RULE INVERSION IN CHADIC[1]

Russell G. Schuh
Department of Linguistics
University of California, Los Angeles

1. Introduction

In Vennemann [to appear] a mechanism of grammar change, called rule inversion, is described. Reduced to essentials, rule inversion takes place when a historical change *A > B / X___Y is reflected by a synchronic rule B --> A / X___Y. This will typically be the case when the environment conditioning the change *A > B appears in a lexically basic form, e.g. the singular of a noun, but not in a less basic form, e.g. the plural of a noun. The etymologically original A will alternate with the derived B, but since the A alternate appears in the "conceptually more complex morpho-syntactic category" (Vennemann [to appear], p. 4), the B alternate will be taken as basic and A will be derived synchronically from it.

The principal empirical evidence for the existence of rule inversion comes from linguistic changes which take place after the original change(s), but which would have no conceivable motivation if the synchronic rules replicated the original diachronic process(es). The main such subsequent changes are regularization of an alternation and loss of an alternation.[2] Suppose that both ɫ and k palatalize to č in singular forms but are retained in plurals. If the synchronic rules continued to derive the č's in singulars from underlying ɫ and k respectively, we would expect the alternations to remain stable. It is frequently the case that such alternations do not retain their etymological patterns, however.

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[1] I would like to thank Theo Vennemann for encouraging me to write this paper. It is through discussions with him that I have begun to make sense of the syncrhonic alternations described here. I would also like to thank Paul Newman for furnishing me with a manuscript of his forthcoming monograph, The Kanakuru Language. Professor Newman was also kind enough to make comments on an earlier version of this paper.

[2] Andersen [1969] has called the process of regularizing an alternation under these circumstances extension of a morphophonemic process. He has called retrenchment and eventual loss of such alternations curtailment of a morphophonemic process.

The rule inversion hypothesis claims that in the synchronic grammar, after the sound changes have taken place, there are two inverse rules which derive the plural alternates from the singulars, viz. č --> k and č --> t. Note, however, that formulated as inverse rules the alternations of some č's with k and others with t creates a conceptually anomalous situation. That is, there is nothing in the synchronic facts to tell the speaker of this language why some č's alternate with t and some with k. Conceptual anomalies are part of the basis of linguistic change. The anomaly will be resolved either by regularization of the alternation such that č always alternates with t or k but not both, or by disappearance of the alternation altogether and extension of č to all lexically related forms. In fact both types of change are observed.

In what follows, I will describe a number of cases of rule inversion resulting from consonant changes in two Chadic languages, Kanakuru and Hausa. The Kanakuru sound changes are described in Newman [1970], and a synchronic Kanakuru phonology is found in Newman [1973]. I have described the sound changes themselves as occurring in somewhat wider environments than given in Newman [1970] through extrapolation from the synchronic account. The synchronic account suggested here does not differ in essentials from that given in Newman [1973]. It should be pointed out that Newman had already formulated the synchronic Kanakuru phonology as requiring inverse rules purely on internal grounds before rule inversion was elaborated as a bona fide and widespread type of language change.

The Hausa sound changes described here were first systematically laid out in Klingenheben [1928]. I have gleaned further data relevant to these changes from standard Hausa references, particularly Bargery [1934] and Abraham [1962], as well as from my own work on Hausa. To my knowledge, this is the first discussion suggesting that the synchronic alternations in Hausa must be accounted for by inverse rules.

2. Kanakuru

a. The Kanakuru sound changes

Stop consonants in Kanakuru weakened to corresponding sonorants in phonologically specifiable environments. The etymological stops have yielded the following sonorant reflexes:

(1)   *T > r   (*T = *t, *d, *ɗ)

       *K > ɣ   (*K = *k, *g)

       *P > w (> ɓ in some dialects)   (*P = *p ~ *f, *b, *ɓ)

Certain nouns and verbs, while undergoing the expected weakening in their singular forms, have retained stops in plural forms with no apparent phonetic motivation. I will return to these alternations after describing the more regular alternations resulting from the sound changes in (1).

The evidence for weakening comes both from comparative evidence and from stop/sonorant alternations in the contemporary language. After specifying the environments in which weakening took place, I will argue that in a synchronic grammar of Kanakuru, all the alternations must be viewed as operating in just the opposite direction from the historical changes, i.e. they are inverse rules.

