TOWARD A TYPOLOGY OF DIACHRONIC PHONOLOGICAL CHANGE IN BANTU LANGUAGES

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ABSTRACT

There has been much recent work on explaining different types of phonetic and phonological processes. At the same time our overall knowledge of the world's languages is greatly expanding. Despite this, published statements about diachronic processes still tend to be largely based on long established Indo-European facts. This paper attempts to make a contribution to that imbalance by considering phonetic/phonological processes in a complete set of (non-Indo-European, Bantu) languages in a delimited geographical area (eastern Africa). It looks specifically at the diachronic processes needed to derive the contemporary languges from Proto-Bantu. Each process is identified, outlined, its relative frequency assessed, and, where possible, parallels are drawn to similar phenomena elsewhere. We do not attempt to indicate the interaction of the processes nor their implication for contemporary languages. It is hoped that this represents a small addition to the pool of knowledge on which future analyses are based.

1. Introduction

1.1. Purpose

In recent years much effort has been invested in characterising and explaining a range of phonological processes. Rather less effort has gone into systematically examining a wide selection of languages in order to determine which processes are really widespread, and therefore worthy of characterisation and explanation. My aim here is to look at the diachronic processes linking Proto-Bantu (henceforth, PB) to the many Bantu languages of eastern Africa with a view to determining how frequent each is. Each process is outlined, illustrated, and its frequency estimated. This frequency is expressed as a percentage of the total of the survey languages set out in the following section. Where relevant I point to parallels with familiar processes in other languages. In some cases, however, no obvious parallel is possible as the processes dealt with are idiosyncratic.

1.2. Data base

Bantu languages are conventionally divided into those of the so-called 'west' (actually the north-west of the Bantu area, located mainly in western Nigeria, Cameroon, Gabon, Congo, and Zaire) and those of the 'east'. The latter are variously referred to but comprise all the remaining Bantu languages, spoken in central, southern, and eastern Africa. I am concerned here with a subset of the latter, namely all the Bantu languages of East Africa proper (Uganda, Kenya, Tanzania, and parts of adjoining countries). In some cases it is not clear whether 'language' or 'dialect' is the appropriate term; that is not important as virtually all the Bantu speech communities of East Africa are covered.[1] In all, 111 languages/dialects are included.

The data were collected during the 1970s at the University of Dar es Salaam by the French scholar G. Philippson and the present author. For each language/dialect a native speaker filled out a 1000-word list using the Roman alphabet. In an interview later, lasting several hours, each speaker was asked questions about, inter alia, the phonetics of what had been written. Although such a procedure has obvious strengths and weaknesses[2] we were confident that phonemic distinctions were made in most cases.

1.3. Historical background

It should be emphasised that what follows is a statement of the processes linking PB to contemporary languages. Although there is some disagreement about details of PB phonology, there is a broad consensus such that most of the claims made below would not be seriously invalidated by slightly different assumptions about PB. Since we are looking at the starting point (PB) and the endpoints (contemporary languages) it is possible that some of the processes underwent intermediate stages no longer visible. However, since so many languages are included and since the processes themselves are often at different stages in the various languages, it is likely that most of the intermediate points are in fact attested in at least some contemporary language(s). The question then of course is how to interpret them (for which see sections 2 and 3 below).

Most scholars would assign the following to PB:

Vowels

7 qualitative vowels, with a length distinction (written V:VV) at least for identical vowels. The 7 vowels are represented as: a, ɛ, e, i, ɔ, o, u, (and in sections 2 and 3, 5-vowel languages are represented as: i, e, a, o, u).

Tones

A two-tone (high-low) system.[3]

Consonants

Allowing for minor differences in detail, it would be safe to assume for PB the following consonant inventory:

p	t	s	k
B	l	z	G
m	n	ɲ	ŋ

Within this system there is uncertainty about the phonetic value of B and G (stop versus fricative?), s and z (fricative versus affricate versus stop? palatal versus alveolar?). It is clear however that all the non-nasal consonants could occur prenasalised, in which case mB, nl, and - ŋG were realised as mb, nd, and ŋg, respectively; and that when a nasal appeared as a prefixal class marker, the nasal was assimilated to the point of articulation of the following oral segment.

Syllable Structure

All syllables were open and of the shape (N)(C)V, that is, a syllable consisted of vowel, or vowel preceded by nasal and/or oral consonant. This means that contexts for consonant change could be either word-initial, or intervocalic, or prenasalised. Since in most eastern Bantu languages consonants typically behave identically in word-initial and intervocalic position, the significant contexts for stating consonant changes tend to be prenasalised or non-prenasalised.

1.4. Inherited/older, more recent, and diffusional, processes

The presence in contemporary languages of the end results of the diachronic processes below might in principle be explained in any of three ways. First of all, we might assume the conventional family tree representation with constant splitting and a number of intermediate proto-languages, in which case the processes can be held to have occurred in the protos and are thus inherited in today's

languages. Secondly, the limited geographical distribution of at least some of the processes would suggest that they are relatively recent. Thirdly, their geographical distribution would suggest that they are not only recent but have diffused across language/dialect boundaries, which implies that articulatory and phonological habits can be borrowed from one language/dialect to another.

