RULE INVERSION IN CHADIC

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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 \( A \to B / X__Y \) is reflected by a synchronic rule \( B \to A / X__Y \). This will typically be the case when the environment conditioning the change \( A \to B \) 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. Suppose that both \( t \) and \( k \) palatalize to \( 
\) in singular forms but are retained in plurals. If the synchronic rules continued to derive the \( 
\)'s in singulairs from underlying \( t \) 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.

1I 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 synchronic 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.

2Andersen [1969] has called the process of regularizing an alternation under these circumstances extension of a morphophonemic process. He has called reterchement 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. \( \ddot{c} \rightarrow k \) and \( \ddot{c} \rightarrow t \). Note, however, that formulated as inverse rules the alternations of some \( \ddot{c} \)'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 \( \ddot{c} \)'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 \( \ddot{c} \) always alternates with \( t \) or \( k \) but not both, or by disappearance of the alternation altogether and extension of \( \ddot{c} \) 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 \textit{bona fide} and widespread type of language change.

The Hausa sound changes described here were first systematically laid out in Klinghenheben [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:
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 mutu
'eye' yero cf. Hausa idoo
'four' parau cf. Hausa fudu
'it's not a louse' woi jan'kar u jan'kat 'louse'

3Mysteriously, 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 (< *duyi < *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 a as in jupâle 'to tumble'. I believe that this a 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 a's are extremely short.
*K > γ
'to build' dəyì cf. Hausa dàakìi 'hut'
'the okra' garàγ-i garàk 'okra'
'blind' buum < *buyum cf. Tangale fügum, Karekare mbügum

*p > w
'to spit' tuwi cf. Hausa tóofa
'room' gaawi cf. Bolanci gæbi
'cloud' ãwè cf. Pero yæbe
'he is not seated' wo-ṣìì ʂàrab u ñìì ʂàrap 'he is seated'
(This last example is from a dialect where *P > w > b.)

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 > γ* only after
alveolars.

(3) 'to buy' dìbàre cf. Ngizim dèbdè 'to sell'
    'he washed (it) for her' a job-ro but a pan-to --> [pando] 'he transplanted
    (it) for her'

    'he cured her' a jàq-re but a al-te --> [aîde] 'he saw her'

    'wing' bòbuwa < *bòbuyà cf. Hausa fìffìkèe
    'your hand' ar-wo < *ar-γo but a ɓak-ke 'he ignored you'

"As noted in fn. 3, the a (--> 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-ye but a jan-ke \(\rightarrow\) [jange] 'he cured you'
a dup-ko 'he mixed (it) for you'
a wum-ko \(\rightarrow\) [wumgo] 'he rubbed (it) for you'

'fish' širuwo'

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\(^5\) \(\star T \succ r\) before \([-\)coronal\] consonants. This has taken place both within words and across word boundaries.

(4) 'stones' guwar-ngin but a šit tiŋa 'he stole a sheep'

'he stole a bow' a šir pek

\*K \(\succ\) \(\gamma\) in some syllable final environments, e.g. gumbayla 'toad', yajjak 'sifting', yilīŋ-no 'my tongue'. However, there are conflicting examples, e.g. a duk-ro 'he beat (it) for her', a šak-taru 'he founded it', a šak 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.

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

\*T \(\succ\) \(n\) / \(\star [\)cor], e.g. ar- 'hand' + ni 'his' \(\rightarrow\) [an-ni], a kut noki 'he refused his mother' but ar-mai 'your hand';

\*K \(\succ\) \(ŋ\) / \(\star [\)cor], e.g. *a bak-mai \(\rightarrow\) [a ban-ŋai] 'he ignored you (pl)' but yilīŋ-no 'my tongue'; \*P \(\succ\) \(m\) / \(\star [\)cor], e.g. *a duw-no \(\rightarrow\) [a dum-no] 'he mixed (it) for me', a tup mori 'he spat the oil'. More investigation will be required to discover whether the historical process producing these alternations went through a development \*stop \(\succ\) sonorant \(\succ\) 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
c consonant changes that have taken place in Kanakuru. The interplay
between the weakening and non-weakening environments has yielded syn-
chronic 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)  
ar–ok 'hand'  
   ar–wo < *ar–yo 'your hand'  
   at–to 'her hand'  
   diye–ro 'her grand–bo–wo < *bo–yo 'your father'
   yilik 'tongue'  
   yiliγ–no 'my tongue'  
   yilik–ko 'your tongue'

b. Kanakuru synchronic alternations as inverse rules

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:

Stage I: 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.

