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DEPRESSOR CONSONANTS IN GEJI

Bernard Caron
*IFRA - LLACAN**

Geji¹ has a tonal system based on a three-level distinction between Hi, Mid and Low, with Falling and Rising combinations of Hi and Lo. This system is fully operational in both grammar and lexicon, but it may be the result of the interaction between a set of voiced consonants called depressor consonants and a deeper two-level opposition between Hi and non-Hi tones. The effect of depressor consonants in Geji can best be observed in verbal nouns.

1. Geji verbal nouns

Geji verbal nouns are formed by adding a *-ti* suffix to the verb, and replacing its lexical tone pattern by a L pattern if the initial consonant is a voiced obstruent, and a M pattern for all other initial consonants.

C ₁ = Voiced obstruent		C ₁ = Voiceless obstruent	
<i>bùktì</i>	baking	<i>po:lti</i>	washing
<i>dèstì</i>	pounding	<i>tasti</i>	sweeping
<i>gù:tì</i>	billowing	<i>ke:fti</i>	tearing
<i>fùntì</i>	hiding	<i>hapti</i>	marrying
<i>zàtì</i>	helping	<i>su:ti</i>	wanting
<i>ḥàktì</i>	pulling	<i>ʔoti</i>	killing
C ₁ = Sonorant		C ₁ = Pre-nasalised	
<i>nalti</i>	growing	<i>mbəlti</i>	increasing
<i>manti</i>	knowing	<i>ngipti</i>	holding
<i>lakti</i>	lighting	<i>nɕikənti</i>	filling
<i>wupti</i>	sucking		
<i>yenti</i>	seeing		
C ₁ = Glottalic		C ₁ = Glottalic	
<i>ba:ntənti</i>	fearing	<i>do:rati</i>	piling up

* Institut Français de Recherche en Afrique, Ibadan et Zaria (Nigeria) & UMR 8135 (Inalco, CNRS) : Langage, Langues et Cultures en Afrique Noire (Villejuif, France). E-mail : caron.bernard@yahoo.fr. We are greatly thankful to the organisers of the 6th WOCAL for their generous invitation. Special thanks to Theda Schumann and Larry Hyman for their remarks and suggestions on a previous draft.

¹ Geji is a language spoken in Bauchi State (Northern Nigeria) belonging to the the West-B3 group of Chadic languages (Newman 1990), spoken in the two nearby villages of Geji and Pelu, with a corresponding dialect split.

2. Depressor consonants

The existence of depressor consonants has been acknowledged for Bantu languages since the 1920s (Beach 1924), for Vietnamese in (Haudricourt 1954), and extensively discussed since the 1970s (Hyman 1973; Hyman & Schuh 1974; Hombert 1978). Its importance has been assessed in (Wolff 1987) for Chadic languages in general and more recently in (Pearce, 1998) for Kera and (Odden, n.d.) for Kotoko. (Moreton 2006) gives a typological account of voicing-tone relations. (Bradshaw 1999) studies these relations from the point of view of a theory of interaction between phonetics and phonology.

The generalization emerging from this overview is that depressor consonants have a lowering effect on a following tone. The definition of a depressor consonant varies from language to language.

In Kera (Pearce, 1998), consonants are divided into three sets: Depressor consonants (i.e. Voiced Obstruents), always associated with L tone; Raising consonants (i.e. Voiceless Obstruents), always associated with H tone; all the others being Neutral, and compatible with both H and L tone.

In Kotoko, Odden (*op.cit*) fixes the following hierarchy of consonants concerning their propensity to lower tone, those at the left end exhibiting the greatest participation in the tone lowering rules.

(1) Consonant Gradient for Lowering Effect

Lowering ←————→ *Raising*
voiced obstruent > sonorant > ? > implosive > voiceless obstruent / h

In Geji, as seen in verbal nouns in the table above, we have a clear-cut two-term division between Voiced obstruents associated with L tone on one side, and all the other consonants on the other side. Voiced obstruents make up the set of depressor consonants (D) in Geji, the others being non-Depressor (T). The role of D consonants in Geji is also visible in treatment of Hausa loanwords:

	Hausa	Geji	C ₁
hornbill	<i>búrtú:</i>	<i>burtu</i>	D
fence	<i>dángá:</i>	<i>danga</i>	D
shrew-mouse	<i>ɕá:bá:</i>	<i>ɕa:ba:</i>	D
foam	<i>kúmfá:</i>	<i>kúmpá</i>	T
breathing	<i>númfá:ǰí:</i>	<i>númpá:ǰí</i>	T
mortar	<i>túrmí:</i>	<i>túrmí</i>	T
pail	<i>gù:gá:</i>	<i>gù:gà (H)</i>	D
adultery	<i>zíná</i>	<i>zìnà (H)</i>	D ²
fallow	<i>sàwrá</i>	<i>sapla (H)</i>	T

