllables. Presence or absence of an epenthetic glide [y] is difficult to ascertain. Indeed, for the combination -aa + ii (preposition) variation exists between [aayii] or [aa ii] (two syllables) and [aai] (one syllable) depending on speech tempo, etc.

- prep. ii /jää íi gáa-rá/ --> (transcribed) [jää íi gáará] '(it) came to her'
 /wúnyā-w ətltáa íi msə-rá/ --> (transcribed) [wúnyāu ətltáa yí-msərá] 'the girl set (it) aside for her husband'
 /né-íikáa íi-wà/ --> (transcribed) [níikáaiwà] 'I saw for us'
- others /jää íikí/ --> [jääikí] 'that we (excl.) see'
 /wáa íiDí/ --> [wáaiDí] 'that we (incl.) twist'
 /ámā-áa-íi/ --> [ámāai] 'your (m.sg.) wife'
- aa uu- /áa ̀urá-k ̀bjlám/ --> [áauráN ̀bjlám] 'on the neck of the hyena'
 -aa a- /náa àkó/ --> [náakō] 'I am behind'
 -aa aa- /náa àanəm/ --> [náanəm] 'I am southward'
- e ̀- /dà ̀kté ̀fcáan/ --> [dàkwtéfcāan] 'that he bring a mat'
 -e u- /dà ̀kté ̀gdáan/ --> [dàkwtégdāan] 'that he bring a gourd'
 -e ii- /gà ̀kté íi-wà ákán/ --> [gàkwtéwákán] 'that you bring us fire'
 /jää ̀gvè íi kúnú-k sərə/ --> [jäägvè kúnúk sərə] 'and we fell in the well'
- e uu- /dá gáfè ̀urákən/ --> [dá gáfèurákən] 'that he catch a leopard'
 -e a- /dà ̀kté ákūn/ --> [dàkwtékūn] 'that he bring a goat'
 /sé ákci dāa dukwì/ --> [sékcí dāa dukwì] 'then they heard'
 -e aa- /dà ̀kté áanən/ --> [dàkwtéyāanən] 'that he bring water'
- o ̀- /nó ̀bjlám má.../ --> [nóbjlám má...] 'well the hyena said...'
 -o u- no examples found
 -o ii- /áa áikó íi ré-k m̄abú-k bàcāa-w/ --> [áaikó(y)íi réN m̄abúg bàcāaw] 'he was looking to the place of the guy's anus'
 -o uu- ~~no examples found~~
 -o a- /áci jú nò átú má.../ --> [áci jí nòtə má...] 'when he went she said...'
 /tò à pàwé Bà/ --> [tòpàwé Bà] 'well come on down!'
 -o aa- /̀bjlám à ríi nò àa kúnú-k sərə/ --> [̀bjlám à ríi nò(w)áa kúnúk sərə] 'the hyena was there in the well'

It would now be desirable to try to draw some generalizations in the form of rules for vowel contraction, elision, and coalescence. It turns out to be difficult if not impossible to formulate a set of generative style rules which give much more understanding of the processes involved than the table above. However, a promising solution emerges from Foley (1977). In Foley's theory, phonological elements are defined not by articulatory or acoustic properties, but rather in terms of relative phonological "strength" along various parameters. These parameters typically have rough correlations with articulatory or acoustic properties (place of articulation, vowel height, etc.), but it is the behavior of phonological elements in language which defines the parameters and the relative positions of the elements along the parameters, not the makeup of the units in distinctive features.

Let us establish an arrangement of the Bade vocalic units along the following scale, with stronger elements to the right of weaker ones:

* (Abubakar Hassan Fulahe 2/5/83)

- /kábc̄ únú á rāan?/ → [kábc̄únú á rāan?] 'what did Kabe spend the night?'
 /kábc̄ únsú ádyáwákəh/ → [kábc̄únsú ádyáwákəh] 'Kabe inserted more funds'

i	{ii}	a	{e}	aa
@	{uu}		{o}	
u				

-----> ascending strength

This strength scale is established on the basis of Bade processes, but it corresponds closely to the arrangement of vowels by Foley (1977:44-48) along his η and ω scales. Foley did not consider length, which is a crucial factor in₁ Bade, so an exact comparison of this scale to his is not possible.

