

Tone and vowel deletion, insertion, and syllable structure

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5 Introduction

This paper has two purposes. The first is to examine the interaction of tone with the rules of vowel deletion, vowel insertion, and vowel replacement. The interaction of these rules and tone is examined in three Chadic languages, Mina, Gidar (both Central Chadic), and Lele (East Chadic). This part of the study is interesting because those three genetically related languages display different rules with respect to tonal behavior. When one deals with similar phonological processes in genetically closely related languages, one expects similar outcomes. A similar outcome would have been a result of the genetic relationship, if not of more universal properties of the phonological systems and processes. Different outcomes of the same phonological processes in closely related languages pose a challenge to anyone attempting to explain the phenomenon. It is hoped that one day somebody will accept that challenge.

The second part of this study deals with the hitherto non-described interaction between the weight of the syllabic onset and the tone. When syllabic weight affects other elements of phonological structure of a word, the weight is usually conceived as the weight of the coda, where long vowels and coda consonants can form heavy syllables. The present study demonstrates that the weight of the syllabic onset can also have effects on the phonological structure of the word and therefore should be recognized as a phonological category.

6 Tone and vowel deletion

6.1 The potential questions

The most interesting question with respect to tone and vowel deletion is what happens with the tone if the vowel is deleted. The importance of this question rests on its implication for theories that postulate that tone constitutes a separate tier in the phonological structure of the word, a tier independent of the consonant and vocalic tiers or of the segmental tier, if the latter two are put together. For theories postulating independent tiers, a tone shift to a preceding or a following syllable, under the condition of vowel deletion, constitutes a supporting argument. On the other hand, a tone loss associated with vowel deletion would support theories that

associate tone with one tone-bearing unit, be it a vowel or a sonorant. As we shall presently see, the three languages display both outcomes of vowel deletion, tone shift and tone loss. The existence of the two outcomes needs to be explained.

6.2 Vowel deletion and tone loss in Mina

Mina is spoken in the Extreme North Province of Cameroon, in the town of Hina Marbak and surrounding villages (see Frajzyngier and Johnston with Edwards, to appear). Mina has two tones: L and H. Some morphemes have an inherent tone, and others have a polar tone, i.e. the tone opposite to the preceding or following tone. Morphemes that have a polar tone include: the end-of-event marker *za*, the point-of-view of subject marker *ka*, the dependent habitual marker *ra*, all occurring in verb-phrase-final position. The third-person object suffix *-u* also has a polar tone, as does the infinitive marker *kə*: *ká dàm* ‘to marry’ and *kàdám* ‘penetrate, ache, pain’ and ‘wear trousers, shoes’.

The inherent tone of a morpheme can also undergo a change to code a number of functions. Thus, tones of subject pronouns that are inherently L become H to code imperative and subjunctive moods. The tones of verbs that are inherently H become L in the imperative mood and also in dependent clauses.

Mina, like several other Central Chadic languages, has a rule of final-vowel deletion to mark the phrase-internal position. The retention of the final vowel codes the phrasal boundary, including clausal and sentential boundaries (cf. Frajzyngier and Shay in press). The retention of the final vowel thus allows a bottom-up method of discovery of what types of syntactic phrases actually exist in the language.

If a vowel is deleted, the tone of the syllable is also deleted. Consider the behavior of object pronouns. All object pronouns, regardless of their function, viz. direct or indirect, are preceded by the object marker *á*. The full form of object pronouns is revealed by their form in the phrase-final position. In that position the first-person object pronoun is *kù* (all examples from Mina come from Frajzyngier and Johnston with Edwards, to appear):

- (1) *hídì wà m̀-nd-á-kù dèb ǹ kítà*
 man DEM REL-beat-GO-1sg lead PREP justice (Fula)
 ‘It was this person who hit me. Take him to be judged.’

In the phrase-internal position, the final vowel of the pronoun is deleted and there is no tonal shift, as evidenced by the fact that the object marker *á* keeps its H tone:

- (2) *ká m̀-á-k zà | í ká lim-é-k z̀ m̀mbùrkó*
 INF catch-GO-1sg EE 3pl INF see-GO-1sg EE yesterday
 ‘He caught me’ | ‘They saw me yesterday’

- (3) *hidi wèhíŋ á zá ván á n kǎ ɓà á gǎr kǎ*
 man DEM 3sg COMP rain 3sg PREP INF fall 3sg want INF
nd-á-k kàsám skù
 touch-GO-1sg body NEG
 'This man said, "Rain, when it falls, will not touch me.'

