Notes on Glottal Constriction in Gorum

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Introduction*

In this paper I take a look at the phonology of glottal constriction in Gorum, a South Munda language of the Austroasiatic stock spoken in the Eastern Ghats in India. The common denominator of the phenomena I focus on in the following is glottalization, i.e. stricture at glottal level, and can be represented by the feature [+constricted glottis]. In the present study I emphasize the role of the syllable and other prosodic units. Through this focus I take up one aspect of an older approach by Aze (1971, 1974), which is now generally ignored. Additionally, I will highlight the comparative and historical implications of this analysis.

The three phenomena I am interested in are the following: the glottal stop /ʔ/, as in (1), a series of preglottalized voiced obstruents /ˀb, ˀd, ˀɟ, (ˀg)/, such as /ˀd/ in (2), and vowels with creaky voice articulation, i.e. /a̰ ḛ ḭ o̰ ṵ/, as /a̰/ in (3).

(1) ɖa̰ʔ [ɖa̰ʔ] ‘water’

(2) ɖa̰ˀd [ɖa̰ˀdⁿ] ‘for’

(3) a̰l [a̰l̰] ‘husking pit’

The glottal stop and creaky voice are purely glottal phenomena and differ from one another mainly in the degree of glottal constriction and its timing relative to the vowel. The glottal stop is a complete obstruction of the airflow at glottal level and is perceptionally clearly delimited from the adjacent vowel. Creaky voice involves a lesser degree of glottal constriction and extends over the whole duration of the vowel and a following sonorant in the rhyme, if present. Perceptionally, creaky voice is a property of the vowel, as it cannot be separated from it. The glottalization in preglottalized obstruents, on the other hand, is part of a complex phenomenon and occurs at the boundary between vowel and obstruent, parallel to the oral closing gesture. The glottalization is here only one aspect of the phoneme.

Most other Munda languages only have the glottal stop and the (pre-)glottalized obstruents, although Juray (Zide 1982) and Sora (Donegan p.c.) also have creaky phonation as a variant of the glottal stop. In most Munda languages, the (pre-)glottalized obstruents are considered allophones of the non-glottalized obstruents, as they occur only in syllable-, stem-, or morpheme-final position. This is the case, for example, in Santali (Ghosh 2008) and Kharia (Peterson 2008). Gorum, however, seems to be unique among Munda languages in having all three phenomena. Also, as I will argue, these phenomena are phonemic and involve one feature of glottalization, whose proper domain is the syllable.

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Previous Accounts

Aze (1971, 1974) and Zide (1963, 1982) analyze the status of these three phenomena in very different, in fact incompatible, ways. Aze (1971, 1974) subsumes the three under a single prosodic phoneme, an analysis that allows him to reduce Gorum syllable structure to (C)V(N) and (C)Vʔ(N), where /ʔ/ represents glottalization of the syllable. However, his analysis cannot distinguish between creaky voice phonation and the glottal stop. Furthermore, it fails to distinguish a combination of either one of these with a nasal from the homorganic preglottalized obstruent. As such, Aze's analysis cannot account for a set of minimal pairs and hence has to be regarded as insufficient.

Zide (1963, 1982), on the other hand, recognizes three distinct phenomena, assuming that creaky voice and the glottal stop are two distinct phonemic segments, while preglottalized obstruents are a non-phonemic variant of voiced obstruents. The treatment of creaky voice as a segment is phonologically unfortunate. Also, while the glottalization of obstruents might very well have been a non-phonemic process in earlier stages of Gorum, this analysis seems not to be appropriate to account for the present state, nor does it seem to be psychologically adequate.

In my own analysis, all three glottal phenomena involve one feature [+constricted glottis] or glottalization, which is connected to the syllable. In so far, thus, I follow Aze. However, in my view all three are distinct and phonemic, so that in this respect I am more in agreement with Zide. Historically, I believe she is right in assuming that the preglottalized obstruents are not phonemic. However, synchronic evidence shows that they have become so, due to the heavy influx of Indo-Aryan loan vocabulary, so that preglottalized obstruents contrast with non-glottalized ones in coda-/stem-final position.