Having defined the relative strengths of the vowels in this way we can formulate the following rules:

- (1) Identical vowel contraction: Identical vowels contract to a single vowel of the same kind.

Comment: Since we are dealing here only with medial vowels, the short high vowels are all "identical" for the purposes of this rule, and their ultimate quality will depend on the vowel quality rules of 2.4.1.

- (2) Short vowel elision: A short vowel is elided when preceded or followed by a stronger vowel (long or short).

Comment: The short high vowels being the weakest, are elided by all other vowels. Short a is elided only e, o, and aa.

- (3) Diphthong formation: A sequence of a long vowel followed by a vowel equal in strength to it or weaker than it forms a diphthong with the second vowel becoming a homorganic offglide.

Comment: This correctly accounts for /-ii uu-/ --> [iiu], /-a uu-/ --> [au], /-aa ii-/ --> [aai], /-aa uu-/ --> [aau], and /-e uu-/ --> [eu]. The diphthongs ai (from a + ii) and ei (from e + ii) will both have to be further converted to [e]. The rule also predicts /o uu/ --> [ou] (and probably further ou --> o). I have no examples of this sequence as contraction of vowels, but this is the phonetic form resulting from addition of the Previous Reference Marker (3.2.1) to nouns with final -o. Finally, it predicts /-uu ii-/ --> [uui], /-aa e-/ --> [aai], /-aa o-/ --> [aau]; these sequences never occur. There is one incorrect prediction, viz. /-o ii-/ should become [oi]. The examples I have recorded seem to retain two syllables, viz. [o(y)ii]; however, it happens that this sequence occurs only across major syntactic boundaries which could play a role in its not being reduced phonologically.

- (4) Two syllable retention with optional glide insertion: A sequence of a long vowel followed by a stronger vowel (long or short) remains two syllables with or without an epenthetic glide derived from the preceding vowel.

Comment: This correctly accounts for sequences involving ii + a ~ aa and e ~ o + aa. It predicts similar behavior for uu + a ~ aa, but this sequence does not occur.

Note that the difference between rules (3) and (4) derives naturally from a further principle that syllable final is a weak position. In Bade, the general principle is that when vowels occur in sequence, a single syllable is the outcome. In the case of rule (3), the second of the underlying syllables is reduced to a glide--an appropriate outcome for a relatively weaker element in a relatively weaker position in the syllable. In the cases accounted for by rule (4), however, the vowel sequence is antithetical to such reduction: the weaker vowel is in the stronger position and vice versa. The result is that two syllables are retained with or without facilitation by an epenthetic glide.

2.5. Tone rules. A full and accurate account of Bade tone would be the most complex topic in Bade phonology. In 2.1.1.3, I showed that Bade can be analyzed as having only two underlying tones. However, there are numerous morphological tone rules, in addition to purely phonetic tone rules, almost all of which depend on fairly complex segmental information (surrounding consonant types, vowel length, syllable structure), and these rules combined with factors of speech tempo and operation of vowel contraction rules (2.4.3) make accurate textual prediction of tones impossible. In this section I will discuss what might be called "canonical processes", i.e. processes which consistently operate in a certain way in fairly short phrases spoken in normal conversational style. These processes operate with a high degree of consistency in connected discourse as well, but they are frequently overridden by "performance" factors such as pauses or emotive intonational contours. Sections 2.5.1-2 will discuss the two major phonetically conditioned tone rules; section 2.5.3 will discuss realization of "underlying" tonal glides; section 2.5.4 will summarize the interplay of tones and segmentals. Morphologically conditioned tonal rules are not systematically covered here. Most such rules are found in the verbal tense/aspect/mood system and are discussed in section 3.8.