There is considerable evidence that all three have occurred. In each case we have attempted to indicate the possibilities. Since we assume the legitimacy of the 'inherited' model, the ranking by order of statistical frequency (as shown below) does not imply that a particular process happened separately in all the languages affected. I have attempted to provide some measure of how many times any change may have occurred separately by taking the 10 genetic subgroupings of the 111 languages/dialects and seeing to what extent they were affected by each process.[4] If all or most of the members of a subgrouping show regular reflexes of any process, we can assume the process occurred just once, in the proto-language ancestral to the subgrouping. If none or virtually none of the members show any reflex of the process, we assume that the proto-language was never affected. However, an intermediate situation is often the case: that is, some members of a subgrouping show evidence of a process while others do not. Most of these cases need further investigation.

The three member notation occurring after the percentage or statistical frequency of each process reflects the subgroup distribution of the process. The first member of the notation shows the number of subgroupings (out of 10) in which the process has occurred in all or virtually all the members, suggesting an original single occurrence in their proto-language; the second member shows the number of subgroups in which the process is present in some members but not in others; and the third member indicates the number of subgroups in which the process is not, or only minimally, present. Thus, for example, 6-1-3 means 'present in all or most of six subgroups, present in some members of one subgroup but not in others, and not, or minimally, present in three subgroups.'

In sections 2 and 3 we distinguish between 'major' (i.e., more frequent) and 'minor' (i.e., less frequent) processes. After each process there is a statement of its statistical frequency. Although the line between 'major' and 'minor' is arbitrary, it is nevertheless true that the former are widespread in the languages surveyed, whereas the latter are localised.

2. Major Processes

2.1. Bantu spirantisation: spirantisation of consonants before high vowel (has affected 81% of the 111 languages examined: 7-1-2)

This can best be represented by the format:

		*/_iC	*/_uC
*p	>	F	F
*B	>	V	V
*t , k^5	>	S	F
*l , G	>	Z	V

in which /F, V, S, Z/ are cover symbols. /F/ represents overwhelmingly [f], but occasionally [pf]. /V/ represents overwhelmingly [v], but occasionally [ß]. /S/ represents overwhelmingly [s], but occasionally [ʃ], [č], or [ts]. And /Z/ represents overwhelmingly [z], but occasionally [ʒ], [ǰ], or [dz]. A list of examples follows, with the lefthand column representing PB forms and glosses, and the righthand column, typical results:

	-pìka	'arrive'	-fika
	-pù	'stomach'	-fu
	mabí	'excrement'	mavi
	-búna	'harvest'	-vuna
	-tíma	'dig'	-sima
	-túla	'forge'	-fula
	ŋkíngɔ̀	'neck'	singo
	makútà	'oil'	mafuta
	molì	'root'	muzi
	-lùma	'roar'	-vuma
	ŋgì	'fly'	nzi
	mogúí	'arrow'	muvwi
also	nsímbà	'lion'	simba
	nsúí	'fish'	swi

For tu/lu, 25% show S/Z rather than F/V, and for pi/Bi, 14% show S/Z instead of F/V. Both these percentages increase slightly if the context is /_yV or /_wV, that is, where /i, u/ act as glides. Although the more common form of palatalisation, that of velars, is dealt with in the next section, it should be noted that (pi/Bi >)Fi/Vi > Si/Zi can also be regarded as a form of palatalisation (assibilation or sibilantisation). The end results of this form of palatalisation are very similar to the end results of the palatalisation of velars. A similar process also occurred in the history of French.

In a majority of cases Bantu spirantisation is older and thus inherited. In some cases the results of Bantu spirantisation have

been affected by other secondary, more recent, processes, and in a very few cases it may have been diffusional. (See Hinnebusch 1981, Moehlig 1981) Spirantisation as a process is widespread in natural languages, but is most frequent in intervocalic context. Spirantisation in the context described here appears to be not common. However, the results of this Bantu spirantisation are akin to the results of the First and Second (Germanic) Consonant Shifts in that a series of spirants appears beside older stops.

