

RULE INVERSION IN CHADIC: A REPLY

William R. Leben  
 Stanford University

1. Introduction

In a discussion of some interesting examples of developments in two Chadic languages, Schuh [1972] has attempted to document rule inversion as a mechanism of linguistic change. Rule inversion is said to take place "when a historical change \*A > B / X\_\_Y is reflected by a synchronic rule B → A / X\_\_Y" (p. 379). This situation would result in an etymologically basic segment A not being present in underlying forms where it used to appear; for a while, segment A is derived in the appropriate environments from segment B, and where this situation leads to what Schuh calls "conceptual anomaly", the language changes in the direction of eliminating the inverse rule, thereby removing A from surface forms in which it used to appear or bringing about some other simplification.

Schuh states (p. 379) that "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)." Basically, the fact that rule inversion creates a "conceptual anomaly" is what is responsible for subsequent changes: to reduce the level of anomaly, the alternation between B and A is regularized in some fashion, or the alternation is lost completely in favor of the etymologically less basic segment B.

In this paper I argue that Schuh's evidence does not lead to the intended conclusion. The basic objection will be that while the "conceptual anomaly" created by an inverse rule would in some cases be sufficient to motivate a change of the type observed by Schuh, this is not true in all cases; furthermore, it does not appear to be a necessary factor in such developments. Rather the positing of a synchronic stage with "conceptually anomalous" inverse rules constitutes a middleman which it would be advantageous to eliminate in principle from the realm

of possible phonological systems. In the course of the discussion, I will propose alternatives which do not seem to suffer from the empirical and theoretical defects of the analysis involving rule inversion.

## 2. Kanakuru

In his discussion of Kanakuru, Schuh notes that stops have undergone the following changes in certain phonological environments: labials have become *w* (or *β* in some dialects), alveolars have changed to *r*, and velars have become *ɣ*. The weakening of stops to sonorants has taken place intervocally, except when the stop was both preceded by a short vowel and followed by *e*, and when the stop was followed by *ə*. Another place in which this change took place was after a consonant which did not agree with the stop in its specification for the feature [coronal]. *muri* has *r* in place of etymological *t*, *dəyi* has *ɣ* for etymological *k*, and *tuwi* has *w* for etymological *f*. But *kape*, where *p* is preceded by a short vowel and followed by *e*, has not become *kawe*; and *jupele*, where *p* is followed by *ə*, has not become *juwele*.

Schuh observes that these changes gave rise to synchronic alternations between stops and sonorants, and he proposes that the synchronic rules expressing the alternations were the inverse of the historical process: that is, sonorants become basic "in the more basic syntactosemantic forms", and stops came to be derived from them. However, the derivation of stops from sonorants led to great complications in the grammar, and these complications subsequently induced the language to change in a certain way. The complications resulting from rule inversion in this case are obvious. For example, if we have a sonorant *w*, we have no way of predicting whether it will alternate with *p*, *b*, or *β*; because of this, it will be necessary, for each instance of *w* that alternates with a stop, to assign it to a morphological category that will tell us which stop it alternates with. Hence, lexical entries may contain *w*<sub>1</sub>, which alternates with *p*; *w*<sub>2</sub>, which alternates with *b*; and *w*<sub>3</sub>, which alternates with *β*. A further complication is that we must add *w*<sub>4</sub>, the reflex of etymological *w*, which does not alternate with any stops. Similar measures must be adopted for the alveolar and velar series.

Because this ad hoc marking is "conceptually anomalous", the language is led to regularize the alternations. Schuh observes that regularization was achieved in Kanakuru by converting all sonorant-stop alternations into alternations of sonorant with the corresponding voiceless stop. This simplification was extended even to etymological sonorants, which now began to alternate with the corresponding voiceless stops.

Of course, the proposed explanation for the historical changes is only as valid as the proposed "conceptually anomalous" stage which putatively led to the changes. It is important to note that Schuh presents no direct evidence that the sonorants became basic but rather states that by assuming that this is what happened, it is possible to explain the historical developments. However, if we do not assume that sonorants became basic, it is still possible to explain the historical developments.