The Phonemic Status of Glottal Phenomena

The fundamental differences in the previous accounts illustrate the difficult phonemic status of the three phenomena. It is in fact difficult to demonstrate their distinctiveness, since they are largely confined to mutually exclusive contexts; also, the phonetic differences can be very subtle.

Each of the three phenomena contrasts with its absence, i.e. [+constricted glottis] contrasts with [−constricted glottis]. The examples in (4)-(9) demonstrate this. The difference between (8) and (9), however, is a secondary one between native and loan vocabulary, as (9) is a loan from Telugu, probably via Desia Oriya. Synchronically, it is nevertheless real and does not seems to be different from the other two contrasts. Examples (8) and (9) are especially relevant in the light of Zide's claim that preglottalized obstruents are not phonemic.[107]

(4) a̱l [a̱l] 'husking pit'

(5) al [al] 'to thatch'

(6) ɖa̱ʔ [ɖa̱ʔᵃ] 'water'

(7) ɖa̱ [ɖa̱] 'to do'

(8) ɖa̱ˀbu [ɖa̱ˀbᵐu] 'close-INF.TR'

(9) ɖabu [ɖabu] 'money'

Having established the contrastivity of presence vs. absence of glottal stricture in all three types, let me now come to the contrast between the three phenomena. Finding minimal pairs here is rather more complicated. The main reason for this is that the preglottalized obstruents are, by their very nature as oral obstruents, quite distinct from the purely glottal phenomena creaky voice and glottal stop. The pairs (10) and

107 The distinctiveness can still be doubted in cases such as (8) and (9). These two can be seen as structurally different – i.e. by construing the syllable structure of (8) as /ɖa̱ˀb.u/ in contrast to /ɖa̱.bu/ for (9). This, however, does not invalidate the fact that the distribution of both types of phonemes widely overlaps, so that no general complementary distribution can arise.

(11) as well as (12) and (13) come as close to minimal pairs as one can get. All four feature glottal constriction combined with an alveolar closure. In case of /VʔnV/ in (11) and /V̰n/ (12), this involves nasality in the form of a nasal segment, in this case the nasal stop /n/, and in (10) and (13) a nasal release of a single complex phoneme /ˀd/ [Vˀdⁿ].

(10) ɖaˀd [ɖaˀdⁿ] ‘for’

(11) kinɖaʔ-n [ɖaʔn] ‘at the river (river-LOC)’

(12) ɖa-nɛ̰n [nɛ̰n̰] ‘if done (do-TOP)’

(13) abgeˀd [geˀdⁿ] ‘to ignite’

These combinations of glottal constriction, alveolar oral closure and nasality differ slightly in their phonetics. In the glottal stop plus nasal combination /VʔnV/ in (11), the vowel preceding the glottal stop as well as the nasal following it are minimally affected by the complete glottal stricture. This results in a sound event best transcribed as [aʔn]. The combination of a creaky vowel with a nasal as in (12), shows a glottal constriction that stretches over the whole articulation of the vowel and extends into the following sonorant. This sound event is best represented by the transcript [ɛ̰n̰]. The preglottalized obstruents in (10) and (13) are more complicated in their articulation. The vowel starts in modal voice phonation. The glottal stricture starts parallel to the oral gesture and is clearly audible before the oral closure is complete. The stop is afterwards released in nasal plosion. This sound event may be transcribed as [aˀdⁿ], where [ˀ] is intended to represent the temporally restricted glottal constriction at the end of the vowel.

The three types of glottal phenomena differ primarily in the relative timing of the gestures involved, i.e. glottal constriction, oral closure and velic opening, as well as in the degree of glottal stricture, i.e. complete closure in the case of /ʔ/ and partial constriction in the case of creaky voice and preglottalization.

Speaker judgments vary in their rigidity: while speakers regard a replacement of /ˀd/ by /ʔn/ as a clear audible mistake, they are less clear about the relationship between /ˀd/ and /V̰n/.