The deletion of the word-internal vowel also leads to the deletion of the tone. Consider the noun corresponding to 'village', which has two phonetic realizations, *wùtá* and *wtǎ*. When this noun is phrase final, it is realized as *wùtá*:

- (4) *ábà nd-á ngǎn wùtá* | *í tsú á wùtá miɛɜ*
 ASSC go-GO 3sg village | 3pl go PRED village but
 Then she returned to her village | 'They went home but...'

When this noun is in the phrase-internal position, it is realized as *wtǎ*:

- (5) *á wtǎ cíŋ*
 PRED village his father
 'at his father's'

The explanation of the phrase-internal form [wtǎ] is as follows: The high vowel is reduced to Ø after the homo-organic glide if the syllabification conditions allow. Thus *wùtá* (citation form) is reduced to *wtá*, which is then reduced to *wtǎ* in the phrase-internal position if the syllabification rules require vowel insertion. There is no trace of the L tone or a word-medial schwa.

6.3 Vowel deletion and tonal shift in Gidar

Gidar, spoken in the Extreme North Province of Cameroon, is also a Central Chadic language. In some areas Gidar villages are separated from Mina villages by as little as 15 miles. There are two underlying tones in Gidar: H and L. Tone is a component of a morpheme, just as its vowels and consonants are. However, unlike vowels and consonants, in many words the tone has no specific position in the morpheme. Consider the word *krà* 'dog'. When the diminutive suffix *kǎ* is added, the final vowel of the word *krà* is deleted. The tone of the morpheme is now realized on a new syllabic peak created through vowel insertion, viz. *kǎ-kǎ*.

If a new syllable is created whose peak is the following vowel, the new syllable has the tone of the following vowel:

- (6) *tà-y ǎ-ddà-ní* → [tàyíddàní]
 PROG-3masc. INF-go-3masc. 'he is going'
tà-t ǎ-ddà-tá → [tátáddàtá]
 PROG-3fem. INF-go-3fem. 'she is going'

Similarly to Mina, Gidar codes the phrasal boundary through retention of the final vowel, and the phrase-internal position through deletion of the final vowel. If the

vowel of a syllable is simply deleted (rather than replaced by another vowel), the tone of the deleted vowel shifts to the preceding syllable. Consider the definite marker *vàní*, which is bisyllabic and has a L tone on the first syllable. In the phrase-final position, the last vowel is deleted, the word becomes monosyllabic, the tone of the last syllable shifts to the preceding syllable, and the form is realized as *ván*:

- (7) *mò-k tà-bát-àk á ddáf vòf né-t inkílè vání*
 mother-2sg 3fem.-fall from-PRF PREP in hole GEN-3PL water DEF
 'Your mother fell in that well.'
- (8) *wá tà-n ván à-mbát-àk á wrá kàw kày bíššà*
 child-3masc. DEF 3masc.-go-PRF PREP field PURP find tree
 'His child went to the bush, searched for and found a *bišša* bark.'

The marker of obligation is *gàní* in the phrase-final position and *gón* in the phrase-internal position:

- (9) *ná-nzá-w gání*
 1sg-run-1sg SUBJ
 'Let me run!'
- (10) *à-só-má-nà-k mè-dé gón pùmpùm*
 3masc.-ask-1pl-pl-PRF 1pl-go:VENT SUBJ tomorrow
 'They asked us to come tomorrow.'

The feminine/diminutive suffix *kə* has a polar tone. If the suffix follows a L tone noun, the tone of the suffix is H. If the vowel of the suffix is deleted, the tone of the suffix shifts to the preceding noun, and consequently, the noun has a tone opposite to its underlying tone. Thus when the noun *krà* 'dog' is followed by the diminutive suffix, the form is *kə r-kə*. In the phrase-internal position, the vowel of the suffix is deleted and the tone shifts to the preceding syllable:

- (11) *krá-k tètùr-kə*
 dog-DIMIN black-DIMIN
 'black bitch/puppy'

Compare the form that retains the underlying tone:

- (12) *kìr-zé tètùr-zè*
 dog-pl black-pl
 'black dogs'

Consider the realization of the first-person singular possessive pronoun *wa*, which has a polar tone. In the phrase-final position, it is reduced to *w*. When *w* is added to a word ending in a consonant, *w* is realized as *u*. The new vowel assumes the tone of the morpheme to which it is added. Here is a complete derivation of one example. The underlying word for sibling is *màlmán*, realized as *màlmá* in isolation. The underlying velar nasal makes its appearance in the plural form *màlmíní-dí*.