2.5.1. Tone Raising. Probably the most obtrusive and pervasive tone rule can be stated informally as follows:

Tone Raising: When not immediately followed by pause, a Lo syllable is raised to Hi following a Hi if the Lo begins in a consonant other than voiced obstruent. This applies iteratively, i.e. a syllable raised in this way potentially raises a following Lo.

This rule can be illustrated with verbs in the Perfective (3.8.3.1), which have underlying tones Lo ... Hi (all Lo with final Hi):

/nʔ tàksú/	--> [nʔ táksū]	'I tied'	(rule operates)
/n@ d@psú/	--> [n@ d@psú]	'I hid'	(rule blocked by vd.
/nʔ bàzàrtú/	--> [nʔ bàzàrtú]	'I showed'	obst. <u>d-</u> and <u>b-</u>)

/nə tənkeku/ --> [nə tənkeku] 'I pressed' (rule applied iteratively)
 /nə Dúwàtlú/ --> [nə Dúwàtlú] 'I got tired' on 1st two syllables)
 /nə məskátú/ --> [nə məskátú] 'I turned'
 /nə tɔmbɔlú/ --> [nə tɔmbɔlú] 'I pushed' (rule blocked by b
 in second syllable)

The rule does not affect a syllable before pause (verbs here are in the Imperfective, 3.8.3.6):

/náa sɔDà/ --> [náa sɔDà] 'I will wash'
 /yáa túwáyù/ --> [yáa túwáyù] 'you (m.sg.) will forget'

The rule operates across word boundaries:

/nə məskətə kúnáfɛn/ --> [nə məskətə kúnáfɛn]
 'I turned the adze'
 /nə məskətə gápàcémɛn/ --> [nə məskətə gápàcémɛn]
 'I turned the beam'
 (in second example, rule affects verb but not object)

In the phrases above with underlying final Hi, the Hi is realized as phonetic downstep (DS). It is possible to interpret this as reflecting the underlying Lo's which have been lost, though as I pointed out in 2.1.3, there seems to be no contrast in Western Bade between ... Hi Hi# and ... Hi DS#. Note that if the DS is interpreted as reflecting a lost Lo, there must be an additional rule displacing DS to the end of the phrase. Bade allows phrase internal DS only under fairly restricted circumstances (2.5.3), so that the phrase 'I turned an adze' above is not *[nə məskətə kúnáfɛn] with DS on the final syllable of the verb, even though this is an underlying Hi following a raised Lo. Thus, it does not seem incorrect to say that Tone Raising raises Lo's with no phonetic compensation.

2.5.2. Tone lowering. The second major phonetically conditioned tone rule can be stated informally as follows:

Tone Lowering: A Hi is lowered in the environment Lo__Hi if the Hi begins in a segment other than a voiceless obstruent, viz. if it begins in a voiced obstruent, sonorant, or glottalized sound.

In the following pairs of sentences in Perfective aspect (3.8.3.1), (a) illustrates application of the rule before Hi, (b) illustrates non-application before Lo. In the last pair, the rule fails to operate because the Hi syllable in question begins in a voiceless obstruent.

(a) /jə ɔDgə kóorɔn/ --> [jə-Dgə kóorɔn] 'we followed a donkey'
 (b) /jə ɔDgə dùwún/ --> [jə-Dgə dùwún] 'we followed a horse'
 (a) /jə wàné kázámɛn/ --> [jə wàné kázámɛn] 'we followed a girl'
 (b) /jə wàné mɛn/ --> [jə wàné mɛn] 'we followed a person'
 (a) /jə kɔrɔ kóorɔn/ --> [jə kɔrɔ kóorɔn] 'we stole a donkey'

- (b) jə kərə̀ dùwún (underlying & phonetic) 'we stole a horse'
- (a) /jə̀ tàDə̀ kóorōn/ --> [jə̀ tàDə̀ kóorōn] 'we released a donkey'
- (b) jə̀ tàDə̀ dùwún (underlying & phonetic) 'we released a horse'
- (a) jə̀ gə̀fá kóorōn (underlying & phonetic) 'we caught a donkey'
- (b) jə̀ gə̀fá dùwún (underlying & phonetic) 'we caught a horse'

2.5.3. Tonal glide simplification. Tonal glides (Fall and Rise) in Bade derive from three sources. The first source is the contraction of two syllables which differ in tone onto one syllable which retains the tones of both syllables. By far the most common source for such syllable conflation is the vowel elision, contraction, and coalescence processes in 2.4.3, though vowel syncope or apocopy is sometimes also a source, e.g. as in áDâakfân 'knee' < *áD-áa-kə̀f-ən cited in 2.1.3 or dùwôn '(not) at all' < dùwónì (also heard).