2.2. Palatalisation of velars (75% of languages: 1-5-4)

The most common context for this is following /y/ (that is, non-syllabic /i/); then /y, i/; then /y/ and all front vowels; and finally, in a small number of cases, a high front vowel preceding the velar. Most commonly affected are either /k/ or /k, G/: it appears to be rarely the case that /G/ alone palatalises. For /k/ the commonest outcome of palatalisation is /c/ (it is not clear in all cases whether this represents affricate or stop, palatal or palato-alveolar). This is followed at some distance by /ʃ/, and in a few cases, /s/. For /G/, the overwhelming outcome is /j/ (again, unclear as to point and manner of articulation). Examples:

PB	Standard Swahili (5 vowels)	Mwiini (5 vowels)	Comorian (5 vowels)
kyakolyá 'food'	chakula	chakuja	shahula
kentò 'thing'	kitu	chiintu	shintʳu
kɛ̀ndá 'nine'	kenda (archaic)	keenda	shendʳa

Palatalisation of velars appears to have been very common throughout the history of the survey languages, and geographical distribution suggests that in some cases it has also been the result of areal diffusion. In most cases it follows chronologically 2.1, preceding. Palatalisation of velars is common world-wide, and much mentioned in most texts on phonology. For a survey, see Bhat (1978).

2.3. Processes affecting the Class 5 prefix (*li- or le-)

Bantu noun classes are marked morphologically by prefixes of the shapes /CV-/ or /N-/. Typically the segments involved behave as they do in other contexts, with one exception, the Class 5 prefix, which originally is likely to have been */li-/ or */le-/. Typically before vowel-initial noun stems, some form of this prefix is retained, e.g.,

*li-íɲɔ̀ 'eye' to li(i)nɔ (then see 2.3.2., following)

2.3.1. Reduction of the Class 5 prefix before consonant-initial noun stems (70% of languages: 6-0-4)

Before consonant-initial noun stems, however, the prefix and frequently reduces, first to /i-/ and then to zero, e.g.,

*li-Bɛ́ɛ́lɛ̀ 'breast' to i-B ɛɛ lɛ to Ø-B ɛɛlɛ

In many languages neither this loss of /l/ nor the subsequent vowel deletion corresponds to general processes affecting these segments in other contexts, and neither has been adequately explained. There may have been an early allomorphic situation where variants with and without /l/ were present. Later, after loss of /l/, factors other than phonetic appear to have played some role in vowel deletion; prominent among these were paradigmatic levelling ('analogy') and syllable structure rules. While the role of non-phonological factors in phonological change is well known in general, the details of this particular process appear to be Bantu-specific.

2.3.2. Spirantisation of the Class 5 prefix before vowel-initial stems (24% of languages: 2-0-8)

E.g., li-ínɔ̀ 'eye' to zi(i)no/ji(i)no/dzi(i)no etc.

In all languages affected except one, this occurs in languages which have also undergone general Bantu spirantisation, so must be assumed to be related in some way to it. However, not all spirantising languages have undergone this particular process, and in those which have, the end result sometimes differs from the result of the general spirantisation.

Although both of the above processes are inherited, both appear to have been subject to much inter- and intra-language adjustment more recently.

2.4. Vowel neutralisation (reduction of seven to five vowels) (65% of languages: 3-4-3)

I.e., *i/e to /i/, and *u/o to /u/.

Crothers (1978) would regard this as 'to be expected', and Maddieson (1984) regards balanced vowel systems (i.e., i, e, ɛ, a, ɔ, o, u and i, e, a, o, u) as statistically common, 5-vowel systems more so than 7-vowel systems.

With two (somewhat dubious) exceptions, all the survey languages have either retained the original seven vowels or reduced the seven to five by neutralising */i/ and */e/, and */u/ and */o/. The two exceptions have six vowels, with more front than back vowels (see Crothers' Universal 14, and Maddieson 1984:136 ff.). Vowel neutralisation necessarily follows Bantu spirantisation, as the latter requires the presence of the two high vowels: and vowel neutralisation is a very frequent corollary of Bantu spirantisation. It is both inherited and recent; and it is not clear if it might also be diffusional. Examples:

PB	Gikuyu (7 vowels)	Swahili (5 vowels)
-pígà '(cooking) stone'	ihiga	figa
-péta '(sur)pass'	-heta	-pita
-tɛ́ma 'cut'	-tɛma	-tema
-támb- 'spread'	-tamba	-tambaa
-tɔ́k- 'boil'	-tɔgɔta	-tokota
-tóma 'send'	-toma	-tuma
-túma 'weave'	-tuma	-fuma

It is remarkable that Bantu vowel systems have remained very stable over a time span some 2,000 years, when compared with developments during the same period in many European. For a general typological discussion, see Maddieson (1984), chapters 8 and 9.