- (13) málmiŋí-dí-n tízì málmiŋí-d-wà
 brother-pl-3masc. Tizi sibling-pl-1sg
 'Tizi's brothers' 'my brothers'

In the phrase-internal position, the vowel *a* of the possessive pronoun is deleted, and the glide becomes *u* after a consonant. It also assumes the tone of the plural marker *dí*:

- (14) málmiŋí -d-ú án-dàya
 sibling-pl-1sg REL-surpass
 'my older brothers'

6.4 Vowel deletion and tone deletion in Lele

Lele is an East Chadic language and is spoken in the Republic of Chad. Lele has three tones: L, M, and H. If a morpheme, whether lexical or grammatical, loses a vowel, it also loses its tone. Consider the verb *óm* 'catch'. The evidence that the verb has two tones is provided by the forms that have two vowels, such as the imperative *úmá* and the infinitive *omé*, which have different tones on the first and the second syllables. The inherent tone of the verb is also realized when a vocalic object suffix is added:

- (15) kírbi óm-íy
 Kirbi catch-3masc.
 'Kirbe caught him.'

When this verb occurs in the past tense without an object beginning with a vowel, i.e. when its last vowel is omitted, only the first tone of the verb, M, is realized:

- (16) càniǵé óm-dú
 Canige catch-3fem.
 'Canige caught her.'

The following table represents a summary of phenomena involved in vowel loss in the three languages examined.

Table 2. *Vowel loss*

	<i>Mina</i>	<i>Gidar</i>	<i>Lele</i>
<i>Tone shift</i>	no	to the left	no
<i>Tone loss</i>	yes	no	yes

7 Tone and vowel insertion

7.1 Motivation for vowel insertion

Vowel insertion is motivated by constraints on syllabic structure and on sequences of consonants. In some languages, the underlying form of a morpheme may not include a vowel. In such a language, syllabification rules may require insertion of a vowel to allow for the phonetic realization of the underlying structure. If the syllabic structure

were to be violated as a result of the phonological or morphological processes as described in the previous section a vowel may be inserted. The insertion of a vowel requires tone assignment to the newly created syllables, as there may be no syllable without a tone.

7.2 Vowel insertion in Mina

1.1.1 Syllable structures in Mina

The following syllabic structures are allowed. (A period marks a syllabic boundary.)

- V *a* 'third-person singular subject', *á.bà* 'associative marker, singular' *i* 'third-person plural subject'
- S (S stands for a sonorant). Only nasal consonants can be syllabic peaks: *ńtsà* 'vulva', *ńtsùr* 'nose', *ńvà* 'excrement'
- VC An example of the VC syllable is the verb *if* 'blow', the form occurring in verb reduplication. Most VC syllables occur across morpheme boundaries or as a result of the final-vowel deletion in a VCV structure:

- (17) *á* *wtá* *tá-kínèŋ* → [áw.tá.tá.kí.nèŋ]
 PRED village GEN-2pl
 'at your place'

CV *tá* 'genitive marker' (*tá* in phrase-internal position)

CVC *dòk* 'horse', *tár* 'month' (in phrase-internal position)

CSV *grá* 'find', *trá* 'month, time'

There are no CSVC syllables.

1.1.2 Vowel insertion in Mina

To prevent a disallowed syllable structure, including disallowed consonant clusters, from emerging as the result of the underlying structure of the morpheme or as a result of vowel deletion as described in section 2.2, a schwa is inserted in lieu of the deleted vowel. Although various syllabic structures are allowed, some structures are preferred over others. Thus although there are structures of the type CSV, the structure CVS is preferred over the structure CSV in the process of syllabification. Consider the word *trá* 'month, time'. When it is followed by another word within a phrase, the final vowel is deleted. The syllabification process does not insert a schwa after the second consonant, but rather after the first. The inserted schwa bears the underlying tone of the morpheme:

- (18) a. *trá láy* → tr' láy → [tár láy]
 b. *tár láy tá mìtá š*
 month time GEN hunger
 'The year of the hunger.'