All three types of phenomena are consonantal. Interestingly, even creaky voice, which from a phonetic point of view seems to be a quality of the vowel, behaves in some respects like a consonantal phoneme. The best evidence for this comes from echo word formation. Echo words are a phonologically altered repetition of a word. One strategy used in Gorum is vowel replacement. In this formation process, the consonantal skeleton of the base word is maintained, while the vowel or vowels are replaced.

(14) ali ‘liquor’

(15) ula ‘liquor (echo word)’

(16) gagaʔ ‘cooked rice’

(17) gigiʔ ‘cooked rice (echo word)’

(18) gṵmar ‘winnowing’

(19) gḭmir ‘winnowing (echo word)’

In this process, creaky voice figures as part of the consonantal skeleton, just like the other elements with glottal constriction. Thus in the case of examples (18) and (19), the consonantal skeleton of the word is *gV̰.mVr*, with creaky voice a part of it, as shown by the fact that the creaky voice in the first syllable is unaffected when the original vowel pattern *u-a* is replaced in the echo word by *i-i*.

In summary, the three types of glottalized phonemes – glottal stop, preglottalized obstruents and creaky voice – have been shown to be distinct and phonemic in Gorum. They behave as a class and can be categorized by the feature [+constricted glottis]. Evidence from echo word formation suggests that all three should be grouped with consonants. This is, however, all that can be gained from a point of view centered on

the segment. All other relevant data is syllable- or even stem-related and will be discussed in the following sections.

I can now contrast my view of the phonemic status of the glottal phenomena with the two previous accounts by Aze and Zide. For Aze (1971, 1974) every occurrence of glottalization is distinctive and glottalization is a prosodic property of the syllable. However, he recognizes only one phonemic process of glottalization, so that in his analysis creaky voice phonation and the glottal stop are identical. Additionally, he regards the phenomenon here called preglottalized obstruents not as an obstruent phoneme, but as a combination of a nasal coda with prosodic glottalization. By this he can reduce all syllable structures in Gorum to four types: CV, CVʔ, CVN, CVʔN. Zide, on the other hand, only recognizes segments and distinguishes a phonemic glottal stop from a phonemic creaky voice. Preglottalized obstruents in her analysis are obstruents. However, they are not glottalized phonemically, but allophones of the non-glottalized voiced obstruents.

Since Aze recognizes glottalization only on syllable level, the three approaches can best be compared by contrasting the possible syllable types that result from the approaches. Note how several syllable types are conflated in Aze's analysis, while Zide's analysis basically yields the same results as mine. However, she treats creaky voice as a segment /H/ and syllables with preglottalized obtruents are not phonologically glottalized in her view.

Rau	Aze	Zide
C̰V	CVʔ	CVH
CVʔ	CVʔ	CVʔ
CVʔn	CVʔn	CVʔn
C̰VN	CVʔn	CVHN
CVˀO	CVʔn	CVO (not glottalized)

Table 1: Comparison of the different approaches

The Syllable

The syllable is of particular importance for the phonology of glottal constriction in Gorum, since restrictions on number and placement operate on syllable-level. Glottal constriction is restricted to the rhyme and only one occurrence is permitted per syllable.

Syllable Structure

Gorum has a maximal CVC/C̰VC syllable structure. Three exceptions occur: The complex onset /ɖɽ/ occurs in one native word, two lexemes have a complex coda /ŋk/, and some word forms possess a coda /ʔn/. This last cluster can only occur as a result of the affixation of the locative marker *-n* and is very rare; an example can be found in (11) above.

The feature [+constricted glottis] is confined to the rhyme. All three types of phenomena occur with the nucleus or after it.[108] Additional phonetic evidence comes from the articulation of creaky voice. In words such as *ạl* [a̰l̰] 'husking pit' in (20) (repeated from example 4), the glottal stricture extends into a sonorant in coda position. However, the creaky phonation never extends into a sonorant in the onset of the following syllable. Thus the /m/ in *ạmaŋ* [a̰.maŋ] 'before' is not affected by the creaky phonation of the first syllable.