2.5. Instability of nasal followed by homorganic voiceless stop (63% of languages)

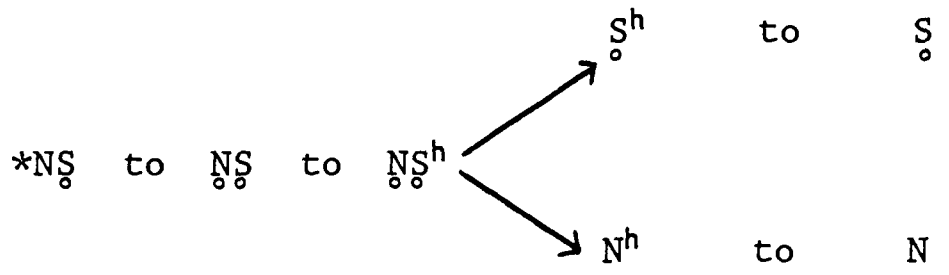
Nasals followed by voiceless stops (N$\underset{\circ}{S}$) are to be expected to be unstable because of the difference in voicing (See Greenberg 1978:260). There seem to be two (possibly three) different basic processes involved:

i) Stop voicing (i.e., *N$\underset{\circ}{S}$ to NS, in 27% of languages: 2-4-4) e.g.,

PB		Kamba
mpígɔ̀	'kidney'	mbiɔ
montò	'person'	mondo
ŋkiŋgɔ̀	'neck'	ŋgiŋgɔ

ii) Nasal devoicing, stop aspiration, followed by either loss of stop or loss of nasal (and deaspiration) (36% of languages: 2-3-5)

That is:



We illustrate this by a single word, with the more common results:

PB moǹto 'person'; Pokomo munt^{h}u; some Swahili speakers mt^{h}u; other Swahili speakers mtu; some Lu̥̥guru speakers mun^{h}u; other Luguru speakers munu.

Both i) and ii) above have occurred sporadically over a long time period down to the present, and there is evidence that both can diffuse across adjoining languages and dialects.

2.6. Instability of nasal preceding spirant (61% of languages: 1-7-2)

This necessarily follows Bantu spirantisation (2.1. above), as it is Bantu spirantisation that produces spirants. Loss of all nasals occurs in 35% of the survey languages; loss of some nasals affects 26%. This depends on point of articulation, voicing (it is more common before voiceless spirants), etc. Examples (although all the examples show word-initial nasals, loss of nasal also occurs in all other appropriate contexts):

PB		Malela	Giryama	Daßida
ntùŋgɔ̀	'genet'	emfuŋgɔ	fuŋgo	-
mpígɔ̀	'kidney'	?	figo	fighó
mbúlà	'rain'	emvula	Swahili mvua	vuá
nsúí	'fish'	enswi	(archaic Swahili swi)	-
ŋkiŋgɔ̀	'neck'	?	siŋgo	siŋgo
ŋgìgɛ̀	'locust'	enzijɛ	nzije	zighe

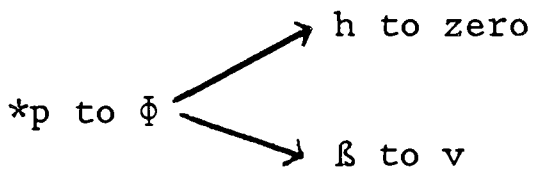
Such nasal instability is most obviously recent and diffusional, but in a few cases may be inherited. Deletion of nasals before spirants here is very similar to developments in Old English (compare

English soft, mouth, five, us, tooth, with their cognates in other Gmc and IE languages).

2.7. Lenition of non-prenasalised */p/ (59% of languages: 3-2-5)

(See Gamkrelidze 1978, who considers /p/ to be a marked consonant, and Maddieson 1984:31 ff).

Lenition of */p/ appears to be best explained by a schema such as



in which [Φ] is the weak link/unstable element, as it is rarely attested. In some languages there is no evidence of an intermediate stage between [p] and [h]. Examples are:

PB -péta '(sur)pass' ; Swahili -pita; Pokomo -Φiha : Gikuyu -heta: Saghala -ita; Comorian (Ngazija) -ßira; Comorian (Nzwani) -vira.

The commonest result of p-lenition in eastern Africa is [h]. P-lenition follows Bantu spirantisation. In some cases it is clearly inherited, in other cases it cuts across related languages and dialects and thus appears to be diffusional.

In the last two decades there has been much typological work on the relative 'strength' of consonants along the parameters of voicing, and place and manner of articulation: see discussion in Gamkrelidze (1978) and Maddieson (1984:31 ff). This also applies to the topics of sections 2.10., 2.13., and several of the minor processes in section 3.

2.8. 'Dahl's law' (53% of languages: 3-4-3)

This is a voicing dissimilation process whose original form was probably that in a sequence of two voiceless stops, the first was replaced by its voiced counterpart. Today the amount of possible variation in the process is considerable. In some languages the process has petrified, leaving only traces in stems; in others it affects prefixes (and even suffixes) actively. In some languages several obstruents are affected; in others only stops (predominantly

/k/) are affected. It is active in 32% of the survey languages and there are traces suggesting past presence in 21% of the languages. The following examples are taken from Taita, where the process is no longer active, and Gikuyu, where the process is active:

PB		Taita	
-písa	'hide'	-visa	(cf. Swahili -ficha)
-pìka	'arrive'	-vika	(cf. Swahili -fika)
-kúpé	'short'	-vui	(cf. Swahili -fupi)
-ikóta	'be satiated'	-guta	(cf. northern Swahili -kucha)
mokósì	'chief'	mgosi	

Gikuyu

-tɔk( )a	'boil'	-tɔɤɔta	(c.f. Swahili -tokota)

Underlying form /ka+kaa+ke+ko+eta/[ɤaɤaaɤeɤweeta] 'and so he (Class 12) will call you'

Dahl's Law is most easily interpreted as both inherited and diffusional (See Davy and Nurse 1982). Many of the forms of Dahl's Law are similar to what happens in Grassmann's Law in Greek and Sanskrit. When Dahl's Law was first described it was in fact (not quite accurately) expressed in terms almost identical to the formulation of Grassmann's Law.