Newman ([1970], p. 43) states that weakening affected "intervocalic non-nasal obstruents". Judging from synchronic alternations, the intervocalic weakening applied not only to word medial stops, but also to word final stops when followed by a vowel across a morpheme boundary. Word initial stops have not been affected.[3]

(2)   *T > r

'to die'	muri	cf. Hausa <u>mutu</u>
'eye'	yero	cf. Hausa <u>idoo</u>
'four'	parau	cf. Hausa <u>fuɗu</u>
'it's not a louse'	woi jaŋkar u	<u>jaŋkat</u> 'louse'

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[3]Mysteriously, the change failed to operate in one intervocalic environment, viz. with a preceding short vowel and a following e, e.g. kape 'to sow'. Note the doublet duwi (< *duɣi < *duki) 'to beat' but duše (< *duče < *duke) 'to pound (in a mortar)' (cf. Hausa duuka 'to beat', daka 'to pound (in a mortar)'). Newman [1970] mentions a second intervocalic environment where the change did not operate, viz. before epenthetic ə as in jupəle 'to tumble'. I believe that this ə is without structural import and is needed solely to prevent an obstruent from abutting with a sonorant. This is a common restriction in Chadic languages. Newman notes that these ə's are extremely short.

*K > ɣ

'to build'	d̛əɣi	cf. Hausa <u>d̛aakii</u> 'hut'
'the okra'	garaɣ-i	<u>garak</u> 'okra'
'blind'	buum < *buɣum	cf. Tangale <u>fugum</u> ,
		Karekare <u>mbugum</u>

*P > w

'to spit'	tuwi	cf. Hausa <u>toofa</u>
'room'	gaawi	cf. Bolanci <u>gabi</u>
'cloud'	awe	cf. Pero <u>yəɓe</u>
'he is not seated'	wo-šii šaraɓ u	<u>šii šarap</u> 'he is seated'

(This last example is from a dialect where *P > w > ɓ .)

Weakening also took place in certain non-intervocalic environments.
In particular, the second of two abutting consonants became sonorant.
Again, word initial stops were not affected, but initial stops in certain
enclitic suffixes, especially pronouns, were weakened since these enclitics
are phonologically part of the word to which they are suffixed. Synchron-
ically, the sonorant alternates in these enclitics appear only if the
preceding consonant disagrees with respect to the feature [coronal], i.e.
*T > r only after labials and velars, *P > w and *K > ɣ only after
alveolars.

(3)
'to buy'	d̛ibəre[4]	cf. Ngizim <u>d̛əbdə</u> 'to sell'
'he washed (it) for her'	a joɓ-ro	but <u>a pan-to</u> --> [pando] 'he transplanted (it) for her'
'he cured her'	a jaŋ-re	but <u>a al-te</u> --> [alde] 'he saw her'
'wing'	bobuwa[4] < *bobuɣa	cf. Hausa <u>fiffikee</u>
'your hand'	ar-wo < *ar-ɣo	but <u>a ɓak-ke</u> 'he ignored you'

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[4]As noted in fn. 3, the ə (--> u in the env. of w) probably
has no structural significance. It was introduced after, or as part of,
the weakening of the stop which it precedes.

'he saw you'   a al-ɣe   but a jaŋ-ke -->

[jaŋge] 'he cured you'

a dup-ko 'he mixed (it) for you'

a wum-ko --> [wumgo] 'he rubbed (it) for you'

'fish'   širuwo[4]   cf. Lame kirvi

(By an accident of Chadic history, there are no enclitic suffixes beginning with a labial stop which would be subject to the p/w alternation.)

Some syllable final stops have also been subject to weakening[5] *T > r before [-coronal] consonants. This has taken place both within words and across word boundaries.

(4)   'stones'   guwar-ŋgin   guwat 'stone'
       'he stole a bow'   a šir pek   but a šit tiŋa 'he stole a sheep'

*K > ɣ in some syllable final environments, e.g. gumbaɣla 'toad', yaɣjək 'sifting', yiliɣ-no 'my tongue'. However, there are conflicting examples, e.g. a duk-ro 'he beat (it) for her', a šak-təru 'he founded it', a ɓak lowei 'he ignored the boy'. The conditions which caused or prevented weakening here are obscure.