The second source of tonal glides is derivation of Fall via Tone Raising (2.5.1) with the underlying Lo still heard in a Fall. The most common environment for this is where the raised syllable is C₁V(C₂)C₃ and C₂ or C₃ is a voiced obstruent, e.g. /nə̀ Də̀bdə̀ ànkún/ --> [nə̀ Də̀bdə̀nkū] 'I sold a pestle', /nə̀ tə̀mbə̀lú/ --> [nə̀ tə̀mbə̀lú] 'I pushed', /ná tlə̀ví/ --> [ná tlə̀ví]¹³ 'I will pierce'.

The third, and least common, source for tonal glides is the "depressing" affect of voiced obstruents (see further 2.5.4). I have found these only in the initial syllable of certain verb forms and in a very few monosyllabic nouns, e.g. ná gə̀unā-w 'I will weave it' cited in 2.1.3, ghāan 'crow'. Note that these glides differ from those above in that the voiced obstruent creates a Lo onset to an underlying Hi, where in the cases above, the Lo part of the Rise or Fall can be identified as an underlying Lo.

Even though phonetic tonal glides exist, there are far fewer such glides than the extremely common processes of syllable conflation would suggest there should be. This is because of processes which simplify gliding tones to level tones, i.e. Lo, Hi, or DS. I have found it impossible to formulate a set of rules which will account for all the observed patterns. However, the following rule and the tonal absorption rule further on are widely applicable and also are common tonal glide simplification processes found in other languages:

Tonal Glide Simplification: $\left\{ \begin{array}{l} \text{Rise} \\ \text{Fall} \end{array} \right\} \rightarrow \text{Hi}$

Rise: Optional for word initial syllables beginning in a voiced obstruent;
Obligatory elsewhere.

Fall: Inapplicable for C₁∇C₂C₃∇... where C₂ is a voiced obstruent;
optional for C₁∇(C₂)C₃∇... where C₂ or C₃ is a voiced obstruent;
obligatory elsewhere.¹⁴

Rise (optional) - but see further below under Tone Absorption
 /nᵛ dᵛ/ --> [nᵛ dᵛ] or [nᵛ dᵛ] 'I took out'
 /ná gáunà/ --> [ná ǵaunà] or [ná gāunà] 'I will weave'

Rise (obligatory)
 /nᵛ tᵛ/ --> [nᵛ tᵛ] 'I ate'
 /dà táksì ádáyᵛn/ --> [dà táksádáyᵛn] 'that he tie a fennec'
 /dà tágbì áDáyᵛn/ --> [dà tâgbáDáyᵛn] 'that he bury a gourd'
 /jàa màakì áDáyᵛn/ --> [jàa màakáDáyᵛn] 'that we look for a gourd'
 /jàa tlàvì íi-gìi/ --> [jàa tlàvìigìi] 'that we pierce for you'
 /dà táDì íi-gìi/ --> [dà táDìigìi] 'that he release for you'
 /datlàvì íi-gìi/ --> [dà tlàvìigìi] 'that he pierce for you'

Note: The DS in the last example as opposed to the Hi in the preceding example can be accounted for as follows: first downdrift lowers íi of íi-gìi following the Lo of tlàvì; next, Tonal Glide Simplification applies, the (intermediate) result being DS, since presumably this rule raises Rise to the Hi part of Rise, not to some other higher pitch; then Tone Raising (2.5.1) applies to ...Dìi ... but not to ...vìi..., since the latter begins in a voiced obstruent.