(20) ạl [a̰l̰] 'husking pit'

(21) ạmaŋ [a̰.maŋ] 'before'

108 According to my analysis, this restriction applies to all syllables in all situations. Hence, words such as /ɖaˀb.u/ 'close-INF.TR' (from ɖaˀb 'to close') violate the maximal onset principle. Nevertheless, the phonetics and the syllabification by speakers in slow speech confirm this interpretation. An alternative analysis with the syllable structure /ɖa.ˀbu/ would be possible. Under this interpretation, the restriction on glottal constriction would only hold for the stems in the lexicon and not for actual word forms.

In addition to the positional restriction, the three glottalized elements cannot combine with each other to form a cluster. The constraints on the distribution of these sounds lead to the situation that [+constricted glottis] can occur only once in a syllable. The positional and combinatorical constraints of the three phenomena result in the syllable patterns represented in Table 2:[109] They are grouped here into four groups. This first group comprises open syllables together with syllables with a liquid or nasal in coda position. The second group consists of the same syllable types, but with creaky voice phonation. The third and fourth groups are syllables with a glottal stop or a preglottalized obstruent in coda position. These four groups are relevant for the following discussion of syllable weight.

(C)V	(C)V̰	(C)Vʔ	(C)Vˀ̰O
(C)V(j/r/l)	(C)V̰(j/r/l)		
(C)VN	(C)V̰N		

Table 2: Syllable structures of Gorum

Syllable Weight

Syllable weight seems to be intimately connected to glottalization. (C)Vʔ syllables involving glottal stops and (C)Vˀ̰O syllables with preglottalized obstruents are heavy. With creaky voice, the situation is more complex. It can occur with open (C)V̰ syllables, (C)V̰(j/r/l) syllables with liquids in the coda, as well as (C)V̰N syllables with nasals in coda position. Without creaky voice, open syllables and syllables with glides are light syllables, but with creaky voice they are heavy. Non-glottalized syllables with nasals are ambiguous with respect to syllable weight.

Evidence for the relation between syllable weight and creaky voice comes from nominals. Anderson and Zide (2001) propose a bimoraic constraint on nominals in Proto-Munda; a similar constraint seems to be at work in Gorum, where most nouns are disyllabic. Of the monosyllabic nouns, most have the clearly bimoraic form (C)Vʔ or (C)Vˀ̰O. There are no monosyllabic nominals with light syllables such as CV or CV(j/r/l). There is, however, a small group of nouns of the form (C)V̰(j/r/l). Perhaps the most telling of them is the following pair:

(22) sur ‘to hunt’

(23) sṵr ‘hunting / a hunt’

While the verb in (22) has the form CVr, the corresponding noun in (23) contains an additional creaky voice and has thus the form CV̰r. This is particularly interesting given that the bimoraic constraint only applies to nouns and not to verbs. Since the glottalization seems not to be part of the root, its presence is either the source or an effect of the second mora.

Thus, syllable weight in Gorum is closely connected to the presence of glottalization. All syllables containing [+constricted glottis] are heavy and can be considered bimoraic, although it is not evident in all cases which is the cause and which is the effect.[110]

109 Additionally, there is a very small number of exceptional native lexemes – such as /lup/ [lupʰ] ‘big’ – which end in a voiceless obstruent. These lexemes deviate from the patterns presented here. These voiceless obstruents also do not involve glottalization, but their laryngeal component is an aspirated release.

110 The status of syllables with a nasal in coda position is ambiguous, as pointed out above. Monosyllabic nominals with this coda type tend to be (C)V̰N. However, in contrast to clearly light syllables with a liquid phoneme in coda position, there are a few exceptions. The two pronouns *miŋ* ‘I’ and *maŋ* ‘you(SG)’ as well as the singular noun *zaŋ* ‘bone’ do not contain glottalization and either violate the bimoraic constraint or are bimoraic without any interaction with glottalization.

The Phonological Stem

The phonological stem is the next higher level of prosodic organization relevant to the phonology of glottalization in Gorum. There is a constraint on the number of glottalized syllables operating on stem-level. On the other hand, the stem is also crucial for the placement of glottalization in affectedness marking.