2.9. 'Ganda/Meinhof's law' (53% of languages: 2-4-4)

This is a consonant assimilation process in which sequences such as *NCVN(C) are realised as NVN(C), e.g., (these forms occur in a number of languages):

/ŋgɔmbɛ/ 'cow'[ŋɔmbɛ]: /ŋgɔma/ 'drum'[ŋɔma]: /ndeme/ 'tongues' [n:eme] or [neme]

The contexts for this process vary considerably. In some languages it plays a considerable role in morphophonemic alternations today, in others it is only present in relic form. Our data did not allow us to distinguish clearly between languages with morphophonemic processes and those with traces. It is certainly inherited, but may also be diffusional (See Johnson 1979).

2.10. Lenition of non-prenasalised *B

It is difficult to discuss this form of lenition for three reasons. First, the value of the proto-segment */B/, when not

prenasalised, is unclear. Second, we are not sure in all cases of the exact phonetic value of the reflexes of /B/. Third, there is somewhat ambiguous and controversial evidence about the direction or directions that this form of lenition has taken. Given this situation, it is simplest to list the reflexes of */B/ in order of statistical frequency, and to suggest a possible scenario. Approximate frequencies of the reflexes of */B/ are: [ß] 54%, [w] 19%, [v] 13%, [b] and [β] 7%, zero 7%. An obvious scenario of lenition is: [ß] to [w] to zero. It is not clear where [v] (change of place), or [b] or [β] (change of manner) fit in this scenario. There is no reason other than systemic to assume either [b] or [β] for PB. In the few languages where they do occur, they are not infrequently in free variation with [ß], or are word-initial variants of /ß/ (or /w/).

In 34% of the survey languages, assimilation of the labial occurs to a following rounded vowel: thus before [u, o], [ß, v] are realised as [w], or [w] as zero. Lenition of /B/ seems to have been occurring over a long time period.

2.11. Neutralisation of inherited contrast in vowel length (43% of languages: 3-1-6)

PB had not only short vowels, but also allowed sequences of (at least) identical vowels, often realised as long vowels: evidence for sequences of non-identical vowels is ambiguous. Sequences with /i, u/ as the first element were most likely interpreted as glide plus vowel. 43% of the sample have neutralised the length contrast in favour of short vowels.

Changes in vowel length are frequent in natural languages, but are often, at least initially, context-sensitive. There is no evidence within eastern Bantu languages that this neutralisation of vowel length was ever context-sensitive, so we could assume it was a case of vowel coalescence. See Maddieson (1984), chapter 8, for discussion and an overview of the literature.

2.12. Loss of nominal preprefixal vowel (43%: 2-3-5)

E.g., *u-mu-zimu 'spirit' to mu-zimu

Whereas in all Bantu languages a nominal class prefix is present, a not inconsiderable number also have a preprefix, most often of the shape /V-/, where the V is usually a copy of the prefix V. It has been proposed (Greenberg 1978:47-82) that at one point all Bantu languages may have had this preprefix, which represented a range of syntactic/semantic functions. In the survey languages

there are some which retain it completely, some in which it may be present or not, depending on semantic/syntactic function, and others (43%) which have lost it totally, its role having been taken over by other operators (e.g. demonstratives). Thus the loss of this preprefix is not a strictly phonological matter.

Loss of the preprefix appears to have been relatively recent in most of the survey languages and to have been related to intra- and inter-language factors.

2.13. Lenition of non-prenasalised */G/ (43% of languages: 2-4-4)

In almost all the languages which have undergone this lenition, it follows the path [g] to [ɣ] to zero. In a couple of languages there is some evidence to suggest the possibility of an [h] stage before zero. In approximately 5% of the languages, /G/ has apparently strengthened to /k/: this however appears to be not a phonetic process, but rather to relate to a restructuring of the consonant inventory (see section 3.8 below).

The geographical distribution of [ɣ] suggests that once lenition has started, it may diffuse across language/dialect boundaries. Gamkrelidze (1978) considers /g/ to be a marked segment.