I have found no examples of p/w alternates in syllable final position. Only the p variant appears.

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[5]Before nasals the following alternations occur (obligatorily within words, optionally across word boundaries):

*T > n / ___ $\begin{bmatrix} +cor \\ +nas \end{bmatrix}$, e.g. ar- 'hand' + ni 'his' --> [an-ni], a kut noki or a kun noki 'he refused his mother' but ar-mai 'your hand';

*K > ŋ / ___ $\begin{bmatrix} -cor \\ +nas \end{bmatrix}$, e.g. *a ɓak-mai --> [a ɓaŋ-ŋai] 'he ignored you (pl)' but yiliɣ-no 'my tongue'; *P > m / ___[+nas], e.g. *a duw-no --> [a dum-no] 'he mixed (it) for me', a tup mori or a tum mori 'he spit the oil'. More investigation will be required to discover whether the historical process producing these alternations went through a development *stop > sonorant > nasal or whether the stops were changed directly into nasals as a sub-part of the overall weakening process. These nasal alternations are clearly relevant to the subject of rule inversion but they will not be further discussed here.

The above account, with some minor details omitted, summarizes the consonant changes that have taken place in Kanakuru. The interplay between the weakening and non-weakening environments has yielded synchronic alternations. Some such alternations have already been illustrated in (2)-(4). Note also the following paradigms, which show the complex interplay between syllable final and syllable initial alternations:

(5) arək   'hand'   yilik   'tongue'
     ar-wo < *ar-ɣo   'your hand'   yiliɣ-no   'my tongue'
     at-to   'her hand'   yilik-ko   'your tongue'
     diye-ro   'her grand-   bo-wo < *bo-ɣo   'your father'
                        mother'

b. <u>Kanakuru synchronic alternations as inverse rules</u>

In generative phonology, alternations such as those seen above are accounted for by choosing one form as underlying and deriving the correct phonetic output from it by rule. In some cases, synchronic rules may reflect diachronic processes. In the case of Kanakuru, however, the synchronic rules are the inverse of the diachronic process, i.e. whereas diachronically "softening" took place, synchronically the rules producing the alternations noted here are "hardening" rules and the sonorant variants are underlying. We can trace the history of the Kanakuru changes as follows:

<u>Stage I</u>: Stops weakened in the environments described above. Whether weakening took place in all those environments at once or in successive stages is irrelevant for our purposes.

<u>Stage IIa</u>: For the majority of lexical items, sonorants had now replaced etymological stops in the more "basic" syntacto-semantic forms. For example, the verb muri < *muti 'to die' now had the verbal noun form muru and moreover retained the r in many of its other forms. Only if the r appeared before a non-nasal alveolar would t reappear (verbs in -i drop the final -i when not utterance final so there are utterances where r might abut with another alveolar). The appearance of a historically derived variant in lexically basic forms is the basis for rule

inversion. Thus, the sonorants r, γ, and w were now underlying in many lexical items.

For a period, these sonorants probably alternated with the stops from which they were etymologically derived. However, with the sonorants being basic, lexical items had to be specifically marked as to whether the alternation was with a voiced, a voiceless, or a glottalized variant. The alternations were gradually regularized so that in contemporary Kanakuru all the phonological sonorant/stop alternations involve voiceless stop alternates, no matter what they were etymologically, e.g.

(6a)   'neck'   duri   cf. Bolanci <u>dido</u>

       'her neck'   dut-to

(6b)   'to mix'   duwi   cf. Margi   <u>dzaɓə</u>

       'he mixed it for a dup-ko

       you'

(No examples of etymological *g alternating with γ have been found.)

Stage IIb: The weakening of stops to sonorants not only resulted in neutralization of original stop contrasts; in the case of *T > r and *P > w, it resulted in neutralization of stops with the pre-existing *r and *w (no *γ existed prior to the *K > γ change). For a period, the etymological sonorants probably retained their identity by <u>failing</u> to alternate with stops. But non-alternating sonorants needed special lexical marking in the same way that the different stop alternates did, and since such special marking is conceptually anomalous, etymological sonorants were also brought into the sonorant/stop alternation pattern.[6]

(7)   'oil'   mot   cf. Bolanci <u>mor</u>

     'the oil'   mor-i

     'lice'   jaŋkat   cf. Ngizim <u>jaŋkar</u>

     'not lice'   woi jaŋkar u

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      [6]This change of *r > t in word final position is not a "historical sound law" as implied by Newman ([1970] p. 44). It is what is traditionally referred to as an analogical replacement.