Similarly the auxiliary verb *gr'* 'search' is realized as *gár*:

- (19) *á gár ká nd-á-k ksám skù*
 3sg try INF go-GO-1sg body NEG
 'It will not touch me.' (e.g. about an arrow)

If a morpheme has a tone of its own, a schwa inserted to prevent a disallowed consonantal sequence from emerging assumes the tone of the underlying morpheme:

- (20) *Underlying* *Vowel deletion* *Schwa insertion*
ká ndà zá fú → *kánda z' fú* → [*kánda záfú*]
 INF go EE always
 'Each time she went . . .'

The schwa is also inserted between words in a clause to prevent a disallowed syllable structure from emerging. The inserted vowel assumes the tone of the preceding syllable. In the following example, a verb borrowed from Fula, *naast* 'enter', is realized as *nástà* with final schwa because it is followed by a preposition with an initial consonant:

- (21) *nd-á nástà nà yàm*
 go-GO enter (Fula) PREP water
 'and entered into the water' (natural discourse example)

The tone on monosyllabic and polysyllabic words borrowed from languages without tone is not predictable. Most borrowings from Fula have H tones: *gaw* 'hunter' → *gáw*; *wurt* 'leave' → *wúrt*; *mallum* 'teacher' → *mállúm*; *deft* 'book' → *déf* 'book, Koran'; *derewol* 'paper' → *déréwól*. But there are also L-tone borrowed words: *gam* 'because' → *ngàm*; *deftere* 'book' → *déftèrè*. The same word may have different tones, e.g. *nástà* and *nástà* 'enter'.

7.3 Tone and vowel insertion in Gidar

1.1.3 The allowed syllabic structures in Gidar

In Gidar, there are lexical items with inherent vowels and lexical items with no underlying vowels. In addition, in the phonetic realization, some vowels are deleted and other vowels are inserted. The following syllable structures are allowed in Gidar:

- V: *á* 'Preposition', *í* 'third-person plural demonstrative';
 CV: *tí* '3pl';
 VC: *án* '1sg:FUT';
 CVC: *gàm* 'conjunction';
 SCV: *wá mpà rá* 'he will eat it';
 CSV: *krá-s wá mtà* 'this dog will die';
 SSV *dàm.nyá* 'termite'.

The following structures are disallowed: *CC(C)V and *VCC(C) if the consonants are non-sonorant stops. A stop followed by a continuant or a sonorant is allowed in

the word-initial or the intervocalic position: *krà* 'dog'. Consonant clusters in the phrase-final position are not allowed.

1.1.4 Syllabification processes in Gidar

The syllabification process in Gidar starts with the syllabic peaks available from underlying vowels and creates syllables by picking up allowed onsets and codas. If a disallowed consonantal onset or coda is encountered, an epenthetic vowel is inserted. The disallowed consonant clusters emerge through a number of processes, such as the deployment of underlying forms that do not have vowels, or through the rule of final-vowel deletion. The epenthetic vowel is inserted by the following rule:

(22) $\emptyset \rightarrow V[+\text{high}, \alpha\text{round}] / C___ + CV[\alpha\text{round}]$

Thus, the inserted vowel is [u] if the vowel in the next syllable is round. The inserted vowel is [i] if the vowel in the next syllable is [+front]. If there is no vowel following the target syllable, or if the vowel in the next syllable is [a], the inserted vowel is schwa. Consider the perfective marker, whose underlying form is *kà*, as shown when it is in the phrase-final position:

(23) à-zá m-kà
3masc. eat-PRF
'he ate'

In the phrase-internal position, the final vowel of the perfective suffix is deleted, creating a disallowed sequence [mk] in the word-final position.

(24) à-zá m-k úúà
3masc. eat-PRF meat
'he ate meat'

The product of syllabification is [à-zá m-ək úúà]. The following is an explanation of how this form has emerged. The onset [kə] is not attested anywhere in the language, and thus it prevents the emergence of the structure [à-zám.kuúà]. After the initial vowel *a*, the next vowel is the schwa of the verb *zám* 'eat'. The syllabification process encounters a disallowed coda *mk* and inserts an epenthetic schwa after *m*. If the syllable where the vowel is inserted has no inherent tone, the newly created syllable has a L tone:

(25) à-mbát-kà sá Djabe
3masc.-go away-PRF PREP Djabe
'He left Djabe.'

After the reduction of the vowel of the perfective suffix, the phrase becomes:

(26) à-mbát-k sá djabe
'He left Djabe.'