Consider first the regularization of the sonorant-stop alternation which led to sonorants alternating only with voiceless stops. In the examples given by Schuh, the voiceless stops resulting from this regularization appeared in a typical devoicing environment, immediately preceding a voiceless stop. *dur*l 'neck', where *r* is etymologically from *d*, appears as *du*t in *du*t-to 'her neck'; *du*wi 'to mix', where *w* is etymologically from *β*, appears as *du*p in *du*p-ko 'he mixed (it) for you'. Thus even if we assume that the sonorants did not become basic, i.e. that the underlying roots of 'neck' and 'to mix' remained /*dud*/ and /*duβ*/ for a while, it would still be possible to explain why *d* and *β* alternated with voiceless stops: they appeared in devoicing environments. Meanwhile, with historical weakening incorporated as a synchronic rule (a possibility which Schuh accepts in principle), the basic forms would still be realized as *dur*l and *du*wi. If, in addition, etymological *d*, *β*, etc., ceased to surface phonetically as voiced stops, then future generations would be presented with no synchronic evidence for setting up underlying voiced stops in these words. Instead, one would be faced with a choice: either voiceless stops became basic and the historical weakening rule was retained, or sonorants became basic and the historical weakening rule became inverted.

Let us see what evidence Schuh offers in favor of the latter alternative. He claims that the fact that sonorant-stop alternations were extended even to historical sonorants, so that they came to have voiceless stop alternants, is evidence for an inverse rule rather than for the original weakening rule. But in fact the only instances he cites of the extension of the alternation to historical sonorants occur in word final position, and Schuh himself notes (p. 386) that "word final is a position of neutralization where stops and sonorants cannot contrast either phonetically or underlying [sic]. At the deepest level, these word final consonants are archiphonemes, unspecified for the feature [sonorant]." Thus it is unnecessary to posit a "conceptually anomalous" stage to account for the extension of the sonorant-stop alternations to etymological sonorants in word-final position. Instead, the motivation for this extension is simply that if a word like *mot* 'oil' (where *t* comes from etymological *r*) were pronounced *mor* it would violate the otherwise exceptionless pattern of neutralization of stops and sonorants in word final position. The *t* in *mot* will naturally be subject to the same alternations as any other instance of *t*. Hence, it becomes *r* in *mor-i* 'the oil'.

Another reason given in favor of rule inversion stems from the following forms:

(1)	<u>Basic verb form</u>	<u>Subj. + Verb + Clitic, etc.</u>	
a.	<i>wupe</i> 'to sell'	<i>a wupə-ro</i>	'he sold (it) to her'
b.	<i>guwi</i> 'to forge'	<i>a gup-ro diyi</i>	'he forged a hoe for her'
c.	<i>kuke</i> 'to learn'	<i>ʒi kuka-mai</i>	'he is learning (it)'
d.	<i>duyi</i> 'to beat'	<i>ʒi duŋ-ŋai</i>	'he is beating (it)'

(cf. also *a duk-ro* 'he beat (it) for her')

Schuh claims that if we were to take the medial consonants as underlying stops in all of the above verbs, then there would be no way to distinguish the medial consonant in the verb root in (a) from that in (b), and the medial consonant in the verb root in (c) from that in (d), for the purposes of ə-Epenthesis. This is incorrect. Consider first Schuh's own treatment, which he does not formulate explicitly but which may be



epenthetic *e* is without structural import; in effect, within Schuh's analysis, epenthetic *e* signals that the preceding stop has not been derived by Strengthening.

The following alternative makes no use of inverse rules. The underlying forms of the verbs in question all contain medial stops. The rules of *i*-Dropping, Epenthesis, and Nasal Assimilation are the same as above. In place of Strengthening, we have a rule of Weakening, which is an exact reflex of the historical process.

(4)	(a)	(b)	(c)	(d)
	/wups-ro/	/gupi-ro/	/kuke-mai/	/duki- ai/
(2a,b)	wups-ro	gup -ro	kuke-mai	duk -ŋai
(2c)				duŋ -ŋai
Weakening	-	-	-	-

Weakening does not apply to any of the forms in (4) because, as Schuh notes, the historical change did not affect stops preceded by a short vowel and followed by *e*, or stops followed by *e*. But Weakening does, of course, apply to some of the isolation forms of the verbs in (1), namely to those ending in *-i* but not those ending in *-e*.