Fall (inapplicable)
 /nᵛ mäsᵛ @ǵjáan/ --> [nᵛ mäsᵛǵjáan] 'I bought a handle'
 /jᵛ tàDᵛ @vjáan/ --> [jᵛ tàDᵛvjáan] 'we released a monkey'

Fall (optional)
 /nᵛ tᵛmbᵛlú/ --> [nᵛ tᵛmbᵛlú] or [nᵛ tᵛmbᵛlú] 'I pushed'
 { /jᵛ ràkᵛ @bjlámᵛn/ --> [jᵛ ràkᵛbjlámᵛn] 'we chased a hyena'
 { /jᵛ sìidᵛ @bjlámᵛn/ --> [jᵛ sìidᵛbjlámᵛn] 'we slaughtered a hyena'

Fall (obligatory)
 /nᵛ mäsᵛ ànkún/ --> [nᵛ mäsánkún] 'I bought a pestle'
 /nᵛ nàsᵛ àràsᵛn/ --> [nᵛ mäsàràsᵛn] 'I bought sorrel'
 /áci Dᵛǵᵛ ùurákᵛn/ --> [áci Dᵛǵᵛúurákᵛn] 'he followed a leopard'

A common glide simplification process in African languages is Tone Absorption (Hyman and Schuh 1974). This process can be formulated as follows ([αHi][−αHi] = Fall or Rise):

Tone Absorption: [αHi]₁[−αHi]₂ [−αHi]₁ => [αHi]₁[−αHi]₂

That is, when the latter part of a tonal glide is followed by a syllable with a tone at the same level, the latter part of the glide is "absorbed" into the following syllable, leaving the original glide syllable with a simple tone opposite to that of the next syllable. Other things being equal, Tone Absorption usually works when the glide is on the first syllable, but sometimes "other things are not equal" and the rule applies to the mirror image environment. Thus, a form not accounted for above is the following:

/nᵛ sìidᵛ àajlùwáan/ --> [nᵛ síidàajlùwáan] 'I slaughtered a heron'

The rule above would predict that the underlined sequence should be Hi; what is "not equal" here is that the surface syllable in question -daa- begins in a voiced obstruent, a consonant antithetical to Hi tone (see esp. 2.5.4), so Absorption overrides Simplification. Indeed, it appears that all cases involving Fall (= Hi Lo) could be accounted for by absorption. This is obvious for the cases "Fall (optional)" above. The phrases under "Fall (obligatory)" are more complex but are also amenable to this solution. Thus, in 'I bought sorrel', Vowel Contraction (2.4.3) gives nə mäsàràsən; Absorption gives nə mäsàràsən; and Tone Raising (2.5.1) gives the correct [nə mäsàràsən].

Tone Absorption will not account for some of those simplifications of Rise that were cited, e.g. in 'that he pierce for you', the intermediately derived -vii- is preceded by Hi and followed by Lo. However, Absorption would handle a case not cited, viz. /ná dèpsá-w/ (optionally) --> [ná dèpsáw] 'I will hide it'. Here the Rise does not become expected Hi (or DS), but rather Lo, apparently from absorption of the Hi portion of the Rise (note again the antithetical nature of the voiced obstruent d to Hi tone).

Thus, Bade seems to need both a rather mechanical rule which raises gliding tones to Hi and a second, more phonetically transparent rule, Absorption. Some phonetic forms can be explained by either process, but others can only be explained by one of the two.

2.5.4. Interaction of consonant types and tone. The general tone rules in sections 2.5.1-3 refer to consonant types. Throughout Bade, consonant types are crucial for formulating not only purely phonetic rules but also morphologically conditioned rules and lexical structure. The relations of consonant types to tone can be summarized as follows:

voiced obstruents are concordant with Lo and antithetical to Hi;

voiceless obstruents are concordant with Hi and, to some extent, antithetical to Lo;

sonorants (nasals, liquids, glides, vowels) and glottalized¹⁵ consonants are neutral to Hi and Lo, though they show an affinity with Hi where other factors are not antithetical to this.