Stage IIa: For the majority of lexical items, sonorants had now replaced
etymological stops in the more "basic" syntacto-sematic forms. For
example, the verb muri < *mutl '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 histori-
cally 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 dido
    'her neck' dut-to

(6b) 'to mix' duwi cf. Margi dzabê
    '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 failing 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 mor
    'the oil' mor-i
    'lice' jankât cf. Ngizim jankar
    'not lice' woi jankar u

6This 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.
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', jaŋkaɾ '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 wiŋ-wiŋ 'he sold (it) to (wпе 'to sell') her'

(8b) a gu-ta diŋ-ii 'he forged a hoe (guwi 'to forge') for her'

(8c) št kuka-ma 'he is learning (kuke 'to learn') (it)'

(8d) št duŋ-ŋai 'he is beating it' (duyi '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 a insertion. The presence of a 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 γ 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 specific 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

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>'to tie'</td>
<td>dowe</td>
</tr>
<tr>
<td>'to shoot'</td>
<td>boi</td>
</tr>
<tr>
<td>'to get out'</td>
<td>pui</td>
</tr>
<tr>
<td>'to die'</td>
<td>muri</td>
</tr>
<tr>
<td>'to go out'</td>
<td>pori</td>
</tr>
</tbody>
</table>

Nouns

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>'father'</td>
<td>boŋ</td>
</tr>
<tr>
<td>'chicken'</td>
<td>yaawë</td>
</tr>
<tr>
<td>'gazelle'</td>
<td>šere</td>
</tr>
<tr>
<td>'shoe'</td>
<td>taa</td>
</tr>
<tr>
<td>'duiker'</td>
<td>boo</td>
</tr>
</tbody>
</table>

An explanation for why stops in plurals were not always changed to sonorants as they were in the singular awaits discovery. It is clear, 7Besides the sound changes described here, Kanakuru also underwent a change which converted all alveolar and alveo-palatal spirants to γ (--→ 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 ū's in the plural, in the word 'die' (<*muta), 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/ū, 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 ū's in plurals where the etymological consonant is not *ū (e.g. the word for 'to go out') are recent replacements 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 tīŋa 'sheep' (pl) tīŋan (cf. Ngizim tamaaku). The alternation seen in 'wife' is the only synchronic survival reflecting a sound change *S > ū in all environments (cf. fn. 7). The non-existence of s/ū alternates elsewhere in the language precludes the possibility that Kanakuru speakers could have formed the plural mišan as a later analogical development, since there is no model for it. The ū/ū alternation found in 'sheep' is likewise an alternation not found elsewhere 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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8Paul Newman, in personal communication, has suggested that the ū in miyo may etymologically be *y, cf. Ngizim maį 'mother'. This does not affect the argument here but only complicates the facts. The y/ū 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 ū was not etymologically *ū in the same way p has now spread so as to alternate 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/d, and γ/k. 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 -gin, e.g.

(10) 'hen' yaawe yaapiyen or yaawingin
     'gazelle' šere šediyen or šereŋgin
     'bow' ruya rukan or ruwangin
     'billy goat' buut < *buyut bukarin or buringin

Of the plural form in -gin, 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 contemporary language. The synchronic rules must all be considered inverse rules 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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9Between identical vowels, γ has been lost. We therefore see in some cases that ø alternates with k (taw/takin 'shoe'). In the word for 'duiker', k now alternates with ø where ø < w < *6 between two o's. As a general rule, however, w < *p or *w has not been lost between identical vowels (cf. [kowo] '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 Klinghenheben's Law since the changes were first systematically described in Klinghenheben [1928]. The changes which took place are as follows:

(11) \( ^*K > w / \quad \text{\$}^{10} \quad (^*K = ^*k, ^*g, ^*k) \)

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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 \( / \quad \text{\$} \) abbreviates \( / \quad \{C\} \).
*T > ř / ___$ (*T = any alveolar obstruent; ř = "trilled r", which contrasts phonetically with r, a "retroflex flap")

*P > w / ___$ (*P = *p ~ *f, *b, *b, *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. Klinghenheben [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. talaka 'poor person'
'a twin'  batauye  cf. tagwaaye 'pair of twins'
'tusk'  hauree  cf. hakoorii 'tooth'

(13) *T > ř

'Audu's gown'  riiga-ř Audu  cf. ṭa Audu 'that of Audu, Audu's'
'to count'  ḱirga < *kiŋga  cf. kididdiga 'to reckon'
'five'  biyař  cf. Karekare baadu
'pagan'  ařnee  cf. dialectal asnee

(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)'  hauği  cf. dialectal hapšii

'needle'  alluufaa  < Arabic ḫal'ibra
'to sit'  zauna  cf. zama 'to remain'; dialectal zamna
'mosquito' sauroo cf. dialectal sabroo or samroo

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: ranta 'to lend' (cf. dialectal ramta); diŋkii 'sewing' (cf. dialectal dimkii). Word final, m is retained or else becomes η, e.g. mutum or mutuŋ 'person'.