Schuh also mentions sonorant-stop alternations in Kanakuru singulars and plurals. According to Newman [1970:46], plurality is sometimes marked by intervocalic consonant hardening in addition to suffixation; this happens in a small subset of nouns and in a small class of verbs that form plural stems. In these cases, *w*, *r*, and *ɣ* in the singular correspond respectively to *p*, *d*, and *k* in the plural. Schuh proposes that this is an inverse rule, which would imply that the present Strengthening process corresponds to a former Weakening process. I see no good reason for assuming that the former process did involve Weakening in singulars, but even if it were shown that this morphological rule had become inverted, the case for Schuh's other inverse rules would not become any more plausible. For one thing, this morphological rule converts *r* into *d*, and thus it does not reinforce Schuh's earlier proposal of a rule to convert *r* into *t*. More significantly, plural hardening was said to operate intervocalically in plurals formed

from a small set of singulars. Even if this could be shown to be the inverse of a former weakening process applying to this small set of singulars, the development would not constitute a shift in the direction of greater complexity ("conceptual anomaly"). Thus, such a development, if it occurred, would still not create a precedent for doing the sort of violence to otherwise valid constraints on phonological relationships that is done by the "conceptually undesirable" inverse rules that Schuh posits elsewhere in his paper.

Newman [1970:45] points up another instance of Strengthening, whereby some dialects of Kanakuru have replaced intervocalic *w* by *ɓ*. This has happened both to etymological *w* and to synchronically derived *w*. Strengthening in these dialects has made the intervocalic weakening of labials inoperative and, therefore, nonexistent. Here is a real case in which a rule  $\text{ɓ} > \text{w} / \text{V} \_\_\_ \text{V}$  becomes eradicated by a rule  $\text{w} \rightarrow \text{ɓ} / \text{V} \_\_\_ \text{V}$ . This example, for which there is direct evidence, is in complete contrast with the sorts of examples proposed by Schuh, for which there is no direct evidence (and for which the indirect evidence does not hold up) and which provide phonological theory with an otherwise totally unnecessary set of alternatives to consider in the evaluation of competing analyses.

### 3. Hausa

Schuh discusses a set of sound changes, known as Klingenheben's Law, that occurred in Hausa. The changes are said to involve the realization of syllable final velar stops and labial consonants as *w*, and of syllable final alveolar obstruents as *ɓ̄*. As with the Kanakuru changes, Schuh proposes to treat the alternations resulting from Klingenheben's Law as inverse rules. For example, the *w* in *ɓawnaa*<sup>1</sup> 'buffalo' comes from etymological *k* but was weakened in syllable final position to *w*. The *k* still shows up synchronically in the plural *ɓak-aa-n-ee*, where the underlined segments represent the root of *ɓawn-aa*. The infixion of *-aa-* and suffixation of *-ee* is accomplished by morphological rules applying in the formation of some other plurals, but which would not be

<sup>1</sup>For expository purposes, I will write orthographic *au* as *aw*, and orthographic *ai* as *ay*. In addition, I will write long *uu* as *uw*.

called productive.

Schuh observes that a typical phonological account of the alternation between *k* and *w* in forms like these would posit *k* in the root: /*Bakn-*/, and would change *k* to *w* when it winds up in syllable final position, as it does in *ɓawn-aə* but not in *ɓak-aə-n-ee*. He observes that this analysis would in effect be positing an underlying form which would be an impossible phonetic form; the impossibility of a phonetic form corresponding exactly to the proposed underlying form /*Bakn-aə*/ is expressed by Klingenberg's Law. He comments that this fact should not a priori rule out the viability of this underlying form, but he claims that there is good evidence that *k* is not present in this underlying form, or in other similar cases. Before discussing the evidence, let us sketch the analysis that Schuh proposes. The underlying form of *ɓawn-aə* is regarded as identical to its surface form, and an inverse rule converts *w* to *k* in all positions except syllable final. But since *w*, due to Klingenberg's Law, may arise from *k*, *g*, *k̄*, *f*, *b*, *ɓ*, *m*, we need a number of inverse rules and a way of categorizing which *w*'s are subject to which inverse rule. This yields the "conceptually anomalous" situation which Schuh claims to need in order to explain subsequent developments in the language.