'hot'	gərgət	cf. Tera gərgər
'not hot'	woi gərgər u	
'he stole a sheep'	a šit tiŋa	
'stealing'	širi < *čiri	cf. Ngizim kərə

I have not yet identified any examples of etymological w's in automatic alternation with p (but see examples of "hard" plurals below).

In words like mot 'oil', jaŋkat 'lice', etc., final t appears in the citation form (= basic form) of the word, yet this t alternates with r. Such words are not counter-examples to my claim that the sonorant/stop alternation in contemporary Kanakuru is an inverse rule where sonorants are underlying. Word final is a position of neutralization where stops and sonorants cannot contrast either phonetically or underlying. At the deepest level these word final consonants are archiphonemes, unspecified for the feature [sonorant].

We have seen that regarding the contemporary Kanakuru consonant alternations as an inverse rule where sonorant --> stop rather than the historical process stop --> sonorant explains the regularization of the alternations giving only voiceless stops as alternates of sonorants. It also explains why etymological sonorants now alternate with stops.

Consider now the following sentences:

(8a) a wupə-ro   'he sold (it) to   (< wupe 'to sell')
                    her'

(8b) a gup-ro diɣil   'he forged a hoe   (< guwi 'to forge')
                        for her'

(8c) ši kukə-mai   'he is learning   (< kuke 'to learn')
                     (it)'

(8d) ši duŋ-ŋai   'he is beating it' (< duɣi 'to beat')
      (cf. also a duk-ro 'he beat (it) for her')

If we were to take the stops as underlying in all cases and derive the sonorants from them, there would be no way to distinguish the medial consonant in the verb root in (8a) from that in (8b) and the medial consonant in the verb root in (8c) from that in (8d) for the purposes of

epenthetic ə insertion. The presence of ə after the medial consonants of the verbs in (8a) and (8c) results from a condition on the formation of words in Kanakuru preventing obstruents from abutting with sonorants (cf. fn. 3). Likewise, by not distinguishing k and ɣ underlyingly, we would have no way to predict which words have velars which assimilate to a following nasal, as seen in (8d).

The inverse rules just described are of particular interest since they exemplify inverse rules that have become productive phonological processes. More typical are inverse rules which level variability in alternations but remain restricted to specific lexical items. Kanakuru also has such lexically speicific inverse rules. Certain nouns and verbs have plural forms which replace a sonorant in the singular with a stop in the plural. (Plural verb forms are used with transitive verbs which have plural objects and with intransitives which have plural subjects.)

(9)

Verbs	Singular	Plural	
'to tie'	ɗowe	ɗope	cf. Hausa ɗamre
'to shoot'	boi < *buwi[7]	bupe	cf. Karekare basa
'to get out'	pui < *puwi	pupe	cf. Ngizim fuwə
'to die'	muri	muti	cf. Hausa mutu
'to go out'	pori	poɗe	cf. Hausa fita

Nouns			
'father'	boŋ	bopin	cf. Hausa uba
'chicken'	yaawe	yaapiyan	cf. Tangale yaɓɛ
'gazelle'	šere	šeɗiyan	cf. Dira kite 'duiker'
'shoe'	taa < *taɣa	takin	cf. Hausa taaka 'to step on'
'duiker'	boo < *bowo	bokiyen	cf. Tangale bɔɓo, Kofyar paap

An explanation for why stops in plurals were not always changed to sonorants as they were in the singular awaits discovery. It is clear,

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[7]Besides the sound changes described here, Kanakuru also underwent a change which converted all alveolar and alveo-palatal spirants to y (--> w in the env. of a round vowel). See Newman [1970].

however, that singulars characterized by "soft" consonants which are
paired with plurals characterized by "hard" consonants represent an old
alternation pattern, not a new development. Were the alternations a new
development (a rather implausible hypothesis under any circumstances), we
would expect the hard/soft alternations to be perfectly regular. But
whereas most r's in the singular alternate with ɗ's in the plural,
in the word 'die' (< *muti), we find r alternating with t. The odds
are vanishingly small that Kanakuru speakers would single out this one
word for an r/t alternation rather than r/ɗ, where this one word is
one where it happened that the etymological stop which yielded r was
*t. We can only assume that the t in the plural alternate of 'die' is
a historical retention and that ɗ's in plurals where the etymological
consonant is not *ɗ (e.g. the word for 'to go out') are recent replace-
ments occasioned by what has traditionally been called analogical leveling.