2.14. Devoicing of spirants (39% of languages: 3-2-5)

This necessarily follows Bantu spirantisation. In 12% of the survey languages, all voiceless spirants (whether originally voiceless, or resulting from this devoicing of voiced spirants) reduce to /h/, then to zero. There are a few languages showing some words with voiceless fricative, other words with /h/, and a few languages with /h/ in some words but zero in others. This supports the claim of a general direction: voiceless spirant > h > zero. Examples are:

PB	Swahili	Kisi	Mpoto	Rufiji
mBúlà 'rain'	mvua	fula	hula	ula
maḳúta 'oil'	mafuta	mafuta	mahuta	mauta
-lìBa 'stop up'	-ziba	-siva	-hiba	-iba
-cɔ̀ni 'shame'	soni	soni	ihyoni	oni

The evidence suggests that devoicing of spirants, reduction to /h/ and to zero are all in some cases inherited, in other cases recent and diffusional. There is also evidence to suggest that reduction to /h/ and zero proceeds word by word.

Reduction of /s/ to /h/ is attested quite widely outside Bantu, e.g., in older Greek and in Japanese. Loss of /h/ is even more common. On the other hand, devoicing as a general process tends to be context-sensitive. Although this may have originally been the case with those of the survey languages that devoice spirants, the context is now no longer apparent.

2.15. Lenition of non-prenasalised */B, G/ (30% of languages: 2-3-5)

See 2.10. and 2.13. above, for details.

2.16. Lenition of non-prenasalised */p, B/ (28% of languages: 3-2-5)

See 2.7. and 2.10. above, for details.

3. Minor Processes

As already suggested, in most cases these are localised and relatively recent phenomena, and their geographical distribution suggests that, once started, they may have spread by diffusion.

3.1. Loss of non-prenasalised */l/ (15% of languages)

In most cases this is partial, that is, it occurs before some vowels (most commonly non-front vowels) and not before others. In some cases it is total, taking place before all vowels. There is evidence from a few languages to suggest that [y] is an intermediate stage between [l] and zero. Examples are:

PB	Upper Pokomo	Lower Pokomo	Southern Swahili	Northern Swahili	Shambaa and/ or Bondei
-làpa 'swear'	-laΦa	-yaΦa	-apa	-apa	-aha
-lɔ́mba 'ask'	-lomba	-yomba	-omba	-omba	-ombeza
loBàlú 'rib'	lußavu	yuwavu	ubavu	uwavu	ubavu
-lɛ́ɛ́ta 'bring'	-lerha[6]	-yeha	-leta	-eta	-eta
-lèpa 'pay'	-liΦa	-iΦa[7]	-lipa	-lipa	-iha

3.2. Lenition of non-prenasalised /t/ (12% of languages)

This is a localised phenomenon and does not always appear to follow the same path. One obvious direction is: */t/ to [d] to [r] to [h] to zero. There are several problems here. The most salient are: (i) the occurrence in some languages of voiceless alveolar spirants as reflexes of */t/; (ii) a range of phonetic variants of [r] - trills, flaps, etc.; (iii) the possibility that [r] might precede [d] in the suggested scenario. The geographical distribution suggests that, once started, this form of lenition can spread by diffusion. There is one case of h/zero with pronounced nasalisation of the adjacent vowels (possibly a spontaneous nasalisation), and one case of */t/ to (affricate) /c/ - which however is the result of a restructuring of the consonant system (Nurse 1985). Examples (as the nature of surrounding vowels plays no visible role here, just one word, with two different vowels, is exemplified):

PB	Swahili	Daßida	Comorian	Upper Pokomo	Duruma	Digo
-tátò 'three'	-tatu	-dadú	-raru	-rharhu	-hahu	-hahu or -ãũ

3.3. Lenition of non-prenasalised */k/ (12% of languages)

The only two outcomes of this are [x] and [h]; see also 3.8. following.

Note that the implication of 2.7., 3.2., and 3.3. is that in this geographical area /p/ is the weakest of the three voiceless stops, and that /t, k/ have approximately the same strength. In any language in which /t/ is weakened so also is /p/: there are no exceptions to this. In most languages in which /k/ is weakened so also are /p, t/: there are three exceptions to this.

3.4. Split of non-prenasalised */l/ into allophones [l] and [r], ultimately into /l/ and /r/ (11% of languages)

This appears to be a spontaneous development occurring in geographically separate languages. In nearly all cases the appearance of [r] is associated with a following or preceding front vowel.

3.5. Lenition of */B, l, G/ (voiced oral consonants) (11% of languages)

For details, see 2.10., 2.13., 2.15., 2.16., and 3.4., preceding. In these languages /l/ is more resistant to lenition or loss than /B, G/, and voiced consonants are more likely to lenite as a series than their voiceless congeners (see 3.8. below).

3.6. Tones replaced by (penultimate) stress (10%, but data for 6% ambiguous)

As already suggested, fully active tones and penultimate stress seem to represent the two extremes of a spectrum. Between the two lies a range of other possibilities, such as languages with both 'tone' and 'stress', many languages with restricted tonal systems and others with pitch accent[8]: facts and details of development are unclear in many cases. It is also not clear why systems with penultimate stress should have apparently evolved separately in geographically discrete areas. (See Clements and Goldsmith 1983 for discussion and analyses of specific languages.)