Schuh's first bit of evidence involves the way that Hausa deals with syllable final velars introduced by borrowings or by productive derivational processes. In these cases, *k* is not converted to *w* but instead assimilates totally to the following consonant. For example, the reduplication form *ɗaɗ-ɗak-aə* 'to pound well' comes from *ɗak-aə* 'to pound' by reduplicating the verb stem. The reduplication process yields *ɗak-ɗak-aə*, but the first *k* does not change to *w* but rather to *ɗ*. However, Schuh overlooks the fact that many alveolars which are placed in syllable final position by the same reduplication process are in fact converted by Klingenberg's Law to *r*: *kas-ee* (> *kaʃee*) 'to kill', *kas-kas-ee* > *kaʃ-kaʃ-ee* 'to kill repetitively'; *faaɗ-aə* 'to fall', *faaɗ-faaɗ-aə* > *faʃ-faaɗ-aə* 'to fall repetitively'.

Some speakers assimilate this *ʃ* in reduplicatives totally to the following consonant, yielding the variants *kaʃ-kaʃ-ee* and *faʃ-faaɗ-aə*.

The existence of co-variants for alveolars but not for velars shows that the real problem is not to block Klingenberg's Law from applying synchronically but rather to guarantee that velars will undergo total assimilation even when alveolars do not. This problem extends to another reduplication, encountered in the derivation of denominal adjectives. *zaak-ii* 'sweetness' has the adjectival form *zaak-zaak-aa* > *zaz-zaak-aa*, and even underlying *w* is subject to total assimilation: *kyaw* 'beauty' has the adjectival form *kyaww-kyaww-aa* > *kyak-kyaww-aa*. On the other hand, underlying alveolars become *f* and only sometimes are subject to total assimilation: *faad-ii* 'breadth' has two adjectival forms, *faaf-faaf-aa* and *faf-faaf-aa*.

As far as borrowings are concerned, Schuh notes that English 'lecture' is borrowed as *lacca* rather than \**lawca*. This might pose a problem if we assumed that borrowed words were incorporated by adopting the phonetic form in the donor language as the underlying form in the borrowing language. If this were the case, it would raise the question of why *k* in the putative underlying form /*lekca*/ did not become *w* by the synchronic version of Klingenberg's Law. However, I do not believe that Schuh would assume this account of borrowing. English 'table' was borrowed by Hausa as *teebur*, despite the fact that Hausa has no rule or rules that could convert putative underlying syllabic *l* into the sequence *ur*. It seems rather that Hausa borrowed both 'lecture' and 'table' by giving them the pronunciation that best approximated the English one while still being consistent with Hausa phonotactics. The *k* of 'lecture' would not have been consistent with Hausa phonotactics, and the obstruent *c* was a much more likely (phonetically similar) substitute than the sonorant *w* would have been. This model explains why Klingenberg's Law was bypassed in borrowing.

To summarize the point thus far, we may conclude that the data from reduplication actually support the existence of a synchronic reflex of Klingenberg's Law; the rule demonstrably applies to alveolars. Furthermore, we may conclude that the facts of recent borrowings provide no support for the position that Klingenberg's Law is not a synchronic rule in Hausa.