Other evidence that "plural hardening" is an old alternation is seen
in the following singular/plural pairs miyo 'wife' (pl) mišan, and
tiŋa 'sheep' (pl) tiŋgan (cf. Ngizim təmaaku). The alternation seen
in 'wife' is the only synchronic survival reflecting a sound change
*S > y in all environments (cf. fn. 7). The non-existence of s/y
alternates elsewhere in the language precludes the possibility that
Kanakuru speakers could have formed the plural mišan as a later ana-
logical development, since there is no model for it.[8] The ŋ/ŋg
alternation found in 'sheep' is likewise an alternation not found else-
where in the language.

It is equally clear that the sonorant/stop alternation between
singulars and plurals is an inverse rule in contemporary Kanakuru. First,
the stops found in the plurals do not always reflect their etymologies,

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[8]Paul Newman, in personal communication, has suggested that the y
in miyo may etymologically be *y, cf. Ngizim mai 'mother'. This does
not affect the argument here but only complicates the facts. The y/š
alternation in the word for 'wife' must date from a time when not only
were there sonorant/stop alternations in singulars and plurals, but also
some plurals having y/alveolar fricative alternations. It would not be
unexpected for the latter alternation to spread to words where the y was
not etymologically *S in the same way p has now spread so as to alter-
nate with w's which are from etymological *w (as in the word 'to get
out' in (9)), not etymological *P.

as can be seen in the examples in (9). In fact, with the exception of
the verb 'to die', where r alternates with t, the alternations are
always w/p, r/ɗ, and ɣ/k.[9] Second, plural hardening in Kanakuru is
typical of many inverse rules in that it involves an alternation which is
both phonetically unmotivated and requires arbitrary marking of those
lexical items which undergo it. Such rules are subject to replacement by
more regular processes which do the same semantic or syntactic work.
Newman [1970, 1973] does not mention alternates to the "hard" plurals.
However, in the Kanakuru list in Kraft [to appear], all words given with
hard plural forms are also given with a non-hardened variant using a
suffix -ŋgin, e.g.

(10) 'hen'   yaawe   yaapiyen or yaawiŋgin

      'gazelle'   šere   šedĭyen or šereŋgin

      'bow'   ruɣa   rukən or ruwaŋgin

      'billy goat'   buut < *buɣut bukərin or buriŋgin

Of the plural form in -ŋgin, Newman ([1973], p. 7-1) says, "This is
by far the most common plural suffix and also the most productive at
present, as evidenced by its use with recent loanwords." We can add that
its productivity is further evidenced by its use as a replacement for
plurals formed in more conservative speech by an inverse rule.

To summarize, Kanakuru has undergone massive weakening of stops to
corresponding sonorants, but the weakening occurred only in specific
environments, the result being stop/sonorant alternations in the contem-
porary language. The synchronic rules must all be considered <u>inverse
rules</u> for a number of reasons: loss of etymological contrasts in stops
alternating with sonorants, extension of alternations to words containing
etymological sonorants, replacement of "hard" plurals with more regular
plural forms containing sonorants.

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[9]Between identical vowels, ɣ has been lost. We therefore see in
some cases that Ø alternates with k (taa/takin 'shoe'). In the
word for 'duiker', k now alternates with Ø where Ø < w < *ɓ between
two o's. As a general rule, however, w < *P or *w has not been lost
between identical vowels (cf. [kowot] 'mucous').