The Glottal Constraint

On the level of the phonological stem, there is a restriction on the number of syllables with glottalization that can occur. In general, only a single glottal element is allowed in a stem. Thus in reduplication of roots containing glottalization, the glottalized element is lost in the reduplicant. This is illustrated in examples (24) through (26); the reduplicant in (24) is a faithful copy of the stem, while in (25) and (26) the segment in the coda which contains the glottalization is lost in the reduplicant.

(24) zum 'to eat' → zumzum

(25) gaʔ 'to eat' → gagaʔ

(26) gaˀd 'to cut' → gagaˀd

This constraint on glottal elements is also at work with the causative prefix, which takes the form *ab-* with roots containing glottalization and *aˀb-*[111] with roots without the constricted glottis feature. In contrast to the reduplicant in (26), where the glottalized coda is lost, the coda segment – /ˀb/ or /b/ – is present in both (27) and (28), but the presence of glottalization depends on the nature of the root.

(27) ab + soˀɻ 'causative + to learn' → ab-soˀɻ

(28) ab + suŋ 'causative + to fall' → aˀb-suŋ

The three types of glottal phenomena form a class which can be interpreted as natural if we assume that all three involve the same feature [+constricted glottis]. Furthermore, the stem is the relevant domain here. This can be seen from example (29), which contains two glottal elements. However, the preglottalised obstruent /ˀd/ is part of the stem *ḏimaˀd* 'to sleep', while the glottal stop /ʔ/ marks affectedness on the non-past suffix *-tu*. This shows that the constraint does not extend over a stem boundary.

(29) ḏimaˀd#-tuʔ 'sleep#-NPST:AFF'

The affectedness marker is discussed in more detail in the following section.

Affectedness Marking

Affectedness marking is another part of Gorum grammar in which glottalization interacts with syllable structure and the phonological stem. This morpheme marks the medium voice of a verb. It is obligatory with one class of verbs, while it has detransitivizing effects on other verb classes.

The morpheme takes two forms, depending on the syllable structure it encounters. In those cases where it combines with an open syllable, it has the form of a glottal stop, resulting in a (C)Vʔ syllable. If the coda position is occupied by a nasal, affectedness marking takes the form of creaky voice phonation, resulting in a (C)V̰N syllable.[112] In either case, affectedness marking takes the form of glottalization and is thus solely an instantiation of [+constricted glottis].[113]

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111 The glottalized form of the prefix could be either *aˀb-* or *a̰b-*. The phonetic evidence is not unequivocal, yet the preglottalized obstruent is the most likely solution.

112 Other forms do not occur, as verbal suffixes only have CV or CVN syllable structures.

113 This is a clear case of allomorphy. If the affectedness marking is considered in isolation, it looks very much as if the glottal stop and creaky voice were allophones conditioned by the prosodic structure. This seems to have influenced Aze's conception of the phonological status of the three types of glottal phenomena.

The morphological behaviour of the affectedness morpheme is unique in the grammar of Gorum. Its placement is not relative to other morphemes, but solely prosodic. The vital notions determining the placement are the right stem boundary and syllable structure; it occurs in the first rhyme following the stem regardless of any other aspect of the morphological structure of the verb. Due to the general restriction on stem boundaries in Gorum to coincide with a syllable boundary, the syllable following the stem is the place of affectedness marking. This is schematically represented in (30). (31) to (34) give concrete examples of the placement relative only to the stem boundary, as well as of the allomorphy depending on the syllable structure. They also show that morpheme order and other morphological aspects are irrelevant.