Syllabification from left to right, disregarding the morphological and lexical structure, would have produced the form *[à.mbátk.sǎ.Dja.be]. The onset *ks* is not recorded in the data and presumably disallowed. That leaves a disallowed structure *mbátk*. The syllabification is resolved through the insertion of schwa between the consonants *t* and *k*, resulting in the syllabic structure [à.mbá.tǎk sǎ Djabe]. A similar process has taken place in the derivation of the phonetic form for 'he uprooted corn':

- (27) à-pt-k háyà → [áp.tǎk háyà]
 3masc.-uproot-PRF corn
 'he uprooted corn'

Even if different syllable structures are allowed, some structures are less preferred than others. Consider the verb *ǎ vrá* 'hit'. The potential sequence *vrw* is syllabified through the insertion of schwa after *r*. That indicates that the cluster *rw* is less preferred than the cluster *vr*:

- (28) à-vrǎ-wǎ-kǎ | à-vr-w-ŋ-kǎ → [à.vrǎ.wǎ ŋ.kǎ]
 3masc.-hit-1sg-PRF | 3masc.-hit-1sg-pl-PRF
 'he hit me' | 'they hit me'

In the sequence *vr̄m*, the cluster *vr̄* is less preferred than the cluster *rm̄*, which consists of two sonorants. Consequently, the epenthetic vowel is inserted after *v* rather than after *r̄*:

- (29) kǎ-vǎr-mǎ-ŋ-kǎ → [kǎ.vǎr.mǎŋ.kǎ]
 2-hit-1pl-pl-PRF
 'you hit us'

In the process of syllabification, the velar nasal is divided at the syllabic boundary, with the velar nasal forming the coda of the preceding syllable and the velar voiced stop forming the onset of the following syllable, as illustrated by the forms before a vocalic suffix:

- (30) ò-tóŋ.g-ǎ-k éŋgíl
 3masc.-enter-3masc.-PRF PREP:home
 'he entered his house' (the house was previously mentioned)
 ò-tóŋ.g-ó-ŋ-k éŋgíli é né-t dá
 3masc.-enter-TOT-pl-PRF PREP:home PREP GEN-3pl LOC
 'They entered their houses.'

7.4 Tone and vowel insertion in Lele

In Lele, if a new syllable is created, it carries a tone identical with that of the preceding syllable. The evidence for this hypothesis is provided by nouns whose last syllable appears to be created by vowel epenthesis, i.e. nouns that without the epenthetic vowel would have ended either in a consonant cluster or in a disallowed

consonant, such as *s, j, d, t*. In such nouns, the last syllable bears the same tone as the preceding syllable:

(31) múglú 'heart' kūsu 'body' mōglō 'fast'

If a new syllable is created but one of the morphemes carries its own tone, then the tone of the morpheme is the tone of the new syllable. Consider the definite marker *ŋ*, which carries a L tone and also causes the raising of the preceding tone. The addition of the definite marker to nouns ending in a glide results in a new syllable that has a L tone, regardless of the tone of the preceding syllable:

(32) gáw-ŋ
hunter-DEF
'the hunter'

(33) jàw-ŋ → [jāwŋ]
enemy-DEF
'the enemy'

The following table represents a summary of the tone rules involved with vowel insertion:

Table 3. Vowel insertion

Language	Copies the preceding tone	Assumes the tone of the morpheme	A default tone
Mina		yes	
Gidar		yes	If the morpheme has no tone of its own, the epenthetic vowel has a L tone
Lele	yes	yes	

8 Tone and vowel replacement

8.1 Tone and vowel replacement in Mina

When a suffix is added to a morpheme ending in a vowel in Mina and the vowel is by itself not a grammatical marker, such a vowel is deleted before suffixation. The tone that the vowel carried is also deleted. The tone of the vocalic suffix becomes the tone of the new syllable. Consider the addition of the goal-orientation marker *á*. The evidence that this marker has a H tone is provided by its realization after CVC verbs:

(34) à zá ngùl-yū hámáy tá màcīŋ lúw-á-ŋ mək
3SG COMP husband-PL stick GEN DEM say-GO-3SG would you
'She said, my husband, this stick, say to it'

(35) hà ndí dzán-á nám skən məná wà tiki
2sg HAB find-GO 1DU thing like DEM where
'Where do you find us things like this?'