The inverse rules are all morphophonemic in the sense of Vennemann [to appear] and Andersen [1969]. However, they are of two types: the first involves productive alternations which take place in (morpho)phonologically specifiable environments (environments mentioning only segments and/or boundaries but not lexical categories or specific lexical items). Though the original phonetic motivation for this rule (weakening of stops) has been lost, the rule has become stabilized and has even been extended to sonorants not originally part of the alternation. I should point out in passing that the fact that the rule was extended because of conceptual motivation (reduction of irregularity), not phonetic motivation (a natural process of obstruent weakening), is the evidence that the rule is no longer phonological, but rather morphophonemic (see Vennemann [1971] for discussion of changes involving conceptual as opposed to phonetic processes).

The second type of alternation yields stops in plural forms corresponding to sonorants in singulars. The alternation is being curtailed as can be seen by the replacement of "hard" plurals by more regular plural types.

The reason for extension in the one case and curtailment in the other is clear, viz. the former operates unexceptionally in the appropriate environments while the latter requires special lexical marking on the items undergoing the alternation.

3. Hausa

Hausa has undergone a series of sound changes weakening consonants to the corresponding sonorants in syllable final position. The entire series of changes is now generally referred to as Klingenheben's Law since the changes were first systematically described in Klingenheben [1928]. The changes which took place are as follows:

(11)   *K > w / ___ $[10]   (*K = *k, *g, *ƙ)

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[10]The symbol $ represents a syllable boundary. Since no more than two consonants can occur in sequence in Hausa, the environment / ___ $ abbreviates / ___ $\left\{ \begin{array}{c} C \\ \# \end{array} \right\}$.

$$*T > \tilde{r} \;/\; \underline{\quad}\$$$ (*T = any alveolar obstruent; $\tilde{r}$ = "trilled r", which contrasts phonetically with r, a "retroflex flap")

$$*P > w \;/\; \underline{\quad}\$$$ (*P = *p ～ *f, *b, *ɓ, *m)

We know from dialect evidence that these changes happened historically in the order from top to bottom in (11), since the latter changes have only partially taken place or have not taken place at all in some dialect areas (cf. Klingenheben [1928], Schuh [1972]). We will be concerned here only with the dialect where the entire series of changes is complete.

Evidence for the changes is found in synchronic alternates, dialect variants, and comparative evidence. (In conformity with the standard orthography, syllable final w will be represented u):

(12) *K > w

'poverty'   talaucii   cf. <u>talaka</u> 'poor person'
'a twin'   batauyee   cf. <u>tagwaaye</u> 'pair of twins'
'tusk'   hauree   cf. <u>haƙoorii</u> 'tooth'

(13) *T > ũ

'Audu's gown' riiga-r̃ Audu   cf. <u>ta Audu</u> 'that of Audu, Audu's'
'to count'   ƙirga < *ƙir̃ga cf. <u>ƙididdiga</u> 'to reckon'
'five'   biyar̃   cf. Karekare <u>baaɗu</u>
'pagan'   ar̃nee   cf. dialectal <u>asnee</u>

(The alveolar fricatives s and z have usually not changed before labials or velars, e.g. askaa 'razor', cazbii 'prayer beads' in all areas.)

(14) *P > w

'barking (of dog)' haušii   cf. dialectal <u>hapšii</u> or <u>hafšii</u>
'needle'   alluur̃aa < Arabic <u>ʼalʼibra</u>
'to sit'   zauna   cf. <u>zama</u> 'to remain'; dialectal <u>zamna</u>

'mosquito'	sauroo	cf. dialectal <u>sabroo</u>
		or <u>samroo</u>

In the dialect in question, *m > w only before sonorants (cf. the last two examples). Before obstruents, *m remains nasal but assimilates to point of articulation: ranɗa 'to lend' (cf. dialectal ramɗa); ɗiŋkii 'sewing' (cf. dialectal ɗimkii). Word final, m is retained or else becomes ŋ , e.g. muɗum or muɗuŋ 'person'.

Klingenheben's Law applied only to <u>syllable final</u> consonants. There are in Hausa a number of morphological processes which insert vowels between abutting consonants. When the first of the abutting consonants is one which was weakened by Klingenheben's Law, insertion of a vowel between the consonants results in alternation between a sonorant and the corresponding obstruent (or nasal in the case of m). The most common alternations of this type are found in plurals formed by insertion of -aa- between medial abutting consonants (usually accompanied by change of the final vowel of the singular to -ee). Thus, we have a singular askaa 'razor' with a corresponding plural asaakee where there is no alternation, but with ɓaunaa 'buffalo' we find the plural ɓakaanee, giving evidence that the singular is from *ɓaknaa.