3. Depressor consonants and verb classes

(2) Geji Verb Classes³

	1 syll	2 syll	3 syll
HL C ₁ = T	H ^L (18) <i>ɕwét</i> , tear off	HL (4) ⁴ <i>dágà</i> , lift	(0)
MH C ₁ = T	M ^H (85) <i>kum</i> , hear	MH (51) <i>ba:ntí</i> , fear	MHH (3) ⁴ <i>rungú má</i> , hug
LM C ₁ = D	L ^M (21) <i>dès</i> , pound	LM (8) <i>gàbe</i> , greet	LMM (1) ⁴ <i>gàngare</i> , roll down

Three tone patterns emerge from the table:

- Hi verbs : HL pattern, surfacing as H followed by a floating L tone on one-syllable verbs, and HL on two-syllables verbs; there are no 3 syllable-verbs corresponding to this pattern;
- Mid verbs : MH pattern, surfacing as M followed by a floating H tone on one-syllable verbs, MH and MHH on 2 and 3-syllable verbs respectively);
- Lo verbs : LM pattern, surfacing as LM and LMM on 2- and 3-syllable verbs respectively. There is no evidence of a floating M tone following one-syllable Lo verbs. However, as a floating Mid tone would have no phonological manifestation, one-syllable Lo verbs can be characterized as L^M for the sake of consistency

Lo verbs are systematically associated with initial D consonant. The only opposition is between

² A few exceptions need to be accounted for : *balkunó*, 'pepper' (<H. *bàrkò:nó:*); *go:ribà*, 'dum-palm' (<H. *gò:rúbà:*).

³ Verb classes are obtained from the plural form of the Aorist: the Aorist has a zero pre-verbal TAM marker, and the plural subject pronouns have a Mid tone that leaves the verb unchanged. Cf. table (10) below.

⁴ All these verbs are borrowed from Hausa. Despite the fact that no stock 2-syllable Geji verb exhibits the HL pattern, this pattern is well attested for 1-syllable verbs.

Hi and Mid verbs, since they both begin with initial T consonants. The quality of the vowel following the initial consonant is irrelevant as all vowels (*a, e, ə, i, o, u*) are represented in the first syllable.

We can hypothesize from the verb system an original 2-tone system for the Geji lexicon : H and -H (or Ø) which would be changed into a 3-tone system through the intervention of depressor consonants.

(3) Derivation of verb tone classes (Version #1)

General Rules

- a. D changes tones to L
- b. H is delinked after L ($H > \emptyset$)⁵
- c. Ø is realised M

Verb Derivation

- d. Verbs have a lexical contrast between H and Ø on the first syllable followed by a H suffix. The resulting original tone templates are: HH and ØH.
- e. Derivation of tone classes for verbs:
 - i. HL < HH by (b) because all 4 verbs have C2 = D
 - ii. MH < ØH by (d)
 - iii. LM < LØ by (d) < LH by (c) < HH or ØH by (b)

Can this be generalized to the noun system?

4. Depressor consonants in nouns

The 3 tones (L, M and H) are represented in the nominal lexicon. Except for 1-syllable nouns, only one initial Falling tone is represented in a borrowed word, and there is no lexical Rising tone.

(4) Tone and Consonants in One-syllable Nouns

H = T (12) (cf. *fín*, tuwo; *ʔá*, cattle)

M = T (23) (cf. *fín*, tooth; *ʔu*, meat) & D (8) (cf. *ʔi*, body; *bən*, city)

F = T (21)

L = D (19)

Comments: (i) Initial High and Falling tones behave in the same way in relation to initial

⁵ This rule applies to all the lexicon with only three exceptions all borrowed from Hausa : *bà:bá*, father; *gùʔyá:*, groundnut ; *zàrgáw*, snare. All the LH templates are realized with a floating H tone in citation form: LL^H. This is observed in lexical phonology, but does not operate in postlexical phonology: compare *bàlkən* (*kən*), (it is a) shrub *sp.* with *bàlkən* (*gwon*), some shrub *sp.*

consonants. (ii) If H/F and L tones have the same affinity with T and D consonants respectively, Mid tones occur with both D and T initial consonants in nouns whereas they only occur with T initial consonants in verbs.