Schuh claims to have stronger evidence that *k* is not basic in synchronic *k* - *w* alternations. The evidence comes from the direction of changes in plural formation. He states that plural forms are changing to eliminate *k* - *w* alternations, as well as the others that have resulted from Klingenheben's Law. Thus, while the dictionaries give *ɓawnaa* the plural *ɓak-aa-n-ee*, Schuh notes that a common alternative to this plural form is *ɓawn-aayee*, in which the root is treated as if it contained an underlying diphthong rather than ending in a sequence of consonants. A parallel development is noted by Schuh to be taking place in other words:

(5)	<u>Singular</u>	<u>Plural</u>	<u>Regularized Plural</u>	
a.	zuwciyaa (//zukt-//)	zuk-aa-t-aa	zuwciyooii	'heart'
	buwz-uu	bug-aa-j-ee	buwzaayee	'Tuareg'
	fark-ee (//fatk-//)	fat-aa-k-ee	?	'trader'
	juwj-ii (//jibj-//)	jib-aa-j-ee	juwjaayee	'rubbish heap'

Schuh proposes that the obstruents in the old plurals are derived from the sonorants by inverse rules *w* → *k*, *w* → *g*, *ɓ* → *t*, *w* → *b*, etc. Since these rules require special lexical marking, and since they express an apparently arbitrary phonological relationship, such rules are said to be "conceptually undesirable"; this is offered as an explanation of why the language is regularizing its plurals in a way that eliminates the former sonorant-obstruent alternations in favor of the sonorants. But the proposed solution seems unnecessary, since the regularized plurals are functioning to reduce allomorphy in the singular-plural paradigms. There are perhaps over a dozen different ways of forming plurals in Hausa; a noun may take a number of different plurals, all with the same meaning. A given noun or adjective must be marked for which way or ways its plural is formed. Looking at the correspondence between the singular and the old plural and comparing this to the correspondence established with the regularized plural, it is hardly surprising that the regularized plurals should be gaining ground, to the detriment of the older forms.

Schuh notes that he has no explanation for why faṛkee in (5) does not lose its plural fataakee in favor of a regularized form \*faṛaakee. I believe that this may be explained if Schuh's rule inversion proposal is abandoned. First, however, let us explore Schuh's analysis a bit further.

It has already been commented that Schuh's explanation involving rule inversion may not be necessary to explain developments in the language. If this is correct, then we might still wish to examine the question of whether rule inversion was even possible in the cases proposed by Schuh. The key to Schuh's explanation is the arising of a "conceptually undesirable" stage in the development of the language. In this stage, etymological obstruents in singulars were replaced in underlying forms by sonorants, and a number of ad hoc inverse rules were formulated to yield the sonorant-obstruent alternations. If this stage in the history of Hausa occurred, then there is another conceptually undesirable development that Schuh does not discuss. The development involves eliminating an otherwise valid constraint on plural formation. Newman [1972] notes that with certain restrictions stems that end in two consonants have -aa- inserted between these two consonants in the plural, while those which end in a glide-consonant sequence generally have -aa- attached after the glide-consonant sequence. Once the ending -ee is added, certain forms qualify for epenthetic  $\gamma$ -insertion. The derivations are sketched here:

(6) Plural stem:	ask-	gawI-
-aa- Insertion	as-aa-k-	gawI-aa-
-ee Insertion	as-aa-k-ee	gawI-aa-ee
$\gamma$ -Epenthesis	-	gawI-aa- $\gamma$ -ee

Now, if the "conceptually undesirable" stage that Schuh posits actually existed, it would have been necessary at this stage for the generalization about the environment of -aa- Insertion to have been abandoned. Rather than inserting -aa- only between certain stem-final consonants, the rule necessitated by the intermediate stage invented by Schuh would also have to insert -aa- between certain sequences of glide followed by consonant. This is seen in the following forms, where the underlying

form of the stem is assumed to be that proposed by Schuh in this conceptually undesirable stage:

(7) Putative stem:	ɓawn-	jiwɟ-
Insertion	ɓaw-aa-n-	jiw-aa-j-
Inverse rules	ɓək-aa-n-	jib-aa-j-
(w → k, w → b, etc.)		