3.7. Lenition of non-prenasalised */p, t/ (8% of languages)

See 2.7. and 3.2. preceding.

3.8. Very minor phenomena

These are processes which occur in 5% or less of the survey languages, but in more than a single language. They are simply listed, without exemplification or percentage of frequency in most cases.

i) <u>Shift of non-prenasalised */G/ to /k/</u>.

This occurs only in languages which have undergone the shift of /k/ to /x, h/: see 2.13. and 3.3., preceding. In

2.13., it is suggested that this seems to represent part of a restructuring of the consonant inventory.

ii) Dentalisation.

This is replacement of non-dentals (alveolars, palatals) by dentals. In some cases a whole series is affected, in some cases a single segment. There are also cases of a dental series being borrowed. (See Nurse 1985).

iii) Lenition of the voiceless stops */p, t, k/.

See 2.7., 3.2., and 3.3., preceding.

iv) Creation of syllabic nasals through */muC../ to /MC../.

It is not clear exactly how many languages/dialects are affected, but it results from loss of (rounded/labial) /u/ after (labial) /m/.

v) Strengthening of [+continuant] segments to [-continuant].

This creates stops (predominantly geminates or implosives) out of spirants, semivowels, and liquids, and is always associated with the presence of a preceding high front vowel, which is itself lost in the process.[9]

vi) Rhotacisation of [nd], that is, [nd^{r}] from [nd].

This occurs only in some dialects of three languages and in all three cases it occurs after other processes have created another sequence of nasal and voiced apical stop: in two cases *[nt] > [nd] (see 2.5.i) and in the other case [nz] > [nd] (see 3.8.ii). It thus appears to be a strategy to prevent the reflexes of older */nd/ falling together with the new sequence. For pull- and push-chains, see King 1969.

vii) Monophthongisation of /wa, we/.

This creates [o] or [o:] out of sequences of /we/ or /wa/.

viii) Other minor vowel phenomena.

These most frequently take the form of lowering word-initial high vowels (u, o) to mid vowels (o, e), or of raising final mid vowels to high (or vice versa).

ix) Labiovelarisation.

This is a process whereby sequences of /kwV/ and /gwV/ become [k͡pV] and [g͡bV]. Sequences of /mwV/ are less clearly affected, giving [m͡ʊV].[10]

x) Loss of nasal in prenasalised sequences of nonsyllabic nasal and voiced stop.

In the two (discrete) languages where this occurs clearly, it appears to be in response to a substratum influence.

xi) Phenomena affecting sequence of syllabic nasal and consonant.

After the creation of syllabic nasals through */muC../ to /MC../ (see just above), a number of languages then undergo a variety of forms of assimilation of nasal to stop or vice versa.

xii) Phenomena affecting sequences of nonsyllabic nasal and voiceless stop.

Apart from the general assimilation of nasals to following oral segments mentioned in 1.3., above, there are two very minor processes both of which occur in just a couple of languages. One results in /ŋ/ from */mp/, the other results in /h/ or zero from */ŋk/. Dialect evidence for the latter suggests: /ŋk/ to [ŋ̊k] to [ŋ̊kʰ] to [kʰ] to [h] to zero.

4. Processess Not Addressed

In section 1.3., a number of problems associated with */s, z/ were mentioned. Firstly, their phonetic nature in PB is disputed, and, secondly, they show a range of reflexes which cannot be solved adequately without first resolving the question of the phonetic quality of */s, z/ and without very lengthy discussion. They have therefore not been dealt with in this paper except in so far as they are affected by processes affecting other consonants (e.g., 2.1., 2.5., 2.6., 2.14.).

5. Conclusions

It should be recalled that my intention, as set out in the Introduction, was not to discuss the phonological implications (however interesting they might be) for specific languages of the processes outlined above, but rather to set out their relative frequency and outline their nature. Nevertheless, the occurrence and interaction of the processes have dramatic results for the languages involved. Thus, for instance, languages which underwent Bantu spirantisation saw a considerable increase in their consonant inventories (Pokomo, a spirantising language, has today a consonant inventory of well over 30 units, whereas Gikuyu, a non-spirantising language, has only a dozen or so). And there is an apparently direct connection between several of these processes. Languages which underwent Bantu spirantisation and increased their consonant inventories have also mostly been subject to neutralisation of vowel quality and quantity, thus largely reducing their vowel inventories and contrasts; on the other hand, virtually all the languages which did not undergo these processes - thus retaining a relatively small consonant inventory - also kept a full set of seven vowel contrasts, both long and short. The processes which have had the most far reaching effects are: Bantu spirantisation, changes in vowel quantity and quality, phenomena affecting nasal plus obstruent, Dahl's Law, spirant devoicing, and various kinds of lenition, especially in languages where lenition has affected classes of consonants.