(5) Tone Patterns in Two-syllable Nouns

MM (66)	HH (53)	LL (31)
ML (13)	HL (12)	LH (3) ; LL ^H (22)
MH (4) : MM ^H (44)	HM (10)	LM (Ø)
MF (6)	HF (27)	LF (2)

If we keep only the most significant tone templates, and have a look at the compatibility with consonants we find:

(6) Tone and Consonants in Two-syllable Nouns

	HH	HL	HM	LL	LL ^H	ML	MH	MM	MM ^H	MF
C ₁	T	T	T	D	D	D, T	D, T	D, T	D, T	D, T
C ₂	T	D	D, T	D, T	D, T	D	T	T	D, T	T

Observations : the situation for C₁ & C₂ is the same as in one-syllable nouns: M is compatible with both T and D consonants, whereas H and L are exclusively associated with T and D respectively. However, there is one important exception in C₂ for the LL template where L appears with T onsets in the 2nd syllable.

Conclusions :

1. As Mid tone is associated with both D and T consonants, D consonants cannot be limited to the production of L tone from H. We have to consider a twofold effect of D consonants: Lowering of H to M and Ø to L.
2. M tone has 2 possible origins: it can be either the surface realization of a lexical Ø, or a H depressed by a preceding D consonant.
3. Ø + D > L ; H + D > M ; Ø + T > M ; H + T > H
4. The association of L and T in C₂ shows that D consonants are not the only source of L through their depressing effect.

As a consequence, LM verbs should be derived from ØH (and not HH), and we need to reformulate the verb derivation rules.

(7) Derivation of verb tone classes (Version #2)

Rules

- a. D changes Ø tone to L and H tone to M

- b. Ø is realised M
- Verbs
- c. Out of the 4 possible templates, HØ, ØH and ØØ are represented; HH is not represented.
- d. Derivation of tone classes for verbs:
- i. HØ > HL (T,D)
 - ii. ØH > LM (D,D & D,T) ; MH (T,T)
 - iii. ØØ > LM (D,T)

Comments:

- the template ØH does not produce a MM pattern as there is no combination of a T C₁ followed by a D C₂.
- this does not account for floating tones in 1-syllable verbs. Is it a case of alignment on 2-syllable verbs?

5. Consonants and the TAM system

In SBW Chadic languages, conjugation is marked by a preverbal TAM complex. In the Aorist, the TAM marker is Ø, and the tone of the subject is copied onto the first¹ syllable of the following verb. See the following examples in the Aorist with nominal subjects preceding the Mid verb *tfet*, ‘press’ in the expression *tfet n̄j: t́á*, ‘to milk’, *lit.* ‘to press the cow’s udder’.

- (8) a. *áwdù tfet n̄j: t́á*, ‘Audu milked the cow’
 b. *mú:sá tfet n̄j: t́á*, ‘Musa milked the cow’
 c. *dwq: tfet n̄j: t́á*, ‘the blind man milked the cow’

With pronominal subjects, it is the tone of the Pro subject marker that is copied on to the verb. The paradigm for Geji Pro subjects is as follows:

(9) Geji Subject Pronouns

	singular	plural
1	<i>à</i>	<i>mə</i>
2	<i>ká</i>	<i>kə</i>
3	<i>tá</i>	<i>sə</i>

The result of the copying of the pronominal subject tones on to the different 1-syllable is as follows:

(10) 1-Syllable Verbs in the Aorist

	<i>gìl</i> , ‘get lost’ (Lo ; C ₁ =D)	<i>pól</i> , ‘wash’ (Hi ; C ₁ =T)	<i>ʃèt</i> , ‘press’ (Mid ; C ₁ =T)
1sg. : <i>à</i>	<i>gìl</i>	<i>pól</i>	<i>ʃè̀t</i>
3sg. : <i>tá</i>	<i>gìl</i>	<i>pól</i>	<i>ʃé̀t</i>
3pl. : <i>sə</i>	<i>gìl</i>	<i>pól</i>	<i>ʃèt</i>

Comments : Contrary to what obtains in other languages with tone-consonant interaction (Odden n.d.:3):

- T consonants do not block L tone spreading (cf. *áwdù ʃèt* & 1sg. *à ʃè̀t*)
- D consonants do not block H tone spreading (cf. 2sg. *tá gíl*, where *gìl* (L) is raised to *gíl* (M) by the H tone of *tá*)

Combinations following tone spreading produce the following surface realizations:

(11) Surface Realization of Tone Combinations

	L	H	M
L	M	H	L
H	M	H	H
M	L	H	M

The rules for the surface realization of tone combinations on a single syllable are:

- M is neutral, leaving H and L unchanged (MH & HM>H ; ML & LM>L ; MM>M)
- HH>H ; LL>M ; HL>M ; LH>H.

NB : the realization LL>M (as in *à gíl* where *gìl* < *gíl*, L^M).

6. Depressor consonants and “floating” tones

The copula *kəŋ*, ‘it is a ...’ is a particle with a Mid tone⁶ that copies the last tone of the noun it follows.