Consider now the addition of the goal-orientation marker to a monosyllabic verb *ndà* 'go'. After the vowel deletion in the phrase-internal position, the consonant of the verb and the goal-orientation marker form one syllable with a H- rather than a L tone:

- (36) *tséy mbi déw kà báy ndá hət mómóŋ ábà cíŋ*
 so 3SG sit like chief go:GO take his mother ASSC his father
 'Then he became a chief, and he came to take his mother and father'

8.2 Tone and vowel replacement in Gidar

In Gidar if an initial vowel in the sequence V1V2 is replaced by V2, the tone of V1 is also replaced by the tone of V2, i.e., the tone transfers to the preceding syllable, replacing the tone of that syllable:

- (37) *zəgá às-ká* → [*zəgàská*]
 thing DEM-DEM
 'this thing'

8.3 Tone and vowel replacement in Lele

Vowel replacement in Lele is of a different kind from the one described in Mina and Gidar. Vowel replacement in Lele is limited to internal vowel changes in the formation of plural forms of some nouns. The formation of the plural through the infix *a* involves the replacement of the first vowel of the noun by the vowel *a*. In such a replacement the tone of the syllable remains the same:

- (38) *gírà gàrè* (pl) 'dog'
kírgá kàrgé (pl) 'man'

The following table represents a summary of the phenomena involved with vowel replacement in the three languages:

Table 4. Vowel replacement

Language	Tone assumption	Tone replacement
<i>Mina</i>		yes
<i>Gidar</i>		yes
<i>Lele</i>	yes	

As we can see, vowel replacement in all three languages produces similar effects in that the vowel that replaces another vowel brings with it its own tone.

9 Weight of the syllabic onset and the tone

In phonological theory and in phonological studies of various Chadic languages, syllable weight has long been recognized as an important factor affecting the structure of the word (Newman 1972, Frajzyngier 1976). The syllable weight is usually determined by the weight of the segments comprising the syllabic peak and the syllabic coda, or as some scholars postulate, everything from the syllabic nucleus

to the right (cf. studies in Goldsmith [ed] 1995 and Spencer 1998 for a sample of treatments of syllabic weight). Lele provides the evidence that there exists a distinction between light and heavy onsets, and that this distinction has important tonal effects.

Verbs that have an initial voiced consonant form their plural ('pluractional' in Newman's 1990 terminology) form through the devoicing of that consonant. If the singular form of the verb has a L tone, the plural form has a M tone:

(39)	<i>Singular</i>	<i>Plural</i>	<i>Gloss</i>		<i>Singular</i>	<i>Plural</i>	<i>Gloss</i>
	bòy	pōy	'break'		bàá	pā-d-wí	'fall'
	bòr	pōr	'cut'		bè	pēd-wé	'give/whip'
	digrì	figrì	'kill'				

There are a number of questions that emerge in connection with those plural formations. The first is about the nature of the initial devoicing. One could simply state that initial devoicing is a means of coding the plurality of the verb, as opposed to initial voicing, which codes the singular form of the verb. Such a conclusion cannot be maintained, however, because verbs with initial voiced stops have meanings similar to verbs with initial voiceless stops. Most verbs with initial voiceless or voiced stops do not have punctual, hence clearly singulative, meaning. Here are the lists of all the verbs in Lele with initial voiceless stops, taken from Weibegué and Palayer 1982. Verbs that have singular counterparts with voiced stops have not been included:

(40)	kàb	'whip a little'	kīl	'buy'
	kàdigí	'sift'	kìn	'return'
	kál	'climb'	kir	'examine' (no tonal notation)
	kānjírì	'crack'	kír'	'to be gnawed, consumed'
	kāsírì	'crumble'	kīrbì	'think'
	kàw'	'walk'	kīsì	'saw'
	kēglí	'remain attached'	kōgí	'to be too large or too small to pass'
	kēl	'criticize'	kòglí	'polish'
	kējì	'carry'	kòy	'steal, rob'
	kēl'	'gather'	kùjigilí	'rinse mouth'
	kèsi	'share'	kūn'y	'take a walk'

(ny in Weibegué and Palayer 1982 codes nasality of the palatal glide.)