I will not attempt to give an exhaustive listing of the interaction of consonant types with tone. The following list is merely meant to illustrate how pervasive this relation is (Vd0 = voiced obstruent, V10 = voiceless obstruent, S/G = sonorants and glottalized consonants):

(1) Tone Raising (2.5.1): blocked by Vd0, allowed by others.

(2) Tone Lowering (2.5.2): blocked by V10, allowed by others.

(3) Tonal glide simplification processes (2.5.3): simplifications to Hi do not generally take place where a Vd0 facilitates retention of the Lo part of the glide; certain glides are simplified to Lo where Hi would otherwise be expected.

(4) Subjunctive verbs (3.8.3.3): verbs beginning in V10 take Hi initial tone, others Lo.

(5) Verbal nouns and Imperfective verb forms (3.8.2, 3.8.3.6): verb tone is determined by syllable structure rather than consonant types (verbs with initial syllable C@ or @C have Lo, others Hi); however, verbs with initial Vd0 are generally pronounced with initial Lo, Rise, or DS even though they behave like Hi tone verbs, esp. for pronoun polarization, e.g. yà t@Dí 'you will release' but yà g@fí 'you will catch', in both cases with subject pronoun "polarized" to Lo.

(6) In derived forms with the prefixes ma- (3.9.2.4), d@- (3.9.3.2), za- (3.9.3.1), medial syllables beginning in Vd0 have Lo tone, others Hi.

With such a close connection between tone and consonant type, one is led to look for possible constraints on lexical tonal structure, at least where it is not overridden by such things as aspectually determined tones on verbs. No constraints of this type are obvious, however. Syllables within nouns appear to be able to bear any tone, regardless of consonant type. It is my impression that syllables beginning in voiced obstruents tend to be Lo more frequently than Hi, and syllables following Hi tend to be Hi up to the next voiced obstruent (= lexical realization of Tone Raising). For example, the word átákwázàm@n 'hedgehog' is áatàgwàzhàm in Ngizim. If the Ngizim tones are original, Bade has raised the second and third syllables (but not the fourth, which begins in a voiced obstruent, z). Whether the correlations noted are greater than chance would require a thorough lexical survey and statistical analysis.

FOOTNOTES, Chapter 2

¹ The root initial restriction results from a general historical change that has shifted all root final diphthongs to the corresponding mid-vowels, e.g. àgwé-n 'egg(s)' (cf. Ngizim àgwái), dàmtó 'near' (cf. Ngizim dàmtáú). Root medial diphthongs are rare in this language group; where they have existed, at least some have been shifted to mid vowels, e.g. màlèkùwáan 'spirit' (cf. Hausa màláa'íkàa 'angel', where Bade would have deleted the glottal stop, giving a root malaik-), vòonú 'cut off millet heads' (cf. verbal noun váwán@n). Rarity of medial diphthongs in the entire Bade/Ngizim group is accounted for by a rule still active in Ngizim and some dialects of Bade: /ai, au/ --> [ii, uu] in non-final position, e.g. Ngizim rài 'place' but rìi báii 'not a place'. By this rule, medial diphthongs should have all been converted to corresponding long, high vowels, though there is a small unexplained residue of medial diphthongs even in dialects where the rule remains active.

² See Schuh (1978:270ff.).

³ Larry Hyman (personal communication), on listening to a tape of certain verbal forms, has written with regard to these final Downsteps: "I think you have a tendency to interpret something else for lowered pitch (e.g. especially when the penultimate is short and the final long)" He may be right--perhaps there is a drop in amplitude or some other phonetic effect (with or without pitch drop) in this environment. The point remains that phrase final Hi Hi sequences in Western Bade are realized phonetically in some way other than phonemic Hi Hi sequences in languages such as Hausa or Ngizim, and to me there is no perceptible tonal difference between a word like Kábō, seen from comparative evidence to be reconstructable with DS, and any other "Hi Hi#" (or Hi DS#) sequence.