There are two strange occurrences in this account. First of all, the putative relaxation of the condition on -aa- Insertion did not have any effect on the derivation of plurals that had pre-existing stems ending in a glide-consonant sequence. Thus, gawɟ-aa 'idiot' retained its plural gawɟ-aa-y-ee. In such examples the putative relaxing of the condition on where -aa- was to be inserted did not manifest itself; gawɟ- and similar examples were not subject to the process that Schuh must posit for (7). If gawɟ- had been, it would have become \*gaw-aa-l-ee; in addition, if an inverse rule had been extended to forms like this one, the w would have been realized as some obstruent. This did not happen.<sup>2</sup>

A second puzzle raised by the inverse rule account is that once the "conceptually undesirable" stage began to be overcome by regularization of the plural forms of ɓawnaa, juwɟii, etc., Hausa went back to the old restriction on -aa- Insertion, which permitted -aa- to break up only consonant-consonant sequences (and it retained the same two exceptions noted in fn. 2). That is, in the speech of those who have regularized ɓawnaa, juwɟii, etc., the plural of ask-aa is still as-aa-k-ee, while the plural of gawɟ-aa remains gawɟ-aa-y-ee. In order for Schuh's analysis to go through, it is necessary for him to posit

<sup>2</sup> There are two exceptions to the statement that the infix -aa- only breaks up stem final consonant-consonant sequences. In *kyawree* and *kaymii*, -aa- is infixed between the stem final glide-consonant sequence, forming the somewhat irregular plurals *kyaw-aa-r-ee* and *kay-aa-m-ee*. But it would not be plausible to suggest that it was on analogy to these irregular forms that the new plurals for *ɓawnaa*, *juwɟii*, etc., were produced, since this would not explain why the latter plurals are becoming regularized to *ɓawnaayee*, *juwɟaayee*, etc., while the putatively parallel forms *kyawaaree* and *kayaamee* remain as they were.

a stage in which the generalization about -aa- Insertion was lost, followed by a stage in which the generalization was rediscovered. This scenario is not only "conceptually undesirable"; it is totally unacceptable.

If it is correct to eliminate the possibility of the rule inversion stage posited by Schuh, then the following account emerges as the only likely possibility that suggests itself at present:

Stage 1. /bakn-/ is the underlying form, and bawnaa and bakaanee are surface forms. Klingenheben's Law is a synchronic rule.

Stage 2. Speakers "notice" that allomorphy can be lessened by treating the surface forms of bawnaa as an underlying form, yielding the plural bawnaayee. /bawn-/ and /bakn-/ now compete as underlying representations.

Stage 3. /bawn-/ wins out as an underlying representation perhaps because it participates in less complex synchronic derivations, perhaps because /bawn-/ is closer to the surface form of the singular, which is "conceptually basic" [Vennemann 1972].

Hausa is currently in Stage 2. The situation, in one respect at least, seems to resemble the variation in the pronunciation of the word status in English. One variant has [əy] where the other has [ə]. It would be pointless, as far as I know, to propose that the variability in English co-variants such as these is currently due to the existence of a tensing or laxing rule that applies in some dialects and not others, on some occasions and not others. Rather, it seems, the word status simply has two underlying forms at present. Similarly, the existence of the co-variants bakaanee and bawnaayee in Hausa simply constitutes evidence for two competing underlying forms /bakn-/ and /bawn-/.

Incidentally, the revised account presented here suggests a possible explanation for why faṛkee, from /fatk-/, has not regularized its plural, fataaakee, to \*faṛaakee. Recall that the non-occurrence of this development posed a problem for Schuh. If the underlying form of faṛkee is indeed /fatk-/, as its plural form suggests, then it would have to be restructured as /faṛk-/ to permit the more "regular" plural.

However, while the corresponding development met no resistance in *ɓawnaa* and other examples cited above, in this case there is a possible source of resistance: the root /*fatk-*/ also occurs in the derived noun *fatawɕii* 'trading' (derived by an unproductive process), where *w* comes from the *k* in /*fatk-*/ by Klingenberg's Law. Therefore, restructuring of /*fatk-*/ as /*faɕk-*/, though it would still succeed in reducing allomorphy in the singular-plural paradigm, would at the same time obscure the relationship of *fatawɕii* to its root. I cannot at present prove that the proposed explanation is correct. If it is correct, however, it would demonstrate that words no longer derived productively in a language are not always mere "fossils" whose structure has no effect on the rest of the system, contrary to the current assumption of some grammarians.

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