Verbs with initial *p* (verbs that have counterparts with voiced initial stops are excluded):

(41)	pāđí	'grill'	pìn'y	'blow with mouth, winnow'
	pāgdí	'shake in a receptacle'	pil'	'wash (tr. or intr.)'
	pār'	'open eyes'	pòr'	'detach'
	pār'	'splash, flounder, sin (of women)'	pōryí	'lie'
	pāsini	'disperse'	pōsì	'beget many, multiply'
	pē	'dig'		

Verbs with initial *t*:

(42)	tāb'	'put for communal use'	tēr	'pull out, uproot'
	tāb	'follow'	fīb	'tell a story, count'
	tān'y	'become slim'	tìmlì	'oscillate'
	tār	'stood up'	tìmlí	'roll in'
	tār'	'gather (fees, taxes)'	tìmsí	'spit'
	tāsí	'be sour'	tòb	'want, love, desire'
	tèé	'chase away, follow, remove'	tòn	'ask'
	tèl'	'sacrifice, offer'	tòr'	'back down, lower the price'

Some of these verbs have the last syllable identical with the verbal plural marking; hence, they certainly code plurality, even if no form without the plural suffix is attested:

(43)	kāywí	'split, separate'
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With respect to verbs that have voiced/voiceless stop alternation for the unmarked/plural distinction, the relevant question is whether the direction of derivation is from voiced to voiceless or from voiceless to voiced consonant. Given the fact that the variant with the voiceless consonant codes plurality and therefore is semantically more marked, it is likely that the direction of derivation is from the voiced to the voiceless consonant.

One could assume a simple devoicing as the means of coding plurality, but no such means have been recorded in other Chadic languages. Comparative evidence from other Chadic languages indicates that gemination of the second consonant is a frequent means of coding verbal plurality (cf. Frajzyngier 1965, 1977, 1997, Newman 1990). The product of gemination of voiced consonants in some languages are geminated voiceless consonants, which are sometimes reduced to a single voiceless consonant (cf. Frajzyngier 1976, 1989). If the initial voiceless counterpart in the plural form were a result of original gemination, one would have to postulate that the word-initial consonant is geminated, the gemination in the word-initial position resulted in a sequence of geminated voiceless consonants, and the geminated consonants were subsequently reduced:

C1[+voice] → C1C1 [voice] → C1 [voice]

The consonant remains voiceless in the word-initial position (in intervocalic position all stops and affricates in Lele are voiced).

All elements of this scenario are plausible if one assumes the gemination of the first rather than second consonant of the verb as a means of coding plurality. It would then follow that the L tone becomes M in a syllable with an initial heavy coda:

L → M/CCV

Such a solution is also preferred to one that simply postulates tone raising on syllables with voiceless onsets, because there are many syllables with voiceless onsets and with a L tone (examples limited to word-initial stops only):

- (44) kábù 'tree, *Isobertinia doka*' (Weibegué and Palayer 1982)
 kàl 'climb'
 pàjá 'chief's courtier'
 pàr' 'open'
 tàbàl 'spear'
 tàgà 'kidney, lower back'

The proposed scenario is preferred to one that postulates independent and unmotivated consonant devoicing and tone raising.

10 Conclusions

This article has demonstrated that closely related languages may have different tonal behavior with respect to the same phonological processes, viz. vowel insertion and vowel deletion. In the three languages considered, vowel replacement, where the new vowel carries its own tone, results in the replacement of the old tone. The three languages provide the evidence for a different treatment of tone. In some languages the tone is linked with the tone-bearing unit, in that if the tone-bearing unit is deleted, the tone is also deleted. In other languages the tone is not linked with the tone-bearing unit, and when the tone-bearing unit is deleted, the tone shifts to a neighboring syllable, replacing the tone of that syllable.

The study has also demonstrated that the weight of the syllabic onset can have an effect on the phonological shape of the word, in that a heavy onset causes the raising of the tone from L to M. The weight of the syllabic onset should be added to the list of factors affecting the form of the word.

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Symbols and abbreviations

ASSC	associative	COMP	complementizer
DEF	definite	DEM	demonstrative

DIMIN	diminutive	DU	dual
EE	end of event	fem.	feminine
FUT	future	GN	genitive
GO	goal marker	HAB	habitual
H	High	LOC	locative
INF	infinitive	L	Low
masc.	masculine	NEG	negation
M	Mid		
pl	plural	PRED	predicative marker
PREP	preposition	PROG	progressive
PRF	perfective	PURP	purpose marker
REL	relative	sg	singular
SUBJ	subjunctive	TOT	totality marker
VENT	ventive	1	first person
2	second person	3	third person

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