In traditional generative grammar, such alternation could easily be accounted for by having underlying k with a synchronic rule to yield w exactly as the diachronic event did. This would be wrong. Note first of all, that to set up underlying /ɓaknaa/, we would have to set up an abstract form that would be impossible as a phonetic form because of the syllable final /k/. While we would not want to rule out, <u>a priori</u>, all abstract underlying forms, we should always ask whether such abstractions are established because of the realities of the language or because of the linguist's pursuit of elegant solutions. In the present case, there is good evidence that underlying /k/ in ɓaunaa and other words in (12) and (15) is not a reality of Hausa. In the first place, the way that contemporary Hausa deals with syllable final velars introduced in borrowings or resulting from productive derivational processes is not to change them to [w], but to completely assimilate them to the following

consonant, i.e. the phonetic result is a geminate consonant. This is seen in borrowings, e.g. lacca   English 'lecture', littaafii 'book' Arabic al kitābi, and in reduplicated forms, e.g. daddaka 'to pound well' < daka 'to pound (in a mortar)', bubbuga 'to beat well' < buga 'to beat', etc. (cf. kaŋkaama 'to catch (many)' < kaama 'to catch').

Stronger evidence that underlying /k/ in baunaa is not a synchronic reality in Hausa is seen from the direction of changes observed in the formation of plurals. The language is losing those plural forms where obstruents alternate with sonorants. Thus, a common alternative to the plural bakaanee is baunaayee. (In this type of plural, if the first syllable has a long vowel nucleus, -aa- is found after the medial consonant and a suffix -yee is added.)

In a synchronic grammar of Hausa, the alternates reflecting Klingenheben's Law must be accounted for by an inverse rule which derives obstruents from sonorants. As in Kanakuru, the Hausa alternations are typical of inverse rules in that the historically derived variant is found in the lexically basic form (here, the singulars of nouns). Further, these inverse rules in Hausa require special lexical marking for items undergoing them and express an apparently arbitrary phonological relationship (underlying w may become [k, g, ƙ, or w] depending on the word). Clearly, such rules are conceptually undesirable and we would expect the language to eliminate them just as Kanakuru is eliminating its hardened plurals.

Following are a few more examples of singulars containing a sonorant derived historically from an obstruent (or m) via Klingenheben's Law. Plural types other than the -aaCee type are included. In the word for 'trader', I know of no regularized variant.

(15) | | Singular | Plural | | Regularized plural |
|---|---|---|---|---|
| 'heart' | zuuciyaa | zukaataa | or | zuuciyooyii |
| 'Tuareg' | buuzuu | bugaajee | or | buuzaayee |
| 'trader' | farkee | fataakee | | ? |

	Singular	Plural		Regularized plural
type of tree	kaȓgoo	?		kaȓaagee[11]
'rubbish heap'	juujii	jibaajee	or	juujaayee
'young man'	saurayii	samaarii	or	saurii

Further evidence that these alternations must be accounted for by inverse rule is seen in the word gwauroo 'bachelor' which has the plural alternates gwauraayee and gwagwaaree. This second alternate has to be an analogical reformation resulting from the neutralization of *P and *K in syllable final position. The -u- in gwauroo comes from *P, not *g, as can be seen in the dialect variants gwabroo or gwamroo.

Whereas the evidence in Kanakuru indicates that all sonorant/stop alternations should be accounted for by inverse rules, the situation is not quite so simple in Hausa. Consider the following forms:

(16) faȓkee   'trader'   faɫaucii   'trading'
      sarkii   'emir, king'   saraɫaa   'ruling'
                                  sarauniyaa   'queen'
      kuɫuruu   'leper'   kutuȓɫaa   'leprosy'
      makaafoo   'blind man'   makauniyaa   'blind woman'

In these examples, the etymologically older consonant appears in the lexically basic form while the corresponding sonorant is seen in the derived forms. (In the word for 'trader' we are concerned with the k/w correspondence, not the ȓ/ɫ one also found here.) I argued above that the alternate in the less basic form, say the ɫ in the plural faɫaakee, should be derived from the alternate in the basic form, here, the ȓ in the singular, faȓkee. Following the same line of argumentation, it appears that the syllable final -w- in the less basic faɫaucii should be derived from the underlying k in the basic form, faȓkee. Such a syn- chronic rule k --> w / ___$ would exactly parallel the diachronic event.