⁴ In the Extra heavy schemata, the last V in VVV sequences can only be the offglide in diphthongs, e.g. -i- in màaitú 'become chief'. There are no "extralong vowels" *aaa, etc. parallel to the long vowel portions aa of heavy syllables. Alternatively, one could interpret the offglides of diphthongs as consonants, i.e. the rime of the first syllable of the word above would be VVC (màaytú).

⁵ Bade has no geminate consonants with one major class of exceptions, viz. certain "qualifying" words where gemination is part of a morphological process (3.5.4).

⁶ In Schuh (1978) I noted for the Gashua dialect of Bade that the sequence stop + homorganic fricative is impermissible (d@zí 'vein', not *@dzí). There simply seem to be no cases where this sequence type occurs in Western Bade. The cognate item for 'vein' is @zdáan, with the offending consonant sequence metathesized.

⁷ However, comparative evidence within the Bade/Ngizim group is not too useful. Interestingly, Ngizim has undergone exactly the opposite change, voicing obstruents in the environment here, e.g. Ngizim gâazá 'chicken' (Gashua Bade kâzá; cf. Hausa kàazáa). Duwai has not undergone either of these changes, but it is not always a reliable

check, since most Duwai speakers speak some dialect of Bade proper as well and Duwai vocabulary frequently reflects this.

8 A comparative problem exists here. In Western Bade dialects where there are no alternations, the prefixes g@ and da/d@ are always voiced. The second person g@, on comparative Chadic grounds was voiceless (Hausa ka, Bolanci ka, etc.) and is always voiceless in Ngizim and Duwai. There is no broader comparative evidence for da/d@ (unless it can be related to third feminine singular *ta), but in Ngizim it is always voiced, in Gashua Bade and Duwai always voiceless. Within Western Bade, the most likely hypothesis seems to be that, for whatever reason, these prefixes were originally voiced and hence were subject to the voicing dissimilation process.

9 In Ngizim and Gashua Bade, I have consistently recorded the following environment as taking precedence (Schuh 1978:252). In the two words that Lukas (1967/68) records with this conflict, the way she writes the vowels coincides with mine, viz. wúyáan 'vulva' and gwíyáan 'egg'.

10 A single word in Western Bade, viz. ìkó 'see' cannot be explained this way. Cognates for this word are found in all Bade/Ngizim languages, always with initial ii- even where there has been no Prothesis. This vowel is undoubtedly the only remnant of a stage where the vowels a(a) and ii could appear word initial. This is still the case in Duwai, but reconstructed initial *ii- has been lost in Bade in all but this single word, e.g. Duwai ìid@m 'wood' but Bade d@náan, Duwai lìsháu 'shit' but Bade són.

11 One could define vowels along two scales: one corresponding roughly to vowel height (= Foley's n scale) and the other length (call it λ , with short vowels having strength λ_1 and long vowels λ_2). The second rule below could then be expressed

$$\lambda_1 \eta_n \rightarrow \emptyset / \eta_n \text{ where } n > m$$

(the mirror image notation of Bach (1958) being incorporated here). A problem in separating the scales arises, however, in that short a is weaker than e and o, whereas long aa is stronger than they are.

12 I do not know if this rule would apply iteratively. Because of the nature of Bade morphology, I have found no way to construct an utterance having a sequence of Hi tones each of which would meet the structural description of the rule upon application to the preceding Hi. In Ngizim, where a similar rule operates, it is possible to construct such utterances. The rule applies iteratively, but each subsequent Hi is lowered slightly less than the preceding, which gives a series of upsteps!

13 This is not actually from the phonetic Tone Raising rule (2.5.1), but rather is a morphological raising rule affecting a particular class of verbs (3..8.3.6). The tonal principle is the same, however.

14 The rule may have to be made optional (or inapplicable?) for extra-heavy syllables, since the word ádâakf@n has a Fall which is not simplified. I did not investigate this question.

15 In Ngizim, the glottalized consonants pattern with voiceless obstruents. It is worth noting that nowhere do they pattern with voiced obstruents though they are often described as "voiced".