(30) STEM#σ^{AFF}

(31) (ne)$_\sigma$-(ko)$_\sigma$(ko)$_\sigma$#-(*tuʔ*)$_\sigma$ ‘I will sit’

1sA-sit-NPST:AFF

(32) (or)$_\sigma$-(giˀʝ)$_\sigma$#-(n-*g̱j*)$_\sigma$ ‘he/she/it is not visible’

NEG:NPST-see-INF.INTR-CISL:AFF

(33) (ɖu)$_\sigma$(ku)$_\sigma$#-(r-*g̱j*)$_\sigma$ ‘they were’

be-PST-3pS:AFF

(34) (ɖu)$_\sigma$(k#-*i̱ŋ*)$_\sigma$-(aj)$_\sigma$ ‘he/she/it is to me’

be-1sP:AFF-CISL

Example (34) is exceptional: the right boundary of the morphological stem in Gorum generally corresponds to a syllable boundary. However, in the case of the irregular verb *ɖuku* ‘to be’, the stem boundary does not coincide with a syllable boundary, but the affectedness morpheme is nevertheless positioned directly after the boundary in the rhyme of this syllable.

Stem Patterns

In addition to the rules discussed above, there are some strong statistical tendencies in the distribution of the three types of glottal phenomena in stems. The examples (35) to (42) give an impression of these patterns.

(35) gaʔ ‘to eat’

(36) seˀb ‘to chop’

(37) bu̱l ‘to be drunk’

(38) tu.paˀd ‘to thresh’

(39) kin.ɖaʔ ‘river’

(40) gu̱.tuŋ ‘cloth’

(41) aŋ.an.aˀd ‘door’

(42) bi.u̱.gi ‘tomorrow’

As can be seen, there is a strong tendency for the glottal stop /ʔ/ and the preglottalized obstruents /ˀO/ to occur in the last syllable of a stem and, as such, at its right boundary, while creaky voice /V̰/ prefers the penultimate syllable. In monosyllabic stems this tendency is neutralized, so that no complementary distribution arises. These patterns result in the following stem structures:

monosyllabic stems	disyllabic stems	trisyllabic stems
CVʔ	CVC.*CVʔ*	CVC.CVC.*CVʔ*
CVʔO	CVC.*CVʔO*	CVC.CVC.*CVʔO*
CV̰C	*CV̰C*.CVC	CVC.*CV̰C*.CVC

Table 3: Distribution of glottalization in word stems

In a small number of stems this pattern is broken, but most of these cases seem to be frozen compounds. An example is the word *mit̰an* 'today', in which creaky voice occurs in the last syllable. However, this lexeme, which speakers today view as a simplex, can be analyzed as a compound of the word *mit* 'day' and the synchronically unattested demonstrative ***ṯan,*** probably meaning 'this day'. This putative demonstrative can be connected to the still used *ṯat* 'that day', parallel to the pair *ṯon* 'hither' and *ṯot* 'thither'.

A peculiar pattern occurs with some Telugu or Oriya loan words which have a CV.CV structure in the source language. In Gorum, their first syllable became glottalized, so that the resulting prosodic structure is CV̰.CV. This pattern is not productive anymore, but at some point in the history of Gorum it must have been. The following two words are good representatives of this group.

(43) ḍo̰pa 'leaf bowl' from Telugu *doppa*

(44) ka̰ḍu 'bangles' from Desia Oriya *kaḍu*

The motivation for the presence of creaky voice in the first syllable of these words is unclear. None of the source languages has creaky voice as a sound phenomenon, let alone as a phoneme. Some of these lexemes, such as (43), contain a geminate in the source language, a phonological structure that does not exist in Gorum. However, since not all of these lexemes originally contained geminates, this cannot be the defining condition for the phenomenon. Whatever the motivation for the creaky voice in these words, they show that under some conditions glottalization could come into existence in lexemes that originally did not have it. This poses some problems for the historical reconstruction of this aspect of Gorum phonology. I will address this issue in the following section.

Historical Significance

The previous discussion – especially the occurrence of creaky voice in loan words – raises some problems for the historical treatment of glottalization in Gorum. Of the three glottal phenomena, two are comparatively well understood. The glottal stop is present all over the Austroasiatic family and preglottalized obstruents are found in virtually every Munda language. Also, the history of both seems to be relatively straightforward.