My explicit aim was to determine the relative frequency of the processes discussed. Having done this, it would then be possible to come to two conclusions. One would be to point out parallels between these processes and better known phenomena in, say, Indo-European. So Dahl's Law (DL), a voicing dissimilation process, is not dissimilar to Grassmann's Law (GL), an aspiration dissimilation process (see Collinge 1985:47-58, 279-281). Bantu spirantisation produces results comparable to the results of the First Sound Shift for Germanic languages (assuming the traditional formulation of PIE consonants); and the various kinds of lenition and strengthening (3.8) are paralleled by similar processes in the early history of Celtic. A second conclusion would be that our thinking about diachronic processes tends to be straight-jacketed by long exposure to IE facts. Even the most recent texts on historical linguistics (e.g., Hock 1986), while purporting to be talking about general diachronic processes, are really talking about IE mainly. This can be dramatically expressed by comparing GL, well known, with DL, little known. GL initially affected just two languages; it is not clear how many languages were initially affected by DL, as the East African evidence shows it present in all or some members of 7 of 10 subgroups of languages. Traces of GL are found only in those languages deriving from Sanskrit and Greek, whereas over 50 languages

in East Africa alone have traces of DL. In Greek at least the modern reflexes of GL occur in very few productive morphophonemic alternations. In those Bantu languages where DL is active it affects many dozens, if not hundreds, of lexical items, and often plays a role in regular morphophonemic alternations. To claim that Grassmann's Law is interesting because it forms part of a parcel of interlocking processes is no justification since the same holds true of Dahl's Law. This judgement is a little hard on the writers of these texts, as they, like the rest of us, tend to know a few areas well personally, and to rely for the rest on the work of others. And published texts dealing with phonology tend to be concerned with theoretical issues, presenting only a limited range of data to illustrate these issues. It is almost impossible to find a text which pretends to be comprehensive in its coverage of processes in the world's languages: even books such as Greenberg (1978), which includes the term 'Universals' in its title, are quite restricted in what they present. I would hope that this article would go some distance to a greater awareness of less familiar processes.

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FOOTNOTES

[1]In Guthrie 1971, which provides the conventional numbering system, they are: D60; all the languages of Zones E, F, G; M10; M20; M30; N10; P10; P20; P30.

[2]As far as the present survey is concerned, the major areas of uncertainty were:

i. Number of vowels - with one or two exceptions, all the languages covered had seven or five qualitative vowels. In most cases, we had no trouble deciding on five vs. seven vowels via a number of test items. In a few cases we were uncertain and/or other descriptions available showed a different number of vowels.

ii. Vowel length - all the languages either kept the inherited contrast in length or neutralised it to V. In most cases, via a set of test items, this was clear. In a few cases it was not clear. A very small number of languages which lost the inherited length contrast created a new length distinction.

iii. Suprasegmentals - we made a gross distinction between languages with 'tones' and those with '(usually penultimate) stress.' This

distinction needs refining, to include those languages with both tone and stress, pitch-accent, and a variety of tonal systems.

iv. General phonetic accuracy - we strove to register phonemic distinctions, with the possible result that some phonetic detail was overlooked. For present purposes, we may have overlooked certain apical (alveolar vs. dental) distinctions, and certain palatal (true palatal vs. palato-alveolar) distinctions.

v. /l/ and /r/ - most of the languages surveyed have /l/ or /r/; a few have both /l/ and /r/, and a very few have more than one phonemic /r/. We did not record phonetic detail for most cases of /l/ and /r/.

vi. Voiced bilabial or labio-dental fricative/continuant - there is considerable inter- and intra-language variation with these segments. We were mainly interested in phonemic distinctions and may have overlooked some phonetic detail here.

[3]Details of the overall system within which these two tones operated have not been conclusively worked out.

[4]The 10 subgroupings are: Central Kenya; Chaga-Taita; West Tanzania; North East Coast (= Pare, Sabaki, Seuta, Ruvu); Southern Highlands (= Njombe); Corridor; Nyakyusa; Kilombero; N10-P10-P20; Lacustrine (D60-E10-E20-E30-E40). (See Nurse 1982:205-207).

[5]There is little data on which to base statements about how Bantu spirantisation affected */s, z/, but they seem to behave as do */t, k, l, G/.

[6]Upper Pokomo rh represents a voiced, alveolar, rolled spirant.

[7]Apparently, Lower Pokomo [y] deletes before /i/.

[8]G. Phillipson is currently working on a typology of East African tonal systems.

[9]H. Paddock has suggested to me that this may represent assimilation of degree of constriction between consonant and adjacent vowels: that is, less constricted consonants (those which are [+continuant]) become more constricted (i.e., [-continuant]) following the most constricted vowels (i.e., [i] and occasionally [u]). The languages affected are Comorian, southern Swahili, and Ganda.

[10]H. Paddock has suggested that this can be regarded as assimilation of manner: plosive plus glide to plosive plus plosive.

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