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[11]Although neither Abraham [1962] nor Bargery [1934] give a plural alternate *kaTaagee, it is certain that the ȓ here derives from *T. Trilled ȓ is found only as a result of Klingenheben's Law or in borrowed words. Borrowing is ruled out in this case since other dialects which have l instead of ȓ as the reflex of *T have kalgoo for this word. These dialects do have ȓ in borrowings, however, e.g. baȓkaa 'blessing' (< Arabic) in all dialects.

While the theory being advocated here does not in principle exclude
from a synchronic grammar both rules which reflect the direction of a
historical change and rules which are the inverse of that change, such
a solution must be ruled out for the Hausa examples in (16). Note that
if we used a rule k --> w / __$ to derive fatauci i from underlying
*/farakci i/, we would have to set up exactly the same type of abstract
underlying form that was ruled out above for ɓaunaa. Recall that under-
lying /ɓaknaa/ was ruled out because a /k/ --> w analysis in this
instance is supported neither by productive synchronic rules affecting
syllable final velars nor by change in plural forms observed in the
language.

In fact, it is not uncommon in languages to find what we may call
<u>lexical correspondences</u>. These are sets of words which are etymologically
related, but which can no longer be related by synchronically generative
rule. Such lexical correspondences may result from extensive borrowing
from related languages or borrowing from an earlier period in the history
of the language. Thus, we find pairs like English 'foot'/'ped-al' and
'father'/'pater-nal' where <u>f-</u> and <u>p-</u> form lexical correspondences.
Lexical correspondences may also result from earlier phonological alter-
nations which have lost their productivity,[12] leaving pairs of lexical
items which are no longer relatable by rule in the synchronic grammar.
Thus we have English 'drink'/'drench' and 'stink'/'stench'. Hausa pairs
like farkee/fatauci i are of the latter type.

At present, I have no firm notion about how such pairs of lexical
items should be related in a synchronic grammar. Although we would like
to show that farkee and fatauci i are lexically related in a way that,
say, farkee and kaasuwanci i 'trading' (< kaasuwaa 'market') are
not, it is apparent that we do not want to relate them by generative rule.
To state such relations, Vennemann [to appear] has proposed what he calls
<u>via rules</u>. These are rules of the form '<u>x</u> is related to <u>y</u> via <u>z</u>' where

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[12]The rule relating ɓaunaa to ɓakaanee, etc. is not <u>productive</u>
either, in the sense that it would not apply to borrowings, for example.
It is <u>generative</u>, however, in the sense that it is a morphophonemic rule
relating morphophonemic alternates in a systematic way.

x and y are lexical correspondences of the type being discussed and z is a statement of a correspondence. Thus, z may state a correspondence k --> w ("k corresponds to w") by which we can relate farkee and fataucii without deriving the latter directly from the former. Note that this theory implies a lexicalist view of grammar, such as that outlined in Chomsky [1970]. Thus, the words farkee and fataucii would both appear in the lexicon and would be related by statements of lexical correspondence, not generative rule. Since this is the case, the t in fataucii could not be derived from r̃ by the generative inverse rule I proposed above any more than w can be derived from k. We will therefore need a via correspondence r̃ --> t, identical in form, but not in function, to the generative rule deriving the plural form fataakee from farkee.

Obviously, these claims about how farkee and fataakee are related are not nearly as elegant as would be a solution where the two words were derived from underlying /fatkee/ and /fatakcii/ (or better, /fataktii/) by generative synchronic rules which add shafts to the arrowheads of Klingenheben's Law. But evidence of the type given in favor of rule inversion, and also evidence from semantic change, as, for example where the etymologically related forms, hauree and hakoorii now mean 'tusk' and 'tooth' (cf. (12)), demonstrate that elegant solutions which recapitulate historical facts are not always the solutions most in accord with evidence afforded by synchronic states.

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