Creaky voice, however, is intriguing: it occurs in several Austroasiatic languages, but its history is still nebulous. Gorum is the only Munda language in which it is phonemic. Nevertheless, it has been claimed to be reconstructable for Proto-Munda (Zide 1976 as well as Zide and Zide 1987). Diffloth (1989) argues that it goes back to Proto-Austroasiatic. Indeed the evidence from all over the language family is quite suggestive, yet the history of this phoneme is still not well understood. This may be due to a variety of reasons. In the Munda languages, it appears that several developments, besides segmental sound changes, have obscured the picture.

The most frequent occurrence of creaky voice in Gorum is probably the affectedness morpheme. This morpheme has no known direct correspondences in other Munda languages, so its history is difficult to determine. Its allomorphy with a creaky voice and a glottal stop allomorph considerably complicates the historical phonology of this morpheme: given the phonological similarity between the two allomorphs, every putative comparative evidence could pertain to either one of the two glottal phonemes.

Further difficulties for a comparative approach stem from the fact that in nominals such as *sṵr* 'hunt' (example 23), the creaky voice seems to be connected with the second mora and might very well be a

derivational device. In other lexemes – such as *ga̰suŋ* 'house' – the creaky voice does not seem to be part of the root either. In this particular case, internal and comparative evidence suggests that the root is *suŋ*, while *ga̰-* seems to be a derivational prefix. Thus in some cases the creaky voice cannot be established as part of the root and its emergence at some point in history is not understood yet.[114]

In addition to those cases were creaky voice cannot be ascertained to be part of the etymon, there are also words where it cannot possibly be part of the original root. These loan words with a CV.CV-structure are evidence that at some point in the history of Gorum a productive pattern existed that gave rise to creaky voice in these lexemes. As long as the motivation for its emergence in these words is not understood, this poses a severe problem for the historical treatment of creaky voice.

Perhaps the most fruitful starting point for a comparative approach would focus on words in which creaky voice occurs in the root and no known pattern motivates its emergence. To my knowledge the monosyllabic verbs in (45)-(48) are the best candidates for this. The other four lexemes are also likely candidates. The only caveat is that *la̰ki* has a CVCV structure, but in contrast to the loans discussed above it is neither a loan word nor a noun. However, this list cannot resolve the fact that prosodic structure and word phonological processes seem to be the key to the understanding of this phenomenon.

(45) bṵl 'to be drunk'

(46) d̰ḛl 'to ripen'

(47) mḛŋ 'to live'

(48) ṵn 'to perform a burial ritual'

(49) a̰maŋ 'before'

(50) a̰gaj 'when'

(51) la̰ki 'later'

(52) bio̰gi 'tomorrow'

There is, I think, another option which should be considered: the phonemic creaky voice in Gorum could be the result of a split in this language, rather than a remnant of an old Proto-Munda phoneme. The tendency for a complementary distribution of creaky voice and glottal stop in stems and the allomorphy of affectedness marking could be interpreted in that direction. The current status of creaky voice in Sora and Juray would then be similar to the historical situation in Gorum.

On the other hand, Diffloth's evidence strongly suggests that creaky voice is an old feature in the Austroasiatic family. However, the historical development, at least on the Munda side of the family, is so heavily obscured that historical reconstruction has to proceed with care.

Conclusions

There are three phonemic types of glottalization in Gorum: the glottal stop, preglottalized obstruents, and creaky voice. These types are forms of one general phenomenon glottalization that can be represented as [+constricted glottis]. Its phonology is best understood in terms of syllable structure. Also, interactions with other elements, restrictions and regularities have to be captured on the even higher level of the phonological stem.

114 I am not convinced by the connection made by Zide and Zide (1987) between the loss of some instances of /s/ in Sora-Juray-Gorum and creaky voice. Since we do not understand the history of creaky voice and there are no systematic, if any, reflexes of it in other Munda languages (cf. Zide 1982, p. 367ff), it seems problematic to posit its existence in some lexemes at some earlier stage solely to explain another unexplained phenomenon.

The history of these phonemes is still poorly understood and in my opinion, a better understanding of prosodic structures in Munda languages, and especially the phonology of glottal constriction, is needed to understand the diachrony of these phenomena.

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