- (12) a. *yétál* (H), ‘wind’: *yétál kən* : ‘it is the wind’;
 b. *gàdâ* (L), ‘basket’: *gàdâ kən* : ‘it is a basket’;
 c. *kusən* (M), ‘rat’: *kusən kən* : ‘it is a rat’.

With some nouns having L or M tone, *kən* appears with a H tone. This can be accounted for by positing a floating H tone linking with the particle:

⁶ We can posit a lexical Middle tone that would account for this behaviour, following the tone rules described in table (11).

- (13) a. *bàlkà̀n* (LL^H), ‘shrub sp.’⁷: *bàlkà̀n kán*, ‘it is a shrub’.



The same floating H tone cannot link with syllables with a D onset, as can be seen with the quantifier *gwon*, pl. : *ɕon*, ‘some’. The quantifier is realized with a M tone and the floating H tone links with the last syllable of the noun. This can be accounted for by saying that *gwon* has a Mid tone pattern, and D consonants act as a barrier (are “opaque”) to H tones.

- (13) b. *bàlkà̀n* (LL^H) + *gwon* > *bàlkán gwon*



This behaviour would be quite normal for D consonants, and has already been noted by Odden (n.d.: 3) for example. However, we have seen that T consonants do not block the rightward spreading of tone in the TAM system (cf. ch. 5, above, comments to table 10). Moreover, the tones of *gwon* in other contexts vary in a way that is difficult to explain if it has a Mid tone. Let us compare the behaviour of *gwon* with that of *kà̀n*:

- (14) a. dog *kadì kà̀n* *kadì gwòn*
 b. dove *kúlú kán* *kúlú gwon*
 c. monkey *bàlì kà̀n* *bàlì gwon*
 d. shrub sp. *bàlkà̀n kán* *bàlkán gwon*
 e. rain season *wá:ɕán kà̀n* *wá:ɕán gwòn*

If *gwon* had a lexical Mid tone, apart from its D onset, it should behave like *kà̀n*. However, if it has a lexical Lo tone, and if we consider that it does not block the rightward spreading of H, the rules of table (11) for the surface realization of tone combinations apply. As a consequence, the floating H tone of {*bàlkà̀n*} would no longer be lexical, but only a surface realization of the citation form⁸. The lexical form should be *bàlkán*.

Now, *kà̀n* and *gwon* share the same behavior: they both allow spreading of the last tone of the noun they follow.

⁷ *bàlkán*, ‘*Dichrostachys cinerea* (*Mimosaceae*)’

⁸ The tone pattern LH seems to be avoided in the citation form of Geji nouns. There are no 1-syllable nouns with a Rising pattern, no 2-syllable nouns with a MH pattern, and the only 3 nouns with a LH pattern are Hausa loanwords: *bà:bá*, ‘daddy’; *gùɕyá*, ‘peanut’ and *zàrgáw*, ‘snare’.

- (15) a. *kadī + kən* M+M > M *kadī kən*
 b. *kadī + gwòn* M+L > L *kadī gwòn*
- (16) a. *kúlú + kən* H+M > H *kúlú kán*
 b. *kúlú + gwòn* H+L > M *kúlú gwon*
- (17) a. *bàlì + kən* L+M > L *bàlì kèn*
 b. *bàlì + gwòn* L+L > M *bàlì gwon*
- (18) a. *bàlkán + kən* H+M > H *bàlkèn kán⁹*
 b. *bàlkán + gwòn* H+L > M *bàlkán gwon*
- (19) a. *wá:ʔn + kən* M+M > M *wá:ʔn kən*
 b. *wá:ʔn + gwòn* M+L > L *wá:ʔn gwòn*

7. Remarks in form of a conclusion

As can be seen from its verb classes, Geji probably developed a 3-tone system (Hi, Mid, Lo) from a 2-tone system (Hi, non-Hi or Ø) through the effect of D consonants. However, the effect of depressor consonants in Geji is limited to the lexical phonology of stock Geji vocabulary: they don't apply to words recently borrowed from Hausa or to ideophones; they don't apply to postlexical phonology, as they don't block the rightward spreading of H tone. Geji now operates a 3-tone system where Hi tone is marked, i.e. it is the most active in terms of spreading, and Mid tone is unmarked, i.e. it is totally ineffective in the rules of tone spreading.

⁹ We still need to account for the fact that we have *bàlkèn kán* and not **bàlkán kán*. This may be a consequence of the OCP if *kən* is a clitic.

Abbreviations

<	comes from	H.	Hausa
>	gives	L	Lo tone
1, 2 ,	first, second, third	M	Mid tone
3	person	pl	plural
C ₁	first consonant	sg	singular
D	depressor consonant	T	non-depressor
H	Hi tone		consonant

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