Klingenheben's Law applied only to syllable final 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 baunaa 'buffalo' we find the plural baakaanee, giving evidence that the singular is from *baknaa.

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 /baknaa/, 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, a priori, 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 baunaa 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', littaa-fii 'book' Arabic al kitābī, 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 bakaane 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 Klinghenheben'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, ḫ, 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 Klinghenheben's Law. Plural types other than the -aaCee type are included. In the word for 'trader', I know of no regularized variant.

<table>
<thead>
<tr>
<th>(15)</th>
<th>Singular</th>
<th>Plural</th>
<th>Regularized plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>'heart'</td>
<td>zuuciyaa</td>
<td>zukaataa or zuuciyoooyi</td>
<td></td>
</tr>
<tr>
<td>'Tuareg'</td>
<td>buuzuu</td>
<td>bugaajee or buuzaayee</td>
<td></td>
</tr>
<tr>
<td>'trader'</td>
<td>faŋkee</td>
<td>fataakee</td>
<td>?</td>
</tr>
</tbody>
</table>
Further evidence that these alternations must be accounted for by inverse rule is seen in the word gwauroo 'bachelor' which has the plural alternates gwauraaeye 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:

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
<th>Regularized plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>type of tree</td>
<td>kařgǔo</td>
<td>?</td>
</tr>
<tr>
<td>'rubbish heap'</td>
<td>jibaaje (or)</td>
<td>juujaayee</td>
</tr>
<tr>
<td>'young man'</td>
<td>saurayi</td>
<td>samaarii (or)</td>
</tr>
</tbody>
</table>

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 r/t one also found here.) I argued above that the alternate in the less basic form, say the t in the plural fataačee, should be derived from the alternate in the basic form, here, the r in the singular, fařkee. Following the same line of argumentation, it appears that the syllable final -w- in the less basic fataaucii should be derived from the underlying k in the basic form, fařkee. Such a synchronic rule \(k \rightarrow w / ___\) would exactly parallel the diachronic event.

\(^1\)Although neither Abraham [1962] nor Bargery [1934] give a plural alternate *kaTaagee, it is certain that the r here derives from *T. Trilled r is found only as a result of Klinghenheben's Law or in borrowed words. Borrowing is ruled out in this case since other dialects which have l instead of r as the reflex of *T have kalgoo for this word. These dialects do have r in borrowings, however, e.g. bařkaa '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 \( k \rightarrow w / \_ \_ \_ \) to derive \( \text{fataucii} \) from underlying \( */\text{farakci}i/ \), we would have to set up exactly the same type of abstract underlying form that was ruled out above for \( \text{baunaa} \). Recall that underlying \( /\text{baknaa}/ \) was ruled out because a \( /k/ \rightarrow w \) 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 lexical correspondences. 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 \( \_f- \) and \( \_p- \) form lexical correspondences. Lexical correspondences may also result from earlier phonological alternations which have lost their productivity, 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 \( \text{fařkee}/\text{fataucii} \) 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 \( \text{fařkee} \) and \( \text{fataucii} \) are lexically related in a way that, say, \( \text{fařkee} \) and \( \text{kaasuwaacii} 'trading' (\(<\ \text{kaasuwa} 'market'\) 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 via rules. These are rules of the form \( \_x \) is related to \( \_y \) via \( \_z \) where

\[12\]The rule relating \( \text{baunaa} \) to \( \text{bakaanee}, \) etc. is not productive either, in the sense that it would not apply to borrowings, for example. It is generative, 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 \(k \rightarrow w\) ("\(k\) 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 \(\tilde{r}\) by the generative inverse rule I proposed above any more than \(w\) can be derived from \(k\). We will therefore need a via correspondence \(\tilde{r} \rightarrow \tilde{t}\), 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.

REFERENCES


Vennemann, Theo. To appear. "Rule inversion." Lingua 30. [Page references are to a prepublication manuscript distributed at UCLA.] [This article has since appeared; the reference is: 1972. Lingua 29:209-242.]